

Quality. Uncompromised.

ROTEL®

**PUBLIC ADDRESS
AMPLIFIER WITH
AM/FM TUNER**

QA-40A

**INSTRUCTION
MANUAL**

WARNING
TO PREVENT FIRE OR SHOCK HAZARD,
DO NOT EXPOSE THIS APPLIANCE TO
RAIN OR MOISTURE

Write your SERIAL NUMBER here.
The number is located near the name
plate on the rear panel.

PRECAUTIONS

To ensure maximum safety, please carefully follow the instructions below:

1. Check the power source

Plug the unit only into a power source whose voltage and frequency ratings match those given in the instruction manual.

2. Power cord

The unit is provided with a 3-core type a.c. line cord with a grounding wire. Insert the plug only into a 3 conductor outlet (containing grounding wire) of 120V/60Hz. Or if a 3-conductor outlet is not available, use an adaptor, connecting the grounding wire to a grounding screw on a wall, etc. Insert or unplug the a.c. line cord only after making certain the unit's power switch is turned off, to prevent shock noise from damaging the speakers.

3. Ventilation

To offset heat generated by the unit, it is necessary to provide ample ventilation around the unit. Avoid blocking or impeding the ventilation holes on the unit. To prevent unnecessary problems, install the unit on a place free from any vibrations, direct sunlight, humidity or dust circulation.

4. Do not open the cabinet

The unit has been completely factory adjusted. To avoid electric shock or harm to the human body or to the unit, never open the cabinet.

5. If the unit gets wet or foreign matter enters

In case the unit gets wet or any water or foreign matter gets into the cabinet, immediately disconnect the a.c. line cord, and consult your dealer or qualified electrician.

6. Instruction manual

Keep the instruction manual near the unit, and record the serial number (found on the rear panel) on the cover.

SWITCHES, CONTROLS AND OPERATION

(1) Power Button

Depress this button to turn on power. Pressing it a second time will turn off power.

(2) Power Indicator

Glowes when the power is turned on, indicating that the unit is in operation.

(3) BASS/TREBLE Tone Controls

These are rotary controls that regulate the balance of tone of input signals coming from MICs 1, 2, AUX, or PHONO/TUNER. BASS regulates the low frequency range and TREBLE the high frequency range. Rotate the respective knobs to the right to increase the response, and to the left to decrease it.

BASS is effective in reducing low-frequency noise produced by record warpage, and TREBLE reduces the scratch noise on a record or the hiss on a tape. Also use these controls to compensate for acoustic conditions.

(4) Microphone Jack (MIC 1)

An input terminal used to connect a high impedance microphone with standard type plug to the unit. On the rear panel of the unit are screw-type MIC 1 terminals. Since the MIC jack on the front panel takes priority over the rear MIC terminals, the MIC jack on the front panel should not be connected with a microphone plug when the MIC 1 terminals on the rear panel are in use.

(5) MIC 1, 2 Level Controls

These controls regulate the input levels from microphones connected to the respective MIC terminals. Rotate each knob clockwise to raise the input level, and counterclockwise to reduce it. Turning the knob fully counterclockwise (to position "0") cuts all input from microphone.

(6) AUX Level Control

This knob regulates the level of input from any equipment connected to the AUX jack on the rear panel, such as chimes, tape deck, rhythm box, synthesizer, etc. Rotate the knob clockwise to raise the level and counterclockwise to reduce it. Turning the knob fully counterclockwise (to position "0") cuts all input from above equipment.

(7) PHONO/TUNER Level Control

This knob regulates the level of input from the tuner section of the unit, or connected record player. Rotate the knob clockwise to raise the level of input from the built-in tuner, and counterclockwise to raise the level of input from the record player. At mid-position ("0"), input from either source is cut.

This control operates on either tuner or record player, not both at once; signals cannot be mixed.

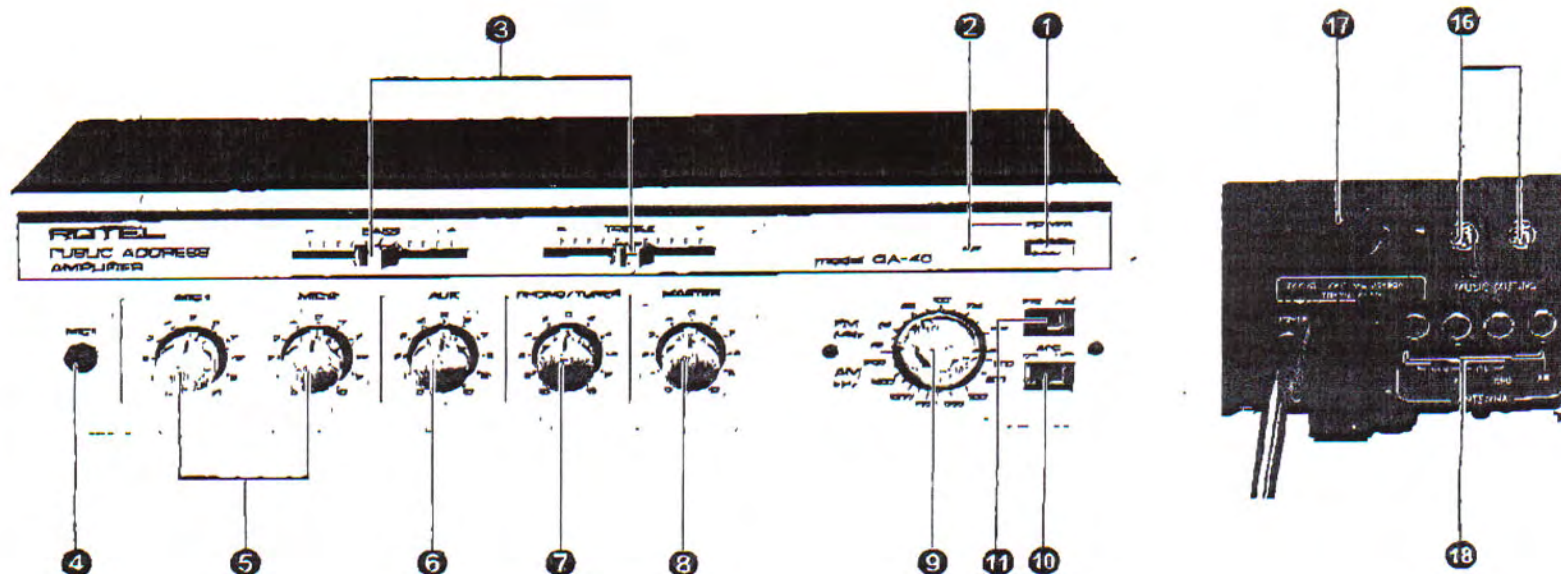
(8) MASTER Volume Control

This knob controls at one time the combined signals coming from MICs 1, 2, AUX, and PHONO/TUNER. Rotate the knob clockwise to raise the overall level of those signals together, and rotate it counterclockwise to reduce it. Turning the knob fully counterclockwise (to "0" position) cuts all inputs.

Note that this control should be used at position "5" or higher. If the master volume control is set lower than "5", the separate controls for MIC, AUX or PHONO/TUNER set higher may cause "clipping" of input signals and increased distortion in sound.

(9) Tuning Dial

This knob tunes in the desired AM or FM broadcast station. Use the lower half of the knob for AM band, and the upper half for FM band reception. Rotate the knob to bring the pointer on the knob to the desired position on the frequency scale around the knob.



(10) AFC Switch (FM)

This switch is used to prevent tuning drift originating in frequency deviation of local oscillator. As a general rule, set the switch to OFF when you tune in to a station, and to ON after tuning is complete.

(11) AM/FM Selector

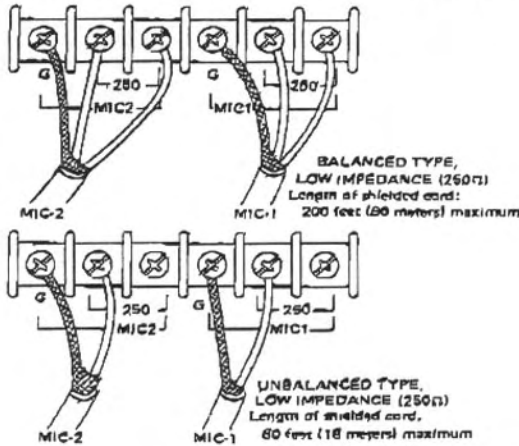
This switch selects AM or FM reception.

Note: Place the cover provided over the part containing tuning knob, AFC switch, and AM/FM selector when they are not in frequent use.

(12) Microphone Input Terminals

These are screw-type microphone input terminals. The 3 right-hand terminals are for MIC 1 connections, and the 3 left-hand terminals are for MIC 2 connections. Both MIC 1 and MIC 2 connections can be made simultaneously. These terminals have been already adjusted to accept low impedance (250 Ohms) balanced or unbalanced microphone. The stranded wire from the microphone should be hooked up to G terminal.

• MICROPHONE INPUT TERMINAL CONNECTION

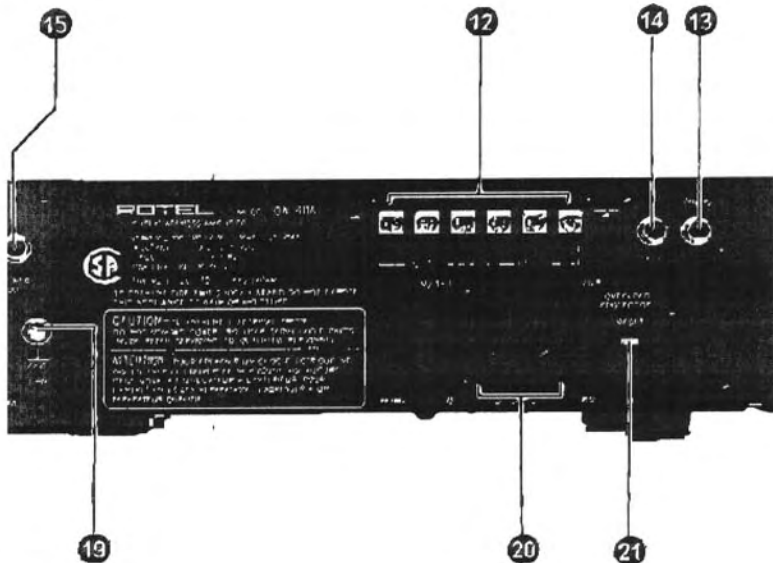
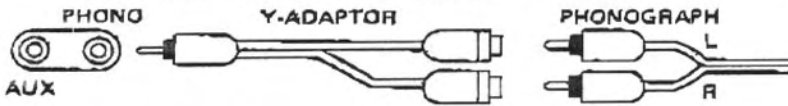


(13) PHONO Input Jack

This is a phonograph input terminal for RCA pin plug. When using stereo phonograph, use Y-adaptor for RCA plug connection.

Note: The PHONO input jack is for record player with MM type cartridge. Plug player with ceramic or crystal cartridge into the AUX jack.

• PHONO INPUT JACK CONNECTION WHEN USING STEREO PHONOGRAPH



(14) AUX Input Jack

This is an auxiliary input jack for RCA pin plug.

(15) TUNER Output Jack

This is a tuner output jack for RCA pin plug. It transmits signal from the built-in tuner independently, without mixing. To mute tuner, short-circuit the jack with shoring plug.

(16) Music Muting Terminals

Short-circuiting GND and S terminals will immediately cut input signals at AUX and PHONO/TUNER (and signal from built-in tuner). Remove the short-circuit to regain state already established by front panel controls. This function is effective in interrupting music signals to insert announcement, etc. by means of microphones.

(17) Ferrite-bar Antenna

This is a built-in antenna for use in AM broadcast reception. Erect the bar towards you, and position it where the reception is optimal.

(18) Antenna Input Terminals

Use the terminals labeled 300Ω when parallel feeder is used, and the terminals labeled 75Ω for coaxial cable. The AM terminal is used to connect external antenna when sufficient electric field strength cannot be obtained with the built-in ferrite bar antenna.

(19) GND Terminal

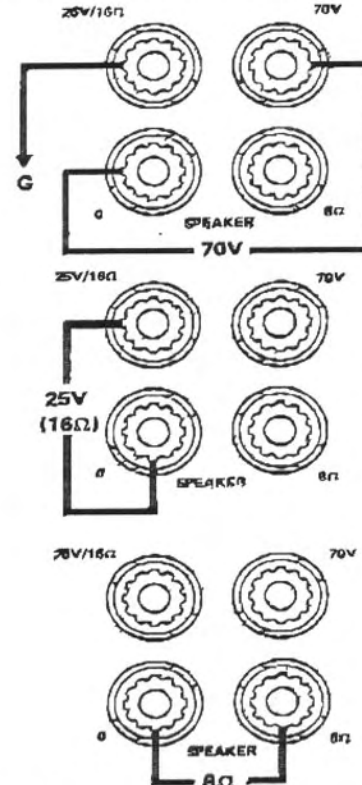
This terminal is the connection for grounding wire of record player, etc., to reduce inter-equipment hum noise or induction noise, or to prevent static electricity.

(20) Speaker Terminals

Unit is provided with convenient speaker terminals for low impedance, high impedance, or constant voltage use. For low impedance use, 8, 16 and 25 ohm/25V terminals are available. For high impedance or constant voltage use, 70 volt terminal is available.

Terminals are quick screw-knob type. Loosen the knob, and the hole will open. Insert the bared end of speaker cable into the hole, and then tighten the knob so that the cable is securely fixed. (Refer to "CONSIDERATIONS FOR PA SPEAKER LAYOUT" for details on use of these speaker terminals.)

• 4-PIN CONNECTOR SPEAKER CONNECTION



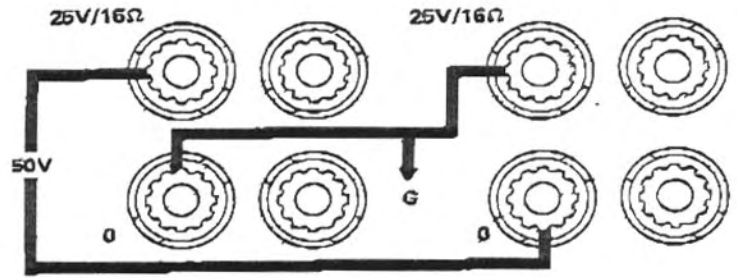
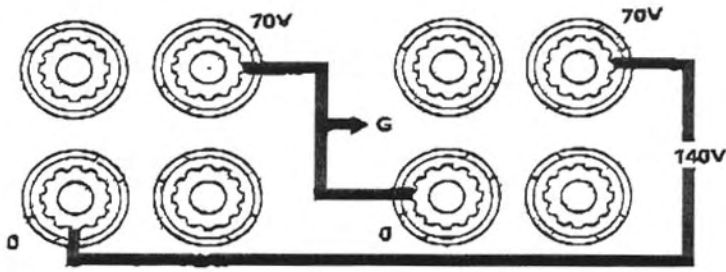
(21) Overload Protection Reset Button

This button resets the built-in protection device, which would cut the output when main amplifier section is overloaded because of mismatching of speaker impedance, etc. If the protection device is activated to prevent the unit from being damaged, remove the cause of overload, and press the Overload Protection Reset button to start normal operation.

● CONNECTING AMPLIFIERS IN SERIES

If two PA music amplifier units are connected in series, the same speaker system can be driven with double power output.

Note: Do not use the G terminal (0V terminal) of the 4-pin connector on the Amplifier 2. Make connections for external equipment so that input signal is fed to the amplifier in parallel. Volume and tone controls on both amplifier units should be set at same level.



CONSIDERATIONS FOR PA SPEAKER LAYOUT

SPEAKER CONNECTIONS

In connecting speakers to a public address amplifier it is important to present the amplifier with the load impedance it is designed to handle. Failure to do this can cause overheating and component failure. In many cases problems can take months to appear in the form of reduced reliability and unnecessary service calls. A load impedance that is too low is especially bad. You should strive to have a load impedance of not less than 70% of the chosen amplifier output impedance. For example, do not connect a 4 Ohm speaker to the 8 Ohm output. Driving a load of higher impedance than rated amplifier output is not as serious, but results in a power loss proportional to the mismatch and should be avoided. For example, driving a 16 Ohm load through the 8 Ohm output will result in a 50% loss in power. The high impedance mismatch should be kept to less than 200%, especially if it is anticipated that more than 50% of the rated amplifier power will be required.

There are two methods of connecting groups of speakers to the amplifier. Firstly, using the low impedance (i.e. 4, 8, 16 Ohm) outputs. This is preferable where: -

- Runs are short (less than 200 ft. [70 m]).
- Few horns or speakers are to be used (i.e. typically 4-8)
- Some sound levels are required at each speaker.
- Low impedance also provides slightly better fidelity and frequency response.

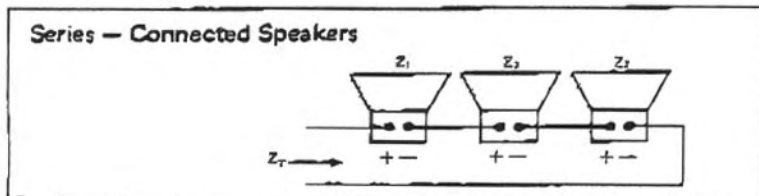
High impedance or constant voltage is the second method and is preferable where: -

- The runs are long and line losses are to be avoided.
- Many speakers are to be used.
- Different sound levels are required at different locations, for example indoor speakers and outdoor horns.
- Future expansion possibilities require flexibility in wiring layout.

The following is a more detailed discussion of these two methods.

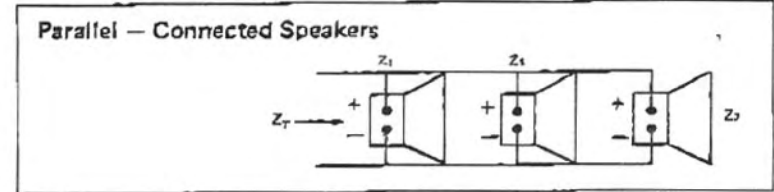
LOW IMPEDANCE CONNECTION

The speakers must be connected so as to present a combined impedance equal to the selected amplifier output impedance, i.e. 4, 8, 16 Ohms. The connections should be arranged in a series/parallel combination to achieve this according to the following formulae. The impedance should be between 70% and 200% of the output impedance selected. If the amplifier is to be driven anywhere near its full rated output the impedance should be well within these tolerances.



$$Z_T = Z_1 + Z_2 + Z_3 + \dots + Z_N$$

where Z_T = total combined load impedance
and Z_N = individual speaker impedance

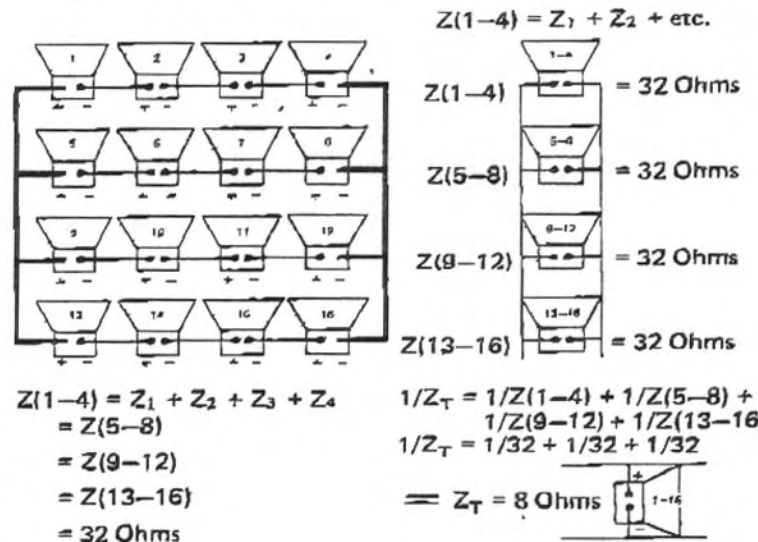


$$Z_T = \frac{1}{1/Z_1 + 1/Z_2 + 1/Z_3 + \dots + 1/Z_N}$$

SERIES/PARALLEL COMBINATIONS

In larger systems it will be necessary to combine series and parallel connections to obtain the necessary impedance. The rules for calculating the total effective impedance is to divide the entire circuit into individual small series of parallel sub-circuits and apply the foregoing rules to them.

The following is an example using 16 x 8 Ohm speakers. Each schematic is an impedance equivalent to its predecessor but has been simplified.



As can be seen, a problem arises if one more speaker must be added at some future date, as all the connections must be changed. This is not much of a problem if only a few speakers are involved, but if the network is extensive, the problem is significant. In addition, failure of one speaker can take out a number of associated units.

HIGH IMPEDANCE OR CONSTANT VOLTAGE (25V & 70V) SYSTEMS

The high impedance or constant voltage method of impedance matching uses a high impedance amplifier output which is transformed down to 8 Ohms by an impedance matching transformer at each individual speaker. The big advantages of this approach as compared to low impedance are: -

