PUBLIC ADDRESS AMPLIFIER WITH AM/FM TUNER

QA-100

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 these precautions before:

1. Check the power source
   Plug the unit only into a power source whose voltage and frequencies match those given in the instruction manual.
2. Power on
   The unit is provided with a 2-prong type ac, line cord and a grounding wire. Insert the plug only into a 2-conductor wall outlet featuring a grounding wire of 120V/200V. Or if a 3-conductor wall outlet is used, insert the plug so that the grounding wire is not pinched or kinked. This will help prevent short circuits or damage to the unit.
3. Ventilation
   To ensure that the unit is adequately ventilated, it is necessary to provide adequate ventilation. Do not place the unit near an a/c unit, heater, or other appliances that may increase the internal temperature. Also, do not place the unit near any fans, as they can cause overheating.
4. If the unit gets wet or foreign material gets inside
   In case the unit gets wet or any foreign material gets inside, immediately disconnect the power cord and contact your nearest service center or authorized technician.

SWITCHES, CONTROLS AND OPERATION

(1) Power Button
   Depress this button to turn on the power. Pressing it a second time will turn off power.
(2) Power Indicator
   Lights when the power button is turned on, indicating that the unit is in operation.
(3) Microphone Jack (MIC 1)
   An input terminal used to connect a high impedance microphone with a standard type plug to the unit. On the back of the unit are a pair of MIC 1 terminals. The MIC jack on the front panel of the unit is a phone jack, which is compatible with non-audio devices.
(4) MIC 1, 2 Level Controls
   These control the input levels from microphones connected to the microphone input terminals. These are used for adjusting the volume level to match the level of the audio source.

USING JACK MOUNTING BRACKETS

The unit is mounted into a 19-inch rack. When rack-mounting the unit, remove the screws near the front panel at both sides of the cabinet and install the rack-mounting brackets with the screws. The unit can also be placed in the rack for easy mounting. For that purpose, remove screws on the bottom plate of the unit, and install suitable brackets with the screws.

CONNECTING SPEAKERS IN SERIES

If two PA music amplifiers are connected in series, the same speaker system can be driven with double power output. When using 2 units in series, then connect the speaker terminals of the separate units in series, with the polarity of the speaker terminals matching the amplifier terminals.

(1) Ferrite Bead antenna
   This is a built-in antenna for use in AM broadcast reception. Connect the antenna to the AM jack on the back panel, and tune it for the station you wish to receive.
(2) Antenna Input Terminals
   Use the terminals labeled 2000 to plug in a parallel feed antenna, and the terminals labeled 76/300 to feed an aerial cable. The AM terminal is used to connect external antennas when AM reception is poor.
(3) PHONO 45/78 Input Jack
   This is a built-in phono input jack for 45/78 rpm records. It is convenient to use near the turntable. To use this jack, plug in a 45/78 rpm record player. The jack can also be used for 78 rpm records. Insert the needle of the record player into the hole on the phono input jack. Turn the record player on, and the input function will switch to the phono input jack.
(4) PRE OUT Terminal
   Output from the preamplifier section appears at this terminal. This terminal can be used as an input to another power amplifier or as an input to another unit.
(5) MAIN IN Terminal
   For feeding signals into the main amplifier section, use the terminals labeled MAIN IN. These terminals are used for connecting stereo components or external devices.
(6) Receiver Outputs
   The receiver outputs are used to connect external devices such as speakers. These outputs are used to control the level of the sound being played. When using external speakers, connect them to the speaker outputs of the receiver.
(7) Microphone Input Terminals
   These are for connecting microphone input terminals. The 3 right-hand terminals are for MIC 1 connections, and the left-hand terminals are for MIC 2 connections. Both MIC 1 and MIC 2 connections can be made simultaneously. The MIC jacks are provided with a screw for connecting microphone input terminals. These terminals are used for connecting microphone input terminals.

(23) Overload Protection Reset Button
   This button resets the built-in protection device, which will cut off the power when the amplifier is overloaded. If the power is cut off, it is advisable to turn off the unit and check for any signs of damage, such as loose connections or damaged components. If the protection device is activated, it is advisable to turn off the power and check for any signs of damage, such as loose connections or damaged components. If the unit is damaged, it is advisable to contact an authorized service center or technician for repair.

(24) Speaker Terminals
   The unit is provided with 2 sets of speaker terminals, one for low impedance use, and the other for high impedance or constant voltage use. For low impedance use, 4, 6, and 8 ohm terminals are available. For high impedance or constant voltage use, 1, 2, 5, 7.5, and 10 volt terminals are available. If the speaker terminals are overloaded, an overload protection device will activate, and the power will be cut off. If the overload protection device is activated, it is advisable to turn off the power and check for any signs of damage, such as loose connections or damaged components. If the unit is damaged, it is advisable to contact an authorized service center or technician for repair.
CONSIDERATIONS FOR PA SPEAKER SYSTEM

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 this 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 no 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 higher than rated amplifier output is not as dangerous, but results in a power loss proportionate 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 must 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 when (a) Runs are short (i.e. less than 200 ft. (70 m)).
(b) Few hours or speakers are to be used (i.e. typically 4-8) (c) Same sound levels are required at each speaker.
(d) Low impedance also provides slightly better fidelity and frequency response.

High impedance or constant voltage is the second method and is preferable where:
(a) The runs are long and line losses are to be avoided.
(b) Many speakers are to be used.
(c) Different sound levels are required at different locations, for example, indoor speakers and outdoor horns.
(d) Future expansion possibilities without added 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 Ohm. The connections should be arranged in a series/parallel combination to achieve the according to the following formulas. 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.

\[
Z_{total} = Z_1 + Z_2 + Z_3 + \ldots + Z_n
\]

where \(Z_{total}\) = total combined load impedance and \(Z_{individual}\) = individual speaker impedance

\[
Z_{parallel} = \left(\frac{1}{Z_1} + \frac{1}{Z_2} + \frac{1}{Z_3} + \ldots + \frac{1}{Z_n}\right)^{-1}
\]

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

The high impedance or constant voltage method of impedance matching uses a high impedance amplifier output stage connected down to 70V by an impedance matching transformer at each individual speaker. The basic advantage of this approach is compared to low impedance:

1. Reduced line losses and ability to use smaller wire gauges. This is due to the higher voltage and reduced current in the speaker lines.
2. Much simpler impedance matching procedures and designs. Constant voltage is a minimum in that the amplifier does not always produce 70V. Rather, the amplifier output impedance is set at such a level that, irrespective of its load value, it will produce 70 volts output full power. Thus a 10 Watt amplifier output load would have an impedance of 5000 Ohms (V^2/P = 70/10 = 700), a 40 Watt amp would be 125 Ohms and 100 Watt amp, 50 Ohms.

Transformer taps allow the impedance at each speaker to be adjusted individually to give a total matched load. Because of the high impedance arrangement, the system is easy to impedance match and is also inherently less susceptible to problems caused by mismatching.

Transformer taps are marked in Watts instead of Ohms (usually 4, 2, 1, 0, 0). A 0 should be added in place of those tap positions output are only achieved when the transformer is working at 70V. The taps are connected in parallel. A good match is obtained by arranging that the total of all tap settings fits into the range of 40-80% of rated amplifier output. 80% is chosen to allow for transformer temperature rise, it is also good practice to drive the amplifier to 100% of its capacity.

Examples are shown below. For simplicity it is assumed that all tap settings are the same at each speaker.

For a 40 Watt amplifier the range 80-80% is equivalent to 16-32 Watts. Therefore:

6 speakers x 4 Watt taps each = 24W
4 speakers x 1 Watt taps each = 4W
20 speakers x 1 Watt taps each = 20W
20 speakers x 4 Watt taps each = 80W
Very poor match

30 speakers x 1 Watt taps each = 30W
Good match

NOTE:
None of the above tap settings guarantee the actual sound levels through each speaker. This is as much a function of the master volume control as the tap setting. The setting simply defines the maximum power consumed by an 8 Ohm speaker if presented with 70.7 volt input. In the case of a small number of speakers, it is always preferable to use a higher tap setting and reduce the sound level by turning down the master volume control. In calculating the amplifier rating needed for a typical music system using speakers distributed in an off-corridor environment a good rule of thumb is to allow about 1/2W per speaker and space speakers at 1/2 x ceiling height. For city areas, or where the volume load required is higher, more power is required.

PHASING

When using multiple speakers in a sound system installation, it is advisable to phase the speakers in order to reduce the cancellation effect caused by incorrect speaker phasing. Speaker output from each channel has two possible one-half of their normal volume and will operate with poor tonal characteristics.

For speakers facing in the same general direction, the speakers are in phase when all speakers come more in the same direction when an equal signal is applied. With two speakers facing each other, each phasing is achieved when the cone of one speaker moves inwards while the cone of the other speaker moves outward.

POWER LOSS IN LONG LINES

For long lines, the power loss in the lines (1\/2 delta) becomes a significant factor. The power supplied by the amplifier is effectively reduced by the line loss. For a 0.5 dB loss in sound pressure the total wire resistance must be limited to 6% of speaker impedance. The following table shows the calculated two wire cable lengths permissible for number of wire sizes in feet. For a 1 db loss, the lengths may be doubled. For 2 db loss, multiply by 4.

<table>
<thead>
<tr>
<th>Resistance (Ohms/1000 feet)</th>
<th>Low Impedance</th>
<th>High Impedance Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>2.00</td>
<td>14.00</td>
</tr>
<tr>
<td>16</td>
<td>4.00</td>
<td>28.00</td>
</tr>
<tr>
<td>18</td>
<td>6.39</td>
<td>52.00</td>
</tr>
<tr>
<td>20</td>
<td>10.11</td>
<td>78.00</td>
</tr>
<tr>
<td>22</td>
<td>16.93</td>
<td>109.00</td>
</tr>
</tbody>
</table>

TECHNICAL SPECIFICATIONS

AMPLIFIER SECTION

<table>
<thead>
<tr>
<th>Power Output</th>
<th>100 watts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Response</td>
<td>50 Hz – 10 KHz, +15 dB, -3 dB</td>
</tr>
<tr>
<td>Hum and Noise</td>
<td>0.05 V</td>
</tr>
<tr>
<td>MIC 1 Input (front)</td>
<td>55 kV</td>
</tr>
<tr>
<td>MIC 1 Input (rear)</td>
<td>260 kV</td>
</tr>
<tr>
<td>MIC 2 Input</td>
<td>50 dB below rated output</td>
</tr>
<tr>
<td>MIC 3 Input</td>
<td>50 dB below rated output</td>
</tr>
<tr>
<td>AUX Input</td>
<td>80 dB below rated output</td>
</tr>
<tr>
<td>PHONIO Input</td>
<td>85 dB below rated output</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>0.9 mV/0.25mW</td>
</tr>
<tr>
<td>AUX Input Vom</td>
<td>2.5 mV/0.25mW</td>
</tr>
<tr>
<td>PHONIO Input Vom</td>
<td>3 mV</td>
</tr>
<tr>
<td>Outputs</td>
<td>4, 8, 16 ohms</td>
</tr>
<tr>
<td>IMC Input</td>
<td>15 mV (21.5 mV), 25V (35.25 mV), 70V (84 mV)</td>
</tr>
<tr>
<td>MIC 2 (low impedance)</td>
<td>2.5V</td>
</tr>
<tr>
<td>MIC 3 (high impedance)</td>
<td>1A</td>
</tr>
<tr>
<td>AUX (high impedance, high level)</td>
<td>1A</td>
</tr>
<tr>
<td>PHONO (for microphones)</td>
<td>1A</td>
</tr>
<tr>
<td>PHONO (for microphones)</td>
<td>1A</td>
</tr>
<tr>
<td>MASCHINE</td>
<td>1 TUNER/VOLUME, 1 VOLUME, 1 VOLUME, 1 VOLUME</td>
</tr>
<tr>
<td>MASCHINE</td>
<td>1 VOLUME, 1 VOLUME, 1 VOLUME, 1 VOLUME</td>
</tr>
<tr>
<td>Weight</td>
<td>9.5 kg/20.9 lbs.</td>
</tr>
</tbody>
</table>

TUNER SECTION (at TUNER OUTPUT)

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>AM: 0.5–160 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>110 µV for 20 dB output</td>
</tr>
<tr>
<td>Distortion</td>
<td>1.5%, MOD 50%</td>
</tr>
<tr>
<td>Hum and Noise</td>
<td>90 dB</td>
</tr>
<tr>
<td>Output</td>
<td>200 mW, MOD 50%</td>
</tr>
</tbody>
</table>

MISCELLANEOUS

<table>
<thead>
<tr>
<th>Power Requirement</th>
<th>120V AC/60 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Consumption</td>
<td>87,000 Btu/HR</td>
</tr>
<tr>
<td>Dimensions</td>
<td>450 x 110 x 309 (3 mm)</td>
</tr>
<tr>
<td>Net weight</td>
<td>16.16 x 4.56 x 11.13/22</td>
</tr>
<tr>
<td>Weight</td>
<td>9.5 kg/20.9 lbs.</td>
</tr>
</tbody>
</table>

Specifications and features subject to possible modification without notice.
OWNER'S WARRANTY

This warranty covers ROTEL QA-100 Tuner/amplifiers.
This equipment is warranted to be free from defects for one year with respect to material and labour from date of purchase by original purchaser under conditions of normal use and service. The warranty covers component parts and shop labour at authorized service stations only. Outside labour charges are not included.
This warranty does not apply to breakage of any kind if equipment, or any of the component parts have been damaged through accident or alteration, abuse or misuse or to any damage caused by fire, flood or other Act of God.
This warranty is in lieu of all warranties expressed or implied and of all obligations or liabilities on its part in connection with the sale of this machine.

In the event of equipment failure, contact your dealer who will advise you, or forward the unit prepaid to one of the service depots listed below. Include a description of the problems and a return address. Sales receipt must accompany the unit to validate the purchase date and hence warranty.

TITRE DE GARANTIE DU CLIENT

Cette garantie couvre ROTEL QA-100.
Cet équipement est garanti être libre de tous défauts, pour une année en ce qui concerne le matériel et le travail, à partir de la date d'achat par l'acheteur original, et sous conditions normales d'utilisation et de service.
Cette garantie ne couvre pas le bris d'aucune façon, ni l'équipement ni aucune de ses parties endommagées par accident, modifications, abus ou mauvais emploi, ou tout autre dommage causé par le feu, l'inondation ou tout autre cause force majeure. Cette garantie remplace toute autre garantie expressément ou implicite, et toute obligation ou responsabilité liée à la vente de cet appareil.
Si des réparations ou des ajustements s'avèrent nécessaires, consulter votre distributeur qui vous renseignera, ou retourner l'appareil défectueux à un des dépôts de service autorisés désignés ci-dessous. Joindre une note indiquant la nature du problème et votre adresse de retour. Inclure la facture pour confirmer la date d'achat et la validité de la garantie.

CANADIAN AGENT: BURTEK MARKETING INC., 3879 East 2nd Ave,
Burnaby, B.C. V5C 3W7
Ontario Rep: VICOM ENTERPRISES, 3668 Chesswood Dr., Downsview,
Ont, M3J 2W6
Québec & Maritimes: S.GREENE AGENCIES INC., 8255 Mountain Sights,
Ste, 405, Montreal, Québec, H4P 2B5