Please read before using this equipment.

MPA-40

35-watt PA Amplifier
INTRODUCTIONS

Your new REALISTIC® MPA-40 gives you 35 watts of solid power for your public address system. And, the built-in three-band equalizer enables you to tailor the sound to fit your environment.

The amplifier's wide frequency response - 70 Hz to 20 kHz - makes it suitable for music as well as voice.

Priority terminals permit Microphone 1 to override all other inputs.

Use it for live bands, in meeting halls and auditoriums, at sports events, or in a disco, in school, for office paging systems - in any circumstance where special announcements or great sound are needed.

Read this manual carefully. It leads you through the various speaker connections to help you select the best arrangement for your system. Then a look at USING YOUR MPA 40 shows you how easy it is to use.

WARNING: To reduce the risk of fire or electric shock, do not expose this appliance to rain or moisture.

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated dangerous voltage within the product's enclosure.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

For your own protection, we urge you to record the serial number of the unit in the space provided. You will find the serial number on the rear of your unit.

Serial Number: ____________________________

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This is a connection for a school auditorium or small business requiring only a simple system with a single speaker. Consult the remainder of the manual for more information about the use of additional components and more than one speaker.
1. MIC 1 and MIC 2 SOURCE MIXING Controls
   Adjusts the level of each of the two microphone inputs. 0 is off and 10 is maximum.

2. PHONO/AUX SOURCE MIXING Control
   Adjusts the level of the PHONO or AUX input. Use the AUX/PHONO switch on the rear panel to select the desired source—PHONO or AUX.

   The Source Mixing controls, MIC 1, MIC 2 and PHONO/AUX, blend (mix) the right levels of sound from all three sources.

3. MASTER VOLUME Knob
   The MASTER VOLUME Knob controls the overall level of all sources. The normal setting is about 10. But, it will vary as the total load of your speaker system varies.

4. VOLUME MEMORY Ring
   The VOLUME MEMORY Ring is set as a reference for the correct level of the MASTER VOLUME Knob.

5. FREQUENCY EQUALIZER Controls
   Slide up or down to increase or decrease the level of sound (by up to ±12 dB) around the frequency range listed above the control. At the center position, the sound will not be affected.

6. POWER Button and Indicator
   Press the button in to turn on the unit. The indicator will light. Press again to turn it off.

7. Power FUSE
   The fuse protects your Amplifier from voltage surges and abnormal operating conditions. If the power indicator does not light, check the fuse. If it is blown, replace it only with the same size and type (2A for USA, 1.25A for UK and Australia). Be sure the power cord is disconnected when replacing the fuse. A spare fuse is taped to the unit.
8. PRIORITY Terminals
Connect any SPST (single pole, single throw) switch to these terminals, such as Radio Shack's 49-517.
Any time you press the switch down, the MIC 1 channel will override all the other channels.
It's great for paging or public announcements.
You may use up to 200 feet of normal, two conductor wire for this connection, available at Radio Shack.

9. AUX/PHONO Switch
Selects either AUX or PHONO input.

10. MIC Inputs (1 and 2)
Connect any standard high or low impedance microphones with 1/4" (6.3 mm) plugs.

11. PHONO Inputs (L and R)
Connect a turntable that has a magnetic cartridge. The output from the MPA-40 will be monaural.

12. GND Screw
Connect the ground wire (usually black or green) from your magnetic-cartridge turntable to this screw to avoid hum.

13. AUX Inputs (L and R)
Connect any high level source, such as a tape deck, FM tuner or turntable with a crystal/ceramic cartridge. The output from the MPA-40 will be monaural.
Note: You can connect both PHONO and AUX inputs at the same time, but you will only be able to operate one of them at a time.

14. Speaker Push Terminals
Connect a speaker system here. For further information refer to the pages for various speaker connections.

15. AC Cord
Supplies the MPA-40's power. Plug into any standard outlet.
SYSTEM CONNECTIONS FOR MULTIPLE COMPONENTS

Switch 49-517

Dynamic Microphone

To AC

Tuner

Turntable with Magnetic Cartridge

Dynamic Microphone

Note: For speaker connections, refer to page 7 through page 13.
EASY CONNECTION USING A SINGLE SPEAKER

Connecting only one speaker is very simple as shown below:

Connect the minus (−) side of the speaker to the COM terminal on the amplifier. Connect the plus (+) side of the speaker to the terminal that matches the impedance of the speaker. In our example the 8Ω speaker is connected to the 8Ω terminal.

CONNECTING TWO OR MORE SPEAKERS

There are two ways of connecting speakers. The first is to connect them without transformers. This usually involves using few speakers and short runs of wire (essentially no longer than 50 feet). The second way is with transformers. This method is often used with a system that requires many speakers and longer runs of wire.

When making connections without transformers, all the speakers must have the same impedance rating to ensure equal volume from each speaker. You will notice all the speakers used in the examples are 8Ω—this is the type of speaker sold by Radio Shack.

To connect a speaker system for maximum power transfer, you have to observe impedance matching. This means that the total impedance of all the speakers must match the output impedance on the amplifier.

Impedance is measured in ohm and is designated by the ohm (Ω) symbol.
Connecting Speakers in Series

When there is more than one speaker in a sound system, you **must** determine the total impedance of the speakers before you can make the correct connection.

In the example, two 8 Ω speakers are connected in series. To determine the total impedance of speakers connected in series, add the impedance of all the individual speakers.

\[ \Omega_{\text{of SPKR 1}} + \Omega_{\text{of SPKR 2}} = \text{Total } \Omega \]

\[ 8 \Omega + 8 \Omega = 16 \Omega \]

Connecting Speakers in Parallel

To arrive at the correct impedance for connecting speakers in parallel, as in the example, divide the number of speakers (two) into the impedance of a single speaker (8 Ω).

Note: Remember all speakers must have the same impedance when using this formula.

\[ \frac{\Omega_{\text{of 1 SPKR}}}{\text{No. of SPKRS}} = \text{Total } \Omega \]

\[ \frac{8 \Omega}{2 \text{ speakers}} = 4 \Omega \]
Impedance in Series

If you connect four 8-ohm speakers in series, the total impedance will be 32 ohms.

Impedance in Parallel

If you connect four 8-ohm speakers in parallel, the impedance will be 2 ohms.

Casual connecting of several terminal on the amplifier, which will match the connection to maintain a final (total) impedance combination of series and parallel. You might have to use a combination of series and parallel connections and hook-up more than two.

Required Impedance

You can arrive at the expected impedance by the amplifier. If you merely connect four in parallel, the impedance is less than 8 ohms.
First connect each pair of speakers in series. In our example below each pair has a total impedance of 16Ω.

Next, connect the two pairs of speakers in parallel. To arrive at the total impedance of the four speakers, divide the number of pairs (of speakers) into the impedance of a single pair. In our example, the impedance of one pair (16Ω) is divided by the number of pairs (2).

Never use a speaker impedance lower than the amplifier impedance you select. Never, for instance, use 4-ohm speaker impedance with 8-ohm amplifier impedance. Damage to your speakers and amplifier could result.

Never use a speaker with an impedance rating lower than 4 ohms. Also, do not use any combination of speakers for which the total impedance is less than 4 ohms nor greater than 16 ohms.

\[
\frac{\text{Ω of 1 Pair}}{\text{No. of Pairs}} = \text{Total Ω}
\]

\[
\frac{16\Omega}{2} = 8\Omega
\]
Using Transformers

Transformers are used for complex multiple speaker arrangements where long runs of connecting wire are necessary.

There are several advantages to using transformers. Speakers of different impedances can be used without causing differences in output between them. You can also change a speaker system without having to recalculate the impedance for the entire system.

Radio Shack’s Line Transformer, Cat. No. 32-1031, is to be used with the MPA-40 Amplifier. A separate transformer is needed for each speaker.

Primary Taps

The line transformers have multiple connectors, generally referred to as taps. There is one set of taps on each side of the transformer. One side is called the primary. The taps on the primary side are marked in watts—10, 5, 2.5, 1.25, and 0.62. One of these is connected to the 70 Volt line of your amplifier. The COM connector on the primary side is connected to the COM connector on your amplifier.

Secondary Taps

The opposite side of the transformer is called the secondary. The taps on this side are marked in ohms—4, 8, and 16Ω. These are to be matched to the impedance of your speaker terminals. The COM connector on the secondary side is connected to the minus terminal on each speaker.
Normally all the wattage connections on the primary side of the transformer should be equal. If you want a particular speaker to have a higher volume level, use a higher wattage tap on the primary connection of its transformer.

Adding the number of watts of all primary taps that are to be connected, gives you the total wattage. Be certain the total does NOT exceed the amplifier’s power rating (35W). The total wattage of the example in the illustration is 8.75W.

Connecting the Secondary Taps

1. Connect the plus (+) terminal of each speaker to the secondary tap of the transformer that matches the speaker’s impedance.

2. Connect the minus (−) terminal of each speaker to the COM terminal of the transformer.
Connecting the Primary Taps

1. Connect the desired wattage tap on the primary side of each transformer to the 70-volt amplifier output.

2. Connect the COM terminals on the primary side of the transformers to the COM terminal of the amplifier.

**Note:** Use connections as shown below to avoid multiple connections to the amplifier terminal.
SPEAKER PHASING

Speaker phasing is not pertinent unless you are using more than one speaker in the same room or area. But, when using multiple speakers in your sound system installation, you should phase the speakers to reduce the cancellation effects caused by improper phasing. Speakers out of phase will lose up to one-half of their normal volume and will have poor tonal characteristics.

For speakers facing in the same general direction, the speakers are in phase if all speaker cones move in the same direction when an equal signal is applied.

Proper phasing can be achieved by connecting + and − speaker terminals as shown in the connection examples.

If the speakers are unmarked, or are not the same model, the following procedure will allow fast and simple phasing. You can detect the polarity of the speaker terminals by observing the movement of the cone.

1. Connect one side of a 1.5V flashlight battery to one of the speaker terminals (Figure A).

2. Momentarily contact the other speaker terminal to the other side of the battery (Figure A).

3. Note direction of cone movement, inward or outward.
4. Refer to the figures below. If the speaker cone moves outward (Figure B), the terminal connected to the positive side of the battery is plus. If the cone moves inward (Figure C), the terminal connected to the negative side of the battery is plus. Mark the terminal that is positive with a plus sign.

(Figure B)  (Figure C)

5. Repeat the same procedure for each successive speaker—being sure to mark the correct terminal for the direction of cone movement in each case.

6. Referring to figures D and E, connect the terminal in accordance with your speaker wiring.

(Figure D)  (Figure E)
Each sound system installation is unique. The best installation for your purposes can only be found through trial and error. Microphone and speaker placement can be especially tricky. Often moving one of these items just a few feet can make a big difference. Remember that your sound system should be a natural extension of voices and music—the loudest sound possible isn’t always the clearest sound.

You get the best results from your system when you cover the area with a constant sound level—avoiding reverberation (echo effects) and preventing "dead" spots.

A couple of hints: Place the speakers so they are mounted slightly above the heads of listeners and pointed toward them. When using more than one speaker, overlap the projection areas of the speakers to prevent "dead" spots. Be prepared to experiment a little before you obtain optimum positioning.

When you install your MPA-40, don’t place it near a heat vent, radiator or other heat source. Provide adequate ventilation for your MPA-40. If ventilation is inadequate, a thermal overload could result.

If there are any accessories you want to augment your system, you’ll find a wide selection of microphones, speakers, cables, etc. at your local Radio Shack store.
1. To protect your speakers, always set the MASTER VOLUME Control and the MIXING controls to 0 before turning on the power.

2. Turn POWER on.

3. Before adjusting the SOURCE MIXING controls, set the MASTER VOLUME control to about 10. Line up the MEMORY VOLUME ring with the correct setting.

4. Next adjust the individual SOURCE MIXING controls, MIC 1, MIC 2, and PHONO/AUX, to get the proper volume and balance. A little experimentation and practice will soon give you the required “feel” for smooth mixing and fading.

5. Adjust the FREQUENCY EQUALIZER controls to tailor the sound to match your individual surroundings or to provide a special emphasis to a specific performance.
**150 Hz control** enhances output for the few instruments in this extremely low range (organ, contrabassoon, etc.). Slide it down to reduce rumble, acoustic feedback and other low frequency disturbances. An overaccentuated bass will result in a very muddy and boomy quality to the music, and too little bass will sound hollow and thin. Use it to achieve good overall balance.

**1 kHz control** enhances the midrange frequencies (voice and instruments). Adjustment of this control brings the vocalist "up front" or moves the singer "back" into the orchestra.

**6 kHz control** affects the brilliance of music such as that generated by cymbals. Slide it up to increase high frequency presence. If there is too much high frequency, making the sounds overbearingly harsh and strident, slide this control down. It can also act as a high frequency noise filter.

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After getting the desired customized sound, if you feel that the overall tuning level is too high or too low, adjust the MASTER VOLUME setting accordingly.

When you achieve the proper volume level, set the MEMORY VOLUME ring to mark the position for later reference. Be careful not to raise the level too high. It might cause the system to become overloaded.
MAINTENANCE

Your MPA-40 Public Address Amplifier is an example of superior design and craftsmanship, and should be treated with care. The suggestions below will help you enjoy this product for many years.

Keep it dry. If water should get on it, wipe it off. Water contains minerals that can corrode electronic circuits.

Do not store in hot areas. High temperatures can shorten the life of electronic devices, and warp or melt certain plastics.

Do not drop it. This might cause permanent damage. The circuit boards and case can be broken.

Do not use or store it in dusty, dirty areas. This will cause premature wear of moving parts.

Do not use harsh chemicals, cleaning solvent, or strong detergents to clean it. Wipe it with a soft cloth dampened in a mild soap and water solution.
If you should run into difficulties, check the wiring of the system. Are there any short circuits in the speaker wiring? Have you provided adequate ventilation? Did you calculate speaker impedance correctly?

Be sure there is no defective microphone or connecting cable.

Make sure you are using large enough speaker wire. You should always use #16 or larger wire. The longer the run of speaker wire, the heavier the gauge should be.

If you have feedback problems, reposition your microphones and speakers; or rearranging the microphone pickup pattern can also stop the feedback noise.

If the MPA-40 does not work at all, check the fuse on the rear panel. If it is blown, replace it only with the same size and type.

If none of the above solves the problem and you still have difficulties, please take it to your local Radio Shack. The personnel there will assist you and, if necessary, arrange service.
SPECIFICATIONS (TYPICAL)

Output Power:
35 watts RMS (8 ohms, 5% THD, 200Hz to 7kHz)

Input Impedance:
Mic 1, 2, PHONO and AUX ........................................... 50kohm

Input Sensitivity (for 35 Watts rated power):
Mic 1, 2 ................................................................. 1.5mV
PHONO ............................................................... 3.5mV
AUX ................................................................. 150mV

Frequency Response:
70Hz-20kHz, −3dB (AUX Input, 2 watt, 8 ohms)

Control Frequency Accuracy at 150Hz/1kHz/6kHz ......................... +/−10%

Control Range at Each Band: ....................................... +/−12dB

Signal-to-Noise Ratio:
Mic 1,2 and PHONO .................................................. 60dB
AUX ................................................................. 65dB

Residual Hum and Noise Level:
Less than 5mV at 8 ohms output (Master Volume at Min.)

Distortion:
1.5% (AUX input, 2 watt output into 8 ohms at 1kHz)

PHONO Equalization Response:
at 100Hz .............................................................. +12dB
at 10kHz ............................................................. −13.5dB

Input Overload Point (3.5% THD, 2W output, Volume at Max.):
Mic 1, 2 ................................................................. 300mV
PHONO ............................................................... 450mV

Outputs:
4-8-16 ohms, 70 Volt Line

Priority Terminals: .................................................. Normally Open

Power Requirements:
AC 120 volts, 60Hz, 150 watts
(AC 240 volts, 50Hz for the units purchased in U.K. or Australia)

Dimensions (H x W x D):
3 1/2" x 11 7/16" x 7 1/2" (88 x 290 x 190 mm)

Weight:
9lb 4oz (4.2kg)
Schematic subject to change without notice. For most accurate schematic (and parts) contact Radio Shack, National Parts Dept., Fort Worth, TX 76101.
RADIO SHACK LIMITED WARRANTY

This product is warranted against defects for 1 year from date of purchase from Radio Shack company-owned stores and authorized Radio Shack franchisees and dealers. Within this period, we will repair it without charge for parts and labor. Simply bring your Radio Shack sales slip as proof of purchase date to any Radio Shack store. Warranty does not cover transportation costs. Nor does it cover a product subjected to misuse or accidental damage.

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We Service What We Sell

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