

EVERYTHING YOU NEED TO KNOW ABOUT SPEAKERS

If you are installing an aftermarket (Sony, Kenwood, Pioneer, etc.) an updated or converted,

or Reproduction radio, you will need to install MODERN aftermarket speakers! No ifs ands

or buts or science experiments about it, if you try to hook any of our radios up to your OEM

original speakers, your radio will be damaged and your warranty will be void.

The human ear is not a perfect audio receiver, but it is the best we have to work with. Infants can bear sounds

approaching 20 kHz. As we age, our hearing, like other body parts, loses some of its ability to function. A 20-year-old

can be expected to hear sounds near 15 kHz, but it's all downhill from there. There are a few important considerations

when deciding on a speaker system that will greatly affect your ability to hear all of the sounds your new stereo can

produce. Fortunately, an automobile usually makes an excellent acoustic chamber in which to reproduce sounds

(convertibles excepted).

Here are the basics:

I. How speakers work. A speaker is comprised of a cone made of paper, mylar, or similar material that is suspended

from a rigid frame in a way that will allow it to move in and out of the frame. At the center of the cone, a coil of magnet

wire is attached to it and connected to the radio amplifier. This is the voice coil. A stationary permanent magnet is

mounted in very close proximity)' to the voice coil in such a way that a current flowing in the voice coil will cause the

speaker cone to be attracted to or repelled from the permanent magnet. The cone will act like an air pump of sorts.

It will move in and out at the same frequency as the signal applied to the voice coil, and with an intensity that is

determined by the amount of power in the voice coil and the strength of the magnet. Speakers are rated in

Ohms (the impedance of the voice coil), Watts (the power handling capabilities of the coil),
Frequency response

(The range of audio frequencies where the coil is most efficient) and SPL or Sound Pressure
Level (a relative measure

of overall efficiency). SPL ratings are an indication of how much electrical energy a speaker can
transform into air

movement. The higher the number, the more efficient the speaker.

2. Power Handling. Until high power stereos became commonplace, most car radios only
produced 1 to 10 watts of

audio power. If your original radio used vacuum tubes, it probably had a 4 ohm speaker. If it
was an early transistor

radio (late '50s thru the '60s) it may have had an 8, 10, 20, or even 40 ohm speaker. In any
event, it was never intended

to handle more than about 10 watts. Your new stereo will eat these speakers and probably
won't even burp! You must

use speakers capable of handling at least 35 watts RMS. The output of this radio is rated at 45
watts RMS peak, when

connected to a 4 ohm load.

3. Magnet size. Prior to WWII, permanent magnets could not be mass-produced cheaply and reliably, so early speakers

used an electromagnet that required a great deal of space and power for a little action. After the war, permanent magnets

became commonplace, and have steadily improved. Still, the size of the magnet determines how far the voice coil can

pull or push the cone. Bigger is better for low frequencies where depth of throw is important. To move a large volume

of air at low frequencies a long stroke is necessary. At higher frequencies a shorter stroke is required. Less movement

means less return time.

4. Range. Your original speaker had just one cone. It was designed for AM radio. AM radio operates at the low end of

the radio spectrum. There is very little space between stations on the dial. In order to prevent one station from

interfering with another, the range of audio signal a station can broadcast is limited to 5 kHz. For this reason radio

speakers were never intended to reproduce audio signals in a range higher than 5 kHz. Response drops off dramatically

after about 8 kHz. Adjacent channel spacing of FM stations is wide enough to allow at least 15 kHz audio signals,

which is the primary reason FM has replaced AM in the high fidelity entertainment market. Today, speakers generally

fall into 3 classes: Bass, Midrange, and Tweeters. Bass speakers are the big ones. They have the longest cone travel

and the biggest magnets. Cone size is usually 8-15 inches

in diameter. Midrange speakers have smaller cones and magnets, but can faithfully reproduce all but the lowest lows

and highest highs. Cone size is usually 4-8 inches. Tweeters can't reproduce bass notes at all, but will reproduce high

frequency signals up to 20 kHz. Modern speakers often have 2 or more cones built into the same speaker housing,

often with several magnets to reproduce the full range of sounds. For instance, the PIONEER TS-A6965R is a 6x9

3-way speaker 60 Watt average RMS power rating, capable of handling 400 watts peak RMS. They have a frequency

range of 35 Hz to 37 kHz with a very efficient SPL of 92 dB @ 1 Watt @ 1 Meter, other brands that can sound great

are Kenwood, Sony, etc.

5. Location. Most of us have our ears permanently attached to the sides of our heads and pointed forward. For this

reason, the ideal location for stereo speakers would be above the dashboard and at an equal distance from the

driver's head, pointed directly at him, which is not generally a practical location in most cars.

The challenge that arises when installing a stereo radio in an otherwise original car is how to accomplish this without

altering the original appearance. We have dual speakers that will fit the original opening of many original cars, which

makes a quick and easy solution with trade-offs. if you can only have one speaker in your car then this is the best

compromise that is available, the 2 speakers must be much smaller than the original in order to fit. The first trade-off

then is a loss of low frequency response due to the small cone size. The 2nd trade-off is the loss of the stereo effect

since there is not much physical separation between the speakers. A better solution would be to install one mono

speaker in the original front opening (4 ohm like a Sony, Kenwood, Pioneer, etc.), and another mono speaker

(4 ohm like a Sony, Kenwood, Pioneer, etc.) in the rear deck. This would allow the larger single cones for efficiency

and good separate left vs right separation even if it were front to rear instead of left to right.

Another good possibility (and the most common) would be to place 2 speakers on the rear package shelf as far

apart as possible and 1 dual stereo speaker in the front dash. This provides good separation, and the trunk makes

an excellent compression chamber.

6. Phasing. The little red dots on your speaker terminals are not smashed mosquitoes! They show which way the

current must flow in order to push or pull the cone. It is important that both speakers are connected to the proper

terminals to insure that both cones push or pull together instead of trying to cancel each other. Or there is a small

plus and or minus sign pressed into the insulator,.. other hints can include a red wire or a wire with a red stripe,.. etc.



Originals of award-winning designs of the best speakers are only available at our speakers at all.