### Noise Suppression Guide

#### IMPORTANT

Before starting, compare items on your invoice with items received. Carefully check through packaging material. If any item is missing, please call: Crutchfield Customer Support at 1-800-955-9091

Although reasonable attempts are made to verify the accuracy of the information contained in this guide, it is presented without warranties or guarantees of any type due to the constantly changing nature of this type of information and running changes in vehicle production. Any person or entity using this information does so at his, her, or its own risk. If you find that our instructions do not apply to your vehicle, or if you have questions, do not continue with your installation. Contact our toll-free technical support for assistance (tech support phone number is on your invoice).

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#### Tools Needed: (depending upon vehicle)

- Flat Blade Screwdriver
- Phillips Screwdriver
- Panel Tool
- Pliers
- Drill & Bit Set
- Utility Knife
- Wire Stripper/ Crimp Tool
- Socket & Ratchet Set
- Torx Driver Set

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As with any car audio/video installation, your first step is to disconnect the negative terminal of your car battery to prevent short circuits. Check your Crutchfield MasterSheet™ (available for most vehicles) or vehicle owner’s manual for specific directions. In some vehicles, disconnecting the battery may require you to re-enter a security code or have the dealer reset the internal computer.
You've installed a new receiver in your car, and now you've got a noise problem. What can you do? It boils down to this — you made a change that has introduced noise into your system. So, the first thing to do is check out all facets of your installation.

1. **Is your receiver securely grounded?**
   Is the ground wire located near a noise source (like a heater, air conditioner, or computer)? Is the ground wire actually connected to the vehicle’s ground? Since the antenna lead can act as a ground (thereby enabling a new receiver to operate without its ground wire properly connected), the antenna lead is frequently the source of noise problems.

2. **Check to see if you're getting noise on all sources — CD (or cassette), AM, FM, and auxiliary sources**
   If the noise is present only on the radio, then it’s coming through your antenna lead. If you’ve checked out all potential causes for the noise problem, you may be able to cure (or at least minimize) the noise with a filter. There are three types of noise that can enter your system, and you can find filters that help with each type.

**Backway Noise**
This is noise introduced through the power and ground wires connected to your receiver. If you’re hearing alternator whine (a whirring noise that varies with engine RPMs), you can install an alternator noise filter on the power line between the battery and the alternator to minimize the problem. You can also install a noise filter on the receiver’s power lead to cut down on signal pollution.

**Frontway Noise**
This is noise coming from a source within the receiver — either the radio or cassette section (noise from a CD transport is very rare). If you determine that the noise originates with your radio antenna, an antenna filter plugs in between the antenna and your receiver to stop (or minimize) noise from entering your system. Insert a blank cassette and turn up the receiver. If you hear noise, try rerouting the wiring coming from the rear of your receiver to prevent radiated noise from reaching the tape head.

**Sideway Noise**
This is noise induced by the new receiver’s proximity to a noise producer (like a heater motor or car computer). If the noise-causing accessory has a motor, a source noise filter can be installed on the accessory’s power lead to minimize radiated noise. If the car computer (or other motor-less accessory) is causing the problem, move your receiver’s wiring away from that accessory to minimize the radiated noise.
Noise and Your New Amplifier

You've installed a new amplifier, only to discover noise in your system that wasn't there before. Don't panic — just run down this checklist, eliminating possibilities until you find the culprit.

Where is the amp mounted?
Is it near something that could be radiating noise, like a rear-mounted tuner or computer? If so, unbolt it and move it away to see if the noise stops. Remove your patch cables. If you still hear noise, check to see if your amp is isolated from the vehicle’s chassis. Any contact between your amp’s metal casing and your vehicle’s body could cause noise problems.

Check your ground wire
Is it securely attached to the vehicle’s chassis with a good contact to clean metal? Your ground wire should be no longer than 18” long — a longer ground wire can cause noise problems. Improper grounding causes most system noise problems.

Check your gain structure
After you’ve set the gain on your amplifier, check for system noise (or hiss) with the engine off. Put your CD player on pause and turn the volume way up. If you hear an unusual amount of hiss, reduce the gain on your amplifier so that your receiver is supplying more signal in order to reach the same volume level. Experiment until you eliminate the hiss or reduce it as much as possible. A tiny bit of hiss is OK. You won’t hear it while driving.

Are you hearing engine noise?
Any amp installation can be prone to engine noise. You may hear a whining or clicking sound (that varies with engine speed). Since most noise problems come from a poor ground, always make sure your ground wire is connected firmly to bare metal. You can also try isolating your amp from the chassis of your vehicle by mounting it on a board or using rubber grommets or feet; using a different brand of patch cables; or, only if all else fails, installing a noise suppressor. The tricky part is figuring out which step or steps to take. Please read the rest of this section and try some of the simple tests.
If you cannot find the faulty ground in your multi-amp system, a ground loop isolator can help minimize the problem. Inexpensive, standard patch cables (left) are more susceptible to noise than premium, twisted pair designs (right).

Inexpensive, standard patch cables (left) are more susceptible to noise than premium, twisted pair designs (right).

Noise in the patch cables
Noise can be picked up by the RCA patch cables connecting your components. To test this, detach the cables from your amp. (Note: A small number of amplifiers mute themselves when patch cables are removed. To defeat the automatic mute, insert one side (left or right) of a spare patch cable into the amp’s left and right input jacks.) Turn on your system and engine. If the noise is gone, reconnect the cables to the amp, and disconnect them from your receiver. If you hear the noise, your patch cables are definitely picking it up. Try re-routing them, taking care to separate them from your power cable by at least 18 inches. Also, newer cars may have a cable that provides power to computers and lights in the rear of the vehicle — make sure that your patch cables aren’t too close to this cable.

You should also switch to higher-quality patch cables. The inexpensive RCA cables many people use to connect their components don’t have the shielding or conductivity necessary to deflect noise in the metallic, highly-conductive automobile environment. Twisted pair RCA patch cables excel at rejecting noise generated by your vehicle. As a last resort, a ground loop isolator can be installed between the receiver’s preamp outputs and your amp to minimize this problem.

Noise picked up by your antenna
If it’s not in the patch cables, the noise may be coming from a ground loop caused by your antenna. Plug all your patch cables back in and unplug your antenna. If the noise goes away, try an antenna noise suppressor. This filter plugs in-line between your receiver and your antenna, breaking the ground path between them.

Noise picked up by the power or ground cables
If you still have noise after unplugging the antenna, it may be coming in through the amp’s main power cable. Noise can be created by cable of insufficient gauge, so you might try thicker cable.

Multiple amplifiers can also create ground loop problems, which can usually be solved by grounding each amplifier with its own separate wire. If you are unable to locate the cause, a ground loop isolator can be installed between the receiver’s preamp outputs and the amplifiers to minimize this problem.

Radiated noise
If the antenna isn’t causing the noise, try pulling the receiver from the dash while a tape or CD is playing. If the noise goes away, it’s being radiated into your system. Try re-routing the wiring at the back of the receiver to stop the noise that’s radiating into your system.

Noise in speaker wiring
Noise can also come in through the speaker wires (extremely rare). To test them, turn the system off and disconnect the speaker wires from the amps. Now start the car. If the noise is still there, then it’s being radiated into the speaker wires. You’ll have to reposition them.

Safety Check
- Check that wires do not interfere with safe vehicle operation.
Noise from your electrical system
If you’ve tried all of the noise-fighting tips above and you still hear the noise, the problem might be with your vehicle.

Have a mechanic check your alternator and battery. If your car is older and hasn’t been tuned up recently, you may have ignition noise—a ticking sound that varies in speed as you accelerate. You may need a tune-up using resistor-type spark plugs, shielded carbon-core spark plug wires, and a new distributor cap and coil.

If the noise doesn’t disappear, then your ignition system may not be grounded well enough. It may be broadcasting noise to other items such as your air cleaner, hood, exhaust system, etc. With your sound system on and the car running, try grounding each of these different components of the car. It’s possible that grounding one of your car’s components will eliminate the noise. If so, make the ground permanent with a braided ground strap.

Noise and your nervous system
Noise problems can be very frustrating, especially when you can’t wait to hear your new equipment. It helps to remember that you’ve just placed a very sophisticated piece of electronic gear (a new receiver or amplifier) in the middle of an extremely complex system — your vehicle’s electrical wiring. Noise is just nature’s way of telling you that something’s out of whack. Just run down the list, eliminating possible noise sources until you find the problem.