# Noise Issues Part 1- Identification

## INTRODUCTION

Next to intermittent electrical issues, rattles and squeaks are probably the most difficult issues to troubleshoot. When we asked the best rattle and squeak technicians to name their biggest challenges, they consistently named two difficulty areas:

- Duplicating the noise.
- Isolating the source of the suspected noise.

They also mentioned that in some cases, they repaired a different noise than the one shown on the RO. They also wasted time in disassembly while tracing the source of the noise.

This resource guide is designed to address these concerns by providing specific troubleshooting techniques to isolate and repair vehicle rattles and squeaks.

## OVERVIEW

There are two rattle and squeak issues, language and location.

Language refers to finding a descriptive word for abnormal noises. For example, one person may call a noise a rattle, while another person says it is a clunking noise.

This issue is magnified when we add the service advisor to the information loop. Both the service advisor and customer are probably not technically oriented, so they don't use the same language as technicians.

Location refers to identifying the correct noise. In some cases, technicians repair a different noise than the one listed in the R.O. This occurs because people hear the same rattle or squeak differently. Every person's hearing is sensitive to different frequencies, and as people get older, they may lose their ability to hear high frequencies.

In many cars, the technician can hear several abnormal noises while driving the vehicle. Depending on the issues, the noise complaint on the R. O. may be barely audible over other noises.

To address language and location issues, we recommend driving the car with the customer present to help hear and identify the noise issue. If a test drive with the customer isn't possible, we've included a chart designed to help improve communication. You can use it to help standardize body noise names, and to gather hints regarding the sources of various noises.

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## NOISE NAMES

| Noise Name | Sounds Like |
|---|---|
| Banging | Slamming a wooden screen door |
| Bonging | Striking a large gong |
| Booming | Distant thunder |
| Buzzing | A swarm of bees |
| Chafing | Rubbing dry hands together |
| Chattering | Wiper sweeping a dry windshield |
| Chirping | A cricket |
| Clacking | A railroad car rolling down the track |
| Clanging | A cow bell or triangle |
| Clanking | Dropping a wrench on concrete |
| Clapping | Clapping hands |
| Clashing | Striking cymbals together |
| Clattering | Dropping wood blocks on a concrete floor |
| Clicking | Flipping a switch on and off |
| Clinking | Empty bottles hitting each other |
| Clunking | Pushing a solid wood door closed |
| Cracking | Breaking a tree branch |
| Crackling | Logs burning in a fireplace |
| Creaking | Opening a rusty hinge |
| Croaking | A bullfrog calling |
| Crunching | Walking on gravel |
| Droning | A prop plane flying in the distance |
| Drumming | Fingers drumming on a desk. |
| Fluttering | A flag flapping in the wind |
| Grating | Raking a shovel over pavement |
| Grinding | A running garbage disposal |
| Groaning | Stepping on a loose floorboard |
| Growling | A dog expressing displeasure |

| Noise Name | Sounds Like |
|---|---|
| Gurgling | Water flowing in a pipe |
| Hissing | Air leaking from a tire |
| Hooting | An owl call |
| Howling | Wind blowing through a door gap |
| Humming | An energized transformer |
| Jingling | Loose coins in a pocket |
| Knocking | Knuckles rapping on a door |
| Moaning | Saxophone playing a low note |
| Oil-canning | Flexing a metal sheet |
| Pattering | Rain Drops on a window pane |
| Pinging | Marbles rolling around in a can |
| Popping | Opening a champagne bottle |
| Pounding | Slamming your fist on a desktop |
| Rapping | A gavel striking a sound block |
| Rattling | Shaking a box of loose candy |
| Roaring | River rapids |
| Rumbling | Clothes tumbling in a dryer |
| Scratching | Rubbing two pieces of sandpaper together |
| Screeching | Running your fingernails across a chalkboard |
| Slapping | Hitting the water with the flat side on an oar |
| Squeaking | Wet rubber soles on a hardwood floor |
| Squealing | Tires making a hard, fast turn |
| Ticking | A mechanical clock keeping time |
| Whining | A distant siren |
| Whistling | A tea kettle at full boil |
| Zapping | A short, quick buzz |

## TROUBLESHOOTING BODY NOISES

This section of the resource guide reviews the five steps required to effectively repair vehicles:




**Steps:**

1. Verify the customer issue.
2. Analyze to develop a plan.
3. Isolate through testing.
4. Repair the issue.
5. Confirm a successful repair.

### Gathering Information From the Customer

The initial information gathering stage is the most important step in this whole process. As we explained, identifying the correct noise is essential.

Before performing a test drive, you need to know the exact driving conditions required to reproduce the noise.

In addition, it is also important to find out if there are any special circumstances required to duplicate the noise such as:

- What accessories are installed?
- Does the car need to sit before creating the noise? (If so, how long?)
- How warm is the car when the noise first becomes noticeable?
- Does the car need to be driven for a period of time before the noise appears?
- What types of weather conditions are present when the customer hears the noise?
- What are the ambient temperature and humidity levels?
- How much weight (people, passengers, and trunk contents) is in the car when the noise occurs?
- How is the weight distributed?

All of these factors can have a dramatic effect on the success of your noise duplication and isolation efforts.

**Duplicating the Noise**

Next, you need to duplicate the noise. Duplicating a body noise is usually difficult; you need to get as much information from the customer as possible, and be able to consistently duplicate the noise. If you can't recreate the noise, you can't isolate the issue.

The idea is to find a way to duplicate the noise and make the noise repeatable. If you accomplish this, you can isolate it and identify the source.

Sometimes you may have trouble duplicating the noise on a consistent basis, but you heard the noise at least once. In this situation, look for an alternative way to consistently turn the noise "on". You have two options: **Dynamic** and **Static**.

**Dynamic** approaches require you to drive the car. Look for roads and locations that create the noise in a consistent manner. Once you find a location that reliably creates the noise, you can return to the same spot after repair and confirm the noise is gone.

You can create creaks and squeaks dynamically by entering or exiting a driveway with an elevation change. If your first try does not work, try the same action at different angles, or use the driveway ramp to place one wheel on the curb. Another option is to slowly drive over speed humps. All of these actions are designed to make the body twist and generate noise.

Other dynamic options include driving the car backwards, quickly applying the throttle or brakes at low speeds, and applying the parking brake with the car stopped, and then loading the engine with the throttle in both forward and reverse.

**Static** approaches are used with the car parked in your stall. This could include applying loads to the chassis with a jack or bouncing the car up and down to move suspension components.

In your stall, you can try several static duplication techniques. For certain types of noises, such as buzzing and rattles, putting the car on the hoist and hitting each tire with a large rubber hammer may duplicate suspension noises. In the interior, you can pound on the suspected area with a closed fist.

Body pops and creaks usually require flexing the body to apply stress to the body joints. To do this in your stall, place someone in the driver's seat and lift each corner of the car with a hydraulic jack. With a corner fully lifted, "bounce" the other corners of the vehicle while someone else listens for noises. Once you've checked that corner, quickly let it down and repeat this check for the other corners of the car.

Static techniques are extremely helpful since they don't require you to drive to a test spot, and you don't need to remain in the driver's seat during your checks.

**Locating the General Area of the Noise**

Body noise issues may be caused by interior trim rubbing together, or from exterior subassemblies, chassis components, or sheet metal issues.

The difficulty lies in isolating the noise down to a specific location. For example, what sounds like a noisy spot weld could be caused by a metal bracket touching a body panel. In addition, a noise generated at one spot may broadcast from a different location. For example, a noise heard near the top of a "B" pillar may actually occur at the base of the pillar.

In fact, noise is transmitted throughout the body in much the same manner that sound carries between two cans connected with a string. Body sheet metal is an excellent sound transmitter, which means the driver's seat receives sounds from all directions.

**Isolating From General to Specific**

Once you have duplicated a noise issue, there are two methods to locate the source.

The first method is to isolate using your ears, and then press and probe suspected parts until the noise disappears. You can also remove parts and drive the vehicle to see if the noise goes away. We call this the push, pull, or remove option.

The second method uses a listening tool to narrow down the location of the noise. From there, we are back to the push, pull, or remove option.

When looking for the source of a noise, it is important that you only remove one part at a time whenever possible. If you remove multiple parts and the noise turns off, you don't know which one caused the issue.

**Listening Tools**

Listening tools include the automotive stethoscope, along with an electronic stethoscope or Steelman ChassisEar listening tools.

Automotive stethoscopes are similar to doctor's stethoscopes, but come with special tips to help probe the vehicle. These include a solid contact probe, or an extension tube to listen inside boxed sheet metal sections.

Automotive Stethoscope



Electronic stethoscopes are also available to probe for noises. Using this electronic tool, you shut out surrounding noise with the headphone cups, and can adjust or amplify vehicle sounds.

If you wish to use these stethoscopes during dynamic testing, it becomes a two-technician job. One tech may have to move all over the passenger compartment while the second tech drives the car under the conditions required to duplicate the noise.



To help locate the source of transmitted sounds, we recommend an electronic listening device with multiple microphones such as the Steelman ChassisEar. During use, the technician can choose one microphone at a time, and compare noise intensity from point to point. This allows technicians to identify the loudest test point, and then move other microphones closer to the noise source to narrow down the transmission point. The goal is to find the spot where the noise is loudest and clearest.

Steelman ChassisEar with pickups




The ChassisEar microphones mount on large alligator clamps. The microphones rely on sounds transmitted to the component they are clamped to, rather than sounds transmitted through the air. This makes them very effective when listening for body creaks caused by noisy spot weld and metal contact issues.

ChassisEar pickups mounted to Intake Manifold




**Isolating the Specific Cause**

Regardless of which listening method that you use (stethoscope, ChassisEAR, etc.), here are some common noise isolation techniques:

- Visually inspect the part for correct alignment and positioning.
- Physically check the part for loose mounting tabs or bolts.
- Place tension on the part to see if the noise goes away during the test drive.
- Remove the part from the car and retest for the noise.

To help with these isolation techniques, we also interviewed our factory, engineering, and service operations people. Based on this information, we created the noise example chart on the next page, which provides another resource to narrow and isolate vehicle noises.

## NOISE EXAMPLES

| Interior Noises | | |
|---|---|---|
| **Noise Type** | **Possible Causes** | **Noise Examples** |
| Buzz | Rapid movement of light components at a high frequency due to looseness or touching another component. | Combination-meter to meter panel |
| Chirp | Rapid movement of parts that are tight and close together. | Combination meter to meter panel |
| Creak | Two materials moving together at a slow speed while in firm contact with each other. | A & B pillar noises |
| Squeak | Two pieces of material in contact with each other. The type of material contact can be described as follows: | Rubber pieces rubbing together |
| | • Plastic material to plastic material contact | Combination meter to meter panel |
| | • Metal parts to metal parts | Bearings and seat tracks |
| | • Plastic material to metal parts | Door liner touching the metal panel with the felt missing |
| | • Foam material to metal parts | Seat back |
| Jingle | Very loose parts or detached parts. | Very loose center dash bolt (washer rattling around) |
| Rattle | A clearance issue between two parts. | Door lock rod rattle |
| Rolling Object | Detach parts such as bolts rolling around. | A detached bolt rolling around the trunk |
| Stick and Release, Pop | A soft material that sticks to a harder-inflexible material when undergoing slow, moderate to large movement. | Instrument panel support |
| Tick | See Stick and Release | |
| Twang | Steel or spring steel vibrating. | Knee bolster |

| Exterior Noises | | |
|---|---|---|
| **Noise Type** | **Possible Causes** | **Noise Examples** |
| Clunk | A heavy object hitting another heavy object (one object is usually solidly mounted). | Strut damper, loose or broken mounts |
| Clatter | Loose parts inside another part. | Brake pads and shoes |
| Squeak or Creak | Rubber to metal movement. | Stabilizer bar bushings |
| Groan | Metal to rubber (partially lubricated) A longer noise. | Damper assembly issues |
| Grunt | Metal to rubber (unlubricated), a brief noise. | Stabilizer bar bushings |
| Knock | Similar to a clunk but more sharp. | Loose fuel filter bracket |
| Rattle | A clearance issue between two parts | Moon roof loose |
| Screech | Unlubricated metal to metal contact | Disc brake dust shield |

END