Chapter 1

Guitar 101

In This Chapter

- Identifying the different parts of the guitar
- Understanding how the guitar works
- Interacting with the guitar

All guitars — whether painted purple with airbrushed skulls and lightning bolts or finished in a natural-wood pattern with a fine French lacquer — share certain physical characteristics that make them behave like guitars and not violins or tubas. If you're confused about the difference between a headstock and a pickup or you're wondering which end of the guitar to hold under your chin, this chapter is for you.

The following sections describe the differences among the various parts of the guitar and tell you what those parts do. We also tell you how to hold the instrument and why the guitar sounds the way it does. And, in case you took us seriously, you *don't* hold the guitar under your chin — unless, of course, you're Jimi Hendrix.

Anatomy of a Guitar

REMEMBER

Guitars come in two basic flavors: *acoustic* and *electric*. From a hardware standpoint, electric guitars have more components and doohickeys than do acoustic guitars. Guitar makers generally agree, however, that making an acoustic guitar is harder than making an electric guitar. That's why, pound for pound, acoustic guitars cost just as much or more than their electric counterparts. (When you're ready to go guitar or guitar accessory shopping, you can check out Chapters 15 and 16, respectively.) But both types follow the same basic approach to such principles as neck construction and string tension. That's why both acoustic and electric guitars have very similar constructions, despite a sometimes radical difference in tone production (unless, of course, you think that Segovia and Metallica are indistinguishable). Figures 1-1 and 1-2 show the various parts of an acoustic and electric guitar.

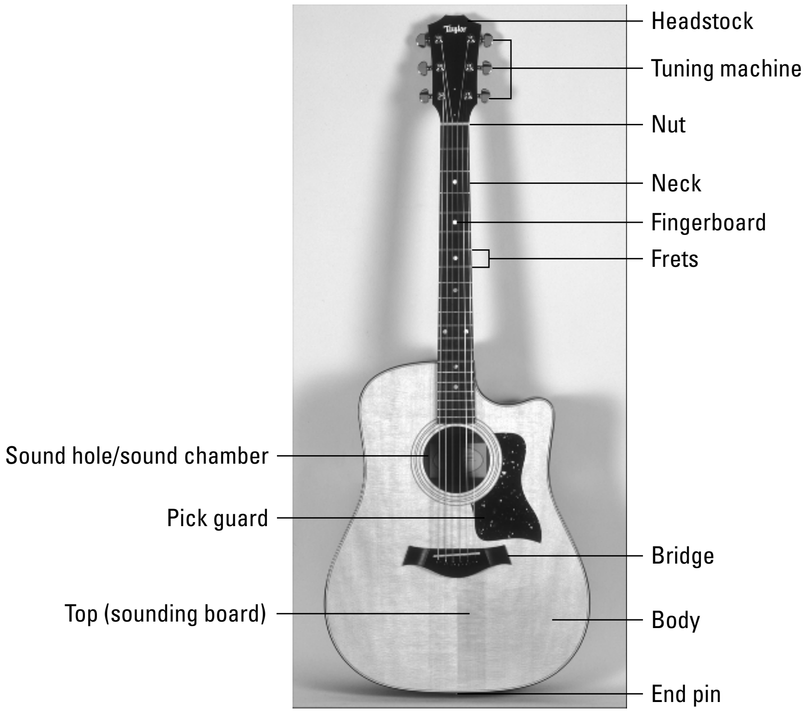

Figure 1-1: Typical acoustic guitar with its major parts labeled.

The following list tells you the functions of the various parts of a guitar:

- **Back (acoustic only):** The part of the body that holds the sides in place; made of two or three pieces of wood.
- **Bar (electric only):** A metal rod attached to the bridge that varies the string tension by tilting the bridge back and forth. Also called the tremolo bar, whammy bar, vibrato bar, and wang bar.
- **Body:** The box that provides an anchor for the neck and bridge and creates the playing surface for the right hand. On an acoustic, the body includes the amplifying sound chamber that produces the guitar's tone. On an electric, it consists of the housing for the bridge assembly and electronics (pickups as well as tone and volume controls).
- **Bridge:** The metal (electric) or wooden (acoustic) plate that anchors the strings to the body.
- **End pin:** A metal post where the rear end of the strap connects. On *acoustic-electrics* (acoustic guitars with built-in pickups and electronics), the pin often doubles as the *output jack* where you plug in.
- **Fingerboard:** A flat, planklike piece of wood that sits atop the neck, where you place your left-hand fingers to produce notes and chords. The fingerboard is also known as the *fretboard,* because the frets are embedded in it.

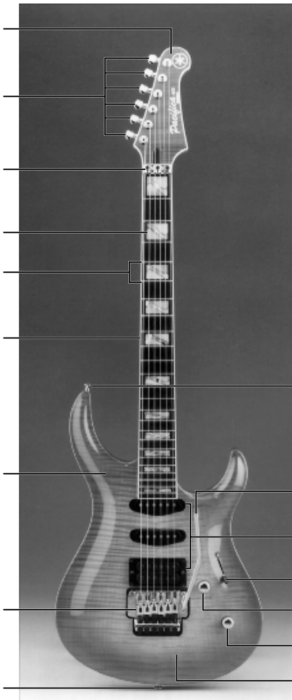

Figure 1-2: Typical electric guitar with its major parts labeled.

- **Frets:** 1) Thin metal wires or bars running perpendicular to the strings that shorten the effective vibrating length of a string, enabling it to produce different pitches. 2) A verb describing worry, as in "He frets about how many little parts are on his guitar."
- **Headstock:** The section that holds the tuning machines (hardware assembly) and provides a place for the manufacturer to display its logo. Not to be confused with "Woodstock," the section of New York that provided a place for the '60s generation to display its music.
- **Neck:** The long, clublike wooden piece that connects the headstock to the body.
- **Nut:** A grooved sliver of stiff nylon or other synthetic substance that stops the strings from vibrating beyond the neck. The strings pass through the grooves on their way to the tuners in the headstock. The nut is one of the two points at which the vibrating area of the string ends. (The other is the bridge.)
- **Output jack (electric only):** The insertion point for the cord that connects the guitar to an amplifier or other electronic device.
- **Pickup selector (electric only):** A switch that determines which pickups are currently active.

- **Pickups (electric only):** Barlike magnets that create the electrical current, which the amplifier converts into musical sound.
- **Sides (acoustic only):** Separate curved wooden pieces on the body that join the top to the back.
- **Strap pin:** Metal post where the front, or top, end of the strap connects. (Not all acoustics have a strap pin. If the guitar is missing one, tie the top of the strap around the headstock.)
- **Strings:** The six metal (for electric and steel-string acoustic guitars) or nylon (for classical guitars) wires that, drawn taut, produce the notes of the guitar. Although not strictly part of the actual guitar (you attach and remove them at will on top of the guitar), strings are an integral part of the whole system, and a guitar's entire design and structure revolves around making the strings ring out with a joyful noise. (See Chapter 17 for more information on changing strings.)
- **Top:** The face of the guitar. On an acoustic, this piece is also the *sounding board,* which produces almost all the guitar's acoustic qualities. On an electric, the top is merely a cosmetic or decorative cap that overlays the rest of the body material.
- **Tuning machines:** Geared mechanisms that raise and lower the tension of the strings, drawing them to different pitches. The string wraps tightly around a post that sticks out through the top, or face, of the headstock. The post passes through to the back of the headstock, where gears connect it to a tuning key. Also known as tuners, tuning pegs, tuning keys, and tuning gears.
- **Volume and tone controls (electric only):** Knobs that vary the loudness of the guitar's sound and its bass and treble frequencies.

How Guitars Work

After you can recognize the basic parts of the guitar, you may also want to understand how those parts work together to make sound (in case you happen to choose the *parts of a guitar* category in *Jeopardy!* or get into a heavy argument with another guitarist about string vibration and string length). We present this information just so that you know why your guitar sounds the way it does, instead of like a kazoo or an accordion. The important thing to remember is that a guitar makes the sound, but you make the music.

String vibration and string length

Any instrument must have some part of it moving in a regular, repeated motion to produce musical sound (a sustained tone, or *pitch*). In a guitar, this part is the vibrating string. A string that you bring to a certain tension and then set in motion (by a plucking action) produces a predictable sound — for example, the note A. If you tune a string of your guitar to different tensions, you get different tones. The greater the tension of a string, the higher the pitch.

You couldn't do very much with a guitar, however, if the only way to change pitches was to frantically adjust the tension on the strings every time you pluck a string. So guitarists resort to the other way to change a string's pitch — by shortening its effective vibrating length. They do so by fretting — pacing back and forth and mumbling to themselves. Just kidding; guitarists never do *that* kind of fretting unless they haven't held their guitars for a couple of days. In guitar-speak, *fretting* refers to pushing the string against the fretboard so that it vibrates only between the fingered fret (metal wire) and the bridge. This way, by moving the left hand up and down the neck (toward the bridge and the nut, respectively), you can change pitches comfortably and easily.

The fact that smaller instruments such as mandolins and violins are higher in pitch than are cellos and basses (and guitars, for that matter) is no accident. Their pitch is higher because their strings are shorter. The string tension of all these instruments may be closely related, making them feel somewhat consistent in response to the hands and fingers, but the drastic difference in string lengths is what results in the wide differences of pitch among them. This principle holds true in animals, too. A Chihuahua has a higher-pitched bark than a St. Bernard because its strings — er, vocal cords — are much shorter.

Using both hands to make a sound

The guitar normally requires two hands working together to create music. If you want to play, say, middle C on the piano, all you do is take your index finger, position it above the appropriate white key under the piano's logo, and drop it down: *donnnng.* A preschooler can sound just like Horowitz if playing only middle C, because just one finger of one hand, pressing one key, makes the sound.

The guitar is somewhat different. To play middle C on the guitar, you must take your left-hand index finger and *fret* the 2nd string (that is, press it down to the fingerboard) at the first fret. This action, however, doesn't itself produce a sound. You must then strike or pluck that 2nd string with your right hand to actually produce the note middle C audibly. *Music readers take note:* The guitar sounds an octave lower than its written notes. For example, playing a written, third-space C on the guitar actually produces a middle C.

Frets and half steps

The smallest *interval* (unit of musical distance in pitch) of the musical scale is the *half step.* On the piano, the alternating white and black keys represent this interval (except for the places where you find two adjacent white keys with no black key in between). To proceed by half steps on a keyboard instrument, you move your finger up or down to the next available key, white or black. On the guitar, *frets* — the horizontal metal wires (or bars) that you see embedded in the fretboard, running perpendicular to the strings — represent these half steps. To go up or down by half steps on a guitar means to move your left hand one fret at a time, higher or lower on the neck.

Pickups

Vibrating strings produce the different tones on a guitar. But you must be able to *hear* those tones, or you face one of those if-a-tree-falls-in-a-forest questions. For an acoustic guitar, that's no problem, because an acoustic instrument provides its own amplifier in the form of the hollow sound chamber that boosts its sound . . . well, acoustically.

But an electric guitar makes virtually no acoustic sound at all. (Well, a tiny bit, like a buzzing mosquito, but nowhere near enough to fill a stadium or anger your next-door neighbors.) An electric instrument creates its tones entirely through electronic means. The vibrating string is still the source of the sound, but a hollow wood chamber isn't what makes those vibrations audible. Instead, the vibrations disturb, or *modulate,* the magnetic field that the *pickups* — wire-wrapped magnets positioned underneath the strings — produce. As the vibrations of the strings modulate the pickup's magnetic field, the pickup produces a tiny electric current that exactly reflects that modulation.

If you remember from eighth-grade science, wrapping wire around a magnet creates a small current in the wire. If you then take any magnetic substance and disturb the magnetic field around that wire, you create fluctuations in the current itself. A taut steel string vibrating at the rate of 440 times per second creates a current that fluctuates 440 times per second. Pass that current through an amplifier and then a speaker and — *voilà* — you hear the musical tone A. More specifically, you hear the A above middle C, which is the standard absolute tuning reference in modern music — from the New York Philharmonic to the Rolling Stones to Metallica (although we've heard that Metallica sometimes uses a tuning reference of 666 — just kidding, Metallica fans!). For more on tuning, see Chapter 2.

Guitars, therefore, make sound either by amplifying string vibrations acoustically (by passing the sound waves through a hollow chamber), or electronically (by amplifying and outputting a current through a speaker). That's the physical process anyway. How a guitar produces *different* sounds — and the ones that you want it to make — is up to you and how you control the pitches that those strings produce. Left-hand fretting is what changes these pitches. Your right-hand motions not only help produce the sound by setting the string in motion, but they also determine the *rhythm* (the beat or pulse), *tempo* (the speed of the music), and *feel* (interpretation, style, spin, magic, mojo, *je ne sais quoi,* whatever) of those pitches. Put both hand motions together, and they spell music — make that *guitar* music.