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### **Appendix A—Preservation Reasons**

Why preserve log buildings? According to Pete Brown, the Historic Architecture Specialist with the Montana State Historic Preservation Office, building preservation has intrinsic appeal to civic-minded optimists, backwoods romantics, and hard-nosed pragmatists. People are motivated to preserve old buildings for cultural, aesthetic, practical, and environmental reasons. In addition, each Federal agency is required by law to carefully care for the historic sites and structures (including log cabins) that the agency owns or funds and that are eligible for or listed on the National Register of Historic Places.

Cultural reasons for preserving log cabins include:

- They are a tangible link to the past.
- They reflect the time of their creation as a counterpoint to our own (priorities, values, technology, community self-image).

Aesthetic reasons for preserving log cabins include:

- Architecture is public art.
- Retaining log cabins sustains the architectural diversity of a community.
- Retaining log cabins preserves the builder's or settler's vision.

Practical reasons for preserving log cabins include:

- Restored log cabins can contribute to community development.
- Log cabins are less material intensive (but more labor intensive) than new construction.
- Existing log cabins utilize existing infrastructure (no need for adding infrastructure, as with new buildings).

- Restoring existing log cabins builds and sustains the local tax base.
- Older buildings can be more affordable for startup businesses or first-time homeowners.
- Restoring a log cabin extends the life of the owner's previous investments.
- Tax credits may be available.

Environmental reasons for preserving log cabins include:

- Construction of historic buildings created a smaller carbon footprint than construction of modern build-ings (hand work, animal power, and local producers).
- The builders usually constructed historic cabins in locations that pedestrians could access.
- The builders usually constructed historic cabins to utilize natural light and ventilation.
- "The greenest building is the one that is already built" (Carl Elefante, Fellow of the American Institute of Architects). Continuing to use log cabins means that the materials and energy used to construct them doesn't go to waste, additional materials and energy don't have to be used to replace them, and no additional agricultural or natural land must be converted to urban use.

Building preservation can achieve what investors, planners, architects, historians, environmentalists, oldtimers, and newcomers value—all at the same time. So why preserve log buildings? Because it is pretty cool to save them.



#### Appendix B—Preservation Requirements

Making a decision to retain or repair a historic log cabin is only the first choice of many that will lead to actual work on the cabin. First, you have to decide which "treatment" is appropriate, taking into account the building's historical significance, condition, and proposed use.

The four treatment options are preservation, rehabilitation, restoration, and reconstruction. The Secretary of the Interior has established official standards for each treatment option. The standards generally describe appropriate work for each treatment option. The Secretary of the Interior's Standards for the Treatment of Historic Properties often are referred to simply as "the standards." The standards define how to maintain, repair, and reconstruct buildings in each treatment category and how or whether to make new additions or alterations.

**Preservation** sustains the existing form, integrity, and materials of a historic building. Preservation of log cabins is the focus of this report.

- Identify, retain, and preserve historic materials and features.
- Stabilize deteriorated historic materials and features as a preliminary measure.
- Protect and maintain historic materials and features.
- Repair historic materials and features.
- Limit replacement in kind of extensively deteriorated portions of historic features.
- Do not obscure, damage, or destroy character-defining materials or features in the process of meeting code and energy requirements.

**Rehabilitation** makes a compatible use possible through repair, alterations, and additions, while preserving the parts or features of the building that convey its historical, cultural, or architectural values. This treatment option is the most liberal of the standards and the most widely applied by corporations and individuals because it retains the historic character while enabling the building to function in a way that meets modern needs.

- Identify, retain, and preserve historic materials and features.
- Protect and maintain historic materials and features.
- Repair historic materials and features.
- Replace deteriorated historic materials and features.
- · Replace important historical features that are missing.
- Make additions or alterations that do not radically change, obscure, or destroy character-defining spaces, materials, features, or finishes.
- Do not radically change, obscure, damage, or destroy character-defining materials or features in the process of meeting code and energy requirements.

**Restoration** accurately depicts the form, features, and character of a building as it appeared during a particular period of time. During restoration, the restorers remove features from other time periods and reconstruct missing features from the restoration period. Restoration allows for some upgrading of mechanical, electrical, and plumbing systems and other coderequired work.

- Identify, retain, and preserve materials and features from the restoration period.
- Protect and maintain materials and features from the restoration period.
- Repair materials and features from the restoration period.
- Replace extensively deteriorated features from the restoration period.
- Remove existing features from other historic periods.
- Recreate missing features from the restoration period.
- Do not obscure, damage, or destroy historic materials or features from the restoration period while meeting code and energy requirements.

**Reconstruction** means rebuilding a structure that no longer exists. The form, features, and detailing of the building during a specific time period are replicated in the building's historic location.

- Research and document historical significance.
- Investigate archeological resources.
- Identify, protect, and preserve extant historic features.
- Reconstruct nonsurviving building and site.
- Do not destroy existing historic features and materials or obscure reconstructed features while meeting code and energy requirements.

Information about the standards for each historic treatment category is available at <http://www.nps.gov/tps/standards. htm>. Federal and State agencies must follow the standards when modifying log cabins that are eligible for or listed on the National Register of Historic Places. People also must follow the standards during grant-in-aid projects assisted through the National Historic Preservation Fund or if they use Federal or State funds on buildings that are eligible for or listed on the National Register of Historic Places. Of course, the standards may be used by anyone planning and undertaking work on historic properties, even if compliance isn't required.

To explain how to accomplish the standards, the Secretary of the Interior has established guidelines for performing the work outlined in each standard. Illustrated Guidelines for the Treatment of Historic Properties, a web-based presentation of the four treatment standards, are available at <http://www. nps.gov/tps/standards/four-treatments/standguide/index.htm>. These guidelines explain in detail the appropriate methods for each treatment standard.

Choose the appropriate treatment category for your cabin based on the condition of the structure, its importance in history, and its proposed use. After you determine the appropriate treatment and familiarize those in charge of the project with the requirements, project planning and then actual preservation work can begin.



## **Appendix C—Preservation History**

Log cabins are a small part of America's historic building inventory. Public activism is largely responsible for the continued existence of much of this valuable resource. In the late 1940s, leaders of the growing American preservation movement realized that a national organization was needed to provide support and encouragement for grassroots preservation efforts. Because of their efforts, Congress passed legislation, signed into law by President Truman in 1949, to establish the National Trust for Historic Preservation (NTHP) <http://www.preservationnation.org>. The NTHP is a private, nonprofit membership organization that provides leadership, education, advocacy, and resources supporting efforts to save America's diverse historic places and revitalize communities at the grassroots level.

Realizing that private efforts alone would not be enough to achieve preservation of a meaningful sample of historic buildings and places, Congress passed the National Historic Preservation Act (NHPA), which President Johnson signed into law in 1966. The NHPA <http://www.achp.gov/nhpa. html> provides leadership for preservation and fosters conditions that encourage private and public conservation of prehistoric and historic resources through incentives and regulations. The Act transformed the Federal Government into a preservation facilitator and a responsible steward for future generations.

To achieve this transformation, the NHPA and related legislation established a partnership between the Federal Government and the States that capitalizes on the strengths of each entity.

• The Federal Government, led by the National Park Service (NPS), provides funding assistance, basic technical knowledge and tools, and a broad national perspective on America's heritage. • The States, through State Historic Preservation Officers (SHPOs) appointed by the Governor of each State, provide matching funds, a designated State office, and a statewide preservation program tailored to State and local needs and designed to support and promote State and local historic preservation interests and priorities.

NHPA also created an Advisory Council on Historic Preservation (ACHP), a cabinet-level group consisting of experts in the field and representatives from Federal, State, and local governments appointed by the President, to address historic preservation issues. ACHP provides private citizens and local communities a forum for influencing Federal policy, programs, and decisions concerning historic properties.

Section 106 of NHPA established the legal status of historic preservation in Federal planning, decisionmaking, and project execution. It requires all Federal agencies to take into account the effects of their actions on historic properties, and provide ACHP with a reasonable opportunity to comment on those actions and the manner in which Federal agencies take historic properties into account in their decisions.

Individual citizens, organizations, businesses, communities, elected officials, and public institutions support historic preservation in various ways. Across the country, preservation relies on a partnership among the ACHP, NPS, SHPOs, NTHP, State and local governments, and Native American tribal governments. Most parts of the country have implemented State and local laws, statutes, and regulations that are closely modeled on Federal examples. Grant funds, tax credits or rebates, and public recognition have inspired and rewarded preservation efforts.



#### Appendix D—Glossary

See figures 4 and 5 for illustrations of common components of log cabins and early 20th-century houses and figure 296 for an illustration of window parts. These figures may enhance your understanding of some glossary terms.

**Adz**—A tool, similar to an axe but having an arched blade attached at a right angle to the handle, used to shape and trim timber (see figure 97).

**Band clamp**—A long strip of metal material with threaded tightener that is used to hold logs together during log replacement (see figures 58, 63, and 64).

**Beetle mallet**—A large, heavy mallet with a wooden head, used to move a framing member or log a short distance (see figure 91). Sometimes called a persuader.

**Broadaxe**—A bladed, hand-held implement with a wide, flaring head and short handle, used for shaping and hewing timber (see figure 96).

**Brush weather stripping**—Weather stripping consisting of a strip of bristles with a winged friction mounting that is inserted into a slot cut into the wood frame of a window or door. Comes in long strips or rolls (see figure 302).

**Bulb weather stripping**—Weather stripping consisting of a compressible tube with a winged friction mounting that is inserted into a slot cut into the wood frame of a window or door. Comes in long strips or rolls (see figure 302).

**Calipers**—An instrument for measuring and transferring a precise measurement from one surface to another (see figure 89).

**Cant hook**—A lever tool with a hinged, hooked arm near the end, used to grip and turn a log over. Similar to a peavey, but with no spike (see figure 91).

**Cant strip**—A triangular board that is used at the joint between a vertical element, such as a dormer, and the drainage pitch of the roof to guide water away from the vertical surface and provide support for roofing, asphalt felt roofing paper, or ice and water shield that is bent up the vertical surface (see figure 237).

**Chimney crown**—The element that caps the top of the chimney and prevents intrusion of water into the masonry from the top. Crowns may be premanufactured (see figure 307) or site built (see figure 241). The flue liner (if any) extends through the chimney crown.

**Chinking**—Material used to fill the horizontal spaces between logs (see figures 192 and E31).

**Chisel**—A long-bladed handtool with a beveled cutting edge and a handle designed to be struck with a hammer. Used to cut or shape wood, stone, metal, or other materials (see figures 98 and 99).

**Commander**—A big mallet (see figure 91).

**Commandette**—A big mallet, but smaller than a commander (see figure 91).

**Coping**—A U- or V-shaped trough cut down the length of the underside of a log that mimics the round shape of the log below it. When coped logs are stacked, little or no air can pass between them (see figure 25).

**Counterweight**—A weight that balances the weight of another object. Used in single-hung or double-hung windows (sash weight) to make it easier to raise or lower a window sash, and to hold a window sash in place when it is raised or lowered (see figure 297).

**Course**—A horizontal row of material units, such as a horizontal row of bricks or a horizontal row of shingles or shakes.

#### Dovetails and Broadaxes: Hands-On Log Cabin Preservation

**Cribbing**—Boards or lumber stacked in a crosshatch pattern to support a structure during construction work that requires removing existing structure support (see figure 73).

**Crosscut saw**—A saw used for cutting across the grain of a log or large timber (see figure 100).

**Crown end**—The end of a log that extends beyond the notching at the corner of a log building (see figure 43).

**Daubing**—The finish layer covering chinking or gaps between wall logs (see figure 26).

**Double-hung window**—A window, typically taller than wide, having two vertically stacked halves that can each be opened.

**Double-strength glass**—Sheet glass that is about  $\frac{1}{8}$  inch thick, as opposed to single-strength glass, which is about  $\frac{1}{16}$  inch thick.

**Drawknife**—A single-edge blade with a handle at each end, operated by drawing the knife over the surface toward the user. Used to shape wood or remove bark from a log (see figure 93).

**Epoxy**—An adhesive made from synthetic thermosetting polymers. Also, paint, plastics, or other materials containing these polymers (see figure 109).

**Felling axe**—A full-size axe for felling trees and sectioning logs—the Jersey Pattern axe in figure 95 is an example of a single-headed felling axe and the Bluegrass Western Pattern axe in figure 95 is an example of a double-headed felling axe.

**Fiberboards**—Construction panels made from compressed wood or other plant fibers and binders, manufactured using compression and heat. Sometimes referred to by their manufacturer's names, such as Upson Board, Beaver Board, Homasote, and Celotex (see figure 316). **Fire box**—The part of a fireplace or wood stove where fuel combusts.

#### Flashing—

- **Base flashing**—Runs across and a short distance up the chimney where the chimney meets the roof. Sits on top of the shingle or shake course that is cut to butt into the chimney. Folds around the bottom corners of the chimney and tucks up along the sides (see figure 244).
- **Counter flashing**—Placed in the mortar joints; overlays the base, step, and saddle flashing (see figures 246 and 247).
- **Saddle flashing**—Laid at the upper side of the chimney at the saddle; overlays the step flashing (see figure 245).
- **Step flashing**—Laid with each course of shingles along the sides of the chimney; overlays the base flashing at the lower side of the chimney (see figures 244 and 244).
- **Valley flashing**—Applied in roof valleys where two roof planes intersect, producing an internal angle (see figures 253, 254, and 255).
- **Vent flashing**—Applied around vents that extend through the roof (see figures 249 through 252).

**Frame and panel door**—(also known as rail and stile) A frame of vertical stiles and horizontal rails holding raised or flat panels in place to form a door (see figures 303 and 305).

**Frass**—A sawdust-like powder produced by wood-boring insects as they drill into a log or timber, visible on the exterior of affected wood structures after the insects expel it through the bored hole.

**Footing**—The bottommost part of a foundation, normally wider than the rest of the foundation to provide bearing against the soil (see figures 5 and 81).

**Geotechnical engineer**—An engineer who specializes in the behavior of earth materials and who performs work such as evaluating the stability of natural slopes and man-made soil deposits, assessing risks posed by site conditions, and designing earthworks and structure foundations.

"Ghosts" of past construction—A difference in paint or other surface evidence that occurs around the former position of a structural element, appliance, or furniture, including darker or lighter flooring, paint outlines, and fastener holes (see figure 310).

**Glazing**—Panes of glass or other transparent or translucent material in a window.

**Glazing points**—Small metal triangles, diamonds, or winged shapes pushed into the wood window frame against a pane of glass to hold the glass in place before putty is applied (winged shapes are not appropriate for historic windows).

**Gouge**—A chisel with a concave blade (see figures 98 and 99).

**Guano**—Bat or sea bird feces; usually describes droppings concentrated in a small area that form a layer over a surface.

**Joint**—On shingle or shake roofs, a gap between horizontally adjacent shingles.

**Hand plane**—A handtool with a flat bottom housing a projecting steel blade, used to pare shavings from the surface to flatten and smooth wood. Usually has knobs or handles on top, in front of and behind the blade, to grasp while pushing the tool across the wood surface (see figure 102).

**Heat shield**—A sheet of nonflammable material installed on spacers to encourage a convection flow of air that prevents most of the heat from a wood stove or metal flue from reaching the combustible material behind the heat shield. **Hewing**—Chopping or cutting a log with a broadaxe to create a relatively flat surface (see figures 124 and 125).

**Knee wall**—A partial-height wall that connects the floor and a low ceiling. Usually load bearing (see figure 5).

Lag screw—A heavy hex- or square-head wood screw.

**Ledge and brace door**—(also known as plank and batten) Several vertical boards tied together at the top and bottom by horizontal boards (called ledges or battens) to form a door. Sometimes includes a diagonal board (brace) that extends from the top ledge to the bottom ledge and fastens to each of the vertical boards to keep the door square (see figure 304).

**Lite**—A framed opening in a window or door containing a pane of glass or other translucent or transparent material (see figure 297).

**Log cleat**—A small steel device used to hold a log in a fixed position while the log is shaped. Normally available in pairs connected by a rope; the pointed ends grip the log and the surface it rests on (see figure 94).

**Log dog**—(also known as log staple) A steel bar with each end bent 90 degrees and sharpened. Available in various sizes and with either chisel or pointed ends that are pounded into a log and the surface it rests on to hold the log in a fixed position for shaping (see figure 94).

**Log screw**—A long, approximately <sup>1</sup>/4-inch-diameter wood screw available in lengths of about 4 to 16 inches, with only 3 inches of thread on the end; the rest of the shaft is smooth.

**Mallet**—A hammer with a large, cylindrical wooden or rubber head (see figure 91).

**Markerboard**—A board marked in measured intervals, attached to an object and used with a surveyor's level or transit to track vertical or horizontal movement (see figure 62).

**Miner's wedges**—Large wooden wedges with a shallow slope (see figure 56).

**Mullions**—Vertical window dividers that provide structural support (see figure 297).

**Muntins**—Strips of wood or metal separating and holding panes of glass in a window (see figure 297).

**Needle**—A metal or wooden beam extending the full width of a building to support the building while raising it or replacing the foundation or support structure (see figures 69 and 85).

**Notching**—A method of joining stacked log walls at the corners by carving shapes into the logs. Secure notching methods (saddle, half dovetail, full dovetail, "V," step and lock) alternately interlock end and side logs using shape alone, while less complex notches require fasteners (square, butt and pass) (see figures 16 through 21).

**Pane**—A single sheet of glass in a window or door (see figure 297).

**Peavey**—A lever tool with a hinged, hooked arm near the spiked end, used to grip and turn over a log; a cant hook with a spiked end (see figure 91).

**Persuader**—Big mallet (see figure 91). See definition of beetle mallet.

**Pier**—A pillar support for a structure, usually constructed of masonry (see figures 81 and 82).

**Piling**—Heavy beam or post driven vertically into the ground or sometimes set vertically into an excavated hole in the ground to support a structure.

# Plank and batten door (also known as ledge and brace)—Several vertical boards tied together at the top and bottom by horizontal boards (called ledges or battens) to

form a door. Sometimes includes a diagonal board (brace) that extends from the top ledge to the bottom ledge and fastens to each of the vertical boards to keep the door square (see figure 304).

Plumb—Precisely vertical.

**Plumb bob**—A heavy, usually conical weight on a fully flexible string or cord. Used to determine a precisely vertical line or whether a surface is vertical or leaning (see figure 45).

Pony wall—A partial-height wall that is not load bearing.

**Power plane**—A powertool with a flat bottom housing a rotating drive with projecting steel blades. Used to flatten and smooth wood by paring shavings from the surface (see figure 107).

**Projectile point**—A sharp-edged head for a projectile, such as an arrow, spear, or dart. Usually fashioned from chipped stone, metal, bone, or ivory (see figure 31).

**Purlin**—Log or timber roof support member running horizontally across the roof, supported by the end walls and sometimes a center wall of the cabin (see figure 205).

**Putty**—A soft, easily worked paste, traditionally made from whiting and linseed oil, that hardens over time and is used mostly for sealing windowpanes within their frames.

**Rafter**—Roof support member running from the peak to the eave of the roof, supported by the outside walls of the cabin and either braced against a rafter on the opposite side of the roof at the peak or supported by a ridge beam at the peak. Can be made of logs, timbers, or lumber (see figure 206).

**Rafter tail**—The portion of a rafter extending beyond the outside wall of a building (see figures 186 through 191).

**Rail and stile door**—(also known as frame and panel) A frame of vertical stiles and horizontal rails holding raised or flat panels in place to form a door (see figures 303 and 305).

**Raking out**—Removing mortar to a depth of about <sup>3</sup>/<sub>4</sub> inch from the face of brick or other masonry (see figures 242 and 243).

**Raker shingles or shakes**—Shingles or shakes laid along the gable end or along an intersecting wall of a roof, perpendicular to normal shingle or shake orientation, to raise the edge of the finished roof enough to guide water back over the main part of the roof (see figure 239).

**Reciprocating saw**—A power saw with a narrow blade that cuts with a back-and-forth motion (see figure 101).

**Roof jacks**—(also known as toe board holders or slide guards) Metal plank holders that are nailed to the roof through angled slots. Used to support planks that provide a horizontal surface for the roofers' feet (see figure 201).

**Rough sawn lumber**—Lumber with a rough surface that wasn't planed after it was sawn. Such lumber has slightly larger actual dimensions than planed lumber with the same nominal dimensions.

**Sash**—The frame holding the glass in a window (see figure 297).

**Sash cord**—In single-hung or double-hung windows, a small rope that runs over a pulley wheel inside the window casing near the top of the window and connects each side of the window sash to a sash weight (see figure 297).

**Sash weight**—A counterweight used in single-hung or double-hung windows to make it easier to raise or lower a window sash, and to hold a window sash in place when it is raised or lowered (see figure 297).

**Sawbuck**—A device for holding rough or round wood so that it may be worked without rolling over or shifting. It consists of two vertical "X" forms stabilized by a connecting horizontal piece. The timber or log is placed in the upward facing "Vs" at the top of the "Xs", similar to the top rail of the sawbuck fence in figure E7.

**Screw jack**—A lifting jack consisting of a threaded rod that can be cranked up and down inside a threaded support, with a plate on the top end of the threaded rod to bear the load. Sometimes called a house jack if it's an appropriate size (see figure 60).

**Scribe**—A pointed instrument used to make guide marks on a surface. When used in construction, normally refers to a compass scribe which has two arms that can lock at a fixed distance apart and be used to transfer a shape from one surface to another (see figure 105).

**Significant**—When used in or as a shortened version of the phrase "historically significant," it means the building or site is important to the history, architecture, archaeology, engineering, or culture of a community, State, or country because of its association with important events, activities, or people; its distinctive physical characteristics; or its potential to yield important information.

**Sill**—A strong, horizontal structural member at the base of a structure, door, or window.

**Sill log**—The bottommost log (usually two per structure, on opposite sides) that supports the rest of a log building (see figures 4 and 151).

**Single-hung window**—Two-section window, typically taller than wide, one-half of which opens vertically (window on the right in figure 47).

**Single-strength glass**—Sheet glass that is about  $\frac{1}{16}$  inch thick, as opposed to double-strength glass, which is about  $\frac{1}{8}$  inch thick.

**Sistering**—Reinforcing a framing member by attaching it to another piece of lumber, usually of the same dimension, that is laid parallel and adjacent to the existing framing member.

**Sleeper**—Wood member resting on a surface or structural support, used to level or raise and support another part of a structure, such as a floor. Log sleepers sometimes were laid directly on soil to support log cabin sill logs and floor joists (see figure E9).

**Slick**—A large chisel driven by manual pressure, never struck (see figure 99).

**Spandrel log**—The second log from the bottom (usually two per structure, on opposite sides) that rests at its ends on the sill logs and supports the rest of a log building (see figures 4 and 151).

**Spud bar**—A long, straight metal bar generally used lengthwise as a handtool to jab an object, causing the object to move, break up, or deform. Some spud bars have a wood or fiberglass bar and wider steel chisel end for specific jobs, such as roofing tear-offs (shingle spud) or removing bark from logs (bark spud) (see figure 59).

**Square**—Enough roof material to cover about 100 square feet of roof.

**Square**—A flat L (framing square)- or triangular (speed square)-shaped tool, usually made of metal, commonly marked on the edges at measured intervals and inscribed with framing tables, used for marking right (90-degree) angles and sometimes other angles, spacing for wall studs, rafter angles, and so on (see figure 104).

**Standard dimension lumber**—Lumber sawn to match standard lumber dimensions listed in the U.S. Department of Commerce American Softwood Lumber Standard (ALS). Sometimes called "dimensioned" lumber.

**Stem wall**—A vertical foundation wall, usually constructed of concrete or masonry, extending from the footing upwards to support the perimeter walls and floor framing or slab, and to retain soils outside the crawl space or basement (see figure 5 and figures 83 through 86).

**Sticker**—Dry, unwarped wood, usually of small dimension, used to separate individual pieces of lumber to allow air to circulate and prevent the lumber from warping in storage.

**Structural engineer**—An engineer who is responsible for analyzing and designing the physical components that support a structure and withstand the forces exerted upon it by wind, earthquakes, snow, and so on.

**Stub wall**—A horizontal, short wall that "stubs" out from (and usually is perpendicular to) a full wall.

**Tempered glass**—A type of safety glass that is made by heating glass to about 1,200 °F and then blowing air on both sides to cool it quickly to about 500 °F, making it much stronger than standard glass and causing it to crumble into many small pieces when broken rather than shattering into shards.

**Timber tongs**—A pincer-like, hinged device with pointed grabbing ends, used to partially surround and hold logs or large timbers as they are lifted by a chain or bar attached at the hinge end (see figures 51 and 91).

**Whalers**—Paired timbers on either side of a wall that are through-bolted or nailed to the wall, creating a "sandwich" to stabilize the wall (see figures 65 and 68).

**Wood grain**—Refers to the orientation of wood cell fibers, which are visible in patterns of alternating darker and lighter wood.

**Worm drive saw**—A term typically used when referring to circular saws with a worm (screw form) shaft and wheel gear drive motors, which are heavier, more expensive, and more powerful than direct drive or sidewinder circular saws. Worm drive circular saws can be identified by the position of the motor parallel to the blade and the main handle behind the blade (see figure 101).

