# Log House Maintenance and Technical Notes

## With Architectural Illustrations By: Bill Ransom

This book is obviously not a technical journal intended to guide the professional or amateur builder/designer through the intricacies of logbuilding. It will, however, inspire many people to build, or have built, a home of logs. Since this is such a unique and often misunderstood approach to building, the authors felt a responsibility to explain, at least on a fundamental level, the differences, alternatives, problems and solutions peculiar to log construction.

The information for this chapter was derived from personal construction experiences. Additionally, much knowledge was acquired through visiting hundreds of log homes and interviewing their architects, builders and owners. Many written resources were also consulted and are listed in the bibliography following the chapter. While the subject of log home design, construction and preservation is too complex to cover in one chapter, we have tried to present, mostly in simple terms and illustrations, the most common situations relating to these topics.

### Log Home Maintenance

#### Wood Preservation

At one time or another, we have all seen, in real life or in pictures, examples of old log cabins that seemed one good push away from collapse. Abandoned and neglected, many of these early relics eventually decayed their way back to the earth that nurtured their existence. While this may be poetic justice at its finest, it's a fate that modern-day log home owners want to avoid. With adequate wood care and preventative maintenance, the log homes built today will endure for centuries.

Increasing the longevity of wood in a structure involves protecting it from the destructive forces of nature. This can be accomplished both from design and maintenance perspectives. Since design considerations are discussed elsewhere, our focus here will be on preservation through preventative maintenance.

Without delving into the cellular structure and chemical make up of the tree, suffice it to say that most woods contain naturally occurring oils that resist weathering and decay. Deterioration occurs over time as these oils are leached from the wood and need to be replaced. What they are replaced with, and how, forms the basis of wood preservation.

To solve or prevent log degradation, you must first pinpoint the problem and its source. For example, a log house subject to a hot, dry southwestern climate, will need a different formulation of log preservative than its counterpart in the Smoky Mountains of Tennessee, where excessive moisture enhances the growth of decay bacteria. Not only will the formulation be different, but the log preparation and application of preservative may also differ. And while regional climates may dictate general preservation techniques, cases of crossover also occur. For instance, the house in the arid Southwest might have irrigation sprinklers wetting the lower courses of logs and subjecting them to decay, while upper courses are dried and weathered by ultra-violet and infrared sunlight. —A note about lawn sprinklers: it's our contention that malfunctioning and misdirected sprinkler heads account for a significant portion of log decay problems.

Once the source of decay has been identified, there are a plethora of wood preservatives on the market from which to choose, each claiming to be the best that modern technology and chemistry can produce. So how do you know which to choose? How important are the differences? What is their toxicity, cost and ease of application over new or old wood? Specific questions like these can only be answered by consulting with professionals or reading a profusion of associated literature. Since it is beyond the scope of this chapter to analyze every product or every situation in need of attention, we will focus on important points that will generally apply.

**1.** While this first point has little to do with preservatives, it has everything to do with wood preservation. Prevent water from coming into contact with your logs! Lawn sprinkler heads, roof drip splash back, inadequate roof overhangs, leaking gutters, snow buildup and improper flashing techniques are just a few areas of concern. Of the three ingredients necessary for decay fungi to flourish (oxygen, heat and water), water is really the only element that can be effectively controlled.

**2.** Inspect your logs carefully to pinpoint potentially damaging conditions. If the logs are unusually moist and have fungal stains on them, the first step is to identify and eliminate the source of excessive moisture. Logs must be thoroughly cleansed with a solution of soap and bleach. After cleaning, the wood should dry completely, and a preservative solution containing a water repellent and mildewcide needs to be applied. By reapplying this solution until the logs will no longer accept any more preservative, you insure a lasting treatment. If, on the other hand, you find the logs on the west and south side of your structure to be so dry that the surface of the wood disintegrates when you scratch it, you must select a preservative that contains oils, possibly pigments, and ultra violet blockers to retard this disintegration. Following are some important points relating to solution application:

**a.** Before applying any solution to the logs, make sure the logs are clean of dirt, fungi and the accumulation of previous preservatives before applying any solution. This can be accomplished by hand scrubbing, pressure washing, or, in extreme cases, sandblasting.

**b.** Dry wood will ensure maximum absorption of preservative material, so give the logs plenty of time to dry. If this is not possible (i.e. either the logs are still "green" or exist in an extremely wet environment, etc.), use a preservative that will diffuse under moist conditions such as the newly available borate solutions.

**c.** Put as much material on the logs as they will absorb, but don't try to get it all on in one application. Apply several coats over several days for more lasting protection. The use of low pressure agricultural sprayers followed by hand brushing works well.

**d.** Don't apply an impermeable finish such as varnish or paint to the exterior surface of the logs. This will trap moisture within the log and can lead to finish failure and log decay.

**e.** Incorporate a regular program of preventative maintenance on your logs. Don't walk away from your home after one treatment thinking you have everlasting protection.

**3.** Caulk all upper surface checks on the exterior of logs (see *Illustration 1*). This may seem like an overwhelming task at first, given the number of logs in a home, but if the structure was built properly in the first place, most of the logs will have been placed on the wall with the largest checks facing down and self-draining. The authors, who specialize in log home preservation, restoration and weatherization, have found that this detail has been overlooked far too long. Rain and snow that accumulates in exposed checks (splits or cracks which occur as wood dries) creates mini-reservoirs of water that begin the decay process deep within the wood. While caulking can be time consuming , benefits are far reaching and include better thermal efficiency, log preservation and insect control.

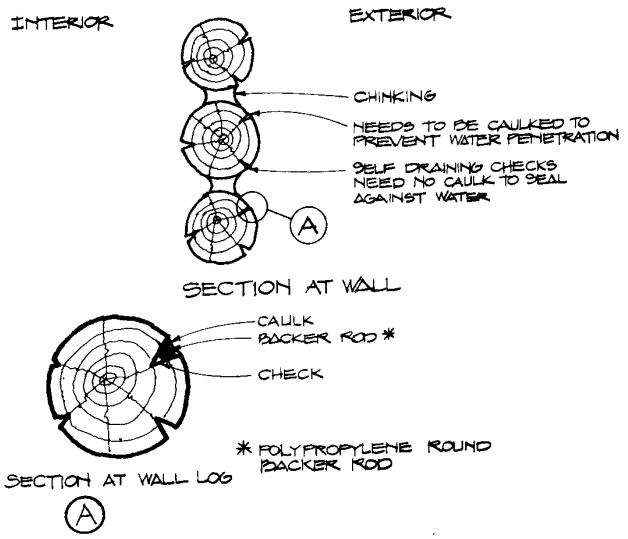



*Illustration 1*

**Thermal Efficiencies and Deficiencies of Log Homes**

If you own a log home, especially one built with large diameter logs (ten or more inches in diameter), you are probably aware of one of the greatest benefits of log home living. That is, the home seems warmer in winter and cooler in summer than conventionally built structures with framed walls and cavity insulation. This is not an illusion, but sound fact based on the premise that the more mass you have in a structure, the less pronounced the temperature swings are within its confines. Put another way, as the outside temperature drops, the inside of the building tends to retain its warmth as the logs release heat stored within their mass. Conversely, in the summer the log home interior will remain cooler. As outside temperatures climb, the mass of the logs, which are now relatively cool compared to rising air temperatures, prevent overheating.

All of this, however, can be short circuited by one very important inherent weakness in log homes, especially in full round, handcrafted structures. That weakness is air infiltration, and it can originate from several sources. As the logs lose their moisture, they will shrink. Corner notches that were once tight, now open up, and lateral checks (see *Illustration 2*) can penetrate directly into the interior of the house through log ends. These same penetrating checks can also substantially decrease the insulative value of a log. Sometimes incorrect or inadequate insulation around window and door openings will permit air penetration as the building moves and settles. In scribed log houses (see *Illustration 3*), the shoulders of the lateral grooves can open up from log movement permitting leakage at these points. This infiltration can be difficult to pinpoint since air will travel along the lateral groove and exit at a point far removed from its source.

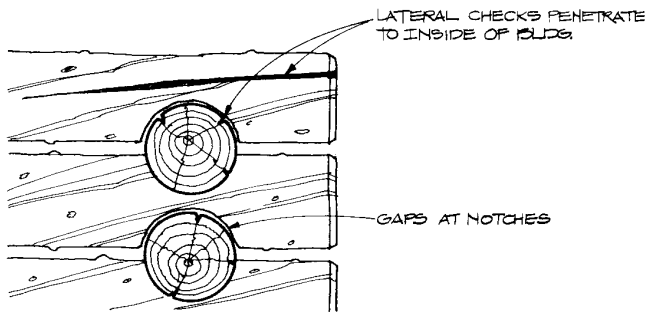



*Illustration 2*

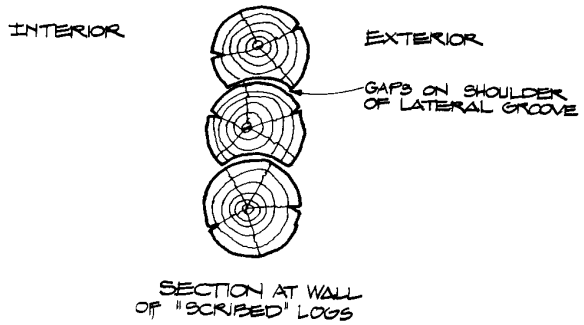



*Illustration 3*

If your log home is in a cold climate, as many of them are, significant air infiltration is unacceptable. It is the duty of the architect to address this issue and incorporate mitigating factors into the design. There are many excellent products on the market and proven weatherization techniques that, if implemented, will render air infiltration obsolete. It is then the responsibility of the builder to ensure that the appropriate steps are executed throughout the building while keeping in mind that log shrinkage will cause movement at some point in time. Final responsibility, however, rests with the owner since it will take several years for the logs to finally reach equilibrium with their environment. It is at this point that final sealing of the structure can take place, and any remaining drafts can be effectively sealed off with caulk.

**Insect Control**

It seems that while log homes are attractive to people wanting a return to more traditional building styles, they are also attractive to insects. One of the most effective advertisements we have seen, pictures three of the most common and destructive wood boring insects known to exist—a powder post beetle, termite and carpenter ant. Above the picture, in bold print, are the words, "You aren't the only one who's anxious to move into your new home." You guessed it, the ad is for a wood preservative.

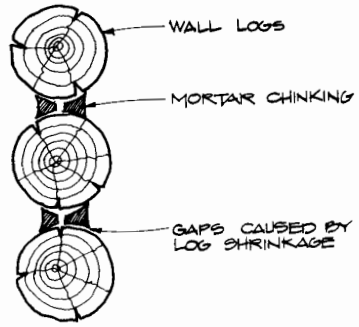
Scare tactics aside, insects, benign or otherwise, can be a real problem in log homes. We can remember all too well sitting in our sun room several years ago and watching the hatch take place. It was still winter outside, but the temperature in this particular room was warm enough to hatch a bevy of flying critters from house flies to yellow jackets. We could hardly believe our eyes and began to wonder if having a log home would mean sharing the premises with these pests. Sure, we could fumigate every six

months or so, but the prospect of living with toxic chemicals seemed even less appealing. Instead, we began to experiment by caulking checks where insects sought refuge and laid their eggs. That is when we realized that by sealing our logs, we accomplished two things. We denied the insects a place to breed and also sealed our house to air infiltration. Using this process, we were able to eliminate upwards of 90 percent of these pests and have since for numerous other home owners.

While this may take care of non-wood boring insects, the borers are another matter. In many cases, insects like the powder post beetle are in the logs before the logs are in the home. Carpenter ants can also come in with the wood, though that is a less frequent occurrence. Treatment for these damaging types of insects usually involves strong insecticides that are best applied by professional exterminating contractors. In the case of termites, both the wood and the ground surrounding the structure have to be treated. It is worth mentioning here that if the logs are treated at the factory with insecticides, fungicides, mildewcides and other preserving chemicals, they will be less prone to damage from decay, bacteria and insects. However, the full-round, hand-peeled logs used in most custom homes are rarely treated in this manner. Not only would it be cost prohibitive, but it is usually unnecessary.

**Chinking**

One thing that revolutionized custom log home building was the development of synthetic chinking compounds. Once the "Achilles' heel" of log home construction, acrylic latex chinking is a far more effective product than its cement-based predecessor. While mortar is still used on occasion, especially in hewn-log restorations, the new chinking compounds are far superior. Excellent adhesion and elasticity helps form a tight bond to the wood and accommodate log shrinkage. With mortar, the logs generally shrink away, permitting water and air to penetrate the joint. *(see Illustration 4)*. In the past, chinking, which was the weakest point of the wall with regard to thermal efficiency, now is the strongest, surpassing even the logs themselves in resistance to thermal conductivity *(see Illustration 5)*. Expanded color choices have also been a boon to homeowners and designers, since chinking is a prominent part of the overall appearance of a home.Another separate and distinct style of chinking that has found its own niche among log home enthusiasts is the use of scribed wood strips or poles between the logs *(see Illustration 6)*. This traditional chink style was especially prevalent in Jackson Hole, Wyoming, and still is. It is a labor-intensive process that takes a skilled craftsman to execute properly, but for some, the regional authenticity is worth the extra cost.




LOG WALL SECTION
SHOWING CEMENT BASED CHINKING

*Illustration 4*

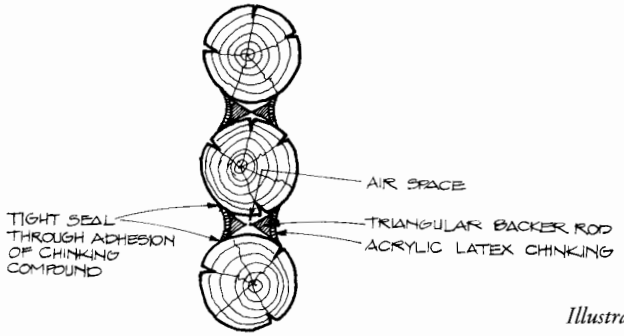
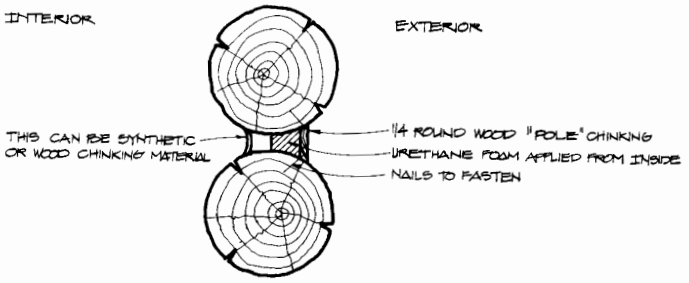



*Illustration 5*

LOG WALL SECTION
SHOWING "SYNTHETIC" CHINKING




LOG WALL SECTION
SHOWING WOOD CHINKING

*Illustration 6*

Over the past ten years, the log home industry has matured in an extraordinary manner. The quality and quantity of log homes has never been greater, and innovative designs and fine craftsmanship have created a renaissance unequaled since the days of the Great Camps of the Adirondacks. Even *Architectural Digest,* the preeminent publication on architectural diversity, routinely showcases log homes, while in the past, such houses rarely graced their pages. What has fueled the revival of this construction form that was once confined to summer cabins and hunting camps? There are many reasons, but among the most influential has been the involvement of architects and other professionals in the design process. Because of this involvement, many of the log homes built today are on the cutting edge of design and engineering technology. They are stronger, more energy efficient and architecturally diverse. In the following sections we will look at some of these new technologies in combination with the time-honored craft of log building itself.

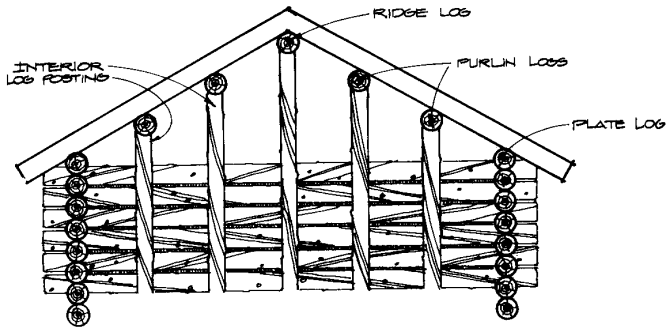
**Foundations**

There was a time when all you had to do was place some flat stones on the ground and start laying your logs up. Of course, today most foundations consist of poured concrete footings and walls. This method works for log homes as well, with some modifications. Since log walls and posts are considerably heavier than their frame counterparts, it is often wise to increase the size of the footings where the logs will lay. This may be more important in marginally load bearing soils. However, since building codes often call for over-engineered foundations to begin with, problems probably won't arise except in unusual situations where the design dictates overly tall walls or excessive point-loading from posts.

**Roof Structures**

The options for roof design are numerous and could alone fill a book . We will address the most common designs applicable to log homes.

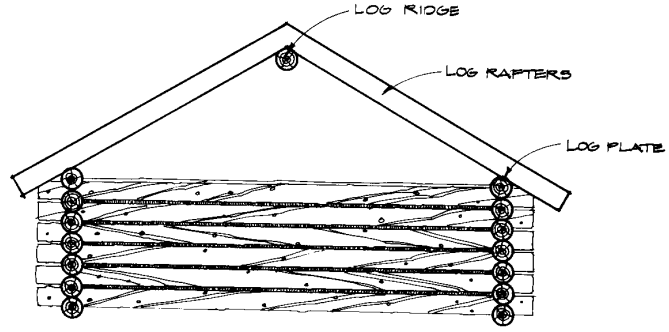
**1.** Roofs with log purlins laid parallel to the ridge log (see *Illustration 7*) are among the most popular in log home design. Not only is it the least costly roof system that still employs logs in the structure, but it will tolerate settling better than a raftered roof. The drawbacks to this design are the number of interior posts or bearing walls that are required to support the purlins. The use of trusses or multiple purlins, can reduce the number of supporting members, but not without escalating your costs.




SECTION OF LOG PURLIN ROOF CONSTRUCTION

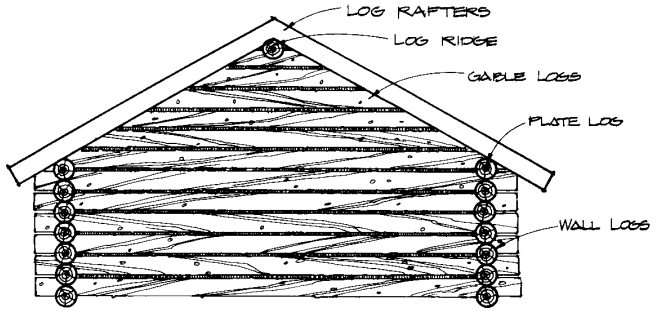
*Illustration 7*

**2.** Raftered roofs, with logs running perpendicular to the ridge (see *Illustration 8*), are more traditional, partly because rafters are usually of shorter length and smaller girth than purlins and therefore easier to get up on the roof. (Cranes were in short supply fifty to one hundred years ago.) In a full-log gable (see *Illustration 9*), however, a raftered roof can present problems due to the differential in settling between the ridge log and plate log. If the rafter is attached at these two members (which it usually is), outward thrust can displace the plate logs on the wall. This can be prevented by the use of collar ties on the rafters or with floor joists spanning the affected walls (see *Illustration 10*).



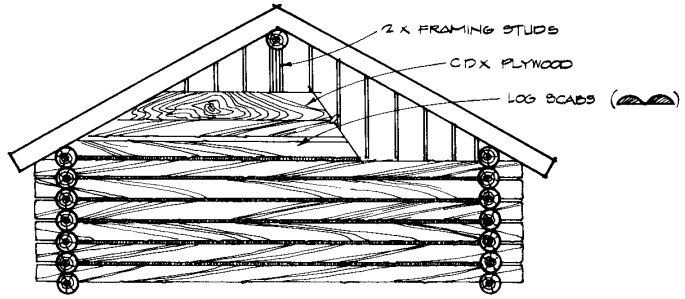

SECTION OF LOG RAFTER CONSTRUCTION

*Illustration 8*



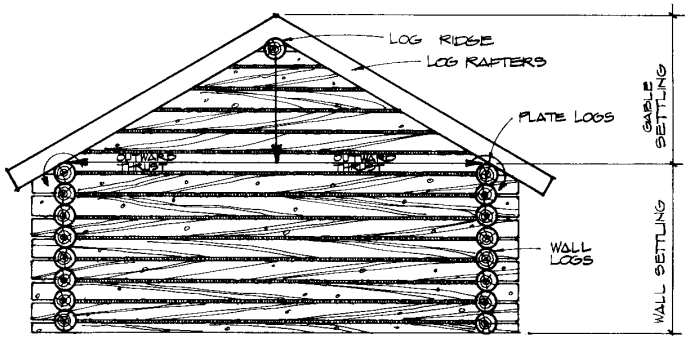

FULL LOG GABLE CONSTRUCTION

*Illustration 9*



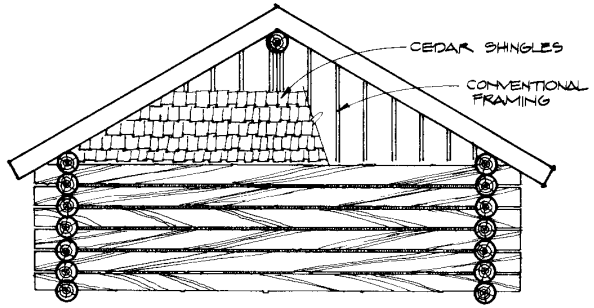

(A) LOG SIDING ON GABLE

*Illustration 10 a*




DISPLACEMENT OF PLATE LOGS
THROUGH DIFFERENTIAL SETTLING

*Illustration 10*




(B) SHINGLES ON GABLE

*Illustration 10b*

An alternative would be to avoid using logs in the gable ends, and frame them up instead. Shakes, siding or stucco can then be used creatively in the design (see *Illustrations 10a, 10b, 10c, 10d & 10e*).

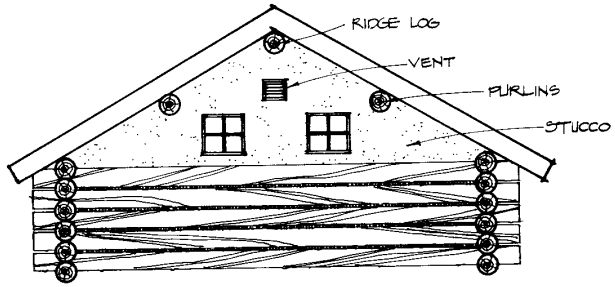



*Illustration 10c*

(C) STUCCO GABLE END

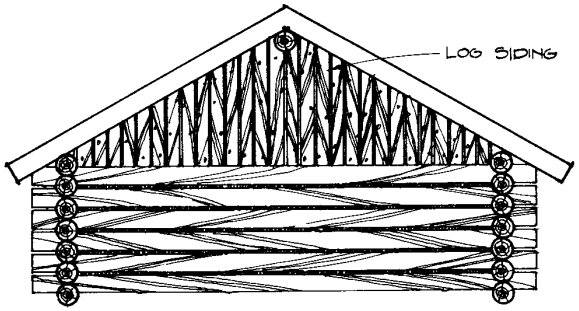
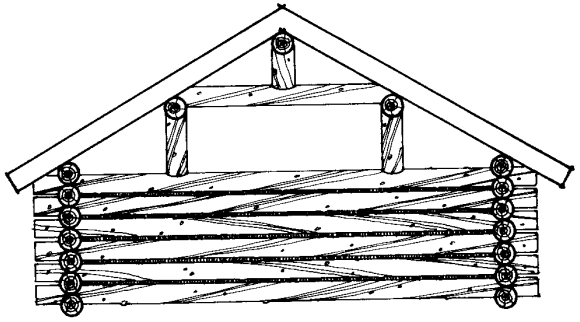



*Illustration 10d*

Ⓓ VERTICAL LOG SIDING

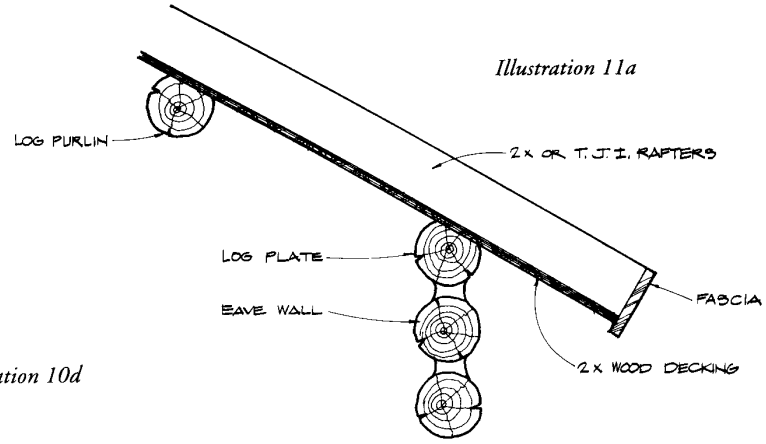


Ⓔ POST & BEAM STYLE

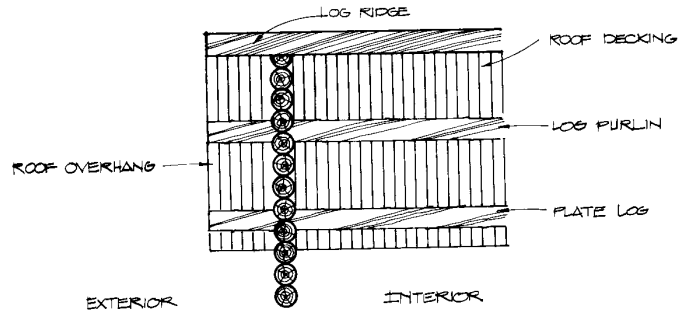
*Illustration 10e*

Another possibility involves detailing the rafters with a slip joint at the plate log. While easier with dimensioned lumber, this option can be a tricky maneuver with log rafters since structural integrity may be compromised. Having said that, if you are determined to build full log gables, select your driest logs at this point in construction to assure a minimum of shrinkage and settling. Before moving into another area of roof design, it might be worthwhile to make one more point. In a purlined roof, the rake overhang is supported by the cantilevered purlins past the wall—an easy detail to build. On the other hand, there is no structural support at the eaves for any overhang, and reinforcement must then be supplied by the addition of rafters (see *Illustration 11a*) over the purlins (see *Illustration 11b*). This is not usually a problem since some sort of insulation space is needed anyway.

*Illustration 11a*



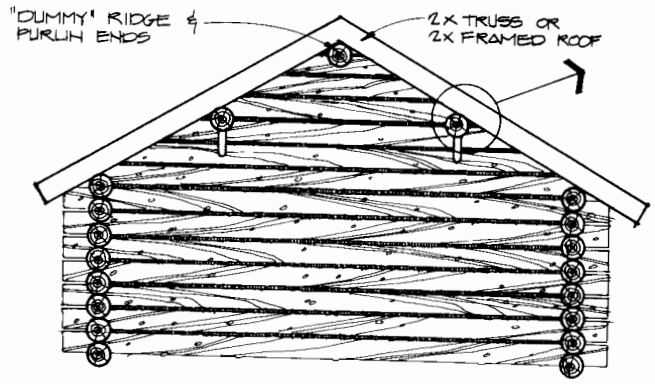

PURLIN ROOF CONSTRUCTION
USING CANTILEVERED RAFTERS TO SUPPORT OVERHANG AT EAVES




GABLE OVERHANG WITH PURLIN CONSTRUCTION

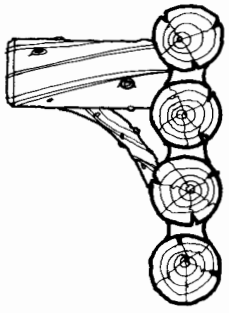
*Illustration 11b*

With a raftered roof the rake overhang must be supported by a truss or rafter, however, there is adequate support here for the eave overhangs utilizing the rafter tails. In conventional construction using dimensioned rafter material or trusses, these situations are not a problem because the framing materials can be hidden with fascia and soffits. However, in log construction where it is desirable to expose log framing material, the roof factors discussed here need to be considered. Many times it is more expedient and cost effective to dimensionally frame the roof on a log house, and then add false purlins, rafter tails and other log "accents" later (see *Illustration 12*).

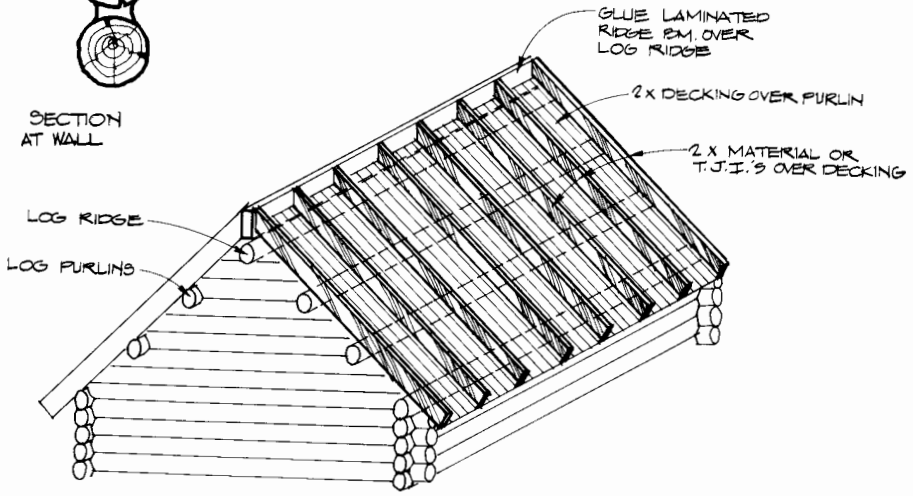



LOG ACCENTS

*Illustration 12*



SECTION AT WALL




DOUBLED ROOF FRAMING

*Illustration 13*

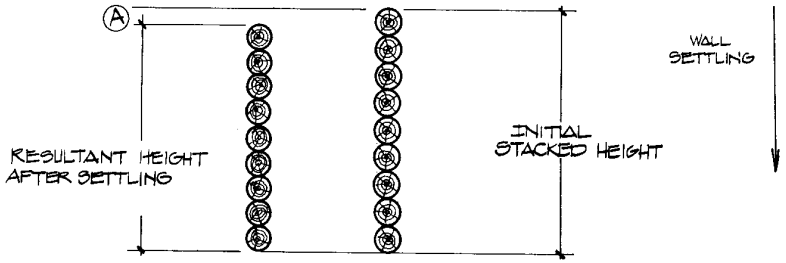
**3.** Other roofing options could include timber framing, which may embody rafter, purlin, truss design, or some combination. The only real difference between a log roof and one of timbers is the use of dimensioned lumber. This is a big difference, however, when it comes to fabricating the structure. The consistency of sawn lumber makes its much easier to lay out and cut the roof, especially more complex designs. It also results in a stronger structure that will "pencil out" better in engineering calculations. In my experience as a builder, as log homes become bigger and more complex, the required engineering almost makes the logs in the roof structurally superfluous, especially in seismic and heavy snow load areas. You usually end up with two separate roof frames—one structural and the other incorporating logs for aesthetics (see *Illustration 13*).

**4.** Other options for roof design entail the use of nominal two-inch framing lumber or trusses. If structural elements need to be visible in this kind of roof design, they could be added later as previously mentioned. Non-structural logs could then be placed aesthetically in high-profile areas of the house such as the entry or living room. This would be a cost effective approach to log roof design, and, when properly done, is nearly indistinguishable from the real thing.

**5.** There is one more area of roof design that is worth mentioning because of the associated problems of decay. By extending purlins and even rafters past the overhangs, you will expose the wood to the destructive forces of weather. Unless considerable effort is taken to protect or maintain these exposed tails, they will eventually decay. Celebrate log roof structure, but don't flaunt it with bad design.

## Log Shrinkage

As interest in log home construction rekindled itself in the 1970s, little attention was given to the effects of log shrinkage and the attendant problem of wall settling (see *Illustration 14*). While green-log construction took some shrinkage into account, so called "dry" log construction often overlooked the fact that these logs would also settle (some more than others depending on the moisture content of the wood). It seemed as though builders and designers were either ignoring the problem or unaware of its consequences. As a result, many log homes were built (and some still are) that have suffered from this deficiency in design.

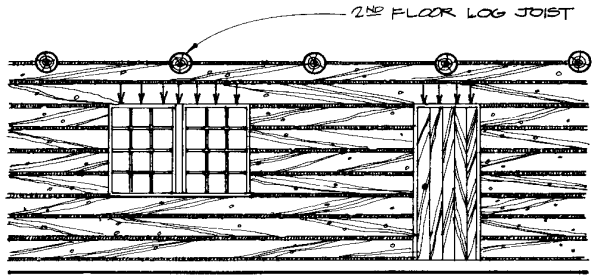



LOG WALL SETTLING

A. THIS DIFFERENCE VARIES AS TO MOISTURE CONTENT OF LOGS AND HUMIDITY LEVELS AT BLDG. SITE.

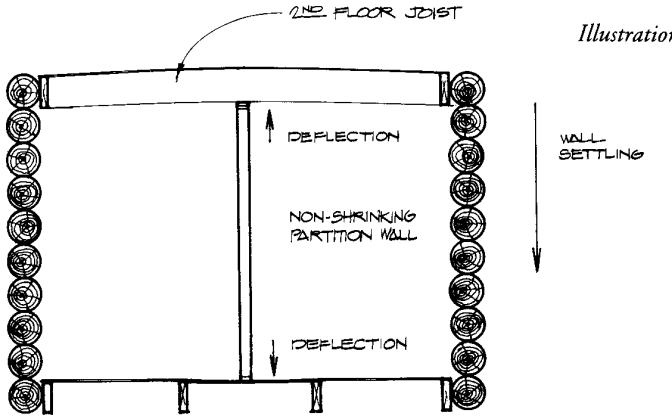
*Illustration 14*

The problems caused by uncompensated wall settling can vary from relatively harmless dry wall cracking to more serious structural failures. Excessive loading can pinch doors and windows (see *Illustration 15*). Framed walls, not designed to be load bearing, can distort and overload floor and ceiling joist systems with dire consequences (see *Illustration 16*). Gable end log walls can settle away from the roof causing it to "float" and create excessive forces on posts and purlins (see *Illustration 17*).



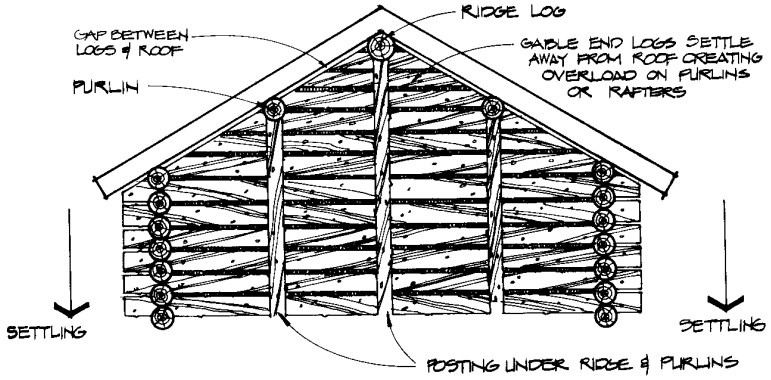

LOG WALL ELEVATION
SHOWING LOADING ABOVE WINDOW & DOOR OPENINGS

*Illustration 15*




OVERLOADED PARTITION WALL

*Illustration 16*




ROOF 'FLOAT'

*Illustration 17*

With large diameter logs, most shrinkage occurs one or two heating seasons after the building is finished. How, then, does the homeowner become aware of these problems? It will usually be quite obvious as the symptoms mentioned above manifest themselves. Besides the previously mentioned dry wall cracking, there can also be cracking in the tile work, especially in second floor bathrooms. Windows and doors will begin sticking, and overloaded framed partition walls will "punch" through ceiling drywall or deflect finished flooring materials. Sometimes deflections in purlins or log joists can be seen as they pass over posts and walls.

With such significant consequences, how do we effect the cure? Can a log house be built that will move while still maintaining structural integrity? The answer, of course, is yes, but it takes a conscious awareness and commitment from both the builder and designer.

Since log walls settle around nonshrinking members of the structure, (i.e. posts, framed walls, masonry, etc.) it is necessary to create "settling spaces" around these components and to incorporate an adjusting device that will take up this movement. These adjustable connectors must be designed to provide adequate bearing and uplift resistance, and still be readily accessible (see *Illustration 18*).

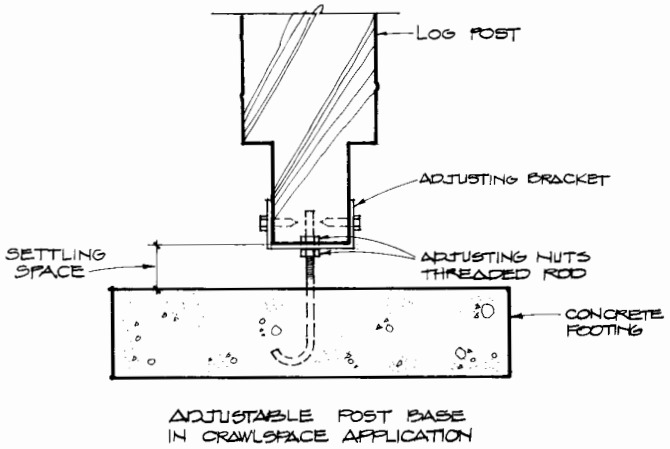



*Illustration 18*

How much room to leave for settling is always a bit of a dilemma because one wants to leave enough without being excessive. A general rule of thumb is roughly ¾" per foot of "green" log wall and ⅛" per foot of logs believed to have a moisture content of less than 15 percent. This could be more or less, of course, depending on the wood and the average humidity levels that exist at the building site. If necessary, specific measurements of the wood can be taken with moisture meters. Building with "green" logs usually dictates a chinkless, scribed method of construction, but remember that chinked homes built with seasoned wood may also require settling provisions.

The mechanical devices described above offer the greatest precision and flexibility when confronting settling, however there are simpler and more direct ways to deal with the problem. While not as effective, they may be viable alternatives, especially for less complex structures and leaner building budgets.

One method entails the use of shims under posts. Using several thicknesses of spacing material will permit the lowering of posts as the building settles. It is important to provide "jack points" (see *Illustration 19*) so that these posts can be lifted and the shims removed. Once all movement has been accounted for, posts can be securely anchored to their bases. A second option is to build out of level to anticipate settling (see *Illustration 20*). This is the least desirable way to compensate for log shrinkage, but it is better than doing nothing.

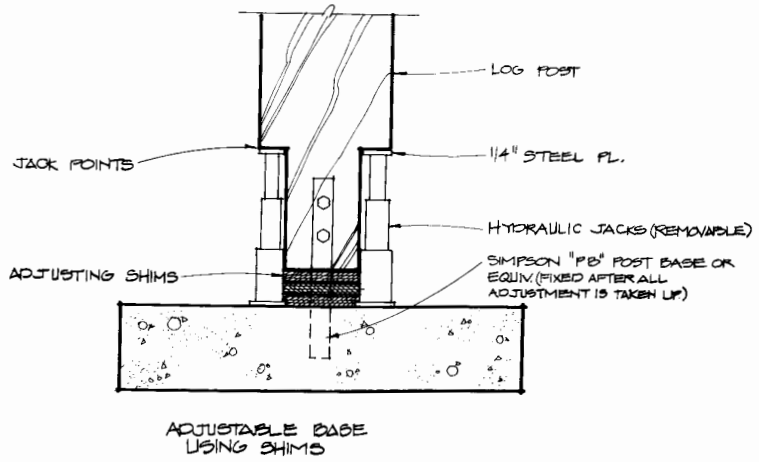
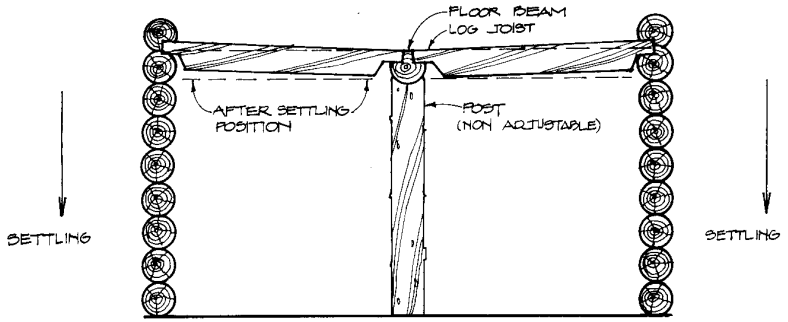



*Illustration 19*




BUILDING OUT OF LEVEL

*Illustration 20*

## Log Species

While many species of wood have been used successfully in log homes, the number of species used by commercial log building companies is actually quite limited. In the western United States, softwoods including firs, (Douglas, white and red), pines, (lodgepole, ponderosa, etc.), cedar, spruce and larch are primarily used. Of these lodgepole pine is probably the most common house log used in the custom home industry today. If we were to design a log home and had the option of all these different species, we would choose them accordingly. For the roof structure we would use Douglas fir because of its strength. The wall logs would be Western red cedar because of this tree's ability to resist decay and its high insulative value. We would then use lodgepole pine "character logs" for posting. "Character log" is a loose term used to describe wood that has natural figuring influenced by growth patterns of the tree. Many of these pine logs, while once cast aside as firewood, have become increasingly popular for posting, furniture, fireplace mantles, railings and other decorative work.

Along with a diversity of log species, comes various peeling techniques that can distinctly affect the overall appearance and feel of a home. While most full round log houses use clean peeled logs, others derive a more rustic look through "skip-peeling." This approach leaves some of the cambium layer attached to the log creating an irregular pattern of light and dark areas. Though the surfaces of these skip-peeled logs are, for the most part, smooth to the touch, they take on a highly textured appearance. Another option is to use weathered logs with some of their bark still intact. These logs also impart a rustic look and tend to make the building look old even when new.

## Log End and Wall Profiles

Here is another area in which strong design elements prevail. While the profile of the logs within the walls (see *Illustration 21*) is important, it's the corners of the buildings that dictate, to a large degree, the overall style of the structure. There are many options from which to choose, and we have illustrated several of them here (see *Illustration 22*).

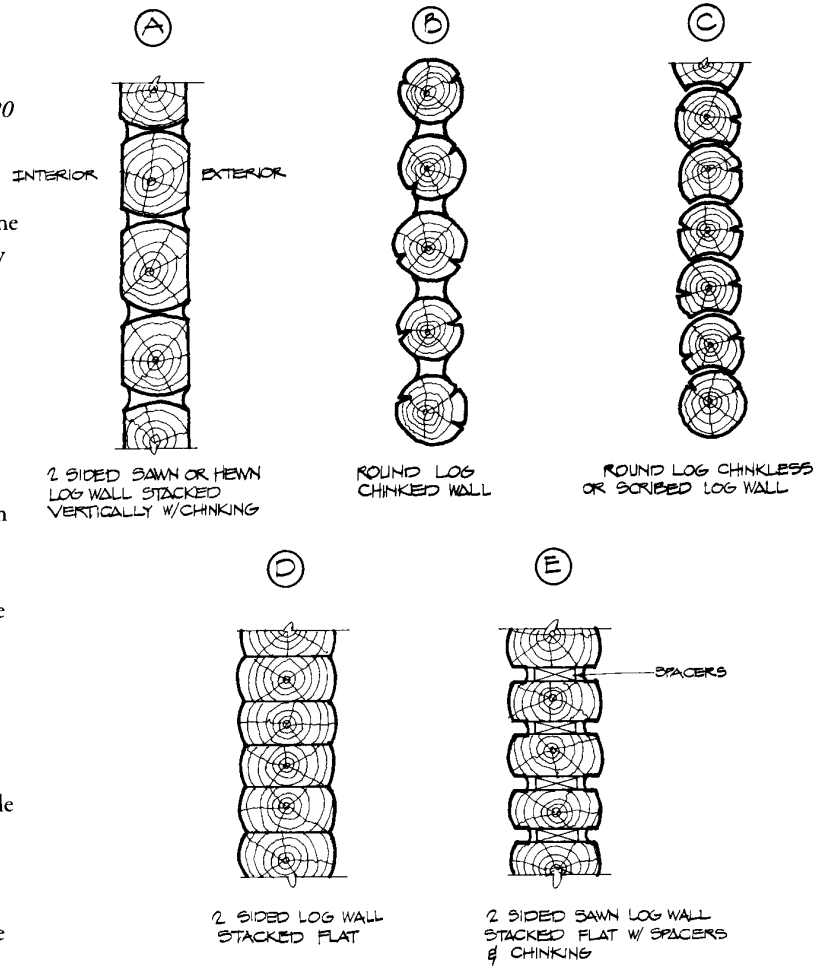



*Illustration 21*

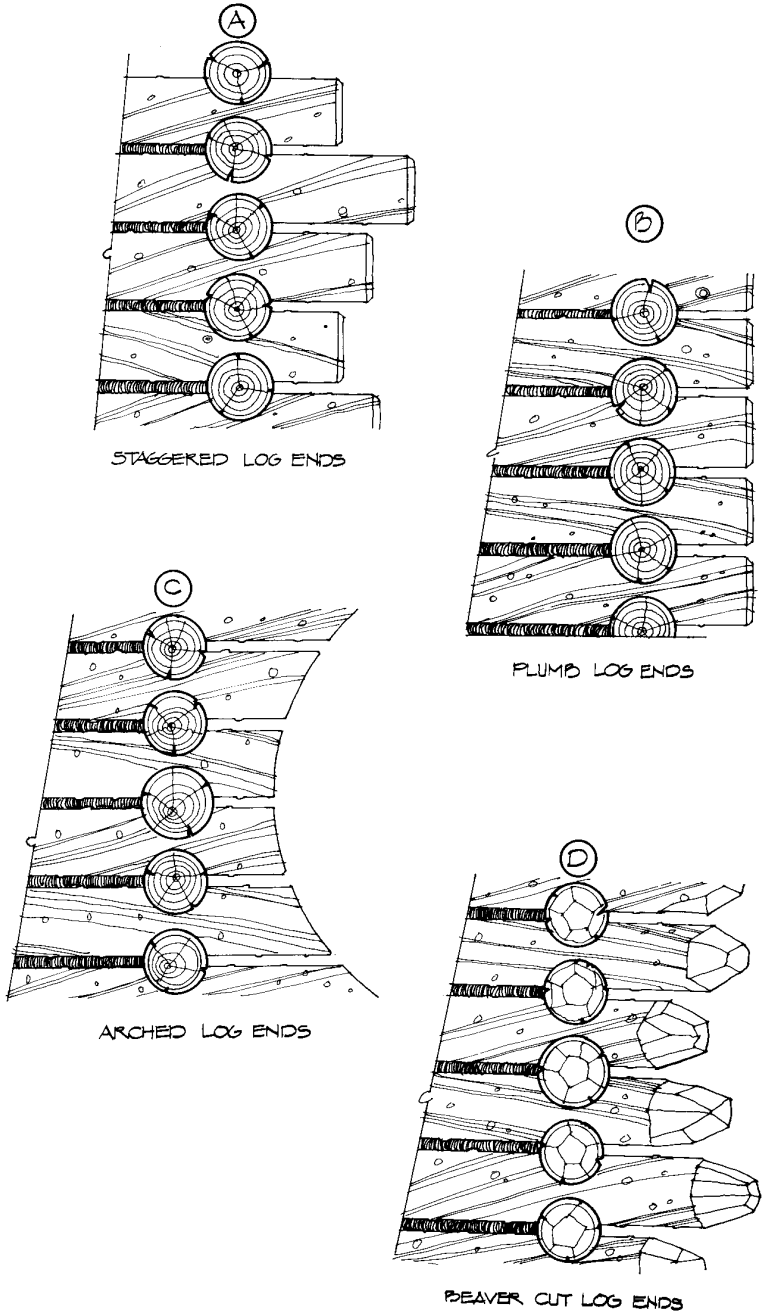


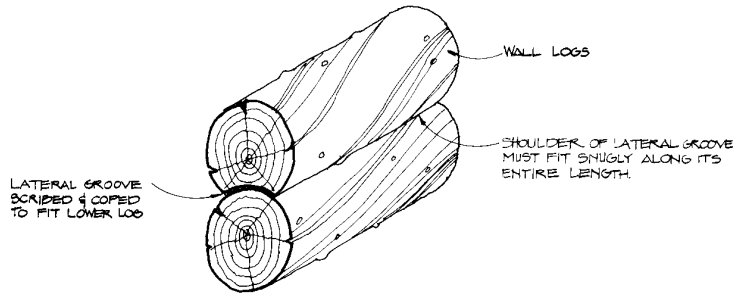

*Illustration 22*

**Chinked Verses Scribed Log Construction**

In the realm of log homes, there are two completely different building approaches. The first, which predominates in American logbuilding, is that of chinked construction, and it presents some advantages. Using seasoned material, the log work can proceed quickly, and the wood itself can be more irregular resulting in better log utilization. Electrical wiring is simplified because the wires can be hidden behind chink lines after the building has been erected.

Before the advent of the acrylic latex compounds, the chief drawback to the chinked style of building was the mortar itself. As pointed out in our discussion of this topic, the formulation of synthetic chinking compounds has eliminated problems that have plagued this building form for the past two hundred years. Ease of construction and traditional values have made chinked log homes the cornerstone of the hand crafted industry in the United States. In Canada, Europe and Japan however, a second chinkless or scribed log style prevails.

Logbuilding anchors its roots in scribed log construction, and there is one man who would not let this legacy slide into the mists of history. B. Allen Mackie of British Columbia, Canada has influenced the revival of traditional logbuilding like none other. His teachings have done more than just influence a whole generation of logbuilders—he created them. Exposure through his school in British Columbia, international workshops and his writings, have preached scribed log gospel to thousands of aspiring builders. He and his students have invented many different kinds of notches and developed innovative techniques for this method of construction.




SCRIBED OR CHINKLESS LOG JOINERY

*Illustration 23*

The appeal of the scribed log home is in its craftsmanship. All the logs must fit together perfectly. There is little room for error as the mated surfaces themselves provide a seal against the weather. This is both the strength and weakness of scribed log construction (see Illustration 23). A worker's skill and patience stands testimony to a perfectly scribed wall, where each log becomes a part of the log above and below. It's difficult to sustain this level of craftsmanship on the scale that is required by many log home companies to be competitive. The fact that so few of these buildings exist in the United States may be partly attributable to the direction set by the majority of home producers.

However, there are other building drawbacks that also play a role. One difficulty lies in keeping a well-scribed log home tight over time. Although builders well-versed in this construction go to great lengths to ensure that log shrinkage minimally affects the joints between the logs, it is difficult to maintain a complete seal throughout the life of the structure. This is especially true of homes built in dry climates such as the Intermountain West and southwestern parts of the United States.

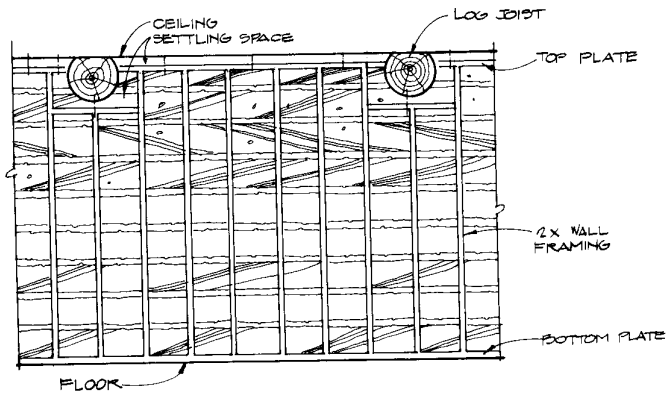
One innovative approach to this problem has been tried by several builders with success. After the structure has been completed, but before windows and doors are installed, urethane foam is injected into the lateral grooves and notches. When this foam cures, it expands and forms a tight seal within. While effective, this procedure can be both expensive and messy. Since the foam is under a lot of pressure, it will tend to ooze from any gap between the logs. When fully cured, this excess foam is cut away, but residues can remain on the logs that will prevent acceptance of stains or preservatives. To avoid this, preservatives should be applied before foaming.

In conclusion, it is not our intent to pit one building style against the other. Particularly in less dry environments, scribed construction can be a very viable method of building. If you have your eye on an existing home with gaps and air infiltration, keep in mind that the exterior can be caulked or chinked without affecting the scribed look inside. Also, remember that when building with green logs, full scribed joinery must be used since log shrinkage will cause early failure of any chinking. So, if you admire this building style, by all means pursue it—just make sure you have a knowledgeable builder both on and off site.

**Framing Considerations**

Early log cabins were simple structures built entirely of logs. On the other hand, contemporary log homes, even those built to traditional designs, tend to use conventionally framed walls on the inside. There are many reasons for this including the lower cost of conventional framing, the need for electrical, plumbing and heating chases, and, perhaps most importantly, for interior design considerations. Many owners prefer some relief from logs.

Since conventionally framed walls will not shrink and settle with the logs, there are different framing guidelines for log homes. Most importantly, framing members must not impede log wall settling (see *Illustration 24*), nor should the connections between the framing members and the logs prevent this movement (see *Illustration 25*). Additionally, any drywall intersecting a log wall should be kerfed into the logs so that as the building settles and logs shrink away, gaps won't occur (see *Illustration 26*). Making the kerf slightly larger than the thickness of the dry wall will ensure that the logs can move past the material without binding. This gap can be filled later with paintable caulk to match wall color. Other areas of concern occur where logs meet glass and tile. Make sure that there is sufficient separation between these materials so that log movement will not create a problem.



FRAMING WALLS FOR SETTLING

*Illustration 24*

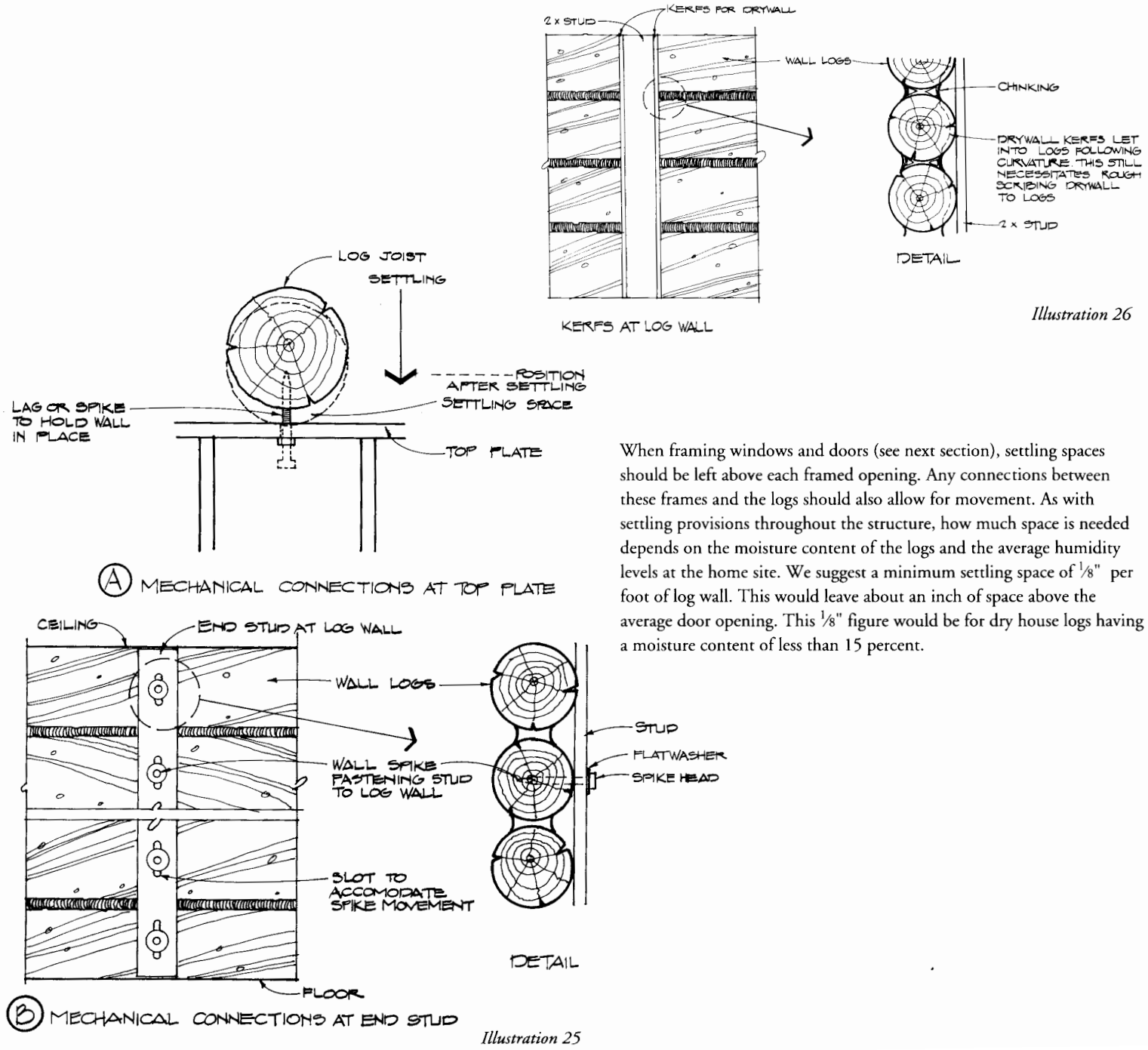



*Illustration 25*

When framing windows and doors (see next section), settling spaces should be left above each framed opening. Any connections between these frames and the logs should also allow for movement. As with settling provisions throughout the structure, how much space is needed depends on the moisture content of the logs and the average humidity levels at the home site. We suggest a minimum settling space of ⅛" per foot of log wall. This would leave about an inch of space above the average door opening. This ⅛" figure would be for dry house logs having a moisture content of less than 15 percent.

*Illustration 26*

**Mechanical Hold Down Connections**

There are a variety of hold-down connections *(see Illustrations 27)* for log walls. The one you choose depends, in part, on whether the logs are stacked directly on the foundation or laid up above the subfloor. Seismic conditions and local codes can also be a factor in design.

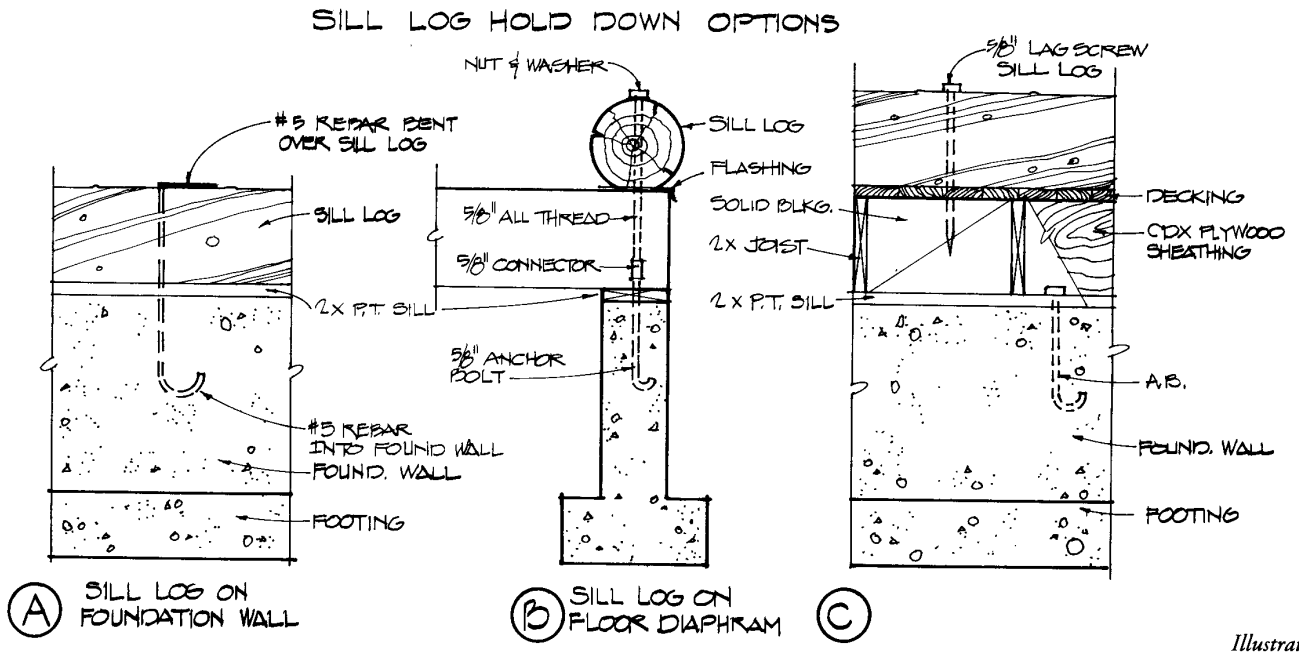
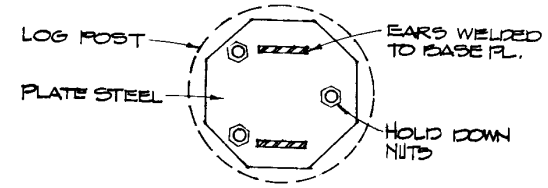


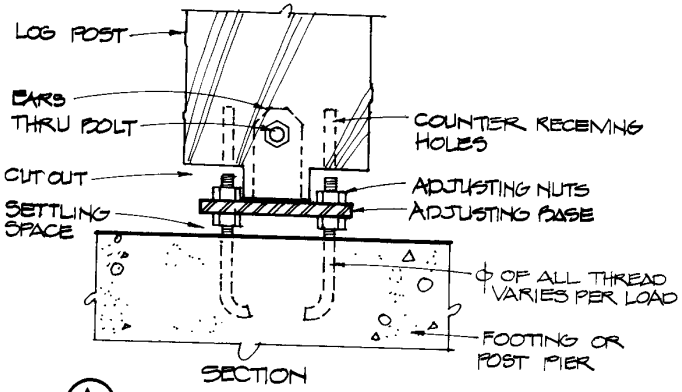

*Illustration 27*

**Design and Implementation of Settling Devices**

Mechanical settling devices can be as complicated as adjustable connectors or as simple as a wooden wedge (see *Illustration 28*). However, when using wedges or removable shims, make sure you have the ability to take the weight off the member when the time comes to make an adjustment. It does little good to have adjusting shims under a post that is too heavy to lift. It is also worthwhile to establish reference points around the structure so comparative settling measurements can be taken after the log work is finished (see *Illustration 29*). Without a benchmark from which to work, you are just groping in the dark.

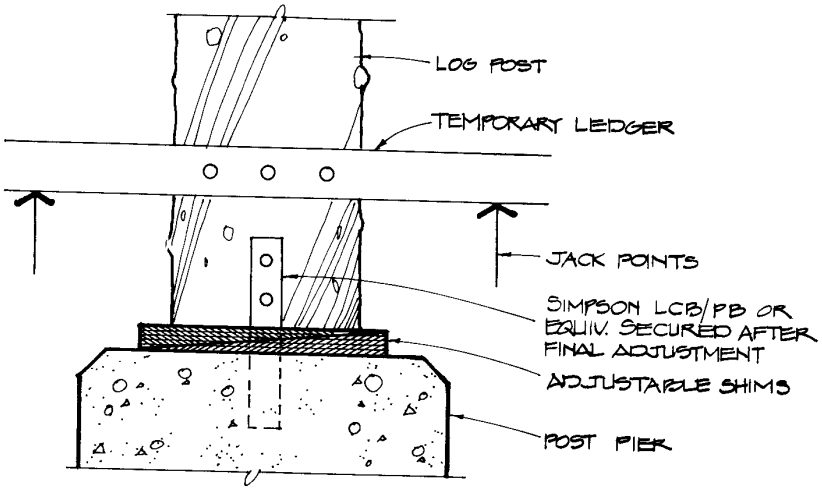



PLAN

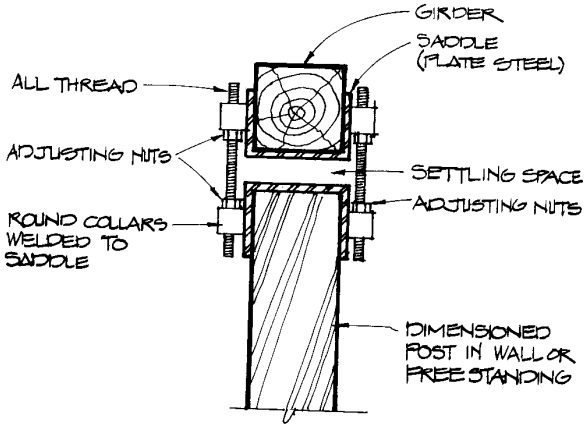



SECTION

Ⓐ ADJUSTABLE POST BASE




ADJUSTABLE BASE USING SHIMS



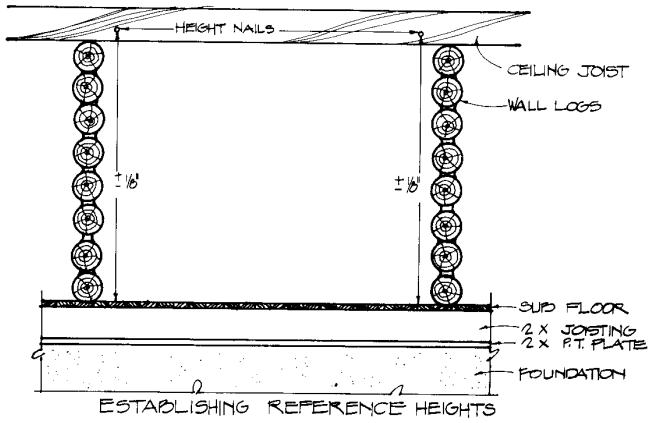

Ⓑ ADJUSTABLE CONNECTOR BETWEEN POST & GIRDER *

* SIMPSON MAKES A FLOOR BEAM LEVELER DEVICE (J/JP) SIMILAR IN DESIGN

*Illustration 28*

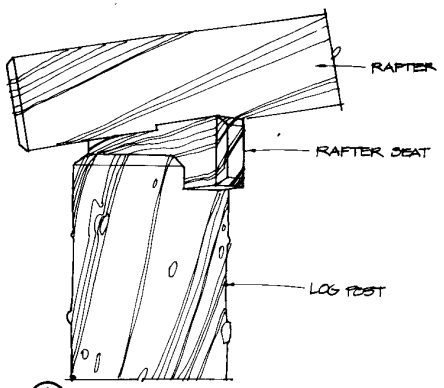
**Post-and-Beam Details**

Connections between the posts and beams in a log house can be varied and add much visual interest to the structure. Some of these connections are pictured here (see *Illustration 30*).

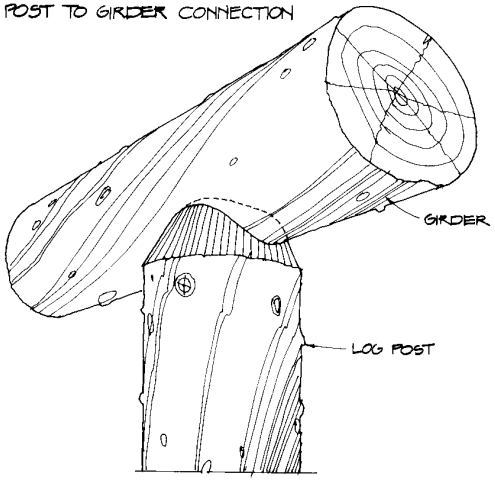



ESTABLISHING REFERENCE HEIGHTS

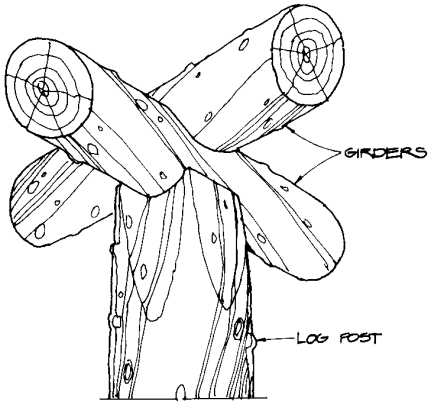
*Illustration 29*




Ⓐ POST TO GIRDER CONNECTION




Ⓑ POST TO GIRDER CONNECTION

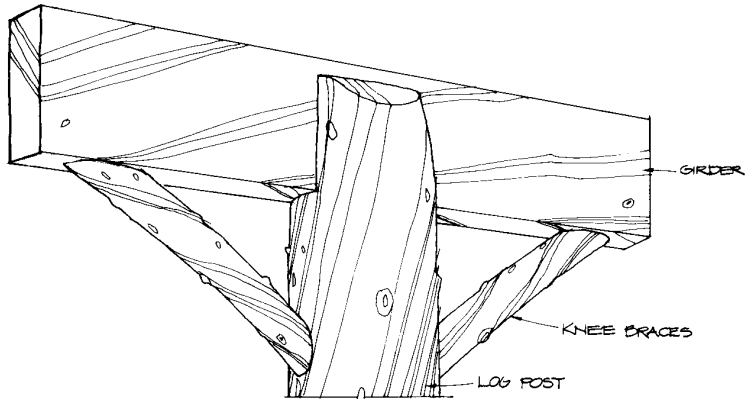



Ⓒ POST TO GIRDER CONNECTION

*Illustration 30*

**Electrical and Plumbing Details**

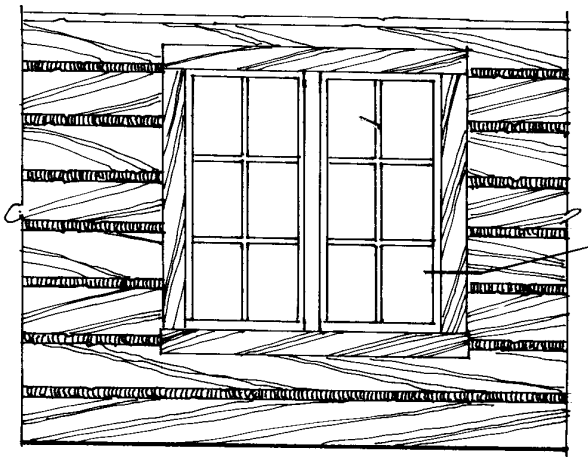
Previously, we noted how wiring can be hidden between the logs and covered with chinking. We also mentioned that framed walls will conceal electrical, plumbing and heating duct work. However, in the scribed log home, electrical wiring needs to be thought out a bit more carefully. In many cases, wiring needs to be run while the building is being erected. This is especially true for outside lights, receptacle boxes and switches. Otherwise, there is some opportunity to hide wiring behind door and window jambs. Installing electrical boxes in logs can be time consuming, and, when possible, it is best to install them in framed walls. Floor-mounted boxes can also be a time saver especially since wiring can be run through the crawl space.



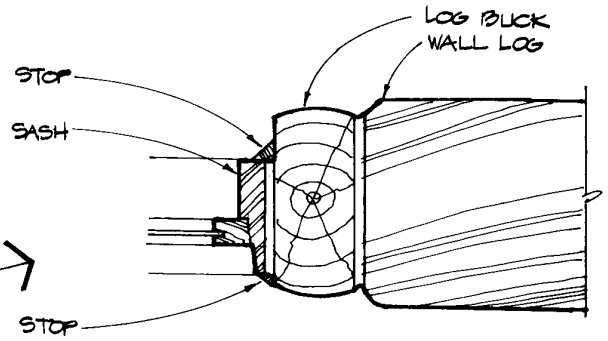

Ⓓ POST TO GIRDER CONNECTION

**Window and Door Framing Details**

There are a variety of ways to frame windows and doors while accommodating most styles and designs. It would be impossible to cover every option here, so we will illustrate the most common.
Log or timber "bucks" can make a rugged and handsome frame-work around a window or door. They work well in a log house because of their scale. Good craftsmanship in this area can permit the rough framing members (bucks) to serve as finished jambs with the addition of stop material to complete the installation (see *Illustration 31*). The thickness of the buck material scales out best at three to six inches. This detail can also carry to the doors located in conventionally framed interior walls (see *Illustration 32*), though most times, it does not. There are drawbacks to this framing method including costs in terms of labor and materials.



WINDOW IN LOG WALL

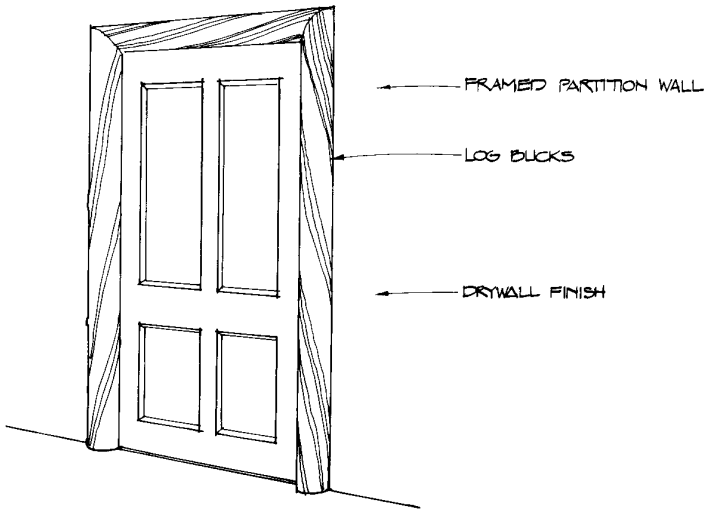



JAMB DETAIL

*Illustration 31*

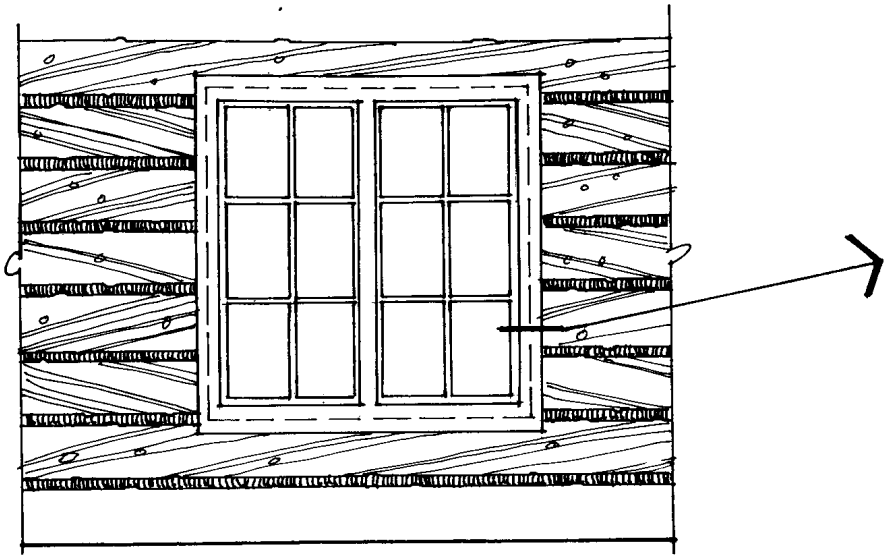
Another option entails the use of two-inch framing material for rough or finished jambs, and there are several ways to go about this. One way would be to use material wide enough to cover the biggest log in the cutout. This may range anywhere from ten to fourteen inches on an average wall built with ten to twelve inch logs. The jamb could then be cased, inside and out, using more conventional trim materials such as 1x4, 1x6 etc. This presents a more finished look to the opening and may be important, if, for example, you are building to a particular design such as the "Craftsman Style."

A third option would consist of using 2x4 framing material to provide a nailing surface for the window flange (see *Illustration 33*). These doubled 2x4s would also serve as a base to fasten exterior and interior trim. The top piece of trim could be fastened to the header log and permitted to slip past the jamb allowing for log settling. Or this head casing could be fitted snugly, fastened with screws for easy removal, then taken off and trimmed later as conditions warranted. This method of window installation is very cost effective in terms of both labor and material.




BUCK DETAIL IN FRAMED WALL

*Illustration 32*



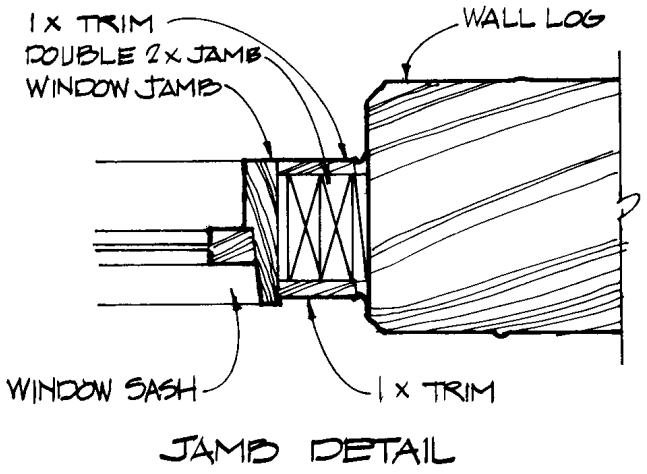




*Illustration 33*

**Finish Trim**

Running trim on a log house can, and should, be a very creative process. It seems that no two houses trim out in the same way. From scribing in end panels of cabinetry, to providing slip joints between partition walls and ceilings, there are many challenges to face in this aspect of log home construction.

It would be ideal if the log work could season for a year or two before fitting the trim. Since this usually isn't possible, the builder must again take shrinkage and settling into consideration as this work progresses. A guiding principle is if trim work is run to log surfaces, then generally it needs to be "let" into the logs. This holds true for drywall, soffit material, base, casing or crown moldings. No matter how carefully this material is fitted to the logs initially, joints will open up as the wood shrinks.