How to Build the Reelfoot Duck Call

By Fred Roe (FDR)

Introduction:

One of the earliest duck call designs is the Reelfoot style call. The call consists of 4 pieces. The barrel forms the structure of the call and holds the other pieces. The reed produces the sound, the wedge holds the reed to the tone board and the tone board provides an airway for the passage of air over the reed and out of the call.

My introduction to the Reelfoot style calls came in the form of a gift from my father. Seems a man named Earl Dennison had visited the local hardware store to sell some calls and one call followed my father home. I tried to learn to blow the thing, finally gave up and up it in a drawer

where it remained. I know now that the reed was too thick for a youngster to blow effectively. Maybe 50 years later I finally made it to Reelfoot Lake for a duck hunt and saw the calls in action. Wow! They were something when blown by an experienced caller so I began a study of antique calls from an engineer's perspective to see what made them tick. Now an antique myself, I thought it appropriate to try and make a call to see if the science I discovered during the study was indeed fact.

Antique calls vary but maybe 90% of the calls studied fall within a group that have a set of very common measurements. I concluded that this group represented what worked best. To build my call I first designed my reed and had a punch made. Applying best engineering practices I designed the reed on a CAD machine around a reference centerline, and checked for symmetry about that line. Then I made my reed design tool and die maker friendly by rounding the back corners of the reed. Basically the reed design is nothing more than 3 precisely spaced holes with the tangents connected.

After designing the reed I optimized my tone board and tone channel designs to work with my reed. What follows is a step by step instruction set for my method of building the Reelfoot call.

Building the call barrel:

My call barrels begin life as a 2X2 inch turning square. The Reelfoot call barrel has a 3/4 inch bore and the barrel is a nominal 4.5 inches long. I bore the 3/4 inch hole the length of the blank with my milling machine using a Colt brand brad point bit available at Home Depot. I let the barrel rest for a few days and then ream the hole using a 3/4 inch reamer purchased from Enco. The call barrel must have a short taper reamed or turned into the exhaust end to accept the wedge and tapered portion of the insert. I use a reamer to make this taper and hand turn the reamer to produce the correct taper depth. The depth of the taper in the barrel sets the location/length of the wedge/insert above the call barrel. A "too shallow" depth taper will let the insert fall out and be lost. Too deep and the wedge will disappear into the barrel and the insert will decrease the volume of air the call barrel can contain. Turn the reamer in carefully, check for fit, repeat until you get it correct. I like about 1/3 of the wedge showing. A suitable reamer is available from McMaster Carr catalog number 3018A6.

Building the Reelfoot call insert:

I use a one inch dowel for my inserts. Cocobolo is a favorite wood because it does not absorb moisture readily.

1. Cut a one inch diameter dowel to a 4 inch plus length. Square the ends on a disc sander or just square it on the lathe which is what I do. You need a little extra length so that you end up with a 4 inch minimum blank, with square ends, to make the insert from.
2. Using a center finding tool find and mark the center of the dowel on each end. Lightly “center punch” the center on each end.

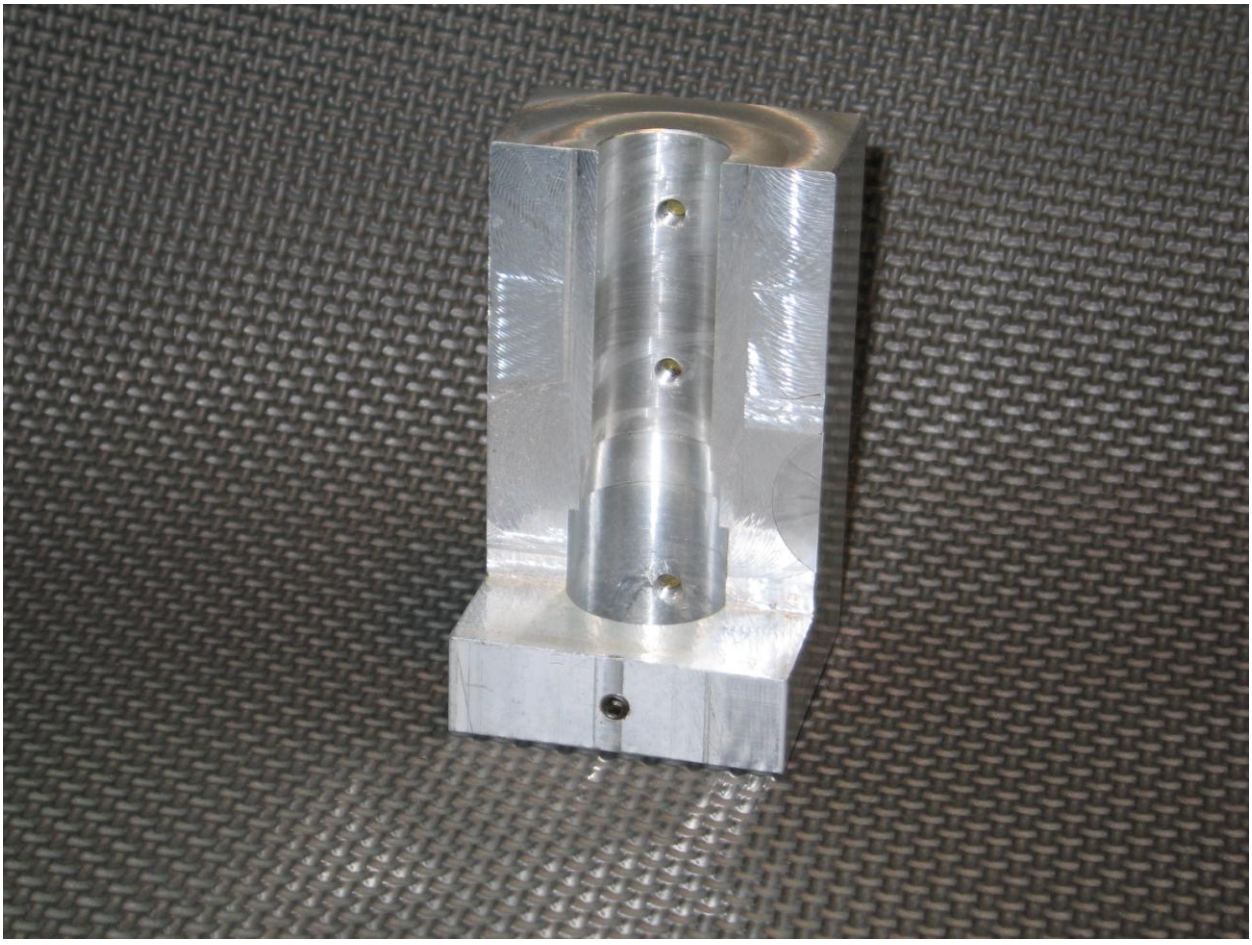
3. Mount the dowel between centers in the lathe. You need to choose which end will be the exhaust end where you will hold the call. All measurements will use this end as a reference.
4. Measure 1.5 inches from the exhaust end. Make a pencil mark at this point. I place the pencil against the wood at this mark and roll the lathe spindle, by hand, to mark the circumference of the dowel. I then take a skew chisel and cut the mark into the dowel. This mark represents the beginning of the tone board. The wedge sits on the tone board and holds the call's metal reed in place so this location is also where the large end of the wedge is located. In this picture the exhaust end is on the left.

5. Measure 2.200 inches from the exhaust end. Make another pencil mark, place the pencil against the dowel and again roll the lathe spindle to produce a second ring around the dowel. This measurement represents the approximate location of the other end of the wedge. An ideal wedge will measure 0.680 to 0.720 inches in length (front to back) and

both ends of the wedge will be square to the bottom of the wedge and parallel to each other.

6. Turn the remaining portion of the dowel to 0.750 inch minus (near 0.740). Remember to allow for sanding the insert. I bore my barrel blanks to 0.750 inch and let them sit for a few days. I then ream the bore again to 0.750. The insert should fit the barrel bore with a little clearance so assembly/disassembly will not crack the barrel and/or the barrel will not swell and lock the insert in place.
7. Turn the area of the insert between the two pencil marks to match the taper you reamed or turned/sanded into the call barrel to lock the wedge/tone board insert into place. At this point the insert will have a straight section that is 0.750 inch minus in diameter, a tapered section that represents the location of the wedge that locks the reed in place and the remainder of the insert where the hand will be placed to hold and operate the call. In this picture the exhaust is on the right.

8. Remove the insert from the lathe centers and retain the live center in the tail stock. Remove the drive center from the headstock and replace it with a 3/4 inch collet chuck.
9. Mount the 3/4 inch portion of the insert in the collet chuck using the live center in the tail stock to help align/center the insert. Tighten the collet chuck. Check for runout and readjust if necessary to minimize any runout.
10. Remove the live center from the tailstock and mount a drill chuck with a 5/16 inch drill in the tailstock. Drill a centered 5/16 inch hole 1.5 inches deep in the exhaust end of the insert. The objective is to drill just deep enough to reach the back of the wedge. Adjust the depth of the drilled hole accordingly. I use a stop collar on the drill bit to absolutely control the depth. If you want a call that is easier to blow, but not as loud, use a 19/64 drill instead.
11. Remove the 5/16 inch drill from the drill chuck and mount a 1/4 inch drill in the drill chuck. Drill to a total depth of 1.750 inch measured from the exhaust end of the insert. The purpose of the second drill is to extend the tone channel beyond the back of the wedge to provide clearance for the shank of the 1/4 inch round nose end mill that will be used to cut the tone channel. Again, I use a stop collar on the 1/4 inch drill bit.
12. Remove the 1/4 inch drill bit and mount a 3/16x1/2 inch, 6 step, step drill in the drill chuck. I use the step drill to remove additional wood from the drilled hole in the exhaust end. I hand turn the spindle and advance the drill until I reach about half way of the 7/16 inch step. Stopping here allows the hand reamer that will be used later, to remove all the steps from the exhaust channel resulting in a smooth tapered exhaust channel.
13. Turn a funnel shaped exhaust at the very end of the insert.
14. I now sand and rough finish the exterior of the insert from the wedge area to the exhaust. I apply the decorative rings by cutting groves with the skew chisel and burnish the groves with a wire while the lathe is running. I re-sand this area to get rid of the overflow from the burnished rings.
15. Remove the insert from the lathe.
16. I use a fixture, of my design, to hold the insert blank so that I can make the tone board cut. I cut my tone board slightly above the centerline of the insert blank but I have studied antique calls that have their tone boards cut on the centerline of the insert and others that have their tone boards cut below the centerline of the insert blank.



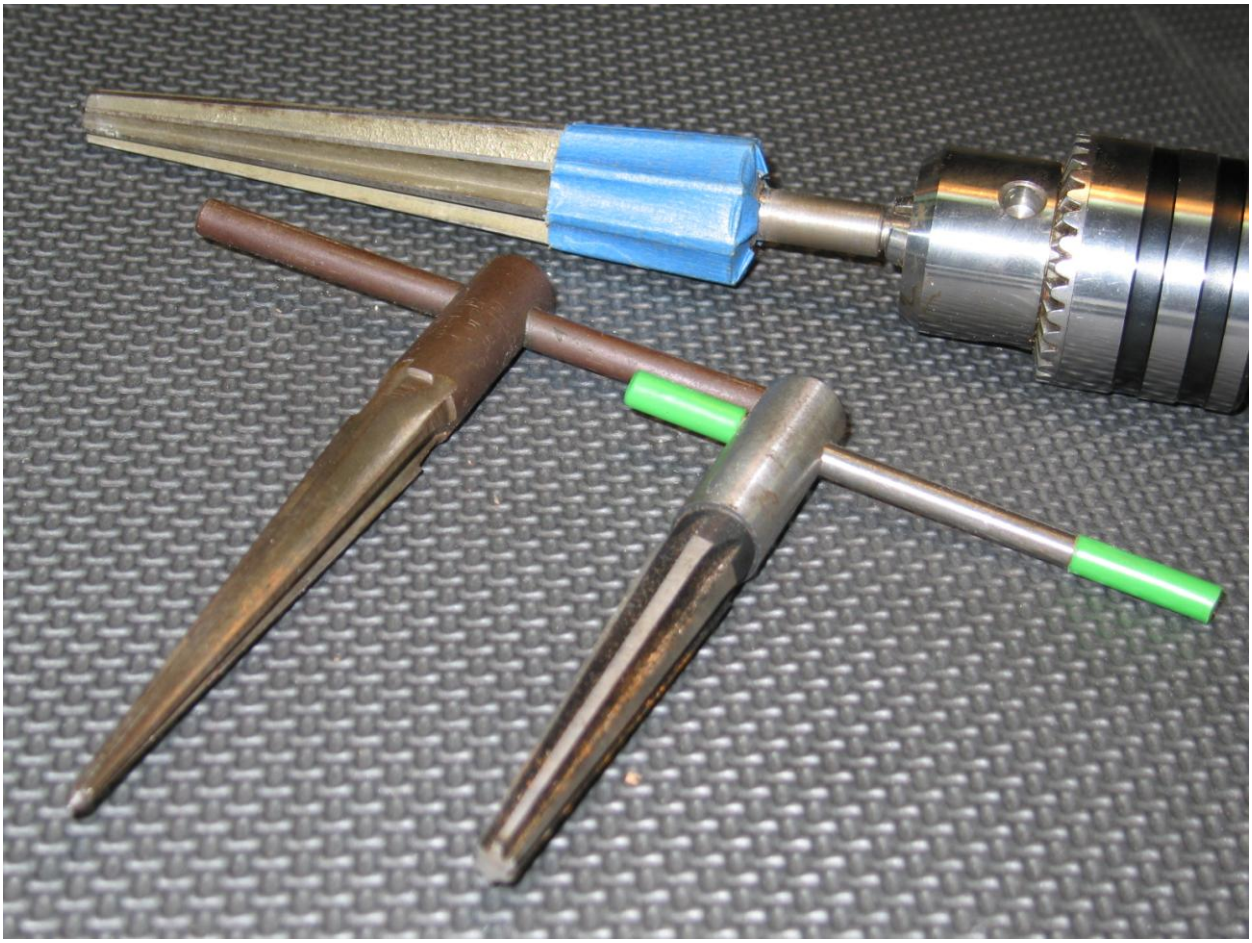
17. Place the insert in the tone board cutting fixture. The fixture has screws to adjust the position of the insert in the fixture. The insert should set level in the fixture when the screws are properly adjusted.
18. I use a milling machine to cut the tone board. You could also use a band saw or scroll saw to cut your tone board but you will need a heat treated steel fixture. Clamp the fixture, with the insert properly mounted, in the milling machine vise. I use a parallel bar as a spacer in the vise so that the fixture sets partially above the vise jaws. The fixture should be clamped level in the vise. I stick 2 pieces of masking tape (one on top of the other) to the fixture tone board cutting surface as a depth reference. The cutting depth of the mill is set to cut away the top layer of tape, only, so that the cutter almost, but does not, touch the surface of the jig. Note: By the way if you don't have a mill you can also use an X,Y table and vise on a drill press to do the same thing. A router cutter in the drill will cut the waste away and milling the tone channel only uses a 1/4 inch round nose end mill which ,since we are only cutting wood, should put little side load on the

quill bearings. You can also do the same thing with a router table I bet. Don't run out and buy a mill. Be creative! And by the way if you do buy a mill they are great for making Turkey calls! But I digress.

19. I now cut the tone board. To cut the tone board, I use a 1 inch multi-flute end mill with the depth of cut set to remove one layer of masking tape. The first cut is a cross cut made just in front of the reference mark that locates the back of the wedge. I then adjust the cross cut and cut again to just removing the reference mark from the wedge/tone board portion of the insert. These cuts produce the portion of the tone board where the wedge will sit. The next cut is along the length of the insert and removes the remainder of the waste wood from the tone board surface. I now have a flat tone board with a ledge at the back that will become the mating surface for the back of the wedge.
20. Remove the fixture, with the insert, from the milling machine vise. Using a flat reed blank, set the reed in place and mark the tip profile of the reed on the tone board surface. Mark the center line of the insert's tone board by measuring off the side of the fixture. Measure 2.1 inches along the centerline and mark the centerline near the reed tip. This mark will be the reference mark for the beginning of the tone channel cut.
21. I now cut the tone channel. The tone channel is cut at a 6 degree angle referenced to the centerline of the insert. Change the milling cutter to a 1/4 inch round nose end mill. Place the fixture in the milling vise; raise the exhaust end of the fixture by sliding a 1/4 inch dowel pin or a 6 degree wedge under the exhaust end of the fixture to set an angle of 6 degree. Clamp the fixture at this 6 degree angle in the milling machine vise. Center the 1/4 inch ball nose end mill cutter over the 2.1 inch mark on the centerline. Adjust the cutter depth to just touch the tone board surface then increase the depth of cut by 0.045 inch. This is the beginning of the tone channel. Now cut along the centerline toward the exhaust end of the insert until the cut hits the hole already drilled from the exhaust end. I now cut backward to near the start point and raise the cutter from the tone channel cut. This cut and re-cut produces a smooth tapered tone channel of the correct depth that intersects the exhaust channel near the back of the wedge. Note: original calls had their tone channels made by drilling 2 holes. The first hole is drilled to the back of the wedge the same as I do. The second (1/4inch) hole is drilled at a 5-7 degree angle to the centerline of the insert and begins at the back of the first hole. When you cut away the tone board waste the remaining ¼ inch hole in the tone board is now tapered as a result to the angle drilled. Lots of variables result depending on how accurate your angle is drilled. This is probably why the tone boards on some antique

calls are cut on center or below center; to correct mistakes in drilling that resulted in tone channels that were too long.

22. Turn off the mill and remove the fixture, with the insert still mounted, from the milling vise.
23. I use a scraper made from a 7/32 inch chain saw file to cleanup the tone channel cut. Just grind the end of the file square to make the scraper cutting surface. I also use a 1/4 inch wood carving gouge as required to complete the cleanup.
24. Once the tone channel has a smooth taper I ream the exhaust end of the insert. I use a repair man's reamer (McMaster Carr number 3018A5) to open the step drilled portion of the exhaust channel to smoothly connect the tone board cut and the drilled exhaust end. My reamer tapers from 1/8th to 1/2 inch. I insert the reamer and hand turn, withdraw, clean and repeat until I have nearly reached the 0.5 inch end. This reamer cut connects the tone channel cuts, produces a continuous taper in the exhaust and should provide a 5/16 inch diameter throat at the ledge where the back of the wedge sits. I also have another repair man's reamer that I have shortened (cut off) which I use when I only want/need to ream the area from the exhaust end to the back of the wedge. Sometimes this area needs a little extra work and the modified reamer can work this area without getting into the longer tone channel.



The top reamer in the picture is the reamer I used to ream the taper in the exhaust end of the barrel. The blue tape marks the depth. The reamer with the green handle is the modified handyman's reamer that is used to work the exhaust hole only. The remaining reamer is an unmodified handyman's reamer.

Making the wedge:

25. I make the wedge from a separate piece of wood. Cut a block of wood about 1"long by 3/4" wide by 3/4" thick. You can also use a short section of a one inch dowel which is what is shown in the pictures. The block will set on the tone board with the one inch dimension oriented from side to side. The side that will set on the tone board has to be flat. I use a disk sander to flatten that side which will become the bottom of the wedge. The two parallel sides that join this bottom and form the other 3/4 inch dimension will

be the front and back of the wedge. I turn the wedge 90 degrees and use the disk sander to flatten one edge or one end if using a dowel. This edge/end will become the back of the wedge and will fit against the tone board shoulder. I then mount the wedge blank in the milling vise such that the sanded edge/end is down and tighten the vise. I then use the milling machine to mill the remaining edge/end of the wedge parallel to the other end and to mill the wedge overall length to 0.680 to 0.720 inches, nominal, as measured from front to back.

26. I now have a wooden block with 3 machined surfaces. I place the block on the tone board to check the fit. The finished wedge will set against the tone board shoulder with no gap if we machined everything correctly. The wedge will extend 0.680 to 0.720 inches down the tone board and overlap the board with enough material to allow the turning of the block to match the taper of the insert at this location. During the machining of the tone board we cut away a portion of this tapered section of the insert. Now we are replacing that section with a removable wedge.

27. Once I am satisfied with the fit of the wooden block I place a drop of CA Gel glue on each side of the tone channel and press the wedge block into place on top of the glue. Give the glue 30 seconds to dry (check by pulling on the block) and then mount the insert back into the lathe. You can mount the insert between centers or use the collet chuck with a live center in the tail stock. Check to make sure that the wedge block does not hit the lathe tool rest.

28. With the insert mounted in the lathe turn the wedge block to the taper that matches the existing taper on the remainder of the insert.
29. To finish the insert I sand the exhaust end of the insert, including the tapered area and wedge to a 600 grit and polish the turning.
30. Remove the insert from the lathe and separate the wedge from the tone board by sliding a tapered punch into the tone channel underneath the wedge and tap the punch lightly until the wedge pops free. Clean the glue residue from the bottom of the wedge (sand paper on a flat surface) and the tone board. I use a fine file to maintain the flat

surface of the tone board. I then burnish the tone board surface using a polished steel rod.

31. We now have a finished insert and wedge that should fit into our barrel. Slip a metal reed under the wedge and check the fit of the insert, wedge and barrel. Adjust the fit as necessary. The wedge should fit into in the barrel taper by a least 1/2 to 2/3rds of its overall length. I prefer 2/3rds.

32. The next step will be to tune the metal reed.

Tuning the metal reed

33. The metal reed sits on the tone board and when properly tuned produces the sounds of the mallard hen when blown properly. The reed can be successfully made from a variety of metals. Antique calls often used 0.006” phosper bronze for their reeds. Modern calls use either stainless steel or brass (half hard) shim stock in thicknesses of 0.005” (stainless) or 0.006” (brass). I use the 0.005” stainless, purchased from Enco, for my calls. Monel is also sometimes used. The reed can be made by hand or cut by a punch and die. The reed must fit the tone board and cover the tone channel. The reed to fit my tone board design is approximately 2.3 inches long and tapers from 0.735 inches wide at the back to a 1/4 inch radius at the tip. The reed sits against the back of the tone board, is covered by the wedge and extends to cover the tone channel. When the insert, with

the wedge and reed in position, is inserted into the call barrel the wedge clamps the reed to the tone board.

34. The properly adjusted reed should form a gentle continuous curve in relation to the tone board. There are three possible adjustments that can be made to the reed:
    a. The reed curvature can be increased to alter the tone in the "bass" direction.
    b. The reed curvature can be decreased which will result in a higher pitch note.
    c. The reed can be trimmed from the back (shortened) to decrease the bass.
35. To place a curve into the reed I place the reed on a flat metal surface, place a polished metal rod on the reed with my right hand, press down lightly, grasp the back of the reed with my left thumb and forefinger, lift the back of the reed up slightly and gently pull the reed toward my body. The result should be a slight curvature in the reed. Mount the reed in the call and try the tone. Repeat the process until the curvature produces the sound of a duck. Turn the reed over and repeat the process to decrease the curvature. Howard Harlin's book contains Tom Turpin's method for tuning a Reelfoot call. This is one area where practice makes perfect. You should note that all reeds are not created equal even from the same punch. When using rolled shim stock the reed should be punched or cut in the same direction as the strip was rolled. Reed material has a natural tendency to curl in a particular direction. You have to find that preferred direction, the same as using Mylar in an Arkansas call and then work the reed with the natural curl up. Start with some gentle curl in the reed. Assemble and blow. As you repeat the process you will reach a point where the call will quack but has no range. I you blow hard the call will immediately lock up. Continue to gently add curve to the reed until you hit a magic point where the call will really sing. If you go too far just turn the reed over and take out some of the curve. If nothing else works you can trim the reed length, starting from the back. If you have trouble with a particular reed just chose another and start over. As I said before all reed are not created equal even from the same punch. Also check any reed for a bur along the edge that was created when the reed was punched. If a bur is present remove it with a fine file or sandpaper. The bur effects the flexibility of the reed

Conclusion:

My purpose in providing this instruction set is to give call makers with an interest in Reelfoot calls a place to start. Without readily available information interest in making Reelfoot calls will continue to decline until the craft will either die or be on serious life

support. Information plus experience leads to knowledge and knowledge leads to innovation. Now, get out on those lathes and try making one! It's not that hard!

Fred Roe
A "Reelfoot" call maker

Sources:
Wade Carpenter made my reed punch and also has the capability to make my fixture design from heat treated steel. Contact Wade @ WEBfoot custom calls.