

Joel

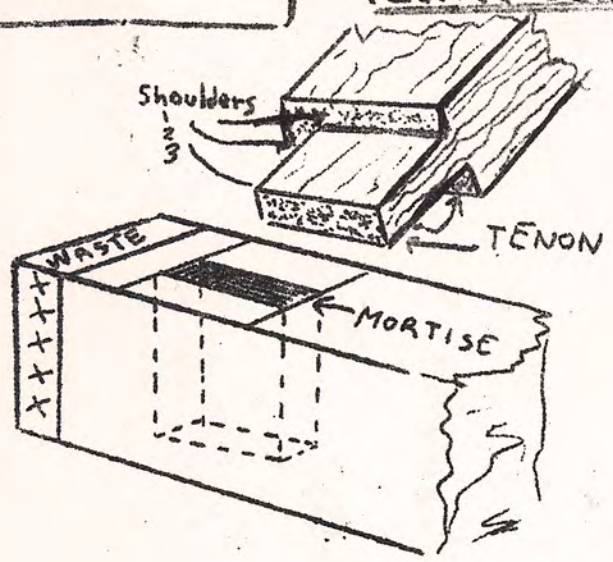
STUDENT'S NAME

CLASS:

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YWCA : CRAFT STUDENTS LEAGUE
WOODWORKING CLASS
Instructor :
Maurice Fraser

MORTISE AND TENON JOINT



3. Shouldered Tenon - Stub Tenon
Blind Mortise
(Not cut-through)

GENERAL PROCEDURE:

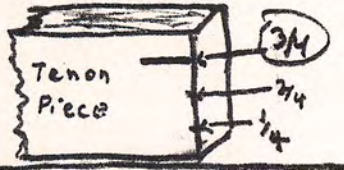
1. Plan the tenon: Lay it out roughly.
2. Lay out mortise from planned tenon.
3. Cut mortise - bore and chisel.
4. Lay out tenon from actual mortise.
5. Saw out tenon.
6. Chisel-trim if necessary, and fit.

LIST OF TOOLS:

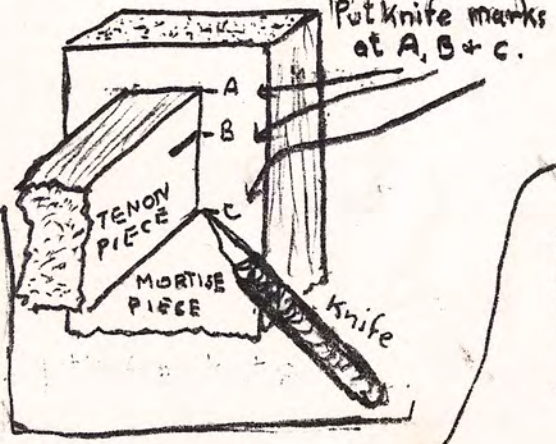
- 1) Mortise gauge
- 2) Try square
- 3) combination square
- 4) Marking knife
- 5) Sharp pencil
- 6) six-inch rule w/ 1/32's
- 7) Brace & bit and
- 8) Depth stop
- 9) Awl
- 10) Chisels
- 11) Masking Tape
- 12) Mallet
- 13) Dovetail saw (or tenon saw or back saw)
- 14) C-clamps
- 15) Bench clamps
- 16) Vise.

I. MORTISE - LONG DIMENSION IS MARKED OUT FROM THE ESTIMATED TENON = 3/4 WIDTH OF TENON PIECE

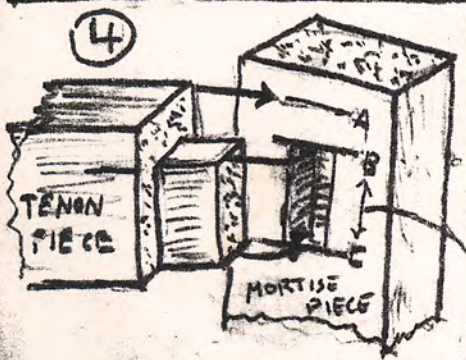
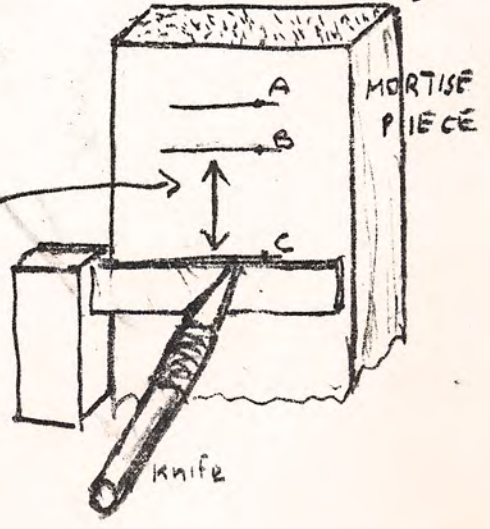
① Make pencil mark at approx. 3/4 of the width, on the Tenon piece.



② Place the Tenon piece against the Mortise piece exactly where you want the two pieces to go together.



③ Extend these points across the Mortise piece with knife and square.



You have just laid out the long dimension of the MORTISE (between B & C.)

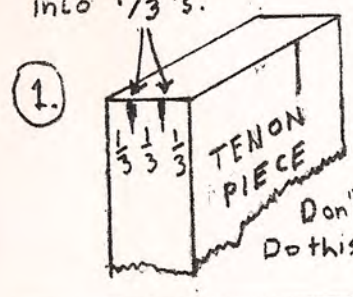
II MORTISE - WIDTH, OR NARROW DIMENSION MARKED FROM ESTIMATED TENON = 1/3 THICKNESS OF TENON PIECE

Make pencil marks on tenon piece dividing the thickness (edge) into 1/3's.

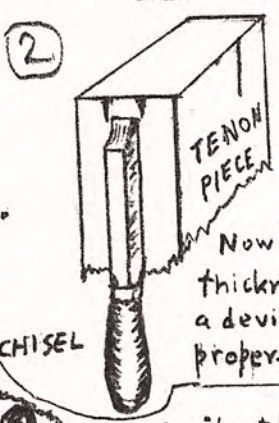
Select a chisel to match this 1/3 thickness (preferably a little under rather than over.)

Measure chisel width with 6" rule but add 1/16" as a safety margin.

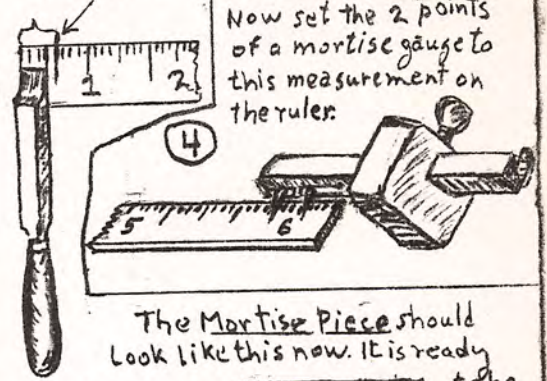
Now set the 2 points of a mortise gauge to this measurement on the ruler.



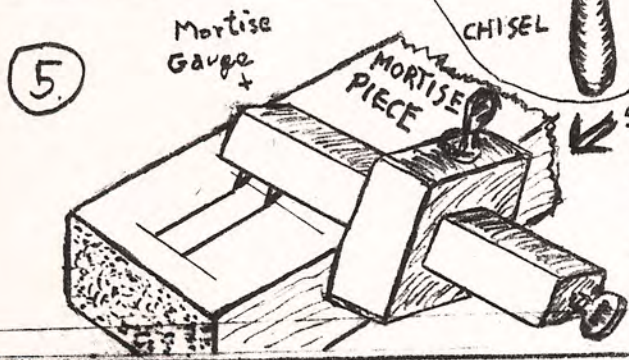
Don't measure. Do this by eye.



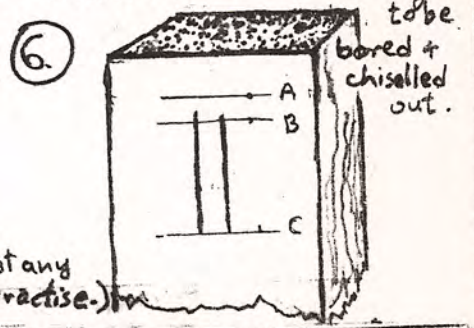
Now forget the 1/3 thickness. It was just a device to select a proper-sized chisel.



The Mortise Piece should look like this now. It is ready to be bored & chiselled out.



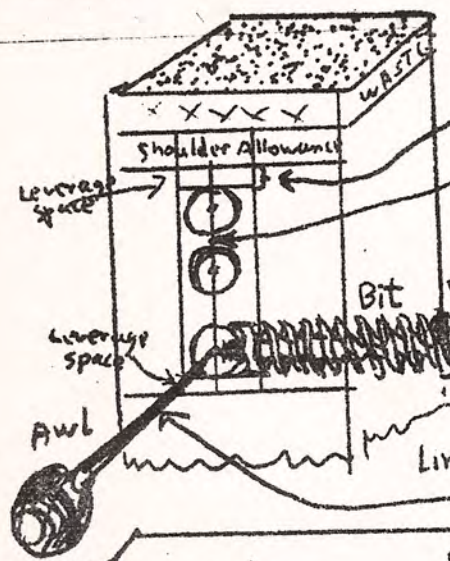
Scribe the double line onto the Mortise Piece with the mortise gauge you just set. Run it down the center, or thereabouts for this exercise. (Almost any place is possible in actual practise.)



III MORTISE DEPTH - BORED

A. BEFORE BORING

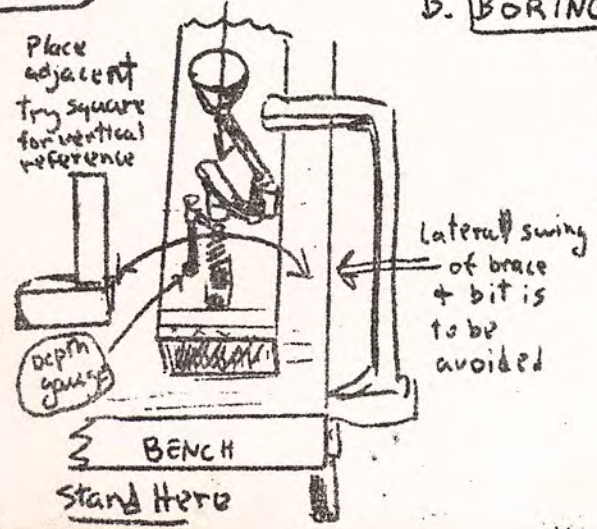
NOTE: Drill bit must be SAME SIZE as chisel!!



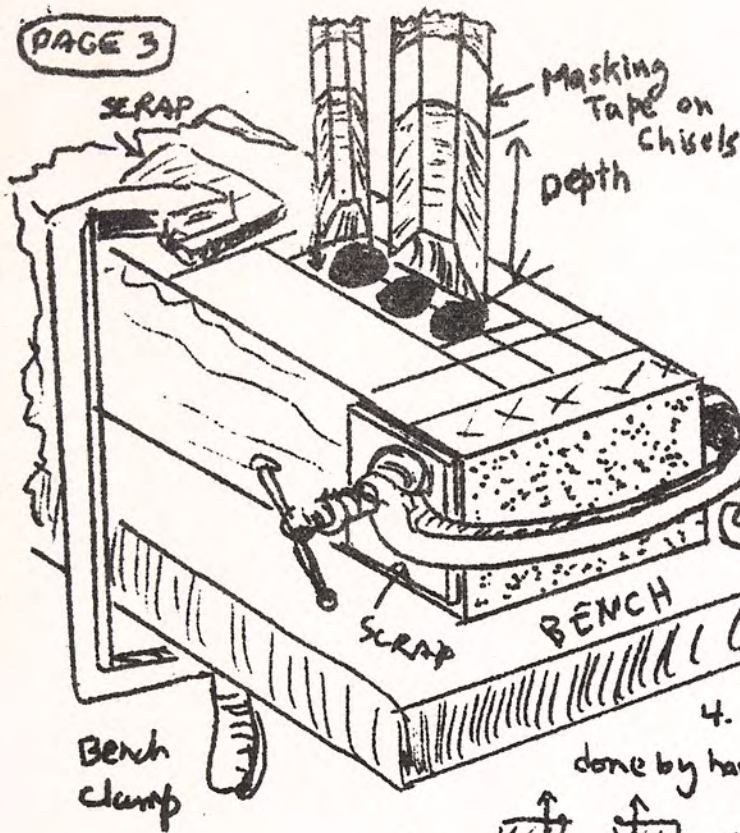
1. Pencil in 'leverage spaces' ($1/8"$ to $3/16"$) for chisel to rock on.
2. Scribe center line for accurate bit placement: use 6" ruler and knife. Be accurate within $1/32"$.
3. Select a bit the same size as chisel arrived at above (Step II, 2.) and "eyeball" the number of holes possible within the space. Locate end holes first, then the center ones. Do not overlap holes - they bore poorly.
4. During the "eyeballing" above prick starter holes onto center line with awl: this should correspond to spur center of the bit in position. Don't press to hard

B. BORING MORTISE

Mortise depth is 2 to 3 times greater than its width.

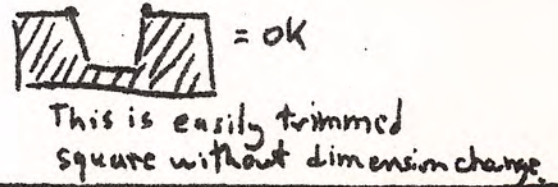
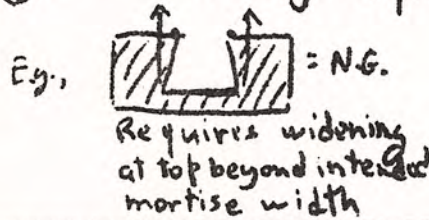


1. Plan to bore about $3/4$ of the way through: attach depth gauge to brace & bit - set it accordingly (use ruler).
2. Clamp work to bench.
3. Stand at end of piece where you can watch brace & bit and prevent its leaning side to side when turning handle. There is more tolerance for end-to-end motion. Upright try square may aid eye.
4. Bore end holes first. Press brace handle firmly downward while boring. Blow away chips often. Stop as soon as depth gauge touches wood.

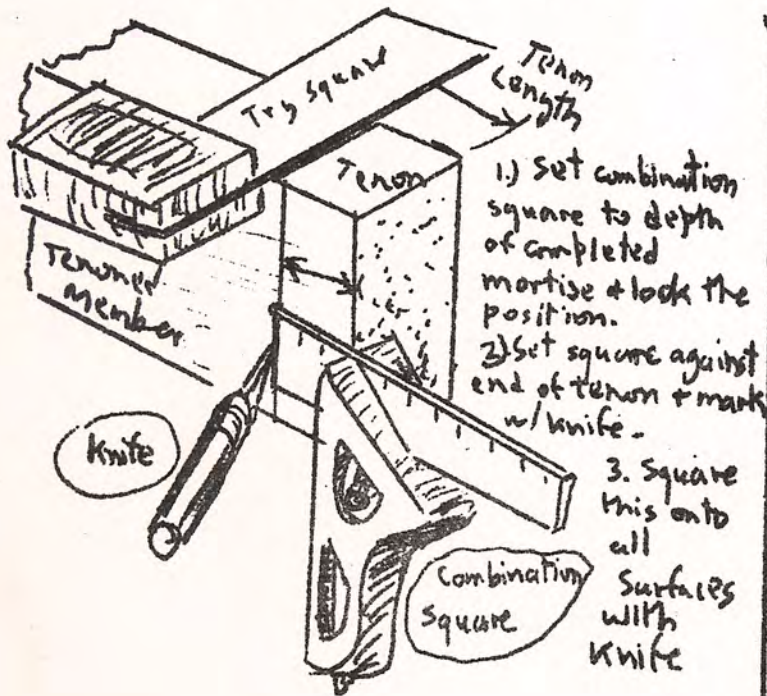


IV MORTISE - CHISELLED OUT

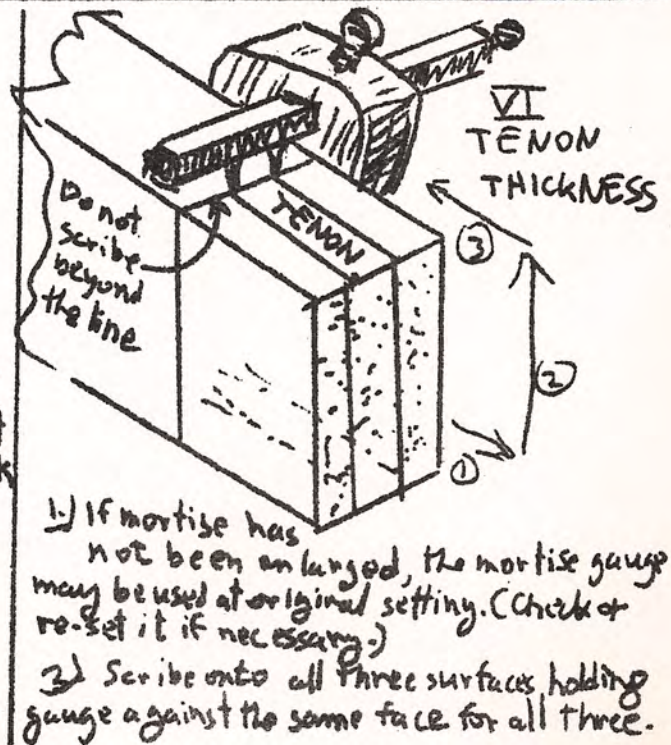
- 1.) Clamp sides with C-clamps if stock is very thin or dry to prevent splitting under heavy chiselling.
- 2.) Mark depth on chisels with masking tape. Use depth decided on when setting depth stop in step III B. Measure w/ 6" rule.
3. Chisel with the bevel facing the wood being removed: watch chisel back when malleting, to insure its being vertical. Leave a border of unremoved wood next to the scribe lines along the length. Remove this with a wide chisel when trimming sides of mortise.
4. Final trimming along sides & end may be done by hand pressure alone. Take care not to widen inward.



V TENON LENGTH

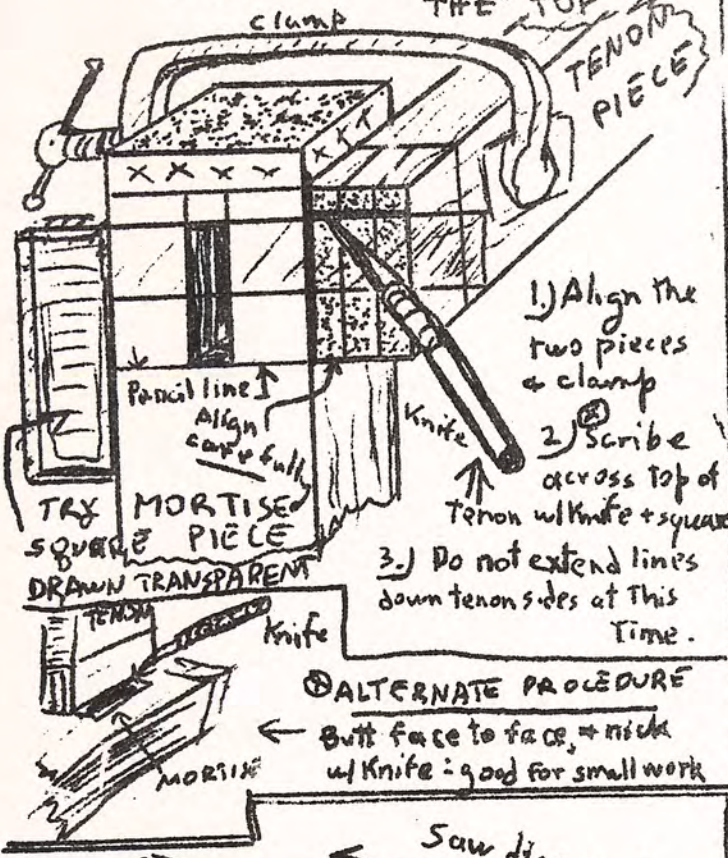


- 1.) Set combination square to depth of completed mortise & lock the position.
- 2.) Set square against end of tenon & mark w/ knife.
3. Square this onto all surfaces with knife

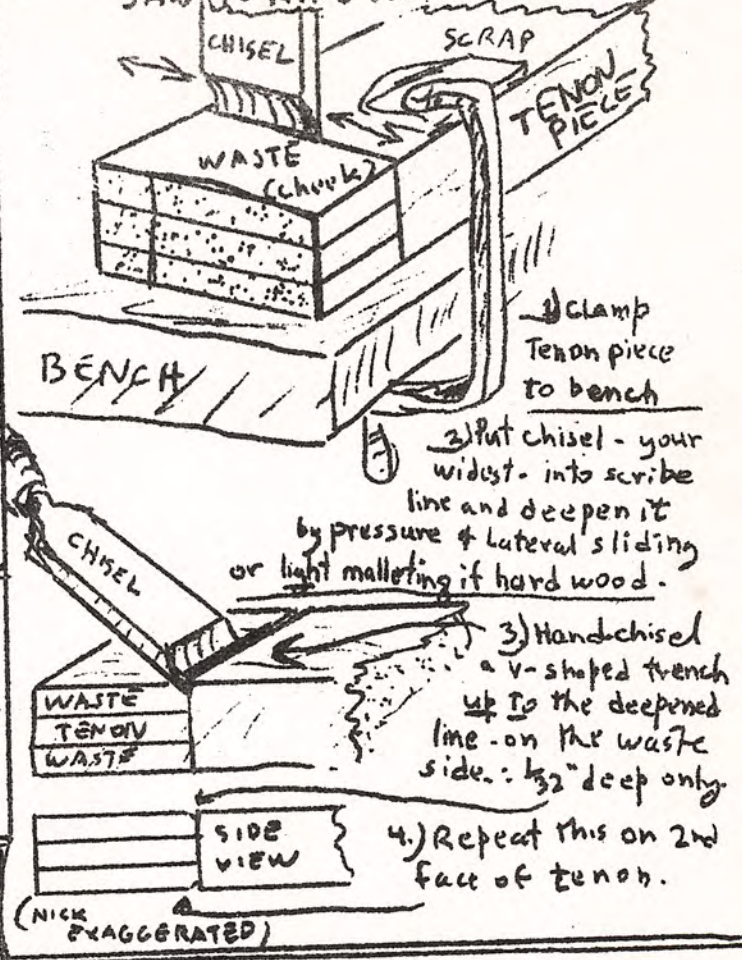


- 1.) If mortise has not been enlarged, the mortise gauge may be used at original setting. (Check or re-set it if necessary.)
- 2.) Scribe onto all three surfaces holding gauge against the same face for all three.

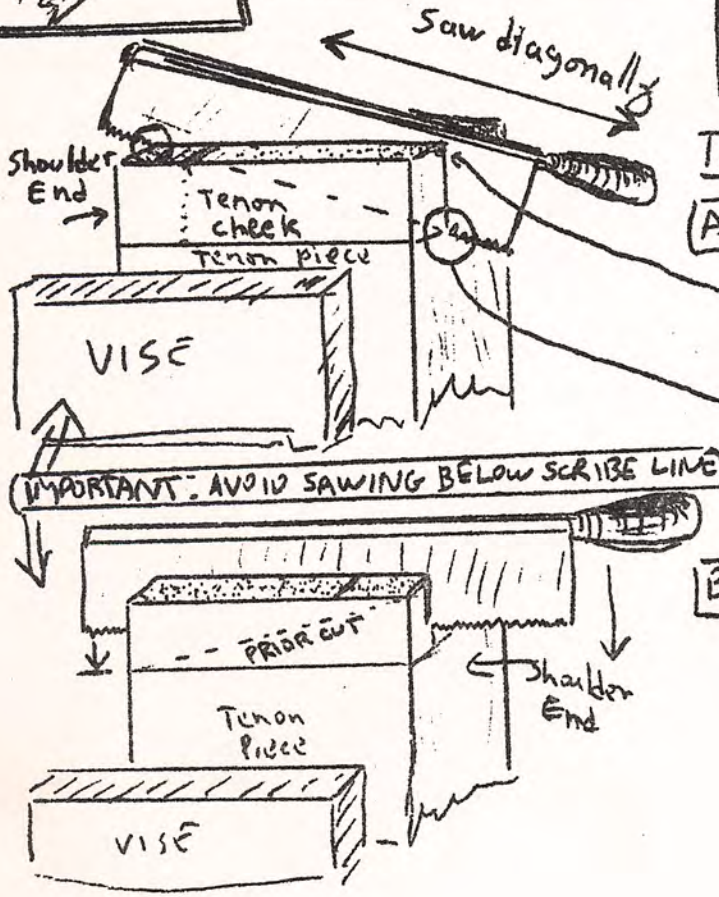
VII TENON WIDTH
TOP SHOULDER MARKED ACROSS THE TOP



VIII CHISEL A CHANNEL FOR THE SAW TO RIDE IN

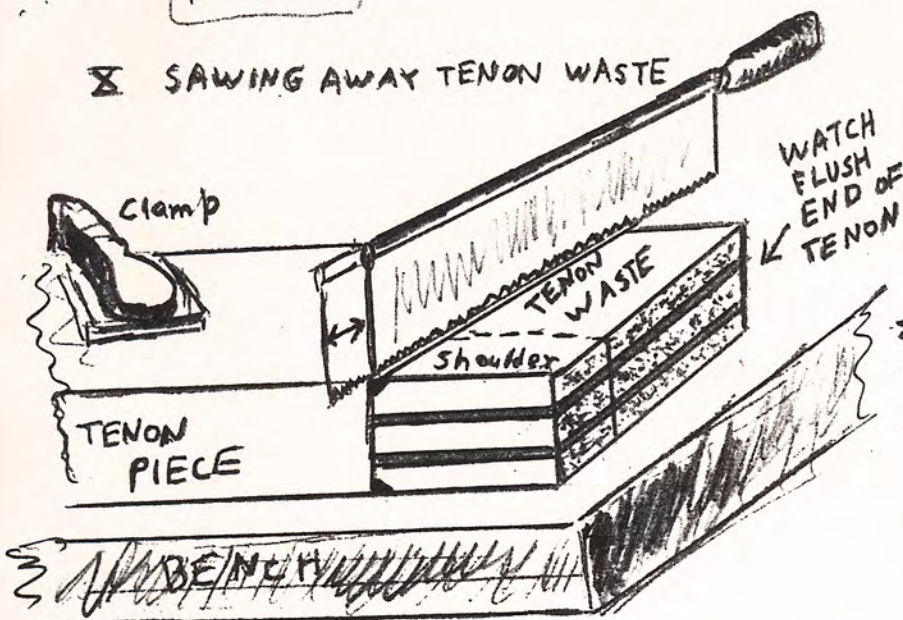


IX SAWING TENON SIDES



- [A] 1.) Hold work upright in vise, with shoulder end farthest from you.
- 2.) Make chisel nicks on waste side, for saw.
- 3.) Saw diagonally till blade touches shoulder end - and down to nearest scribe line.
- 4.) Saw the adjacent cut also, with work still in vise.
- [B] 1.) Turn piece around in vise - shoulder end now nearest you, to complete cut.
- 2.) Saw straight downward - not diagonally as above. Blow away sawdust and check both ends frequently to avoid sawing below scribe line - a common and all too visible fault.

Ⅷ SAWING AWAY TENON WASTE



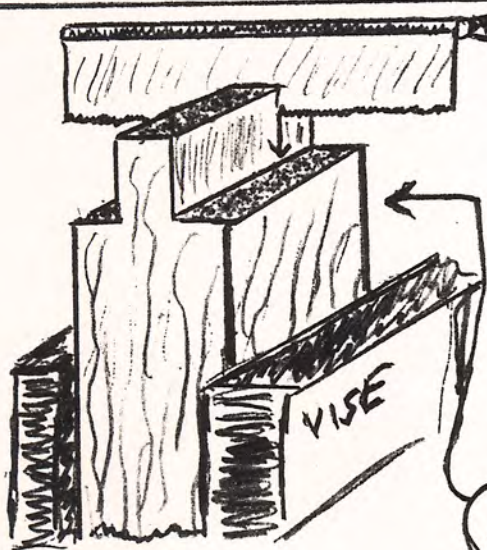
- 1.) Clamp tenon piece to bench.
- 2.) Stand at flush end of tenon while sawing - to avoid sawing into the (exposed) flush end: (The shoulder end will be hidden.)



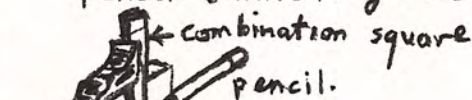
Flush end of tenon

- 3.) Let the saw ride in the chiselled-out channel, made earlier - keep blade straight, blow away sawdust & check accuracy carefully. Complete cut.
- 4.) Turn over & repeat on 2nd side.

Ⅸ SAWING TOP SHOULDER OF TENON

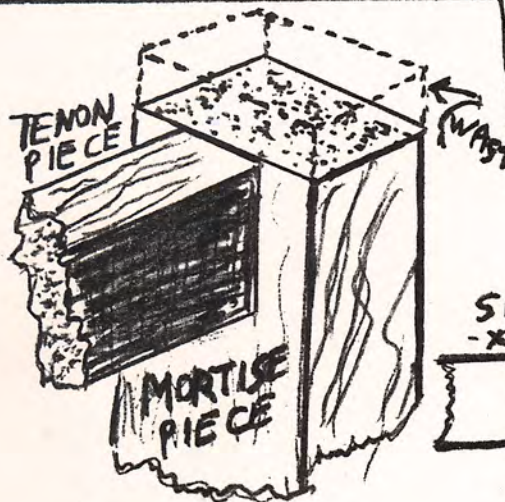
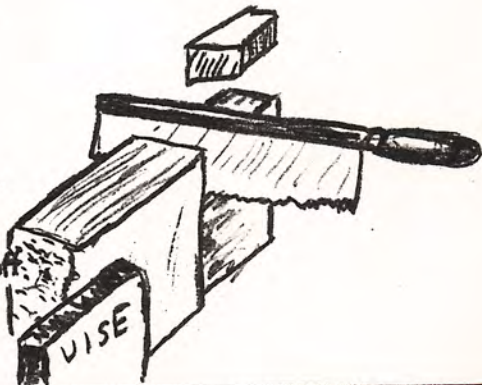


- 1.) Extend top shoulder line down the newly sawn tenon sides: use combination square and SHARP pencil. (Knife may be too hard to control here)

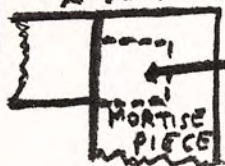


- 2.) Clamp vertically in vise & saw down to shoulder.

- 3.) Clamp horizontally in vise & saw remainder off.



SIDE VIEW - X-RAY



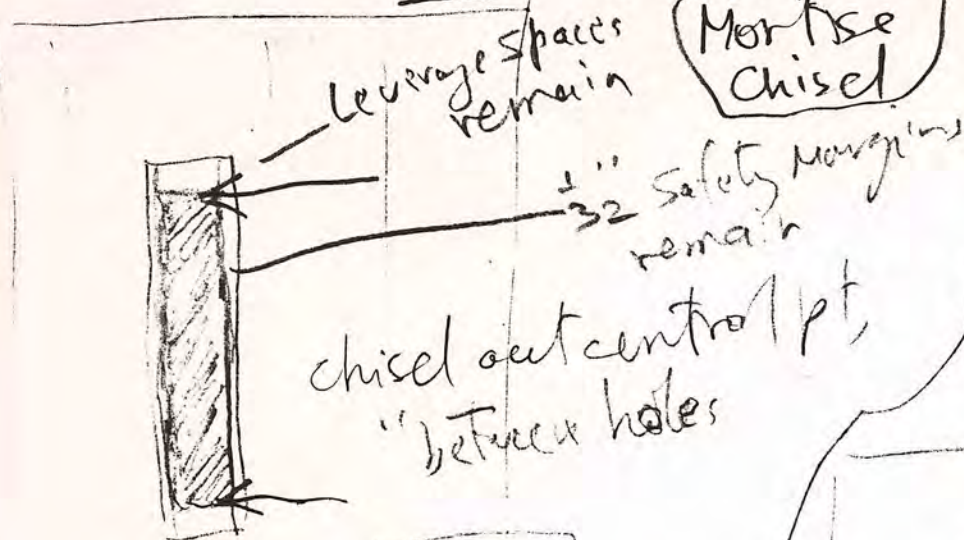
Ⅹ MORTISE + TENON FIT + JOINED

This should be a tight press fit - possibly requiring LIGHT malleting. DO NOT FORCE.

Once a square seamless fit has been made, the waste end may be sawn off - flush in this case.

Any chisel-trimming should correct any dimension inaccuracy - not be used for cosmetic effect: tight fit is essential.

1st stage of chiselling a Mortise



chisel out central pt.
"between holes"

Mortise chisel

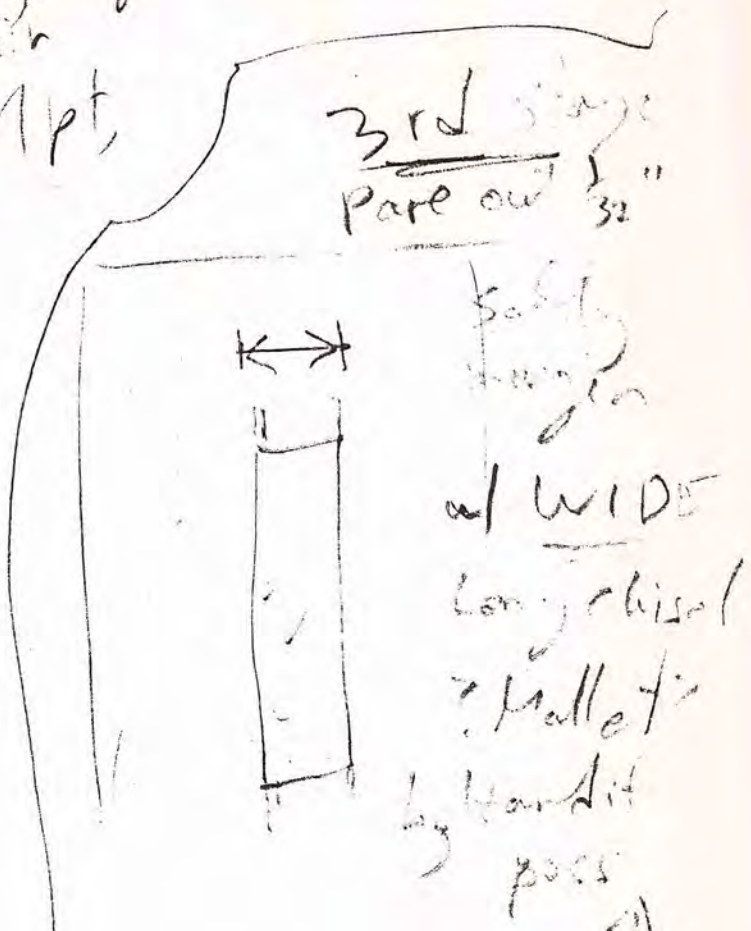
2nd stage
- remove
leverage
spaces



(to full length)

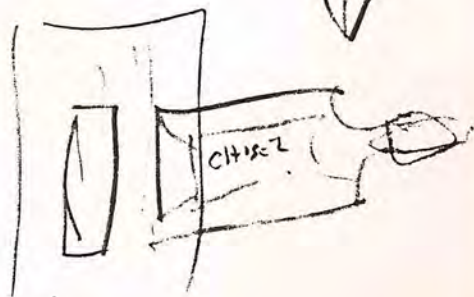
Mortise chisel

3rd stage
Pare out 1/32"



Note:

= paring chisel
w/ edge parallel
to the grain



1st two stages: mortise chisel is held across the grain. Held parallel to the grain, it would split the wood.