

How to install Hammer Shanks & Hammers

Revision 6, 1/ 2009

Note: All pictures can be enlarged for better clarification.

Required Tools

Shop Tools

Bead blasting unit (Option)

Hand Tools

Phillips screwdriver
Slotted screwdriver
Small 6" Square



Fig. 1

Bead
Blaster

Right angle die grinder, available from WNG, part # 06-0265
Quick-change disc holder for 2" discs, WNG part # 06-0266

Drill Bits

4.0 mm slow spiral stub bit, available from WNG - part #06-5613
4.7 mm slow spiral stub bit, available from WNG - part #06-5614



Fig. 2

Slow spiral stub drill
bits for hammer
boring

Supplies

Sand paper for rails (100 grit)
Sand paper to sand hammer rail (150 grit)
Travel paper – several sizes
WNG Glue-Available from WNG Part # 06-5617
½" or ¾" Masking tape
Quick change sanding disks (80 grit) WNG Part # 06-0267
Dust mask, Safety Glasses and Eye Protection

Jigs

72-88 Strike Gauge, available from WNG, part # 06-0264

NOTE: We highly recommend the Sample kit (WNG part# 06-5231) that includes all the Composite action parts made by WNG Company. The Sample kit aids in the ordering process and the purchase price is refunded upon purchase of product.

Procedure

1. Select proper hammer shanks.
 - a. Pick a hammer shank that has the correct flange, the correct knuckle location and the correct knuckle diameter to properly replace the hammer shanks for your piano. Verify by comparing to the original set.
2. Remove the old hammer shanks.
 - a. Remove old hammer shanks from the rail.
3. Clean the screws as needed.
 - a. Many rebuilders will bead blast or otherwise remove any and all corrosion from the action screws while off the action so the job will look "like new" when completed.
4. Clean the hammer shank rail as needed.
 - a. Many rebuilders will sand the shank rail and replace the sand paper so that the job will look "like new" when completed.
 - b. Some will even apply a seal coat of a finish to the rail so that it will be more stable during humidity changes.
5. Check shank center height against known specifications for the piano you are working on if you have them.
 - a. Many rebuilders will re-set the action to the correct action center locations for both the shank and repetition center heights and the spread.
 - b. If you are custom boring, you can arrive at this by working out your hammer boring, shank center height and string height together.

- c. Place the sample shanks at the ends of sections to check center heights. (See Fig. 5)
- i. Set the Top Action Height Gage to the correct height of the hammer center. (See Fig. 4)

NOTE: Here is a simple gage that helps aid the measurement of the hammer and repetition centers that we call; The Top Action Height Gage. The wood dimensions are 2"x2"x 9". Make sure the piece of wood is square and about 9" long with the wire pointer located about 3 1/4" from one end of block. (See fig. 3)

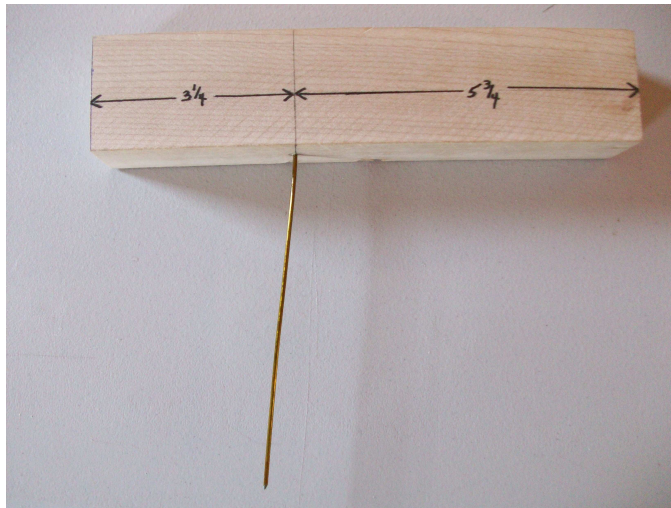


Fig. 3
Top Action
Height Gage Jig

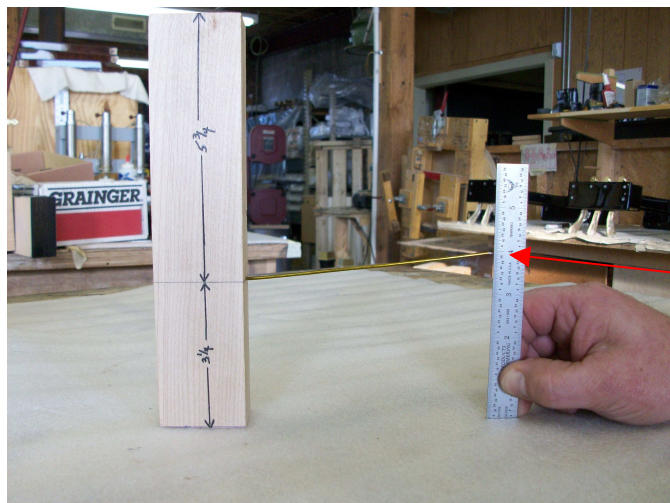


Fig. 4
Setting Height
Gage for
centers

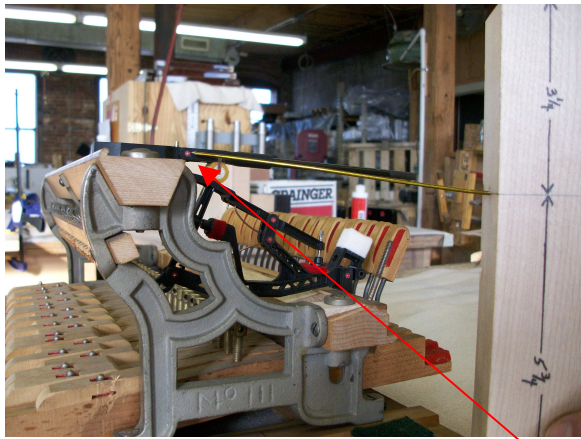


Fig. 5

Locating action centers

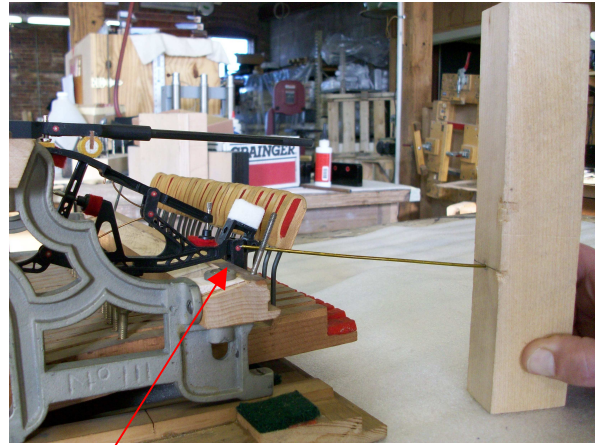


Fig. 6

Install the new WNG hammer shanks on the rails.

d. In a WNG Composite set of hammer shanks there are three types of hammer shanks, Bass, Tenor and Treble. (See Fig. 7)

i. Hammer shanks are color coded underneath near the knuckle.

1. Red for bass
2. White for tenor
3. Blue for treble



Fig. 7

Hammer shank
color-coding

Bass

Tenor

Treble

ii. The Bass hammer shank has the large tube with a 1mm wall thickness.

1. Use from note 1 to note 30.

iii. The Tenor hammer shank has the large tube with an .8mm wall thickness.

1. Use from note 31 to note 44.

iv. The Treble hammer shank has the small tube.

1. Use from note 45 to note 88.

e. Place the end shanks of each section on the top action.

i. Use a square from the front of the rail to get the shanks approximately perpendicular to the shank rail. (See Fig. 8)



Fig. 8

Square and
space shanks



Fig. 9

NOTE: Since you will be traveling, only lightly tighten the screws at this time. Be careful when tightening, as it is easy to strip the screws in an action rail.

ii. Install the rest of the shanks in their appropriate locations spacing and squaring to the front rail. (See Fig. 9)

iii. This will help you solve any traveling problems later.

6. Travel the hammer shanks.

- a. What is “traveling” and why do you need to travel a hammer shank?
- i. A hammer shank should travel in a perfectly vertical fashion as it goes through its normal playing motion.
 - ii. New hammer shanks typically do not travel perfectly when first attached to the hammer rail.
 - iii. A hammer shank is “traveled” by loosening the action screw, placing strips of paper under one side or the other of the shank flange and re-tightening the action screw.
 - iv. This paper shim controls the side-to-side motion of the hammer shank by tipping the action center and thus the travel of the hammer shank.
- b. Place the top action on a flat bench.
- c. Travel the trials square to the bench top. (See Fig. 10)
- i. Set every 5th shank so that it travels square to the bench as a trial.



Fig. 10
Traveling
trials

1. Rotate the shank from the rest position to the striking position using a square on the bench to check the travel (side to side motion) of the hammer shank. (See Fig. 10)
2. Add paper under the side of the shank flange that the shank, as it rises, moves toward.
3. Repeat until all the trials are square to the bench.

d. Travel the rest of the hammer shanks.

- i. Place a long dowel under a section of hammer shanks and rotate the shanks through their normal range of motion. (See Fig. 11)



Fig. 11
Traveling
Shanks

1. You will see side-to-side movement between the shanks that have been traveled and those that have not.
2. Travel the non-trial shanks until all side-to-side movement is gone. (See Fig. 11 and 12)
3. Continue through all sections of the piano.



Fig. 12
Paper shims
for traveling

7. Prep Hammers. (See "Installing Back Checks" for complete details)

NOTE: Always start at the treble end.

- a. Bore hammers with the proper hole diameters.
 - i. There are two sizes of shanks and therefore two sizes of drill bits.
 - 1. The smaller size in the treble is similar to tapering the treble shanks.
 - 2. Treble hammers are drilled with a 4.0mm dia. drill bit.
 - 3. Bass & tenor hammers are drilled with a 4.7mm dia. drill bit.
 - ii. Custom boring is recommended, as that will yield the best possible job.
 - b. Taper hammers. (See "Installing Back Checks" for complete details)
 - i. Use whatever method you prefer.
 - 1. A full top to bottom taper is the best method of tapering hammers.
 - c. Cut the hammer tails to the correct length. (See "Installing Back Checks" for complete details)
- We recommend 1" (25mm) for the hammer tail measured from the center of the hammer shank to the end of the tail.
- d. Arc and square the hammers. (See "Installing Back Checks" for complete details)
 - i. This provides a seat for the back check that is at the correct angle for checking, as well as squaring up the angled hammers, so that the back checks can stay square to the front of the piano and the hammer shank.

NOTE: WNG Company offers superior glue in 2 sizes; 2 oz. and 16 oz. bottles. This glue can be used in many applications in piano building. (See Fig. 13)



Fig. 13

WNG Action
Glue

8. Glue on hammers.

NOTE: The WNG composite hammer shanks are pre-sanded with 100 grit sand paper and are ready for gluing. It is necessary to have the hammer shank area sanded to 80 or 100 grit. A rough surface is important, as this is only a mechanical bond. (See Fig. 14)



Fig. 14

Pre-sanded hammer
shank area

a. Glue on trials.

i. Two methods. There are two methods of replacing hammers.

1. Method one is to use hammers 1, 72 and 88 to establish the correct strike location.
2. Method two is to use the existing "end of section" hammers as your guides.

NOTE: We will be using method one procedure for the hammer hanging process.

- b. Setup action for 1, 72 and 88.
 - i. Mark a centerline on the hammers for notes 1, 72 and 88 on the side facing into the section of the hammer. (See Fig. 15)

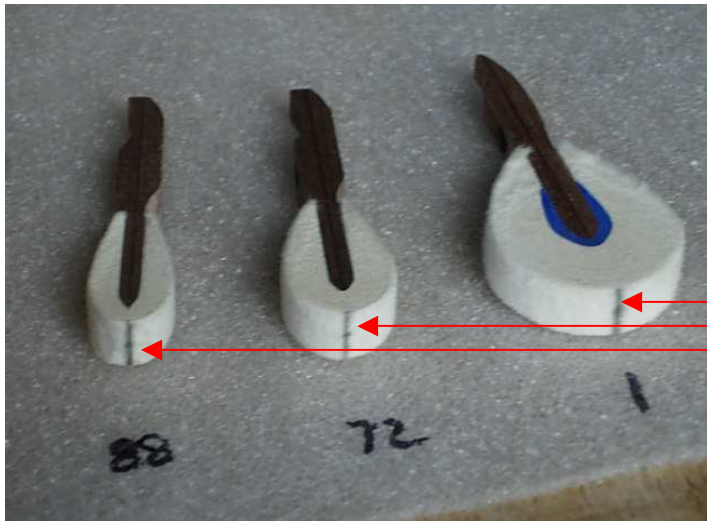


Fig. 15
Guide
hammers
centerlines

- ii. On notes 1, 72 and 88, place the hammers on the shanks using paper to create a tight friction fit between the hammer and the shank. (See Fig. 16)

NOTE: If possible, contact the manufacturer to find the correct strike point for note 1 or use the old hammer strike point if necessary.

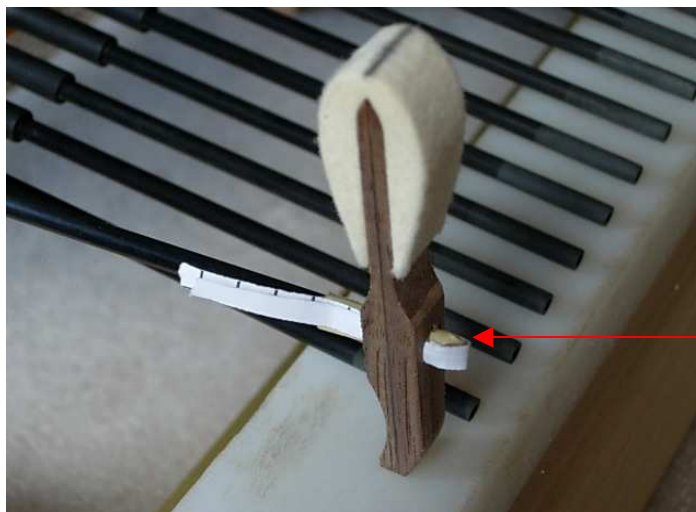


Fig. 16
Fit hammers
on shank
with travel
paper

- iii. Use a small square to make sure that the centerline on the hammer is perpendicular to the shank. (See Fig. 17)
- iv. Place hammers 1, 72 and 88 in the correct location under the strings.
 - 1. Place masking tape on the string of note 1 strike point.
(See Fig 18)



Fig 17
Squaring
hammer
on Shank

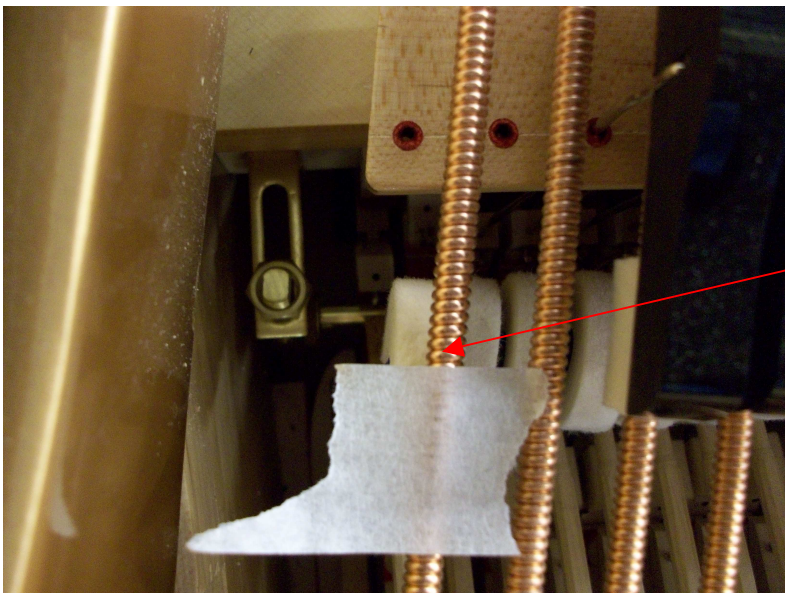


Fig. 18
Edge of tape
locating note
one strike point

- c. Place the action in piano and properly locate.
 - i. Make sure that the keyboard has the same distance to the front of the key block on both sides of the piano.
 - ii. Make sure that there is sufficient clearance between the key slip and the white keys in the down position.



- d. Locate #1 hammer on the shank.

NOTE: In figure 19 a wooden jig is used to locate No. 1 hammer strike point. This is in a factory setting where jigs are commonly used for the same model of piano.

- i. Move the hammer in or out on the shank until the centerline of the hammer lines up on the mark for note #1. (See Fig. 18 &19)

e. Locate #72 hammer on the shank. (See Fig. 20)

i. $11/32"$ (8.7mm) will work for note 72 all the time.

1. Use a strike gage for note 72. (See Fig. 21) (Available from WNG, part # 06-0264)

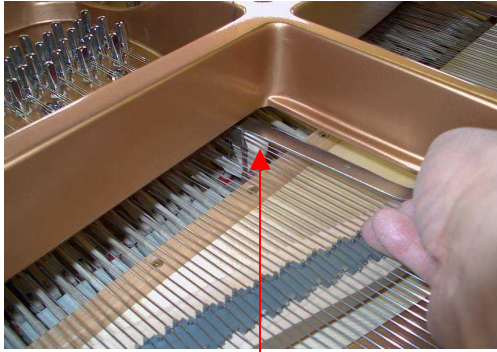


Fig. 20

Locating strike
point for # 72

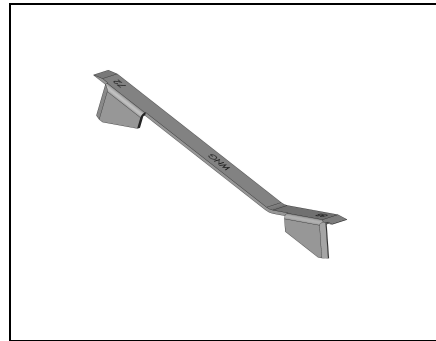


Fig. 21

Strike gage for
72 & 88

NOTE: The strike gage allows you to move the centerline of the hammer to align with the gage. (See Fig. 20 & 21)

2. Move the hammer in or out on the shank until the centerline of the hammer falls on the gage for note #72.

f. Locate #88 hammer on the shank.

i. $3/32"$ (8.7mm) will work for note #88 all the time.

1. Use a strike gage for note #88.

2. The strike gage allows you to move the centerline of the hammer to align with the gage.

3. Move the hammer in or out on the shank until the centerline of the hammer falls on the gage for note #88.

g. Make sure 1, 72 and 88 hammers are still square to the shank.

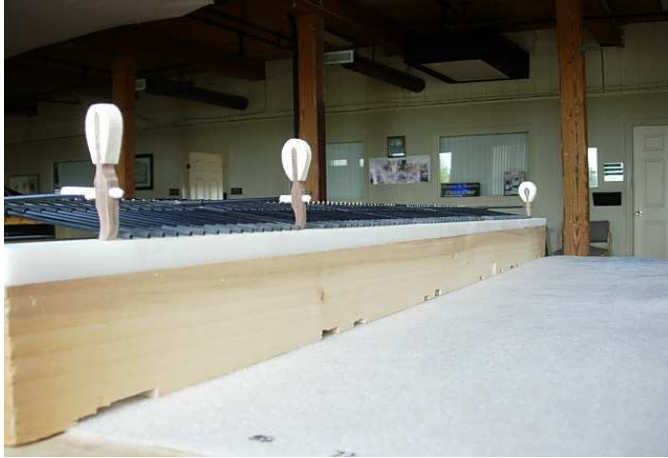


Fig. 22
Glue guide
hammers

- h. Remove action and glue 1, 72 and 88 hammers to shanks. (See Fig. 22)
 - i. Use WNG Glue for hammers.
 - ii. Carefully mark the shank where each hammer is.
 - iii. Remove hammer and paper shim.
 - iv. Apply glue to the inside of each hammer and shank.
 - v. Put each hammer on shank and spin.
 - vi. Move the hammer to the mark on shank.
 - vii. Use a square to make certain the hammer is perpendicular to the hammer shank.
 - viii. Rotate side to side to set up proper tilt.
- i. Place the action back in the piano to confirm that the hammer strikes the string in the proper place.
 - i. Do this promptly least the glue set up on you.
 - ii. Correct as needed.
 - iii. Glue on the trial hammers

1. Remove the action from the piano.

2. Remove the top action from keyboard and place it on the bench.
3. Glue trial hammers to the shanks, at the ends of sections, on a straight line from #1 to #72. (See Fig. 23)



- j. Glue remaining hammers.
 - i. Apply glue to the inside of each hammer and shank.
 - ii. Put each hammer on shank and spin.
 - iii. Use a straight edge between trials to glue hammers.
 - iv. Pay attention to the tilt if you wish the angled hammer to clear after gluing.
- k. Trim Shanks.

Important! Use a good quality dust mask. For the sake of your lungs, you should not breathe wood, glue or composite dust.

- i. Using a right angle die grinder equipped with a 2" 80 grit-sanding disk, (See Fig. 24) grind off the shanks until they are flush with the hammerheads. (See Fig. 25)



Fig. 24

Angled grinder
W/quick-change
disc holder

- i. Continue removing material until the backside of the hammer tail all the way up to the felt is squared up. (See Fig. 25)

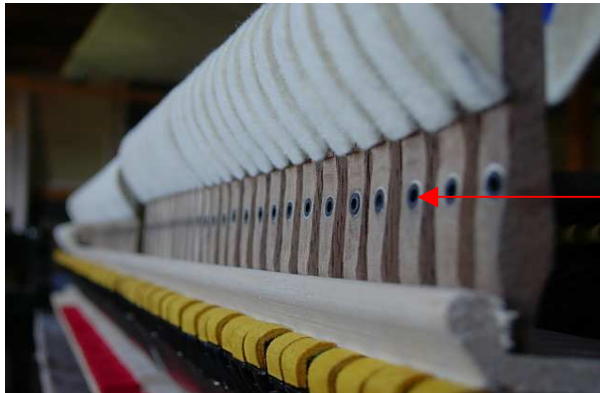


Fig. 25

Grind both the shank
and the hammer tail flat
and parallel across the
set of hammers

1. This will help your clearance for back checking.

- l. Round the ends of the arced hammer tails to protect back checks.
- m. "Burn Hammer Shanks"

It would be more proper to say "Warm hammer shanks".

The composite shank, when heated, will allow you to twist or rotate the hammer to correct errors that occur during the gluing on of hammers.

When the shank becomes hot enough the hammer will, rather abruptly, easily rotate to the correct orientation. When it cools the shank will again, rather abruptly, become stiff.

NOTE: You should allow the glue to dry overnight before burning.

NOTE: Do not try to twist the hammer sideways to correct incorrect drilling angle.

- i. Use a heat gun.
 1. Never use a heat source with an open flame.
- ii. Apply heat over the entire length of the hammer shank.
 1. Never allow one spot to become too hot.
- iii. Gently try to rotate the hammer one direction or the other.
(See Fig. 26)



Fig. 26

Warm composite
shank with heat

- iv. When the shank is hot enough the hammer will rotate easily to the correct orientation.
- v. Hold the hammer until the shank cools and regains its stiffness.