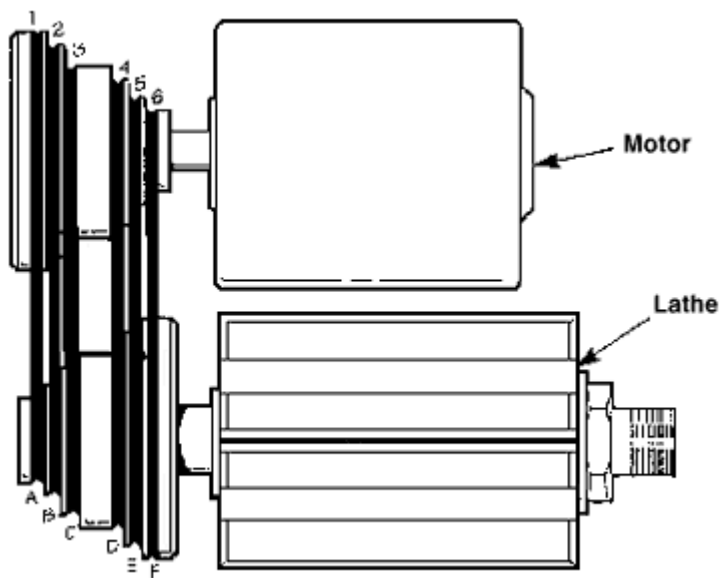


Taig Lathe Instruction Booklet 03J71.00

1. Specifications

Center Height:	2.250"	
Distance Between Centers:	9.75"	
Recommended Motor:	1/6 to 1/4 hp, 1725 rpm, 1/2" arbor	
Accuracy:	? .001"	
Spindle:	3/4" - 16 tpi	
Lubrication:	10W motor oil (head bearings permanently lubricated)	
Replacement Belts:	3M - 315mm or 3M -500mm	
Tailstock Spindle Threads:	3/8" - 24 tpi	
Spindle Speeds (rpm):	1 -A:	5800
	2-B:	3340
	3-C:	2110
	4-D:	1375
	5-E:	880
	6-F:	500



INTRODUCTION

The Taig Lathe components are set by the manufacturer and should not require any adjustment before use. You should, however, go over each component, not only to check for proper adjustment, but also to familiarize yourself with the lathe.

This instruction booklet outlines the adjustments that can be made to each component. Before making any adjustment, you should clean the packing oil from the lathe and lubricate all the parts with 10W motor oil. All the components should slide or turn easily without any free play. **Do not over tighten.**

2. Basic Taig Lathe Parts List

The following parts are the basic lathe components for either the wood turning or metal turning option:

1	Lathe:	Headstock, bed and tailstock.
2	Pulleys:	Motor pulley (1/2" I.D.) and lathe pulley (5/8" I.D.).
2	Belts	Short Vee, Long Vee
1	Motor Mount:	Mounting plate, four 1/4-20x 1" machine screws, four 1/4" flat washers, four 1/4-20 hex nuts.
1	3/32 Hex Key	
1	5/32 Hex Key	
1	1" Thin-Profile Wrench	
1	Brass Thumbscrew	
1	Carriage Stop:	6" steel rod, 1/4-20 thumbscrew.

Metal Turning Option - 03J71.01

The metal turning lathe set includes all items in the Basic Lathe plus the following:

1	Tool bit, unground, 1/4"	1 Carriage with handwheel
1	Tool bit post	1 Rack with 4-40 capscrew
1	Cross slide	

Wood Turning Option - 03J71.02

The wood turning lathe set includes all items in the Basic Lathe plus the following:

1	2" Face plate
1	2-1/2" Tool rest with base and post swivel
1	7/16" Cup center
1	3/4" Spur center

3. Mounting Instructions

OPTION 1: To mount the motor on the left-hand side of the lathe headstock.
(Prevents dust contamination in open case motors.)

Material Required

- 1/4 hp motor (48 or 56 frame, 1725 rpm, 1/2" shaft) - (optional L.V. 03J60.40) or customer-supplied equivalent
- Motor pulleys (2 included)
- Short vee belt (included)
- Motor mount (included)
- 8" x 24" x 3/4" mounting board (optional board L.V. 03J70.04 is medium-density particleboard)
- Two 1/4-20 x 1" rd. hd. machine screws with four 1/4" washers
- Two 1/4-20 x 1/2" rd. hd. machine screws with 2 nuts and 2 washers
- Four #10-32 x 1" rd. hd. machine screws with 4 nuts and 4 washers

Motor Rotation

The direction of the motor rotation will have to be reversed to counterclockwise spindle rotation (when

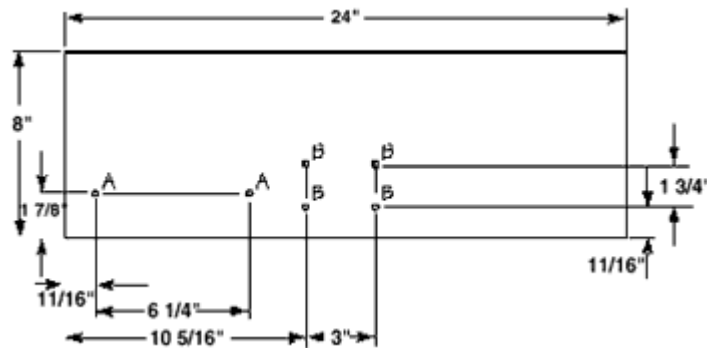
facing spindle) from standard motor manufacture (clockwise rotation).

Motor (L.V. 03J60.40 or equivalent)

Loosen the two screws holding the cover plate at the end of the motor and remove the plate. Interchange the position of the red and black wires and replace the plate. **If you supply your own motor, please refer to instructions on motor.**

Mounting Motor

Fasten the motor base to the top of the included motor mount with the 1/4-20 x 1/2" screws. The washers and nuts go on top. The slots in the motor base may be used to position the motor so the weight of the motor will provide the correct belt tension.



Option 1- Mounting Board Drill Pattern.

- A. Drill #7 or 13/64" and tap 1/4 - 20 NC.
- B. Drill #7 or 13/64". Counterbore from the underside 5/8" diameter x 3/16" deep.

Using Optional Mounting Board (03J70.04)

The motor mount is fastened to the mounting board with two 1/4-20x1" long machine screws. Holes must be drilled. Place 1/4" washers under and on top of the motor mount. Leave about 1/8" clearance between the top of the washer and the screw head. This space permits the motor to tip forward for changing the position of the belt.

The 1/4-20 screws may be forced into the particleboard; however, it is preferable to thread the holes with a 1/4-20 NC tap.

Mounting Lathe

The lathe is fastened in place with four #10-32 x 1" machine screws and square nuts. The counterbores in the bottom of the board are to accommodate the screw heads and washers.

Slide the motor pulley on the motor shaft with the large diameter next to the motor. Line up the motor pulley with the lathe pulley with a rule or by eye and tighten the setscrew on the flat on the shaft.

Tip the motor forward to place the vee belt on the pulleys.

The lathe is now ready for use.

OPTION 2: To mount the motor behind the lathe headstock.

Material Required

- 1/4 hp motor (48 or 56 frame, 1725 rpm) -(optional L.V. 03J60.40) or customer-supplied equivalent
- Motor pulleys (2 included)
- Long vee belt (included)
- Motor mount (included)
- 12" x18"x 3/4" (or larger) medium-density particleboard
- Two 1/4-20 x 1" rd. hd. machine screws with four 1/4" washers
- Two 1/4-20 x 1/2" rd. hd. machine screws with 2 nuts and 2 washers

- Four #10-32 x 1" rd. hd. machine screws with 4 nuts and 4 washers

Motor Rotation

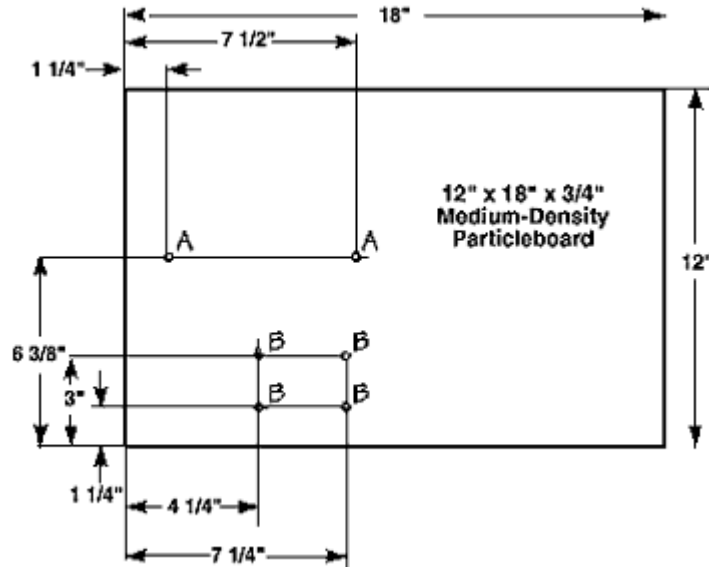
Normal motor rotation is used in this installation. (Clockwise spindle rotation when facing motor.)

Mounting Motor

Fasten the motor base to the top of the motor mount with 1/4-20 x 1/2" screws. The washers and the nuts are on top. The slots in the motor base may be used to position the motor so the weight of the motor will provide the correct belt tension.

The motor mount is fastened to the mounting board with two 1/4-20 x 1" long machine screws. Place 1/4" washers under and on top of the motor mount. Leave about 1/8" clearance between the top of the washer and the screw head. This space permits the motor to tip forward for changing the position of the belt.

The 1/4-20 screws may be forced into the particleboard; however, it is preferable to thread the holes with a 1/4-20 NC tap.



Option 2 - Mounting Board Drill Pattern.

- Drill #7 or 13/64" and tap 1/4 - 20 NC.
- Drill #7 or 13/64". Counterbore from the underside 5/8" diameter x 3/16" deep.

Mounting Lathe

The lathe is fastened in place with four #10-32 x 1" machine screws and square nuts. The counterbores under the board are to accommodate the screw heads and washers.

Slide the motor pulley in place with the small diameter next to the motor. Line up the pulleys with a rule or by eye and tighten the setscrew on the flat on the shaft.

Tip the motor forward to place the vee belt on the pulleys.

The lathe is now ready for use.

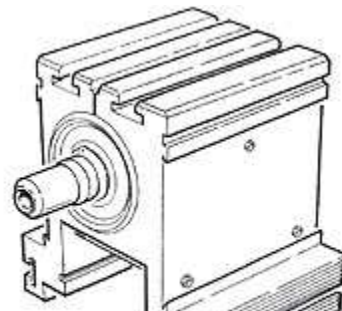
4. Set-Up and Use of the Lathe

HEADSTOCK

The headstock consists of two aluminum extrusions held together with three hex-socket screws. The upper screw tensions the bearings and should be tightened only to the point where the bearings are firmly held in the headstock. The lower two screws clamp the headstock to the dovetail lathe bed. Tighten these two screws evenly until the headstock is held firmly to the bed.

MOUNTING THE PULLEYS

The two pulleys supplied with the lathe have close fitting tolerances. To ease their installation on the spindles, first heat the pulleys in hot

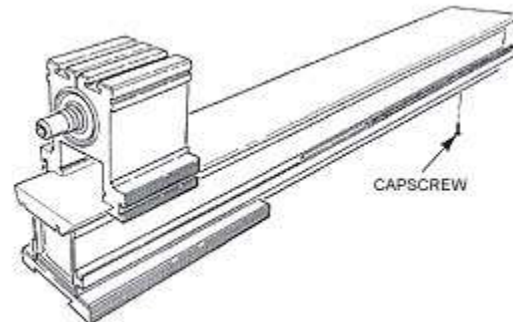


water. This will expand them enough that they should slide onto the spindle freely. Make sure that the lathe pulley seats fully on the spindle. Tighten the setscrews once they are positioned properly.

THE CARRIAGE

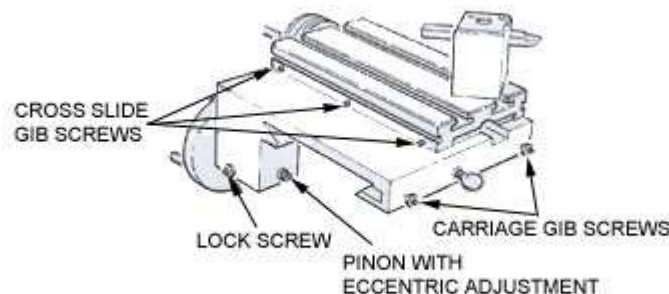
Mounting the Rack

If you have bought the metal turning option, you will have to affix the gear-tooth rack to the lathe bed. The rack fits into a groove in the aluminum bed extrusion (see illustration). Place the rack into the groove with the end without gear teeth toward the headstock and the other end flush with the tailstock end of the lathe bed. The rack is fixed in place with one 4-40 capscrew 3" from the end of the lathe bed.



Adjusting the Carriage Handwheel Pinion

The handwheel pinion gear spins in an eccentric shaft. If the pinion does not engage the rack fully, loosen the setscrew locking the eccentric shaft (located on the right side of the carriage). Turn the eccentric shaft to raise or lower the pinion with relation to the rack. The adjustments to the pinion will have to be by trial and error since access is only possible when the carriage is removed from the



lathe.

Adjusting the Carriage Travel

Any free play in the lathe carriage will make it impossible to accurately turn parts. To adjust the carriage, you must first clean the lathe bed of any packing grease, then apply a light coat of 10W oil to the bed. Slide the carriage onto the bed until the handwheel engages the rack. Move the carriage about midway onto the bed. To remove play from the carriage you must adjust the gib on the back of the carriage. Back off the jam nuts on the two setscrews on either end of the carriage. Adjust both setscrews evenly until the carriage moves smoothly on the bed without play. Lock the jam nut on each setscrew.

Adjusting the Cross Slide Travel

To adjust the cross slide travel, adjust the tension on the gib with the three setscrews on the right side of the cross slide as above.

The Tool Post

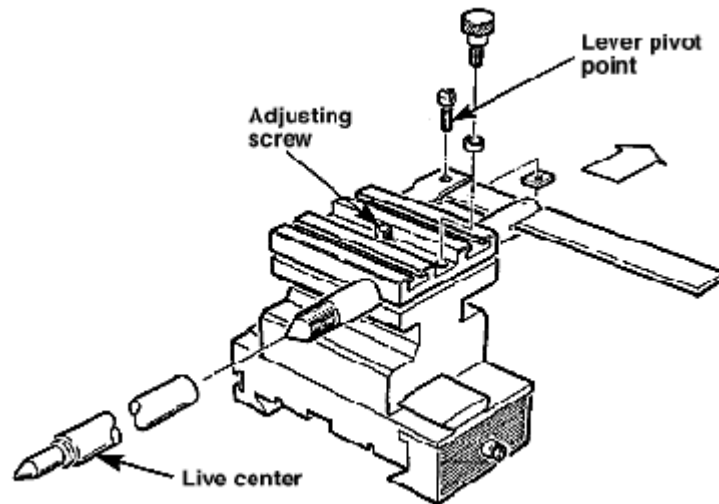
The tool post is milled to accept 1/4" square tools. The post is fixed to the cross slide with a #10 square nut that rides in either slot on the slide. Metal or cardboard shims may be needed to adjust the height of the cutting tools on centre to the spindle. When fixing a cutting tool in the post, make sure that both of the setscrews clamping the tool are tight.

The Tailstock

A brass thumbscrew has been supplied with your lathe. If you wish, replace the hex-socket screw that locks the tailstock centre in position so that hand locking the tailstock is possible. Remove the screw from the tailstock, but retain the steel bushing and replace it with the brass thumbscrew.

Centering the Tailstock

Remove the carriage from the lathe and bring the tailstock up to the headstock and lock it in place. Mount a taper or any center such as the blank collet in the headstock. Bring the tailstock center up to the known center in the headstock and adjust the tailstock's center until it is aligned by loosening the adjusting screw and moving the tailstock fore or aft on its dovetail way.



Changing Tailstock Centers

To replace the standard tailstock center with a live center, first remove the lever pivot screw. Then remove the center with the lever attached; the lever is not used with the live center. Mount the live center.

5. Care and Maintenance

While the Taig Lathe requires very little maintenance, cleanliness is important. After working metal or wood, the lathe must be thoroughly cleaned of swarf or shavings with a soft cloth and brush such as an old toothbrush. After cleaning your lathe, oil the bed to prevent corrosion. Particular attention should be paid to the spindle threads. Before attaching any chuck or component to the spindle, make sure the threads are not damaged and are clean of debris. Components will not seat properly if the threads are damaged and accurate turning will be impossible.

If the lathe will be left idle for any period of time, you should release the tension on the drive belt, otherwise you may induce localized stretching in the belt and experience some vibration once you restart the lathe. This will also prolong the life of the drive belt.

Occasionally check each component for play and smooth movement. Adjust and lubricate any part that needs attention.

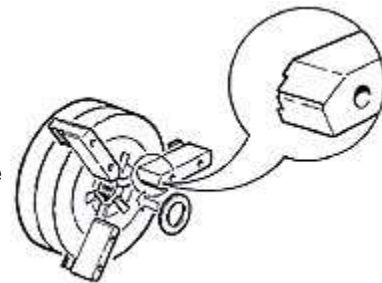
Finally, store your lathe covered to protect it from dust and humidity.

6. General Accessories

THREE-JAW CHUCK (03J70.05)

The three-jaw chuck is self-centering and is useful for holding round and hexagonal stock. Because it is self-centering, it is particularly useful for woodturning. The standard, aluminum soft jaws have a capacity of 1/8" to 7/8".

Before using the chuck, the jaws must be trued. To do so, mount the washer supplied with the chuck into the recess milled into the bottom of the jaws. Tighten the jaws with the tommy bar. Using a boring bar, make light cuts on the inside edge of the jaws until a .010" to .020" "flat" has been turned onto all of the jaws.



One modification that is quite useful for the three-jaw chuck is to turn steps on the aluminum jaws.

Again, to turn the steps on the front of the jaws, first mount the washer at the base of the jaws. This modification will increase the chuck's capacity to 3-1/2".

When using a three-jaw chuck, try to do all operations without having to remove and remount the workpiece. It is almost impossible to remount a workpiece exactly on center in a self-centering chuck. Also, do not leave work clamped in the chuck for extended periods of time; the strain on the jaws may make the chuck sloppy.

Extra sets of standard soft jaws (03J70.06) are available for making custom jaws or replacing a worn set. Full-circle soft jaws (03J70.07) are also available to hold thin stock that needs full support.

FOUR-JAW CHUCK (03J70.08)

The four-jaw chuck can hold virtually any shape of workpiece. Each jaw is adjusted independently to accommodate any shape.

Setting the Work in the Four-Jaw Chuck

For centering regular-shaped objects in the chuck (i.e., square or round stock), set the work in by eye using the grooves milled into the body as reference. Set up a scribe so that the point just touches the corners of the work to be turned. Turn the chuck by hand and note any run-out at the corners of the work. Adjust the jaws by loosening one jaw and tightening the opposite. Keep on repeating this procedure until the workpiece runs true. With practice, this should not take more than a minute or so. Tighten the work into the chuck by finally tightening each jaw exactly the same amount in sequence (1, 2, 3, 4). Check to see that the work remained true.

For round stock, it is best to use a dial indicator in the same fashion as above. If you don't have an indicator, use a fine-tipped felt marker in the tool post so that it just leaves a mark on the workpiece on the high spot. Adjust the chuck, rub off the mark, and repeat until the mark runs right around the work at an even thickness.

A four-jaw chuck can also turn eccentrics (such as crankshafts). To do so, the clamped work is intentionally held off center by the eccentricity or throw desired.

When turning with a four-jaw chuck, you must be careful to keep the carriage and your hands clear of the protruding jaws of the chuck. Set the carriage stop before turning on the power to avoid running the carriage into the chuck.

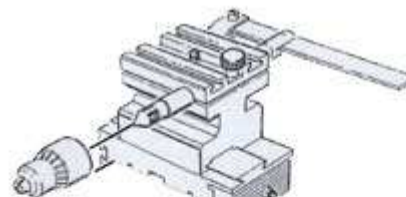
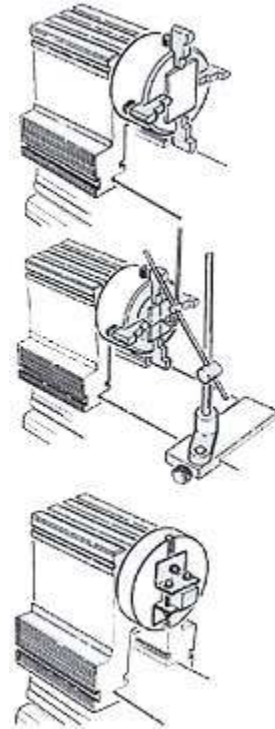
MACHINIST'S FACE PLATE (03J70.09) & RIGHT-ANGLE JAWS (03J70.10)

The machinist's face plate has two T-slots milled into the face to accept #10 square nuts. Work can be held on the face plate by using custom-made clamping bars or available right-angle jaw set. Work is centered on the face plate much as it would be for the four-jaw chuck.

Because work is often unbalanced on the face plate, the lathe should be run at the slowest possible speed and/or the face plate counterbalanced with opposing weights.

JACOBS CHUCK (03J70.14) & HEADSTOCK CHUCK ARBOR (03J70.38)

A chuck is required for the tailstock when drilling work. The Jacobs chuck threads directly onto the tailstock center for this purpose. The Jacobs chuck can also be mounted to the headstock spindle by means of an arbor that runs through the spindle. This will allow you to hold tools for machining parts held to the carriage or milling attachment. It will



also allow you to hold round stock 1/4" in diameter or less, although the collets are better for this purpose.

COLLET SET (03J70.11)

Particularly useful in watch making, collets firmly hold small diameter parts. The set includes 1/8", 5/32", 7/32", 1/4", 9/32", 5/16", one blank collet for a custom-sized collet, plus a closing nut.

NEEDLE-BEARING LIVE CENTER (03J70.19)

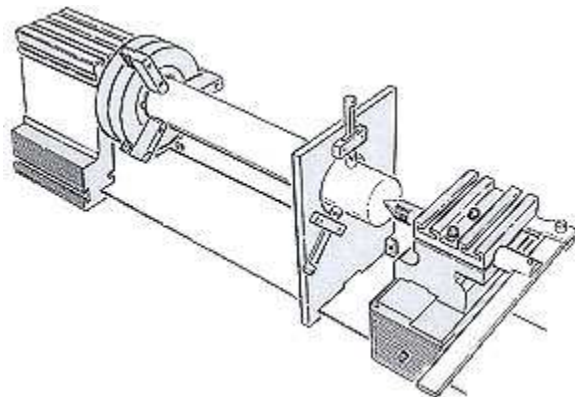


The live center is required to support delicate material between centers. It is spring loaded so that it will maintain the proper setting while turning. The live center is also useful when turning wood. Because the center point turns with the workpiece, heat from friction is eliminated as well as the squeaking.

The live center comes well greased with white lithium grease. It should be cleaned with solvent and regreased periodically. The O-ring should be kept on the shaft to block any debris from getting into the bearings.

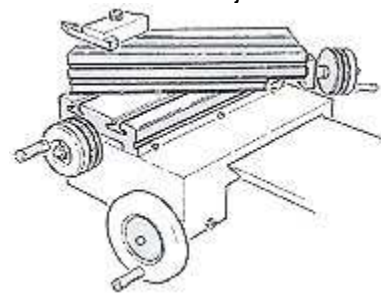
STEADY REST (03J70.23)

A steady rest is used to support material in the lathe that has a long overhang. It can be used when boring the end of long bars or when turning thin sections where there is a tendency for the work to spring under pressure from the cutting tools. Loosen the three posts and adjust the position of each so that it has a close fit to the workpiece. Be careful not to move the workpiece off center with the steady rest.



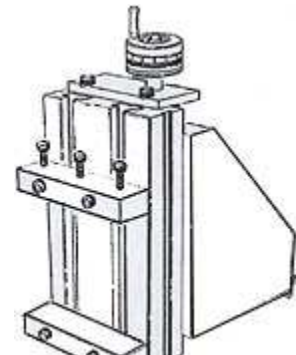
TOP SLIDE (03J70.24)

The top slide allows for cutting tapers or angles. It comes with a rotating tool-bit post and has a travel of 1-3/4". The top slide fits onto one of the cross-slide T-slots. First, loosen the swivel-adjustment bolt on the underside of the top slide (use a 1/8" hex key). Slide the top slide onto one of the cross-slide T-slots and adjust the top slide to the angle desired. Lock the angle by tightening the bolt on the underside of the slide. The top slide is capable of turning tapers to a maximum of 1-3/4" in length. If you need to turn a longer taper, you will have to offset the tailstock center.



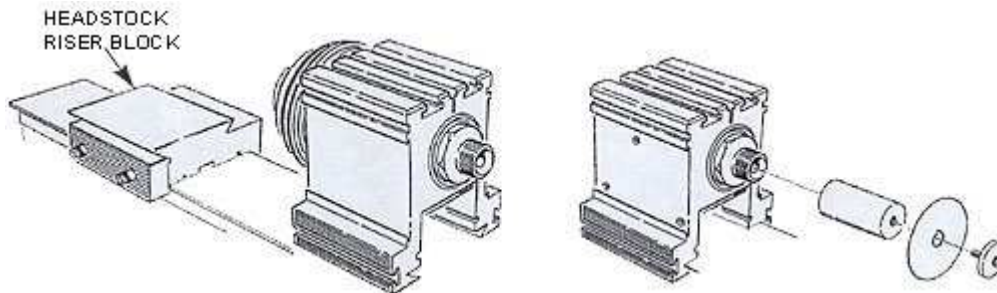
MILLING ATTACHMENT (03J70.25)

The milling attachment gives you the third axis required to convert your lathe into a milling machine - the vertical adjustment. Horizontal adjustments are controlled with the cross slide and depth of cut by advancing the carriage. To mount the milling attachment, loosen the T-nuts on the underside of the attachment and slide it onto the T-slots of the cross slide. The brass bar on the back of the milling attachment registers with the right edge of the cross slide to ensure squareness of the milling attachment to the lathe spindle. Loosen the bolts holding the brass registration bar and lower it over the edge of the cross slide and tighten the bolts. Tighten the clamping bolts. Any play in the slide's travel can be eliminated by adjusting the gib on the rear of the milling attachment.



RISER BLOCKS (03J70.35 and 03J70.36)

You can increase the lathe's capacity by 2" in diameter with the installation of riser blocks beneath the headstock (03J70.35) and tailstock (03J70.36). The headstock riser block comes with a taller tool-bit post.



HSS SLITTING SAW (03J70.18) & ARBOR (03J70.17)

The 2-1/2" dia. slitting saw mounts to the lathe spindle with a 1/2" arbor. The saw is capable of cutting to a depth of 3/4", with a kerf of .032". The saw should be run at low speed with plenty of cutting lubricant to keep the blade cool.

6-pc. HSS LATHE TOOL SET (03J70.15)

The 1/4" tools available for the Taig Lathe are ground for cutting mild steel. They will, however, be suitable for use on other materials such as aluminum, brass, or acrylic. If you plan to work exclusively on a material other than steel, you should consider buying or grinding a set of tools specifically suited to it.



Right-Hand, Left-Hand Tools

The right-hand tool is the tool used most often in metal turning. The face of the tool should be nearly parallel to the work and elevated to be precisely on center. You will find out if it is, after your first facing cut. If it is not, a small portion near the center will remain. The left point of the tool does all the cutting, but the rest of the tool "rubs" against the work leaving a good finish. The left and right tool will take heavy cuts, roughing, as well as leaving a good finish when doing fine work. These tools can also be used for facing.



Round-Nose Tool

The round-nose tool can be used as a roughing tool, but it does not leave as fine a finish as a right-hand tool. The round nose is useful when turning work with a shoulder; the 1/16" radius on the end of the tool will leave an inside radius in the corner of the shoulder to improve the strength of the turnings.



Boring Bar

This tool is used to open up holes in the face of a turning. It is also the only way to enlarge a hole absolutely true with the turning because it does not follow the previously made hole, which may have wandered. The boring bar supplied with the set of six tools requires a pilot hole of at least 1/2". Be careful to leave plenty of clearance around the shank of the tool; otherwise, cutting chips may pack around the tool and force the tool into the workpiece.



Parting Tool

As the name suggests, this tool is used to part off work from the lathe. The parting tool must be set at 90° to the turning axis to maintain side clearance. When parting steel or iron, the lathe should run at



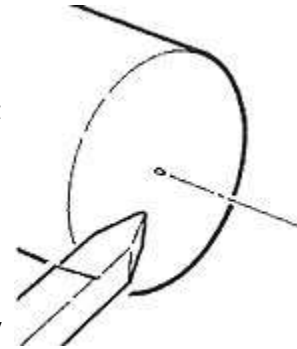
slow speed and the feed should be coarse and continuous. Use plenty of cutting lubricant. Parting off brass can be done at higher lathe speeds, without cutting lubricant. Chips of brass tend to fly off the cutter when parting. Keep your head away from the cut and always wear safety glasses.

Chamfer Tool

When the tool post is set at 90° to the work, you can quickly change to the chamfer tool to put an accurate 45° chamfer on your work.

USING METAL TOOLS ON THE TAIG LATHE

To give a good finish and to cut effectively, tools must be sharp. They should be stored so that their edges don't knock against each other. Set tools into the tool post with cutting edge at center height. Use the tailstock center as a reference. You will need to place shims under the tool to bring it up to center height. These shims can be thin metal, card, or paper.



CUTTING SPEEDS

We have provided a table of recommended lathe speeds for common metals; however, these suggested speeds are for production lathes. Small lathe speeds can vary somewhat from the recommended ones for production. The best rule of thumb is "when in doubt, reduce the speed". By experimentation you will arrive at the proper speeds.

When working with cast iron or brass, you will not need to use a cutting lubricant, but when cutting mild steel or aluminum, lubricants will improve the cut and finish. Motor oil is adequate. There are also cutting lubricants specifically formulated for lathe work. Cutting oil is best applied to your work with a small paintbrush.

HSS MILLING CUTTERS (03J70.31)

These double end-milling cutters enable you to mill slots or faces onto a workpiece held on either the carriage of your lathe or to the vertical milling attachment. The cutters can be chucked in the collets, three-jaw chuck, or in the Jacobs chuck. Run the lathe at the speed recommended for cutter diameter in the adjacent chart. Our 5-piece set includes sizes 1/16", 3/32", 1/8", 5/32", 3/16".

Diameter of Material or Drill Size (Inches)	CUTTING SPEED (RPM)			
	High Carbon Steel	Cast Iron, Stainless Steel	Brass, Bronze, Mild Steel	Aluminum
1/16	611	2445	6112	9168
3/32	408	1630	4075	6113
1/8	306	1222	3056	4584
5/32	244	978	2444	3666
3/16	204	815	2038	3057
7/32	175	698	1746	2619
1/4	153	611	1528	2292
3/8	102	407	1018	1527
1/2	76	306	764	1146
5/8	61	244	611	916
3/4	51	204	509	764
1	38	153	382	573
1-1/2	25	102	254	381
2	19	76	191	286
2-1/2	15	61	153	229
3	13	51	127	191
3-1/2	11	44	109	164
4	9.5	38	95	143

ADDITIONAL TOOLS REQUIRED FOR METAL TURNING

LAYOUT TOOLS:

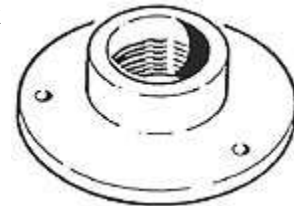
scribe and block
accurate 6" rule
calipers
dividers
vernier caliper or micrometer
machinist's square

CUTTING TOOLS:

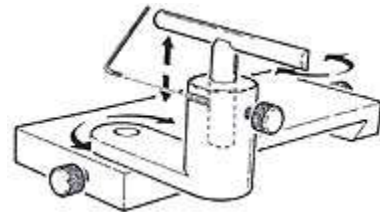
center drill
set of short drills
files
taps & dies
sharpening stone or grinder

7. Woodturning Accessories**2" FACE PLATE (03J72.01)**

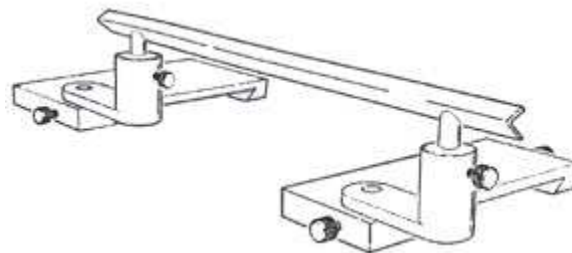
The face plate is drilled for three #6 wood screws. You can also mount work to the face plate with double-sided turning tape. One face plate is supplied with the Wood Turning Lathe.

**2-1/2" TOOL REST, BASE AND SWIVEL (03J72.02)**

The 2-1/2" rest, base and swivel are supplied with the Wood Turning Lathe; however, they may be purchased separately for those who want to turn wood on the Metal Turning Lathe. The tool rest base slides onto the dovetail lathe bed with the swivel post towards the front. The rear thumbscrew on the base locks the base in position on the bed. The thumbscrew on the front of the base locks the swivel in position. The rest height is adjusted with the thumbscrew on the swivel. For improved resistance from loosening due to vibration, the setscrew located opposite to this thumbscrew may be tightened using the hex key provided.

**7" DOUBLE TOOL REST (03J72.03)**

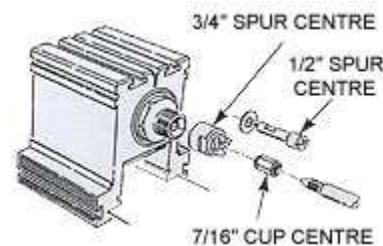
When turning long work on the lathe, a long tool rest allows you to work without having to continually move the rest. The 7" rest comes with one base and swivel, and uses the rest base from the 2-1/2" rest supplied with the Wood Turning Lathe. By adjusting each swivel independently, this tool rest can be adjusted parallel with the spindle axis, or at an angle to keep the rest in close contact with tapered work.

**EXTRA BASE AND SWIVEL (03J72.04)**

An extra base and swivel are available separately for those who want to use the 7" rest, but do not already have the 2-1/2" rest.

7/16" CUP AND 3/4" SPUR CENTER SET (03J72.08)

This set is supplied with the Wood Turning Lathe. The 3/4" spur center mounts to the spindle threads. The removable center pin is held in place by a setscrew and can be replaced with the 1/2" spur center (03J72.13) when turning very small spindles. The 7/16" cup center mounts onto the dead center threads. When using the cup center, you should put a drop of heavy oil on the cup and center point to reduce friction.

**1/4" CUP AND 1/2" SPUR CENTER SET (03J72.13)**

The 1/2" spur center can be held in any chuck, a 1/4" collet, or in the 3/4" spur center by removing its center pin. The 1/2" spur center is supplied with a flat washer. Place the washer between the 3-3/4" and 1/2" spur centers; this will protect you and your tools from the exposed teeth of the 3/4" spur center. When holding the 1/2" center in the 3/4" center, make sure you tighten the setscrew in the 3/4" center.



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