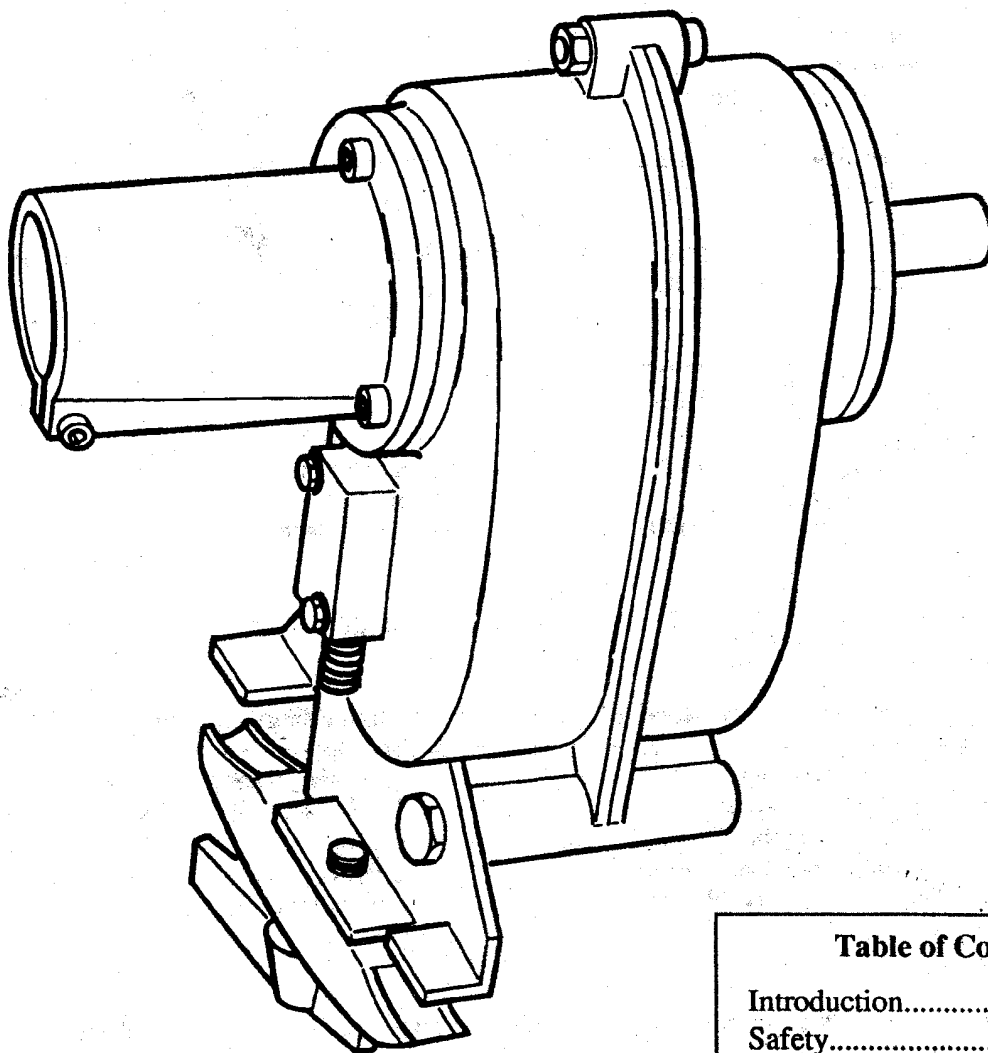




Speed Reducer Owners Manual

555428



WARNING

Read the SAFETY section and complete the Assembly procedures before operating the Speed Reducer.

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INTRODUCTION

The Shopsmith Speed Reducer works with the Shopsmith Mark II, Mark VII and, of course, the Mark V. Though all references in this manual refer to the Mark V, they also apply to the Mark II and Mark VII.

The Shopsmith V Speed Reducer expands the usefulness of your Mark V, II or VII by allowing you to:

- drill holes larger than 1-1/2" in diameter
- turn large bowls and green wood more easily on the lathe
- drill in metal, plastics and other non-wood materials
- bandsaw metal, plastics and other non-wood materials

These new abilities made possible by the Speed Reducer can help you in woodworking projects as well as home repair and improvement activities.

The Speed Reducer decreases the speed from the Mark V spindle by a 7:1 ratio. For example, the Mark V speed setting of "Slow" (700 rpm) becomes 105 rpm with the Speed Reducer.

WARNING

Before you do anything with the Speed Reducer, make sure you read this manual thoroughly. Besides learning the warnings, cautions and notes, you will know how the Speed Reducer fits in with your other woodworking equipment.

Don't try to exceed the maximum speeds and parameters set forth in this manual. To do so risks injury to yourself and to your equipment.

After you have thoroughly read and understood this manual, return to the beginning and perform the Assembly and Alignment procedures. Then go to the part of the "Operations" section that refers to what you want to do. Read again the "Troubleshooting and Maintenance" section of this manual if you experience any problem with your Speed Reducer. And above all, read and learn the "Safety" section of this manual and the owners manual of every tool you use with the Speed Reducer. The time and effort you spend now to learn about the Speed Reducer will pay off. You will work safer and smarter, and you will be able to take full advantage of its features.

Customer Service Information

The Speed Reducer comes with a 30-day money-back guarantee, and is also guaranteed against all defects in parts and workmanship for one full year from the date of receipt. To repair or replace a part in the equipment while it's still under warranty, call Customer Services. If your equipment is out of warranty and needs service, call Customer Services for instructions on how you can have the part repaired at our Factory or a Showroom for a fee.

Where to write-- Shopsmith, Inc., Customer Services, 3931 Image Drive, Dayton, Ohio 45414.

Where To phone-- 1-800-762-7555 (Continental U.S., Hawaii, Alaska, Puerto Rico, & U.S. Virgin Islands)
1-800-268-3998 (Canada)
1-513-898-6070 (Dayton, Ohio area)

SAFETY

To protect yourself from injury:

-The Speed Reducer was designed and intended to be used on the Shopsmith Mark V (Models 500 and 510), Mark II and Mark VII. Do not use the Speed Reducer on the 10-E, 10-ER, the Power Station or any non-Shopsmith products.

-Read, understand and follow ALL the information and instructions in this Owners Manual.

-Read, understand and follow ALL the information and instructions in the Mark V, Mark II or Mark VII Owners Manual (for whichever unit you own) and every manual that comes with each accessory you use with the Speed Reducer.

Throughout this manual, we list **WARNINGS, CAUTIONS AND NOTES**. We advise that when you come to one of these listings, make sure you read and understand it fully. Their meanings are:

WARNING

A **WARNING** is given when failure to follow the directions is likely to result in injury, loss of limb, or life.

CAUTION

A **CAUTION** is given when failure to follow the directions is likely to result in damage to the equipment.

NOTE

A **NOTE** is used to highlight an important procedure, practice or condition.

SAFETY RULES FOR THE SPEED REDUCER

WARNING

-Be sure that you read, understand and follow the Owners Manual of the Mark V and every accessory you use with the Speed Reducer.

-Assemble, align and operate the Speed Reducer only as specified in this Owners Manual.

-Always mount the Speed Reducer to the Mark V, Mark II or Mark VII with the quill clamp end (4) marked "Headstock" pointed toward the Mark V's headstock.

-Failure to mount the Speed Reducer correctly will result in severe damage to the unit and possible personal injury.

-Do not hook up the Dust Collector or its hoses to the Mark V, II or VII when using the Speed Reducer with non-wood materials.

-Use the Speed Reducer and Mark V with Shopsmith accessories only. Also use only Shopsmith parts and accessories. Mounting and using non-Shopsmith accessories or parts could create a hazardous condition and will void your warranty.

- Always reduce the Mark V's, II's or VII's speed to its lowest setting before you turn it off.
- Always wear eye protection when operating the Speed Reducer.
- Do not remove the plugs from the side of the Speed Reducer.
- Do not operate damaged machinery.
- Do not remove the bracket support assembly from the Speed Reducer when you are operating it in the drill press or horizontal boring modes.

Specifications: The Speed Reducer weighs 10 lbs., and measure 14.5" high x 10.5" wide x 8" deep.

SPEED CHARTS--

The Speed Reducer Speed Chart shows the approximate speeds output by the Speed Reducer at the Mark V's speed dial settings.

SPEED REDUCER APPROXIMATE SPEED CHART

Mark V Setting	Final Output From Speed Reducer- RPM	Mark V Setting	Final Output From Speed Reducer- RPM
"Slow"	100	M	350
A	110	N	380
B	125	O	410
C	140	P	440
D	155	Q	475
E	170	R	510
F	190	S	555
G	215	T	600
H	235	U	640
I	255	V	685
J	275	W	745
K	300	"Fast"	760
L	320		

DRILLING SPEED CHART, USING THE SPEED REDUCER, AT MAXIMUM RECOMMENDED RPM's

Bit Diameter:	1/2"	5/8"	3/4"	7/8"	1"	1.5"	2"	2.5"	3"	3.5"
Material--										
Wood	H*	E*	D*	C*	B*	S	O	L	J	H
Plastics	C*	Fast	U	S	Q	L	H	F	E	C
Aluminum, Copper, Brass	B*	U	S	Q	O	J	G	E	C	Slow
Cast Iron	V	P	M	K	L	G	E	C	Slow	Slow
Steel	S	P	M	K	I	E	B	Slow	-	-

*Without using Speed Reducer. Use normal Mark V wood drilling operations with bits 1" and smaller.

NOTE

These are maximum rpm's recommended for use with each material. If difficulties arise, slow down the rpm's until the cutter is cutting satisfactorily.

As indicated by each of these charts, speed selection will vary according to the hardness of the material. Start cutting at three letters slower than the maximum rpm's. If the cutter or the material is overheating, slow the machine further. Also, if excessive force is required to machine the material, then you should increase the speed. Never exceed the recommended maximum rpm's.

BANDSAW SPEED CHART, USING THE SPEED REDUCER AT MAXIMUM RECOMMENDED RPM'S

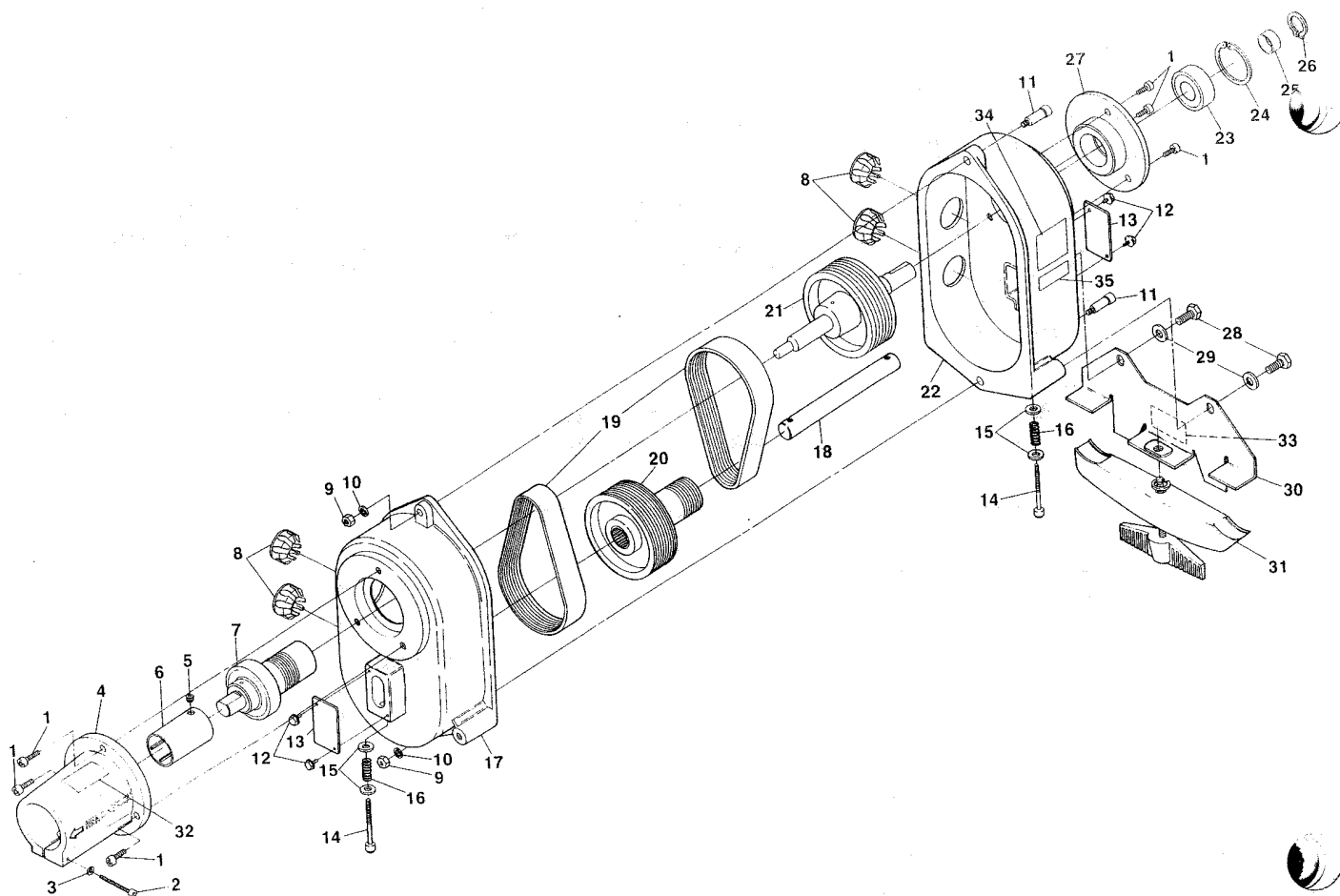
(Do not exceed recommended maximum speed for material)

<i>Material—</i>	<i>Speed Setting--</i>
Wood	Do not use Speed Reducer. Use recommended Bandsaw setup and settings.
Plastics	Slow through M
Aluminum	Slow through N
Cast Iron	Slow
Steel	Slow

LATHE TURNING SPEED CHART, USING THE SPEED REDUCER

(Do not exceed recommended maximum speed for material)

<i>Material--</i>	<i>Stock Size Diameter</i>	<i>Settings for Types of Activity--</i>		
		Roughing	Cutting	Sanding
Wood	8"	D	O	W
	10"	B	M	U
	12"	B	K	T
	14"	B	I	S
	16	B	F	R
Plastics	8"	D	M	S
	10"	C	K	Q
	12"	B	I	O
	14"	B	F	M
	16"	B	D	K



PARTS LIST

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	513201	Socket Head Cap Screw, 5/32"	6	19	515988	Belt Assembly, Matched	1
2	514513	Socket Head Cap Screw, 5/32" x 1-1/2"	1	20	515782	Idler Assembly Sheeve	1
3	502973	Lock Washer,	1	21	515794	Output Shaft Assembly	1
4	515785	Quill Clamp (Adaptor)	1	22	515777	Front Housing	1
5	222458	Set Screw, 5/16"-18 x 1/4"	1	23	515971	Output Ball Bearing	1
6	515798	Coupling	1	24	501622	Retaining Ring	1
7	515792	Sleeve Assembly	1	25	515910	Spacer	1
8	515813	Cap Plug	4	26	515909	Retaining Ring	1
9	120375	Hex Nut, 1/4"-20	2	27	515789	Bearing Housing	1
10	115546	Lock Washer, 1/4"	2	28	515136	Hex Head LCap Screw, 1/4"-20	2
11	515805	Shoulder Screw	2	29	120392	Flat Washer, 1/4"	2
12	515120	Screw, Tapfit	4	30	515797	Support Bracket Assembly	1
13	515894	Speed Reducer Shaft Cover	2	31	513756	Carriage Clamp Assembly	1
14	515986	Socket Head Cap Screw	2	32	515957	Warning Label	1
15	502333	Washer,	4	33	515957	Nameplate	1
16	515987	Compression Spring	2	34	503808	Logo Decal	1
17	515776	Rear Housing	1	35	515931	Patent Pending Label	1
18	515795	Idler Shaft	1	36	503740	Drive Hub (not shown)	1

CAUTION

Rough turn stock of all diameters starting at "Slow" speed until the stock is cylindrical.

WARNING

Do NOT turn metal on the Mark V, II or VII with or without the Speed Reducer.

ASSEMBLY and ALIGNMENT

NOTE

The Shopsmith Speed Reducer works with the Shopsmith Mark II, Mark VII and, of course, the Mark V. Though all references in this manual will be to the Mark V, they also apply to the Mark II and Mark VII.

ASSEMBLY

INTRODUCTION

The Speed Reducer comes assembled, except for the support bracket (30) and carriage clamp assembly (31). Follow these brief assembly instructions and then complete the alignment procedures before operating the Speed Reducer.

Tools Needed:

7/16" wrench
Adjustable wrench (optional)
5/32" Allen wrench

INSTALL THE SUPPORT BRACKET ASSEMBLY

1. Point the angles of the support bracket (30) toward the quill clamp (4) as shown in Fig.1 and Fig.2. Using two screws (28) and washers (29), install the support bracket (30) on the quill clamp side of the Speed Reducer. Finger tighten only. (You'll need the support bracket a little loose for later alignment.)

2. Install the carriage clamp assembly (31). See Fig.2.

This completes the Assembly instructions for the Speed Reducer. Now proceed with the Alignment section.

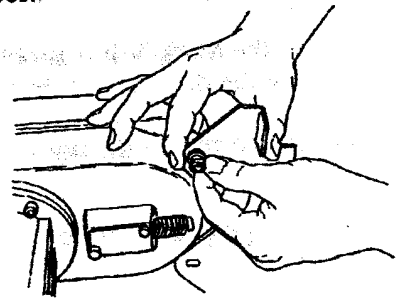


Fig.1

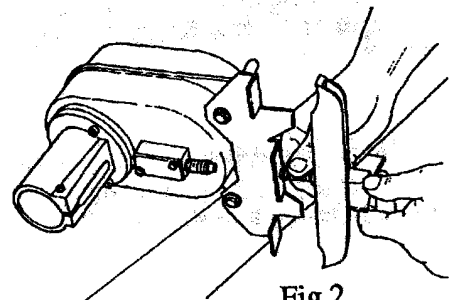


Fig.2

ALIGNMENT

INTRODUCTION

You will need to align the Speed Reducer to the Mark V headstock only once. However, you should periodically recheck the alignment.

NOTE

If your Mark V is already aligned for lathe turning, you may skip Steps 1 through 6 and begin with Step 7.

PREPARE THE MARK V FOR ALIGNMENT, AS YOU WOULD FOR LATHE TURNING ALIGNMENT

1. Install the lathe turning tailstock and a cup center on the end of the Mark V.
2. Install a drive center on the headstock spindle.
3. Move the headstock toward the tailstock as far as possible and lock down the headstock. Extend the quill until the tips of the drive center and the cup center almost touch as in Fig.3.
4. Loosen the setscrew in the tailstock which secures the eccentric mount. Horizontally align the cup center to the drive center by pivoting the eccentric mount and then tightening the setscrew, shown in Fig.4.
5. Vertically align the cup center to the working center by loosening the accessory mount lock and raising or lowering the tailstock. As shown in Fig.6, tighten the accessory mount lock when the centers' points are aligned. Then re-adjust the tailstock's tube collars.
6. Unlock the Mark V headstock, move it back to the middle of the way tubes, and remove the drive center from the quill spindle.
7. Loosen and retract the quill.

PREPARE THE SPEED REDUCER FOR ALIGNMENT

NOTE

To help rotate the Speed Reducer's drive shaft for hub alignment, mount a drill chuck or faceplate to the Mark V's upper auxiliary drive shaft.

1. Install the drive hub (36) on the Mark V spindle shaft fully seated on the flat of the spindle (shown in Fig.7). Put a hub notch in the "12 o'clock" position, as in Fig.8.

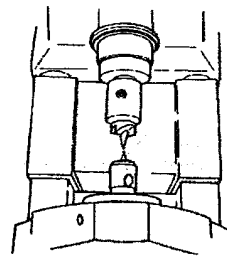


Fig.3

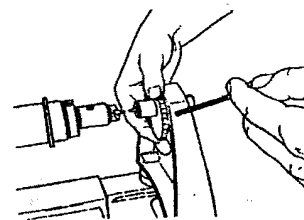


Fig.4

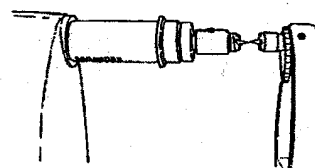


Fig.5

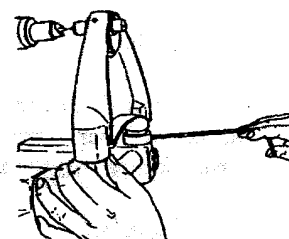


Fig.6

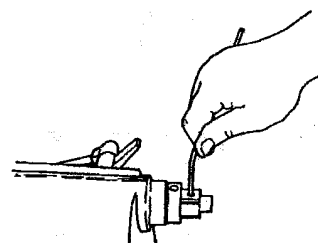


Fig.7

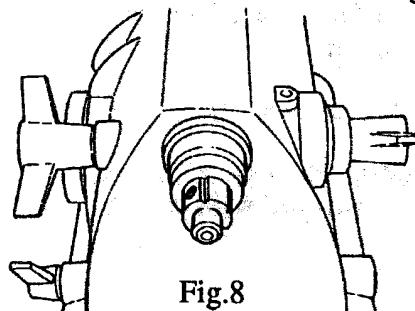


Fig.8

2. Reach inside the Speed Reducer's quill clamp and line up a coupler "ridge" in the "12 o'clock" position.

3. Place the Speed Reducer on the Mark V way tubes. Make sure the side marked "Headstock" is toward the Mark V headstock.

4. Fit the Speed Reducer onto the headstock spindle, making sure the quill clamp slides completely and squarely on the Mark V quill. See Fig.9.

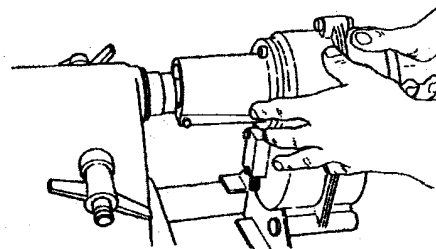


Fig.9

5. Install the drive center on the Speed Reducer's drive shaft, leaving about 1/2" of the shaft exposed, as in Fig.10.

6. Loosen the headstock lock and move the Speed Reducer and headstock toward the tailstock until the tips of the drive center and the cup center almost touch, shown in Fig.11.

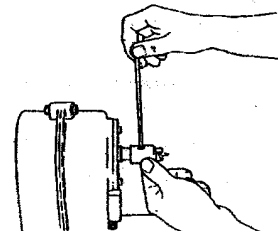


Fig.10

7. Securely tighten the Mark V headstock lock.

8. Tighten the bracket support assembly's wing nut underneath the way tubes, as shown in Fig.12, but do NOT tighten the screws which fasten the bracket to the Speed Reducer housing.

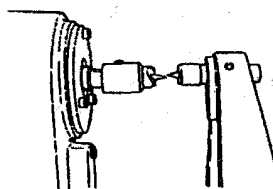


Fig.11

9. Double check to see that the:

- Quill clamp cap screw (2) is loose
- Bracket's cap screws (28) are loose
- Speed Reducer's quill clamp (4) is all the way on Mark V's quill
- Headstock is locked down
- Quill is locked down
- Mark V speed setting is "Slow"
- Bracket support assembly's (31) wing nut is securely tightened

10. Holding the Speed Reducer near the drive center, align points of the drive center and the cup center (see Fig.13). When you have reached alignment, tighten the quill clamp's cap screw (2).

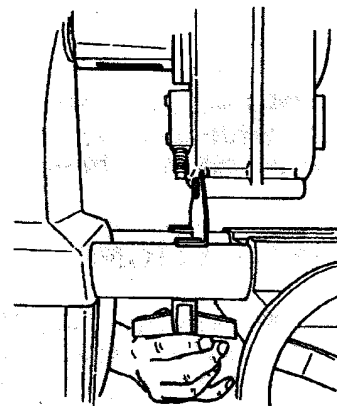


Fig.12

11. Adjust the support bracket (30) to touch the tops of the way tubes.

12. Securely tighten the two bracket support screws (28) as in Fig.14.

You are now ready for one of the various "Operations" sections. Normally, you should not have to align the Speed Reducer again. However, you should periodically re-check alignment, especially when using the Speed Reducer in the drill press or horizontal boring mode.

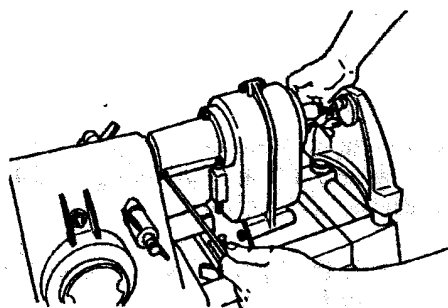


Fig.13

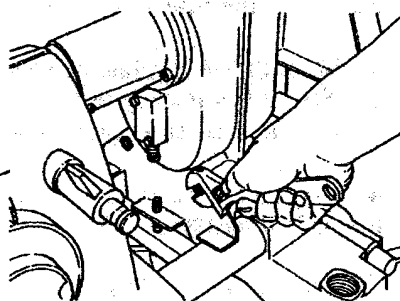


Fig.14

LATHE TURNING WITH THE SPEED REDUCER

INTRODUCTION

The Speed Reducer allows you to more safely and effectively turn large, heavy bowl stock, unbalanced stock and large green stock. Even at the low speeds produced by the Speed Reducer, you must support unbalanced stock with a cup center in a tailstock until the stock is turned round. For round or faceplate stock, use a bandsaw to prepare your turning stock as close to cylindrical as possible before you mount it to a faceplate, between centers or other chucking method.

Since the Speed Reducer permits you to work larger and unbalanced stock, you must take great caution in mounting the stock to a sturdy faceplate or speciality lathe chuck. Read the lathe turning section of your Mark V Owners Manual and the lathe turning chapter in the text, Power Tool Woodworking for Everyone.

WARNING

Read and understand your Mark V Owners Manual, especially the section on lathe turning, before you attempt lathe turning operations with the Speed Reducer.

WARNING

Make sure you have already installed and aligned the Speed Reducer according to the "Alignment" section of this manual before you proceed with these instructions.

OPERATIONS

1. Make sure the Mark V is unplugged and its speed dial is set at "Slow." Also you must have already aligned the Speed Reducer. If you have not, return to the alignment section of this manual.
2. Mount the Speed Reducer to the Mark V headstock. Leave the carriage clamp assembly (31) slightly loose for now. Be sure the Mark V is set to "Slow" before mounting the Speed Reducer.
3. Mount the faceplate or specialty chuck (with the workpiece attached to it) to the Speed Reducer spindle, as you would if you were using the Mark V by itself. Make sure the setscrew is seated on the spindle's flat.
4. Loosen the headstock lock and slide the Speed Reducer and Mark V headstock toward the tailstock until the cup center is 1" from the stock.
5. Lock down the Mark V headstock.
6. Extend the quill until the tip of the cup center marks the stock.

7. Retract the quill and remove the faceplate and stock from the Speed Reducer spindle.

8. Remove the cup center from the tailstock and drive it into the stock at the point marked. If possible, the tip of the cup center should be "buried" to its shoulder in the wood, and no shallower than 1/8" deep.

9. Remount the faceplate and stock on the Speed Reducer spindle, and re-install the cup center in the tailstock.

10. Using the quill, move the stock firmly against the cup center.

11. Lock the quill.

12. Securely tighten the Speed Reducer's carriage clamp assembly (31).

13. Install the tool rest assembly and adjust it so that the outermost point of the turning stock clears the tool rest by no more than 1/4" (see Fig.15). Securely tighten the tool rest assembly.

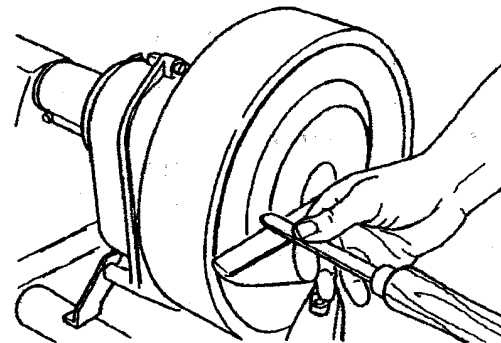


Fig.15

CAUTION

Always turn the Mark V speed setting to "Slow" before you turn off the machine—and never turn on the Mark V with large turning stock mounted unless the speed setting is already set to "Slow." If vibration is excessive, shut off the Mark V immediately.

14. Plug in the Mark V and turn it on.

15. If the turning stock is out of round and unbalanced (as in Fig.16), turn it to round at the "roughing" speeds recommended in the Lathe Turning Speed Chart below.

16. After the stock is rounded, turn the stock at "cutting" speed settings listed in the Lathe Turning Speed Chart.

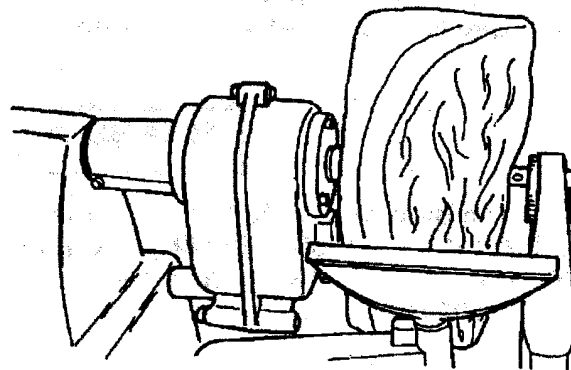


Fig.16

CAUTION

If excessive vibration occurs while operating at "cutting" speeds, slow the machine until the vibration is eliminated.

LATHE TURNING SPEED CHART, USING THE SPEED REDUCER

(Do not exceed recommended maximum speed for material)

<i>Material--</i>	<i>Stock Size Diameter</i>	<i>Settings for Types of Activity</i>		
		<i>Roughing</i>	<i>Cutting</i>	<i>Sanding</i>
Wood	8"	D	O	W
	10"	B	M	U
	12"	B	K	T
	14"	B	I	S
	16"	B	F	R
Plastics	8"	D	M	S
	10"	C	K	Q
	12"	B	I	O
	14"	B	F	M
	16"	B	D	K

NOTE

These are the maximum rpm's recommended for use with each material. If difficulties arise, slow down the rpm's until the cutter is cutting satisfactorily.

As indicated by each of these charts, speed selection will vary according to the hardness of the material. Start cutting at three letters slower than the maximum rpm's. If the cutter or the material is overheating, slow the machine further. Also, if excessive force is required to machine the material, then you should increase the speed. Never exceed the above recommended maximum rpm's.

WARNING

Since the best speed depends on the size, type of wood and weight of the turning stock, start to rough turn all diameters of stock at "Slow." Then gradually increase the speed until you reach a safe and efficient cutting speed.

CAUTION

Do NOT turn metal on the Mark V, II or VII with or without the Speed Reducer.

OPERATING THE SPEED REDUCER AND MARK V IN THE DRILL PRESS MODE

INTRODUCTION

The Speed Reducer lets you use larger diameter bits and other drilling accessories in wood. And because of the lower speeds achieved, with the proper bits you can now use your Mark V to drill in aluminum, steel, cast iron, plastics and other non-wood materials.

Drilling in non-wood materials is similar to drilling in wood, but here are some pointers to help you:

- You must only use twist drill bits or bits which are specifically made for the material you are drilling.

- You should securely clamp the workpiece so it remains immobile and stable as you drill. Usually you can use the rip fence and the miter gauge on the worktable. See Fig.17.

- You should brace the worktable with support legs, especially if you are drilling metals. The Mark V Model 510 already has a leg support system available. If your model (like the Model 500) does not, then you can make 2" x 2" legs to support each corner of the worktable. Cut the legs to a comfortable height (about 36" to 48").

- Just as it is described in the Mark V Owners Manual and the text, Power Tool Woodworking for Everyone, you must protect the worktable from drill bits boring into it. Unless you center the drill bit over the hole in a shaper/drum sander table insert, you need to place a board on the table and underneath the workpiece. Also, adjust the quill stop to limit the bit's travel to only the depth you need.

- We suggest these reference books for more information on working with non-wood materials—

Machinery's Handbook, 22nd Ed., Industrial Press, Inc.
Machining Data Handbook, 3rd Ed., Metcut Research Assoc., Inc.

NOTE

The information contained in this section also applies to horizontal boring with the Speed Reducer and Mark V.

Follow these instructions for drilling with the Speed Reducer and the Mark V in the drill press mode:

PREPARE THE MARK V

1. Make sure the Mark V is unplugged and its speed dial is set at "Slow." Also you must have already aligned the Speed Reducer. If you have not, return to those instructions in this manual and do them before proceeding.

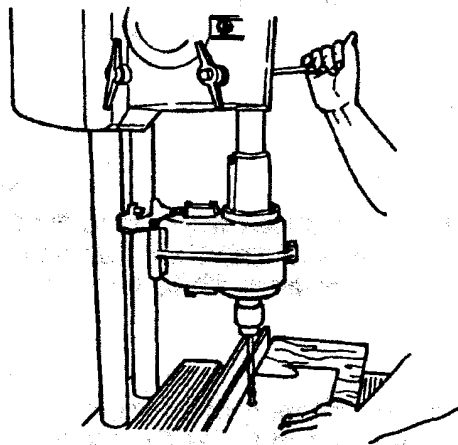


Fig.17

2. Move the headstock far enough to the left to accommodate the Speed Reducer and worktable at a level which you will be safe and comfortable while operating the drill press.

MOUNT THE SPEED REDUCER TO THE HEADSTOCK

3. Mount the Speed Reducer on the headstock spindle by following the steps starting on page 9 in the "Alignment" section of this manual.

CAUTION

Do NOT tighten the Speed Reducer carriage clamp assembly on the way tubes at any time during drill press operations. It should remain only loose enough to allow for smooth quill feed operations.

NOTE

The added weight of the Speed Reducer to the headstock makes it more difficult to lift the Mark V headstock/Speed Reducer into the drill press position. Take extra care to position the headstock and Speed Reducer on the way tubes while the Mark V is in the horizontal position.

PREPARE FOR DRILL PRESS OPERATIONS

4. If you have one, install a shaper/drum sander table insert into the worktable. Fig.18 shows this insert.
5. Install the worktable and set it perpendicular to the Speed Reducer.
6. Make sure this checklist is completed before lifting the headstock/Speed Reducer into the drill press mode:

- Mark V is unplugged
- Speed dial is set to "Slow"
- Headstock lock is locked
- Speed Reducer is securely tightened onto the quill
- Worktable tilt adjustment is locked at 90 degrees
- Worktable height lock is locked
- Carriage is locked
- Headrest handle is unlocked
- Quill lock handle is locked
- Base lock is unlocked

7. Lift the Mark V into the drill press mode, then secure the base lock.
8. Install the drill chuck, shown in Fig.18.

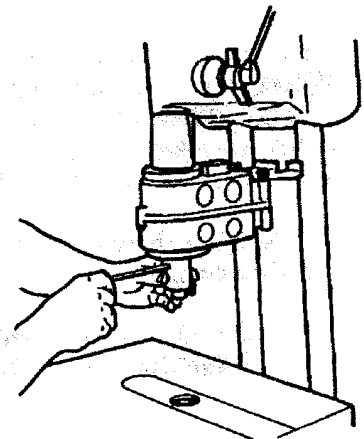


Fig.18

CAUTION

Whenever possible, brace and stabilize the worktable with support legs.

You are now ready to begin drill press operations. See your Mark V Owners Manual and Power Tool Woodworking for Everyone for instructions.

DRILLING SPEED CHART, USING THE SPEED REDUCER, AT MAXIMUM RECOMMENDED RPM's

Bit Diameter:	1/2"	5/8"	3/4"	7/8"	1"	1.5"	2"	2.5"	3"	3.5"
Material--										
Wood	H*	E*	D*	C*	B*	S	O	L	J	H
Plastics	C*	Fast	U	S	Q	L	H	F	E	C
Aluminum, Copper, Brass	B*	U	S	Q	O	J	G	E	C	Slow
Cast Iron	V	P	M	K	L	G	E	C	Slow	Slow

*Without using Speed Reducer. Use normal Mark V wood drilling operations with bits 1" and smaller.

NOTE

These are maximum rpm's recommended for use with each material. If difficulties arise, slow down the rpm's until the cutter is cutting satisfactorily.

As indicated by the above chart, speed selection will vary according to the hardness of the material. Start cutting at three letters slower than the above maximum rpm's. If the cutter or the material is overheating, slow the machine further. Also, if excessive force is required to machine the material, then you should increase the speed. Never exceed the above recommended maximum rpm's.

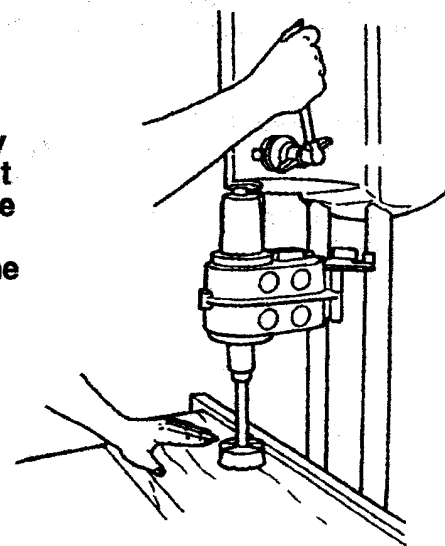


Fig.19

OPERATING THE BANDSAW WITH THE SPEED REDUCER AND THE MARK V

INTRODUCTION

Operating the bandsaw with the Speed Reducer permits you to cut plastic, steel, cast iron, aluminum and other non-wood materials. While bandsawing non-wood materials is similar to bandsawing wood, here are some pointers to help you be safe and efficient:

- Do not "force feed" non-wood material (especially metal shown in Fig.20) into the blade. The workpiece could bind and break the blade, causing a hazardous situation. Force feeding non-wood material also causes premature failure of other bandsaw parts.

- Lubricate the bandsaw blade by shaving off a slice of a bar of soap, as shown in Fig.21. The soap will collect in the gullets between the teeth and prevent material from clogging the blade. Do not use oil or other lubricants. Only bar soap. This type of lubrication is especially needed for aluminum.

- Most materials need at least three teeth in the material at the same time. So choose a bandsaw blade to match the thickness of the thinnest portion of the workpiece you will be cutting. For example, if an aluminum bar you wish to cut is 1/2" thick, you should use a blade with no fewer than three teeth per half inch. This translates into a blade with no fewer than six teeth per inch.

- Plastics (shown in Fig.22), have a tendency to melt during cutting operations, so take extra care to set the speed to the slowest speed and monitor the feed rate while cutting.

- Refer to the "Bandsaw Speed Chart, Using the Speed Reducer" to match speeds to the material you wish to cut.

- Properly brace and support the workpiece before, during and after the cut is made. For example, place a metal pipe in a V-block as in Fig.23.

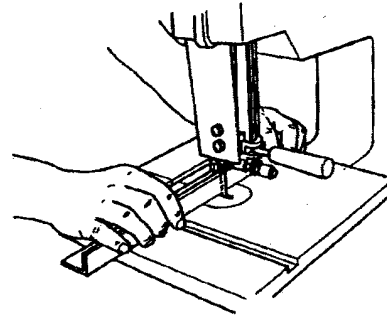


Fig.20

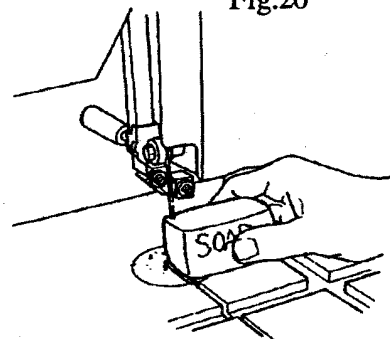


Fig.21

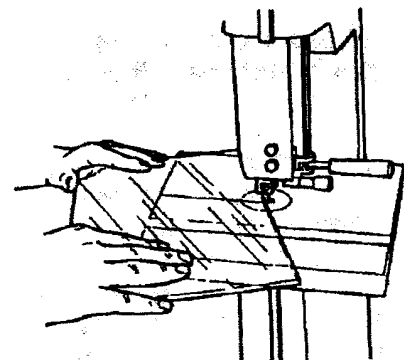


Fig.22

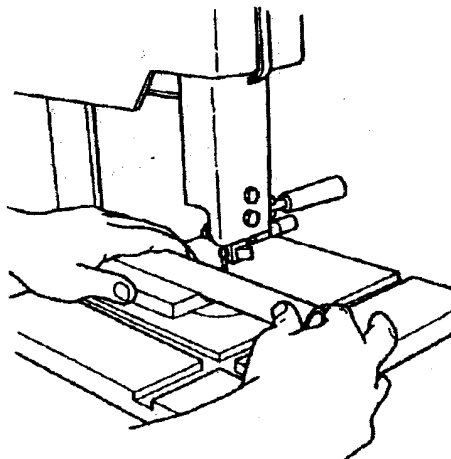


Fig.23

-We suggest these reference books for more information working with non-wood materials—

Machinery's Handbook, 22nd Ed., Industrial Press, Inc.
Machining Data Handbook, 3rd Ed., Metcut Research Assoc., Inc.

WARNING

Read and understand the Bandsaw Owners Manual before you attempt any operations with the Speed Reducer, Mark V and bandsaw.

Follow these instructions for using the Bandsaw with the Speed Reducer and the Mark V:

PREPARE THE MARK V

1. Make sure the Mark V is unplugged and its speed dial is set at "Slow." Also, you must have already aligned the Speed Reducer. If you have not, return to those instructions in this manual and do them before proceeding.
2. Move the headstock to the middle of the way tubes.
3. Make sure a drive hub is installed on the headstock's upper auxiliary drive shaft.
4. Mount the bandsaw in the accessory mount and lock it in place with the mount lock— just as you would to use it with the Mark V.

PREPARE THE SPEED REDUCER

5. Place the Speed Reducer on a workbench. Remove the special coupler from the quill clamp of the Speed Reducer by exposing it's setscrew through the slot in the underside of the quill clamp, as in Fig.24. Then loosen the setscrew and slide the special coupler off the input shaft. See Fig.25.
6. Install the special coupler all the way onto the Speed Reducer's output shaft, shown in Fig.26.

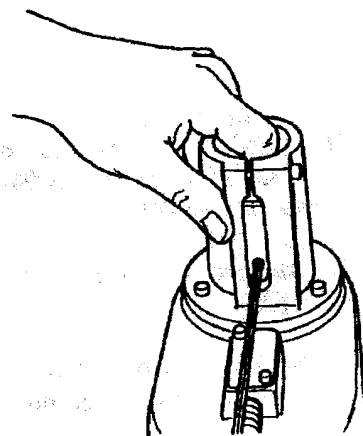


Fig.24

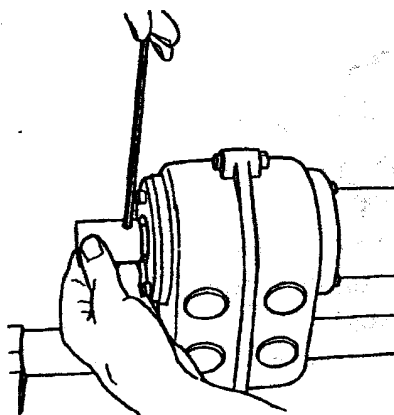


Fig.26

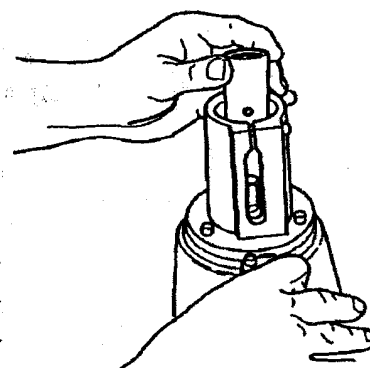


Fig.25

7. Install the drive hub (36) supplied with the Speed Reducer on the input shaft inside the quill clamp as follows—

-Insert a 5/32" Allen wrench through the slot in the base of the quill clamp (4).

-At the "mouth" of the quill clamp, hold the drive hub (36) while you insert the Allen wrench into the hub's setscrew, shown in Fig.27.

-Then use the Allen wrench as a slender "finger" to guide the drive hub onto the input shaft of the Speed Reducer. See Fig.28.

-When you have guided the drive hub onto the input shaft, securely tighten the hub's setscrew onto the flat of the spindle.

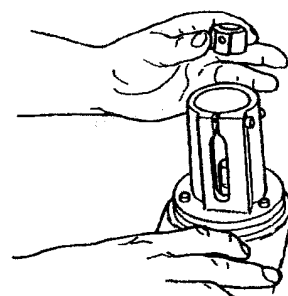


Fig.27

8. Mount a regular Mark V coupler (spring-side out) to the drive hub of the Speed Reducer, as shown in Fig.29.

9. Place the Speed Reducer on the Mark V way tubes, but do not tighten the carriage clamp assembly yet.

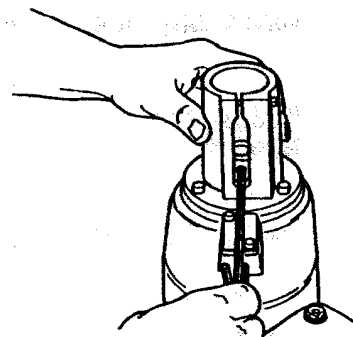


Fig.28

COUPLE THE SPEED REDUCER TO THE BANDSAW

10. Align the bandsaw hub notches with the ridges inside the Speed Reducer's special coupler.

NOTE

You may need to rotate the bandsaw hub to align it with the "ridges" inside the Speed Reducer's special coupler. It is very difficult to rotate the Speed Reducer shaft by hand because of its belts and pulleys.

11. Slide the Speed Reducer's special coupler onto the bandsaw's drive hub, as in Fig.30.

12. Secure the Speed Reducer's carriage clamp assembly (31) to the way tubes by tightening the wing nut, illustrated in Fig.31.

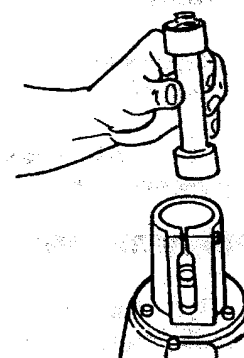


Fig.29

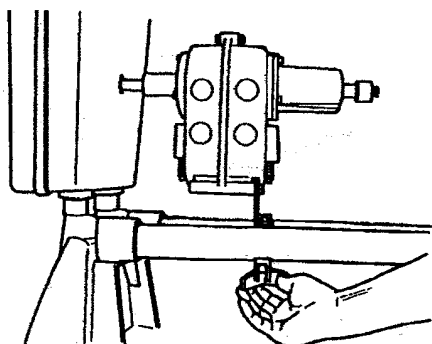


Fig.31

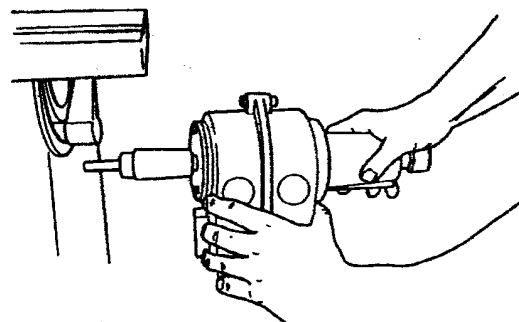


Fig.30

MOUNT THE HEADSTOCK TO THE SPEED REDUCER

13. Move the Mark V headstock toward the Speed Reducer and rotate the spindle by hand until the hub's notches align with the "ridges" inside the coupler.

14. Slide the headstock hub onto the coupler (as in Fig.32), then lock the headstock.

15. Before you begin bandsaw operations with the Speed Reducer and the Mark V, double check that the:

- Headstock is locked
- Speed Reducer clamp is securely tightened to the way tubes
- Bandsaw is locked into the Mark V accessory mount
- Mark V is unplugged
- Speed dial is set to "Slow"

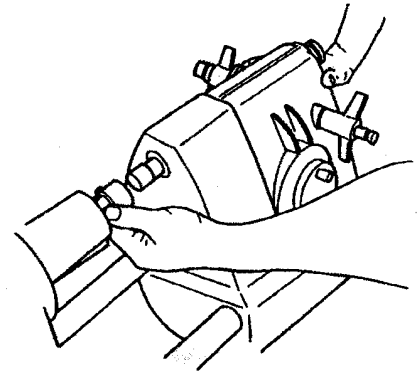


Fig.32

You are now ready to operate the bandsaw with the Speed Reducer and the Mark V. See the Bandsaw Speed Chart below.

BANDSAW SPEED CHART, USING THE SPEED REDUCER AT MAXIMUM RECOMMENDED RPM'S

(Do not exceed recommended maximum speed for material)

<i>Material—</i>	<i>Speed Setting</i>
Wood	Do not use Speed Reducer. Use recommended Bandsaw setup and settings.
Plastics	Slow through M
Aluminum	Slow through N
Cast Iron	Slow
Steel	Slow

NOTE

These are maximum rpm's recommended for use with each material. If difficulties arise, slow down the rpm's until the cutter is cutting satisfactorily.

As indicated by each of this chart, speed selection will vary according to the hardness of the material. Start cutting at three letters slower than the maximum rpm's. If the cutter or the material is overheating, slow the machine further. Also, if excessive force is required to machine the material, then you should increase the speed. Never exceed the above recommended maximum rpm's.

SPEED REDUCER MAINTENANCE

The Speed Reducer is assembled with sealed, self-lubricating bearings. There is no need for the user to lubricate them. Also, the cap screws (14) used to provide tension to the belts are preset at the factory and should not need adjusting, though you should periodically check the setting.

To check the Speed Reducer's belt tension setting:

1. For each of the two tension adjusting cap screws (14), measure the distance between the inside edges of the two washers (15). The distance should ALWAYS measure $27/32"$.
2. If the distance is off, use a $3/16"$ Allen wrench to adjust each of the two tension adjusting cap screws (14) to exactly $27/32"$ -

MAINTENANCE CHART

Every 10 hours or monthly	Clean the external housing thoroughly. Make sure all four cap plugs (8) are installed.
Every 50 hours or every 6 months	Check belt tension. Adjust according to above instructions, if needed.

TROUBLESHOOTING GUIDE

Problem	Possible Causes	Solution
No power at Speed Reducer	•Reducer not properly coupled to headstock. •Coupler setscrew not properly tightened. •Mark V headstock spindle not turning.	•Properly couple Reducer to headstock. •Properly tighten setscrew. •Remove Reducer and refer to your Mark V Owners Manual.
Speed Reducer stalls	•Loose setscrew in coupler. •Reducer not properly coupled to headstock. •Belt in Reducer has broken. •Belt in Mark V headstock has broken. •Belt slippage due to wear in Mark V headstock. •Belt slippage due to wear in Reducer. •Excessive work load caused by dull or improper cutters.	•Properly tighten setscrew. •Properly couple Reducer to headstock. •Replace belt in matched set only. Contact Customer Service or nearest Shoptsmith Showroom. •Replace belt. Refer to Mark V Owners Manual and contact Customer Service or Shoptsmith Showroom. •Properly tension belt. Refer to Mark V Owners Manual. •Properly tension according to above. •Sharpen cutters and/or select proper cutters.
Inaccurate drilling or boring	•Assembly hardware is loose. •Misalignment of Reducer •Deflection of table due to excessive drilling force (improper speed and/or feed rate for cutter and/or material being drilled).	•Properly tighten hardware. •Properly align Reducer. Refer to the Owners Manual. •Select proper speed and feed rate for cutter and material during drilling or boring.
Excessive vibration	•Loose hardware at quill clamp (4) or support bracket assembly (31).	•Properly tighten hardware.
Burning of workpiece and/or cutter	•Dull cutters. •Improper speed and/or feed rate for cutter and/or material of workpiece.	•Properly sharpen cutters. •Select proper feed and speed rate for cutter and/or material of workpiece.

