

MODEL NO. 1

OPERATING MANUAL
and
SAFETY INSTRUCTIONS

for the

MITTS & MERRILL

#1 KEYSATER

IMPORTANT

Only authorized personnel
should operate this machine.

Before operating this machine,
make sure you understand all
operating and safety instructions.

NOTICE

Every effort has been made to ensure that information contained in this manual is accurate. However, *Motts & Merrill L.P.* does not claim to cover all the details relating to your machine, its installation, operation or maintenance.

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**MITTS & MERRILL
KEYSEATERS**

**Training and Operating
Responsibilities**

The users of this machine are responsible for the training and supervision of those persons they select to operate this equipment.

Employers are urged to ensure that the employees whom they select to operate this machine understand that this machine is potentially dangerous and could cause serious injury or death.

Employee instruction should include careful reading and understanding of the contents of this manual.

The operator should understand the functions and capabilities of this machine, its components, and the nature of the work to be performed.

The operator should possess a working knowledge of speed and feeds, depth of cut, properties of the material to be cut, properties of the cutter and principles of the cutting action.

The operator should understand principles for clamping and holding the workpiece and procedures for its safe loading and unloading.

The operator should understand that regular maintenance is an integral part of machine operation and understand general maintenance and cleaning procedures as well as those specific to the machine.

The operator should be capable of recognizing actual or potential problems and unsafe conditions; he should be able to perform those diagnostic and troubleshooting procedures for which he is qualified and trained; and he should understand how and when to properly report existing or potential problems relating to the machine and its operations.

SAFETY INSTRUCTIONS

for

Mitts & Merrill Keyseaters

Warning

**This machine is potentially dangerous
and could cause serious injury or death**

Note:

- a) Only authorized personnel should operate this machine.
- b) Before this machine is set up and operated, make sure you understand all operating and safety instructions.
- c) Arc welding may cause severe damage to microprocessor controls. Evidence of arc welding anywhere on machine will void warranty.

Safety Instructions

- * Use extreme caution when around machine and its controls.
- * Do not remove guards while machine is in operation.
- * Protect yourself. Wear safety glasses, steel-toed shoes and other appropriate safety gear.
- * Don't wear rings, watches, bracelets, necklaces, loose-fitting clothes or anything else that might catch on moving machine parts.
- * Inspect machine before operating to make sure all guards are in place in good condition. Check for loose, worn or broken parts. If something looks wrong or unsafe, report it to your supervisor immediately.
- * Never climb, work or stand on machine.
- * Avoid leaning against, or resting hands on machine.

- * Stop machine immediately at any sign of malfunction or danger.
- * Keep machine and work area clean and properly maintained. Pick up and store loose tools and parts after use.
- * Operate within rated machine capacity.
- * Use electrical lockouts when servicing machine and when machine is not in use.
- * Use the right tooling for each job.
- * Make sure all tooling, fixtures and the workpiece are properly and securely in place before operating machine.
- * Replace worn or defective tooling.
- * Never attempt to attach or remove tooling and fixtures, or to modify the position of the workpiece while the machine is on.
- * Clean up spills and take care of other potentially hazardous conditions immediately.
- * Keep hands and any other parts of the body from inside the machine, and away from any moving parts or pinch points.
- * Never attempt to remove chips from work table while the crosshead and cutter are in motion.
- * Use proper equipment and fixtures to position and hold heavy workpieces.
- * Don't attempt to repair or modify machine without specific training and authorization.
- * Know the safety features of your machine. Never attempt to take "short cuts" by bypassing safety devices, or by skipping steps in set up, operation or maintenance of the machine.
- * Report all injuries, however slight.
- * Know maintenance procedures for the machine and adhere to maintenance schedules. A well-maintained machine is a safer machine.

Warning

**Never operate a machine if you know or suspect
that the machine or its tooling is in any way
defective or unsafe.**

**Report unsafe or potentially hazardous conditions
to your supervisor immediately**

IMPORTANT

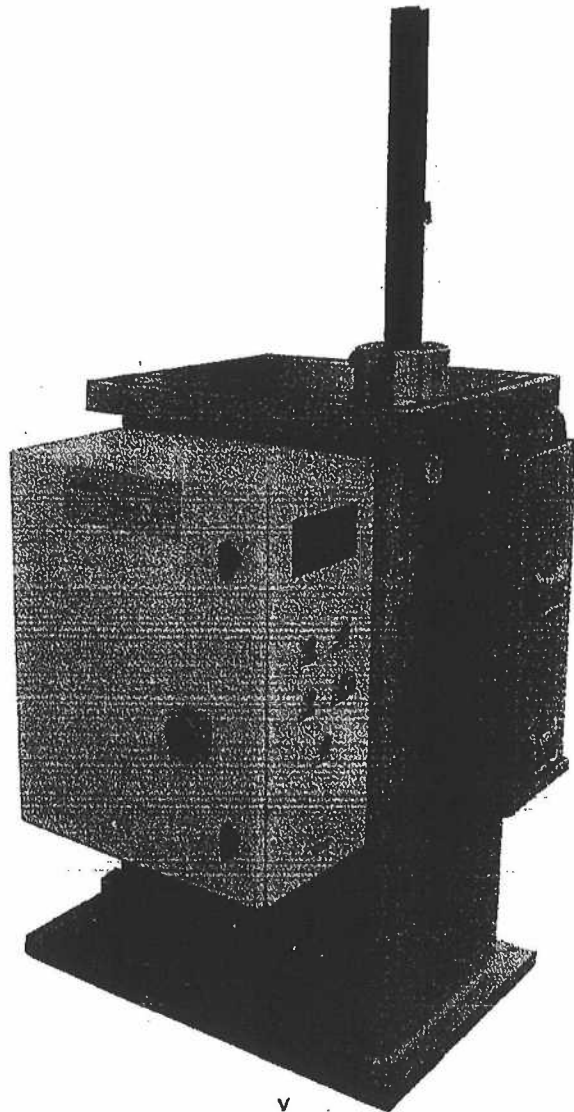
**Safety procedures only work if they are understood and followed.
Protect yourself - and those who work with you -
by knowing safety rules and by using caution and common sense.
Make safety a habit.**

MITTS & MERRILL

#1 KEYSEATER

Specifications

Keyway Width (maximum)	1-1/4"
(minimum)	1/16"
Keyway Length (maximum)	6"
Cutting Speed (maximum)	29 fpm
Crosshead Pull (maximum)	1800 lbs.
Adjustable Feed Rates Per Stroke001-.006"
Tolerances (depth repeatability)	One feed increment
Electric Motor	2 hp
Base Dimensions	20-5/16" wide x 32" deep
Footprint	5.7 sq. ft.
Maximum Workpiece Weight	5,000 lbs.
Maximum Workpiece Diameter	Unlimited



NOTE: HOW TO REFER FROM INSTRUCTIONS TO ILLUSTRATIONS

As you can see from the Table of Contents, all instructions and descriptions are identified by a numbering system. For example, 3.2 quickly identifies the MOTOR START subsection of SECTION 3, DESCRIPTION OF CONTROLS. To find out where the Motor Start button is, simply follow the arrow marked 3.2 in the illustrations for that section.

When there is more than one control or part per subsection which is keyed to an illustration (as in subsection 3.2) a suffix letter has been attached. For Example, in subsection 3.2, the lubricant valve is identified as 3.2a. To find the lubricant valve in the illustration for that section, follow the arrow marked 3.2a).

TABLE OF CONTENTS

- i Training & Operating Responsibilities
- ii Safety Instructions
- iii Safety Instructions
- iv Safety Instructions
- v K-1 Keyseater Specifications
- vi How To Use Text-to-Illustration Keys

- 1. Installing the Keyseater
 - 1.1 Location
 - 1.2 The Foundation
 - 1.3 Setting Up

- 2. Connections
 - 2.1 Conduit
 - 2.2 Power Wire
 - 2.3 Ground Wire
 - 2.4 Compressed Air

- 3. Description of Controls
 - 3.1 Electrical Power
 - 3.2 Motor Start
 - 3.3 Motor Stop
 - 3.4 Clutch On
 - 3.5 Emergency Stop
 - 3.6 Program Unlock
 - 3.7 Smoothing Stroke Timer
 - 3.8 Chip Spout Pressure
 - 3.9 Tool Relief
 - 3.10 Crosshead Speed Adjustment
 - 3.11 Handwheel
 - 3.12 Digital Control
 - 3.13 Feed Adjustment

- 4. Drycycling
 - 4.1 Begin Drycycle
 - 4.2 Stop Drycycle

- 5. Adjustments & Settings
 - 5.1 Adjusting Feed Wedge Holder
 - 5.2 Setting Counter Reset Control
 - 5.3 Setting Depth of Feed
 - 5.4 Adjusting Cutting Feed
 - 5.5 Lubricating the Cutter
 - 5.6 Feed Rate Check
 - 5.7 Changing Rate of Feed

- 6. Tooling Description
 - 6.1 Tool Post
 - 6.2 Plate Bushing (Post Adapter)
 - 6.3 Cutters & Tool Bars
 - 6.4 Feed Wedge
 - 6.5 Taper Wedge
 - 6.6 Workpiece Bushings
 - 6.7 Top Clamp
- 7. Installing Post & Tooling
- 7A *Installing new post with Plate Bushing - Pg 19A & 19B*
- 8. Keyseater Operating Instructions
- 9. Setting the Counter Program
- 10. Maintenance Procedures
 - 10.1 General Procedures
 - 10.2 Filter/Lubricator/Regulator
 - 10.3 Eurodrive Gear Motor
 - 10.4 Tool Bar and Wedge Holders
- 11. Troubleshooting Guide
 - 11.1 Motor Won't Start
 - 11.2 Readout Fails to Register Cutter Movements
 - 11.3 Incorrect Feed

A P P E N D I C E S

- A. Selection & Use of Cutting Fluids
- B. Cutter Sharpening (3)
- C. Keyway Standards
- D. Keyway Depth Control Formulas
- E. Estimating Keyway Cutting Times
- F. Warranty Terms

SECTION 1

INSTALLING THE #1 KEYSATER

1.1 LOCATION

Give careful thought to the placement of your new Mitts & Merrill #1 Keyseater. Choose a location which has access to an overhead crane or hoist of sufficient size and height to clear the top of the keyseater tool post.

If the work to be keyseated has a large outside diameter or long projections, position the machine a sufficient distance from walls, columns or other machinery.

1.2 FOUNDATION

Undamped vibrations can adversely affect the performance of the keyseater and the quality of the work produced. To prevent vibrations from outside sources being transferred to the machine, the foundation of the keyseater must be of sound construction. We recommend the keyseater be mounted on the ground floor.

1.3 LUBRICATION

Fill sight bowl with a good grade of lubricating oil.

SECTION 2

CONNECTIONS

2.1 CONDUIT

Attach wire conduit through the hole in the bottom of the electrical panel.

2.2 POWER WIRE

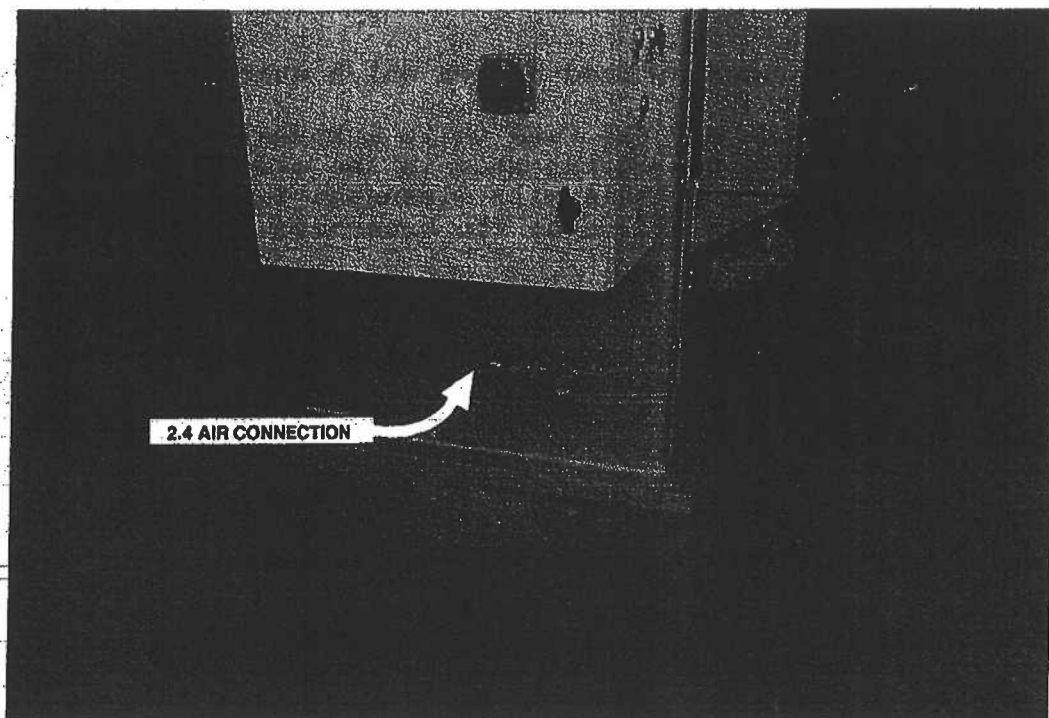
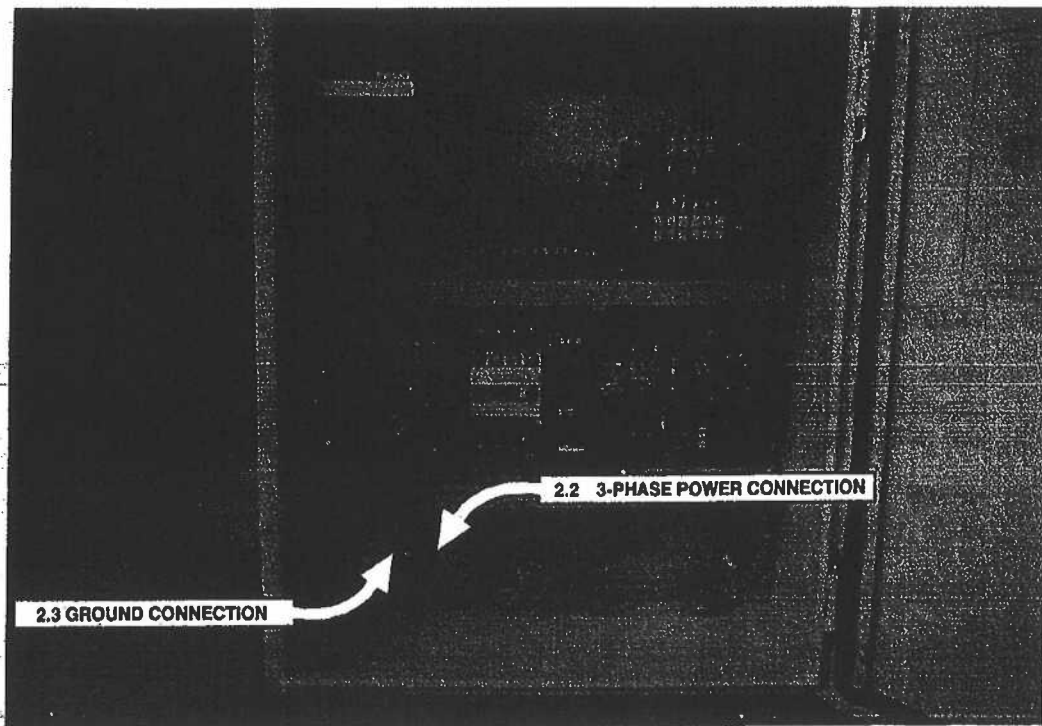
Feed 3-phase power wire through the conduit into the electrical panel and connect the wires to the first three blocks on the terminal strip.

2.3 GROUND WIRE

Connect the ground wire to the ground lug.

2.4. COMPRESSED AIR

Connect the machine to a compressed air source of at least 80 psi using a 1/8" pipe connection



SECTION 3

DESCRIPTION OF CONTROLS

3.1 ELECTRICAL POWER

The power switch is located on the left side of the machine on the door of the electrical panel. This switch must be OFF in order to open the electrical panel.

NOTE: Even when the power switch is in the OFF position, all wires on the line side of the switch are HOT.

3.2 MOTOR START

This button starts the motor, which in turn moves the crosshead. The motor start button also energizes the lubricant valve (fig 3.2a) which allows oil to flow to the crosshead gibs (fig 3.2b). When the clutch is engaged and the motor is running, the motor start button will disengage the clutch (see CLUTCH ON, Section 3.4).

3.3 MOTOR STOP

The motor stop button stops the motor and shuts off the flow of oil to the crosshead.

3.4 CLUTCH ON

This button engages feed clutch which starts cutter feed.

NOTE: To shut off the feed while a keyway is being cut, without having the cutter stop in the middle of a cut, press motor start. This will disengage the feed. Then press motor stop. This will stop the crosshead and cutter.

3.5 EMERGENCY STOP

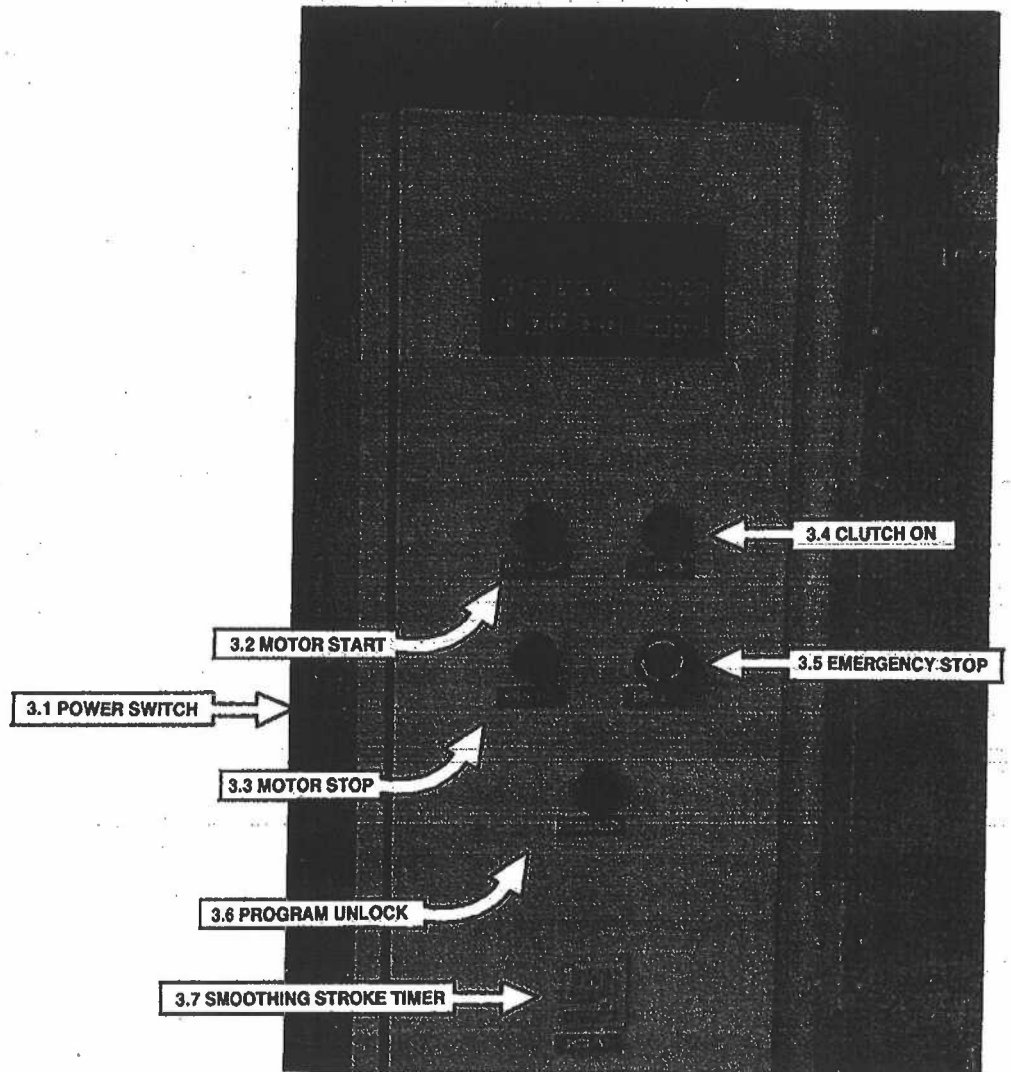
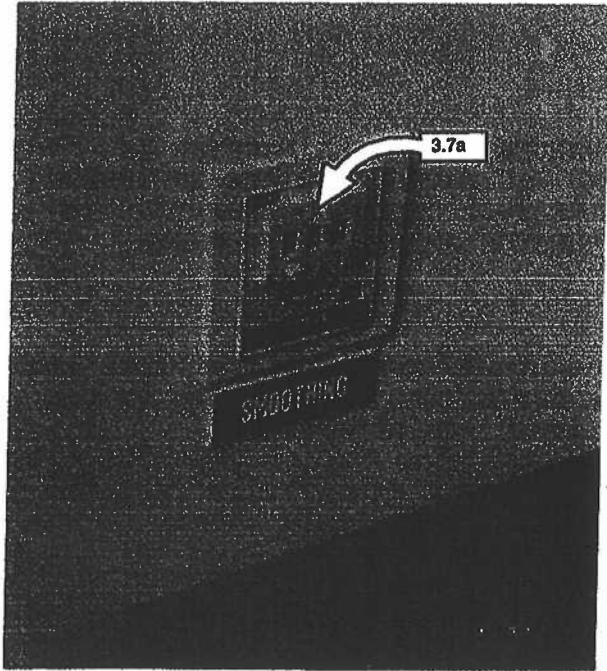
To shut all machine operations down instantly, press the EMERGENCY STOP button. To resume machine operations, reset the EMERGENCY STOP button by turning button clockwise as indicated by the arrow on its face. Then press MOTOR START.

3.6 PROGRAM UNLOCK

This button allows the user to re-program the factory-set values on the Durant Counter. The counter allows you to read cutter position on the digital display.

WARNING: ONLY USE THE PROGRAM UNLOCK BUTTON TO CHANGE FUNCTION 60 (see Section 9).

WARNING: NEVER CHANGE FUNCTION CODE VALUES WHILE MACHINE IS IN OPERATION.



CHANGING FUNCTION CODE VALUES WHILE THE MACHINE IS OPERATING IS DANGEROUS AND CAN CAUSE SERIOUS EQUIPMENT MALFUNCTIONS AND EXPLOSIVE TOOL BREAKAGE RESULTING IN INJURY OR DEATH TO THE OPERATOR AND NEARBY WORKERS.

3.7 SMOOTHING STROKE TIMER

The smoothing stroke timer controls the length of time the cutter dwells at the preset depth. The time should be set to allow enough time for at least one stroke.

To change the smoothing stroke timer, gently flip out the appropriate tab (fig. 3.7a), then press in to change to the new dwell time.

NOTE: After the time expires on the timer, the machine will automatically stop.

3.8 CHIP SPOUT PRESSURE

This knob controls the air pressure to the chip spout.

The chip spout performs a dual role in the operation of a Mitts & Merrill keyseater. Chips removed from the workpiece by the cutter are deflected by the chip spout into a chip collector.

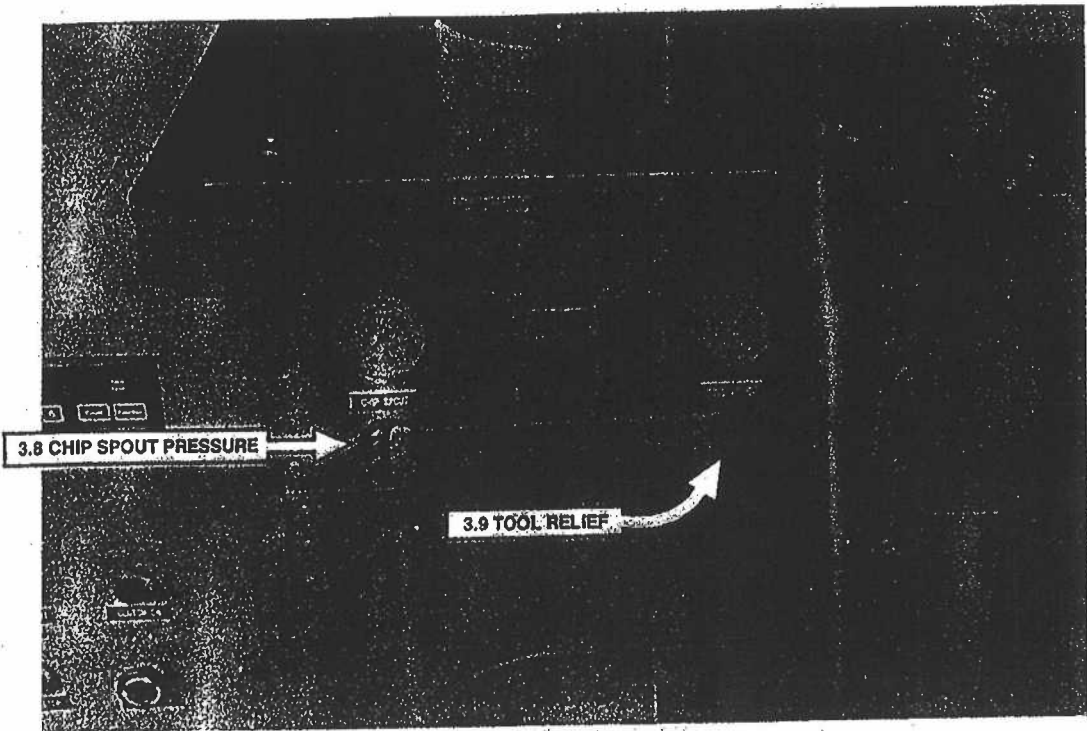
But more importantly, pressure of the chip spout is required to keep the tool bar or bar-type cutter snug against the feed wedge. Both are positioned in the groove of the tool post.

Chip spout pressure is controlled by an air cylinder. The chip spout pressure gauge and pressure adjustment knob are located on the front of the machine directly below the table. Turning the knob clockwise increases the pressure, while turning it counter-clockwise decreases the pressure.

NOTE: Too much pressure by the chip spout on a small bar-type cutter will force the cutter to dig into the work. However, if the pressure is not great enough, a tool bar or bar-type cutter will fall forward in the post groove and cause damage or breakage.

3.9 TOOL RELIEF

This knob controls air pressure to the tool relief cylinder. Setting should be high enough to keep the wedge bar holder in the DOWN position. Larger tooling requires maximum air pressure. Pressure can be reduced while using smaller tooling for smoother operation.



The chart below will help you to determine the correct chip spout pressure. However, it is intended only as a guide.

Groove Width (in post)	Pressure Setting (psi)
thru 5/8".....	10-15
7/8" thru 1-1/4"	15-20
1-1/2" thru 2"	20-30
2-1/2" & up	30-40

3.10 CROSSHEAD SPEED ADJUSTMENT

Crosshead speed is controlled by turning the large knob on the drive unit at the rear of the machine.

IMPORTANT: Turn this knob only while the machine is running.

3.11 HANDWHEEL

The handwheel is located on the right side of the machine and is used to retract or manually control the feed.

3.12 DIGITAL CONTROL

The digital control displays the position of the cutter. (See Sec. 5.3 for programming operating instructions.)

3.13 FEED ADJUSTMENT

To adjust the feed, follow these steps:

- a. Press the machine stop button.
- b. Open the feed door.
- c. Remove the socket head cap screw which holds the feed cam in place.
- d. Move the feed cam to the desired position (see below):

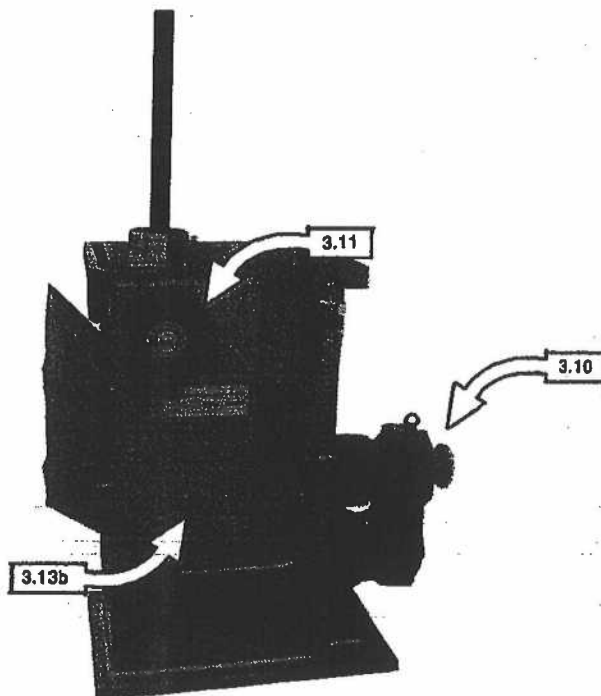
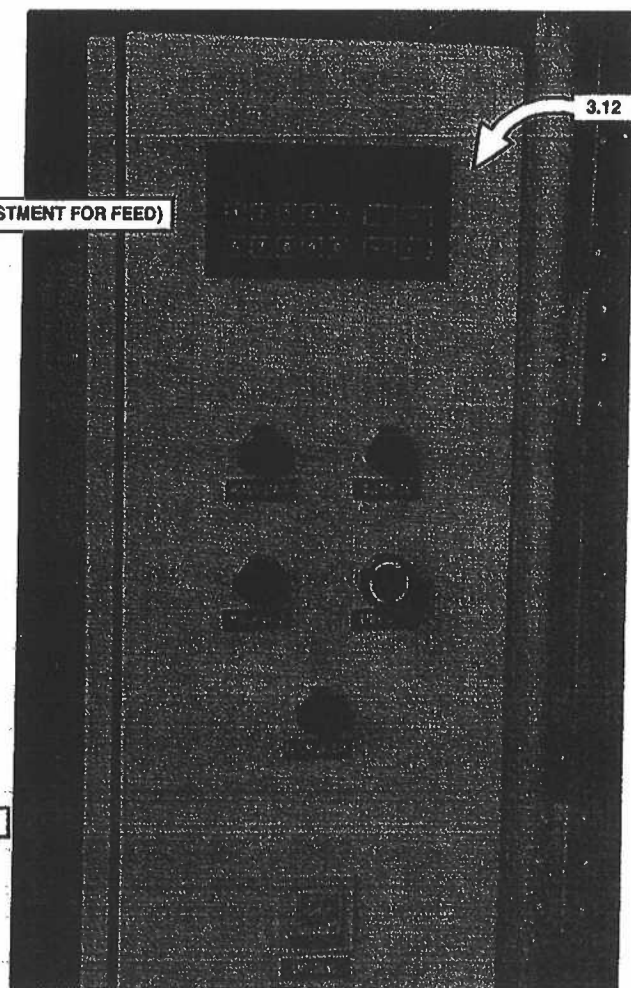
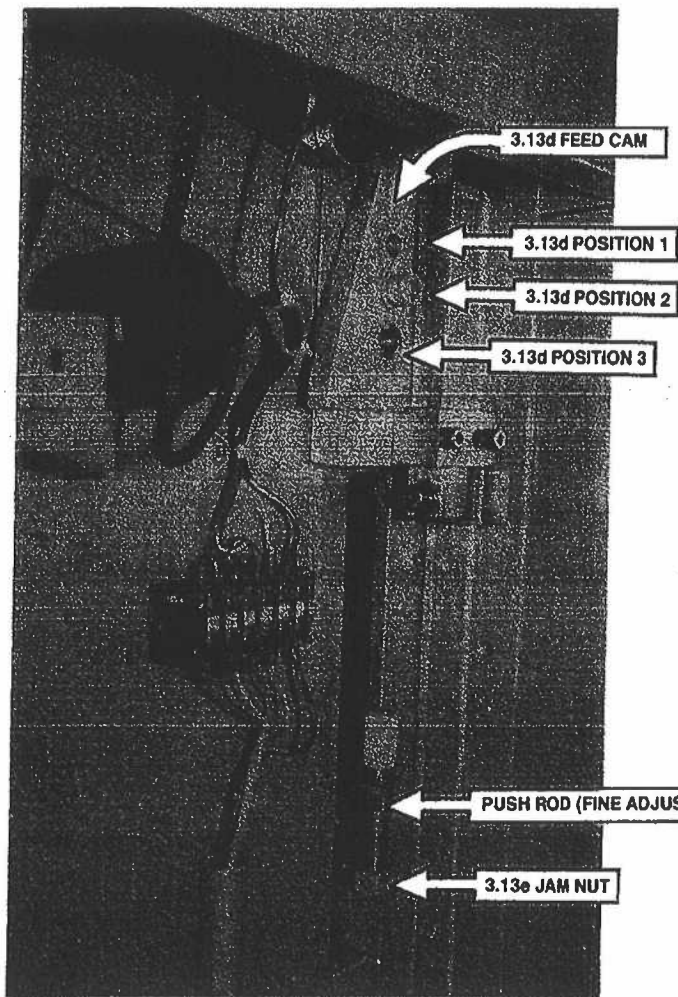
POST SIZE	F E E D R A T E		
	Position 1	Position 2	Position 3
2-3/8"	.002"	.004"	.006"
less than 2-3/8"	.001"	.002"	.003"

- e. Replace cap screw and close feed door. If changing from a 2-3/8" post, FUNCTION 60 must be changed (Section 9).

NOTE: If the feed per stroke varies, loosen the jam nut (see fig. 3.13e) on the push rod and adjust the push rod slightly.

Example: You are using a 2-3/8" post. The cam is in position 2 and .004" is the feed rate. However, the machine occasionally feeds .002". Correct by extending the push rod a few threads.

WARNING: DO NOT OPERATE MACHINE WITH FEED DOOR OPEN. MACHINERY IN MOTION CAN CATCH CLOTHING AND BODY PARTS CAUSING SERIOUS INJURY OR DEATH.



SECTION 4

DRYCYCLING

To check crosshead operations, you should drycycle the machine prior to the installation of tooling.

4.1 BEGIN DRYCYCLE

To drycycle, press the motor start button.

The crosshead is now in Automatic Cycle (drycycle) Mode.

4.2 STOP DRYCYCLE

To stop drycycling, press motor stop button.

SECTION 5

ADJUSTMENTS & SETTINGS

5.1 ADJUSTING THE FEED WEDGE HOLDER

- a. Press motor stop.
- b. Open the cutting chamber door.
- c. Using the hand wheel, move the feed wedge holder up the feed screw until it is within 1" of the top of its travel.

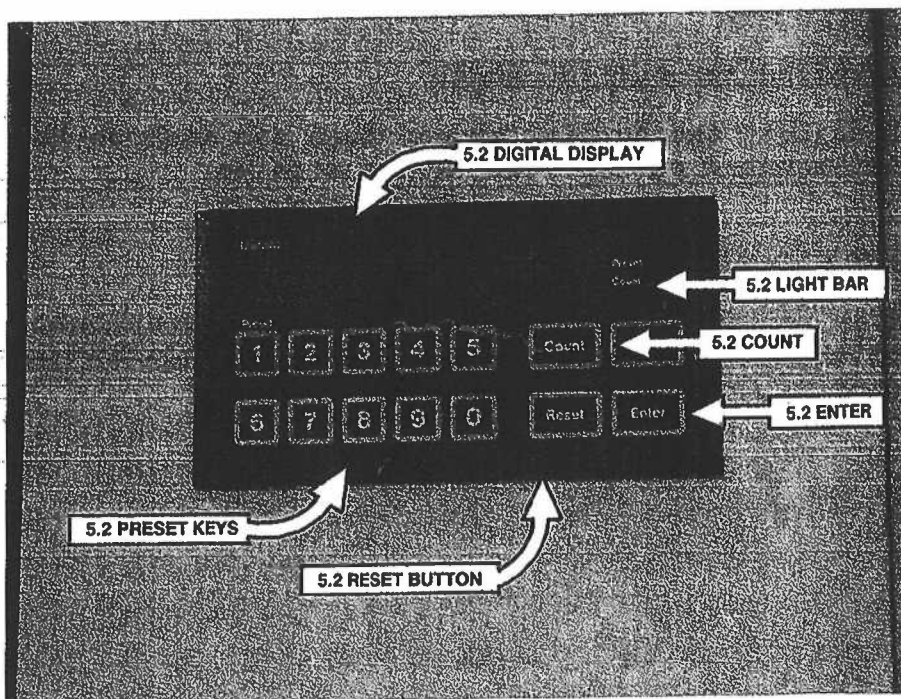
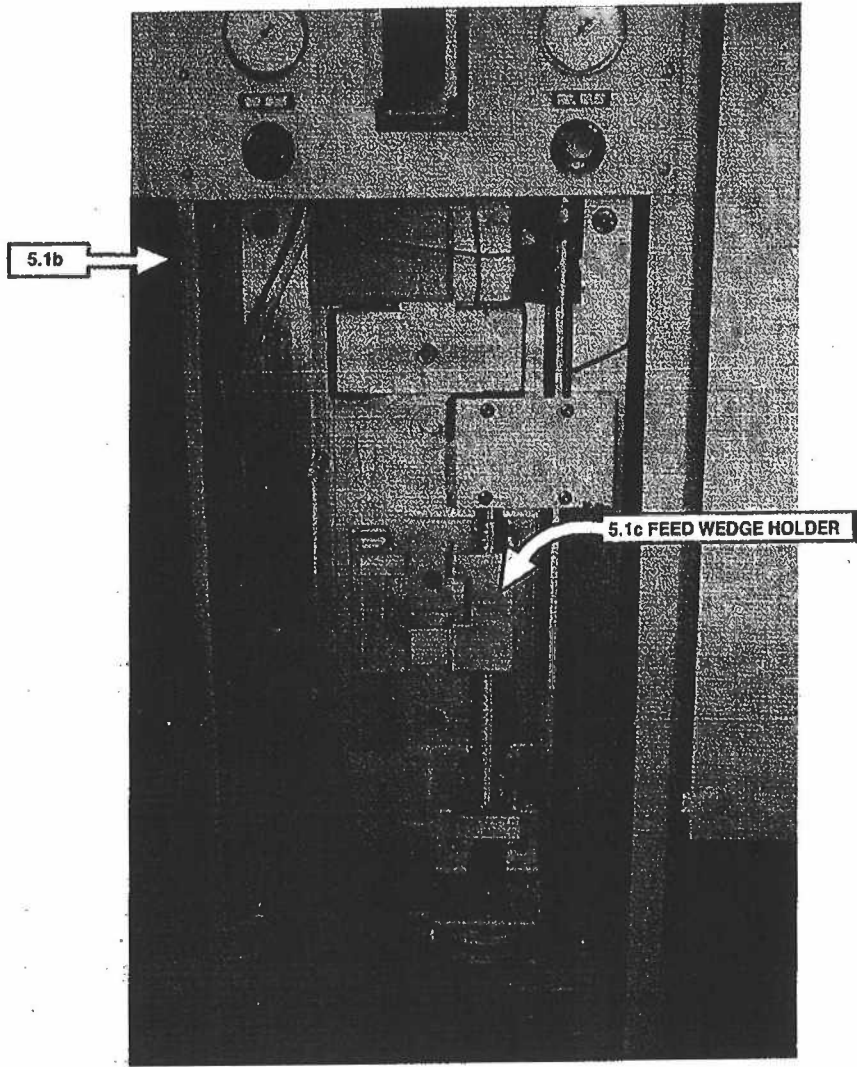
5.2 SETTING DEPTH OF FEED

To set the depth of feed, do the following:

- a. While the digital control is in the Count Mode as indicated by the illuminated yellow light bar next to the counter, press **1**.

This switches the digital control to the Preset Mode and displays the current depth value. (To return to the Count Mode without changing the preset value, press **COUNT**.)

- b. Key in the new value.
- c. Press **ENTER**.
- d. Return to the Count Mode by pressing **COUNT**.



EXAMPLE : The preset control is set at .135; you want to change it to .188. Do the following:

<u>PRESS</u>	<u>DISPLAY</u>
COUNT	Current position of cutter
Preset 1	.135 (current preset)
1 8 8	.188 (new preset)
ENTER	.188 (new preset is now loaded)
COUNT	Current position of cutter

NOTE: If the counter is not in the Count Mode, it will continue to track the cutter's position even though the value of the position will not be displayed.

If tooling is in place, the machine will now feed at the set feed rate. You can monitor the feed action by observing the digital display.

When the machine reaches the preset value (eg. .100), the clutch will disengage. The machine will then dwell at this preset depth for the amount of time set on the smoothing stroke timer, then stop.

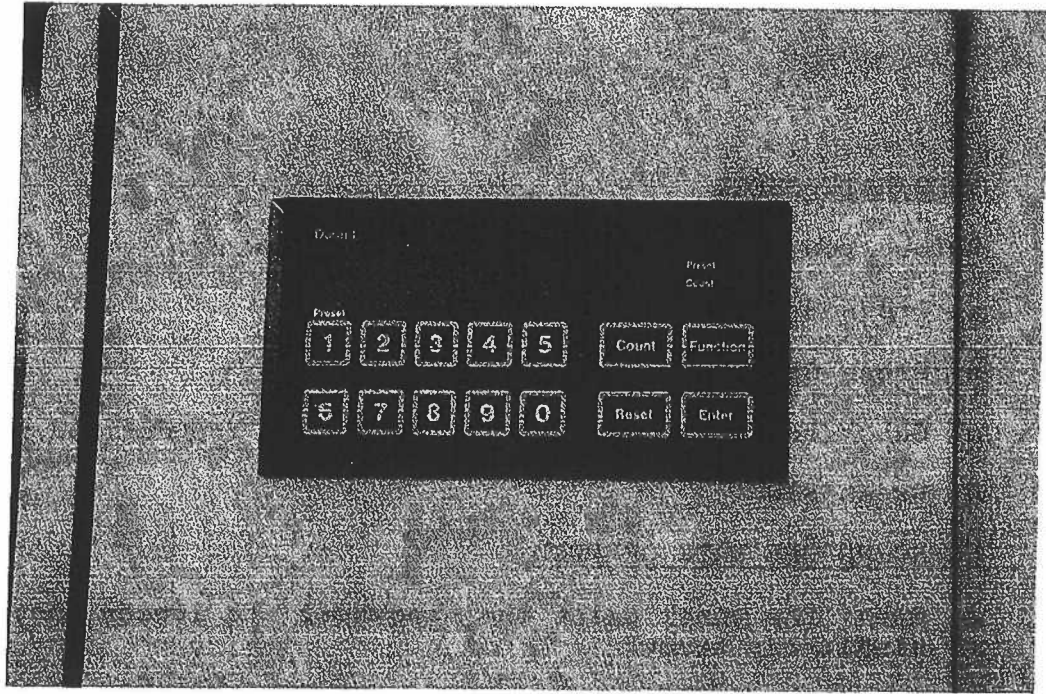
NOTE: If you were now cutting parts, you would now retract the cutter by turning the handwheel counter-clockwise back past ZERO and then back clockwise to ZERO (this removes any backlash in the gears). Now you would be ready to begin cutting again.

5.4 ADJUSTING THE CUTTING SPEED

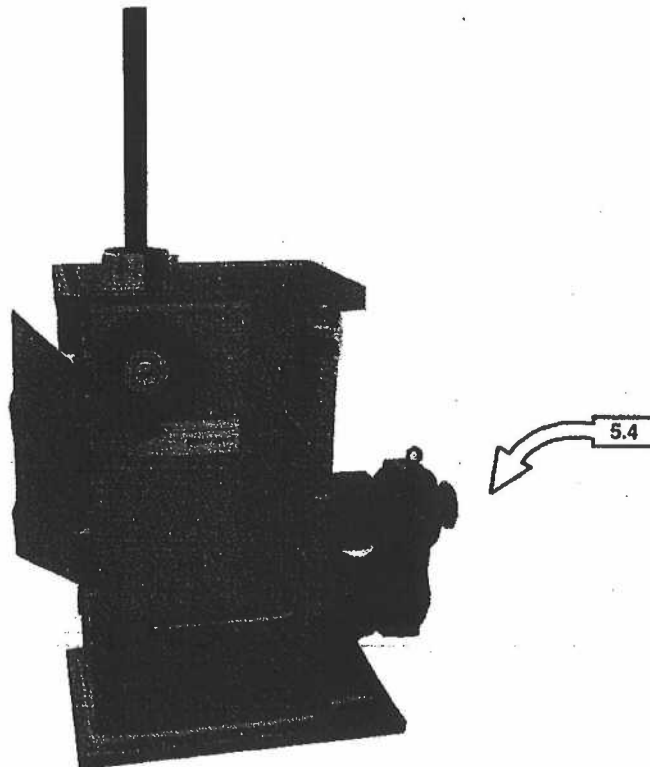
To adjust the cutting speed, turn the knob on the drive unit mounted on the rear of the machine.

5.5 LUBRICATING THE CUTTER

It is recommended that during cutting operations, the cutter and feed wedge be lubricated regularly with a good grade of cutting oil (see Appendix A).



DEPTH OF FEED CONTROLS



5.6 FEED RATE CHECK

Before you install tooling, do the following:

- a. Press START.
- b. Press CLUTCH ON.
- c. Check to see if machine is feeding at the desired rate.
- d. Press STOP.

5.7 CHANGING THE RATE OF FEED

- a. Open the panel below the handwheel and loosen the single cap screw.
- b. Move the cam UP to increase the rate of feed, or DOWN to decrease the rate of feed.
- c. Tighten capscrew and close panel.

NOW YOU ARE READY TO INSTALL TOOLING

SECTION 6

TOOLING DESCRIPTION

6.1 TOOL POST

A center-positioned tool post rises vertically from the horizontal work table through the internal bore of the workpiece.

6.2 POST ADAPTER

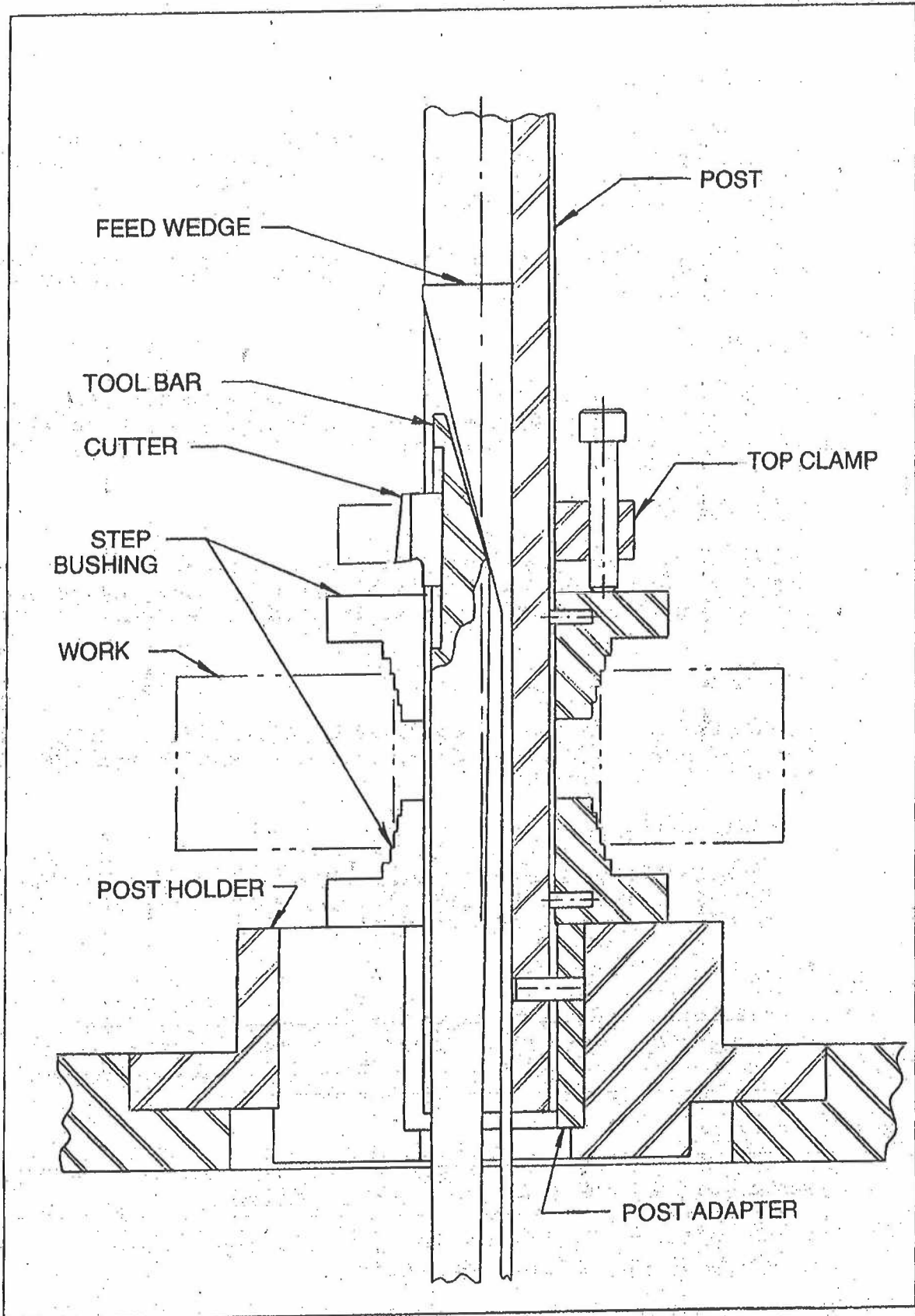
The tool post is attached to the work table by a post adapter (plate bushing), which holds lower end of tool post and fits into a bore (post holder) in the work table.

6.3 CUTTERS

Keyseater cutting tools are of two types: bar and insert. Cutters for special applications are also available.

a. Bar-Type Cutter

The bar cutter is of one-piece construction and combines both tool bar and cutter. It fits directly into the tool post groove and is used for cutting keyways 5/8" wide or less and with bore diameters up to 3-3/4".



b. Insert-Type Cutter

The insert cutter fits into the dovetail of a tool bar. It is used for keyways 1/16" wide or greater and with bore diameters from 1-1/2" to 18". This type cutter is self-centering and self-tightening.

Determining whether to use a bar-type cutter or insert-type cutter depends upon the bore size of the workpiece and the diameter of the tool post.

6.4 FEED WEDGE

The feed wedge slides up and down in the groove of the tool post and travels with the tool bar. The feed wedge moves the tool forward and supports it continuously during the cutting operation.

6.5 TAPER WEDGE

If tapers are to be produced in straight bores, a taper wedge is fitted in the groove of the tool post behind the feed wedge. A standard taper wedge produces a taper of 1/8" per foot.

6.6 BUSHINGS

The workpiece is positioned between expansion or step bushings and is secured to the tool post and to the worktable by a top clamp.

a. Step Bushings

Step bushings are furnished in pairs (top and bottom) and are standard equipment for posts 3/4" diameter and smaller. They are non-adjustable.

b. Expansion Bushings

Expansion bushings, also furnished in pairs, are adjustable. This allows keyways to be cut in bores of varying diameters. These bushings are standard equipment for posts greater than 3/4" diameter.

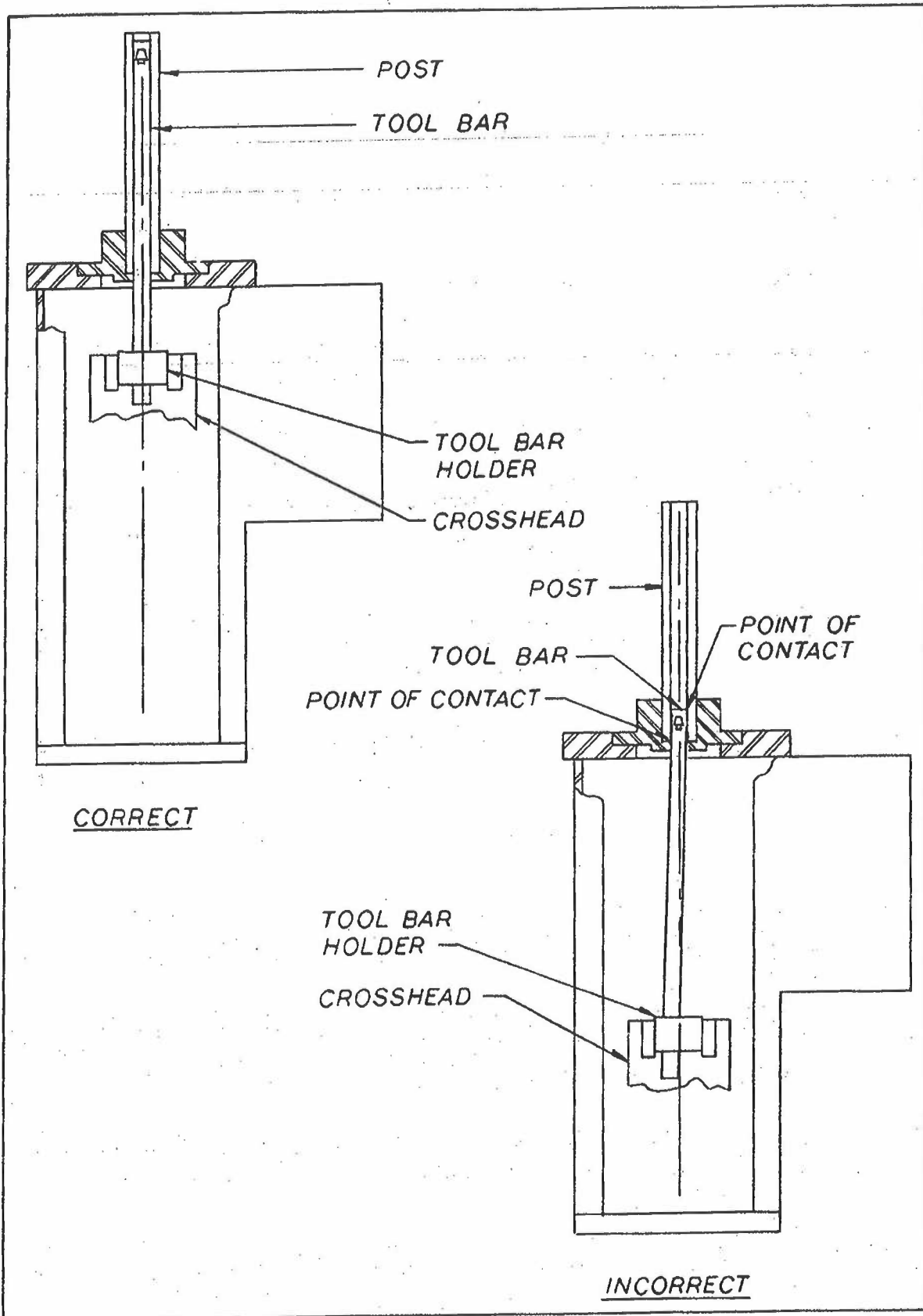
6.7 TOP CLAMP

Bring the top clamp down over the tool post until the projecting vertical clamp screws rest on the surface of the top bushing.

Snug side bolts into appropriate dimples of tool post. Do Not overtighten, as this may collapse tool post.

Finally, finger tighten the top clamp's vertical screws to secure workpiece and all tooling to the worktable.

ALIGNING THE TOOL BAR



SECTION 7

INSTALLING TOOL POST AND TOOLING

- 7.1 Using START and STOP buttons, move crosshead to the top of its stroke.
- 7.2 Open door to crosshead chamber.
- 7.3 Flip the toggle on the small air valve toward you. Toggle is located near the bottom of frame, on left.

This will release pressure on the chip spout.

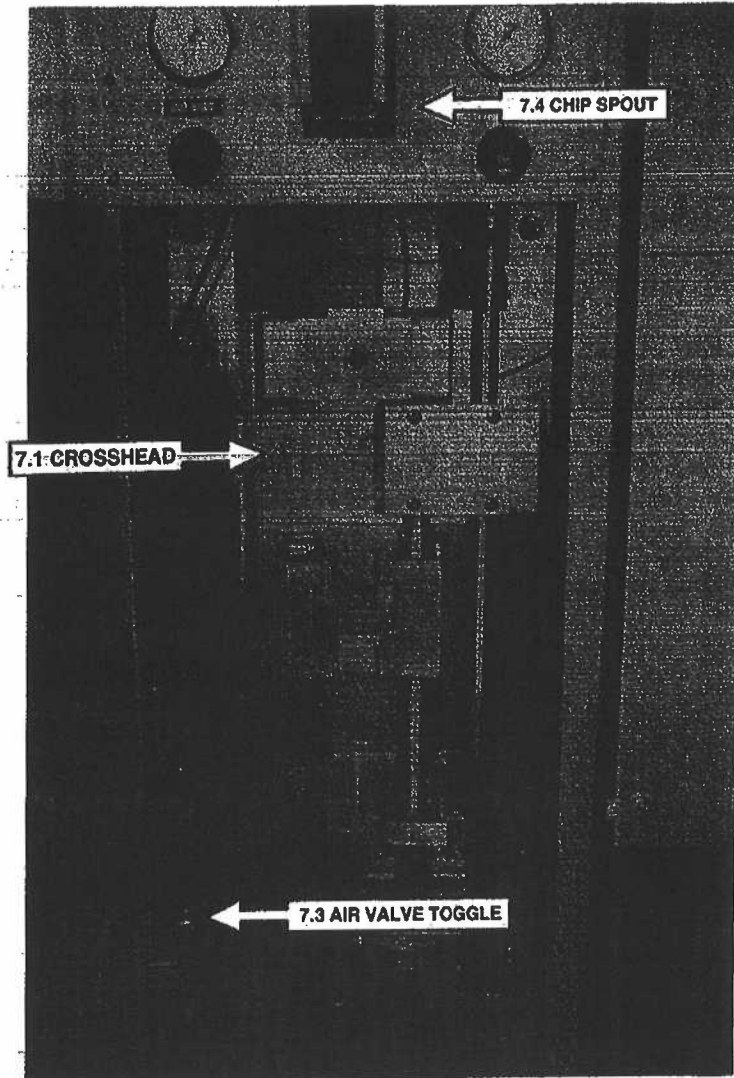
NOTE: The chip spout serves a dual purpose: It directs the chips into the chip collector and it maintains a constant pressure on the tool bar to hold it snug in the post groove while cutting.

- 7.4 Manually pull the chip spout forward until you have provided enough space behind it to easily insert the tails of the tool bar and feed wedge.
- 7.5 Place the post in the postholder (bore in the table top of the machine).
- 7.6 Secure the post with the postholder screw.
- 7.7 Inspect the ratchet teeth on the tool bar or bar-type cutter, whichever is being used, and those of the tool bar holder to see that they are free of dirt and chips. Clean if necessary.

CAUTION: An accumulation of dirt in the teeth will prevent the tool bar from seating properly and could result in damage to the machine.

- 7.8 Lubricate the groove (slot) of the post and the sides of the tool bar or bar-type cutter.
- 7.9 Place the bar in the post groove and lower it into the tool bar holder. The tail of the bar should project at least 1/2" below the serrated plate of the tool bar holder.

NOTE: The cutting edge of the cutter should be positioned so that it clears the bottom of the workpiece.



7.10 Insert the feed wedge in the slot behind the tool bar and clamp it in the wedge bar holder.

7.11 By flipping the air valve toggle switch away from you, move the chip spout back so that pressure is applied against the tool bar and feed wedge.

NOTE: The chip spout will also automatically draw back against the tool bar and feed wedge when the door to the crosshead chamber is closed.

WARNING: IF THE TOOL BAR IS CLAMPED WHEN THE CROSSHEAD IS AT OR NEAR THE BOTTOM OF ITS STROKE, IT MAY BE OUT OF CENTER. THIS WILL RESULT IN INCREASING PRESSURE AT THE POINTS OF CONTACT AS THE BAR TRAVELS UPWARD, AND MAY CAUSE SCORING DAMAGE TO THE TOOL AND BAR.

INSTALLING NEW TOOL POSTS

WITH NEW PLATE BUSHINGS

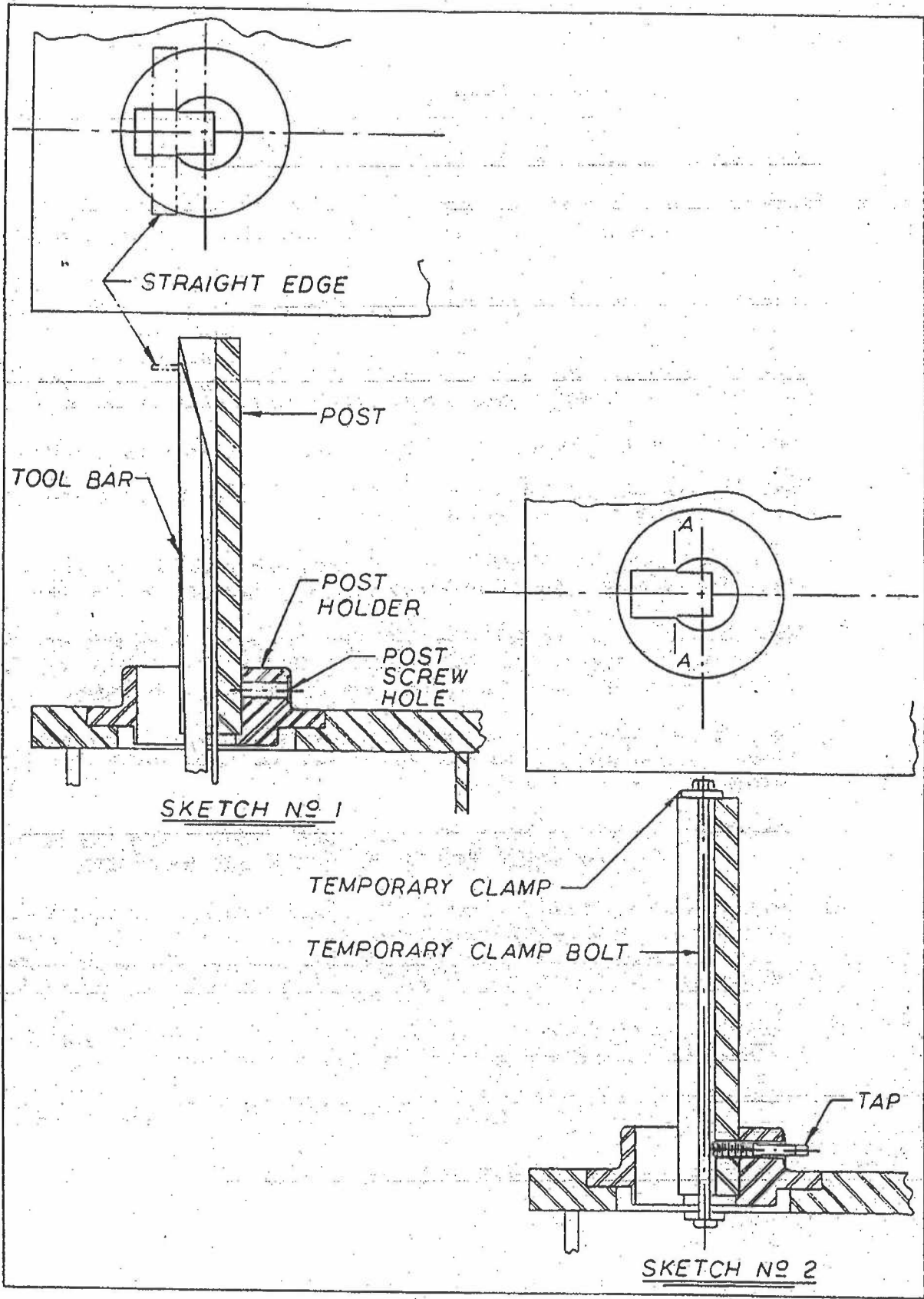
(No indicator Required)

1. Place the post in the machine with the front edges of the slot approximately parallel to the front edge of the table.
2. Check to make sure that the teeth of the back plate on the tool bar holder and those on the tool bar are clean and free of dirt or chips.
3. Move the crosshead up to the top of the stroke and start it down again to take up the relief in the feed wedge holder.
4. Place tool bar in post and clamp it in tool bar holder with teeth properly engaged. The tool bar should be a sliding fit in groove of post, and after clamping should move freely in and out of the slot.
5. Insert feed wedge behind tool bar and clamp it in wedge bar holder.
6. Feed the tool bar out until the front face is parallel to the edges of the slot in the post, as shown in Sketch No 1.
7. Place a straight edge against front of post and revolve the post until the straight edge is parallel to front face of the tool bar.
8. When the post lines up with the tool bar, place the straight edge on top of the post holder; hold square with the slot in the post and scribe a line "AA" parallel to the face of the slot, as shown.
9. Mark the post for drilling, using the post screw hole in the hub as a guide. If your machine has two post screws, mark and drill each hole separately. Do not line bore.

**IMPORTANT! DO NOT USE PUNCH TO LOCATE HOLE. INSTEAD BLUE THE POST
AND USE SCRIBE THROUGH THE POST HOLDER SCREW HOLE.**

10. Remove the post from the machine and drill carefully to tap size. Models K-1 and K-2024 require one 3/4" tapped hole. K-3530 requires two 7/8" tapped holes. Use a Class 3B Tap, because the major diameter of the tap must not be larger than the reamed hole in the post holder.
11. Place the post in the machine and line up as indicated. Clamp post in place with a temporary bolt or stud and tap the hole.
12. When tapping is completed, test tool bar and face of post by repeating steps 3-7.

IT IS IMPORTANT THAT THIS ALIGNMENT IS ACCURATE.

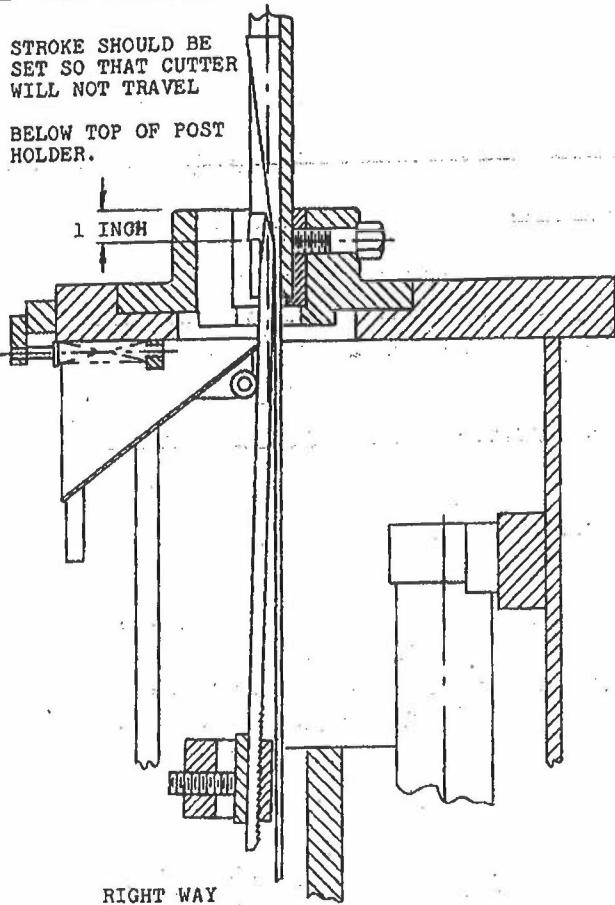


INSTALLING THE TOOL BAR

STROKE SHOULD BE SET SO THAT CUTTER WILL NOT TRAVEL

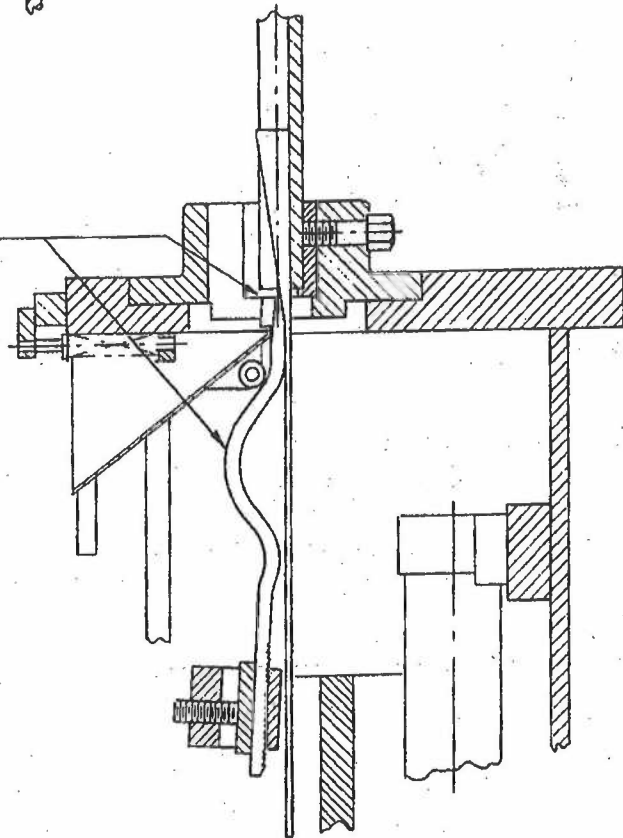
BELOW TOP OF POST HOLDER.

1 INCH



RIGHT WAY

IF CUTTER OR FEED WEDGE TRAVELS BELOW BOTTOM OF POST IT WILL CATCH ON UP STROKE AND RESULT IN DAMAGE.



WRONG WAY

SECTION 8

INSTRUCTIONS FOR OPERATING THE MITTS & MERRILL

K-1 KEYSEATER

- 8.1 After tooling and workpiece have been installed (see Sections 7 and 8), fill oil cup with a good grade of lubricating oil.

CAUTION: NEVER RUN THE MACHINE WITHOUT OIL VISIBLE IN THE SIGHT BOWL.

- 8.2 Turn on air supply (minimum 80 psi).

- 8.3 With handwheel, advance cutter until corner of cutter is .0015" from edge of the bore (a feeler gauge is recommended). This must be done on the downstroke in order to have the feed relief in the down position.

- 8.4 Press RESET.

This resets cutter position to ZERO and establishes a datum or reference point. This need not be reset again until:

- a. a different size bore is cut
- b. the cutter is changed, or
- c. the machine is turned OFF.

- 8.5 Adjust the feed relief (see Section 3.9).

- 8.6 Adjust the chip spout pressure high enough to hold tooling firmly in the tool post.

NOTE: During operation you will see the chip spout move in and out. This is normal.

- 8.7 Set preset depth control to the desired depth (Sec. 5.3).

- 8.8 Set timer to control the length of time the keyseater will cycle (smoothing strokes) after the machine has reached full cutting depth. It is recommended that you set timer at 5 seconds initially and then make necessary adjustments after you have cut a keyway.

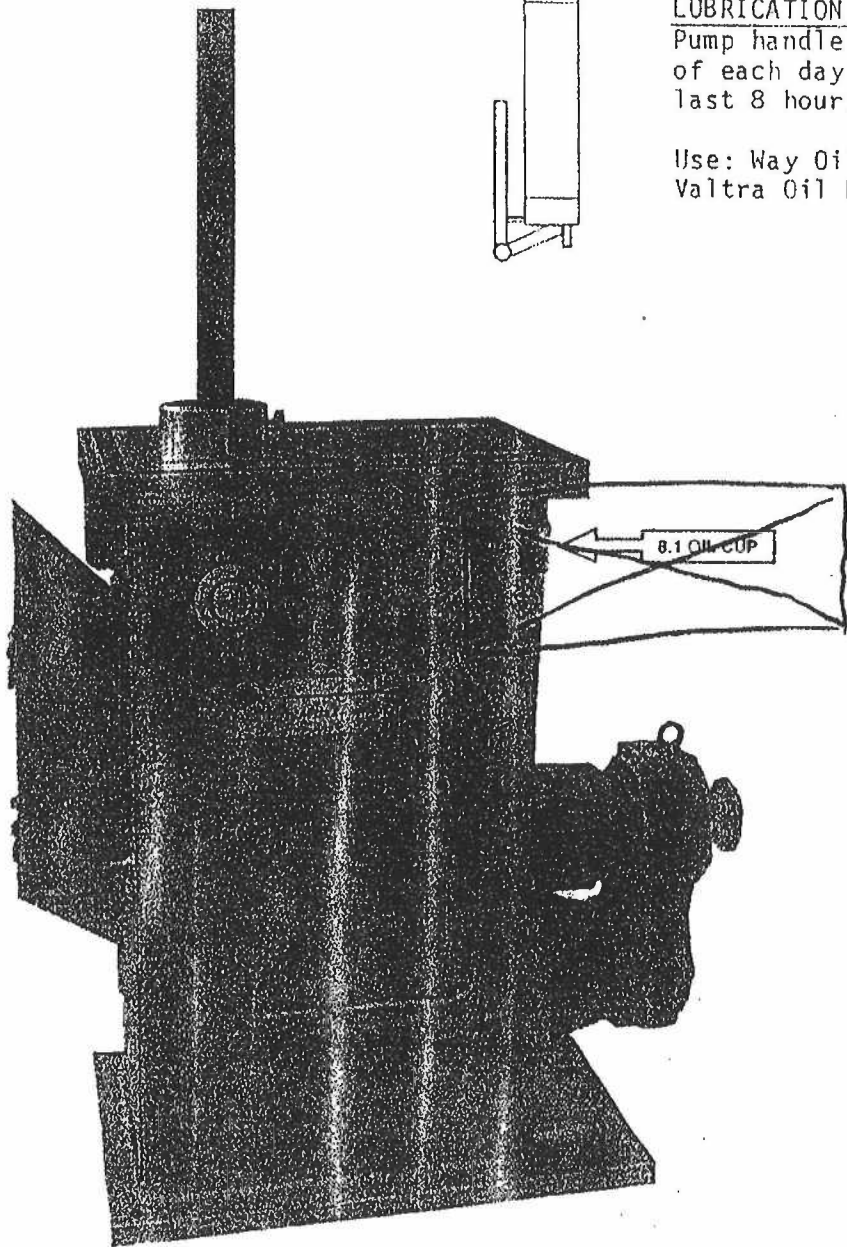
NOW YOU ARE READY TO CUT A KEYWAY



LUBRICATION SYSTEM

Pump handle 5 times in beginning of each day useage and this will last 8 hours

Use: Way Oil
Valtra Oil No. 2 or equal



SEE
ABOVE

8.9 Press START and let the machine stroke once.

8.10 Press CLUTCH ON.

The machine will now automatically feed at the rate you have set. It will continue to feed until the preset depth is reached and the timer has shut off. The machine will now turn off automatically.

8.11 By turning the handwheel, retract the cutter to ZERO.

NOTE: It is recommended that you go past ZERO and then return back to ZERO to eliminate any backlash in the feed gears.

8.12 Remove the finished part.

8.13. To continue to cut the same keyways in another of the same size part,

- a. Install a new part.
- b. Press START.
- c. Press CLUTCH ON.

8.14. To cut different keyways, change workpiece and begin with Operating Instruction 8.4.

WARNING

THE FOLLOWING SECTION DESCRIBES HOW TO CHANGE
THE COUNTER PROGRAM WHEN CHANGING FROM A 2-3/8"
POST TO SMALLER POSTS OR VICE VERSA. PLEASE READ
AND FOLLOW THESE INSTRUCTIONS & WARNINGS

CAREFULLY

TO AVOID POSSIBLE MACHINE MALFUNCTION, EXPLOSIVE
TOOL BREAKAGE, INJURY OR DEATH.

IMPORTANT

Safety procedures only work if they are understood and followed.
PROTECT YOURSELF -- AND THOSE WHO WORK WITH YOU --
by knowing safety rules and by using caution and common sense.

MAKE SAFETY A HABIT!

SECTION 9

SETTING THE COUNTER PROGRAM

Your Mitts & Merrill K-1 keyseater has been equipped with a Durant Programmable Control, which has been pre-programmed by the manufacturer.

The control enables you to determine the cutter's exact position by reading the digital display.

To change the counter program, carefully follow these steps;

- a. With the power ON and the motor OFF, press and hold the program unlock button.

NOTE: This button allows the user to re-program the factory-set programmable counter. The counter allows you to read the cutter position on the digital display. It is only to be used to change the counter to a new feed wedge angle.

WARNING: ONLY USE THIS BUTTON TO CHANGE FUNCTION 60

WARNING: NEVER CHANGE FUNCTION CODE VALUES WHILE MACHINE IS IN OPERATION.

WARNING: CHANGING FUNCTION CODE VALUES WHILE THE MACHINE IS OPERATING IS DANGEROUS AND CAN CAUSE SERIOUS EQUIPMENT MALFUNCTIONS AND EXPLOSIVE TOOL BREAKAGE RESULTING IN INJURY OR DEATH TO THE OPERATOR OR NEARBY WORKERS.

- b. On the counter keyboard, press

FUNCTION

6

0

ENTER

.
- c. If you are using a 2-3/8" dia. post, press

3

ENTER

COUNT

.
- d. For all other posts smaller than 2-3/8", press

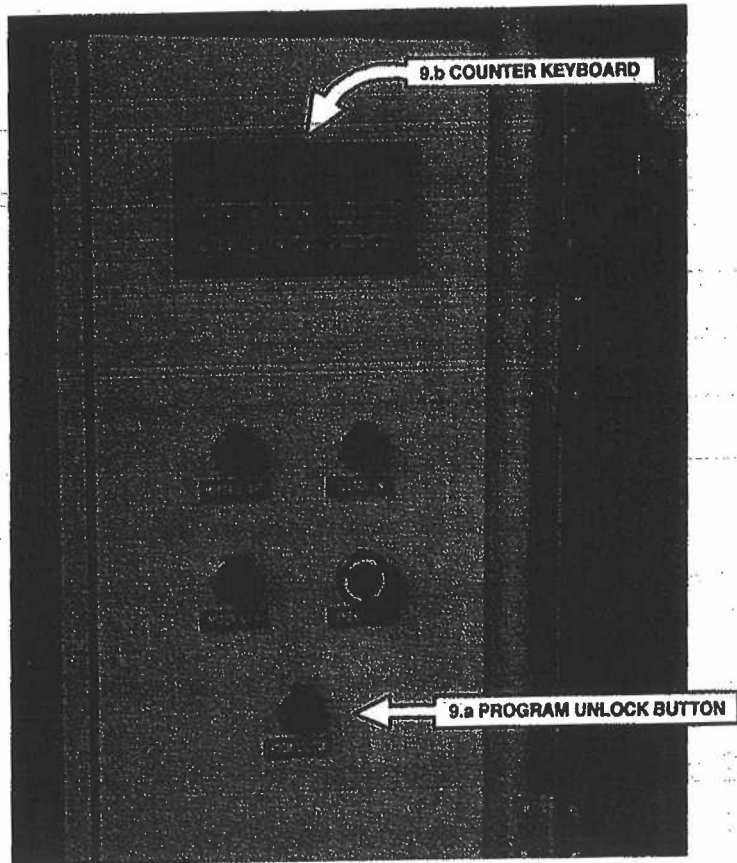
1

ENTER

COUNT

.
- e. Now release program unlock button.

WARNING: ONLY USE THIS BUTTON TO CHANGE FUNCTION 60.



SECTION 10

MAINTENANCE PROCEDURES

10.1 GENERAL PROCEDURES

- a. Inspect machine and tooling before operating.
- b. Check for loose, worn or broken parts.
- c. Keep machine and tooling clean.
- d. Cover machine when not in use for any length of time.
- e. Store extra tooling, parts and accessories in tool cabinet.
- f. Clean chips and excess oil from machine frame.

10.2 FILTER/LUBRICATOR/REGULATOR

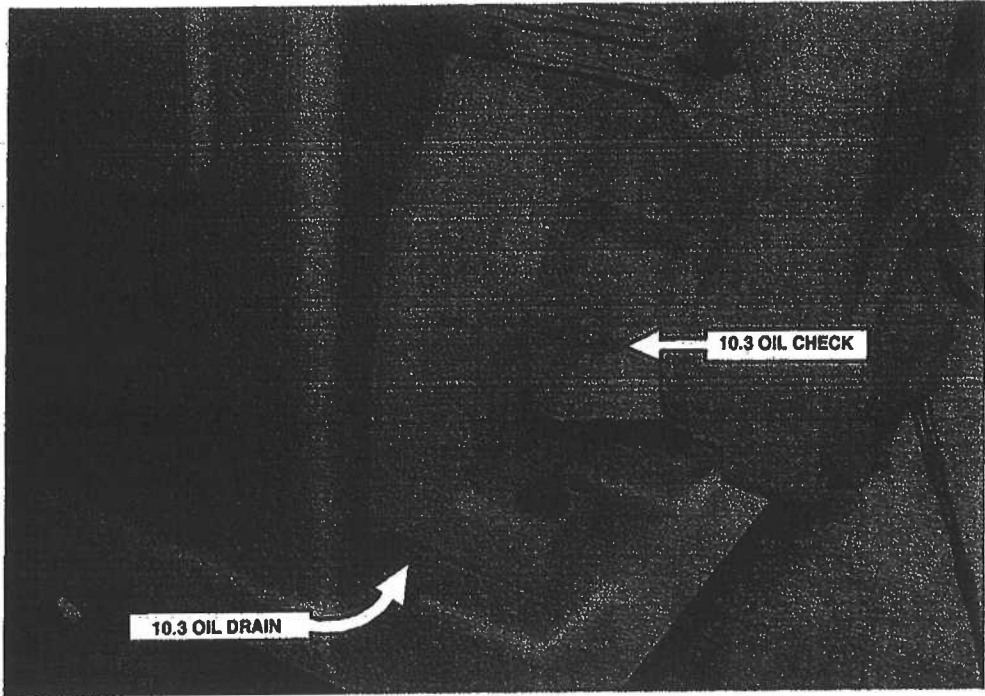
- a. Check and drain excess water from bowl as necessary.
- b. Keep lubricator filled with good grade of machine oil.
- c. Fill lube cups before each use with good grade of machine oil.
- d. Maintain 80 lbs. minimum air pressure.

10.3 EURODRIVE GEAR MOTOR

- a. Check oil level of Eurodrive gear motor.

10.4 TOOL BAR & FEED WEDGE HOLDERS

- a. Clean chips from tool bar and feed wedge holders each time tooling is installed.



SECTION 11

TROUBLESHOOTING GUIDE

PROBLEM

TROUBLESHOOTING CHECKLIST

11.1 Motor Won't Start

- a. Check to see that emergency stop button is reset and power is ON.
- b. Check motor overloads and breakers. Reset if needed.

11.2 Readout Display Does Not Register Movements Of The Cutter

- a. Is it in Count Mode? Press COUNT.
- b. Is counter defective? Run this diagnostic test:
 - 1. Shut Main Power OFF.
 - 2. Turn Power back ON.

If counter flashes a single digit number continuously, it is defective and should be repaired. Call *Mitts & Merrill L.P.*

If counter displays current count value, the encoder is defective and must be replaced. Call *Mitts & Merrill L.P.*

Service: 847-565-0386

~~81-11-11~~

11.3 Incorrect Feed

- a. Check to see if feed cam is in correct position (Sec.3.13).
- b. Check FUNCTION 60.

Is it set to "3" for a 2-3/8" dia. post or to "1" for all others? If not, refer to Sec. 9.

APPENDIX

The Selection and Use of Cutting Fluids

The primary functions of cutting fluids in keyseating operations are cooling and cutter lubrication.

A Mitts & Merrill keyseater removes metal during 60% of its operating cycle, so the function of cutting fluid as a coolant is important. However, the primary function of cutting fluid in keyseating is cutter lubrication. Proper cutter lubrication results in improved tool life, better finishes and, by minimizing the adherence of work metal to the tool, higher dimensional accuracy.

A relatively high-viscosity oil should be used for steel, stainless steel and some grades of cast iron. The oil should contain substantial amounts of fat and compounds of sulfur or chlorine or a combination of both. An oil which is commonly used has viscosity of 155 SUS and contains 2% fat, .8% sulfur and 21% chlorine. if available

Aluminum and some cast iron and soft non-ferrous metals are sometimes keywayed without the use of cutting fluid. However, a light oil can be used. If staining cannot be tolerated, a mixture of kerosene and 10-20% lard oil is recommended.

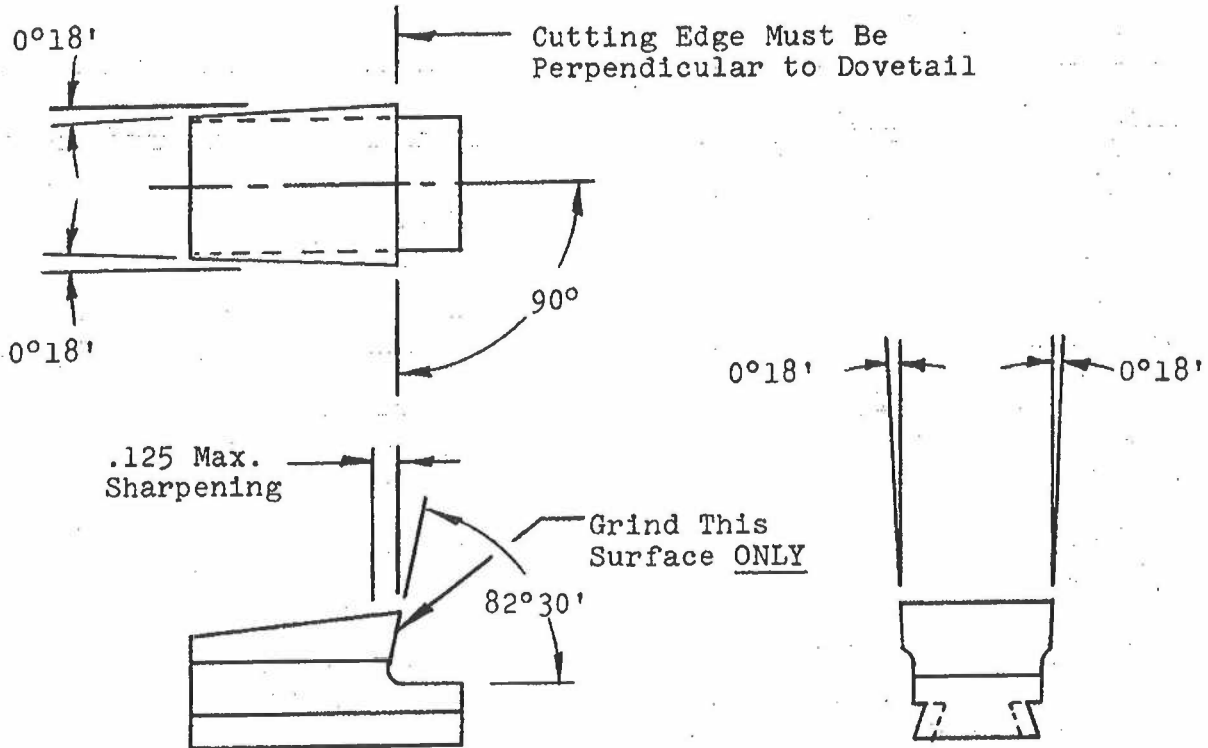
There are many cutting oils available which are suitable for use with Mitts & Merrill keyseaters. A good general-purpose oil is ~~Seabell~~^{Seabell}, produced by the D. A. Stuart Oil Company Ltd. Regardless of which cutting fluid you select, it is of the utmost importance that an adequate supply be provided to the cutting edge of the tool.

Be sure to change oil as needed on a regular basis. Shortened tool life and poor finishes are indications that an oil change is overdue.

DASKONZ Concentrate 14023

D.A. Stuart Co - 630-393-0833

CUTTER SHARPENING



Heel
(Pressure Point)

NOTE :

In most materials, such as mild steel and cast iron, cutters can be sharpened back so that the .188 max. dimension results. In very hard materials the max. dimension should be held somewhat closer to standard. While in soft materials the .188 max. for mild steel and cast iron may be exceeded slightly.

.062 Standard
.188 Max.

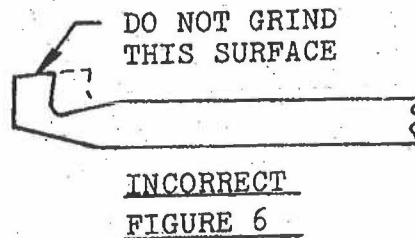
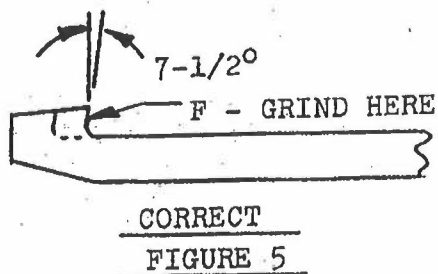
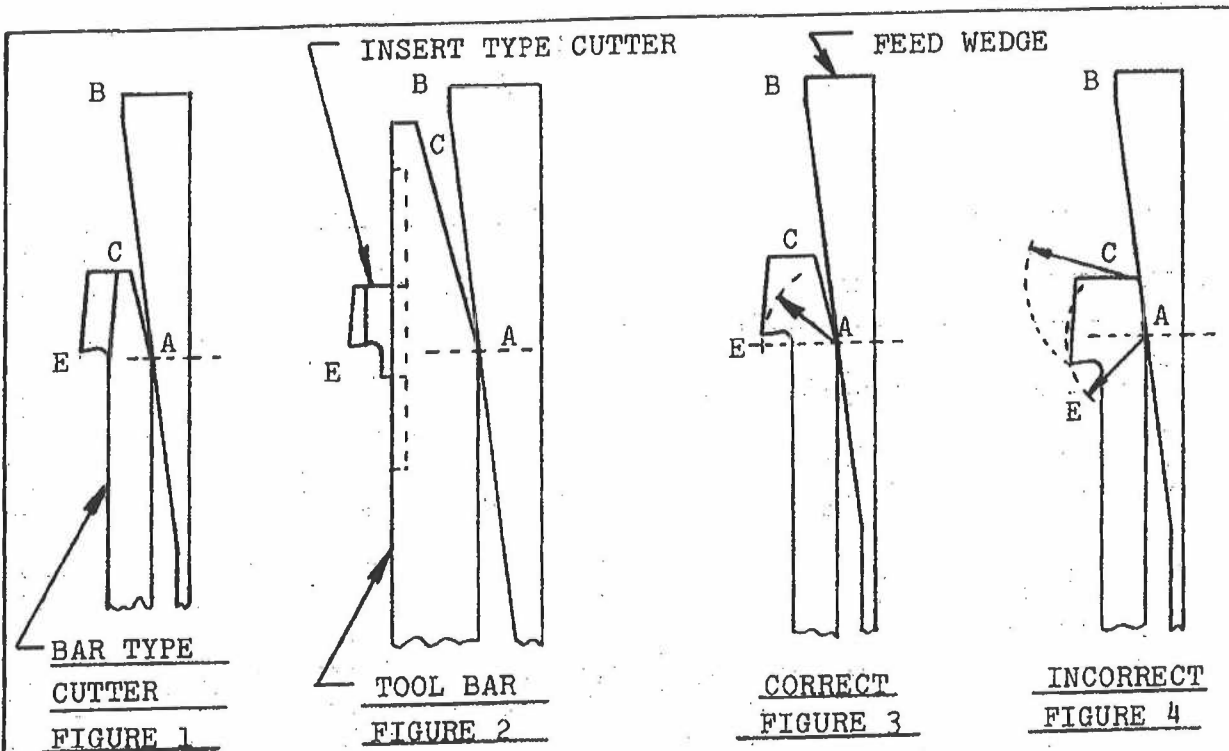
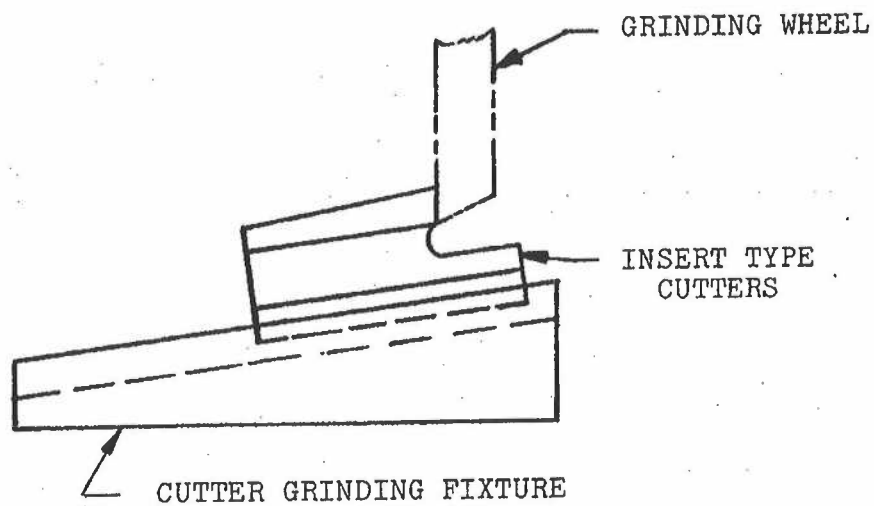
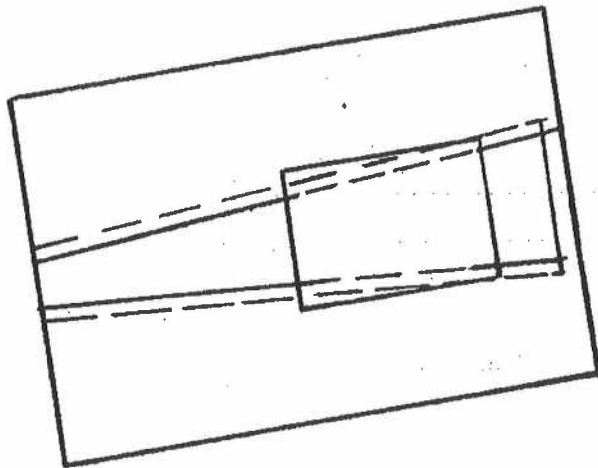


Figure 1 shows the style of cutters which are furnished with posts up to 1-1/4" diameter. Figure 2 shows the style generally furnished with 1-1/2" diameter and larger posts.

Notice that the cutting edge (point E) in figure 3 is above point A. This allows the cutting edge to spring away from the work slightly when under heavy strain, utilizing point A as a fulcrum point. The tool bar (or bar type cutter) touches the feed wedge only at point A.

If plane AC coincides with plane AB the cutting edge (point E) would dig into the work because point C would then become the fulcrum point. The cutter would also have a tendency to dig into the work if point A were above the cutting edge as illustrated in figure 4.

Cutters should be ground on the face marked F only. Never grind the cutter on the front or the side. When cutting soft steel or brass the cutting angle should be less acute.



The **Mitts & Merrill Cutter Grinding Fixture** allows Mitts & Merrill keyseater users to save time and money by enabling them to grind cutter inserts in-plant easily and precisely on any universal grinder.

The **cutter grinding fixture** accommodates all Mitts & Merrill insert-type cutters. The grinder operator simply places the cutter's dovetail into the fixture's mating slot and sharpens. The fixtures eliminates measuring, and guesswork. the fixture's configuration ensures that the correct rake angle for the cutter's face is always obtained.

Mitts & Merrill Cutter Grinding Fixture is available in two sizes for cutting any size cutter inserts:

Small: For insert-type cutters used in 7/8"-1-1/2" tool bars.

Large: For cutters used in tool bars 2" and larger.

USA KEYWAY STANDARDS

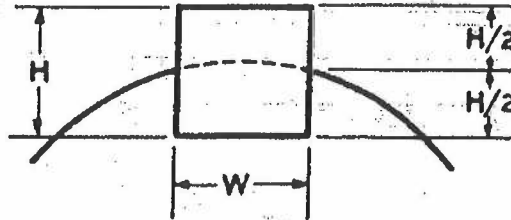


Table 1 Key Size Versus Shaft Diameter

Nominal Shaft Diameter		Nominal Key Size			Nominal Keyseat Depth	
Over	To (Incl)	Width, W	Height, H		H/2	
			Square	Rectangular	Square	Rectangular
5/16	7/16	3/32	3/32		3/64	
7/16	9/16	1/8	1/8	3/32	1/16	3/64
9/16	7/8	3/16	3/16	1/8	3/32	1/16
7/8	1-1/4	1/4	1/4	3/16	1/8	3/32
1-1/4	1-3/8	5/16	5/16	1/4	5/32	1/8
1-3/8	1-3/4	3/8	3/8	1/4	3/16	1/8
1-3/4	2-1/4	1/2	1/2	3/8	1/4	3/16
2-1/4	2-3/4	5/8	5/8	7/16	5/16	7/32
2-3/4	3-1/4	3/4	3/4	1/2	3/8	1/4
3-1/4	3-3/4	7/8	7/8	5/8	7/16	5/16
3-3/4	4-1/2	1	1	3/4	1/2	3/8
4-1/2	5-1/2	1-1/4	1-1/4	7/8	5/8	7/16
5-1/2	6-1/2	1-1/2	1-1/2	1	3/4	1/2
6-1/2	7-1/2	1-3/4	1-3/4	1-1/2 *	7/8	3/4
7-1/2	9	2	2	1-1/2	1	3/4
9	11	2-1/2	2-1/2	1-3/4	1-1/4	7/8
11	13	3	3	2	1-1/2	1
13	15	3-1/2	3-1/2	2-1/2	1-3/4	1-1/4
15	18	4		3		1-1/2
18	22	5		3-1/2		1-3/4
22	26	6		4		2
26	30	7		5		2-1/2

* Some key standards show 1-1/4 in. Preferred size is 1-1/2 in.

All dimensions given in inches.

APPENDIX D

ESTIMATING KEYWAY CUTTING TIMES

$$\frac{D \times L \times C}{R} = T$$

$$L \times C * = \frac{\text{time}}{\text{stroke}}$$

D = depth of keyway

L = length of stroke in inches (7" for the #1)

$$C = \text{constant} = \frac{1}{12 \times \text{fpm}} + \frac{1}{12 \times \text{fpm}} + \frac{1}{12} = .08333$$

R = feed rate

T = cutting time in minutes

"C" VALUE CHART

<u>Cutting Speed</u> <u>(feet per minute)</u>	<u>Model #1</u>
100167
150111
200083
300067

EXAMPLE: Cutting a .150" deep, 7" long keyway with a Model K-1 at 25 fpm and with a .004" feed rate, the time required would be approximately 1.75 minutes.

The calculation follows:

$$\frac{.150 (7) .0067}{.004} = 1.75 \text{ min.}$$

*NOTE: L x C is the time for 1-stroke cycle (in minutes)

LIMITED KEYSEATER WARRANTY

1) Period Covered Under Warranty

Mitts & Merrill L.P.
~~Carthage Machine Company~~ warrants from date of shipment every K-series keyseater sold as new and unused for a period of:

- 12 consecutive months or 3,000 hours of operation, whichever shall occur first.

2) Exclusions - (Not Covered by Warranty)

- Normal wear on all items such as, but not limited to:

Cutters
Toolbars
Toolposts and other tooling

- Replacement parts and accessories which are not genuine Mitts & Merrill parts and/or accessories.
- Damage resulting from installation of parts and accessories other than genuine Mitts & Merrill parts and accessories supplied by ~~Carthage Machine Company~~ or its authorized dealers. *Mitts & Merrill L.P.*
- Damage resulting from improper installation.
- Damage caused by failure to provide proper maintenance as detailed in the Operator's Manual.
- Damage resulting from accident, fire or other casualty, misuse, abuse or neglect.
- Damage resulting from modification to the keyseater or tooling not approved in writing by Carthage Machine Company.
- Losses incurred by the keyseater owner other than keyseater parts and labor.

3) Complete Warranty Details

Available in ~~Carthage Machine Company's~~ "Terms and Conditions of Sale".

Mitts & Merrill L.P.

Sales

~~813-743-323~~

352-343-7000