





HEAD

COMMON

Gasket  
 Motor shaft spacer  
 Motor shaft spacer  
 Motor shaft spacer  
 Motor shaft gear  
 Inner brake disc (4)  
 Locknut  
 Adj. nut  
 156 Truarc-snap ring  
 MRC ball bearing-09 int. fit  
 MRC ball bearing " " (3)  
 MRC ball bearing " " (3)  
 MRC ball bearing " " (2)  
 MRC ball bearing (4)  
 MRC ball bearing (3)  
 MRC ball bearing  
 MRC ball bearing

B-66251  
 B-67242  
 B-67243  
 B-84290  
 B-67245  
 B-67844  
 B-83041  
 B-84289  
 5100-  
 5209K  
 5210K  
 5211K  
 205SG  
 207S  
 208S  
 208SZ  
 308S

Front bearing closer A-47851  
 Balancing ring B-59612  
 Spindle A-37284  
 Spindle adj. nut B-34606  
 Oil thrower B-35088  
 Driving button B-37291  
 Driving button scr. B-37292  
 Gear nut A-54658  
 Timken roller brg #3 precision 593,592A  
 Timken roller brg #3 precision 581,572

118-1505 SPD. RANGE

Tooth clutch gear A-84283  
 Tooth clutch pinion B-84292  
 Small spin. gear B-84297  
 Large spin. gear B-84298

2 in. CAP. SPINDLE-PARTS

143-1820 SPD. RANGE

B-34603  
 B-34605  
 B-34607

Spindle gear spacer  
 Rear bearing closer  
 Bearing spacer

Tooth clutch gear A-85326  
 Tooth clutch pinion B-85332  
 Small spin. gear B-85328  
 Large spin. gear B-85334



CLUTCH LEVER BRACKET

Clutch lever	(2)	B-47823	Shaft	B-56360
Clutch lever brkt.		A-61376	Lever	A-56361
Clutch brkt. cover		A-61377	Brake valve const.	A-59519
Spring		B-31760	Valve body	A-59521
Oil pump gear stud		B-34369	Valve stem	B-59523
Oil gage cover		B-41415	Oil gage gasket	B-60018
Oil gage glass		B-41720	Oil gage gasket	B-60317
Lever pin		B-44288	Oil pump gear	B-60724
Reverse clutch fork	(2)	B-47824	Oil pump pinion	B-60725
Clutch lever shaft		B-47825	Plug	B-62160
Spacer	(2)	B-47826	Plug	B-64870
Clutch fork collar	(2)	B-47827	Pump pinion bushing	B-63954
Pin	(2)	B-47828	Adjustment screw	B-67460
Lever lock pin		B-47833	Relief valve	B-67839
Plunger		B-47834	Lever notice plate	B-72812
Spring		B-47843	Lever	A-95192
Clutch brkt. cov. gask.		B-47846	Lever	B-95193
Button		B-48062	Lever block	A-95195
Valve body gasket		B-49263	Lever block	B-95196
Plate stand		B-50870	Linear "0" ring	11-110
Clutch lever shifter		A-56359	Linear "0" ring	11-111
Handle	(2)	B-92351	Dieco spring	M-111A

TURRET SLIDE & SADDLE

Turret clamp	A-74321	Lever roller	B-34177
Turret cover	B-42668	Lever washer	B-34178
Hex turret	A-57941	Lock bolt spring	B-34179
Slide	L-74319	Pawl pivot	B-34184
Saddle	L-94816	Pawl stop pin	B-34185
Tumbler	A-62940	Spacer	B-72326
Lockbolt lever	B-62938	Locating pin	(2)
Pawl	B-62939	Binder bolt	(6)
Spring retainer	B-70942	Locating ring	
Tumbler seat	B-71971	Chip guard	
Stop scr. carrier nut	B-79536	Chip guard support	
Stop scr. carrier	B-12004	Guard	
Knock out spring	B-31760	Steel way screw	(12)
Knock out rod plug	B-80810	Bevel gear	
Ratchet	B-75553	Lever washer	
Turret bevel gear	B-34166	Lockbolt bushing	(6)
Clamp stud	B-74296	Oil plug	
Washer	B-74302	Taper gib	
Set screw block	B-74303	Taper gib	
Clamp ring locator	B-77660	Straight gib	
Jam nut	B-80811	Left front gib	
Release trip	B-74323	Pawl spring	
Clamp release	B-74324	Dinder hub	
Lock bolt sleeve	B-70941	Binder handle	
Link	B-74325	Bindle handle	
Lever pin	B-65416	Saddle way-rear	

TURRET SLIDE & SADDLE

Saddle way-front	B-59752	Shoe	2359
Rack	A-59753	Brass shoe	2261
Slide cap-front	B-59754	Brass shoe	2253
Slide clamp cap	B-59755		(3)
Slide cap-rear	A-74322		(6)
Slide cap-front	A-59757	For T.S. & S.-W/O-S.A.	
Saddle cap-front	A-59758	Pinion shaft	A-34540
Saddle cap-rear	A-59759	Pinion shaft washer	B-34541
Block	B-59760	Turnstile sleeve	B-34542
Ind. stop shaft	B-59764	Slide cap-front	D-66587
Stop rod	B-59765	Slide cap-front	B-66588
Stop shaft collar	D-59766	Slide cap-rear	A-78004
Clamp nut	B-59767		
Tumbler screw	B-59768	With Bijur lubricator	B-73928
Stop screw	B-59769	Brkt.	A-81026
Knock out rod	B-95169	Front cover	LBK-2036
Clamp stud	B-95170	Bijur lubricator	309
Bevel gear nut	B-59773	Laton snap ring	(5)
Gib screw	D-60136	Linear-o-ring	11-110
Saddle way-front	A-60721	Linear-o-ring	11-010
Stop	B-62194	Timken brg. cone	#387
Lock bolt	B-62326	#3 precision	
Spacer	B-95739	Gits-oiler	#502
Latch pivot	B-63543	Gits-oiler	#503
Latch	B-63544		
Ratchet pin	B-64964	For T.S. & S.-W/O-S.A.	
Lockbolt centers	A-65243	Gits-oiler	(5)
		Gits-oiler	(2)



SADDLE APRON

Handle	(5)	B-92351	J.M. #9846
Knob	(3)	B-93655	Flat gasket
Lever stop		B-95006	
Cam spacer		B-95009	Gits #302
Fd. lever stud		B-95019	Oil cap
Knob		B-95020	
Retainer		B-95024	Tru-arc snap rings
Spring	(4)	B-95025	5100-78 (2)
Spacer		B-95026	5100-137
Pin	(2)	B-95027	5100-250
Gasket		B-95130	
Feed dial		B-95131	Arrow breather
Dial feed plate		B-95132	vent ASP-3BV
Detent plate		B-95133	
Spacer		B-95134	Bijur KIC-C-2367
Brg. spacer	(2)	B-95135	lube pump, 1 in. stroke
Spacer	(2)	B-95136	
Brg. spacer		B-95137	Bijur B-5734 sight-gauge
Lg. fd. lever rod		B-95138	
Seal retainer		B-95139	MRC bearings
Turnstile hub		B-95140	R-4 (2)
Turnstile handle	(5)	B-95141	104-KS (2)
			107-KS
			204-S (2)
			207-S
O-rings			Aetna bearings (2) E-7
PRP 568-008	(2)		
PRP 568-010			
PRP 568-012	(2)		
PRP 568-113			
PRP 568-115	(2)		
PRP 568-210			
PRP 568-213			
Victoprene seal	(2)		Jergens #26908 plunger
#60388			Drill jig bushing (2) GA-92
			5/16 hole
			Brass shoe 1049

CROSS SLIDE & CARRIAGE

Cross slide gib	B-34391	Handle stud	B-68691
Dial	B-42854	Handwheel	A-95159
Carriage taper gib	B-61693	Feed screw	A-95160
Compensating nut	B-62363	Front carriage cap	A-95161
Binder handle	B-68690	Trip dog	B-95162
Carriage	L-94817	Trip pin	B-95163
Cross slide	A-94818	Feed screw nut	B-95164
Clip	B-31937	<u>Experimental</u>	
Gib screw	B-34399	<u>Adaptor</u>	B-95165
Gib stud	B-37754	Handle hub	B-95166
Gib nut	B-40580	Handle	B-92351
Rear carriage cap	B-42168		
Rear cap gib	B-42171		
Wiper	B-47907	Reid tool SKA-13	
Wiper cover	B-47908	Knurled knob assembly	
Clamp	B-62365		
Feed screw gear	B-62366	Brass shoe	2252
Brg. spacer	B-62367	Brass shoe	2281
Brg. spacer	B-62368	MRC bearing	7303
Wiper cover (right)	B-62805		
Wiper	B-62806		
Wiper cover (left)	B-63151		
Stop	B-63545		
Tee bolt	B-66118		

CARRIAGE APRON

Carriage apron			
Apron cover			
Right side cover			
Left side cover			
Cr. fd. lever			
Long. fd. lever			
Gear shift lever			
Carriage dial			
Worm gear			
Knockout spring			
Fd. lever spring	(2)		
Rev. detent spring			
Clutch spring			
Stud			
Pin			
Adj. nut	(2)		
Spring			
Spring	(6)		
Spring			
Spacer	(2)		
Triple cluster gear			
Tooth clutch gear			
Gear shifter stud			
Tooth clutch			
Bushing			
Tooth clutch gear			
Clutch bolt nut	(2)		
Spacer	(2)		
Tooth clutch			
Fd. lever plunger	(2)		
Dbl. cluster gear	(2)		
Dbl. cluster gear			
Dbl. cluster gear			
Idler gear			
Worm			
40T gear			
Bunting bushing			
Bunting bushing			
Spacer	(6)		
Dial marker			
Gib			
Bushing			
Sleeve			
Screw			
Shift pin			
Brq. spacer			
Bushing			
Bushing			
Bushing			
Lever guard	(2)		
Fd. lever cam	(2)		
Clutch plug	(6)		
Stop screw	(6)		
Spacer			

L-94820  
 L-94821  
 A-94822  
 A-94823  
 A-94824  
 A-94825  
 A-94826  
 A-95040  
 B-65296  
 B-31760  
 B-31917  
 B-31918  
 B-34684  
 B-37754  
 B-39805  
 B-40580  
 B-46766  
 B-52222  
 B-59673  
 B-62521  
 A-65259  
 A-65260  
 B-65275  
 B-65286  
 B-65287  
 B-65289  
 B-65293

B-65295  
 B-65297  
 B-65302  
 B-65306  
 B-65307  
 B-65308  
 B-65310  
 B-65311  
 B-65312  
 B-65318  
 B-65319  
 B-65322  
 B-65334  
 B-95855  
 B-65339  
 B-65340  
 B-65341  
 B-65342  
 B-65352  
 B-65386  
 B-65387  
 B-65388  
 B-67045  
 B-67046  
 B-69183  
 A-69817  
 B-70631

CARRIAGE APRON

Stop screw roll				
Bushing	(2)	A-71323	Brg. spacer	(3)
Pin		B-73036	25T gear	
Handle		B-81534	Spacer	
Knob	(3)	B-92351	Fd. disengage pin	
Front gasket		B-93655	K.O. rod plug (1-1/16)	(2)
Left side gasket		A-94991	Fd. lever stud	(2)
Right side gasket		A-94992	Knob	
Cam shaft		A-94993	Washer	
Gear shift cam		A-94994	Pinion shaft gear	
Hollow shaft		A-94995	Handwheel shaft	
Shaft	(3)	A-94996	Retainer	(2)
Handwheel		A-94997	Spring	(8)
Pinion shaft		A-94998	Spacer	(2)
Clutch bolt	(2)	A-94999	Pin	(4)
Lever		A-95000	Cr. fd. lever rod	
Detent holder		B-95001	Rev. gear shaft rod	
Shifter block		B-95002	Plug	
Shifter rod		B-95003	Victoprene seals	
K.C. rod plug (15/16)	(2)	B-95004	#60096	
Lever stop	(2)	B-95005	#60388	
C.S. knockout rod		B-95006	#60454	
Detent plate		B-95007	McCord-McKim gasket	507-F
Cam spacer		B-95008		
Feed dial		B-95009		
Dial feed plate		B-95010		
Idler gear stud		B-95011		
Sleeve		B-95012		
		B-95013		

CARRIAGE APRON

Bijur KIC-C-2367	207-S	(3)	
Lube pump, 1 in. stroke	104-KS	(2)	
	107-KS	(3)	E-7
Tru-arc snap rings	R-4	(2)	
5008-137	Aetna bearings	(3)	
5100-78	Torrington		
5100-137	NTC-1427 Brg.	(2)	
5100-250	TRC-1427 Plate	(4)	GA-92
O-rings	Drill jig bushing	(4)	
PRP 568-008	Steel ball (5/16 D.)		
PRP 568-010	Steel ball (3/8 D.)		
PRP 568-113	Jergens #26908 plunger		
PRP 568-115	Brass shoe		1049
PRP 568-210	Brass shoe		2246
PRP 568-213	Brass shoe		2281
PRP 568-214	Brass shoe	(6)	2289
PRP 568-218			
MRC bearings			
202-S			
204-S			

AIR OPER. COL. CHUCK

Wedge shoe	(2)	B-31983	Spd. cont. plug	(2)	B-88698
Switch box		A-65672	Logan - Model 401		B-87942
Yoke bracket		A-72071	R.F.L. unit		
Finger	(2)	A-70711	5 in. bore-2-1/16 in stroke		90436
Spindle guard pin	(2)	B-32580	Logan air cylinder		B-95662
Spring	(2)	B-34684			
Finger pivot pin	(2)	B-36830	<u>1-1/2 in. Only</u>		B-37595
Finger holder frict.		B-44274	<u>Collet hood guard</u>		A-67755
Detent		B-46705	Yoke		A-37594
Detent plug		B-46706	Collet hood		B-34547
Detent spring		B-46707	Collet		B-35135
Switch bushing	(2)	B-52246	Collet pads		B-37596
Switch plunger	(2)	B-56194	Plunger		B-62792
Finger roller	(2)	B-62784	Wedge shoe stud	(2)	B-67759
Finger roller pin	(2)	B-62785	Wedge		B-67760
Yoke pin		A-65677	Finger adj. ring		B-67761
Link pin		B-65679	Abutment sleeve		A-67762
Cover		B-65681	Finger holder		
Doc	(2)	B-65682			
Switch pin	(2)	B-65683	<u>2 in. Only</u>		A-37287
Guard cover		B-67758	<u>Collet hood guard</u>		A-70361
Spindle guard		A-70378	Yoke		A-37289
Pin		B-77796	Collet hood		A-36758
Cylinder adapter		A-72069	Collet pads		A-42589
Cylinder adapter		A-72070	Collet		B-62790
Link		B-72072	Wedge		B-69765
Spacer-mach. without		A-72037	Finger adj. ring		B-69766
Yoke pin-mach. without		A-72074	Abutment sleeve		A-69767
Oil-rite style dosf.		114	Finger holder		B-70362
Micro-switch	(2)	BZ-2RS	Plunger	(2)	B-70363
Air valve		B-88686	Wedge shoe stud		B-83823
Valve mtg. plate		A-95845	Abutment sleeve ext.		

AUTO CHUCK

Guard cap hinge	B-12890		Wedge shoe stud	(2)	B-34446
Lever	A-34428		Finger roller	(2)	B-34447
Yoke	A-34608		Finger roller pin	(2)	B-34448
Yoke bracket (mach. w/o HEB)	B-34777		Pin wrench	(2)	B-34523
Spindle guard cap	B-35089		Finger pivot pin		B-34618
Hood guard support	B-35104		Rear spindle guard		A-35108
Collet hood guard	A-37287		Rear spindle guard		A-36440
Crank lever	B-40489		Collet pads		A-36758
Yoke bracket	A-67973		Plunger		B-37288
Sleeve	A-46864	(2)	Pivot link pin		B-40496
Wedge shoe	B-62004		Shaft		A-40504
Collet hood	A-37289	(2)	Link		B-42021
Finger	B-38091		Collet		A-42589
Hood guard pin	B-32580		Finger holder		A-44256
Abuttment sleeve	B-33563		Finger holder friction	(4)	B-44274
Wedge	B-33564		False jaw screw		#1453
Pivot link pin	B-31970	(2)	Gits oiler		#502-G



LIPE BAR FEED (SPL.)

SL - (12 ft.) Pipe	#225	Ext'd. piston	A-85163
bar feed unit		Piston const.	A-85298
Bushing	B-85297	Support arm	A-84536
Tube	B-85296	Arm extension	A-84537



MOTOR DRIVE

Louis Allis 256T

Motor bracket  
Motor housing

A-86291  
A-67731

Motor brkt. gasket  
Key

A-95734  
B-86292



S.C.A.

Bracket  
Lg. fd. lever  
Lever (#4 UTL only)  
Leader  
Lever (#6 UTL only)  
Lever (#3 UTL only)  
Leader nut  
Spring  
Leader bushing  
Follower  
Follower rack  
Closer  
Disengage block  
Pin  
Kickout plunger

A-71286  
A-71859  
B-71288  
A-71289  
B-80822  
B-95148  
B-32079  
B-48061  
B-71290  
B-71291  
A-71292  
B-71293  
B-71294  
B-71306  
B-71297

Stop lever  
Knock out adjustment  
Bushing  
Knock out rod  
Lever catch  
Detent  
Knock out rod plunger  
Lever rod  
Lever pivot  
Pinion shaft  
Kickout plun. spring  
Cover  
Spring  
Knob  
Gits oiler

B-71298  
B-71299  
B-71301  
B-71302  
B-71303  
B-71304  
B-71305  
B-95810  
B-71307  
B-71858  
B-52312  
B-71319  
B-56121  
B-95020  
#2201

CROSS SLIDE TAPER ATTACH.

Base	A-34811	Swivel slide	A-34816
Tool slide taper gib	B-34813	Swivel plate	B-34817
Swivel slide taper gib	B-34814	Tool slide stud	B-34821
Yoke	B-34819	Swivel stud	B-34822
Tool slide	A-63199	Bracket	B-47841
Gib screw	B-34399	Tee nut	B-63945
Follower	B-34815	Stud	B-88861
	(2)		(2)
			(2)

10 in. AIR POWER CHUCK (S-P)

Adapter  
Mtg. plate  
Draw rod  
Cylinder guard  
Mounting plate

A-91730  
A-95345  
A-99483  
A-99484  
A-98946

S-P 10 in. 2-jaw chuck Model K2  
S-P 10 in. 3-jaw chuck Model K2  
S-P 10 in. cylinder Model RM  
S-P Soft blank top jaw 10-K-325 (1 set) B-87942  
Logan RFL unit Model 401 (2) B-88698  
Valvair speed control plug (2) B-95900  
Numatics 4-way valve

CHUCK GUARD

Knob	B-84088	Guard	A-95850
Hood	A-95849	Housing	A-84629

10 in. AIR POWER CHUCK (CUSHMAN)

Adapter	A-91730	Cushman chuck #20-672-10-A08	
Mtg. plate	A-95845	Cushman cylinder #10-752-10-000	(1 set)
Draw rod	A-98944	Cushman H.S. top jaws 24-11055	B-87942
Guard	A-98945	Logan RFL Unit	B-88698
Mounting plate	A-98946	Valvair speed control plug	B-95900
		Numatics 4-way valve	

8 in. SMW POWER CHUCK

Mounting plate	A-97160	Logan R-F-L Unit	B-87942
Chuck adapter	(2) A-99076	Valvair speed plug	B-88697
Stand off bracket	(2) A-99077	Numatics 4-way valve	B-97159
Chuck guard	A-99078	SMW chuck-adapter-jaw	B-97161
Knob	B-84088	Bracket	(2) B-99079

INCH/METRIC DIAL

Jergens Conversion			
Dial Unit No. 65103			
Increment Ring 0/333			
Handwheel			
Nut (No. 3 UTL)			
	A-97149	Nut (No. 6 UTL)	B-97152
	B-97150	Adapter	B-97153
	A-97151	Clip	(6) B-97306
	B-98565	McMaster Delrin	
		Fluted-Head Finger	(6) B-97330

## USING THE CONVERSION DIAL

### 1. Inch measurement

With the inch engraving on the selector ring to the top, the engraved dial will now revolve at the same speed as the lead screw.

### 2. Millimetre measurement

The conversion dial can be changed from inch to metric by turning the selector ring slowly  $180^{\circ}$  in a clockwise direction until it can be felt clicking into the detent position. This will show the mm engraving at the top. The engraved dial will now revolve at a higher speed than the leadscrew spindle, 2.54 to 1.

### 3. Reversion to inch measurements

The selector ring is returned to the detent position in a counter-clockwise direction. A small arrow engraved beside the inch and mm engraving shows the direction of rotation in each case.

### 4. Zero set

The engraved dial can be set at zero or any other position on the dial by unscrewing the thumb screw, moving it to the required position and then re-tightening the thumb screw.

ADJ. SPINDLE BACK STOP

Adj. stop  
Guard

A-96999  
A-97000

Adapter  
Sleeve

B-97001  
B-97002



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- Saddle and Hexagon Turret Operation
- Collet Chuck and Bar Feed
- Collet Chuck
- Square Turret
- Coolant System
- Carriage Thread Chasing Attachment
- Cross Slide Taper Attachment

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- Diagnosis of Improper Head Operation
- Carriage and Saddle Apron Adjustments
- Turret and Slide Adjustments
- Cross Slide and Carriage Adjustments
- Square Turret
- Collet Chuck

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- Machine Specifications

# SAMPLE

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This instruction manual is for—

Customer \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Machine \_\_\_\_\_

Serial No. \_\_\_\_\_

Lot No. \_\_\_\_\_

Date Mfg. \_\_\_\_\_

**Note:** When ordering tooling, repair parts or requesting information please refer to the above machine, serial number and lot number.

# UNIVERSAL TURRET LATHE

## INSTALLATION—SECTION 1

The Bardons & Oliver Universal Turret Lathe was designed and built to produce accurate work over a long period under conditions of hard usage. In order that the inherent accuracy be retained, extreme care must be given to the installation of the machine. Thorough inspection of the machine should be made at regular intervals, the frequency depending on the type of work handled and the accuracy desired.

### IMPORTANT

*Do not attempt to run the machine until all of the following instructions for Unpacking, Installing, Lubrication, Electrical Connections, Leveling, and Safety have been carefully and completely followed.*

### UNPACKING

Turret Lathes for domestic customers are shipped in individual crates: those for foreign customers are shipped in individual boxes. While the machine is being unpacked, particular care should be taken not to mar the finish or damage the working parts.

Whenever possible, tools, chucks, and fixtures are attached directly to the machine. Wrenches and other items which cannot be attached, together with a data envelope, will be found in a separate box fastened to the platform or skids.

Contained in the data envelope are the instruction manual, electrical diagram, parts catalogue, and packing list. Be sure this data is preserved and delivered to the proper departments.

Check and account for each item on the packing list before disposing of any crating or boxing material.

These plates should be grouted in concrete flush with the floor. If it is impossible to set these plates in or on concrete, they may be bolted down to a wooden floor. Here it is advisable to use plates affording a much larger bearing area on the floor. Drill and tap for the hold down screws after the bearing plates are firmly fastened to the floor.

On machines equipped with an air collet chuck and bar feed unit, assemble the bar feed unit according to the foundation drawing in the manual and place the unit in its approximate position with respect to the machine. The bar feed unit should be located on bearing plates the same thickness as used under the machine.

Connect the two air lines to the collet chuck cylinder underneath the end of the spindle. Each hose is suitably marked.

### FOUNDATIONS

The machine is mounted on heavy wooden skids to prevent bed warpage in shipping. Locate the machine approximately in its final position before removing the skids. In removing the skids care must be taken to prevent undue twisting which might cause permanent distortion of the bed.

If possible, the legs should rest on a concrete foundation. A wooden floor lacks rigidity and its surface swells or shrinks according to climatic conditions.

To maintain accuracy, place steel bearing plates under each leg, as shown on the outline drawing of the machine.

### ELECTRICAL CONNECTIONS

The machine is shipped from the factory with all electrical equipment wired. It is only necessary to connect the main power lines to the terminals on the disconnect switch in the upper right hand corner of the electric control cabinet. When the headstock oil reservoir is filled as outlined in the "LUBRICATION" instruction, close the disconnect switch and press the "START" button located on the push button control panel. If the power lines have been connected to give the proper rotation of the motors the spindle will rotate in a counter clockwise direction with the start lever in forward.

## LEVELING

**CAUTION**—Before leveling, allow the machine to reach normal operating temperature.

To start machine, read operating instructions first.

The accuracy originally built into the machine will be lost unless the machine is properly leveled. To maintain this accuracy the level of the machine should be checked at least twice a year.

To level, raise the machine by turning the leveling screws so that a 1/8 inch thickness gage may be slipped between the bottom of each leg and the bearing plate. Use a precision level about fifteen inches long. Starting at the head end, place the level lengthwise on the bed ways, and level by turning the adjusting screws. Then place the level across the bed ways and level. Repeat the two operations at the tail end of the machine. After leveling at each end, repeat the leveling process until all readings are equal. After proper alignment, bolt down the legs and recheck the level.

If extremely accurate work is to be done on the machine, the leveling can be further checked by chucking a round bar and taking a turning cut with the carriage or hexagon turret. Any remaining misalignment will be indicated by the amount of taper in the turned diameter. This can be corrected by slight adjustment of the leveling screws.

On machines equipped with the air collet chuck

and bar feed unit, this unit should be bolted to the floor only after it is leveled and aligned with the spindle. To level and align the unit (Figure 1), do as follows: Place the unit in approximately the proper position with respect to the machine, and make necessary electrical and air connections. Insert a test bar (equal to the maximum capacity of the collet) through the revolving scroll chuck and just through the collet. The bar should be straight, of a uniform diameter and about 12 feet long. Close the collet. Place a parallel between the support bars and the test bar. Using a 2 inch parallel, raise the second stand until the test bar is level. Check alignment of support bars by placing level lengthwise on top of the bars and then crosswise on the bars adjacent to the parallel. Adjust by leveling the second stand. Level the first stand lengthwise and at right angle to the support bars. Using the test bar as a guide, align the stands with the center line of the spindle. Recheck level of test bar and support bars. As a check of alignment, the test bar should be concentric with the hole in the abutment sleeve. Recheck the levels throughout the bar feed unit.

To insure proper installation of the bar feed unit, tighten the chuck until it grips the test bar. Loosen the chuck just enough so that it can be moved back and forth over the test bar. It must slide freely over the whole length. After lining up and leveling the bar feed stands, bolt them securely to the floor.

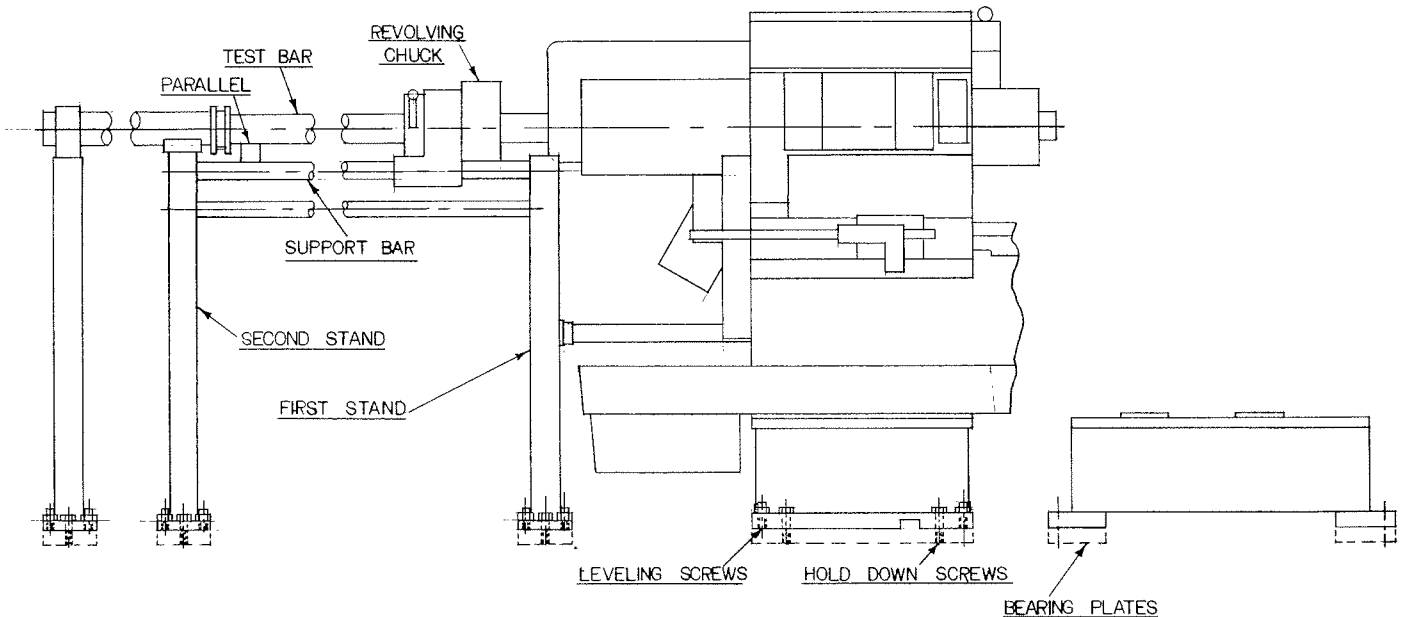


FIG. 1

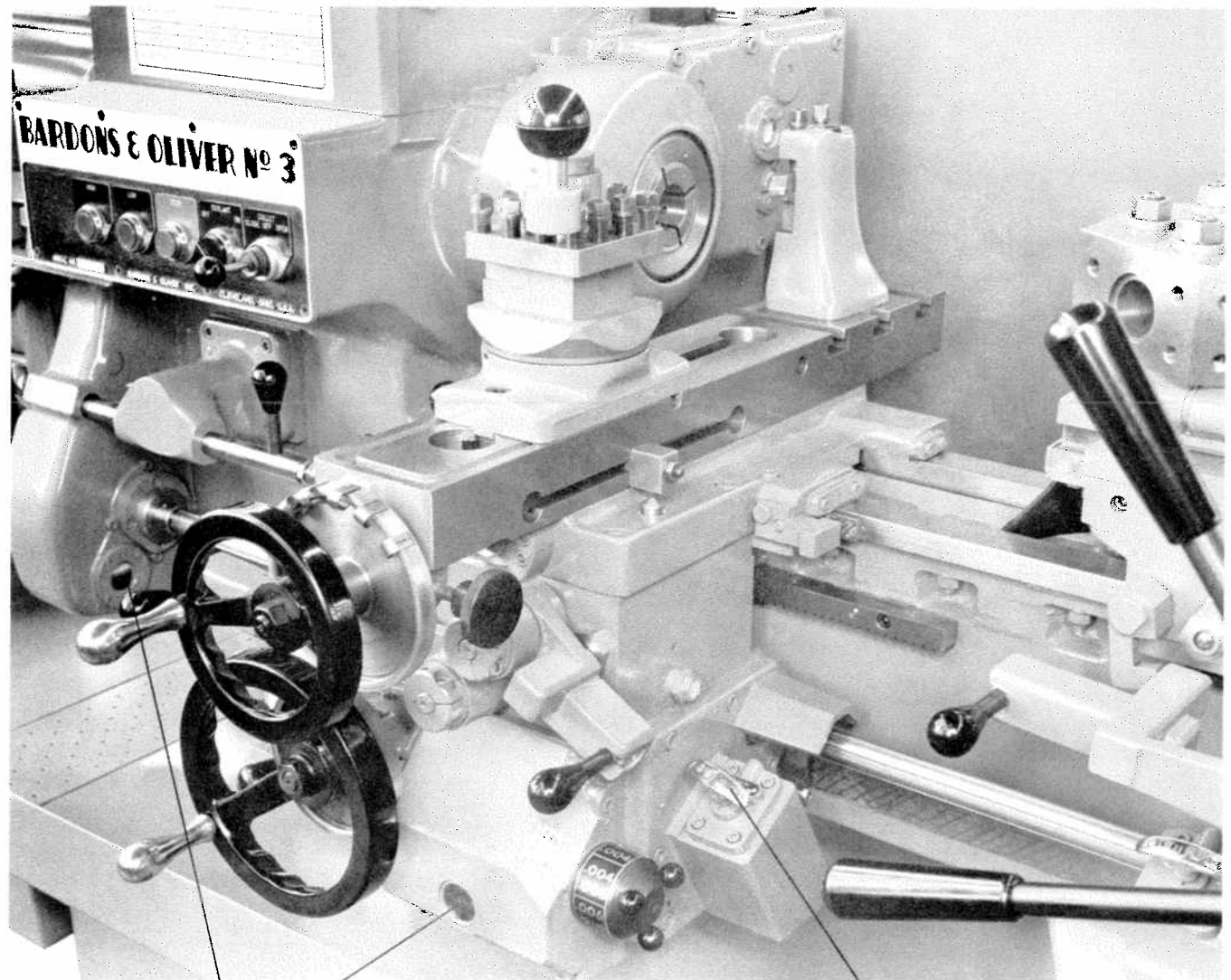
## LUBRICATION

The headstock is fully enclosed and spray lubricated. With the main drive motor on circulating oil should be visible in the sight gauge directly below the forward-reverse lever near the spindle face.

The aprons and head end bracket are splash lubricated. The plunger pumps on the aprons lubricate the bearing surfaces of the turret slide, the cross slide, carriage, feed screw, and nut, as well as bearing surfaces in each apron not reached by the splash system. Since the plunger pumps take oil from the aprons, it may be necessary to add oil to the aprons more often than to the headstock or head end bracket.

The apron oil reservoirs are filled to the proper level before shipment. Fill the headstock and check the aprons and head end bracket. Make sure that the oil level in each reservoir is at approximately the center of the gage glass. Check the oil levels before starting the machine, as the level drops somewhat after the machine is started. Raising the oil level above the center line on the gage will cause oil leakage at various points and excessive oxidation or gumming of the oil.

*The instructions on the lubrication chart (Figure 2) must be followed.* If the machine is operated on a multi shift basis, the headstock and aprons should be drained, flushed and refilled two or three times as often as called for on the chart.



Site Gage

Apron  
Plunger Pump

# LUBRICATION CHART

## INSTRUCTIONS

- Before Starting — Fill all oil reservoirs to the center line on the gages. Fill oil cups. Depress apron pump plungers 3 or 4 times.
- Every 4 hours — Fill oil cups. Depress apron pump plungers 3 or 4 times.
- Every 3 months — Drain apron and head end bracket oil reservoirs. Flush with solvent type flushing oil. Refill reservoirs.
- Every 6 months — Drain headstock oil reservoirs. Flush thoroughly with solvent type flushing oil. *Clean oil filter on inside of reservoir cover.* Refill headstock.

## OIL SPECIFICATIONS

- Headstock and Head End Bracket — High grade mineral oil, Mobil DTE 25 or equivalent.
- Aprons — Mobilgear #626
- Oil Cups — Mobil Vactra oil #2

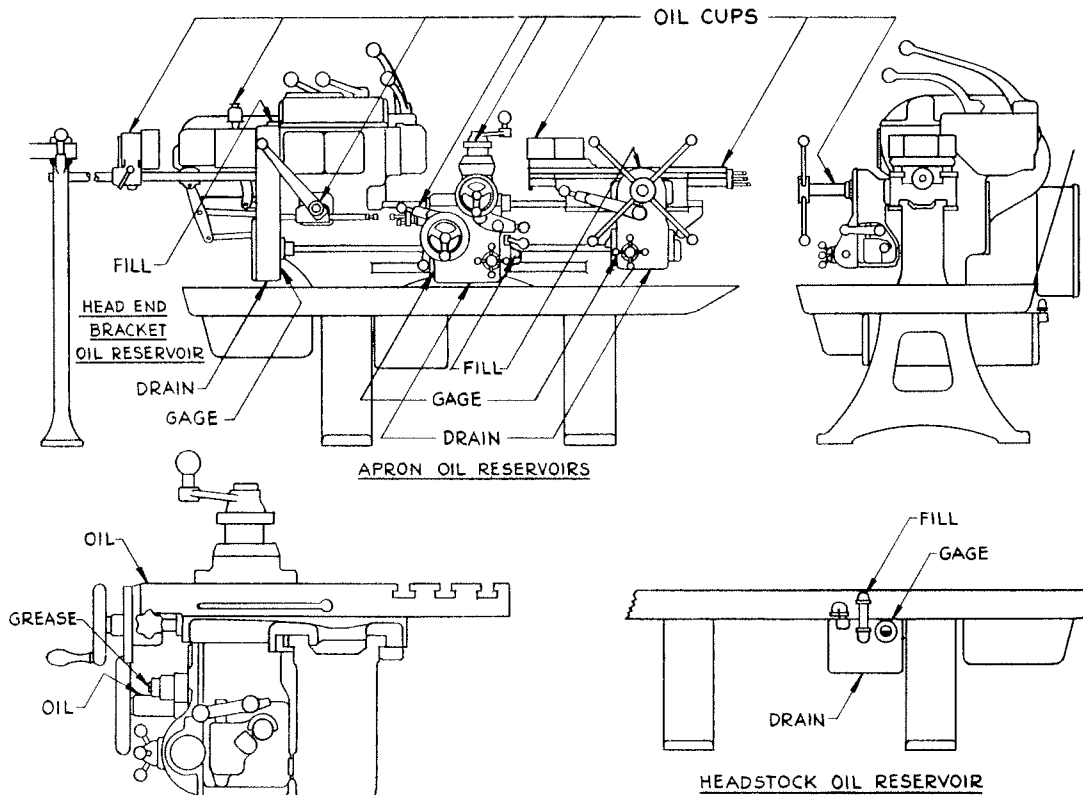


FIG. 2

NOTE: Mobil Products are listed above to indicate the proper type of lubricant. Many manufacturers of high quality lubricants have equivalents, and it is recommended that you consult the company which has best served your past needs.

# OPERATING INSTRUCTIONS

## SECTION 2

### Safety First

Before you turn on the machine—

- Protect your eyes. Wear safety glasses.
- Wear appropriate clothing—No long sleeves, neckties, or jewelry.
- Make sure floor is clean and free of obstructions in work area. Clean up chips, oil spills, and remove parts or tote boxes to a safe area.
- Before turning on power, put the spindle in neutral.
- Make sure work part and tooling are securely fastened in proper holders or fixtures.
- When main power is on and before spindle is rotated check that hydraulic and air pressure gages show proper operating pressure.

### HEADSTOCK OPERATION

The No. 3 Universal Turret Lathe has a 24 speed (with 2 speed motor) headstock. Speeds are easily selected by positioning three levers as indicated on the chart attached to the front of the headstock (Figure 3).

The high-low lever "B" allows spindle speed changes without slowing the spindle. When the position of levers "A" or "C" is changed, the forward-reverse clutch must be disengaged, and the spindle must be allowed to slow almost to a stop. The forward reverse lever when in the neutral position automatically applies the spindle brake. Between the forward and neutral positions there

is a coasting zone which greatly facilitates gear shifting. An automatic lever lock prevents unintentional starting of the machine.

The high-low motor buttons start the main drive motor. Either of these buttons may be pressed with the spindle running allowing an instantaneous shift from high to low motor.

A selector switch turns on and off the separate motor driven coolant pump.

If the machine is equipped with an air operated collet mechanism the switch closest to the operator opens and closes the collet.

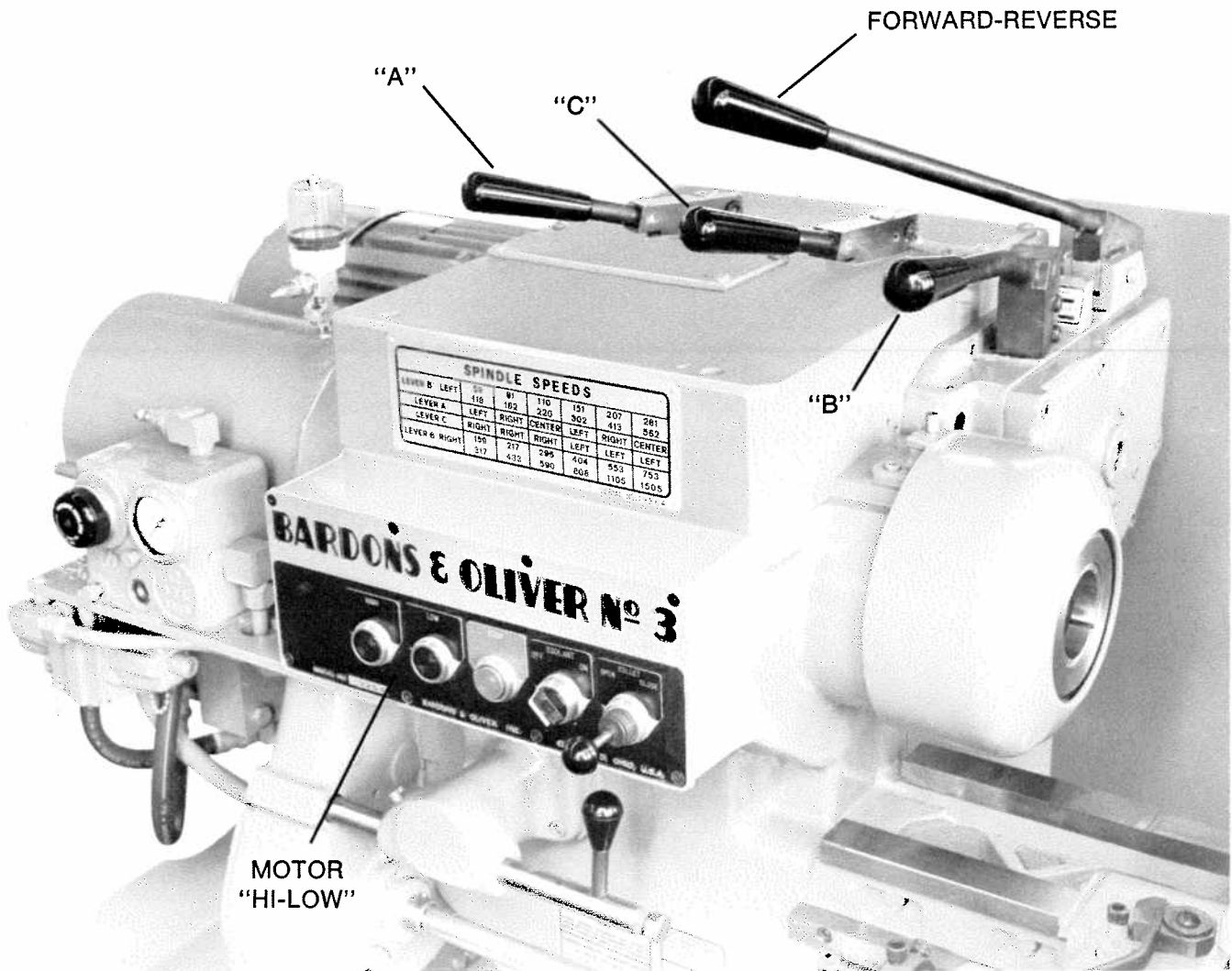


FIG. 3

## CARRIAGE AND CROSS SLIDE OPERATION

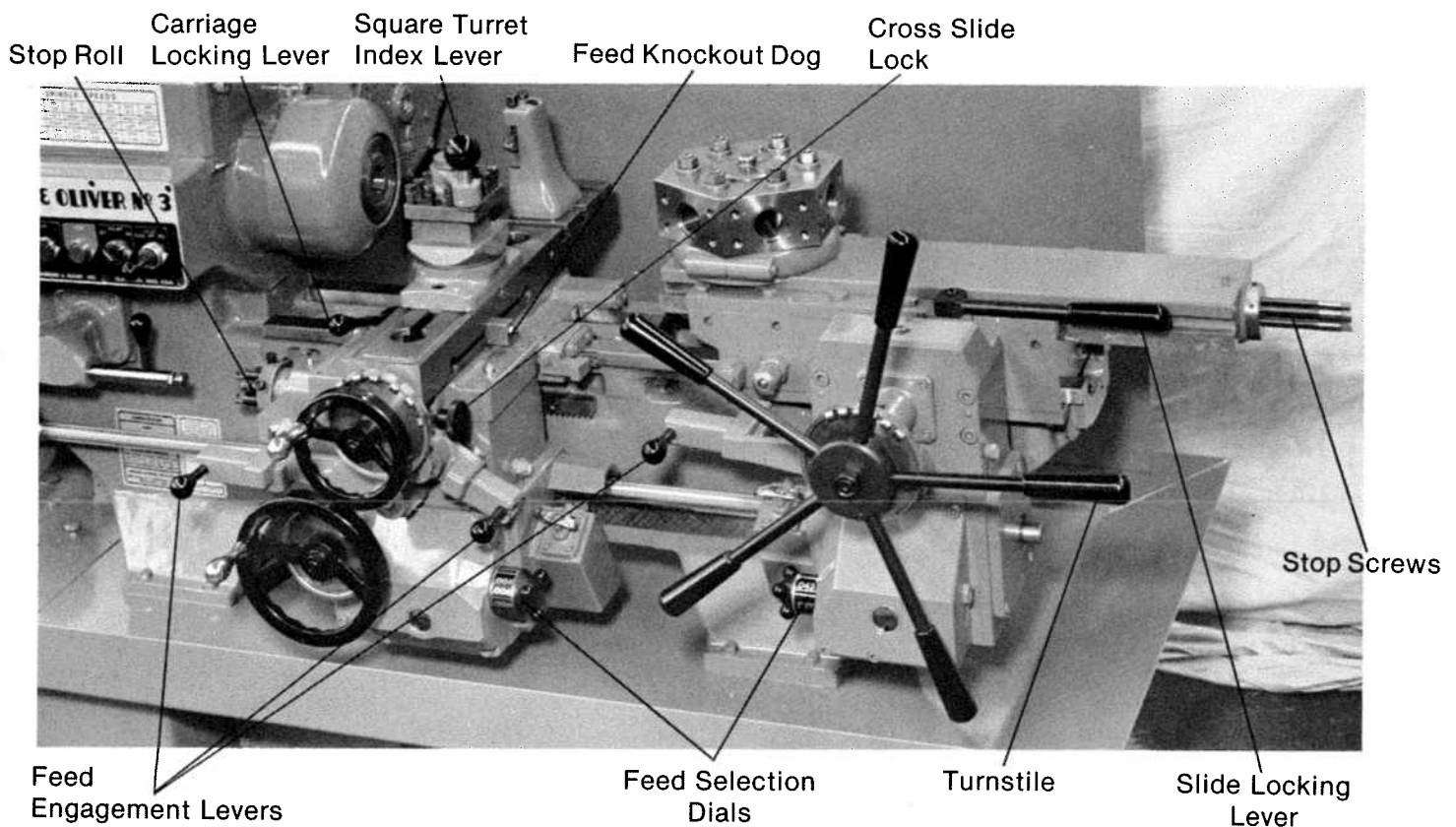
The carriage and the cross slide can be adjusted manually by turning the hand wheels. Power feeds are engaged by lifting the new "easy action" levers and are disengaged by the same levers or by adjustable stop screws or dogs. Positive tooth clutches in each apron assure easy engagement and long life.

Feed selections in each apron are made by means

of a single dial and are easily read on large rotating drums.

The carriage locking lever can be used to lock the carriage into position for facing, grooving or cut-off. The cross slide lock can be used to lock the cross slide in position.

The six position stop screw roll may be set to disengage the feed on longitudinal cuts.



## SLIDE AND HEXAGON TURRET OPERATION

The turnstile handles advance, retract and index the hexagon turret.

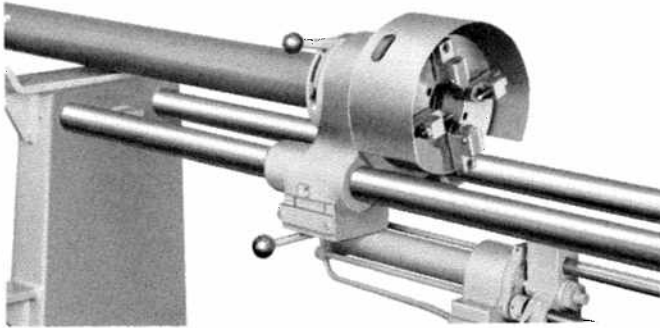
Power feed is engaged by lifting the new "easy action" lever and may be disengaged by the same

lever or by a stop screw.

Stop screws are set by adjusting the screw in the bottom position on the roll which corresponds to the working face of the hexagon turret.

## AIR OPERATED COLLET CHUCK AND BAR FEED

The air operated collet chuck and bar feed are shown below. Controls for the unit are located on the machine control panel on the front of the headstock. See Figure 3.



The operating lever controls the action of the collet separate, or controls the collet and bar feed together.

Bars to be fed into the machine are held in a revolving scroll chuck.

To insert a new bar position the chuck to the right. Swing the support tube forward and insert the bar. Pass the bar through the chuck and just through the collet. Close the collet. Move the chuck all the way to the left. Close the chuck jaws until they grip the bar securely.

As the bar is used, the chuck will advance to the right. When the chuck has reached the end of its travel, loosen jaws and move to left with collet closed. Close chuck jaws as above.

## COLLET CHUCK

To change collet pads, remove the pad screws from the master collet. These can be reached through holes in the collet hood. (Figure 4) To avoid runout of stock, clean the master collet and pads carefully before putting in the new pads.

The grip of the collet is adjusted at the rear of the

spindle by use of the spanner wrench for which holes are provided in the end of the abutment sleeve. (Figure 4) The finger holder should at all times abut tightly against the end of the spindle. The collet grip should be adjusted so that the finger rollers snap into the groove in the wedge when the collet is closed.

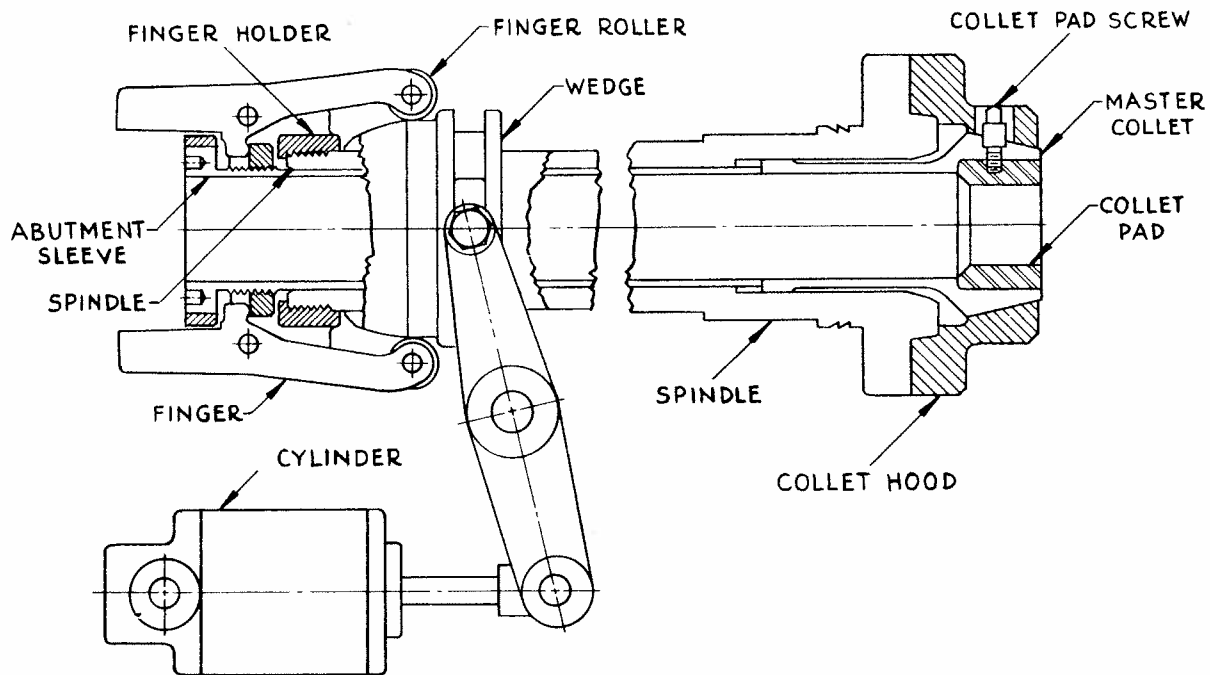


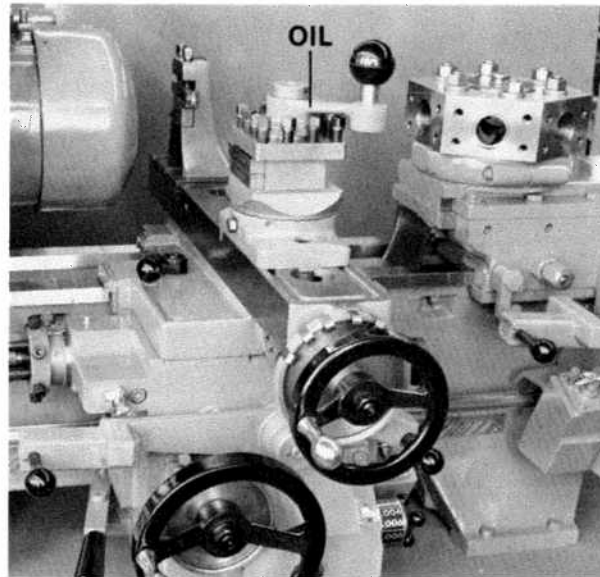
FIG. 4

## SQUARE TURRET

The Bardons & Oliver Square Turret features rugged construction and accuracy, assuring repetitive indexing within a few ten thousandths of an inch. A protective skirt around the bottom of the turret effectively keeps chips from the bearing surfaces. Daily maintenance of the square turret consists of oiling at the point indicated.

Rotate the **Turret Index Lever** counter clockwise to index the square turret.

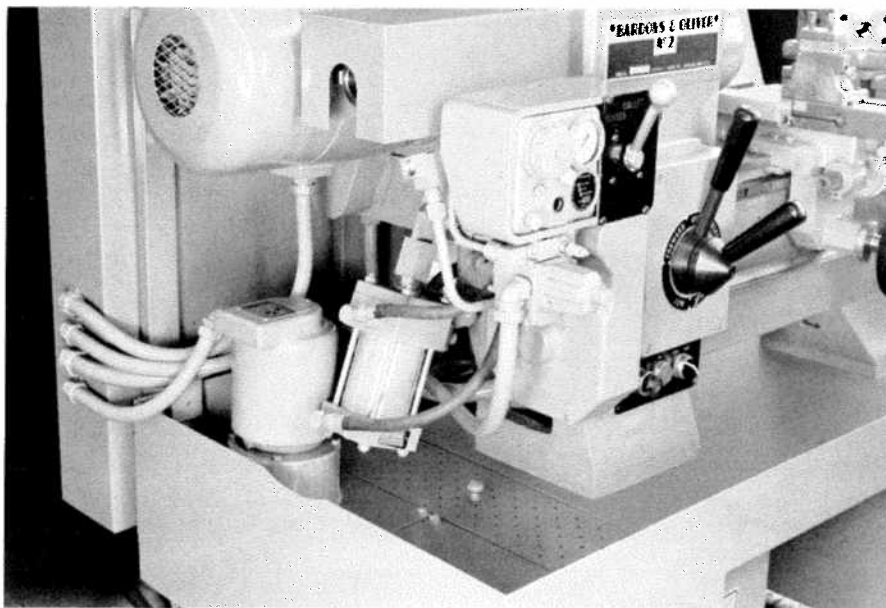
Four cutters can be held in the square turret and each cutter indexed to the cutting position in sequence, according to the job requirements.



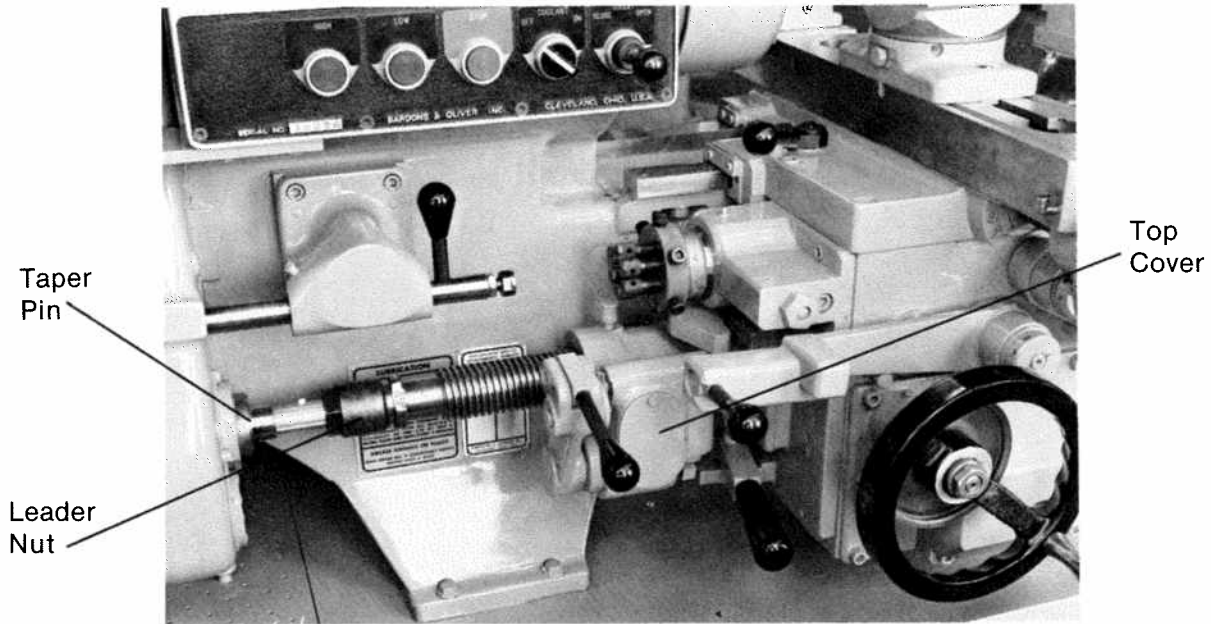
## COOLANT SYSTEM

An impeller type pump with integral motor drive is mounted directly over the coolant sump, and is controlled by an independent push button switch mounted on the control panel at the front of the headstock.

The coolant sump, located at the head end of the machine, is divided into two compartments by a baffle. Metal particles settle in the first compartment, and thus the pump located in the second compartment is protected. The sump should be cleaned frequently.



## CARRIAGE THREAD CHASING ATTACHMENT



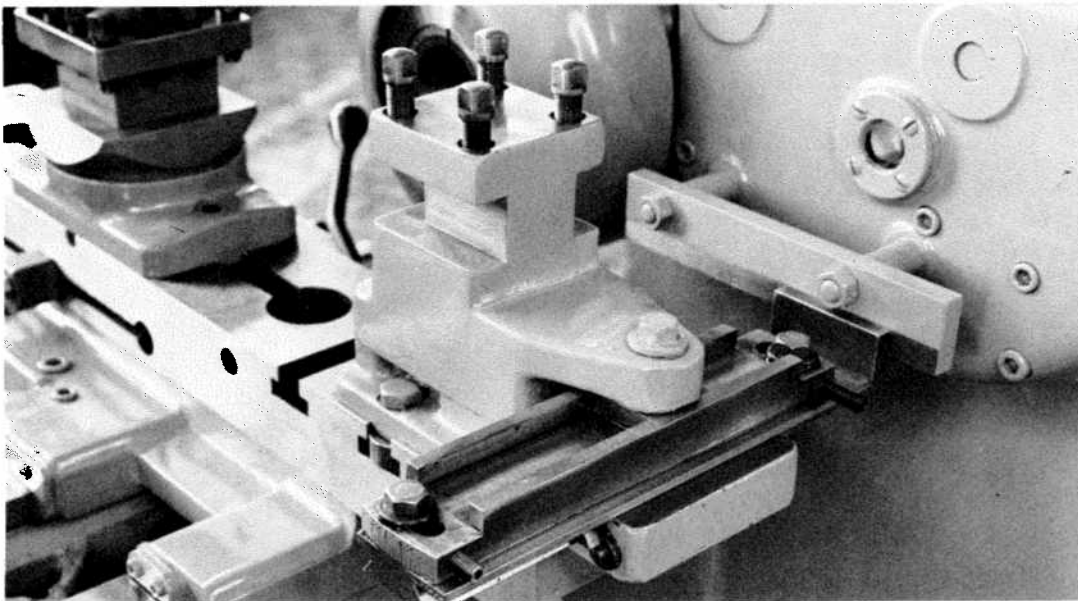
The carriage thread chasing attachment, bolted to the carriage apron and driven by the feed shaft, is simply designed and easy to operate. Lifting the engagement lever meshes the follower with the leader. The quick acting automatic knockout controlled by the carriage stop screws facilitates threading close to a shoulder or blind hole.

When changing leaders disconnect the feed shaft driving coupling by removing taper pin, see above.

Slide the shaft to the right to allow for removal of leader. When tightening leader nut use one wrench on the leader and one on the nut to avoid shearing the pin in the coupling.

To change the follower, remove the top cover on the chasing attachment bracket. After the new follower is inserted, it may be adjusted to the leader by the screw located at the bottom of the chasing attachment.

## CROSS SLIDE TAPER ATTACHMENT



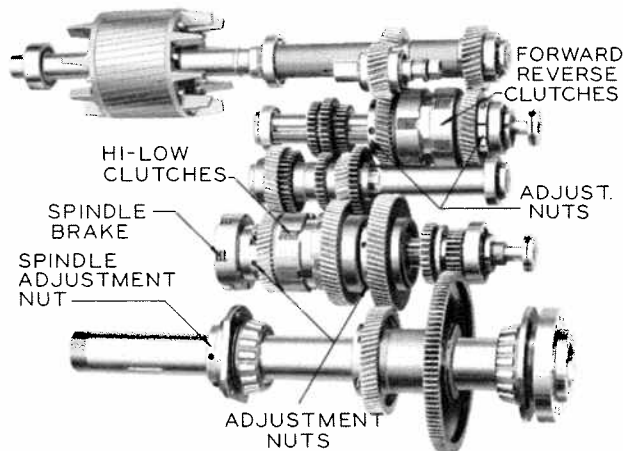
The cross slide taper attachment is mounted on the rear of the cross slide in place of the rear tool post. The lower member of the taper guide carries

a yoke which engages a guide plate held by two studs on the head lever bracket.

# MAINTENANCE AND ADJUSTMENTS

## SECTION 3 HEADSTOCK ADJUSTMENTS

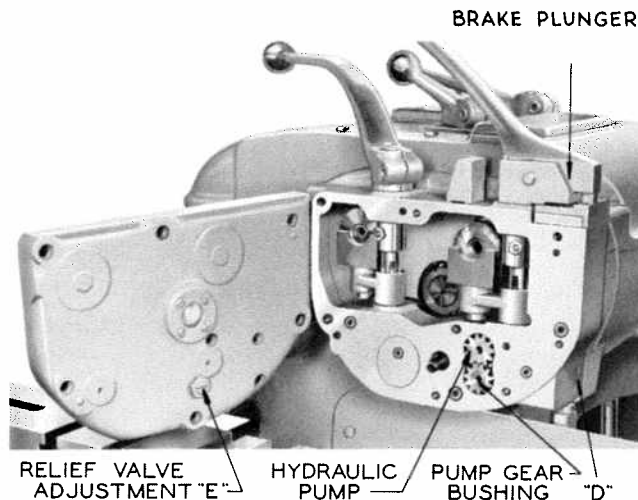
1. There are two double multiple disc clutches, one to obtain forward and reverse spindle rotation and one to provide quick high-low speed changes (Below).



The clutches have split adjusting nuts at each end which may be easily reached by removing the small covers on the top of the headstock. These clutches should not require adjustment more often than once or twice a year. When adjusting the clutches, keep trying the clutch levers in each direction while turning each nut a little at a time. After the right "feel" has been obtained in each clutch, be sure to tighten the locking screws in the split nuts before replacing the covers.

2. The spindle is mounted in two single row precision tapered roller bearings. A split adjustment nut, located on the rear end of the spindle outside the headstock, may be easily reached with a pin wrench after removing the small plate on the top of the head end bracket. In adjusting, all end play should be eliminated but no pre-loading should be introduced.

3. The headstock hydraulic system provides oil to operate the spindle brake and to spray lubricate



all moving parts in the headstock. The hydraulic pump is located in the clutch lever bracket directly in back of the spindle and supplies 50 to 60 lbs pressure to operate the spindle brake.

If the breaking action is slow, insert a pressure gage in place of the pipe plug fitting "D" on the back of the clutch lever bracket. The brake will not operate properly at a pressure below 50 lbs. (See Above)

The pressure may be regulated by adjusting the relief valve at point "E". If oil pressure is still too low, check for the following conditions.

1. Not enough oil in the headstock oil reservoir.
2. Clogged oil filter, located on the inside of the headstock oil reservoir cover.
3. Worn pump gear bushing which allows air to enter the hydraulic system.

If the pressure is correct and the breaking action is still slow, the brake should be disassembled, cleaned, and wire brushed. However, it should not be necessary to do this until the machine has been in use several years.

## CARRIAGE AND SADDLE APRON ADJUSTMENTS

Each feed lever contains a safety spring which allows the tooth clutches to slip only under conditions which would be injurious to the machine. Since the feed engagement clutches are of the

positive multi-tooth type, it is not necessary to adjust them to prevent slippage. The clutch teeth should be fully meshed when the feed lever plunger is engaged.

## TURRET AND SLIDE ADJUSTMENTS

The hexagon turret revolves on and is located centrally by a large diameter tapered roller bearing. A double bevel circumference clamp ring tightens the turret against the slide and preloads the bearing for accurate centering and vertical alignment.

The turret slide travels on hardened and ground replaceable alloy steel ways in the saddle. It is guided between double, hardened, ground and lapped alloy steel gibs on each side, and held by sturdy hardened and ground steel top caps.

To move the saddle on the bedways, loosen the eight screws beneath the lower saddle caps. Do not loosen the adjustment screws on the back side of the saddle. A latch is provided for attaching to the cross slide carriage for easy movement of the saddle along the bedways.

A neoprene apron is attached to the front end of the slide just below the turret to keep chips and dirt out of the indexing mechanism. However, the slide should be occasionally removed so that the saddle may be thoroughly cleaned. To remove the slide, place a board across the bedways beneath the front of the slide, remove the saddle caps and raise the rear end of the slide until the front end rests on the board.

The front top cap consists of three separate pieces, the middle portion serving as a slide clamp. The binder handle has a serrated hole for easy positioning.

1. The clamping action of the turret clamp ring is controlled by a toggle arrangement (Figure 5). The clamp bolt should fit freely in both halves of the clamp ring and its nut should be adjusted so that when the turret is in the clamped position, a .005" to .010" feeler can be inserted between a section of the clamp ring and the spacer.

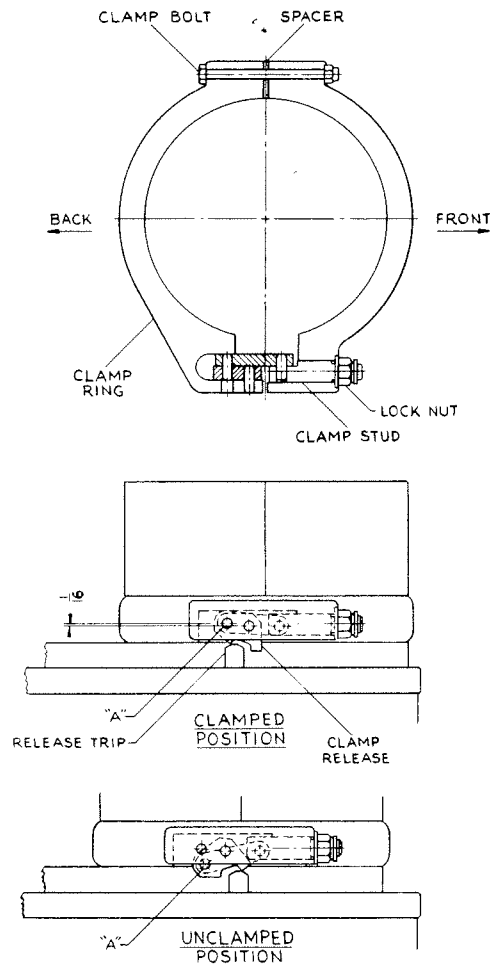


FIG. 5

The height of the trip release should be such that pin "A" lines up with the hole in the back section of the clamp ring (Figure 5) when the turret is in the clamped position. This locates the clamp release 1/16" over center and keeps the clamp ring from releasing. After some period of time the clamp release may become worn. To align pin "A" with the clamp ring hole, raise the threaded, four sided trip release the required amount.

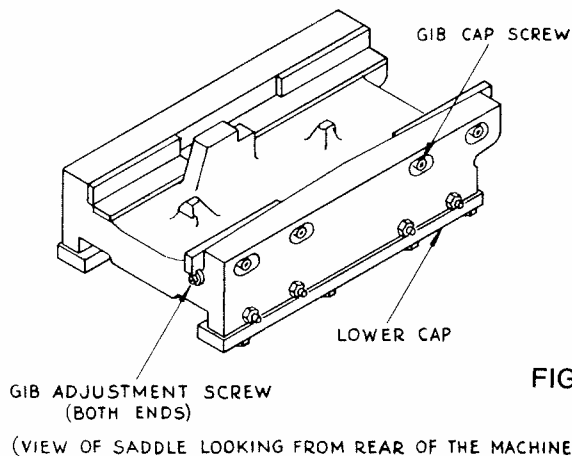
The lock nut on the clamp stud should be tightened until sufficient clamping action results. As the turret slide is moved back and forth by rotating the turnstile and the clamp release rides over the release trip, a slight drag, but no binding should be felt.

To check the clamping action, index the turret half way and then bring the slide forward. In this position the clamp ring is closed, but the lock bolt is not engaged in the turret. Raise two of the turret binder bolts about two inches above the top of the turret. Place a bar between them and try to turn the turret.

2. If, after adjusting the clamp ring, the turret is still inaccurate, proceed as follows: move the slide to the rear, thus opening the clamp ring and indexing the turret. Bring the slide forward about half an inch. Insert a 2 inch bar in one of the turret holes. While applying pressure on the bar back and forth with one hand, place one finger of the other hand so it rests against both the turret and the back of the clamp ring. If movement is felt at this point between the turret and clamp ring, the outer race of the tapered bearing is set too low in the slide. Then place finger against the turret and front of the clamp ring and apply pressure as above. If movement is felt at the front of the turret the lock bolt and lock bolt bushings are worn.

Bring the slide forward until the leading edge protrudes about one inch from the saddle. Locate an indicator on the top surface of the turret. Tap the front of the clamp ring. If the indicator reading drops, either the outer race of the tapered bearing is set too high in the slide, or the flat bearing between turret and slide has become excessively worn.

The conditions outlined here should not occur for several years, even under hard usage. Correcting these troubles will entail one or more of the following operations:—relocating the tapered



bearing outer race, rescraping the bearing surfaces of the turret and slide, replacing the lock bolt sleeve and bushings, and rescraping the clamp ring. Because of the skill and experience necessary to properly perform these operations, we suggest that you contact the factory Service Department before proceeding.

3. After the machine has been in operation a few months it may be necessary to adjust the slide gibs. (Figure 6) The front gibs are not adjustable. There are two adjustable rear gibs. Loosen the cap screws for each gib on the back face of the saddle. The gib adjustment screws are set into each end of the saddle.

### CROSS SLIDE AND CARRIAGE

Pairs of adjustable tapered gibs are provided at the outside of the front bedway, the bottom of the rear bedway and the lower or third bedway. One long tapered gib provides adjustment for the cross slide.

The cross feed screw is mounted in two opposed radial thrust ball bearings which are slightly preloaded and do not require adjustment. An adjustable double bronze nut, located in the front face of the carriage, is provided so that backlash can be eliminated from the feed screw.

A binder handle is provided for clamping the carriage to the bedways. The handle has a serrated hole for easy positioning.

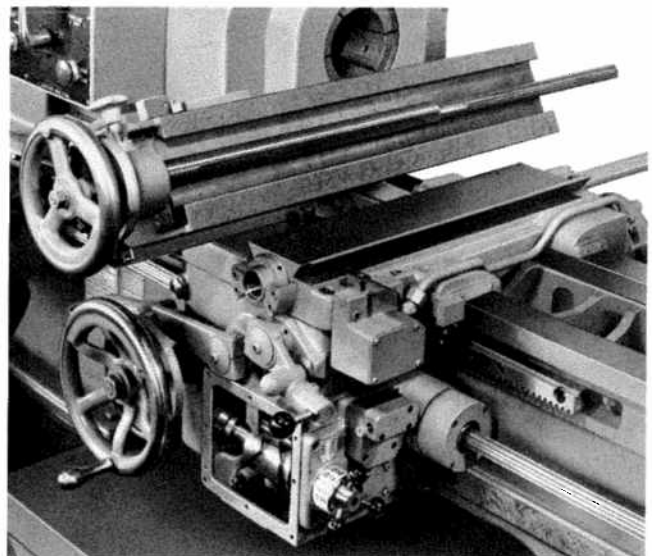


FIG. 7

## CROSS SLIDE AND CARRIAGE ADJUSTMENTS

1. After the machine has been run for a few weeks check the adjustment of the gibs. Check these adjustments about twice a year thereafter. To adjust, back off the gibs between the apron and lower bedway. Tighten the gibs between the carriage and the front bedway until the carriage just begins to bind when the handwheel is turned. Then back the gibs off slightly and make sure there is equal tension on each gib screw. After releasing the set screws on the back face of the carriage, adjust the rear gibs in the same manner as indicated for the front gibs. Adjust the gibs between the apron and lower front way last. Tighten the cross slide gib until the slide just begins to bind. Then, back the gib off slightly. Make sure all gibs are held securely in the adjusted positions.

2. To eliminate backlash between the cross slide screw and nut, loosen the locking screws holding the bronze adjustment nut. (Figure 7) Turn the adjustment nut until the backlash is eliminated, and then retighten the locking screws.

## SQUARE TURRET

The Bardons & Oliver Square Turret features rugged construction and accuracy, assuring repetitive indexing within a few ten thousandths of an inch. A protective skirt around the bottom of the turret effectively keeps chips from the bearing surfaces. Daily maintenance of the square turret consists of oiling at the point indicated on the figure.

When the indexing lever (1) is in the extreme clockwise position as shown in the figure, the lockbolt (2) is seated in the turret bushing (3) and the turret is clamped to the base. Tapered pins position the lockbolt cam (4) and stud collar (5) on the center stud (6) in the proper timed relationship. The indexing sequence is as follows:—The indexing lever is moved counter-clockwise. The turret is unclamped. The hardened pin (7) in the indexing lever engages the stud collar, causing the center stud to move with the indexing lever. The lockbolt cam engages the tumbler (8), depressing the lockbolt lever (9), which in turn disengages the lockbolt. The second hardened pin (10) in the indexing lever then engages the indexing plate (11) causing the turret to turn. The lockbolt rides on a recess in the turret until the next position is reached. Moving the indexing lever clockwise returns the lockbolt cam against the lockbolt sleeve (12). The indexing lever then disengages the stud collar and moves on the double acme threads causing the turret to be clamped to the base.

To properly maintain the square turret it should be completely disassembled and cleaned at least every six months. To completely disassemble, remove the bottom plate (13), stud collar (5), indexing lever (1), turret, center stud (6), tumbler pivot screw (14), tumbler (8), lockbolt lever (9), tumbler plunger (15), screw plug (16), lockbolt spring, and lockbolt (3) in that order. Reassemble in the reverse order, taking care that each part is placed in its original position, particularly the tumbler and lockbolt lever. Double acme threads locate the indexing lever on the center stud. It is possible to assemble this unit with the lever 180 degrees from the proper position. If the tapered pin which locates the stud collar on the center stud fits flush with both sides of the collar, the lever is properly positioned. If the pin goes in only half way, remove the indexing lever and reengage it opposite to the prior point of engagement. In adjusting the tumbler plunger the set screw should be tightened just enough to keep the tumbler in the proper indexing position. Tightening the set screw too much may cause the plunger to bind and shear.

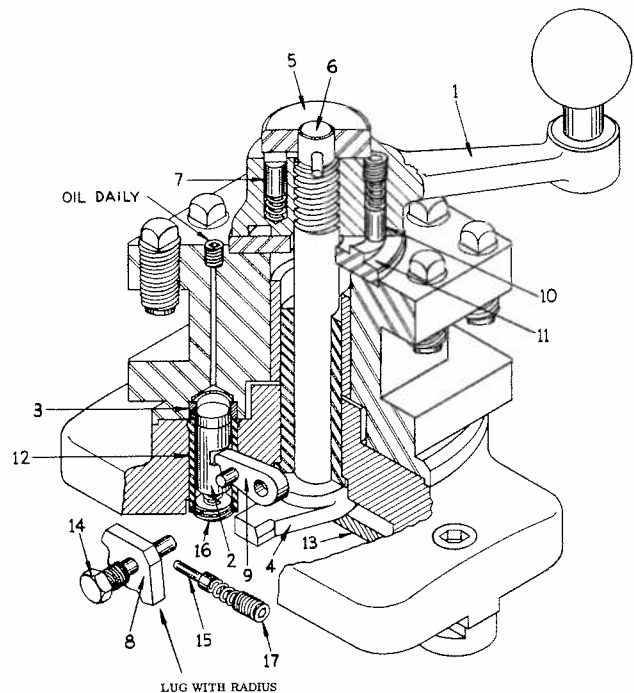


FIG. 8

## DIAGNOSIS OF IMPROPER SQUARE TURRET OPERATION

The following chart lists difficulties which may be experienced with the square turret operation, and indicates the cause and remedy for each trouble. See Figure 8.

TROUBLE	CAUSE	REMEDY
Turret remains stationary although indexing handle is turned one half revolution.	Indexing lever does not engage the indexing plate.	Remove the hardened pin in the indexing lever, clean, and on reassembly be sure the pin works freely.
Indexing lever moves only one quarter revolution and turret will not index.	Lockbolt does not disengage.	
	a) Set screw (17) holding tumbler plunger loosens.	Tighten set screw slowly until turret properly indexes.
	b) Tumbler plunger sticks.	Remove set screw, spring and plunger, clean, and be sure on reassembly that plunger works freely.
	c) Tumbler plunger broken.	Replace plunger. Plunger must work freely.
	d) Tumbler broken or excessively worn.	Replace tumbler.
	e) Lockbolt lever broken.	Replace lever.
Turret "Skips" or fails to stop at the next position on indexing.	Lockbolt spring worn.	Replace with about a quarter inch longer spring.
Repetitive indexing is inaccurate.	Lockbolt spring worn and lockbolt does not fully engage in turret.	Replace with about a one quarter inch longer spring.
	Lockbolt and lockbolt bushing excessively worn.	Recommend the square turret be sent back to the factory for rebuilding.
Turret drags or binds on indexing.	Tools in the turret held too tightly.	Tighten tools only as much as possible with wrench provided. Do not use pipe on wrench handle.
	Bottom plate does not clear the cross slide.	Remove bottom plate, clean, and file nicks which may cause loss of clearance between the bottom plate and the base bottom.

## COLLET CHUCK

To change the collet pads, remove the pad screws from the master collet. These can be reached through holes in the collet hood. To avoid stock runout, clean the master collet and pads carefully before assembly.

Dirt and fine chips working into the collet and spindle recess may cause the collet to stick and not release. To avoid this condition, remove the collet hood and clean the collet and spindle recess frequently.

MASTER COLLET & PADS

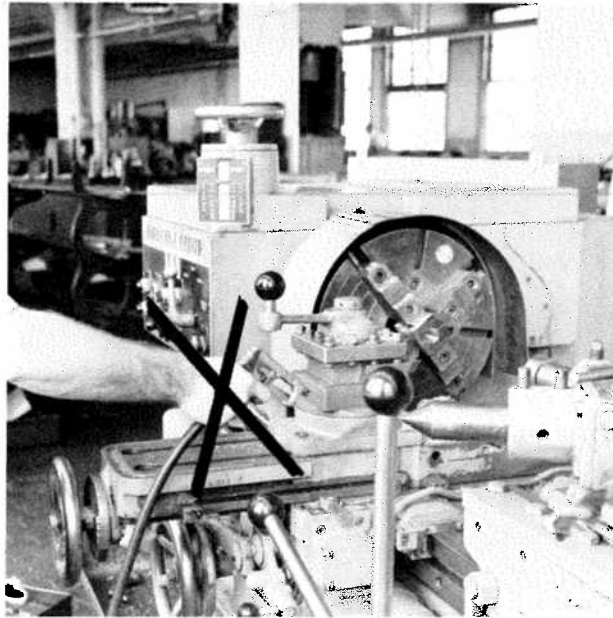


# GENERAL SAFETY

## SECTION 4

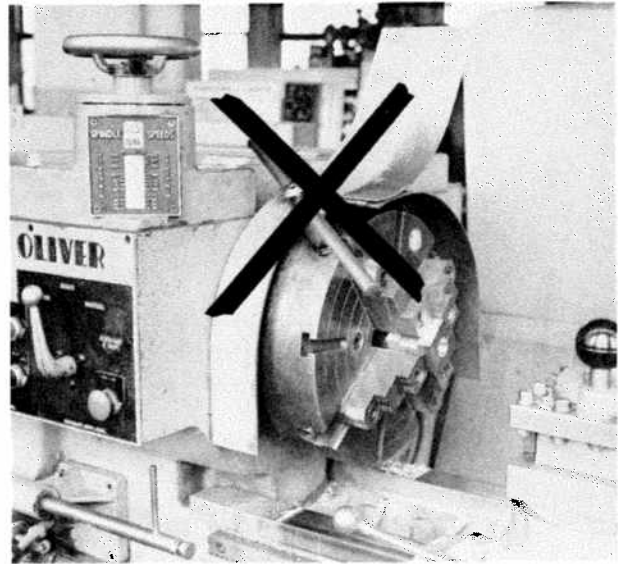
- Before you turn on machine observe all safety rules in Section 2—Operating Instructions.
- Do not leave your machine running unattended.
- Do not attempt to remove or bypass any safety device on your machine.
- Use the proper size wrenches for tool change or adjustments. Discard worn or broken tools and wrenches. A wrench that slips may cause injury.
- Do not overload machine and stall motor.
- Always stop the spindle to check finish or dimensions.
- Do not use an air hose to blow away chips. Air will force dirt into ways and bearing surfaces. Air may blow chips into your eyes.
- After taking a cut be careful not to touch hot chips or parts. Do not remove chips while the spindle is running.

*Do not use an air hose to blow away chips.*

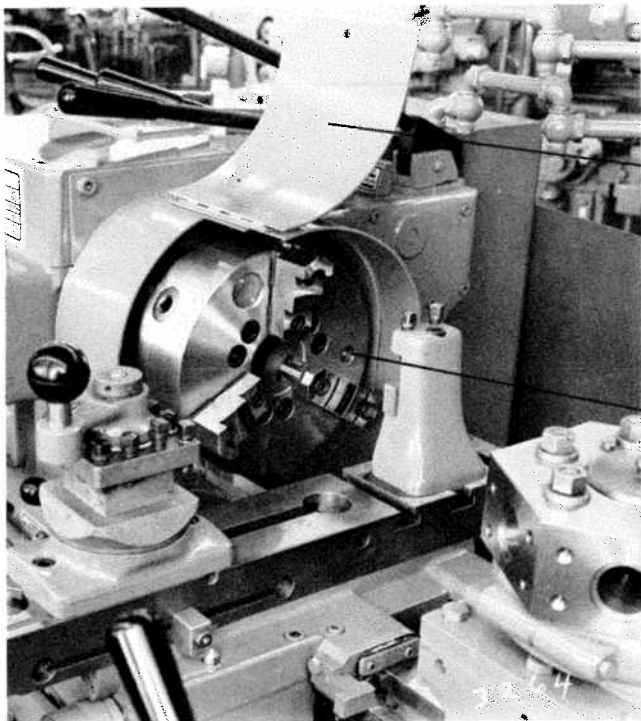


### CHUCK SAFETY

- When loading or unloading parts, remove chuck wrench immediately. Do not leave the wrench in the chuck.
- Wait until the spindle comes to a complete stop before loading or unloading.
- Do not run the spindle with the chuck empty—centrifugal force may cause the jaws to come loose.
- Clean and inspect your chuck regularly—do not overload it. Know its limitations.
- Use the correct jaws for the job.
- Always use the chuck guard to direct chips and coolant down.
- Lubricate chuck as recommended.

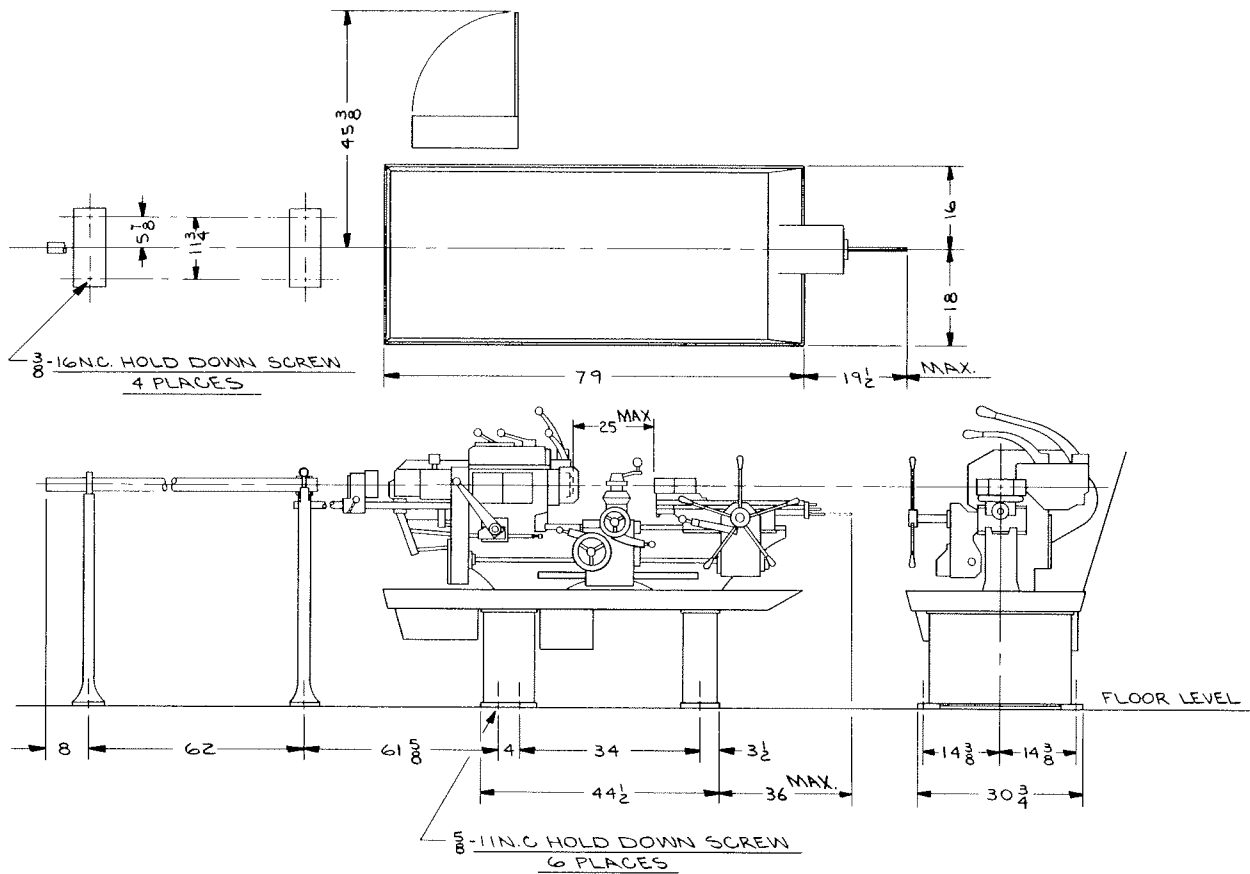


*Do not leave wrench in chuck for any reason.*



Adjustable  
Chuck Guard

Lubricate as  
recommended by  
chuck manufacturer



## Specifications

### BARDONS & OLIVER No. 3 Ram Type UNIVERSAL TURRET LATHE

Swing over bedways .....	15½"	Hexagon turret power feeds .005, .008, .012, .018, .029, .047 <sup>1</sup>
Swing over carriage guides .....	13¾"	Cross slide power feeds .003, .005, .008, .012, .020, .032 <sup>1</sup>
Swing over cross slide .....	7⅞"	Carriage power feeds .005, .008, .013, .019, .031, .050 <sup>1</sup>
Bar capacity round .....	2"	OPTIONAL CARRIAGE THREAD CHASING ATTACHMENT
Bar capacity hexagon .....	1¾"	Pitches available—4 to 28 T.P.I. <sup>2</sup>
Bar capacity square .....	1⅞"	Effective length—5"
Hole in collet chuck plunger .....	2⅞"	OPTIONAL CROSS SLIDE TAPER ATTACHMENT
Chuck size medium duty steel body .....	8"	Maximum taper—3" per foot
Spindle nose .....	8"-A1	Effective length—6"
Spindle hole diameter .....	2¾"	Motor horsepower—10/5
Spindle speeds, number .....	24	Approximate shipping weight with motor—
Spindle speed range .....	59-1505 70-1820	no tooling—3400 lbs.
Maximum distance end of spindle to face of turret .....	25"	Additional shipping weight collet chuck and bar feed—1000 lbs.
Bed width across ways .....	7"	
Width of bedways .....	1½"	
Hexagon turret effective travel at one setting ....	10"	<sup>1</sup> Feeds may be halved with fine feed gears
Hexagon turret size across flats .....	8¾"	<sup>2</sup> 8 to 56 T.P.I. with fine feed gears
Diameter of tool holes .....	1½"	
Center of tool holes to top of slide .....	2⅞"	
Cross slide cross travel .....	9"	
Carriage longitudinal travel .....	18½"	

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