DEPARTMENT
OF THE ARMY TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT

AND GENERAL SUPPORT MAINTENANCE

MANUAL INCLUDING REPAIR PARTS LIST

FOR

THREADING MACHINE,

PIPE AND BOLT

MODEL C

(3419-00-220-9101)

HEADQUARTERS,

DEPARTMENT OF THE ARMY

FEBRUARY 1984

CAUTION! Please Read Following Safety Instructions Before Starting-up or Operating Equipment.

Metalworking equipment is designed to change the shape of workpieces by removing, displacing, or joining metal. Accomplishing these functions requires a combination of high electrical or mechanical power inputs, high speeds, sharp tools, and numerous moving components including in some cases, the workpiece itself. Failure to observe certain basic safety habits in the presence of these elements or incorrect usage of the equipment may result in a crippling or fatal injury to the operator or bystanders.

Although every effort has been made to design and construct safe, dependable equipment, it is impossible to foresee all circumstances under which the equipment may be utilized or to anticipate all possible combinations of factors which may trigger an accident. It is therefore imperative that the equipment operator, as well as all others engaged in any phase of set-up or maintenance of the unit consider safety-first an important part of his job.

The following general safety considerations are offered as an aid to users of metalworking equipment to assist them in becoming safety oriented:

1. READ THE INSTRUCTION BOOK before attempting to lift, move, operate or perform maintenance on any piece of equipment! Become intimately familiar with all equipment controls; their locations, their operation, their effect on equipment functions. Keep the operator's instruction book in a clean location immediately adjacent to the equipment for quick reference!

2. BEFORE ATTEMPTING TO START THE EQUIPMENT, inspect all areas around and adjacent to movable parts for possible obstructions; tools, rags, crating remnants, etc! Be certain that all guards, covers, doors, etc, are in proper place prior to beginning operation.

3. PRACTICE GOOD HOUSEKEEPING: Maintain an area adjacent to - NOT ON - the equipment for tool and/or cutter storage. Remove all oil or coolant spills and potential trip points from the operating areas around the equipment to prevent slipping or falling into the working zone. Remove chip accumulations as required to assure adequate operating clearance for all components. Do not stand on equipment elements not intended for the purpose. Maintain a maximum clear area around the equipment for unobstructed movement of the operator. Perform preventive maintenance at intervals specified in instruction book.

4. Avoid wearing loose clothing, long hair, neckties, etc. when operating equipment as these can easily become entangled in moving parts. It is highly recommended that safety glasses be worn at all times. Safety shoes are likewise recommended. Avoid horseplay around the equipment.

5. Do not attempt to operate equipment if you are ill or excessively fatigued. Shut off equipment immediately if any malfunction occurs or appears immanent. Report any unsafe equipment or condition promptly in order that correction can be made.

6. Bystanders should stay well away from the equipment so as not to distract the operator or accidentally move a control element. Avoid talking to the operator while equipment is in operation.

7. Tools, workpiece, vises, dies, etc. must be securely clamped before equipment is operated under power. Clamping members must not be released during equipment operating cycle.

8. Razor-sharp edges, flying chips, and extremely hot surfaces can result from the metal-working operation. At no time during the work cycle should the operator reach into or across the working zone of the equipment or touch the tool and workpiece. Serious cuts and/or burns may result. The operator must remain alert for pinch points created by moving slides, carriages, or workpieces and must be prepared to stop the equipment at any time in the even of work slippage or tool breakage.

9. When clanging set-up, performing maintenance work, cleaning equipment, etc,. it is recommended that main power supply or supplies (electrical, air, etc. be shut off to avoid accidental operation and possible resultant injury. This is particularly important in the event more than one person is involved in such duties.

10. Only authorized personnel should attempt to diagnose and repair equipment control and power system(s). Serious or fatal injuries can result from tampering with electrical or fluid power system without adequate instructions!

11. IMPORTANT! No piece of equipment can be made absolutely foolproof. No safety device yet invented can replace the good judgment and common sense of an alert operator. Treat the equipment with utmost respect. REMEMBER! - SAFETY IS EVERYONE BUSINESS!

TECHNICAL MANUAL

No. 9-3419-234-14&P

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 28 February 1984

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2, located in the back of this manual direct to: Commander, US Army Armament, Munitions and Chemical Command, ATTN: DRSMC-MAS, Rock Island, IL 61299. A reply will be furnished directly to you.

Operator, Organizational, Direct Support and General Support Maintenance Manual Including Repair Parts List for:

Threading Machine, Pipe and Bolt
Model C
3419-00-220-9101

NOTE

This manual is published for the purpose of identifying an authorized commercial manual for the use of the personnel to whom this equipment is issued.

Manufactured by: Teledyne Landis Machine
5th & Church Streets
Waynesboro, Pennsylvania 17268
Procured under Contract No. DAAA09-79-C-4162

INSTRUCTIONS FOR REQUISITIONING PARTS

NOT IDENTIFIED BY NSN

When requisitioning parts not identified by National Stock Number, it is mandatory that the following information be furnished the supply officer.

1 - Manufacturer's Federal Supply Code Number - 34864

2 - Manufacturer's Part Number exactly as listed herein.

3 - Nomenclature exactly as listed herein, including dimensions, if necessary.

4 - Manufacturer's Model Number - C

5 - Manufacturer's Serial Number (End Item).

6 - Any other information such as Type, Frame Number, and Electrical Characteristics, if applicable.

7 - If DD Form 1348 is used, fill in all blocks except 4, 5, 6, and Remarks field in accordance with AR 725-50.

Complete Form as Follows:

(a) In blocks 4, 5, 6, list manufacturer's Federal Supply Code Number - 3h48h followed by a colon and manufacturer's Part Number for the repair part.

(b) Complete Remarks field as follows:

Noun: (nomenclature or repair part)
For: NSN: 3419-00-220-9101
Manufacturer: Teledyne Landis Machine
5th & Church Streets
Model: C Waynesboro, Pennsylvania 17268
Serial: (of end item)

Any other pertinent information such as Frame Number, Type, Dimensions, etc.

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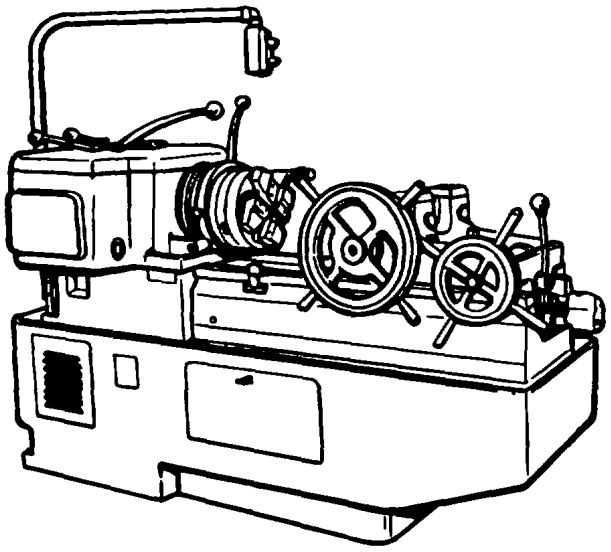
REPAIR AND OPERATOR'S MANUAL
MODEL "C"
10C/16C PIPE AND NIPPLE AND
12C-16C-20C THREADING UNITS



CHAPTER 1 - THREADING MACHINE--MODEL C
SECTION I ..OPERATING INSTRUCTIONS

1-1 INSTALLATION

a. Foundation

No special foundation is required, however, a level concrete base is recommended The holes provided in the bottom of the bed are used to secure the machine in its protective crating for shipment If desired, these holes can be used to bolt the machine to the foundation.

b. Handling

If possible, move the unit to its site of installation before removing its protective crating or skids. Rollers may be used under the skids but never in direct contact with the bed Remove the crating and carefully place the unit into position making sure the machine or its components are not damaged.

c. Cleaning

Remove the rust preventive from all machined surfaces and operating parts Precautions should be taken to prevent cleaning solvent and slush from entering the oil reservoir or lubricating devices Remove all dirt and grit accumulated in transit. After cleaning, apply a light film of oil to all machined surfaces and operating parts to prevent rusting.

d. Leveling Machine

If the base provided for the machine is level the machined pads on the bottom of the bed will sufficiently level the unit. Precision leveling may be obtained by placing shims under the machined pads.

e. Lubrication

The headstock and various oiling points of the machine are prelubricated prior to shipment, however, before placing the machine in operation, inspect the oil sight gauges, No. 101, Figure 19, Page 19, and on the headstock. If additional oil is required it may be added through filler cups located on the headstock and carriage fronts Use Ml L-L-10324, Oil Lubricating, Gear.

f. Electrical Installation

Install main line disconnect (not supplied unless on special order) and make electrical connections to motor starter by referring to the wiring diagram supplied. Check input electrical supply, being certain it agrees with motor and control specifications. Jog the start-stop switch allowing the spindle to revolve several revolutions. Inspect all parts for freedom of operation. As you face the machine, the die heads should be revolving counter-clockwise for right hand threading. If rotation is incorrect, simply reverse the two power line electrical leads at the motor starter.

1-2 SETTING UP

a. Die Head and Leadscrew Trip Mechanism

NOTE It is necessary to follow these instructions when making all set-ups and whenever a change is made in thread length produced on the workpieces or whenever the die head is adjusted for a diameter change. This also applies even for a very small (± 005") diameter adjustment when the machine is equipped with a Hardened *and Ground Die Head.*

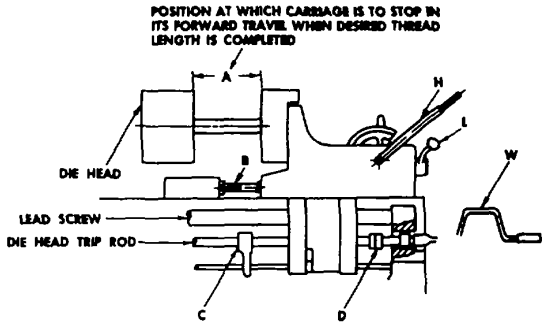


FIG 1

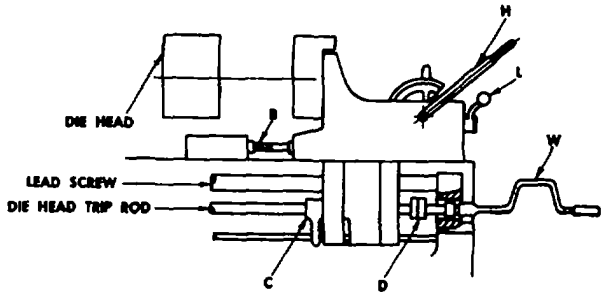


FIG 2

(1) Place headstock speed levers, #85, Figure 15, Page *16*, for slowest spindle speed. The spindle must be stopped before any further adjustments are made.

(2) Install leadscrew gears for desired thread pitch for left or right hand threading. See Lead Screw.

(3) Install chaser holders, chasers and adjust die head for correct diameter.

(4) Move trip rod nut C, Figure 1, to extreme forward position with die head open, using wrench W.

(5) Grip sample workpiece in carriage front or other holding device on the machine to determine position A , Figure 1.

(6) Advance carriage by means of lever or handwheel H, to position A shown on Figure 1. If necessary, adjust screw B to clear carriage when positioned at A. Die Head must be open.

(7) Close leadscrew nut with lever L with carriage in position A and with spindle stopped. If leadscrew nuts will not engage, rotate spindle by hand until leadscrew nuts will engage at position A .

(8) Place a chalk or pencil mark at a convenient place on both the carriage and bed as a reference for further use so that carriage can be moved away from and returned to position A .

(9) Adjust screw B to contact leadscrew trip rod in carriage.

(10) Open leadscrew nuts by means of lever L and move carriage away from die head by means of the handwheel H. Do not close die head.

(11) Readjust screw B approximately 8" closer to carriage and lock the screw.

(12) Remove sample workpiece from grips.

(13) Start spindle revolving with the die head open and engage leadscrew nuts with lever L . This will advance the carriage toward the die head until screw B pushes the trip rod in the carriage sufficiently to open the leadscrew nut.

Check the reference lines placed on the carriage and bed to make certain carriage stopped at position A. If necessary, re-adjust screw B and repeat trials until carriage will stop at position A

(15) Engage the leadscrew and permit the carriage to stop automatically at position A. Hold carnage in this position and close die head manually. With the die head closed and carriage in position A, adjust the trip rod nut C with wrench W until nut C contacts carriage as shown in Figure 2.

(16) Continue turning wrench W to force nut C against carriage until die head trips open. Make certain that the carriage does not move from position A when die head is being tripped open.

(17) Return the carriage to position desired for loading and unloading workpieces, then set nut D to close die head when the carriage Is returned to this position.

(18) With die head closed and spindle revolving at slow speed, engage the leadscrew and permit the carriage to advance to and automatically stop at position A. If adjustments are correctly made, the die head will trip open an instant (fraction of a second) before the leadscrew nuts open.

Note: It is important for the leadscrew nuts to trip open instantly after the die head opens, because any extra overtravel of the carriage after the die head opens will jam the die head trip mechanism and damage the machine.

(19) Set spindle speed levers for normal spindle speed to be used for the job.

(20) Check operation of machine through several cycles without threading workpieces to make certain machine functions correctly at normal spindle speed.

CAUTION

Check operation of machine through several cycles without threading workpieces each time adjustments are made to the die head and leadscrew trip mechanism.

b. Non-Leadscrew Machines

(1) When setting up a Model C Non-leadscrew Machine, the important thing Is to grip the workpiece at exactly the same position each time. This can be easily done through the use of an automatic work stop, Figure 22, Page *22*, or by measuring the workpiece each time one is gripped

(2) Grip a sample workpiece in the vice jaws leaving sufficient clearance so the carriage will not contact the die head upon completion of the thread length.

(3) With the die head closed, advance the carriage by means of the handwheel until the workpiece contacts the stamped surface of the chasers. Place a chalk or pencil mark on the carriage as a reference mark.

(4) Remove the workpiece from the grips and continue advancing the carnage toward the die head. Refer to the mark placed on the carriage and measure until the predetermined thread length is reached. This position is the point at which the die head should trip open and is referred to as A in Figure 1.

(5) Wrench W Is then used to adjust the trip rod nut C until the die head trips open. When adjusting the trip rod nuts, make certain the carriage does not move from position A .

(6) The rear trip rod nuts may be positioned to close the head at any point during the rearward travel of the carriage.

(7) Place the spindle speed levers on the slowest speed and, with the die head revolving, advance the carriage until the die head trips open.

(8) When satisfied with the operation, place the spindle speed levers on the spindle speed required for the job and begin production.

CAUTION Check operation of machine through several cycles before actual threading.

c. Pipe end Nipple Machines

(1) When setting up a 10C or 16C Pipe and Nipple Machine, the only operation necessary is to determine correct thread length.

(2) The 10C and 16C Machines are equipped with Internal Trip Pipe and Nipple Threading Heads designed to thread, ream and chamfer simultaneously through the use of a reamer, Figure 3. Head opening is effected through an internal trip mechanism actuated by the pipe pushing the reamer rearward during the threading operation.

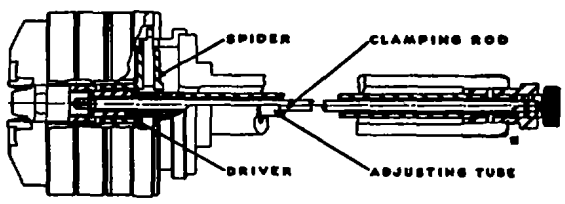


Figure 3

(3) The correct thread length is determined by measuring from the first full tooth of the chaser back to the land of the reamer (die head closed).

(4) Adjustment to the reamer to obtain correct thread length is made through the adjusting tube, Figure 3. First, release the clamping rod and rotate the adjusting tube, moving the reamer forward to decrease thread length or rearward to increase thread length.

(5) If adjustments are correctly made, the die head will trip open Immediately upon completion of the desired thread length.

d. Die Head

For instructions pertaining to the servicing and maintenance of Threading Heads refer to Chapter 2 Page 26 covering Heat Treated Threading Heads.

e. Spindle Reverse

(1) All machines, single spindle, double spindle, leadscrew and non-leadscrew are designed for both right and left hand threading.

(2) These machines may be equipped for left hand threading by incorporating a reversing push button control station offered as auxiliary equipment. By placing the START button in the position marked LEFT the spindles will revolve in the direction for cutting left hand threads.

(3) Double spindle leadscrew machines incorporate a mechanical reversing mechanism, supplied as standard equipment, of facilitate left hand threading. The reversing mechanism can also be equipped to non-leadscrew double spindle machines but is available as auxiliary equipment only.

(4) With the reversing mechanism, only the right hand spindle revolves for left hand threading while the left hand spindle revolves for right hand threading. Thus, a workpiece requiring both right and left hand threads can be threaded on one machine.

CAUTION Do not attempt to change the direction of rotation of the spindles while-they are in motion.

f. Headstock

(1) Spindle speeds are obtained through the use of gears enclosed in an oil tight gearbox located on the headstock. All machines incorporate 8 spindle speeds as standard equipment. With these 8 speeds, all diameters within the ranges of the machines can be threaded at the most efficient speed.

(2) To obtain anyone of the spindle speeds available on these machines simply refer to the speed range chart located on top of the headstock. This chart shows the positions the gear shift levers #85, Figure 15, Page 16, must begin to obtain a certain spindle speed.

(3) Special higher and lower speeds are available, however, they must be incorporated during the course of the machine's construction.

g. Clutch

(1) 10C through 20C Machines incorporate a friction type clutch which is operated by a clutch lever #99, Figure 13, Page 15 The clutch may be disengaged when a change in speed is being made instead of shutting off the machine.

(2) To disengage the clutch when standing in a position to make a speed change, throw the clutch lever to the farthest point away from the operator To engage the clutch, simply pull the lever to the left of the machine until spindles are set in motion.

(3) The clutch may also be used to jog the machine, however, it is not as infinite as when using the Start-Stop push button control station.

h. Carriage

(1) Carriage traverse on 12C, 16C and 20C Machines is obtained through two mediums, a rack and pinion carriage, Figure 18, Page 19, and a leadscrew carriage Figure 20, Page 20.

(2) Non-leadscrew machines incorporate the rack and pinion carriage which is advanced by means of a carriage operating handwheel #183, Figure 18, Page *19*. Depending on the bed of the machine, carriage travel (maximum thread length) of 13 1/2", 24" and 36" can be obtained. Workpieces requiring threads longer than the standard carriage travel can be produced by regripping the workpiece and passing it through the bore of the die head.

(3) A leadscrew carriage is advanced by depressing a handle #195, Figure 13, Page *15*. This action engages the leadscrew nuts with the leadscrew to propel the carriage at a controlled rate It is sometimes necessary to move the carriage slightly so the leadscrew nuts will mesh with the leadscrew.

(4) The leadscrew is tripped open, which stops the forward travel of the carriage, automatically as described under Die Head and Leadscrew Trip Mechanism. The leadscrew can also be tripped manually by lifting the leadscrew operating handle.

(5) 10C and 16C Pipe and Nipple Threading Machines incorporate a lever operated carriage, Figure 17, Page 18, and propelled by a carriage operating handle #225, Figure 17, Page 18. The handle is placed at a convenient position for operating ease and Is adjustable to eliminate unnecessary carriage travel when cutting short thread lengths or on high production runs.

(6) To reposition the carriage along the bedways, lift the operating bar, #10, Figure 17, Page 18, and move the carriage along the bedways until one of the notches on the operating bar falls onto the operating arm stud #224, Figure 17, Page 18.

i. Leadscrew

(1) When setting up a machine equipped with leadscrew feed, the only operation necessary is to place the correct leadscrew change gears in place. A gear table is mounted on the inside of the gear box cover, #237, Figure 13, Page 15, which lists the proper gears to be used for any pitch of thread within the range of the machine. Charts on the gear table also show the method for gearing the leadscrew for right and left hand work with either straight or compound gearing.

(2) To change the gearing of a leadscrew machine, select the proper set of leadscrew gears by referring to the gear table. Remove the gears which are to be replaced and place the proper gears on their respective studs. The gear train can be turned by hand so the gears will mesh. (3)When setting up a machine for left hand threading an additional 48T idler gear is needed. Figure 14, Page 15, shows the location of this gear #228.

j. Automatic Workstop

(1) Automatic workstops #379, Figure 22, Page *22,* are furnished as auxiliary equipment.

(2) The cam, #345, Figure *22,* Page *22,* is positioned on the bed to allow the workstop to be in the gaging position when the carriage is at the rearmost or loading position. As the carriage is moved forward, the cam follower, #335, Figure *22,* Page *22,* starts up the cam incline and actuates the workstop moving it away from the gaging position.

(3) The workstop is mounted on a bar and is adjustable for gaging workpieces of variant lengths.

(4) The cam is also adjustable to eliminate unnecessary carriage travel when cutting short thread lengths. Simply loosen the screws in the cam bracket, #344, Figure *22*, Page *22,* and reposition the cam on the cam bracket.

k. Collet Chucks

(1) Collet chucks, Figure *25,* Page *23,* for 12C, 16C and **20C machines are furnished as auxiliary equipment.**

(2) The collet chuck is mounted on a special carriage front and is operated by an operating lever, # 362, Figure *25*, Page *23.* A quick operating device, the collet chuck is used on production runs on workpieces requiring a high degree of thread concentricity.

(3) It is equipped with an adjustable workstop for fast loading and a variety of collets to accommodate headed workpieces.

(4) Setting up the collet chuck is a very simple operation. However, it must be centered the same as a standard carriage front, instructions for which are found under "Adjustments."

I. Coolant System

(1) Fill the coolant reservoir until the oil level is just under the surface of the coolant strainer, *#322*, Figure 13, Page *15,*

Coolant capacities are as follows:

10C Pipe and Nipple, single spindle-18 gallons
10C Pipe and Nipple, double spindle-32 gallons
12C Single spindle-19 gallons
12C Double spindle-35 gallons
16C Pipe and Nipple, single spindle-18 gallons
16C Pipe and Nipple, double spindle-36 gallons
16C Single spindle-20 gallons
16C Double spindle-40 gallons
20C Single spindle-20 gallons
20C Double spindle-40 gallons

(2) A. coolant nozzle is provided for each die head and provides an ample flow of coolant. When the nozzles are in a vertical position the coolant is automatically shut off. To start coolant flow, simply pivot the nozzle toward the die head and coolant will flow automatically. These nozzles are adjustable so the coolant can be aimed directly to the chasers.

(3) Coolant nozzles on double *spindle* machines *may* be operated independently of each other.

m. Air Operated Carriage Fronts

(1) Air Pressure for the carriage fronts is obtained through an air pressure regulator #421, Figure *21*, Page *21.* To set up a machine equipped with air operated fronts requires only that the proper air pressure be established and the instructions followed as stated under Die Head and Leadscrew Trip *Mechanism.*

(2) To obtain the required amount of air pressure, rotate the handle on the air pressure regulator. A gage is mounted on the regulator to show the amount of pressure being supplied to the grips. Enough pressure should be maintained to prevent the workpiece from slipping in the grips but low enough that they are not forced out of round .

(3) Air requirements for 10C-20C Machines are: 370 cubic feet of free air per hour for a production of 400 pieces per hour at 80 P S I at 21/2" stroke.

(4) On production runs it may be desirable to limit the opening and closing stroke of the grips. Instructions for doing so may be found under Adjustments-Air Operated Carriage Fronts.

n. Leadscrew Indicator Dial

(1) The leadscrew indicator dial, Figure *29,* Page *25*, is a simple device which is attached to the carriage to enable the operator to make a second pass over a thread without error. The indicator will show precisely the point at which the leadscrew should be engaged so the chasers will follow the original cut.

(2) The indicator dial consists of a graduated dial and a worm wheel which meshes with the leadscrew so the dial is revolved by the leadscrew when the carriage is stationary and, as the leadscrew nuts are engaged and the carriage moved forward, the dial remains stationary.

(3) When making a second pass over a thread, the carriage is returned to the loading position with the lead-screw disengaged. The leadscrew is re-engaged when one of the graduation lines on the dial is opposite the zero line, thus causing the chasers to always follow the original path.

(4) If the pitch of thread being cut is even, the lead-screw may be engaged when any of the graduation lines are opposite the zero line, Figure *29,* Page *25.* Odd numbered pitches require that one of the four numbered lines be opposite the zero line. Even numbered lines must be opposite the zero line when cutting 1/2 pitches and line number 1 *only* when 1/4 pitches are threaded.

(5) There is no set reengagement *procedure* that will universally work for all odd fractional pitch threads. What will work, for example, when cutting 6.383 pitch threads will not necessarily work for another odd pitch. Therefore, when cutting odd fractional pitches contact engineering for the proper *procedure to follow.*

1-3 ADJUSTMENTS

a. Headstock

(1) Internal adjustments will seldom be necessary, however, if required, the repair should be made by a mechanic skilled In making such an adjustment.

(2) Excessive spindle end play may be eliminated by tightening the spindle bearing lock nut, #79, Figure 13, Page *15.*

(3) First, loosen the spindle bearing lock nut lockscrew. Rotate the lock nut clockwise until all end play is eliminated, then tighten the lock screw. Before placing the machine in operation after such an adjustment is made, make certain the spindle revolves freely.

CAUTION. *An over adjustment could result in damage to the machine.*

b. Clutch

(1) After extended service, the function type dutch, Figure 4, may need adjustment to restore the original operating efficiency.

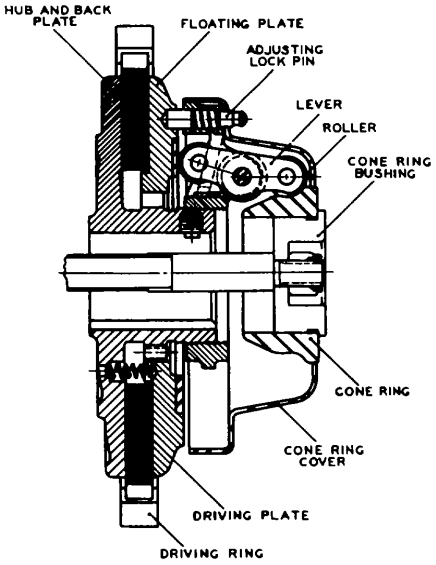


Figure 4

(2) To determine the proper clutch tension, shut off the power and engage the clutch several times. When correctly tensioned, there will be a definite snap to the clutch lever when engagement is made.

(3) To increase clutch tension, release the clutch, pull the spring loaded adjusting lock pin outward and revolve the cone ring cover and cone ring assembly in a clockwise direction, Figure 4. A series of adjustment holes are provided around the outer face of the tension plate. For best results, revolve the assembly in increments of one space at a time.

(4) After adjusting the cone ring cover and cone ring assembly by one increment, re-engage the adjusting lock pin with the floating plate. Engage the clutch and check for proper tension by operating the machine under power. No slipping should occur. If required, continue to adjust the cone ring cover and cone ring assembly by one increment until the proper tension is obtained.

(5) If proper tension cannot be gamed through adjustment, the sectionalized driving plate is excessively worn and will require adjustment. The driving plate can be exposed for replacement by removing the cam bushing and unscrewing the cone ring, cone ring cover and floating plate from the hub and back plate.

(6) After adjusting the driving plate or replacing it, additional adjustment to the clutch for tension will be required.

c. Leadscrew

(1) In many applications, Leadscrew Threading are used to thread workpieces requiring relatively short thread lengths. After an extended period of operation, the leadscrew used to control the carriage movement in producing these threads may wear sufficiently to cause lead error.

(2) For this reason, the leadscrews on all machines were designed to allow them to be reversed or turned end for end. The section of the leadscrew which received little usage can be repositioned to control the movement of the carnage and restore lead accuracy.

(3) When threads are being produced in lengths which require the use of the entire leadscrew, the purchase of a new leadscrew Is highly recommended if close tolerances are to be maintained without difficulty.

(4) To reverse the leadscrew, it is necessary to remove the entire leadscrew assembly from the machine. This can be accomplished by removing the lower leadscrew change gear and the bearing thrust plate. The lead-

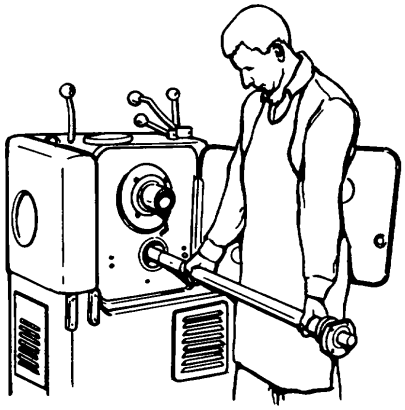


Figure 5

screw driving shaft, bearings, and the leadscrew can then be withdrawn as a unit, Figure 5. Shown on the end of the leadscrew shaft in Figure 5, the bearing thrust plate is easily removed by removing four screws.

(5) The taper pins which join the leadscrew to its coupling are removed. The leadscrew is turned end for end and the new pin holes are drilled and reamed to join the coupling with the end previously supported by the outboard bearing. Drill and ream the leadscrew and its coupling as a unit at the point 1800 from the existing holes in the coupling. Also, have the pins enter the unit from opposite sides to distribute the torque load evenly.

(6) A careful check for burrs should be made on the lead-screw end removed from the coupling to assure that it will operate freely upon insertion in the outboard bearing.

(7) When drilling the coupling and new leadscrew end, care should be taken that cuttings and other foreign matter do not enter the bearings.

d. Carriage

(1) Excessive horizontal and vertical clearance between the carriage and bed ways may be corrected by removing shims from the carriage gibs. A single gib #186, Figure 20, Page *20*, is located on the left hand side of the carriage to remove horizontal clearance. Two gibs #187, Figure 20, Page *20*, are located on the underside of the carnage to eliminate vertical clearance.

(2) In the event that reshimming does not correct excessive clearance, rescrape the mating surfaces of the carriage gibs and, reshim the assembly accordingly.

a. Carriage Fronts

(1) To produce concentric threads, the carriage fronts or vises, #168, Figure 13, Page *15*, must be centered with the die head's center of rotation. The carriage fronts are properly centered prior to shipment, however, they may need to be recentered due to heavy usage, when grips are replaced, turned, sharpened, or when the carriage is reshimmed as described in the foregoing section.

(2) To determine off-centerness, place a piece of ground cylindrical stock in the grips. Attach a dial indicator to the die head by removing the chaser clamp screw nearest the bore of the head and insert the dial indicator as shown in Figure 6. Rotate the die head with the indicator in contact with the stock. This will show the off center relationship of the carriage front to the die head Total allowable off center tolerance is ± 001".

(3) To recenter the carriage front, loosen the two clamping bolts A, Figure 6, which secure the fronts to the carriage. Rotate the four adjusting screws B, until the fronts are centered. Adjustments for both right and left hand carnage fronts on a double spindle machine are made In the same manner.

(4) Air operated carriage fronts and also collet chucks are centered with the die head's center of rotation as described above.

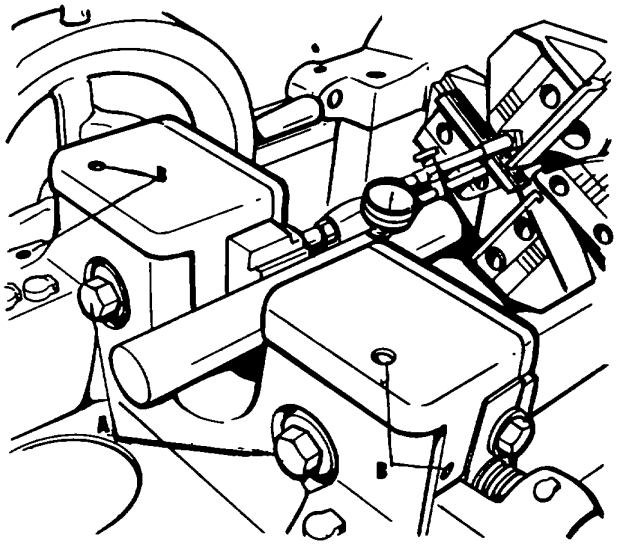


Figure 6

f. Leadscrew Nut Replacement

(1) After extensive usage, the leadscrew nut segments described above will require replacement to maintain lead accuracy.

(2) To replace the nut segments, it Is recommended that the carriage be removed from the machine. This can be accomplished by removing the outboard leadscrew bearing and moving the carriage rearward until it is disengaged from the bed ways. On 12C, 16C and 20C machines, it is recommended that the carriage front or vises be removed before attempting to lift the carriage. To do this simply loosen two clamping bolts A , Figure 6.

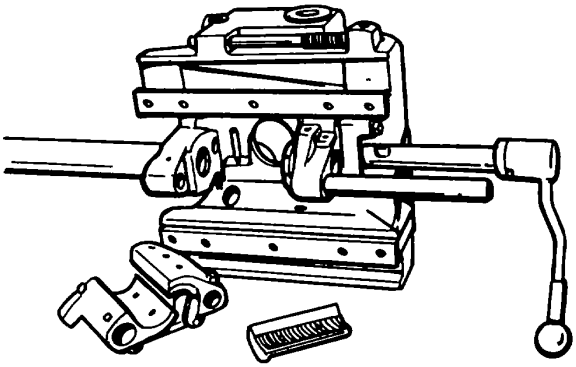


Figure 7

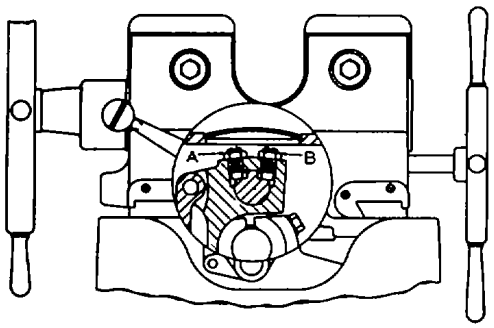


Figure 8

(3) After removing, place the carriage on a bench in a convenient working position as illustrated by Figure 7. Remove the welsh plug m the top of the carriage and loosen screws A and B , Figure 8, until the leadscrew operating shaft can be withdrawn from the leadscrew jaw. Loosen the retaining screw and withdraw the lower leadscrew jaw shaft so the entire jaw assembly can be removed. The leadscrew nut segments can now be easily disengaged by removing three screws. Note that each segment is positioned in the jaw by a locating pin.

(4) To replace the jaw assembly, it is necessary to remove the leadscrew self oiling mechanism. Also, it may be necessary to adjust the nut adjusting bushing to eliminate excessive end play between the carriage and the nut segments. See Leadscrew Nut Segments.

(5) After the carriage has been returned to the machine, the leadscrew nut lever will require adjustment to provide the proper overtravel. To accomplish this, close the leadscrew nuts on the leadscrew and loosen the lock nuts on screws A and B as shown In Figure 8. Withdraw screw A several turns and tighten screw "B" until there is no overtravel or movement In the leadscrew lever. Then, loosen screw B 1/6 of a turn and tighten screw A. Seat the lock nuts on both screws to lock the adjustment.

(6) If the leadscrew lever will not lock when the nuts are closed on the leadscrew, loosen screw B and tighten screw A until the lock will move into position. Then proceed as described above to adjust the lever for overtravel.

I. Leadscrew Nut Segments

(1) After extensive usage, the two leadscrew nut segments may wear to permit excessive end play between the carriage segments. This end play could result in lead error.

(2) To adjust the leadscrew nut mechanism for end play, remove the outboard leadscrew bearing and move the carriage rearward until approximately one half of it extends over the bed ways, Figure 9. Engage the leadscrew nuts and loosen clamping screw B , Figure 10. (Do not loosen screw A). Rotate the nut adjusting bushing D, using a short pin.

(3) Correct adjustment allows .002" to .003" end play.

(4) After making such an adjustment, open and close the leadscrew nuts several times making certain the action is smooth and the nuts do not bind.

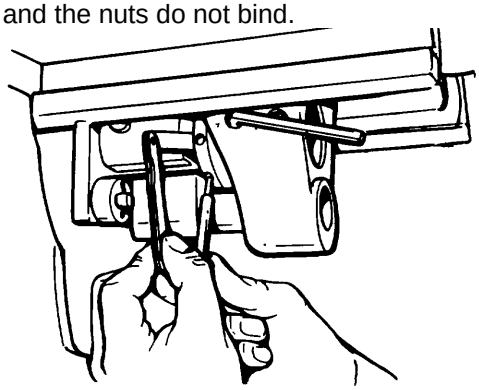


Figure 9

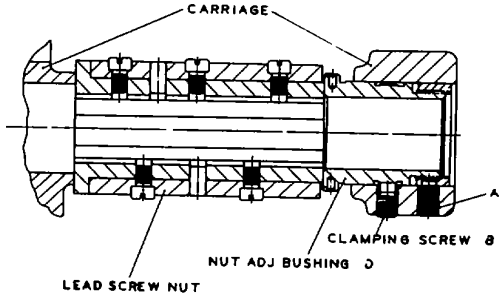


Figure 10

h. Carriage Vise Screws

(1) The vise screws employed in the carriage fronts or vises of Threading Machines are adjustable for eliminating end play.

(2) Excessive vise screw end play can result in the front being off-center, thus, the gripped workpiece will not be in proper alignment when it is presented to the die head for threading. Therefore, since the workpiece will not correctly enter the chaser throats It is possible for

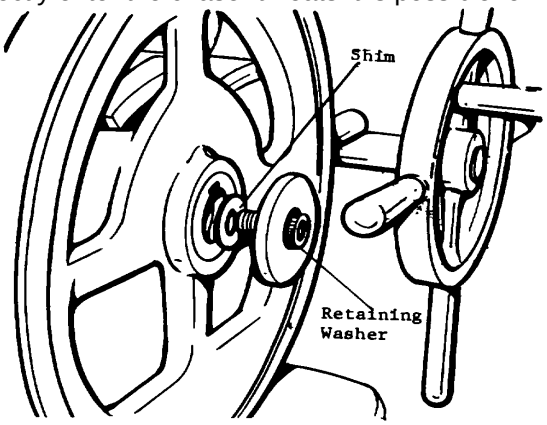


Figure 11

chaser breakage to occur. This excessive end play develops due to wear of component parts in the handwheel assembly.

(3) The correct vise screw end play is obtained through the use of shims, Figure 11. To correct excessive end play, the thickness of the shim between the vise screw and handwheel should be reduced. A clearance of .003" to .005" between the face of the handwheel retaining washer and the machined face of the handwheel is recommended to allow sufficient clearance and prevent binding of the handwheel assembly.

(4) All carriage fronts must be centered with the die head's center of rotation after an adjustment to the vise screw has been made. See Adjustments-Carriage Fronts.

i. Die Head Removal

(1) Due to the size and weight of the die heads furnished with 10C-20C Machines, it is recommended that an overhead crane be used to remove and replace the die head.

(2) Place a wide board across the carriage beneath the die head as a safety precaution. Loop a rope, never use a chain, around the die head and pass one end through the other and loop over crane hook. After the crane has taken up the slack, loosen the yoke screw #2, Figure 13, Page *15*, and the head clamping screws. Jog the crane until die head is free of spindle.

If an overhead crane is not accessible, the board placed beneath the die head may be used. Lift the board to contact the underside of the head and loosen the yoke screws and head clamping studs. For best results, remove the head clamping studs in sequence-leaving the last stud at the uppermost position. As the last stud is removed, use the board to pivot the die head off the spindle.

WARNING Due to the head's weight, extreme care should be taken in doing this.

(4) When removing an Internal Trip Die Head from a 10C or 16C Pipe and Nipple Machine, unscrew the reamer adjusting tube, and the clamping rod Figure 3, from the rear of the machine. Open the die head and remove the reamer.

j. Die Head Alignment

(1) When replacing a head removed for maintenance or cleaning, it must be checked for alignment with the spindle. Before mounting, Inspect the base of the head and the spindle face for particles of dirt, bruises or burrs as any of these conditions may result in an incorrect reading. Fasten a dial indicator to the carnage and bring the instrument into contact with the 0. D. of the die head. After setting the indicator on zero, slowly rotate the spindle and note the highest and lowest reading recorded. The total indicator reading between the highest and lowest point must not exceed .005". If the indication is not within the limits, remove the die head from the spindle and rotate it ¼ turn at a time, until a satisfactory reading is obtained.

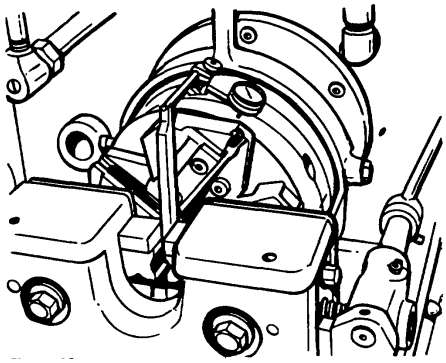


Figure 12

k. Air Operated Carriage Fronts

(1) The opening and closing of the vice jaws are effected through two limit switches in conjunction with a cam. The limit switches are activated by a pin mounted in the limit switch bar. These switches are easily accessible by removing the limit switch box cover #405, Figure 22, Page *22.*

(2) As the carriage moves forward from the loading position, a cam follower #335, Figure 22, Page *22*, starts up the cam incline #345, Figure 22, Page *22*, and closes the vise jaws. Upon completion of the threading operation, the vise jaws will open as the carnage returns to the loading position allowing the cam follower to descend the cam incline.

(3) An adjustment to the amount of air being supplied to the vise jaws is made through the air pressure regulator #421, Figure 21, Page *21.*

(4) In pipe and nipple threading or when cutting short bolt thread lengths, it may be desirable to eliminate the unnecessary travel of the carriage. This can be accomplished by loosening the four screws in the cam bracket #344, Figure 22, Page *22*, and re-positioning the cam in the bracket.

(5) It may also be desirable to limit the opening and closing stroke of the vise jaws. This is advantageous in high production pipe and nipple threading as the vise jaws open only far enough to release the workpiece without letting it fall into the chip compartment. A blank nipple is used to push the finished piece out of the grips and simultaneously be gripped in the vise jaws.

(6) To shorten the stroke of the grips, adjust the screw located on the air cylinder until desired stroke is obtained.

(7) Additional adjustment to this screw will be necessary when there is a change in diameter or when the grips are replaced, turned, or sharpened.

(8) When the machine Is equipped with an automatic workstop, the vise jaws should close just before the workstop moves up from the gaging position and open

just before the workstop moves down to the gaging position on the return travel of the carriage.

(9) If an adjustment Is required to set the opening and closing stroke described above, remove the limit switch cover #405, Figure 22, Page *22*, and adjust the switch throw arms until the proper stroke Is obtained.

(10) To prevent excessive bleeding from the air valve, the arm of the valve regulating the grip opening stroke should be adjusted to allow the limit switch bar pin to contact the switch throw arm roller only during the downward travel. The pin should travel beyond the roller and not contact It in any manner when it is in its full down position. This switch can be distinguished by its roller projecting lower in the workstop bracket than the roller of closing stroke switch.

l. Coolant Pump

(1) The pump packing, #902, Figure 24, Page *23*, should be checked periodically for proper tightness to prevent coolant escape around the pump shafts. If leaking occurs, adjust the two screws in the packing bushing, #903, Figure 24, Page *23.* These should be tightened evenly and only enough to stop leaking. Excessive tightening will result in pump shaft and packing wear.

(2) The pump driving belt should be tight enough to operate without slipping. If slipping occurs, shorten and reset belt for best coolant results.

SECTION II- MAINTENANCE

1-4 MAINTENANCE

a. Lubrication

Inspect headstock oil sight gages for proper level daily. If motor supplied does not contain lubricated-for-life bearings, *grease the fittings with MIL-G-23549*. *Grease every six months or according to instructions posted on or received with the motor. Fill all oiling points.*

b. Chip Compartment

1. Remove chips and clean compartment as required. The coolant strainer, #322, Figure 13, Page *15*, should be kept free of chips to assure free coolant return to the reservoir.

2. The coolant level should be maintained just under the surface of the coolant strainer. A low level will result in improper operation of the coolant pump.

SECTION III

1-4 INSPECTION

a. Clean machine thoroughly and carefully at least once a week. Remove chips, dust, excess oil and coolant from all surfaces of the machine.

b. Use a cloth or non-metallic brush to remove chips and dirt. To protect the operator from serious eye injury, never use compressed air when cleaning the machine.

c. Carefully inspect the machine for loose or worn parts, adjust or replace if necessary.

SECTION IV

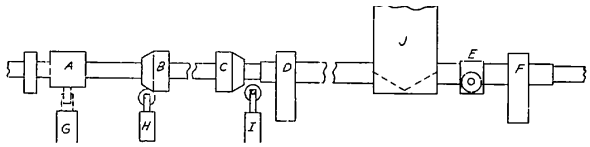
1-6 REPAIR PARTS

When ordering machine repair parts, refer to the illustrations on page *15* to *25*. A parts list and operator's instructions for the die head supplied with the machine is enclosed with this booklet.

IMPORTANT-When ordering machine repair parts, give part name, size and serial number of machine. When ordering repair parts for the die head furnished with the machine, the size and serial number of the head, plus the part name is required.

SECTION V

1-7 SETUP HYDRAULIC UNITS



a. Select proper chasers, holders, and grips for the job.

b. Place the workpiece In the machine in a predetermined position against the workstop. With the machine in manual operation and the die head open, jog the carriage in until the face of the workpiece is even with the face of the chasers in the die head. Slide roller E (see diagram) onto cam J until the limit switch G is made. Now mark the bed with a pencil at the front of the carriage. This is where the leadscrew is engaged and the threads start. Next, using a scale, make another line on the bed at the thread length desired. Remove the workpiece and jog the carriage in to this second line, close the die head and turn the die head trip rod, which Is located at the end of the machine, in until the die head trips open.

c. With the carriage still In the foreword position and the leadscrew engaged, adjust the leadscrew trip rod, located on the side of the machine, by turning it in until the leadscrew nuts trip open. When the leadscrew nuts are tripped, back off one turn of the rod. This allows for the die head to trip open momentarily before the leadscrew nuts are tripped open. Back the carriage away, close the head and engage the leadscrew nuts, and make a dry run. Again, the die head should open momentarily before the leadscrew nuts trip open. However, if the die head falls to open at this point, readjust the die head trip rod until the die head opens at the proper time in relation to the opening of the leadscrew nuts.

d. To set the forward overtravel, run the carriage in to the forward position where the leadscrew trips out. Loosen arm F on the rod (see diagram) and slide it against the stop on the carriage. This setting should allow for a slight bit of overtravel after the leadscrew trips out, but should prevent the carnage from running into the die head. Make a dry run to check that this switch does not engage before the leadscrew nuts trip out.

e. Now with carriage in rear position, place the workpiece in the machine against the workstop and jog the carriage in allowing sufficient clearance between the die head and the workpiece to place and remove the part. Loosen arm D and slide it against the stop on the carnage. Remove the workpiece and make a dry run. This setting should allow the carriage to return far enough to give ample room for changing the pieces yet eliminates excessive carriage travel.

f. Cams B and C (see diagram), and leadscrew tripping mechanism A, are pinned in assembly and require no further adjustment.

Nomenclature

1 Yoke
2 Yoke Screw
3 Die Head Yoke Link
4 Die Head Splash Guard
5 Die Head Operating Lever
6 Trip Rod Coupler
7 Die Head Yoke Operating Pin
8 Die Head Trip Rod
9 Trip Rod Adjusting Nut
10 Operating Bar
11 Trip Nut Guide Rod
12 *Trip Rod Support Bracket
13 Operating Lever Pin
14 Trip Rod Detent Spring
15 Trip Rod Detent
16 Trip Rod Detent Collar
17 Trip Rod Nut-Front
18 Guide Rod Bracket
19 Guide Rod Support
20 Die Head Trip Rod Bearing
21 Die Head Trip Rod End
22 Die Head Operating Lever Shaft
23 Die Head Yoke Pivot Pin
24 Knob.
25 *Splash Guard Clip-L.H.
26 *Splash Guard Clip-R.H.
27 Spindle Rear Bearing Cap
28 Headstock Base
29 *Dowel Pin
30 Headstock Bearing End Cover
31 *First Spindle Gear Cover
32 *Clutch Cover
33 Spindle Bearing Housing
34 Spindle Bearing Housing Shim
35 Spindle Bearing Front Cap
36 Spindle Bearing Rear Cap
37 Main Drive Shaft Bearing Housing
38 Main Drive Shaft
39 Input Shaft Bearing Spacer
40 Feather Key
41 33T-43T-28-T Input Shaft Sliding Gear
42 Ball Bearing Shoulder Collar
43 Bearing Lock Nut
44 Clutch Operating Spool
45 Clutch Operating Spool Screw Lock
46 Clutch Operating Rod
47 Clutch Operating Rod Pin
48 Oil Slinger
49 Main Drive Shaft Bearing Spacer
50 Clutch Bearing Spacer
51 Bearing Housing Gasket
52 Clutch Driving Key
53 Clutch Thrust Washer
54 Clutch Cone Bushing
55 Intermediate Shaft
56 Output and Intermediate Shaft Bearing Spacer
57 Intermediate Gear Spacer (End)
58 36T L H Intermediate Gear
59 Intermediate Gear Spacer (Central)
60 26T Center Intermediate Gear
61 41T R.H Intermediate Gear
62 Output Shaft
63 30T Bevel Pinion Shaft Driving Gear
64 Bevel Gear Shaft Gear Screw Lock
65 40T-50T-35T Output Shaft Sliding Gear
66 Bevel Pinion Shaft
67 44T Bevel Pinion Shaft Gear
68 23T Spindle Drive Bevel Gear
69 Bevel Pinion Bearing Clamp
70 Bevel Pinion Bearing Thrust Nut
71 Thrust Nut Locking Screw
72 Spindle
73 Key
74 Spindle Bevel Gear Hub
60 Spindle Bevel Ring Gear
Spindle Gear Clamping Screw
Spindle Bevel Gear Hub Shim
75 Front Bearing Shim
76 Spindle Bearing Spacer (Front)
77 Spindle Bearing Front Oil Slinger
78 Spindle Bearing Rear Oil Slinger
79 Bearing Lock Nut
80 Clamping Shoe
81 Gear Lever Stud
82 Input Shaft Change Gear Lever
Change Gear Lever Detent Plate
Gear Shifting Lever Stop Pin
83 Output Shaft Change Gear Lever
Change Gear Lever Detent Plate
Gear Shifting Lever Stop Pin
84 Speed Change Gear Lever Shoe
Change Gear Lever Shoe Pin
85 Gear Shifting Hand Lever
86 Second Spindle Gear Spacer
87 Gear Lever Detent
88 Gear Lever Detent Spring
89 Gear Lever Detent Spring Screw
90 Clutch Lever Shaft
91 Clutch Operating Lever
92 *Clutch Operating Link
93 Clutch Operating Link Pin
94 Clutch Yoke
95 Clutch Yoke Pin
96 Clutch Yoke Shaft
97 *Yoke Shoe Pin
98 *Clutch Yoke Shoe
99 Clutch Operating Handle
100 Oil Sight Washer
101 Oil Sight
102 Oil Sight Ring

IMPORTANT-When ordering repair parts always designate part by number and name, giving size and serial number of machine.

103 Oil Strainer
Oil Strainer Flange
Oil Strainer Bottom
104 Oil Retaining Washer
105 Head Clamping Stud
106 Spindle Speed Plate
107 Clutch Cover
108 Clutch Cover Pin
109 *Clutch Cover Connecting Strip
110 Driven Sheave (B Size)
111 Clutch Driving Ring
112 Hub and Back Plate
Cone Ring
Driving Plate
113 Ball Bearing
114 Ball Bearing
115 Ball Bearing
116 Interlocking Retaining Ring
117 Stop Nut
118 Ball Bearing
119 Retaining Ring
120 Ball Bearing
121 Ball Bearing
122 Cup Roller Bearing
123 Cup Roller Bearing
124 Cup Roller Bearing
125 Cup Roller Bearing
126 *Retaining Ring Pull
127 Door Pull
128 Bearing Lock Nut
129 Bearing Lock Nut
130 Bearing Lock Nut
131 Bearing Lock Nut
132 Output Shaft Spacer
133 Reverse Idler Gear Stud
134 Dowel Pin
135 40T Reverse Idler Gear
136 Idler Stud Bearing Inner Spacer
137 Idler Stud Bearing Outer Spacer
138 Reverse Idler Gear Bearing Retainer
139 Second Spindle Gear Spacer
140 27T Spindle Driving Reverse Gear
141 41T-44T Spindle Reverse Sliding Gear
142 Reverse Gear Lever Stud
143 Reverse Gear Lever
144 Reverse Gear Lever Detent Plate
145 Gear Sifting Lever Stop Pin
146 Reverse Gear Lever Shoe
147 Reverse Gear Lever Detent Spring
148 Ball Bearing
149 Second Spindle Gear Cover
155 Second Spindle Output Shaft
156 Output Shaft Screw Lock
157 30T Second Spindle Driving Gear
158 Bevel Pinion Shaft (Second Spindle)
159 Pinion Bearing Thrust Nut Lock
160 Feather Key
161 Clutch Operating Link
162 Ball Bearing
163 LH. Vise Screw Support
164 L.H. Vise Clamping Screw
165 *R.H. Vise Screw Support
166 *R.H Vise Clamping Screw
167 *RH Vise Clamping Screw Adjusting Screw
168 Carriage Front
169 L.H Vise Jaw
170 R.H. Vise Jaw
171 L.H Jaw Operating Nut
172 R H. Jaw Operating Nut
173 Vise Jaw Gib
174 Vise Screw Thrust Collar
175 Vise Screw Key
176 Vise Screw Driving Arm
177 Vise Screw Hand Wheel
178 Vise Screw Hand Wheel Handle
179 Clamping Screw Shim
180 Hand Wheel Retaining Washer
181 Lead Screw Nut
182 Carriage Pinion Shaft
183 Carriage Operating Hand Wheel
184 Hand Wheel Handle
185 Carriage
186 Carriage Side Gib
187 Carriage Bottom Gib L.H.
188 Carriage Bottom Gib RH
189 Carriage Front Adjusting Pin
190 Carriage Rack Pinion
191 Lead Screw Nut Adjusting Bushing
192 Adjusting Bushing Nut
193 *Clamping Shoe
194 Lead Screw Operating Shaft
195 Lead Screw Operating Shaft Handle
196 Operating Handle Washer
197 Lower Lead Screw Jaw Shaft
198 L H Lead Screw Jaw
199 RH. Lead Screw Jaw
200 *Lead Screw Nut Jaw Pin
201 *Lead Screw Jaw Link
202 *Lead Screw Jaw Link Pin
203 Lead Screw Operating Shaft Plunger
204 Operating Shaft Plunger Spring
205 *Operating Shaft Spring Pin
206 Plunger Roller
207 Plunger Roller Pin
208 Plunger Roller Screw
209 Lead Screw Trip Rod
210 Lead Screw Trip Rod Spring
211 Trip Adjusting Rod Bracket
212 Lead Screw Trip Adjusting Rod
213 Adjusting Rod Clamping Nut
214 Lead Screw Jaw Stop Rod
215 Lead Screw Opening Plunger
216 Lead Screw Opening Plunger Spring
217 Pump Plunger
218 Pump Plunger Spring Washer
219 Pump Body
220 Check Valve Body

*Not Shown

IMPORTANT-When ordering repair parts always designate part by number and name, giving size and serial number of machine.

221 D3 Oiler With Screen Filter
222 Carriage Operating Shaft
223 Operating Bar Arm
224 Operating Arm Stud
225 Carriage Operating Lever
226 Lead Screw L.H. Intermediate Gear Stud
227 Lead Screw L.H. Intermediate Gear Sleeve
228 48T Idler Gear
229 Reversible Lead Screw
230 Lead Screw Guard
231 *Lead Screw Tube (Inner)
232 *Lead Screw Tube (Outer)
233 *Lead Screw Tube Sleeves
234 *Trip Rod and Tube Support
236 Lead Screw Gear Box
237 Lead Screw Gear Box Cover
238 *Lead Screw Gear Box Cover Hinge
239 Lead Screw Gear Box Cover Latch Rod
240 Cover Latch
241 Lead Screw Intermediate Gear Stud
242 Lead Screw Intermediate Gear Sleeve
243 Lead Screw Intermediate Gear bushing
244 Lead Screw Intermediate Gear key
245 Spacing Collar
246 Lead Screw Driving Shaft
248 Lead Screw Bearing Lock Nut
249 *Clamping Shoe
250 Lead Screw Bearing Cap
251 Lead Screw Change Gear Key
252 Lead Screw Support Bracket
253 Lead Screw Support Bracket Bearing
254 Welch Plug
255 Lead Screw Gear Plate
256 Preloaded Ball Bearing
257 36T Spindle Lead Screw Driving Gear
258 30T Lead Screw Gear
271 Pump Fuhcrum Shaft
272 Pump Adjusting Bar
273 Pump Adjusting Bar Anchor
274 Clevis Pin
275 Pump Driven Sheave
276 *Coolant Distributor
277 *Coolant Valve Inlet
278 *Coolant Valve Outlet
279 *Coolant Valve Pin
280 *Coolant Valve Spring
281 *Coolant Valve Pin Washer
282 *5/16" Slotted Nut
283 *Coolant Valve Nozzle
284 *Strainer Connector
289 *3/4" male Adapter Union
290 *3/4" Female Adapter Union
291 *3/4” Low Pressure Hose-2;3” Long
292 *Y4" Low Pressure Hose-4'6" Long
293 *Relief Valve
294 2 Unit Push Button Station
295 starter Mounting Plate
296 Push Button Station Bracket
297 Push Button Station Support
298 Bracket Cover
299 Cover Gasket
300 Oil Seal
301 Motor Plate
302 Motor Plate Pin
303 Motor Adjusting Rod
304 Adjusting Rod End
305 Collar
306 Motor Adjusting Rod Anchor
307 Motor Adjusting Nut
308 Motor Adjusting Nut Bearing
309 Retaining Ring
310 *V Belt 69.5 Pitch Length
311 Motor Sheave
312 Bed
313 Bed Way L.H.
314 Bed Way R.H.
315 Bed Way Key
316 Way Guard L.H
317 Way Guard R.H.
318 *Carriage Rack Bracket
319 *Carriage Rack
320 Telescoping Way Guard
321 *Telescoping Way Guard Guide
322 Strainer Plate Assembly
323 Chip Compartment Door
324 Door Latch Rod
325 Motor Compartment Door
326 Bed Door
327 Bed Oil Screen
328 *Name Plate
329 *Trip Rod Adjusting Nut Wrench
330 Work Stop Bracket (Single Spindle)
331 Work Stop Bracket (Double Spindle)
332 Work Stop Bracket Cover
333 Work Stop Bracket Top Cover
334 Work Stop Rack
335 Cam Roller
336 Cam Roller Pin
337 Work Stop Operating Spring
338 Spring Retaining Pin
339 16T Work Stop Rack Pinion
340 Work Stop Rod
341 Work Stop
344 Cam Support Bracket
345 Work Stop Cam
346 Cam Clamping Bar
347 *Pipe Clamp Base
348 *Pipe Clamp
349 Lead Screw Indicator Bracket
350 Indicator Bracket Cover
351 Lead Screw Indicator Gear Shaft
352 24T Lead Screw Indicator Gear
353 Indicator Dial and Shaft

*Not Shown

IMPORTANT-When ordering repair parts always designate part by number and name, giving size and serial number of machine.

354 16T Change Gear
355 16T Change Gear Bushing
356 16T Change Gear Screw
357 *Mounted Chart
358 Lead Screw Indicator Dial
359 *Screw
360 Carriage Front
361 Collet Adapter
362 Collet Operating Handle
363 Collet Sleeve
364 Collet Lock Nut
365 Collet Retaining Nut
366 Collet
367 Work Shop Bushing
368 Work Shop Bushing Screw
369 Work Stop Adjusting Screw
370 Work Stop
371 Work Stop Spring
372 Work Stop Bracket
373 Work Stop Bracket Top Cover
374 Work Stop Spring
375 Rack
376 Limit Switch Bar Spring
377 Limit Switch Bar
378 Work Stop Rod
379 Work Stop
380 Work Stop Rod Plug
381 Work Stop Bracket
382 Limit Switch Bar
383 Limit Switch Bar Spring
387 *Mechanism Guard RH.
391 Mechanism Guard LH.
392 Work Stop Bracket Base
395 Operating Lever Yoke
396 Roller Pin
397 Operating Lever
398 Operating Lever Pin
399 Pivot Pin
400 Jaw Link short
401 Jaw Link Pin-Short Link
402 Jaw Link-Long
403 Jaw Link Pin-Long Link
404 Work Stop Bracket Cover
405 Work Stop Bracket Cover
406 Limit Switch Plate-Short
407 Limit Switch Plate-Long
408 Switch Base
409 *4" Wire Cored Wick
410 Roller Follower
411 Retaining Ring
412 *Air Valve Base RH.
413 *Air Valve Base L.H.
414 *Reversible Lubricator
415 Reversible Lubricator
416 Air Valve Base L.H.
417 Air Valve Guard-LH.
418 Pipe Support
419 Pipe Support Cap
420 Air Strainer
421 Air Pressure Regulator
422 Standard Transformer
423 Air Cylinder
424 Adjusting Screw Bushing
425 Adjusting Screw Seal
426 Male Adapter Union
427 Low Pressure Hose
428 Valve Assembly
429 *Switch
430 Hex Nut
431 Cam Clamping Screw
432 Pin
433 Grip Spacer
900 Short Shaft and Gear Assembly
901 Long Shaft and Gear Assembly
902 Pump Packing
903 Packing Bushing
904 *Check Valve Disc
905 Pump Foot
906 Pump Gasket
907 Pump Body
908 *Outlet Bushing
909 Pump Body Cap
910 *Check Valve Spring
911 *Check Valve Spring
912 Pump Filler Piece
913 Pump Filler Gasket
914 Pump Base
950 *Strainer Body Cap
951 *Coolant Strainer Tube Assembly
955 *Model A Strainer Refill
956 *Strainer Cap

*Not Shown

IMPORTANT-When ordering repair parts always designate part by number and name, giving size and serial number of machine.

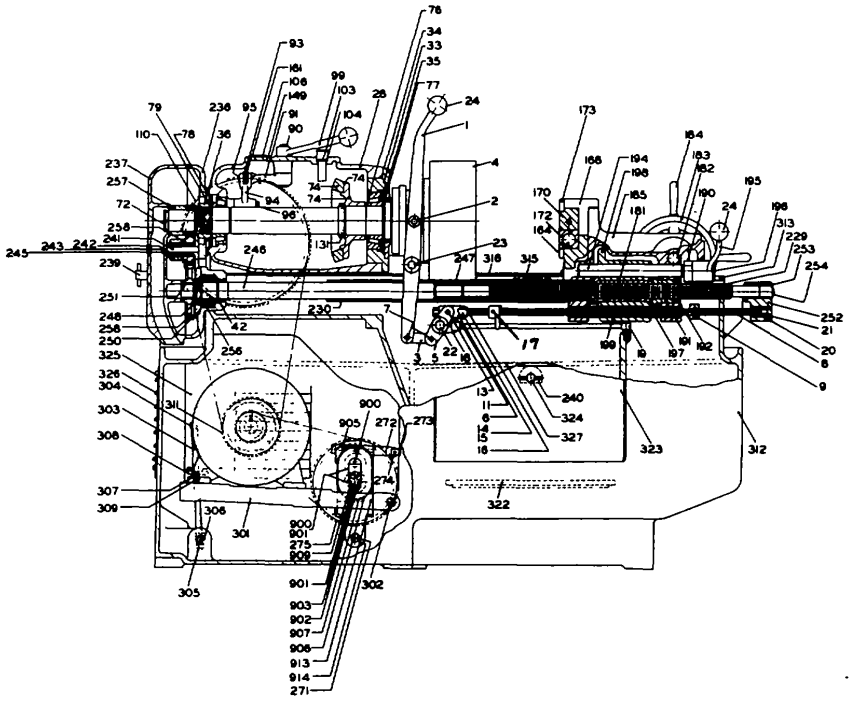


Figure 13-Side View of Machine

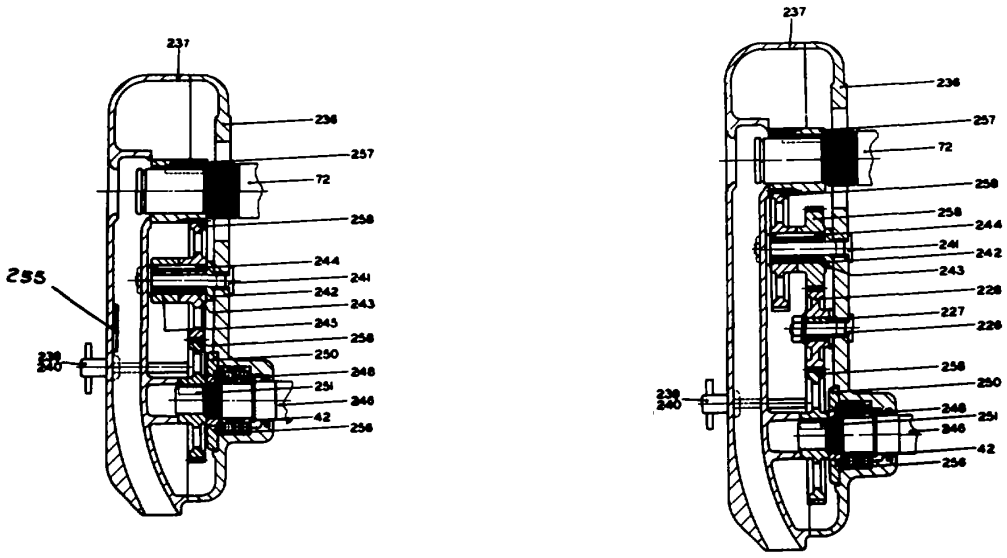


Figure 14-Leadscrew Gearing

IMPORTANT-When ordering repair parts always designate part by number and name, giving size and serial number of machine.

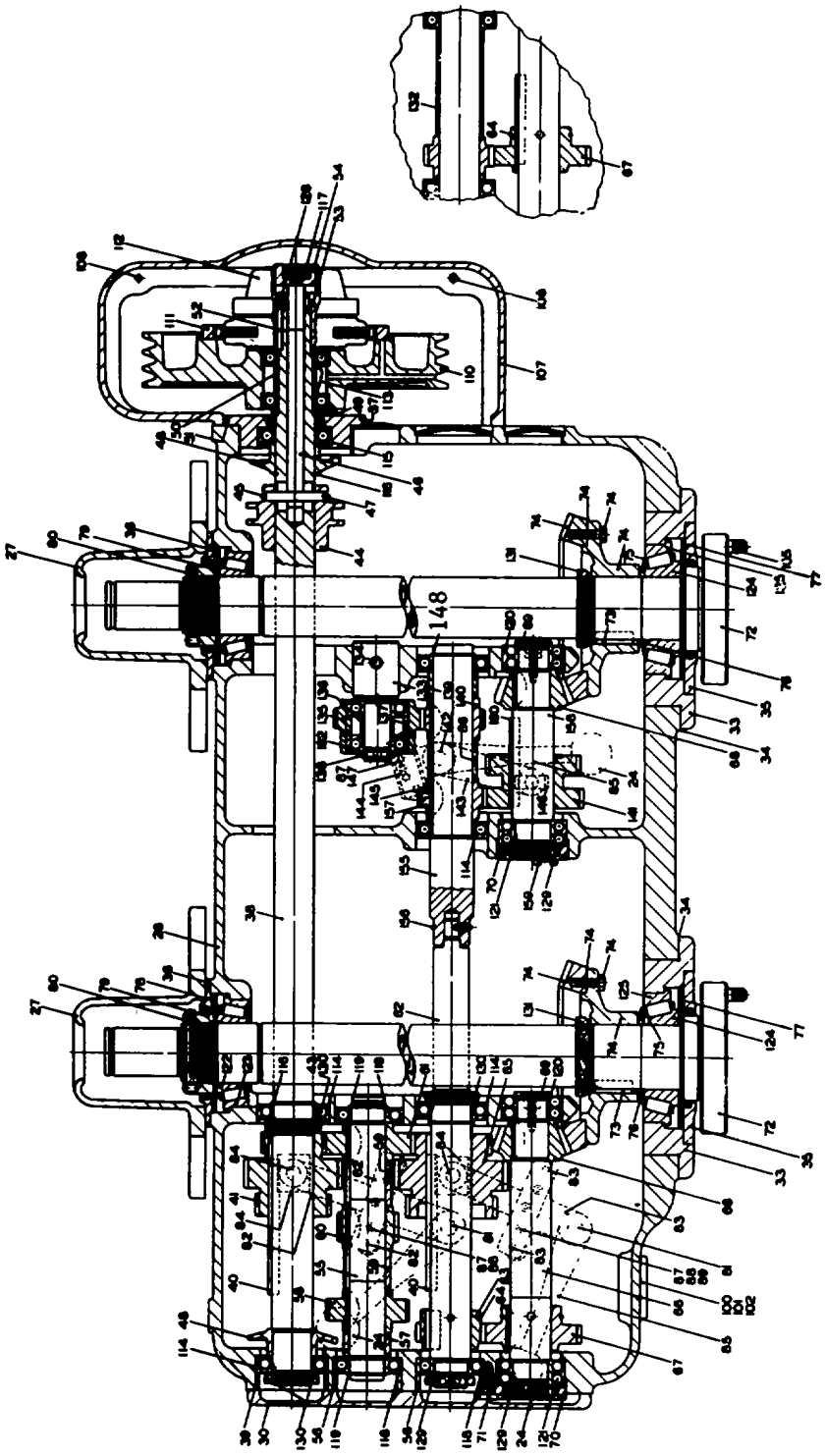


Figure 15-Headstock

IMPORTANT-When ordering repair parts always designate part by number and name, giving size and serial number of machine.

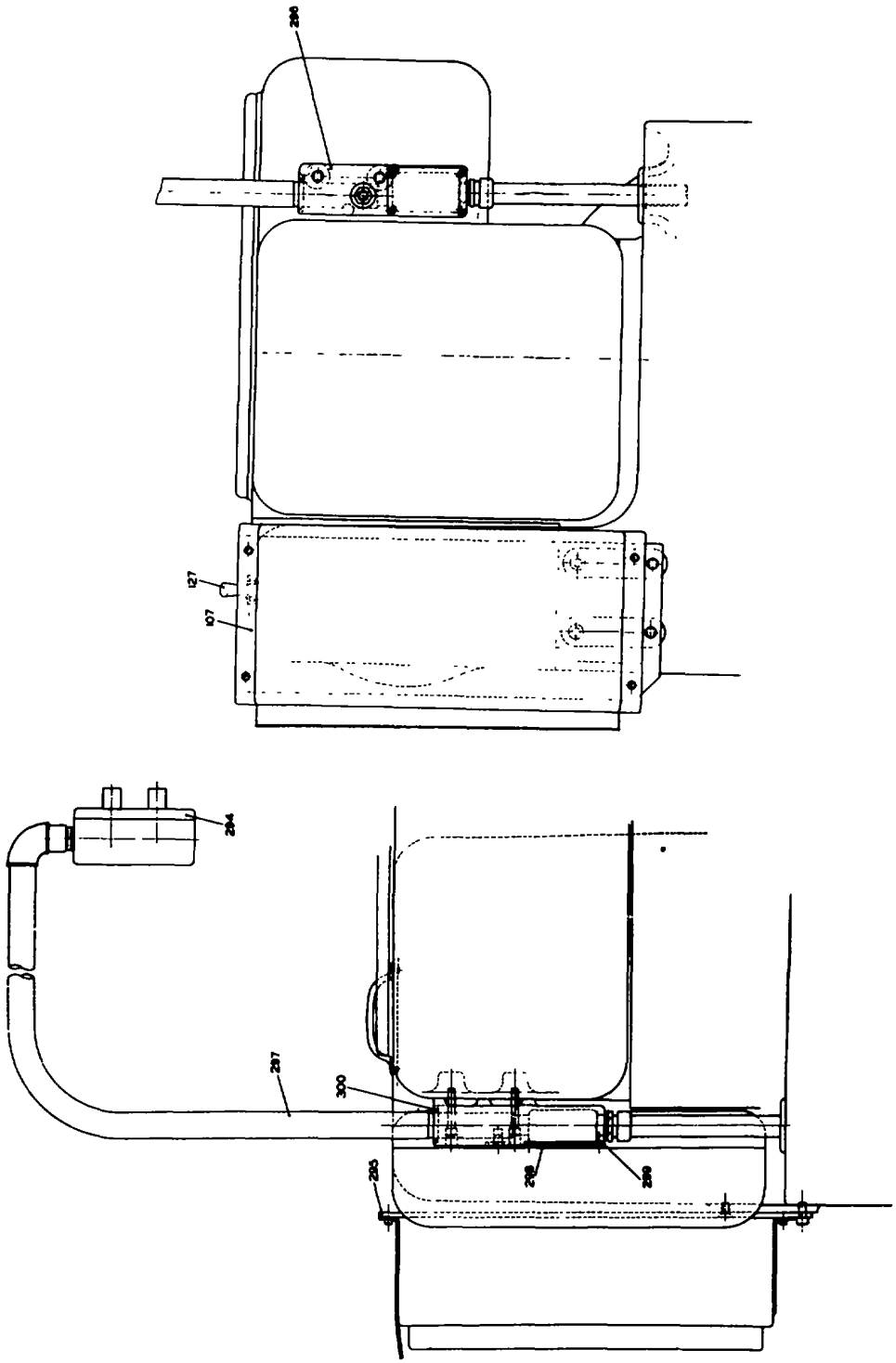


Figure 16-Push Button Control Station

IMPORTANT-When ordering repair parts always designate part by number and name, giving size and serial number of machine.

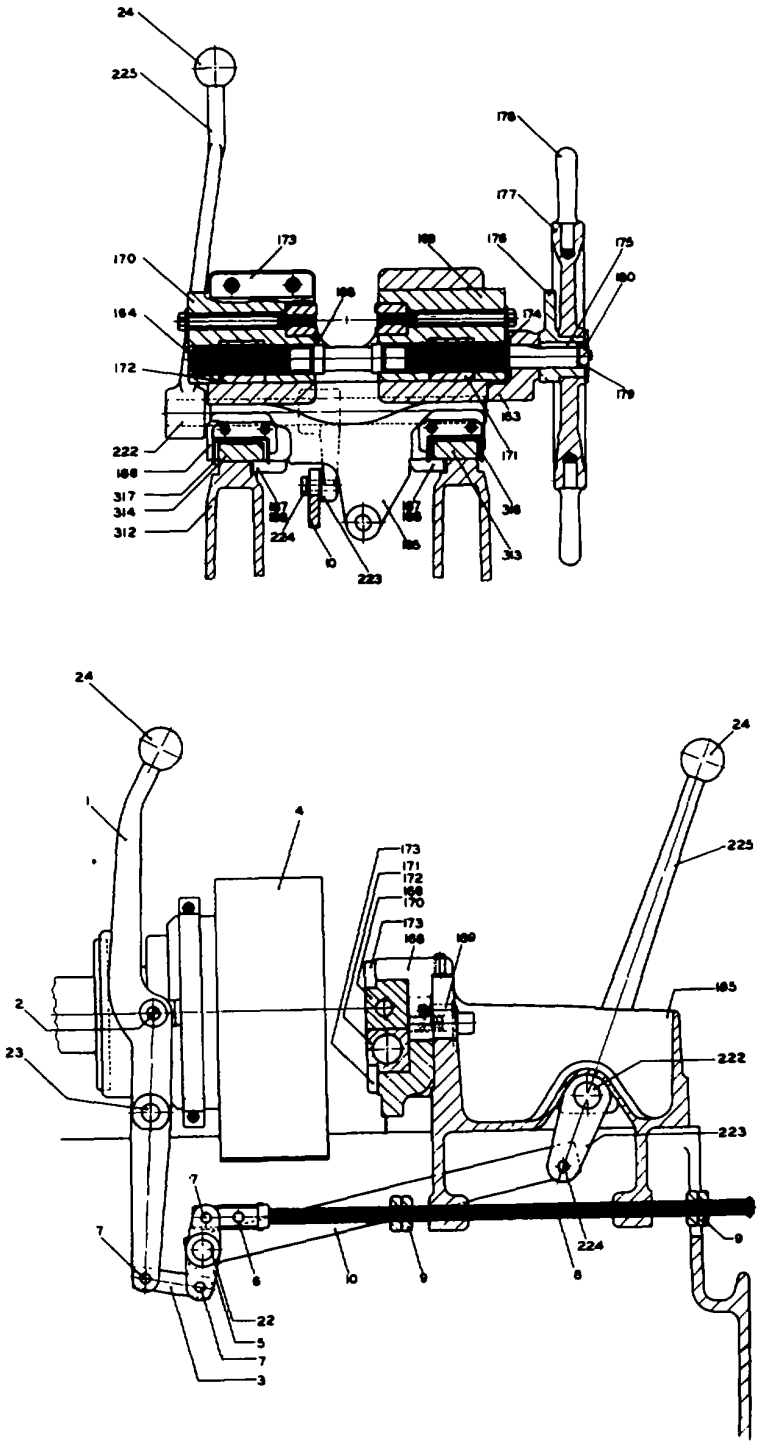


Figure 17-Lever Operated Carriage - Pipe and Nipple Machines

IMPORTANT-When ordering repair parts always designate part by number and name, giving size and serial number of machine.

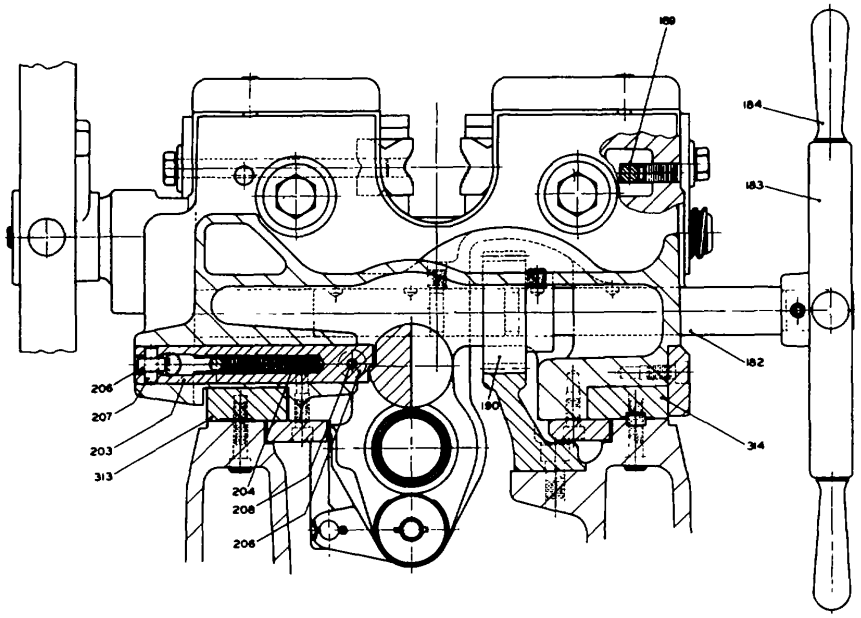


Figure 18-Rack Operated Carriage

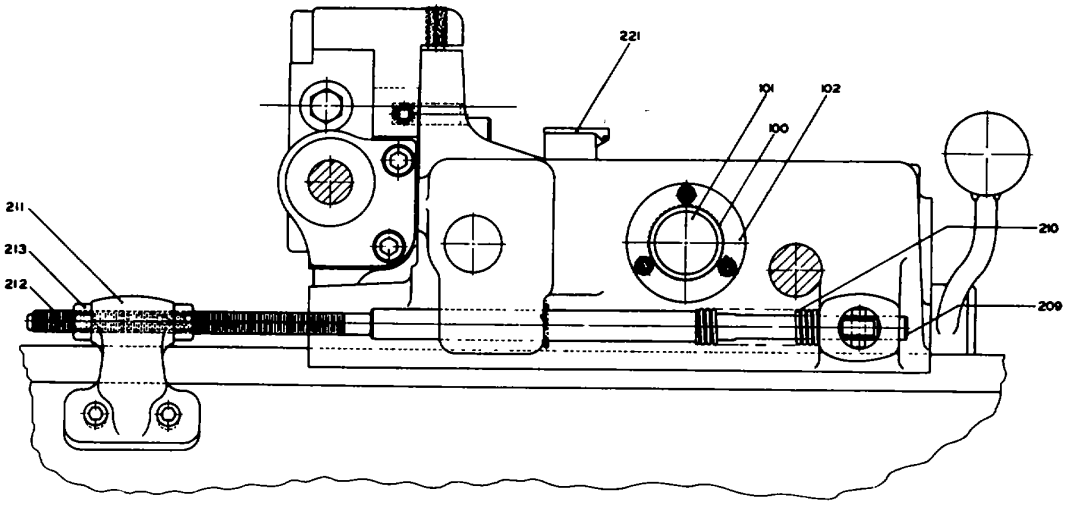


Figure 19-Leadscrew Carriage

IMPORTANT-When ordering repair parts always designate part by number and name, giving size and serial number of machine.

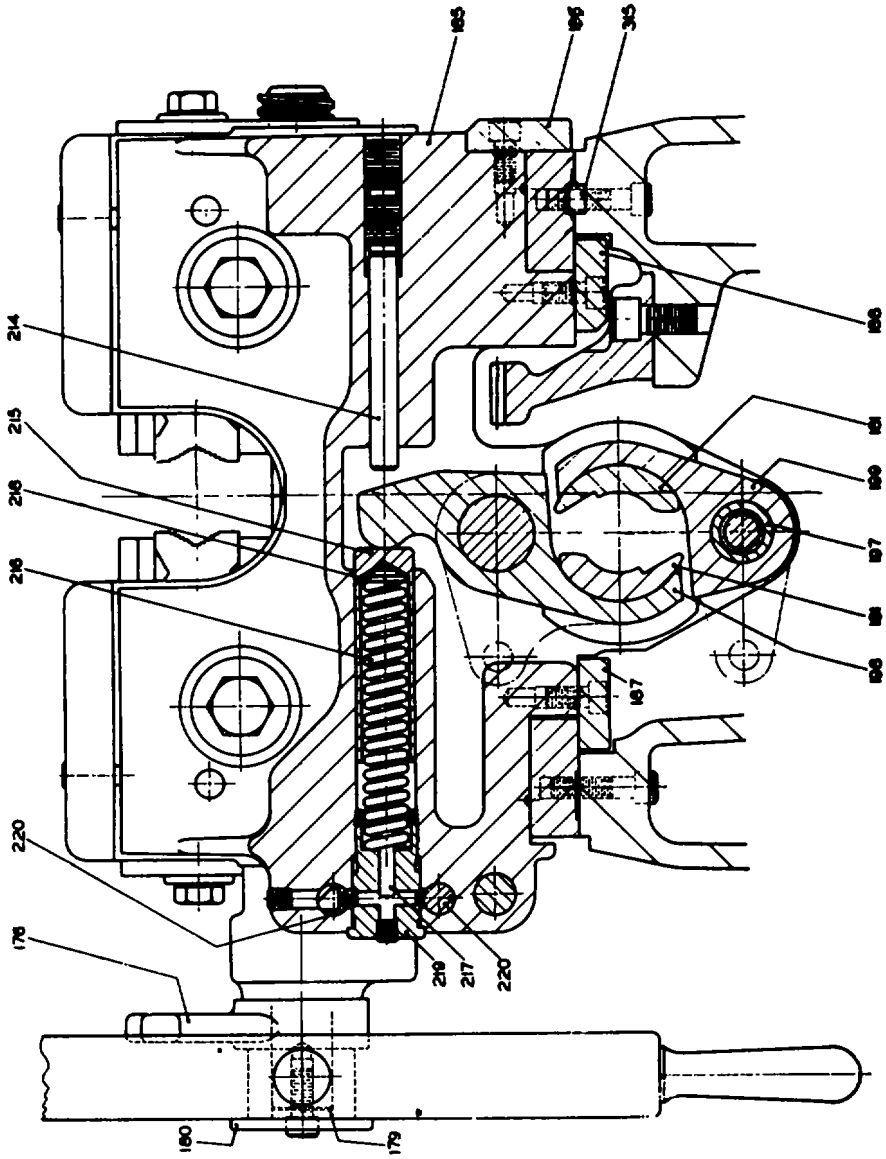


Figure 20-Leadscrew Carriage

IMPORTANT--When ordering repair parts always designate part by number and name, giving size and serial number of machine.

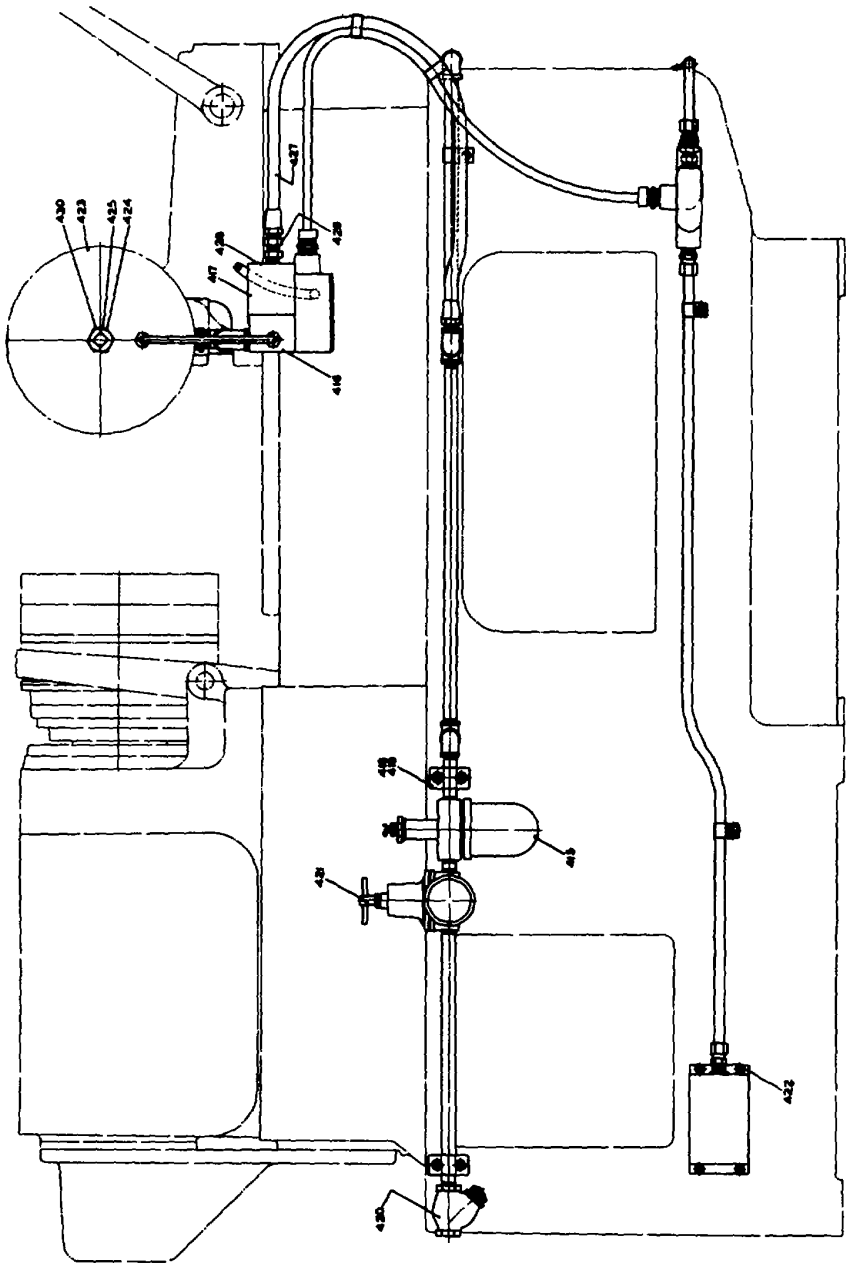


Figure 21-Side View of Air Operated Carriage Machine

IMPORTANT-When ordering repair parts always designate part by number and name, giving size and serial number of machine.

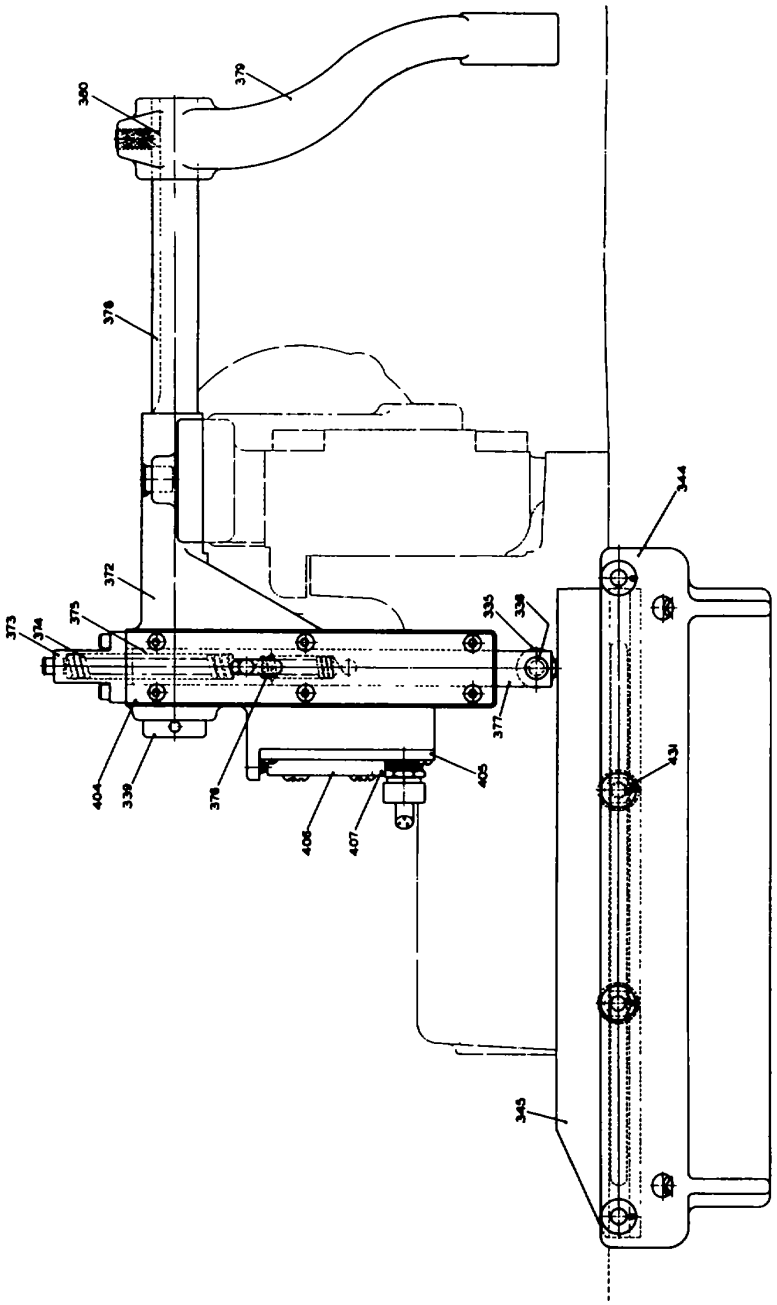


Figure 22-Automatic Workshop With Air Operated Carriage Fronts

IMPORTANT-When ordering repair parts always designate part by number and name, giving size and serial number of machine.

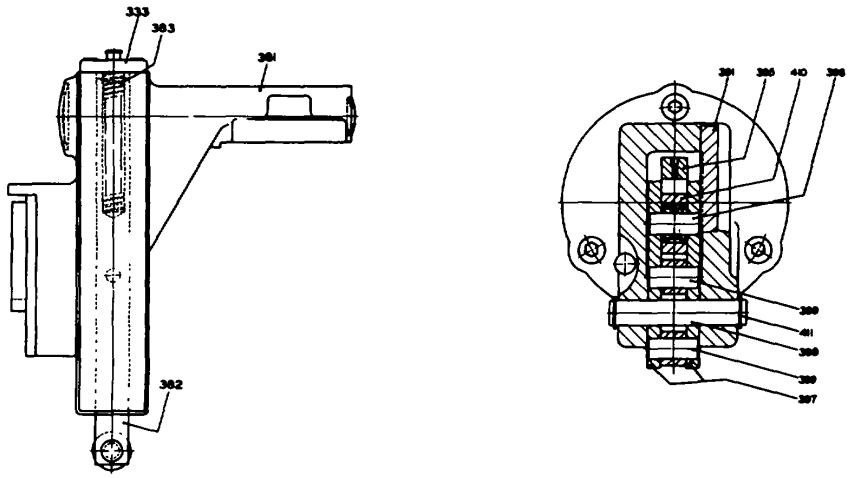


Figure 23-Air Operated Carriage Fronts

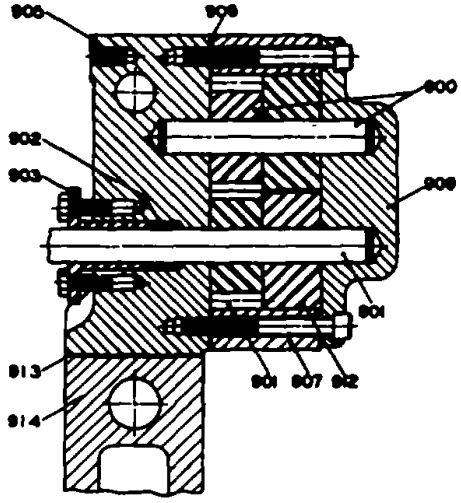


Figure 24-Coolant Pump

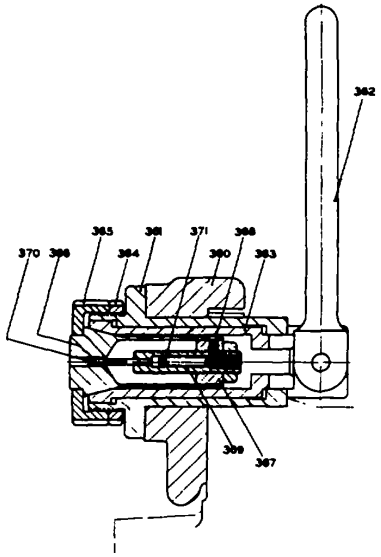


Figure 25-Collet Chuck

IMPORTANT-When ordering repair parts always designate part by number and name, giving size and serial number of machine.

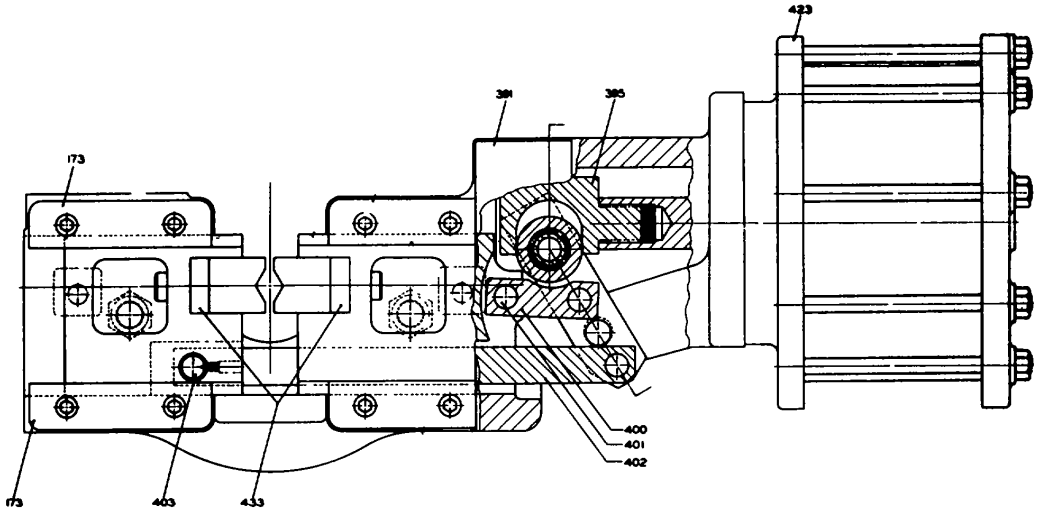


Figure 26-Air Operated Carriage Fronts

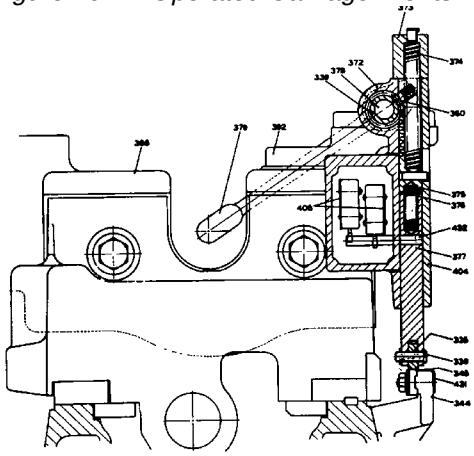


Figure 27-Automatic Workstop With Air Operated Front

IMPORTANT-When ordering repair parts always designate part by number and name, giving size and serial number of machine.

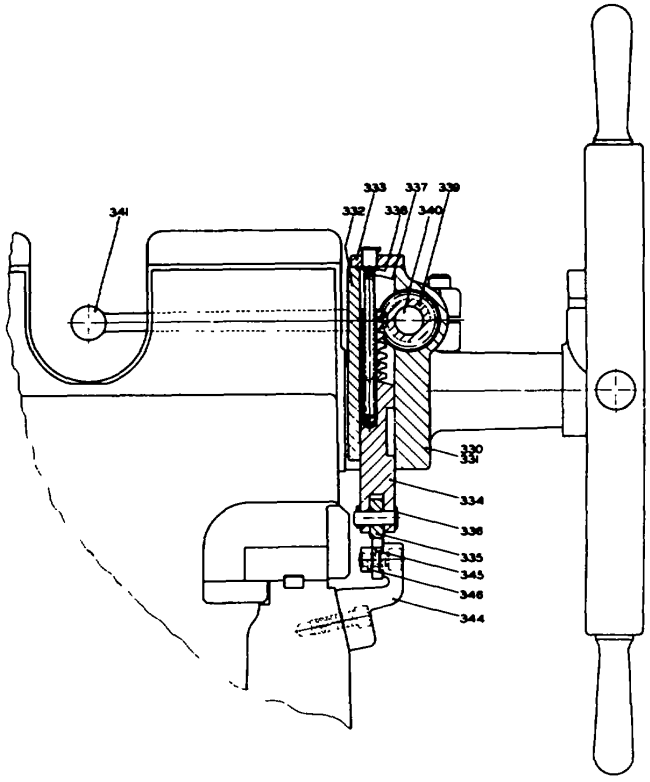


Figure 28-Automatic Workshop With Air Operated Carriage Fronts

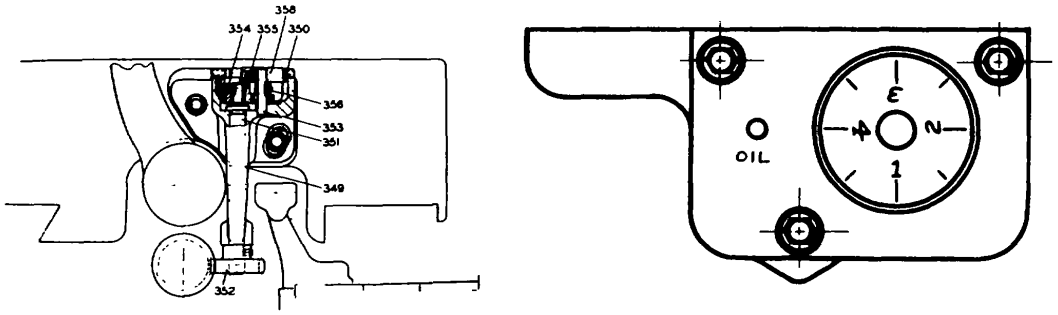


Figure 29-Leadscrew Dial Indicator

IMPORTANT-When ordering repair parts always designate part by number and name, giving size and serial number of machine.

CHAPTER 2- THREADING HEADS

SECTION I

Threading Heads

a. Heat Treated Threading Heads are of the revolving type for application to hand-operated, semi-automatic and automatic threading machines. Of rugged construction, the heads provide accurate and trouble-free operation over long production runs.

b. Manufactured in four types, the R, S, T and RX, the Heads feature wide range coverage for threading diameters from 1/8" to 9 1/4". All types are yoke-operated. The heads are available for standard applications, receding chaser applications, internal trip applications, heavy duty applications and large diameter applications.

c. Constructed of specially-selected alloy steels, the Heads are recommended for threading up to and including Class 3 tolerances and are well known for their ability to cut coarse pitch threads in a single pass. They have wide range coverage, permit rapid et-up, give trouble-free operation, are easy to adjust and of sturdy construction. The initial investment in a Heat Treated Die Head is relatively small, repairs are few, and with the use of Tangential Chasers, tool inventories and tool cost remaining low.

Tangential Chasers

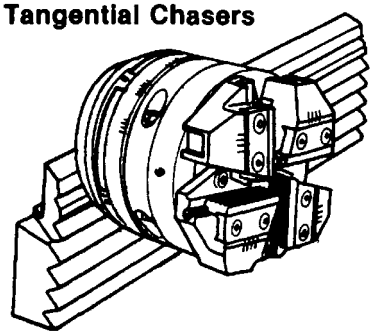


Fig 30

d. Further contributing to the economy of the Heads is the Tangential Chaser.

e. All Die Heads use chasers of the tangential type, a design pioneered and introduced over 75 years ago. Continued research and manufacturing experience has led to the development of the present Tangential Die Head Chaser, a tool without equal for accuracy, economy, and production In thread cutting operations.

f. Tangential Chasers are manufactured from high speed or super high speed steel which must pass exacting metal-lurgical standards. Experienced heat treatment assures that they will perform satisfactorily in service and produce quality threads within the tolerance for which they were intended.

g The tangential principle of design - provides line contact with the work to provide natural clearance comparable to that of a lathe tool. Friction at the cutting edge, thread distortion and chaser wear are minimized. The tangential location of the chaser, m respect to the work, places It in a direct line with the cutting action exerted in forming the thread. Rigidly supported in this natural cutting position by the die head chaser holder, the resulting longitudinal absorption of cutting strains reduces vibration and chaser breakage.

h. Depending upon the size of the die head in which they are used, Tangential Chasers vary in length from 1" to 6 1/2". Their length allows a maximum amount of regrinding and provides exceptionally long tool life.

i. During the resharpening process It is unnecessary to remove the same amount of metal from each chaser in the et. When one chaser is worn, chipped or damaged to the extent that an abnormal amount of metal must be removed, it can be reground and returned to service although much shorter than the other chasers in the set. If a chaser is damaged beyond use, it can be replaced with a single new chaser without the necessity of replacing the entire set.

I- A simple grinding operation quickly and easily removes the few thousandths of metal necessary to restore the cutting edge. They normally can be resharpened by removing .030" or less, depending upon tool condition. As chasers do not require accurate positioning when regrinding to assure that all chasers in the set are of uniform length, the grinding setup is simplified and resharpening time is held to the minimum.

k. Stock inventories are reduced as the same set of Tangential Chasers can be used to produce all diameters within the range of the die head requiring the same pitch. For example, a 1/4" - 20 pitch ULTC thread can be produced with the same chasers used to produce a 1/2" - 20 pitch UNF thread. Special chasers are required, however, for each combination and pitch for special thread forms as well as multistart high helix angle threads.

A simple grinding operation quickly and easily restores the cutting edge.

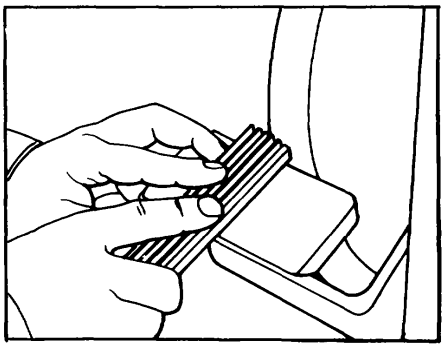


Fig. 31

SECTION II

THE R TYPE

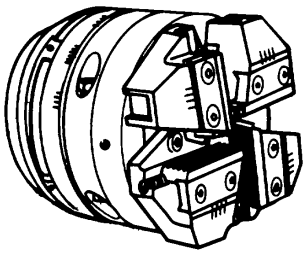


Fig 32

a. The R type Heat Treated Heads are designed for commercial and heavy-duty threading applications and are considered the standard heads m the series. Their initial cost is lower and they feature unusually wide range coverage.

b. Their rugged construction and design simplicity assures trouble-free operation, long life and positive performance. The standard heads are available in 9/16" to 2-1/2" models while a 4" and 6" model are available for heavy duty precision threading of large diameter workpieces. These heavy duty heads are similar in construction to the smaller heads but they both use two head opening springs in balanced positions to assure uniform and positive opening action when threading maximum diameters and coarse pitches. The 6" R also features a six chaser design which provides greater support for the workpiece, more free cutting action, and eliminates out-of-roundness common to large diameter threading.

c. Specifications can be found on pages 32, 33 and 34.

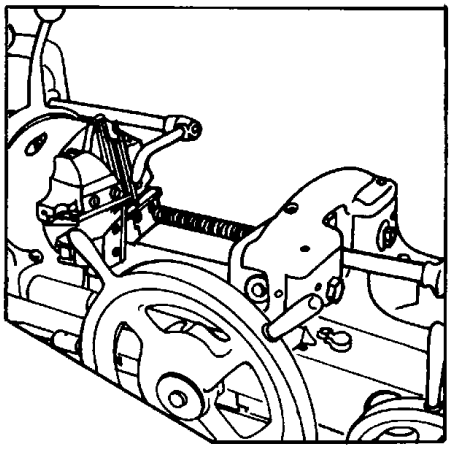


Fig. 33

SECTION III

THE S TYPE

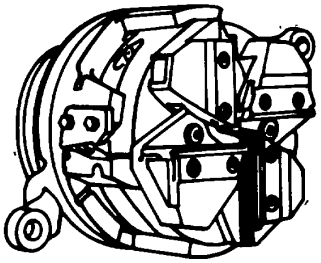


Fig. 34

a. The type "S" Receding Chaser Threading Head is recommended for producing taper threads of maximum accuracy and of long lengths As the receding movement of the chaser produces the cutting action by the throat section only, cutting strains are reduced to a minimum. This feature prolongs chaser life and permits the use of narrow, more economical chasers. Of greater importance is the production of truly conical (no chaser leave off mark) threads which will meet API specifications. The die head must be applied to a machine equipped with leadscrew or power feed.

b. Two adjustable trip bars attached to the machine carriage front actuate the operating ring of the 1-1/2", 2", 2-1/2" and 6" S Heads as the work advances into the head. With the 9/16" and 3/4" heads, the operating ring is actuated by a yoke. The movement of the cam on the operating ring along the cam follower allows the chasers to recede at a uniform rate, and thus produces a tapered thread corresponding to the taper of the cam. The head opens automatically when the cam trips at the end of the cam follower. Special operating rings with cams for cutting other than 3/4" taper per foot are available for the 9/16" head. With the 3/4", 1-1/2", 2", 2-1/2 and 6" heads, threads can be cut with various degrees of taper by the use of the proper cams which can be quickly and easily changed. Straight threads can also be cut by employing a straight cam, and reverse taper threads from the large diameter of the taper to the small diameter can be cut by the use of a reverse taper cam.

c. Specifications can be found on page 35.

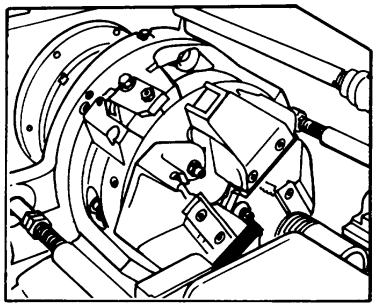


Fig. 35

SECTION IV

THE T TYPE

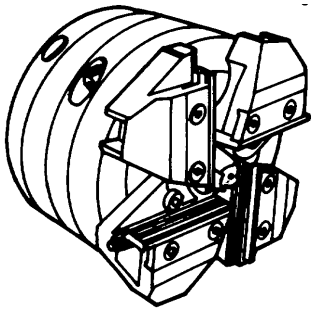


Fig. 36

a. The type T Heat Treated Threading Heads are available for producing short lengths of straight and tapered threads where constant thread length is essential. They can also be supplied for production pipe threading and for use on automatic and hand operated nipple machines. All T type Heads are internally tripped.

b. For pipe and nipple threading, the threading reaming and chamfering operations are performed simultaneously by this type head equipped with a reamer and reamer attachment. The reamer also acts as a stop bar for the internal trip mechanism which provides constant thread length regardless of difference in nipple length or gripping position.

c. Specifications for the type T Heads can be found on page 33.

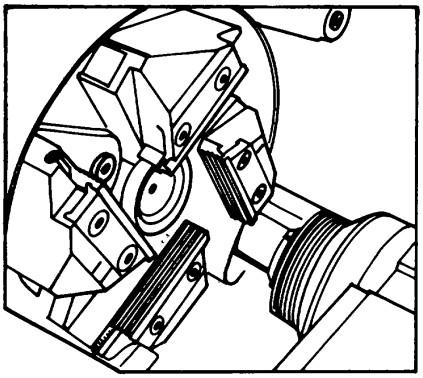


Fig. 37

SECTION V

THE RX TYPE

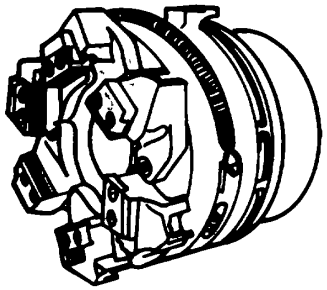


Fig. 38

a. The 40RX Head is recommended for generating threads on large diameters when thread length is comparatively short and of fine pitch. The 40RX Heat Treated Head employs six chasers and has essentially the same features as the standard "R" type heads.

b. Specifications for the type "RX" Heads can be found on page 37.

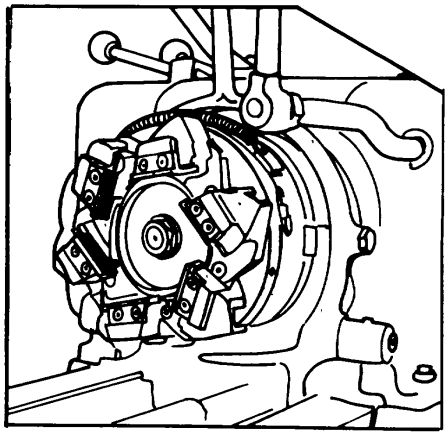


Fig. 39

SECTION VI

Design Features
wide range coverage

a. An outstanding feature of the Heat Treated Heads is their wide range coverage and oversize capacity. The range of each Head is listed in the general specifications. The chaser holders for the various heads, with respective ranges and thread standards for which they are suitable, are included under Standard Chaser Holder specifications, page 35.
b. Oversize chaser holders, which make possible the threading of diameters larger than the standard rated capacity of the die head are also available. When oversize holders are used, the thread length obtainable is limited as usually the workpiece is too large to enter the bore of the die head. The range of these holders, their thread length and pitch limitations are listed under Oversize Chaser Holder specifications page 35.

sturdy construction

c. The Heat Treated Heads are made of specially selected alloy steel. All operating parts are heat treated after machining and then precision ground. This treatment assures both threading accuracy and excellent wearing qualities. The small number of working parts, sturdy construction, accurate machining and careful assembly produce a die head unexcelled for threading to commercial tolerances on a production basis.

size adjustment ease

d. Size adjustment of the Heat Treated Heads can be easily obtained by the rotation of a size adjusting worm. This mechanism is under tension and need not be locked after an adjustment is made.

set-up ease

a. The simplicity of the method and the gage employed in setting the chasers to the correct position facilitate rapid set-up. The chaser setting gage is merely laid on the outer face of the chaser holder with its hooked portion in contact with the cutting edge of the chaser. With the chaser clamp released, the chaser is then moved forward in the chaser holder by rotating the chaser abutting screw until the graduations on the setting gage correspond to those on the chaser holder, thus establishing the correct cutting position.

trouble--free operation
f. The revoking die heads are opened and closed automatically by a yoke.

The simplicity of setting the chasers to the correct cutting position facilitates rapid yet accurate set-ups.

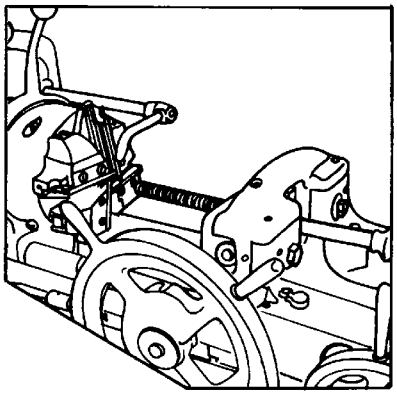


Fig 40

I. The simple opening and closing action of the Heads provides trouble-free operation and peak performance. The component rings of the head, when in the closed position, are locked by the engagement of hardened pins in hardened bushings.
I. Opening action is effected through the withdrawal of the pins from their bullings and the operation of the head opening spring on the dosing ring which pivots the chaser and chaser holder combination away from the workpiece. The compression of this spring assures a uniform head opening action on all diameters within the range of the die head.

chaser holder design

j. The seating surface on which the chaser is seated in the chaser holder is machined it an angle to the face of the die head. Thus, when the chaser is clamped into position, it becomes inclined to the work at a suitable helix angle. The practice of controlling the helix angle setting of the chaser in the chaser holder provides these important advantages.

(1) Simplifies the setting and grinding of chasers.

(2) Eliminates the necessity of grinding chasers in sets.

(3) Allows interchange ability to the extent that any individual chaser may be replaced without replacing the entire set.

(4) Makes possible the use of standard chasers of a given pitch for cutting threads of the same pitch on any diameter of work within the range of the die head.

rigid holder support

k. The chaser holders are mounted on the face of the Die Heads. This design makes the chasers readily accessible for et-up changes and also provides the ample chip clearance so necessary for obtaining maximum tool life. The chaser holders, attached to trunnions which extend through the head body, am rigidly supported between the trunnions and the sliding blocks which are mounted on the closing ring and operate in the tail slot of the chaser holders. The chaser holder mounting is such that the holders and chasers are free to float axially, and this insures proper "tracking" of the chasers.
I. The 9/16" Head is furnished with the chaser holder and trunnion as an integral unit.

The chaser holders are mounted on the face of the die head making both the chasers and holders readily accessible for set-up changes when required.

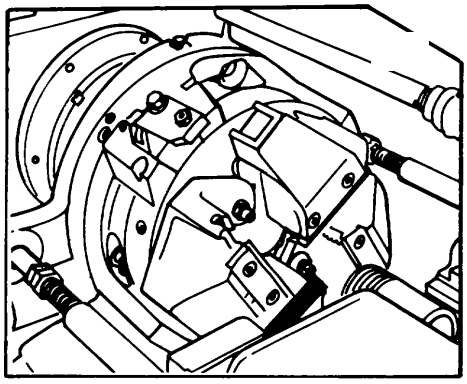


Fig 41

SECTION VII
Special Features

taper threading

a. Proper chasers and/or chaser holders are required for general taper threading. However, if the die head is to be used exclusively for tapered work, consideration should be given to the S type Heads described on page 27 as they are expressly designed for tapered threading.
b. For the smaller Head employing integral holders, the same chaser holders are used to generate straight or tapered threads as the taper, when required, is placed in the chaser. For the larger heads, chaser holders machined to the required taper are necessary as the taper is not placed in the chasers.

special threads
taper threading

c. Special chaser holders are required for generating special threads, when the helix angle is out of the range of standard chaser holders. Limitations of each die head as to the coarsest pitch threads that can be produced are included in the general specifications. However, coarser pitch threads than those listed can be cut provided the form of thread is modified for depth. For complete information regarding special thread generation write to manufacturer giving complete details.

hollow milling cutters

d. Hollow milling comprises an efficient, rapid and economical method of performing turning, forming and facing operations. The standard Heat Treated Die Heads lend themselves with little or no modification to hollow milling operations on leadscrew type or hydraulic feed machines. Multiple diameters may be turned with one set of four milling cutters secured in a set of turning holders. As with tangential die head chasers, the milling cutters can be reground for a major portion of their original length.
e. The cutting rate realized from the hollow milling method is approximately equal to the feed rate of a single tool multiplied by the number of milling cutters contained in the die head. The concerted action of the simultaneously functioning cutting took results in an efficient and uniform method of hollow milling.

Hollow Milling or Turning Cutters are available in a wide variety of shapes, a few of which are illustrated above. These cutters have the same outstanding long life advantages as Tangential Chasers and enable high production turning operations at minimum cost.

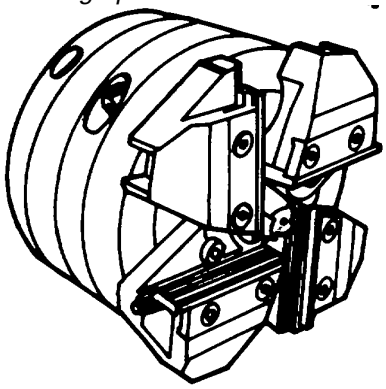


Fig 42

left-hand threading

f. For cutting left-hand threads, left-hand chaser holders are required. The same chasers employed for right-hand threading can also be used for cutting left-hand merely by grinding the proper cutting angles on the opposite end of the chaser.

The same set of chasers used to cut right-hand threads can be turned to cut left-hand threads.

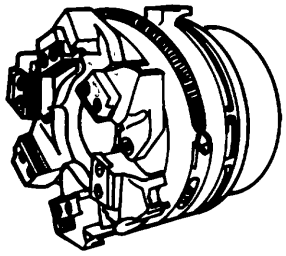


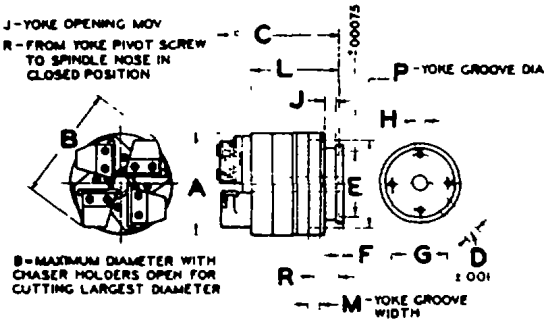
Fig 43

R-TYPE

SECTION VIII
SPECIFICATIONS

	4"R	6"R
Range - Inches	1 to 4	2 1/2 to 6
Range - M/M	24 to 102	64 to 153
Range - Pipe Size	1 to 4	2 1/2 to 6
Coarsest Pitch-Threads per in.*	3	3
Coarsest Pitch-M/M*	7.5	7.5
Weight-Lbs	465 3/4	505
Weight-Kgms.	211.26	228.07
Code Word	YDKBR	YDKAR

Coarser pitch threads can be produced dependent on thread form, material, etc. Write for details enclosing print of workpiece.



DIMENSIONS

	4"R		6"R	
Dim.	Inches	M/M	Inches	M/M
A	15 1/2	393.7	16 1/2	419.1
B*	18 5/16	456.2	17 9.16	446.1
C*	12 1/3 5/2	316.7	12 7/32	310.3
D	4 13/16	122.24	7	177.8
E	11	279.4	11	279.4
F	3/8	9.52	3/8	9.52
G	9 3/4	247.65	9 3/4	247.65
H	5/8 N.C.	15.88	5/8 N.C.	15.88
J	15/16	23.8	31/32	24.6
L	9 19/32	243.7	9 17/32	242.1
M	1 1/2	38.1	1 1/2	38.1
P	12 7/8	327.0	14 3/8	365.1
R	2 19/32	65.9	2 17/32	64.3

"B" AND "C" Dimensions are based upon the use of standard, maximum range N.C. Chaser Holders.

Chaser Holder Specifications

Thread Standard	4"R	6"R	Thread Standard	4"R	6"R
U.N.C., N.C., & S.I.	1 to 1 1/2 (24 to 39 M/M) (1-3/64 X 4 Chaser)	2 1/2 to 2 3/4 (64 to 72 M/M) (1 1/2 x 5 Chaser)	Pipe	1 to 2 (1 1/4 x 4 Chaser)	2 1/2 to 3 (2 1/4 x 5 Chaser)
				2 1/2 to 4	3 1/2 to 4 (2 1/4 x 5 Chaser)
	(40 to 64 M/M) (1 1/2 x 5 Chaser)	72 to 102 M/M) (1 1/2 x 5 Chaser)			4 1/2 to 6 (2 1/4 x 5 Chaser)
	2 5/8 to 4 (68 to 102 M/M) (1 1/2 x 5 Chaser)		Special Chaser Holders	1 to 1 1/2 (1 3/64 x 4 Chaser)	2 1/2 to 3 1/2. (1 1/2 x 5 Chaser)
				1 5/8 to 2 1/2 1 1/2 X 5 Chaser 2 5/8 to 4	2 1/2 to 3 1/2 (1-3/64 x 4 Chaser) 2 7/8 to 4
U.N.F. & N.F.	1 1/8 TO 1 1/2 (1-3/64 x 4 Chaser)				
Whit.	1 to 1 1/2 1-3/64 x 4 Chaser	2 1/2 to 3 1/2 (1 1/2 x 5 Chaser)		2 5/8 to 4 (1 1/2 x 5 Chaser	2 7/8 to 4 (1-3/64 x 4 Chaser)
	1 5/8 to 3 1/2 (1 1/2 x 5 Chaser	3 3/4 to 4 (2 1/4 x 5 Chaser)		1 5/8 to 4 (1-3/64 x 4 Chaser)	4 1/8 to 5 1/4 (1 1/2 x 5 Chaser)
	3 3/4 to 4 2 1/4 x 5 Chaser)				4 1/8 to 5 1/4 (1 3/64 x 4 Chaser)
					5 3/8 to 6 5/8 (1 1/2 x 5 Chaser)
					5 3/8 to 6 5/8 (1-3/64 x 4 Chaser)

OVERSIZE CHASER HOLDERS

	4"R	
	Inches	**M/M**
Range	**4 1/8 to 5 1/4**	**105 to 134**
Coarsest Pitch	**6 TPI**	**4.0**
Max. Thread Length	**3 1/8**	**79.0**

***Not available for 6 R Heads. Refer to page 9 for clarification note on oversize chaser holder capabilities.**

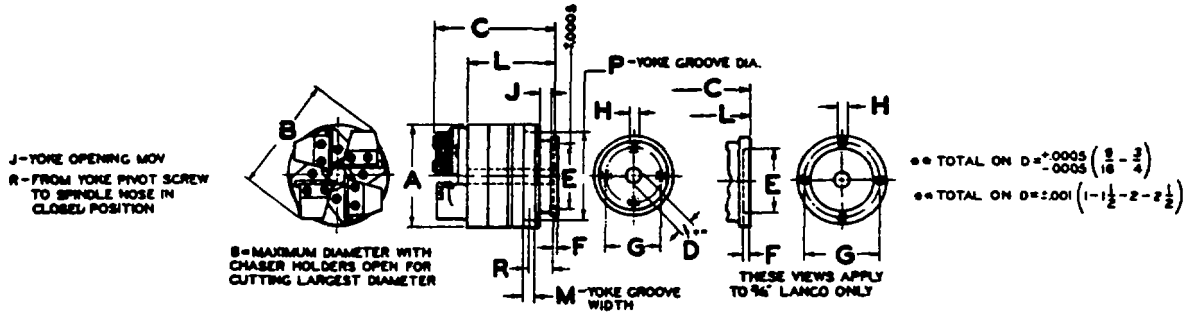
R-TYPE

SPECIFICATIONS

	9/16" R	3/'4" R	1" R	1 1/2" R	2' R	2 1/2" R
range-lnches	1/4 to 3/16	1/4 to 3/4	1/4 to 1	3/8 to 1 1/2	1/2 to 2	1/½ to 2 1/2
Range-MM	6 to 14	6 to 20	6 to 24	9 to 39	12 to 52	12 to 64
Range-Pipe Sizes	1/8 to ¼	1/8 to 3/4	1/8 to 1	1/8 to 1 1/2	1/4 to 2	1/4 to 2 1/2
Coarsest Pitch-Thds. per in.*	12	10	8	6	4 1/2	4
Coarsest Pitch-M/M*	2.0	2.5	3.0	4.0	5.O	6.0
Weight-Lbs.	11	24 1/2	58	113 1/2	172	172
Weight-Kgms.	4.99	11.11	26.3	51.48	78.02	78.02
Code Word	YARFO	YARIU	YARKA	YARRT	YARTZ	YARUC

*Coarser pitch threads can be produced dependent on thread form, material, etc. Write for details enclosing print of workpiece.

Dimensions



Dimensions	9/16R In	9/16R M/M	3/4 R In.	3/4 R M/M	1"R In.	1"R M/M	1 1/2 R In.	1 1/2 R M/M	2" R In.	2" R M/M	2 1/2R In.	2 1/2R M/M
A	3 15/16	100.0	5 1/8	130.2	7 3/8	187.3	9 1/8	231.8	10-7/8	276.2	10 7/8	276.2
B*	4 13/16	122.3	6 1/16	154.	8 1/8	206.4	10 3/16	258.8	12 1/16	306.4	12 1/16	306.4
C	4 9/32	108.7	6- 3/64	153.6	6 59/64	175.8	8 19/64	210.7	9 19/32	243.7	9 19/32	243.7
D	5/8	15.9	7/8	22.2	1 3/8	34.9	1 15/16	49.2	2 5/8	66.7	2 5/8	66.7
E	2.500	63.5	3.3125	84.1	5.500	139.7	7.000	177.8	8.750	222.2	8.750	222.2
F	13/32	10.3	.505	12.8	9/32	7.1	3/8	9.5	3/8	9.5	3/8	9.5
G	2 1/16	52.4	3 3/4	95.2	4 3/4	120.6	5 7/8	149.2	7 1/4	184.1	7 1/4	184.1
H	5/16 N.C.	N.C.		5/16 N.C.		7/16 N.C.		9/16N. C.		5/8N. C.		5/8N.C .
J	25/64	9.9	7/16	11.1	19/32	15.1	5/8	15.9	25/32	19.8	25/32	19.8
L	3 5/32	80.2	4 17/32	115.1	5.179	131.5	6.460	164.1	7.272	184.7	7.272	184.7
M	1/2	12.7	5/8	15.9	13/16	20.6	1	25.4	1 3/32	27.8	1 3/32	27.8
P	3 3/16	80.9	4 9/32	108.8	6 5/64	154.4	7 21/32	194.5	9 1/4'	234.9	9 1/4	234.9
R	3/8	9.5	29/32	23.0	1 3/4	44.4	1 3/4	44.4	1 63/64	50.4	1 63/64	50.4

"B" and "C" Dimensions are based upon the use of standard, maximum range NC. Chaser Holders.

R. TYPE

Standard Chaser Holders

Thread Standard	9/16" R	3/4" R	1" R	1 1/2" R	2" R	2 1/2" R
U.N.C N.C., Whit, & S.I.	1/4 to 9/16' (6 to 14 M/M)	1/4 TO 3/4 (6 to 20 M/M)	1/4 to 1 (6 to 24 M/M)	3/8 TO 1 1/2 (9 to 39 M/M)	1/2 TO 1 1/2 (12 to 39 M/M)	1/2 TO 1 1/2 (12 to 39 M/M)
					1 5/8 TO 2 (40 TO 52 M/M)	1 5/8 TO 2 1/2 (40 TO 64 M/M)
U.N.F. & N.F.	1/4 to 9/16	1/4 to 7/16	'1.4 to ½	3/8 To 1	1/2	1/2
		1/2 to 3/4	9/16 to 1	9/16 to 1	9/16 TO 1	9/16 to 1
				1 1/8 TO 1 1/2	1 1/8 TO 1 1/2	1 1/8 TO 1 1/2
B.S.F.	1/4 TO 9/16	1/4 TO 3/4	1/4 TO 1/2	3/8 TO 7/8	1/2 TO 7/8	1/2 TO 7/8
			9/16 TO 1	1 TO 1 1/2	1 TO 1 1/2	1 TO 1 1/2
					1 5/8 TO 2	1 5/8 TO 2 1/2
PIPE	1/8 & 1/4	1/8 TO 3/8	1/8 TO 3/4	1/8 TO 3/4	1/4 TO 3/8	1/4 TO 3/4
		1/2 TO 3/4	1	1 TO 1 1/2	1 TO 2	1 TO 2
						2 1/2

Oversize Chaser Holders

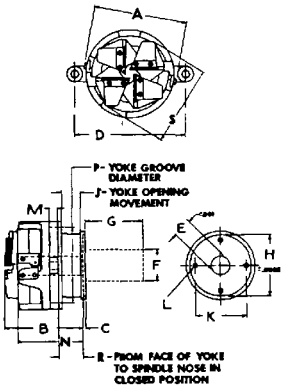
	9/16"R	3/4"R	1"R	1 1/2"R	2"R	2 1/2"R
Range - Inches	5/8 to 7/8	1/1 3/6 to 1 1/4	1 1/16 to 12 1/8	2 1/16 to 3 1/8	2 9/16 to 3 1/8	
M/M	16 to 22	20 to 32	28 to 56	40 to 68	56 to 80	68 to 80
Coarsest Pitch-Thds. per in.	12	10	8	7	7	7
M/M	2.0	2.5	3.0	3.5	3.5	3.5
Max. Thread Length-In.	1	1 3/8	17/16 or 2 3/16*	1 1/4 or 2*	1 7/8 or 2 5/8*	1 7/8 or 2 5/8*
M/M	25.4	33	36 or 55*	33 or 52*	47 or 67*	47 or 67
Range - Inches	7/8 to 1 1/2	1 1/4 to 2	2 1/8 to 3	2 5/8 to 3 3/4	3 1/8 to 4 1/4	3 1/8 to 4 1/4
M/M	24 to 39	33 to 52	60 to 76	72 to 95	84 to 108	84 to 108
Coarsest Pitch-Thds per in.	14	12	8	7	7	7
M/M	1.75	2.0	3.0	3.6	3.5	3.5
Max. Thread Length-In	1 1/8	1 3/16 or 2*	2 3/8*	1 1/2 or 2 5/16*	2 or 2 3/4	2 or 23/4*
M/M	28	30 or 50*	60*	38 or 59'	51 or 70'	51 or 70'
Range-Inches	1 1/2 to 2	2 to 2 3/4	Note - Oversize chaser holders are furnished against order to			
M/M	40 to 52	52 to 72	thread specific diameter and pitch combination can be threaded with a particular set of oversize chaser holders depending upon the helix angles involved. Also, the thread must be within the			
Coarsest Pitch-Thds. per In.	14	12	coarsest pitch and maximum thread length limitations of the			
MM	1.75	2.0	chaser holders. Please refer complete information on			
Max. Thread Length-In.	1 1/8	1 3/16 or 2*	diameter and pitch combinations for engineering review.			
M/M	28	30 or 50*				

*Requires Special Built-Up Chaser Holders

SPECIFICATIONS

	9/16"S	3/4"S	1 1/2" S	2" S	2 1/2" S	6" S
Range Pipe Sizes	1/8 to 1/2	1/8 to 3/4	1/4 to 1 1/2	1/2 to 2	1/2 to 2 1/2	2 1/2 to 6
Coarsest Pitch-Threads per inch	14	11	8	8	8	8
Maximum Taper-Inches per foot	3/4	3/4	2	2	2	2
Maximum Thread Length-Inches	3/4	1 1/4	2 1/4	2 1/4	2 1/4	3 3/8
Maximum Thread Length-M/M	19	32	57	57	67	85.9
Weight-Lbs	16 3/4	37	169 1/2	247 1/2	247 1/2	634 3/4
Weight-Kgms.	7.60	16.78	76.88	112.26	112.26	287.92
Code Word	YDJAS	YDJBS	YDJCS	YDJDS	YDJES	YDJHS

Dimensions



	9/16"S	**3/4" S**	**1 1/2" S**	**2" S**	**2 1/2" S**	**6" S**
Dimensions	In.	In.	In.	In.	In.	In.
A	4 11/16	6 7/16	11 5/8	14 1/8	14 1/8	18 7/8
**B-1	4 1/2	6 41/64	10 5/16	t11 3/32	t11 63/64	14 55/64
**B-2	4 31/32	7 1/16	10 5/16	t12 63/64	t12 63/64	14 55/64
c	1/4	1/2	3/8	3/8	3/8	3/8
D	-	-	16 7/8	17¼	17 1/4	21 3/4
E	5/8	1 5/16	1 5/16	2 5/8	2 5/8	7
F	*	*	-	-	-	-
G	*	*	-	-	-	-
H	2 1/2	3 5/16	7	8 3/4	8 3/4	11
J	1	1 23/32	2 15/16	2 3/4	2 3/4	4 13/32
K	2 1/16	3 3/4	5 7/8	7 1/4	7 1/4	9 3/4
L	5/16 N.C.	5/16 N.C.	9/16 N.C.	5/8 N.C.	5/8 N. C.	5/8 N.C.
M	1/2	1/2	-	-	-	-
N	3 3/8	5 1/8	8 1/2	9 1/4	9 1/4	12 5/8
P	3 15/16	5 1/8	8 1/2	11 1/4	11 1/4	15 7/8
R	1 3/16	2 1/32	5 25/32	3 1/2	3 1/2	5 9/32
S	5	5 7/8	10 5/8	12 13/16	12 13/16	17 15/16

*Shanks will be supplied upon order
**B1 Dimension based upon the use of standard range Pipe Chaser Holder
**B2 Dimension based upon the use of maximum range oversize Chaser Holders
When using wedge type chaser, dimension is 11 7/8".
When using Wedge type chaser, dimension is 13".

Standard Chaser Holders

Thread Standard	**9/16" S**	**3/4" S**	**1 1/2" S**	**2" S**	**2 1/2 S**	**6" S**
Pipe	1/8 to 1/2	1/8 to 3/8	1/8 to 3/4	1/2 to 3/4	1/2 to 3/4	2 1/2 to 3 1/2
		1/2 to 3.4	1 to 1 1/2	1 to 2	1 to 2	4 to 4 1/2
					2 1/2	5 to 6

Oversize Chaser Holders

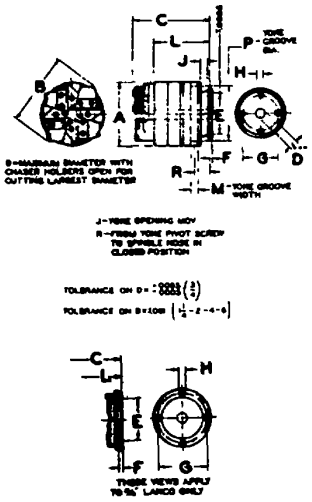
Thread standard	**9/16" S**	**3/4" S**	**1 1/2" S**	**2" S**	**2 1/2" S**	**6" S**
Pipe	3/4	1 to 1 1/4	2	2 1/2 3 to 4	3 to 4	-

T TYPE

SPECIFICATIONS

	3/4" T	1 1/4" T	2" T	4" T	6" T
Range - Inches	1/4 to 3/4	3/8 to 1 1/2	1/2 to 2	1 to 4	2 1/2 to 6
Range - Pipe Sizes	1/8 to 3/4	1/4 to 1 1/4	1/2 to 2	1 to 4	2 1/2 to 6
Weight -Lbs.	24 3/4	106 3/4	165 1/4	460	485
Weight - Kgms.	11.2	47.42	74.96	208.65	219.99

Dimensions



	3/4" T		1 1/4" T		2" T		4" T		6" T	
Dim	Inches	M/M	Inches	M/M	Inches	M/M	Inches	M/M	Inches	M/M
A	5 1/8	130.2	9 1/8	231.8	10 7/8	276.2	15 1/2	393.7	16 1/2	419.1
*B	5 5/8	142.9	9 3/4	247.7	11 15/64	303.2	17 1/2	444.5	18 5/8	473.0
*C	6 3/4	153.6	8 1/2	216.	9 11/32	237.3	12 27/32	326.2	13 1/16	331.7
D	7/7	22.22	1 15/16	49.2	2 5/8	66.7	4 13/16	122.24	7	177.8
E	3 5/16	84.14	7.000	177.8	8.750	222.2	11	279.4	11	279.4
F	.505	12.8	3/8	9.5	3/8	9.5	3/8	9.52	3/8	9.52
G	3 3/4	95.2	5 7/8	149.2	7 1/4	184.1	9 3/4	247.65	9 3/4	247.6
H	5/16 N.C.		9/16 N.C.		5/8 N.C.		5/8 N.C.		5/8 N.C.	
J	7/16	11.1	5/8	15.9	25/32	19.8	15/16	23.8	31/32	24.6
L	4 17/32	115.1	6 15/32	158.3	7 9/32	184.9	9 19/32	243.7	9 17/32	242.1
M	5/8	15.9	1	25.4	4 3/32	27.8	1 1/2	38.1	1 1/2	38.1
P	4 9/32	108.8	7 21/32	194.5	9 1/4	234.9	12 7/8	327.0	14 3/8	365.1
R	29/32	23.0	1 3/4	44.4	1 63/64	50.4	2 19/32	65.9	2 17/32	64.3

*"B" and "C" Dimensions based upon the use of standard, maximum range Pipe Chaser Holders.

Standard Chaser Holders

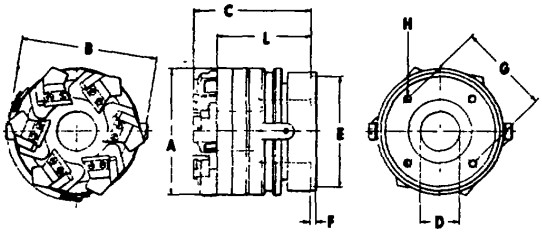
Thread Standard	3/4" T	1 1/4" T	2" T	4" T	6" T
Pipe	1/8 to 3/8	1/4 to 3/4	1/2 to 3/4		2 1/2 to 3
	1/2 to 3/4	1 to 1 1/4	1 to 2	1 to 2	3 1/2 to 4
				2 1/2 to 4	4 1/2 to 6

40RX

Specifications

Note - See chaser holder specifications for range, maximum pitch and thread length limitation. 40RX chaser holder are furnished against order to thread specific diameter and pitch combinations within these limitations. Often, more than one diameter and pitch combination can be threaded with a particular et of holders depending upon the helix angles involved. Please refer complete information on diameter and pitch combinations for engineering review.

Dimensions



"B" Dimension depends on application of Chaser Holders.

Weight-Lbs.	133
Weight-Kgms.	60.3
Code Word	YDIRX

		40 RX
		LANCO
Dimensions	**Inches**	**M/M**
A	10	254.0
B	-	-
C**	9 11/16	246.1
D--Standard*	3 1/8	79.4
E	8.750	222.2
F	7/18	11.1
G	7 1/4	184.1
H	5/8 N.C.	
L	7 7/16	188.9

**"C" Dimension based upon the use of standard, maximum range Chaser Holders.
maximum bore - 5 1/8"

Chaser Holders

40RX

Range-Inches	2 1/2 to 8	3 1/2 to 4 1/2	4 1/2 to 5
M/M	64 to 89	89 to 114	114 to 128
Pipe			
Coarsest Pitch-Thds. per in.	8	8	8
M/M	3.0	3.0	3.0
Pipe			
Max. Thread Length-Inches	7 1/2	7 1/2	7 7/8
M/M	190.5	190.5	200.0
Range Inches	5 to 6	6 to 700	7 1/8 to 7 1/4**
M/M	128 to 152	153 to 178	181 to 197
Coarsest Pitch-Thds. per in.	8	8	8
M/M	3.0	3.0	3.0
Max. Thread Length-Inches	2	1 or 2 1/4	1 1/8
M/M	50.8	- 25.4 or 57.1	29
Range-Inches	7 5/8 to 81/4**	8 1/8 to 8 5/8**	8 3/4 to 9 1/4**
M/M	194 to 209	206 to 219	222 to 235
Coarsest Pitch-Thds. per in.	8	8	8
M/M	3.0	3.0	3.0
Max. Thread Length-Inches	1 1/2 or 1 7/8	1 1/2	1 3/8 or 2 1/2
M/M	38 or 48*	38	35 or 63*

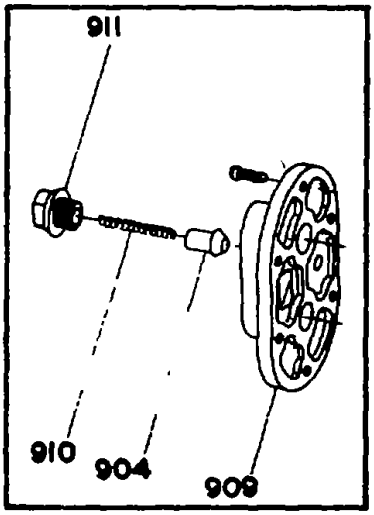
*Requires Special Built-Up Chaser Holders.
**Recommended For Non-Ferrous Materials Only

APPENDIX A

Parts List

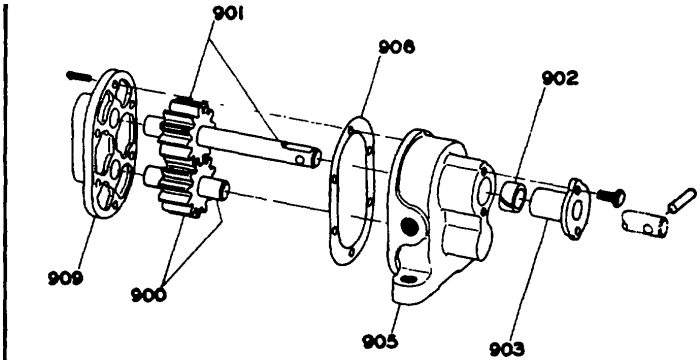
COOLANT LUBRICATION PUMPS

Threading and Forming Machines



A PUMP

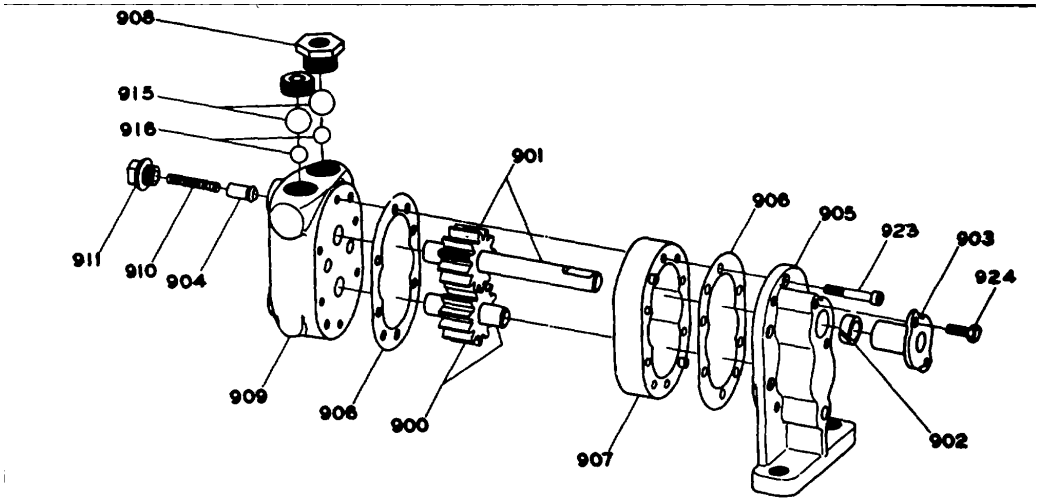
REFER TO AA-AAX PUMP FOR REST OF PARTS

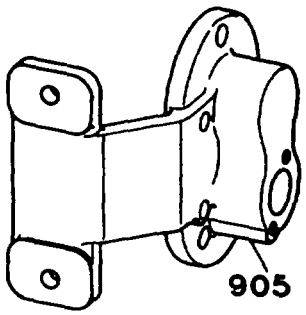


AA-AAX PUMP

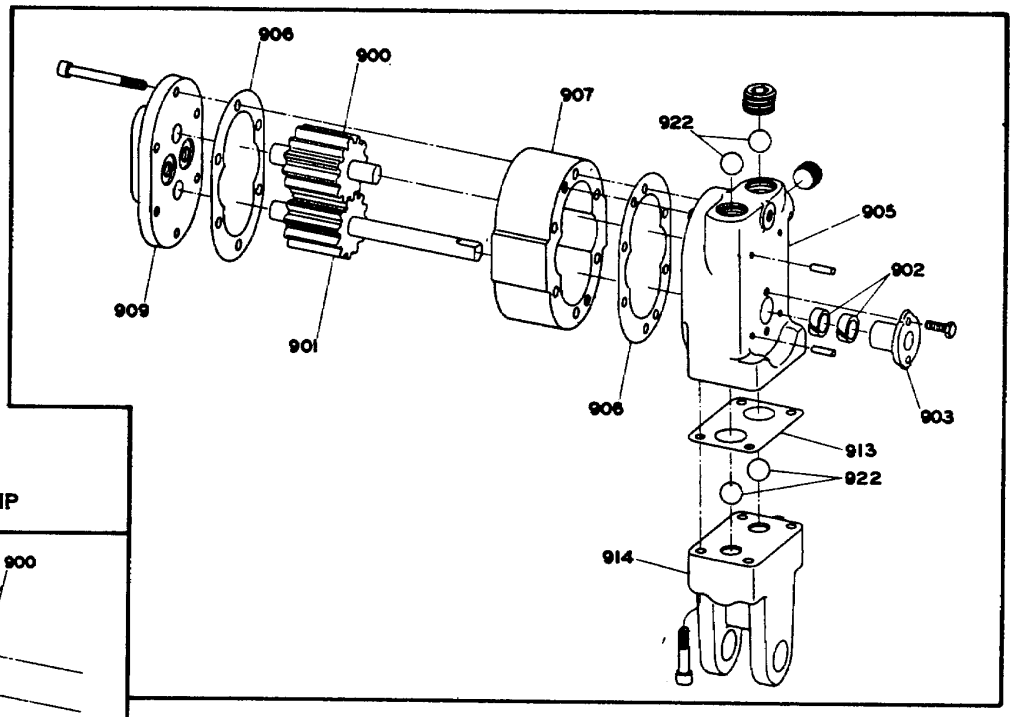
AA-AAX PUMPS ARE THE SAME EXCEPT FOR SHAFT ENDS

AR-ARX COOLANT AND LUBRICATION PUMPS



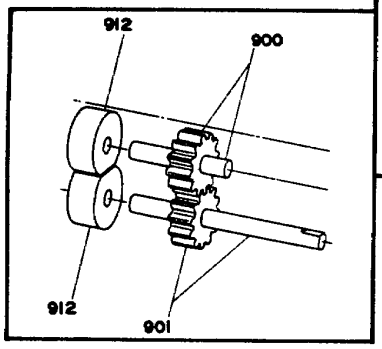


WHEN ORDERING PARTS, SPECIFY TYPE OF PUMP, NAME AND SERIAL NUMBER OF MACHINE.



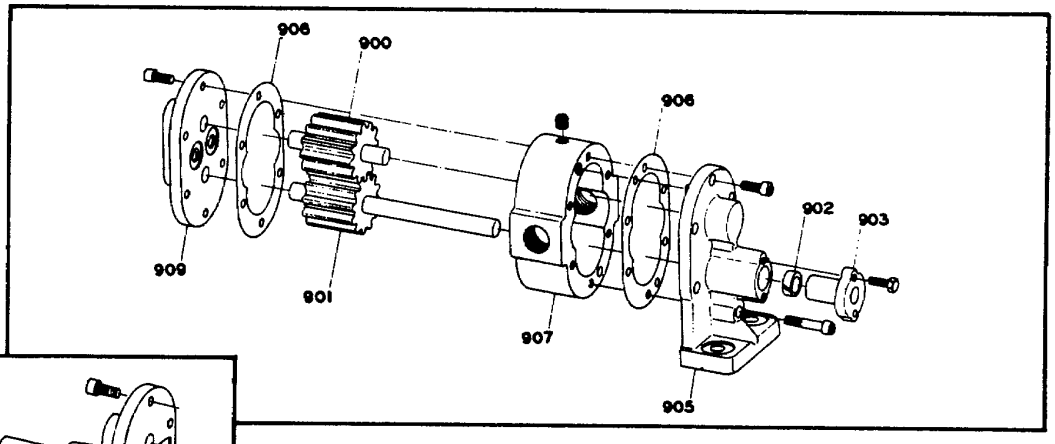
#2 BR PUMP

#1 BR PUMP

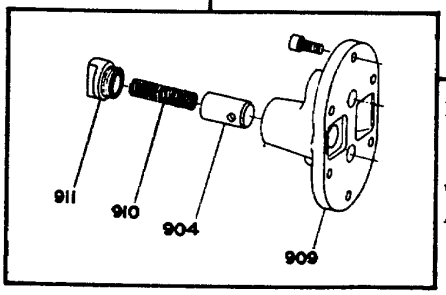


REFER TO #2 BR PUMP FOR REST OF PARTS

BA AND BX PUMP



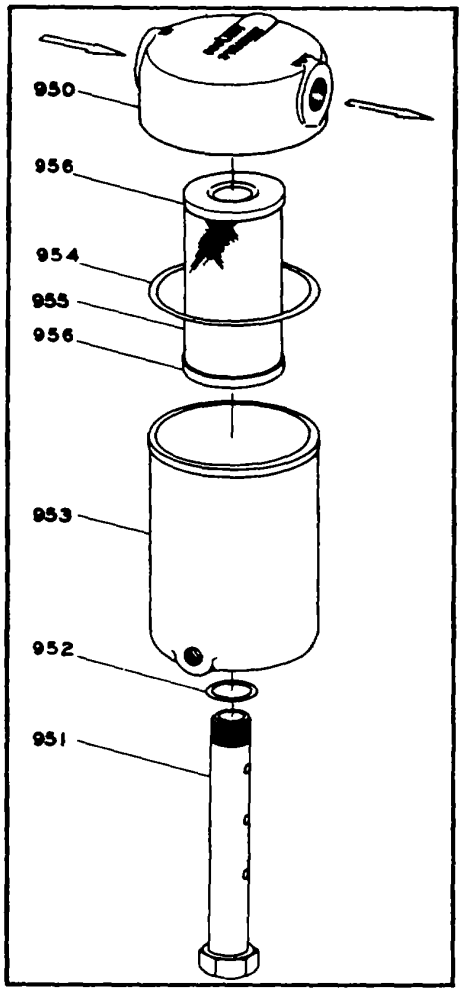
B PUMP



REFER TO BA-BX PUMP FOR REST OF PARTS

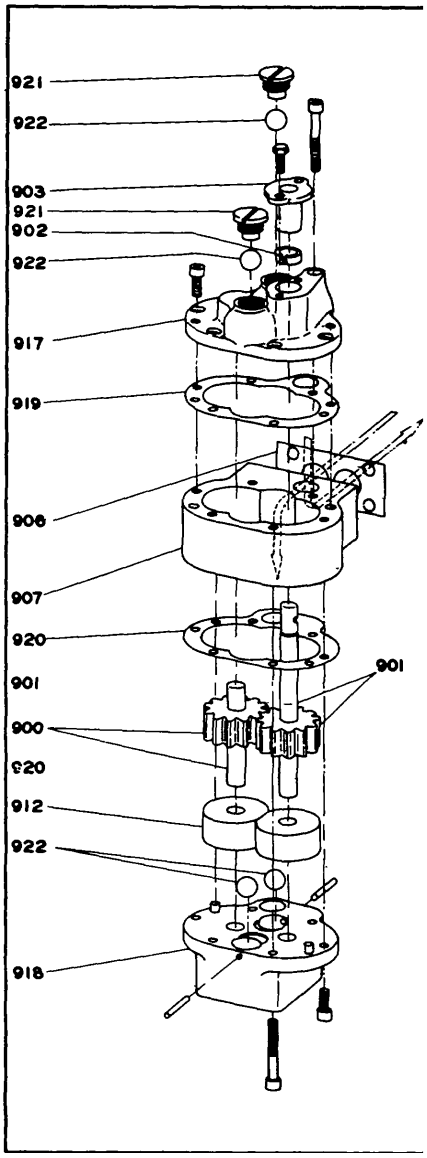
WHEN ORDERING REPAIRS FOR PUMPS, GIVE PUMP TYPE, NAME AND SERIAL NUMBER OF MACHINE.

COOLANT STRAINER



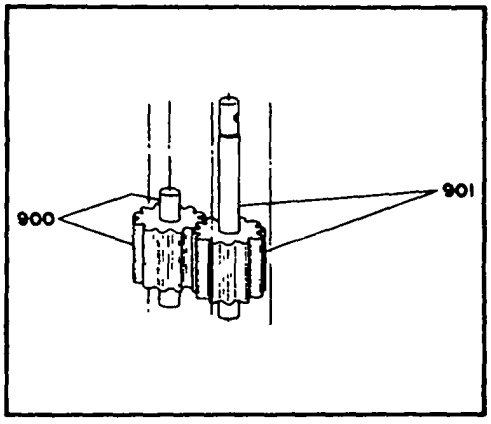
USED ON MOST ALL MACHINES

#1 PUMP

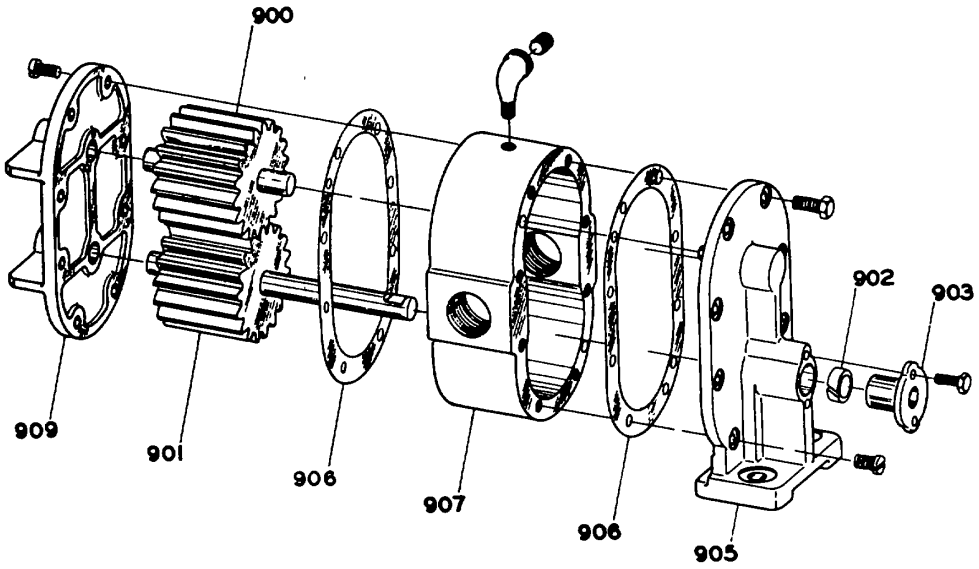


WHEN ORDERING PARTS, SPECIFY PUMP TYPE, NAME AND SERIAL NUMBER OF MACHINE.

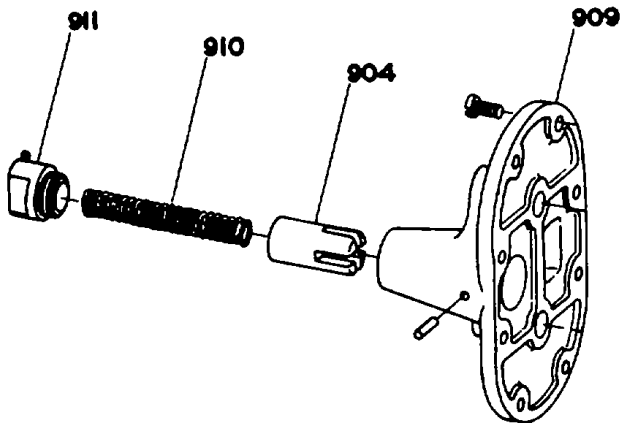
#2 PUMP



REFER TO #1 PUMP FOR REST OF PARTS



C PUMP *CA PUMP*



REFER TO CA PUMP FOR REST OF PARTS TO ASSEMBLE A COMPLETE C COOLANT PUMP.

COOLANT PUMP CAPACITIES

Pump Type	**G.M. @ 300 R.P.M. @ 50 P.S.I.**	**Delivery (Cu.in.)/ Rev.**	**HP. @ 300 R.P.M. @ 50 P.S.I**	*** Power Required H.P./Rev. @ 50 P.S.I.**
A, AA, AR	1.9	1, 46	.23	0008
Landmaco #1 BR #1	2.5	1.92	.31	.0011
B, BA, BR #2 Landmaco #2	5.0	3.85	.62	.0021
C, CA	10.0	7.70	1.25	.0042

*Will Decrease In Proportion To Output Pressure

	PUMP TYPES															PART NAME	NO. RE Q'D
												LANDMACO		LANDMACO			
	A	AA	AAX	AR	ARX	B	BX	BA	C	CA	BAX	BR-1	BR-2	#1	#2		
	A900	AA900	AAX900	AR900	ARX900	B900	BX900	BA900	C900	CA900	BAX900	BR900	BR900	900	900	Short Shaft/	1
																Gear Assembly	
	A901	AA901	AAX901	AR901	ARX901	B901	BX901	BA901	C901	CA901	BAX901	BR901	BR901	901	901	Long Shaft/	1
																Gear Assembly	
P	A902	AA902	AAX902	AR902	ARX902	B902	BX902	BA902	C902	CA902	BAX902	BR902	BR902	902	902	Packing	1
A	A903	AA903	AAX903	AR903	ARX903	B903	BX903	BA903	C903	CA903	BAX903	BR903	BR903	903	903	Packing Bushing	1
R	A904	AA904		AR904	ARX904	B904			C904							Check Valve Disk	1
T	A905	AA905	AAX905	AR'95	ARX905	B905	BX905	BA905	C905	CA905	BAX905	BR905	BR905			Pump Foot	1
	A906	AA906	AAX906	AR906	ARX906	B906	BX906	BA906	C906	CA906	BAX906	BR906	BR906	906	906	Gasket	2
N				AR907	ARX907	B907	BX907	BA907	C907	CA907	BAX907	BR907	BR907	907	907	Body	1
U				AR908												Bushing	1
M	A909	AA909	AAX909	AR909	ARX909	B909	BX909	BA909	C909	CA909	BAX909	BR909	BR909			Body Cap	1
B	A910			AR910	ARX910	B910			C910							Check Valve Spring	1
E	A911			AR911	ARX911	B911			C911							Check ValveCap	1
R												BR912		912		Filler Piece	2
												BR913	BR913			Foot Gasket	1
												BR914	BR914			Base	1
				AR915	ARX915											1-3/16" Diameter Ball	2
				AR916	ARX916											17/32" Diameter Ball	2
														917	917	Upper Cap	1
														918	918	Lower Cap	1
														919	919	Upper Cap Gasket	1
														920	920	Lower Cap Gasket	1
														921	921	Ball Retainer	2
												BR922	BR922	922	922	11/16" Diameter Ball	2
				AR923	ARX923											Pump Body Screws	6
				AR924	ARX924											Packing Bushing Screw	2

COOLANT STRAINER

Part No.	Part Name	No. Req'd	Part No.	Part Name	No. Req'd
950	Strainer Body Cap	1	954	Strainer Body Cap Gasket	1
951	Coolant Strainer Tube	1	955	Strainer Refill	1
952	Coolant Strainer Tube Gasket	1	956	Strainer Cap	2
953	Coolant Strainer Body	1			

Coolant - Lubrication Pump Schedule

A Coolant Pump
1-1/4" Double Standard Pipe and Nipple Threading
Machine
2" Double Standard Pipe and Nipple Threading Machine
AA Coolant Pump
#1 Automatic Nipple Threading Machine
AA Lubricating Pump
43/4" Pipe Threading and Cutting-Off Machine
6" Pipe Threading and Cutting-Off Machine
8" Pipe Threading and Cutting-Off Machine
8-5/8" Pipe Threading and Cutting-Off Machine
12" Pipe Threading and
13-3/8" Pipe Threading and Cutting Off Machine
16" Pipe Threading and Cutting-Off Machine
18" Pipe Threading and Cutting-Off Machine
20" Pipe Threading and Cutting-Off Machine
AAX Coolant Pump
6B Double Pipe and Nipple Threading
Machine
AR Coolant Pump
3/8" Single Threading Machine
1" - 1-1/2" Single Landis Standard Threading Machine
1" - 1- 1/2" Double Standard Threading Machine
2" - 2-1/2" Single Landis Standard Threading Machine
2" - 2-1/2" Double Standard Threading Machine
6B Double Pipe and Nipple Threading
Machine Arranged for Bolt Work
6C- 8C Threading Machine
2" Pipe Threading Machine - Series 200 Little Landis
2" Pipe Threading and Cutting-Off Machine
16-20B Threading Machine
10TRM Thread Rolling Machine
AR Lubricating Pump
32C - 48C Threading Machine
ARX Coolant Pump
5C Threading Machine
B Coolant Pump
1" - 1-1/2" Triple Standard Threading Machine
2" - 2-1/2" Triple Standard Threading Machine
16DEN Double End Automatic Pipe and Nipple Threading
Machine 6’ and 10’
BX Coolant Pump
24PW Thread Roller
32TFRI Thread Rolling Machine
32TFRT Thread Rolling Machine
32TFRG Gear Roll-Finishing Machine
48 Hy-Duty Thread Rolling Machine
72SD Single Die Gear Roll-Finishing Machine
BA Coolant Pump
1- 1/4" - 2" Double End Threading Machine
4" Pipe Threading and Cutting-Off Machine BAX Coolant Pump
16C - 20C Threading Machine with Slow Speeds and Separate Pump
C Coolant Pump
1" - 1-1/2" Bolt Factory Threader
12S2 Semi-Automatic Threading Machine
CA Coolant Pump
3/4" - 1" Automatic Forming and Threading Machine
4-3/4" Pipe Threading and Cutting-Off Machine
6" Pipe Threading and Cutting-Off Machine
8" Pipe Threading and Cutting-Off Machine
8-5/8”pipe Threading & Cutting-Off Machine
12" Pipe Threading and Cutting-Off Machine
13 -3/8" Pipe Threading and Cutting-Off Machine
16" Pipe Threading and Cutting-Off Machine
18" Pipe Threading and Cutting-Off Machine
20" Pipe Threading and Cutting-Off Machine
48TA - 69TA - 77TA Tapping Machine
#1 Coolant Pump
1" - 1-1/4" - 1-1/2" Single Threading Machine with Standard Spindle Speeds
2" - 2-1/2" Single Threading Machine with Standard Spindle Speeds
#2 Coolant Pump
1" - 1-1/4" - 1-1/2" Single Threading Machine with Spindle Speeds Slower than Standard
2" -2-1/2" Single Threading Machine with Spindle Speeds Slower than Standard
#1-1/2 R Shell Tapping Machine
#2-1/2 RR Shell Tapping Machine
1”-1-1/4” - 1-1/2 Double Threading Machine
2” - 2-1/2” Double Threading Machine
#2 Automatic Nipple Threading Machine
BR #1 Coolant Pump
10C - 12C Single Threading Machine with Standard Spindle Speeds
16C - 20C Single Threading Machine with Standard Spindle Speeds
BR #2 Coolant Pump
10C - 12C Single Threading Machine with Speeds Slower than Standard
10C - 12C Double Threading Machine
16C - 20C Single Threading Machine with Speeds Slower than Standard
16C - 20C Double Threading Machine
32C - 48C Threading Machines
CLAN Automatic Nipple Threading Machine
4 - Spindle Semi-Automatic Threading Machine
Earlier models used a Pioneer pump which is obsolete and for which no repairs are available Later machines used a Brown and Sharpe pump. Information available from Teledyne Landis Machine.

COOLANT CAPACITY

MACHINE	MODEL	GALS.	MACHINE	MODEL	GALS.
5C	Single	7	1 1/2 4 Spindle	4 Spindle	60
6B	Double	30	3/4 - 1 Automatic Forming & Threading	3/4 - 1	31 1/2
6C-8C	Single	7	1 1/4 - 2 Double End	Double	50
	Double	15	Chaser Grinder	1 1/2 Old	15
	Single P.N.	18		1 1/2 New	20
	Double P.N.	32	16-20B Thread Cutting Machine	16-20B	8
10C-12C	Single	19	10TRM Thread Rolling Machine	10TRM	8
	Double	35	2’ Pipe Machine		3 1/2
	Single P.N.	18		4 - 4 3/4	12 1/2
	Double P.N.	36		6	11 1/2
16C-20C	Single	20	Pipe Threading Cutting Off Machine	8-8 5/8	13
Double		40		10-12-16	35
	Single P.N.	20		13 3/8-20	20
	Double P.N.	40		18	21
32C-48C	Single 30”	20	4 CLAN Automatic Nipple		20
	Single 48:	27	16DEN Double End	6 Ft.	25
	Single 60:	**31**		**10 ft.**	**35**
	Double	40	NO.1 Centerless Thread Grinder	No. 1	85
#1-#2-#2C AUTOMATIC NIPPLE	#1-#2-#2c	30		No. 10	1 3/4
1 1/4	Single P.N.	15	Precision Tapping Machine	No. 11	2 1/2
	Single	15		No. 11R	6
1-1 1/2	Double	30		No. 12	3
	Single	22	Rolling Machine - Air	16LNRH20	
2-2 1/2	Double	40	Rolling Machine - Hydraulic	16LNRH	20
	Single	24	PW Rolling Machine	24PW	44
1-1 1/4 - 1 1/2 STANDARD	Double	9	32TFRI In/Thru-feed Rolling Machine	32TFRI	50
	Single	6	32TFRT Thru-feed Rolling Machine	32TFRI	
2-2 1/2 STANDARD	Double	12 1/2	32TFRG Gear Roll Finishing Machine	32TFRG	50
SHELL TAPPER	Single	15	48 HY-DUTY Rolling Machine	48 HY-DUTY	50
1 1/2 R-RR-RB-HO	Double	30	72SDA Gear Roll Finishing Machine	72SDA	25
3/4-1 4 Spindle Semi-Automatic		50			

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