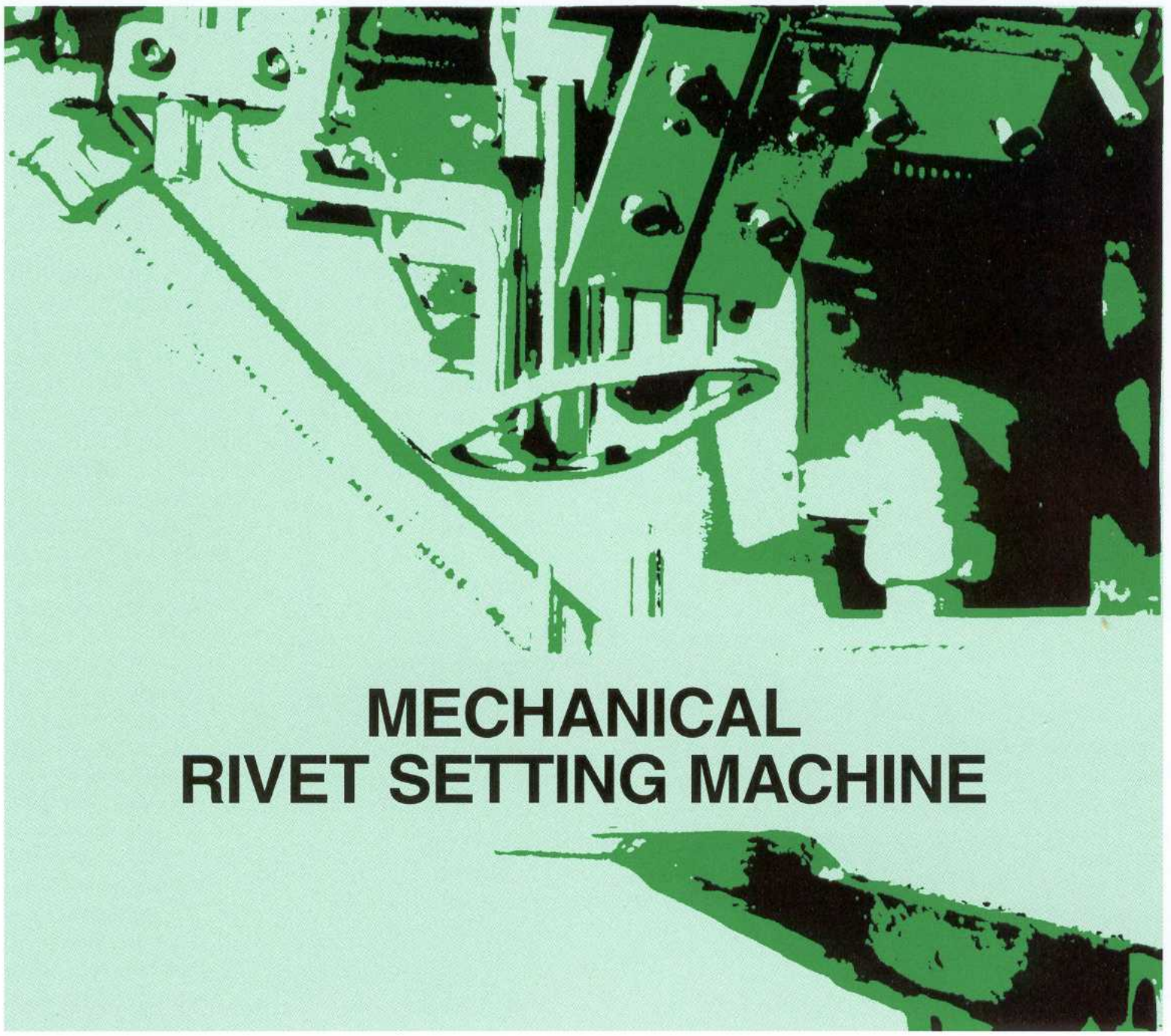
SERVICE MANUAL



MECHANICAL
RIVET SETTING MACHINE

Chicago Rivet

Warranty

The Chicago Rivet & Machine Company warrants automatic rivet setting machines, and parts (excluding Tools, Driver Jaws and Anvils) to be free from defects in material and workmanship under normal use and service for a period of one (1) year from the date of shipment by the Company. The Company's obligation under this warranty is limited to repair or replacing, at its option, any goods which upon inspection by the Company shall disclose to the Company's satisfaction to have been defective in material or workmanship. The Buyer must return the goods to the Company's designated factory, shipping charges prepaid, with complete information as to alleged defects and the installation, operation and service of the goods.

Chicago Rivet

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Introduction

Chicago Rivet mechanical machines include a complete line of both electrically- and foot-powered, general-purpose rivet-setting machines. They are designed to meet a wide range of applications requirements, including multi-rivet setting. In addition, Chicago Rivet manufactures a line of pneumatic machines which employ the steady, even force of air for riveting fragile materials, or those of varying thickness.

This *Set-up & Service Manual* provides all general descriptions and instructions for the unpacking and set-up, inspection and adjustment, lubrication and troubleshooting of *all models* of *mechanically-operated* rivet-setting machines manufactured by Chicago Rivet & Machine Company. It also outlines procedures for rivet-size changeover. Where specific information or drawings for a particular model are referred to, consult the *Parts & Assembly Prints* for your model of machine. These *Parts & Assembly Prints*, one for each model of machine model, and this *Set-up & Service Manual* are organized to be complementary. Before attempting to uncrate, set up, adjust or operate the machine, be sure to *read and understand* all instructions, especially all safety precautions. They will enable you to put the machine into operation efficiently, safely, and without machine damage. The manual is concise and the short reading time required will be more than offset by savings in set-up time.

All Chicago Rivet machines and accessories are designed for a long life of high-production, trouble-free service, and are warranted for a period of one year (see warranty, inside cover), but they must be given the inspections and adjustments, lubrication and cleaning as specified in this manual. By carefully following procedures and maintenance outlined here, you can be assured of the best possible results from your Chicago Rivet machine, and also avoid personal injury or damage to the machine during set-up, operation and maintenance.

Handling & Safety Precautions

General Safety: Keep in mind one very important point, about rivet-setting machines; they are basically *top-heavy*—especially *pedestal* machines. Usually, *safe* practices also avoid *machine damage* as well as *personal injury*, whether in handling, set-up, adjustment or operation of the machine. Never wear jewelry, long sleeves, or neckties in handling or operating machinery. Always wear face mask or respirator and use ventilation fans if necessary when using toxic solvents or other chemicals, when cleaning machines.

Uncrating and Handling: Immediately upon arrival, visually check the outside of crates before opening, for visible evidence of rough handling or damage (sometimes an important point in the success of damage claims with common carriers). If there is, so note with a short description in signing the carrier's bill of lading, or *don't sign at all* until checking with officials of the carrier. Uncrate first the top boards and then sides, using tools carefully to avoid damage to machine. Leave base of crate intact with machine on it and inspect machine for *concealed damage*.

Check bill of lading against purchase order and invoice to be sure all items were delivered, including the box of tools (extra driver, jaw and anvil) fastened within the crate.

Use a fork lift or hand truck under the base to transport the machine and, since it is top-heavy, secure the upper machine column to the forklift with a heavy strap, belt or rope. Do *not* use a *sling* in handling the machine; and do *not* use the *hopper* or *raceways* as a handhold. Wear safety shoes and gloves in handling the machine, and remove (as stated above) any loose items of clothing and all jewelry, especially rings.

Slowly move the machine, on the crate base, to the desired location with the forklift, and move the machine off the crate base to the floor or bench.

Operating Safety: Be sure anyone allowed or assigned to operate a Chicago Rivet machine: (1) is thoroughly familiar with machine operation and has read and understands Page 3, "Operation and Description," of this service manual; (2) wears *safety glasses* and *safety shoes*; (3) removes or secures all items of loose clothing; (4) removes all rings and other jewelry.

Be sure, before anyone touches any machine component for servicing and maintenance of machine, that power is shut off/disconnected, and *safeguarded* so it *cannot be mistakenly turned on* by anyone, except at the direction of the person doing the servicing.

Set Up & Make-Ready

Set-up Procedure:

1. Make certain intended location of machine leaves ample clearance space around machine for both operator and set-up and maintenance personnel.

2. Level machine and anchor with bolts to floor but leveling need not be *perfect*. Bench-type machines must be solidly attached.

3. Clean all preservative grease from machine with degreasing fluid, or similar solvent (avoid gasoline or inflammable materials which are too dangerously explosive and toxic, respectively). Also clean raceways of dirt with brush and cleaning fluid.

4. Completely inspect and lubricate machine according to the lubrication chart and schedule on Page 8, "Inspections & Lubrication". Use SAE 20 oil for lubricating the machine, but do *not* lubricate raceways.

5. Connect the electrical control panel to the electrical supply (be sure voltage, amperage, phase and frequency—Hertz—match the requirements of the machine). This hook-up should be done by a *competent electrician*. Be sure *not* to cover the identification plate of machine.

6. With power *off* make all inspections, in order, outlined below (in this Section) and any adjustments necessary, following procedures on Page 4 and 5, "Adjustments & Part Replacements".

7. After various rivet-setting components are adjusted to specification, clear machine of rivets and turn off hopper feed and lower the anvil so machine can be cycled (without setting a rivet).

8. Place a work assembly on anvil and turn flywheel to bring driver down to riveting position, and raise anvil until assembly is snug between driver and anvil.

9. Return machine to "home" position by turning flywheel.

10. Fill hopper with rivets to proper level (half full) and release transfer slide lock. Transfer a rivet into the jaws.

11. Turn power supply or control switch "on", and trip machine.

12. Check rivet clinch for tightness. If too tight or too loose follow procedure outlined in *Rivet Clinch* on Page 4, *"Adjustments & Part Replacements"* to adjust tightness of rivet clinch and recheck it by repeating steps on Page 4.

13. Machine is set up and ready for production which will yield the final-adjusted clinch.

Operation & Description

Scope of Machine Capabilities: Chicago Rivet mechanical machines can set rivets of a wide range of size and head style. They require, in one case (with slight variations in only rivet shank length) only machine adjustments, in the other cases (variations in shank diameter or head style) a changeover to a new set of various machine components. The dual head models, for multi-rivet setting, can be adjusted to set rivets on various centers. These changes are completely outlined on Page 12, "Rivet Size Changeover". In addition, common operating adjustments must be made, and machine maintenance, from time to time, but no special tools are required.

The same type of component changeover expands machine versatility, adapting it for setting eyelets, drive screw, tacks, grommets and other similar fasteners. Components and accessories available for changeover include a wide variety of horns, anvil holders and special anvil fixtures. Contact your Chicago Rivet representative, or the home office for complete current information.

Elements of Operation: These machines are foot-powered or electric-motor powered for the rivet-setting process, the latter operating cycle electrically controlled with a footswitch or handswitches. The electric motor power is transmitted through a clutch—which also acts as a brake—and is converted by an eccentric crank to the reciprocating motion required for setting rivets. Each rivet-setting cycle of operation normally requires an individual operation of the switch(s). The reciprocating motion, acting through the plunger, forces the driver against the rivet held in the jaws, upsetting the rivet against the anvil. The anvil is held in an anvil holder, horn or fixture supported by the horn, which is attached to the machine column or head.

Anvil—actually determines the shape and quality of the clinch because it does the forming or upsetting of the rivet. So it is one of the most important accessories to the machine, and is available in many styles and lengths. It is a factory-assembled unit consisting mainly of the anvil shell, nut, spring, and a pilot. The rivet presses against a pilot as it is guided by it through the assembly until it meets the anvil shell, which forms the rivet clinch. Because the rivet-setting machine stroke is *fixed*, the clinch is adjusted with the anvil raising/lowering it, until the clinch is satisfactory, but also requires machine adjustment (see *Clinch*, Page 4.)

Jaw & Driver—hold the rivet in place and force it against the anvil, respectively, to form clinch on the rivet(s).

Raceways & Transfer Slide—deliver the rivet from the hopper to the jaw, and consist of an *upper raceway* and *lower raceway*. These which comprise a group of plates between which the rivets slide, and the *transfer slide* which, spring-loaded and actuated by the *transfer slide lever*, transfers rivet from the upper to the lower raceway, once each operating cycle.

Hopper—feeds rivets, synchronized with the rivet-setting operation, through a slotted selector bowl, into the upper race-way. Driving speed is adjustable, with two or three speeds available (depending upon machine model), to accommodate rivets of different length (any shank length up to, but not exceeding, the depth of the hopper bowl slots). A given hopper accommodates *one* combination of *rivet head size and shank diameter* however it is designed for *quick change* when these rivet requirements vary, except for a few models for which the original hopper must be factory-modified. The hopper should not be *overfilled*, and for best machine operation, should be *half* full of rivets. The hopper is emptied of rivets by loosening and removing knurled nut, washer and spring from hopper shaft(s). Place container under bowl to catch rivets, rotate and remove bowl from shaft. Finally, slide all rivets out of the race-way. When reassembling hopper part number on washer must be visible (on outside of washer).

Power/Actuating Mechanism—consists of a clutch assembly, including the cam, shaft, roller cage and latch. Trip mechanism, flywheel and motor (excluding foot operated machines). These are controlled by the foot pedal or switch to permit one complete setting cycle. On some models, there also is a brake; on other models, the clutch acts as a brake.

Periodic Maintenance & Adjustments: Machine parts should be inspected periodically for wear or need of adjustment or lubrication. Some should be oiled or greased weekly; some even daily. See Page 8 for a complete schedule of required lubrication, and the *Parts & Assembly Guide* for your model of machine.

Replacement Parts: Chicago Rivet machine parts are stamped with easily identified part numbers of one or two letters and a dash, followed by numerals. Parts are described in the *Parts & Assembly Guide* for each machine. Each machine nameplate shows machine model/serial numbers, and part numbers of the *original* driver, jaws and anvil supplied with the machine. Part numbers, and dates, of any parts changed, added or modified should be recorded on this nameplate. An up-to-date history of the machine is then immediately available right where it's needed—at the machine.

Adjustments & Parts Replacement

Unplug machine power, if possible, or *be sure* power is off and *cannot be accidently turned on* by someone else. Read *Safety Precautions* on Page 1 before working on machine.

Clinching Adjustment

Symptom of Adjustment Need: New anvil or replacement. Rivet is too tight or too loose in assembly, or clinch is off-center.

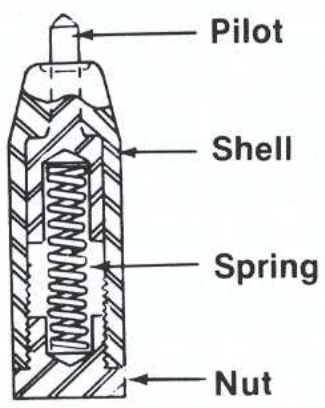
Machine Specification: Distance from top surface of anvil to driver at its *lowest* position, must equal the *minimum* thickness of the work material assembly.

Procedure: If rivet is too tight or loose, adjust rivet clinch by first bringing driver down to *lowest* position, by turning the flywheel. Then adjust the anvil to the *Machine Specification* (above). Set a few trial assemblies typical of the work material thickness in each. If not satisfactory, repeat the procedure to fine-tune the adjustment. If driver does not center properly, with anvil , when in "down" position, inspect driver, anvil and anvil holder for wear, misalignment, damage, and replace if necessary (see respective section on these components in this Section). If these are in good condition, align driver and anvil by simply loosening the four capscrews securing head to column, shifting the head as necessary and re-tightening the screws. In cases where the horn is mounted to the head, align horn to bring ting tin lines ne the driver.

Anvil Replacement/ Adjustment

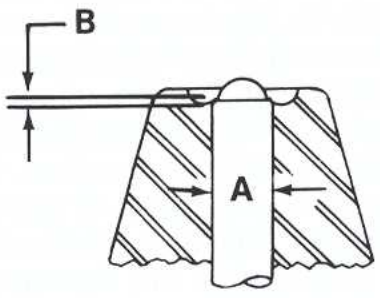
Using a rod through the anvil holder, push the old anvil out from below. Check pilot setting of new anvil as follows: holding anvil assembly in a drill or lathe chuck, remove nut and spring, replace nut. Then check pilot projection distance "B" (as shown in *Pilot Setting* detail drawing Figure 1).

Figure 1



The anvil is a precision made tool designed to clinch semi-tubular rivets. Unless adequate facilities are available in your shop for repair of anvils they should be returned for proper reconditioning or replacement.

NOTE:
Pilots are supplied oversize and must be carefully fitted to the shell. If hole in shell is worn or bell-mouthed it should be relapped before fitting the pilot.



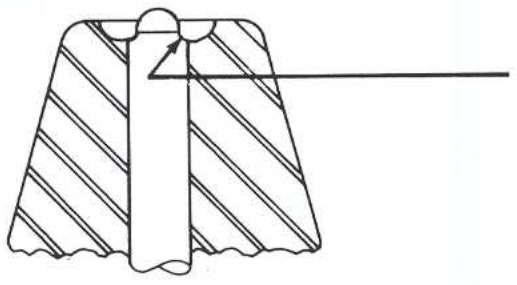
Pilot shown resting against anvil nut

Pilot should be set as shown see table for correct dimensions.

To check pilot setting:

1. **Hold shell securely in a drill chuck or lathe chuck and remove nut.**
2. **Remove spring and replace nut. If pilot is too high, grind off bottom of pilot. If pilot is too low, grind off bottom of shell.**

A	B
1/16	.003/.006
3/32	.003/.006
1/8	.004/.007
9/64	.004/.007
5/32	.004/.007
3/16	.005/.008
1/4	.005/.008
5/16	.006/.010
3/8	.006/.010



Edge must be sharp. Do not grind or polish pilot diameter shown as edge of rivet will be forced into opening and buckle instead of clinching properly. Foreign matter also may settle in crevice causing pilot to lodge in shell.

Jaws

Sympton of Adjustment Need:
Rivets may topple and/or tend to feed improperly from the jaws to the work assembly.

Machine Specification: In the lowered position, jaws should clear anvil pilot tip or assembly by approximately 1/32 inch, slightly more with longer rivets, and in the upper position, should leave .003 to .005 inch vertical clearance with bottom surface of lower race plates. "C" distance (see illustration, Figure 4 & 5 *Jaw/Driver/Race Plate adjustment*) Page 7 from top surface of jaws to bottom of driver should be less than the rivet head diameter.

Procedure: At the top and bottom of the plunger cover plate (see *Machine Front View* illustration, Figure 3, Page 6), an adjustment sockethead setscrew, secured with a locknut, bears on the stop block of the jaw carrier bar, limiting the bar's vertical movement. Loosen these locknuts, adjust the two limit-stop setscrews until the jaws are set to *Machine Specification* above, and then re-tighten the locknuts to secure the setscrews in adjustment. At the same time, make sure the screw and nut securing the jaws and auxiliary jaw springs (the inward- bowed leaf-type centering springs) to the carrier are tight. These springs prevent "spitting" of the rivets in the jaws.

Driver

Symptom of Adjustment Need:
Driver tends to drop slightly, and possibly rivets fail to drop properly into the jaws, both caused by long-term wear on toggle pins/holes.

Machine Specification: .003 to .005 inch horizontal clearance between driver and back plate of lower race plates, and vertical alignment of the bottom end of the driver slightly below lower edge of the back plate to clear head of rivet, (the upper plate of the lower race plate assembly) when the driver is set at its vertical "Home" position—at the top of its vertical travel (see illustration Jaw/Driver/Race Plate Adjustment Page 7).

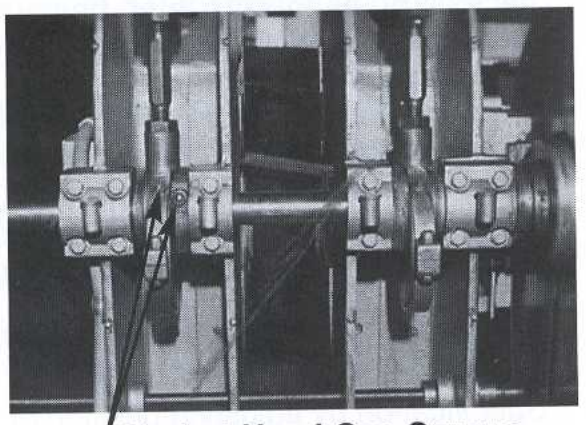
Transfer Slide

Symptom of Adjustment Need:
Rivets do not feed into lower raceway, even though upper raceway contains rivets, and transfer slide is unlocked.

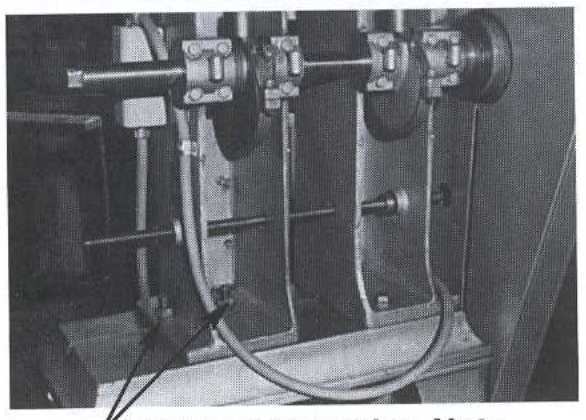
Machine Specification:
Approximately 3/8 inch between end of transfer slide and end of transfer slide lever, to give rivet enough travel time to drop into lower raceway. Transfer slide opening must align with both upper and lower race plates in order to pick-up and release rivet. The transfer slide is spring-loaded, and should move freely with only slight thumb pressure.

Procedure: Check transfer slide movement and adjust transfer slide and transfer slide lever. Adjust if necessary, as follows: first, be sure driver is in *full down* position (see *Driver Adjustment* in this Section). Measure distance from end of transfer slide to end of transfer slide lever. Adjust to *Machine Specification* by adjusting position of transfer slide lever pusher on toggle eccentric bar as necessary, and secure by tightening the pusher capscrew. (or) Adjust to *Machine Specification* by adjusting position of collar on transfer slide lever rod. (or) Adjust to *Machine Specification* by adjusting position of transfer slide lever adjusting screw.

Adjustments & Parts Replacement



Socket Head Cap Screws



RH Head Mounting Nuts

Figure 2

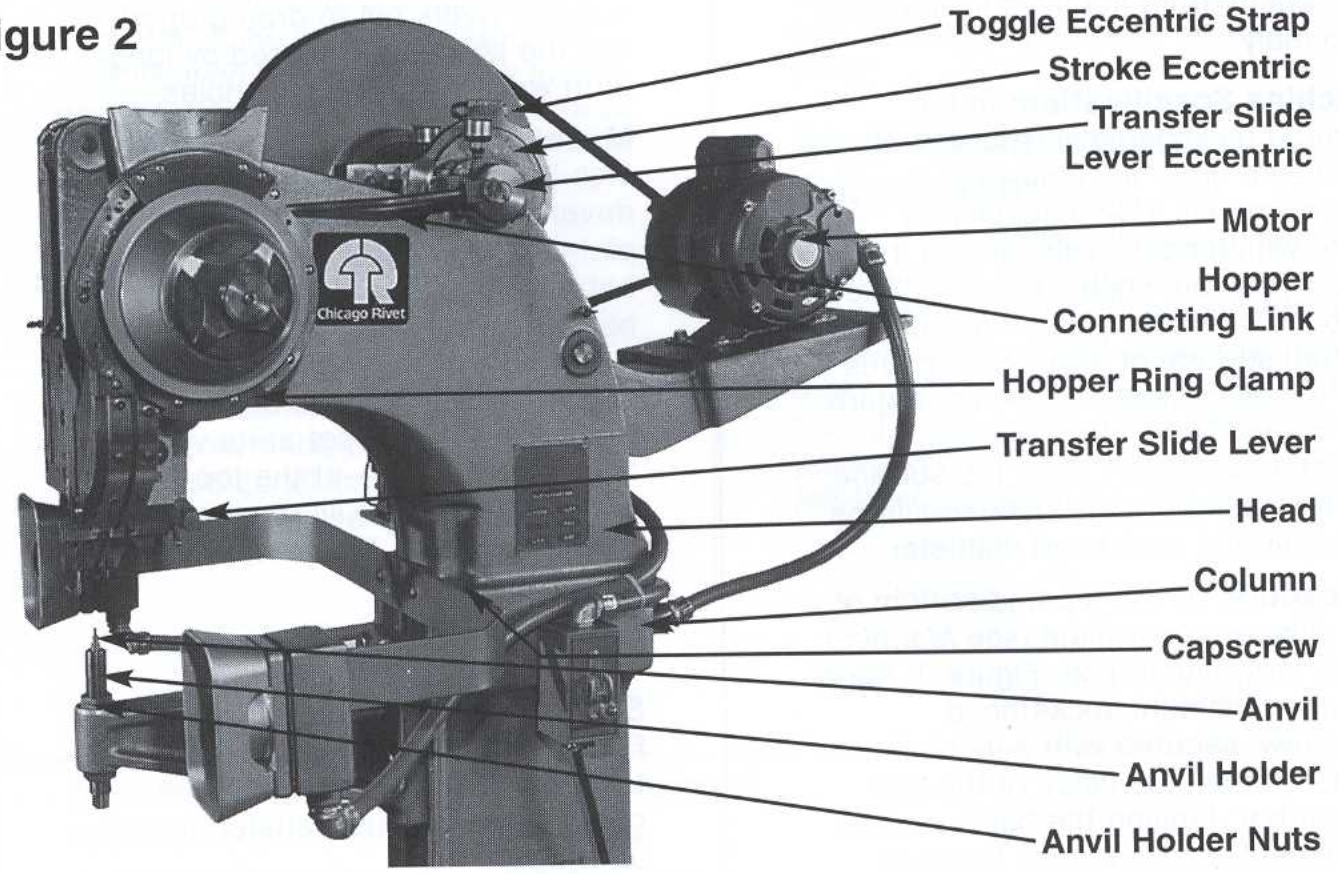


Figure 3

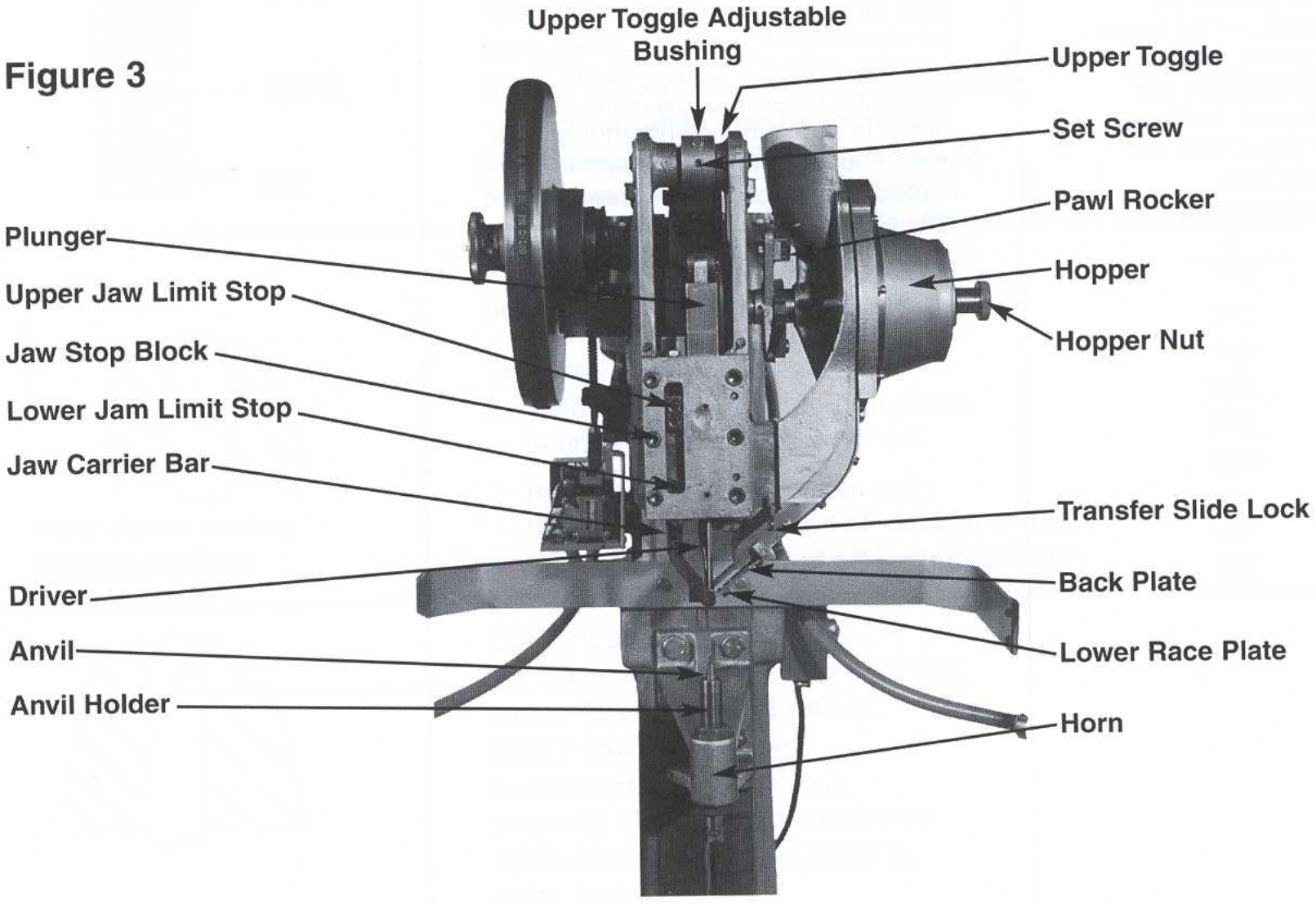


Figure 4

A: .003- to .005-inch clearance for vertical driver movement.

B: .003- to .005-inch maximum clearance. (Jaws should be as close to the lower race plate assembly as possible without touching them.

C: This gap must be smaller vertically than the diameter of the rivet head being used to prevent the rivet from turning over in the jaws. This is particularly important when using extremely short rivets.

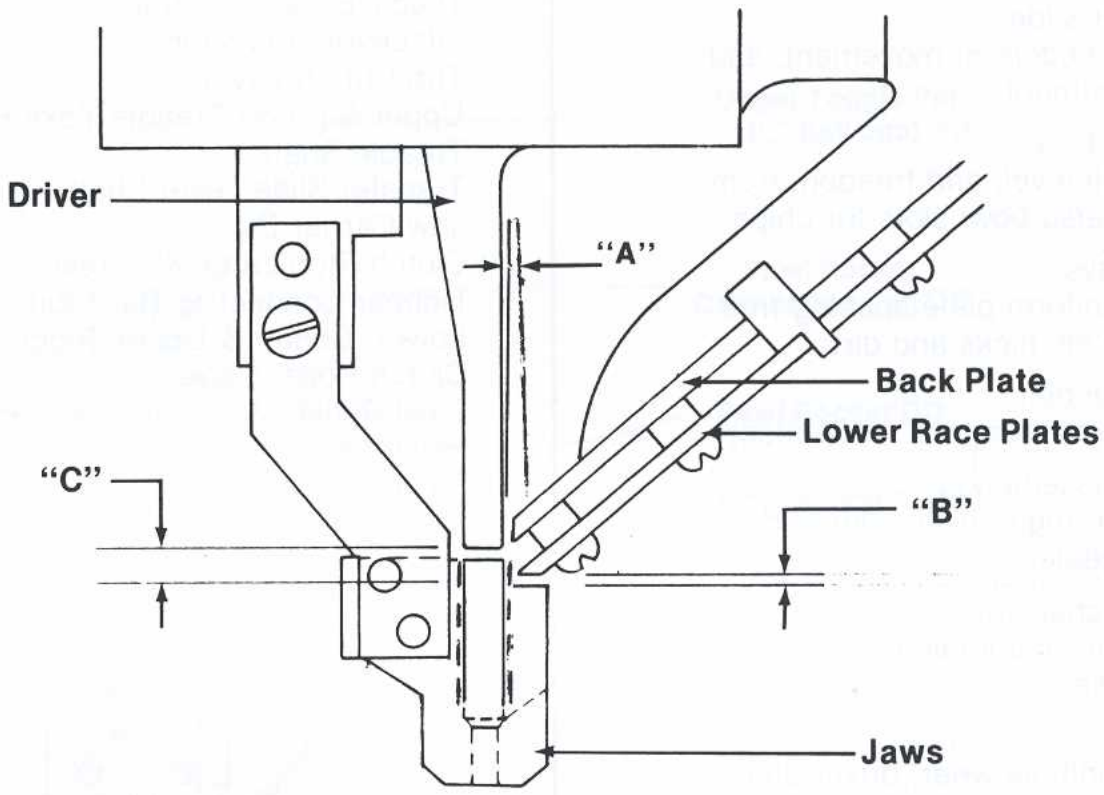
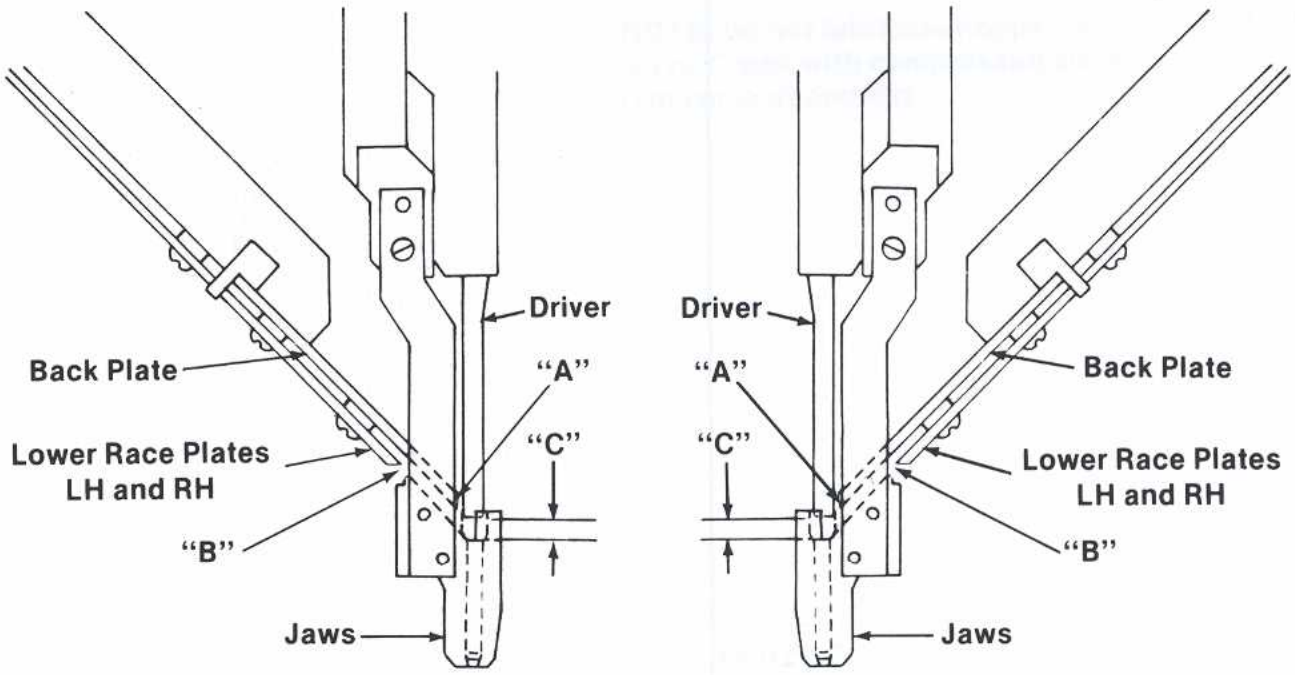


Figure 5

A: .003- to .005-inch clearance for vertical driver movement.

B: Top inlet of jaws should be even with, or slightly below, the upper edges of the lower race plates.

C: This gap must be smaller vertically than the diameter of the rivet head being used to prevent the rivet from turning over in the jaws. This is particularly important when using extremely short rivets.



Inspection & Lubrication

Inspection

Hopper & Raceway Screws . . . . . .
for tightness

Transfer slide . . . . . .
for freedom of movement, and adjustment

Hopper bowl . . . . . .
for fill level, and freedom from dirt, *also* bowl slots for chips

Raceways . . . . . .
for uniform plate spacing free from oil, nicks and dirt

Flywheel belt . . . . . .
for tightness (1/2″ deflection)

Clutch assembly . . . . . .
for strange noises, dirt and congealed oil

Trip mechanism. . . . . .
for dirt accumulation, oil and grease

Toggles . . . . . .
for pin/hole wear, driver-drop

Plunger & jaw carrier bar . . . . . .
for excessive side play

Hopper shaft . . . . . .
for free-turning

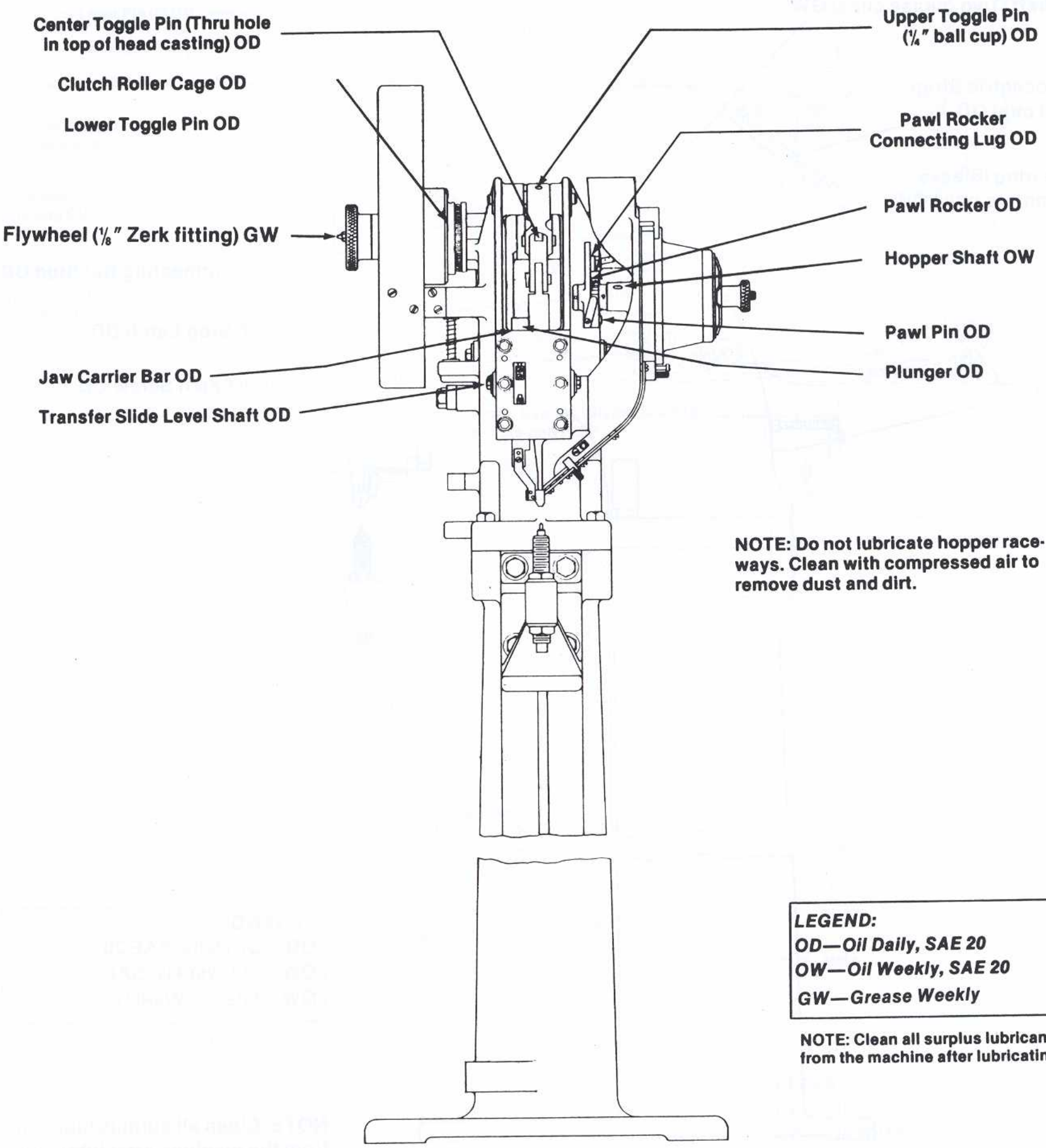
Lubrication

Daily Lubrication Schedule:
(with SAE 20 oil)
Toggle Eccentric Strap
Lift Lever Stud & Pin
Trip Cut-off Lever Pin
Upper & Lower Treadle Yoke Pins
Treadle Shaft
Transfer Slide Lever Shaft
Jaw Carrier Bar
Clutch Stop Latch & Screw
Hopper Connecting Bar Stud
Lower, Center & Upper Toggle Pins
Clutch Roller Cage
Pawl Rocker & Connecting Lug
Pawl Pin
Plunger

Weekly Lubrication Schedule:
(with SAE 20 oil)
Hopper Shaft
Motor Bearings (sleeve type)

Weekly Lubrication Schedule:
(with No. 2 Cup Grease)
Cut-off Stud
Flywheel
Knock-off Pin
Clutch Shaft

Figure 6



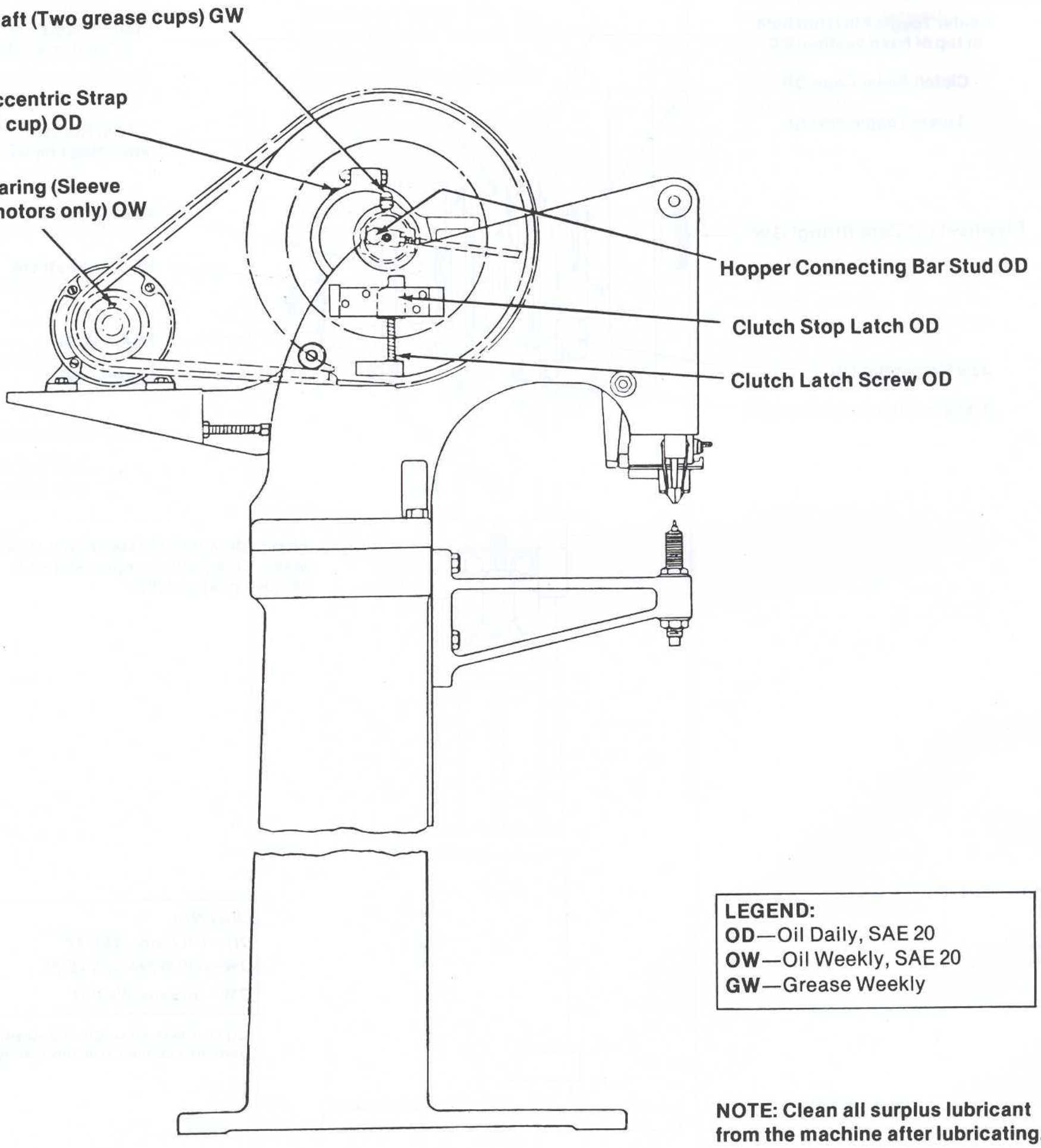
NOTE: Do not lubricate hopper raceways. Clean with compressed air to remove dust and dirt.

LEGEND:
OD—Oil Daily, SAE 20
OW—Oil Weekly, SAE 20
GW—Grease Weekly

NOTE: Clean all surplus lubricant from the machine after lubricating.

Inspection & Lubrication

Figure 7



LEGEND:
OD—Oil Daily, SAE 20
OW—Oil Weekly, SAE 20
GW—Grease Weekly

NOTE: Clean all surplus lubricant from the machine after lubricating.

Figure 8

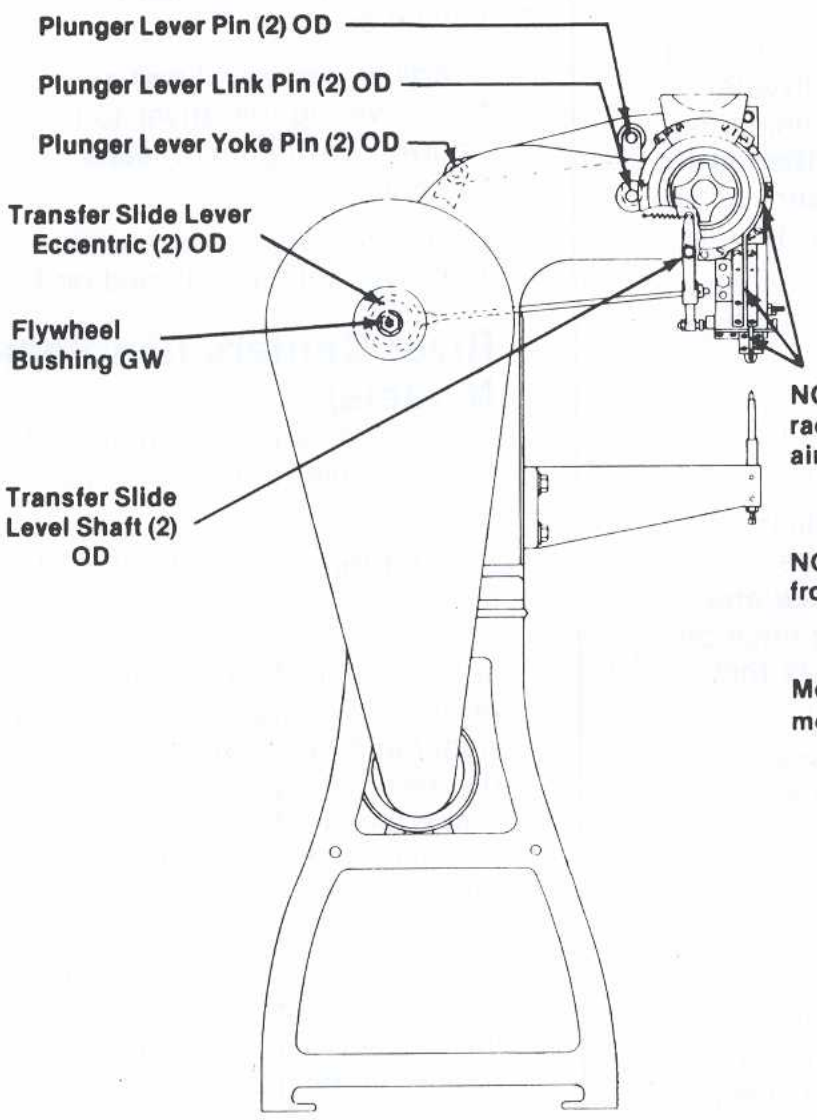


Figure 9

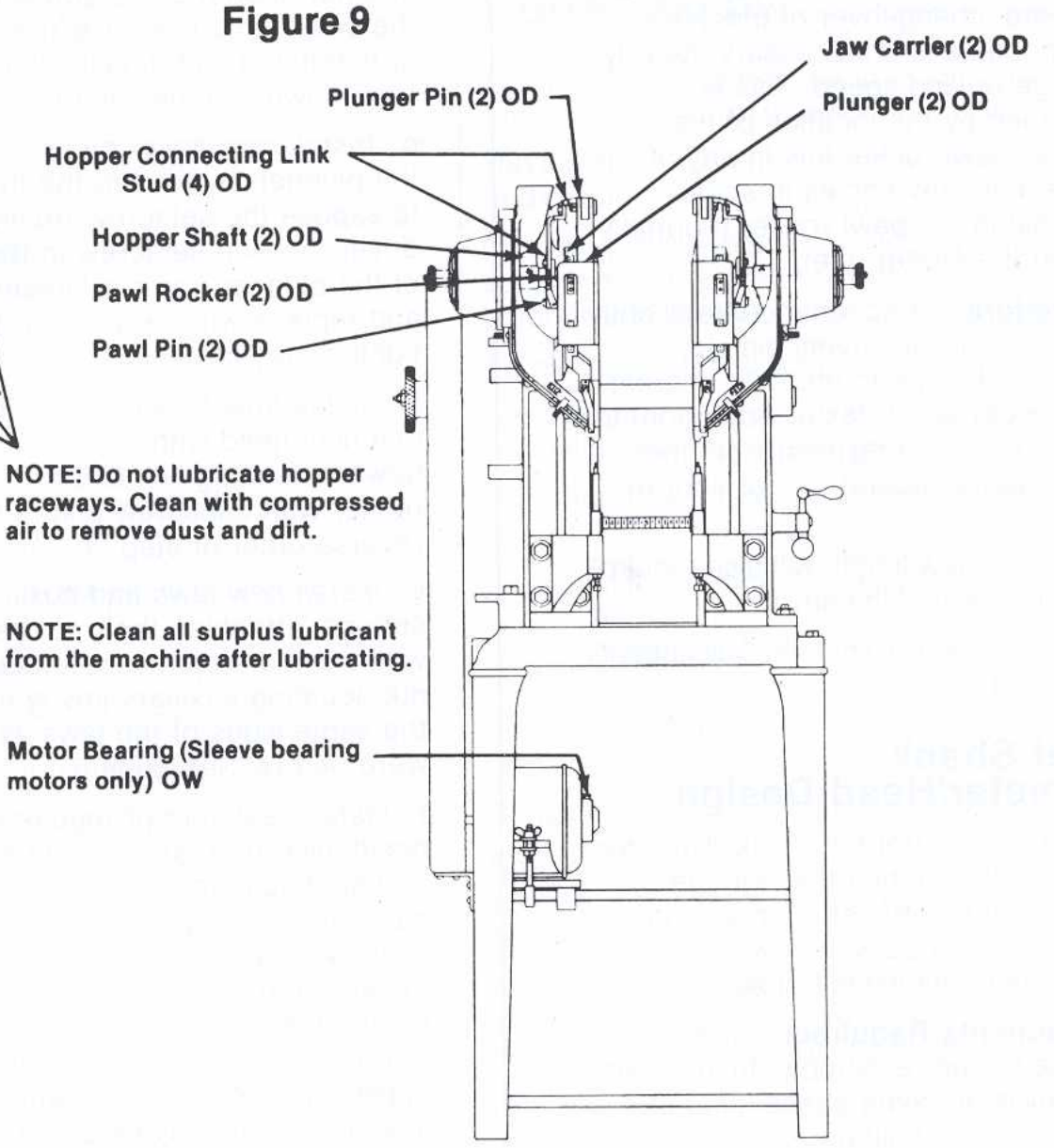
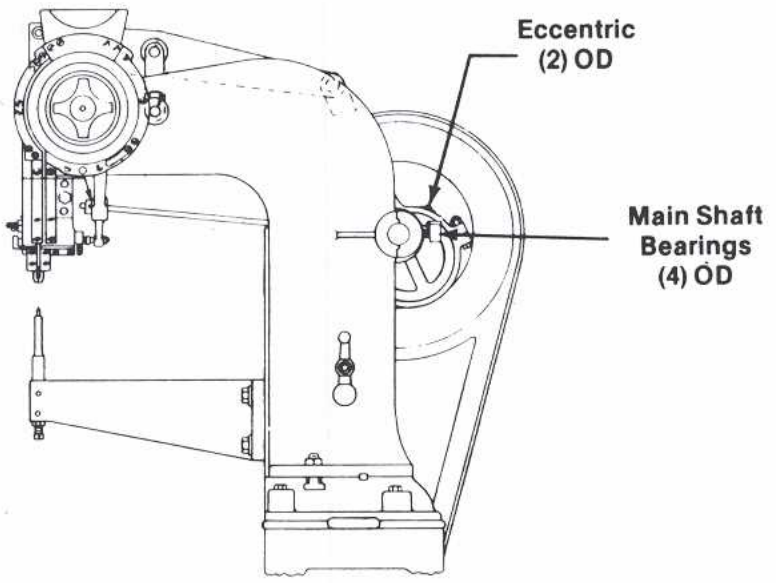
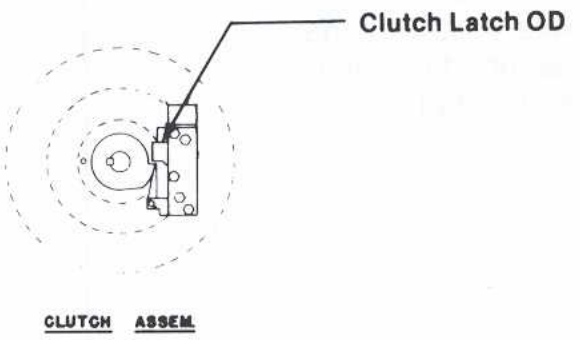


Figure 10





LEGEND:
OD—Oil Daily, SAE 20
OW—Oil Weekly, SAE 20
GW—Grease Weekly

Rivet Size Changeover

Rivet Shank Length (Slight Differences)

If rivets of *only* a new length are to be used, changeover of machine components is unnecessary. Merely change driving speed. This is governed by the location of the hopper pawl rocker link in any of three holes (two holes in some models) in the pawl rocker (normally it is in the center one).

Procedure: To accommodate slightly longer or shorter rivets simply relocate the link to the hole nearest the hopper shaft (faster operation) for longer rivets, or farthest from the shaft (slower operation) for shorter rivets.

Rivets of a new length will also require an adjustment of the anvil.

Procedure: See "Clinching Adjustment" on Page 4.

Rivet Shank Diameter/Head Design

If rivets of a different shank *diameter* or of a different head design are to be used, the rivet-setting machine must be modified with new components as listed below.

Components Required: Quick change hopper assembly driver, jaws and anvils; in some cases, also the horn and anvil holder.

Procedure:

a. *Remove present jaws and their auxiliary springs* by first removing the attachment screw and nut. Empty the hopper of rivets, following the procedure described on Page 3, "Operation & Description".

b. *Remove present hopper*, first removing the link end of the pawl rocker attached with a cap screw and nut; then the cap screw (under the bowl) which secures the hopper to machine head; finally, slide hopper from dowels in machine head.

c. *Install new driver* by first lowering the plunger, by turning the flywheel, to expose the setscrew retaining the driver. Loosen setscrew in the front of the plunger, remove present driver and replace with new driver, then re-tighten the setscrew.

d. *Install new hopper*, securing it to machine head with capscrew (under bowl), attaching link end to pawl rocker with capscrew and nut in reverse order of step "b" above.

e. *Install new jaws* and auxiliary jaw springs, attaching them to the carrier with the old attachment screw and nut, locating auxiliary jaw springs on the same sides of the jaws as they were before. See Page 5.

f. *Install new horn (if required*, by positioning horn at desired height on machine column or head and carefully aligning it with column keyway for precise verticality, and marking the location for four new holes to be drilled. Drill and tap the four holes for the horn-mounting capscrews. (A complete range of anvil length and styles are available for relocated horns).

g. *Change anvils* (see Machine Left Side View and follow procedure on Page 4.

h. *Adjust driver/jaws/race plates*, first setting the machine to "home" position, then following the procedure outline on Page 4.

i. *Adjust jaw travel and anvil height*, first lowering the driver to full "down" position by means of the flywheel.

j. *Test the adjustments* with a few trial rivet-sets as outlined on Page 4.

Rivet Centers (On Some Models)

On dual models, the right-hand head is adjustable to vary the rivet spacing.

Procedure: Loosen the two 5/8 inch hex nuts at the base of the right-hand head, and the two Allen-head setscrews in the righthand eccentric on the main shaft. Then adjust the right-hand head position for the desired rivet spacing by turning the crank handle. Secure head in new position by; first, retightening the two 5/8 inch hex nuts; second, turning the main shaft one complete revolution be sure new rivet centers have been maintained and finally, re-tightening the two Allen-head setscrews on the right-hand eccentric.

Troubleshooting Mechanical Rivet-Setting Machine

Malfunctioning Part Or Machine			
Problem:	**Is with:**	**Caused by:**	**Corrected by:** (see reference for details)
Machine does not trip	Power (or)	Power disconnected, (or)	Turning control panel switch to "on", or connecting electrical power or supply.
		incorrect type of solenoid	Having electrician check solenoid type, and circuitry.
	binding in machine component (or)	Linkage binding.	Checking components for binding, then adjusting appropriate machine components (see Pages 4 and 5)
	cut-off stud	Stud adjustment screw too far *out*.	Turning cut-off stud adjusting screw *in*.
Machine trips but doesn't cycle	Power (or)	Power disconnected.	Checking connections to all components receiving power including motor.
	machine cycling (or)	Machine not in "home" position, (or)	Adjusting driver/jaws to "home" position of machine cycle (see Page 5)
		foot pedal not adjusting properly.	Adjusting foot pedal. See sect "stop collar" below
	clutch	Weak or broken clutch spring, (or)	Replacing spring.
		broken clutch cage, (or)	Replacing cage.
		clutch cam loose on shaft, (or)	Replace clutch shaft.
		broken clutch cam, (or)	Replacing cam.
		grease in clutch stiff from extreme low temperature.	Start machine about ½ hour early to allow clutch grease to warm up and soften.
Machine repeats	Binding in machine component (or)	Linkage binding	Checking components for binding, then adjusting appropriate machine components (see Pages 4 and 5)
	spring (or)	Incorrect cut-off spring	Replace with correct spring see parts list for part number
	cut-off stud (or)	Stud adjustment screw too far *in*.	Turning cut-off stud adjusting screw out.
	stop collar	Incorrect stop collar adjustment.	Adjusting stop collar so that vertical movement of trip cut-off is approx. ¼".
Pilot sticks in "down" position	Pilot (or)	Pilot set too low, (or)	Adjusting pilot setting, (see *Anvil* Page 4)
		bent pilot pin.	Replacing pilot pin
	anvil	Dirt or foreign material collected in anvil, (or)	Disassembling anvil, cleaning, lubricating and reassembling.
		broken anvil spring.	Replacing anvil spring (see Page 4.)

Note: For Solenoid Trip, also see page 14

Malfunctioning Part Or Machine (Solenoid Trip)			
Problem:	**Is with:**	**Caused by:**	**Corrected by:**
Machine trips but won't cycle	Solenoid	Solenoid being incorrectly adjusted to plunger	Re-locate solenoid and cut out switch for proper clearance to plunger
Machine repeats	Solenoid and cut out switch (or)	Solenoid plunger pin failing to activate cut out switch.	Same as above
	spring	Incorrect cutoff tension spring	Replace with correct spring. See parts list for part number of spring.

Malfunctioning Rivet Feed

Problem:	Is with:	Caused by:	Corrected by:
Rivets not feeding into upper raceway	Hopper or raceway	Hopper not connected, (or)	Connect hopper.
		hopper bowl slot or upper raceway jammed with odd-size rivet or foreign matter, (or)	Loosen hopper bowl, pulling it outward on shaft, and removing obstruction with pointed *wooden* stick(metal may damage it)
		excessively worn hopper.	Replace with new hopper.
Rivets not feeding from upper raceway	Transfer slide	Locked transfer slide, (or)	Unlocking transfer slide.
		binding transfer slide, (or)	Adjusting transfer slide (see Page 5).
		incorrectly adjusted transfer slide lever	
Rivets tumbling in jaws	Driver (or)	Driver set too high.	Adjusting driver (see Page 5).
	jaws	Rivets too short for jaws, (or)	Changing jaws to correct style (see Page 5).
		raceway damaged by jaws, (or)	Remove burrs from damaged lower race
		jaws set too low, (or)	Adjusting jaws (see Page 5).
		misaligned jaws, (or)	Align Jaws & Aux. Jaw springs
		worn jaws.	Replacing with new jaws
Rivets "spitting" out of jaws	Rivet not seating in jaws (or)	Rivet tumbling in jaws.	(see above corrections for "tumbling rivets") Page 5.
	jaw bar (or)	Excessive jaw bar spring (or)	Replacing with lighter spring.
		binding jaw bar	Removing jaw bar, cleaning and replacing then lubricating.
	jaws (or)	Jaws incorrectly paired (or)	Installing jaws with matching numbers
		worn jaws, (or)	Replacing with new jaws
		incorrect jaw travel, (or)	Adjusting jaws (see Page 5)
		jaws loose on bar, (or)	F nut on screw
		jaws loose on springs (or)	Tighten or replace jaw rivets
		jaws incorrect for rivet size	Replace with correct s for being used.
	auxiliary jaw springs (or)	Jaw springs too weak, (or)	Increasing the amount of "bow" in springs with heavier spring
		jaws springs installed backwards.	Reverse direction of "bow" in springs.
	driver	Driver too long, (or)	Replace with correct driver (see Page 5).
		driver tip & radius too large for rivet head, (or)	
		bent driver	Replace driver

Imperfect Rivet Formation

Problem:	Is with:	Caused by:	Corrected by: (see reference for details)
Rivets marked by jaws	Jaws/springs	Unpolished jaws, (or)	Polishing the jaws
		jaw springs too strong, (or)	Easing the bow in auxiliary jaw springs or use lighter springs
		jaws being set too low.	Adjusting level of jaws (see Page 5).
Rivets marked by driver.	Driver	Radii of driver and rivet not matching, (or)	Changing driver to the correct one for rivets being used.
		driver diameter too small, (or)	
	(or)	driver edge too sharp.	Buffing the driver tip.
	clinching	Excessive force required to clinch the rivet.	Adjusting the clinch. Page 5.
Poor clinches	anvil	Worn out anvil, (or)	Replacing the new anvil.
		improperly set anvil (or)	Adjusting the anvil (see Page 4)
	(or)	anvil misaligned with driver, (or)	Align driver to anvil Page 4.
		incorrect anvil clinch diameter.	Checking with the Chicago Rivet office
	rivet	incorrect rivet length	Changing to rivet of correct length (see back cover)
		Incorrect hole size in work assembly, (or)	Checking chart (back cover) for correct hole size.
		defective rivet hole	Return sample lot to Chicago Rivet for analysis.

Machine Part Breakage

Problem:	Is with:	Caused by:	Corrected by: (see reference for details)
Jaws break	Jaws	Incorrectly adjusted jaws.	Adjust jaws setting (see Page 5).
Pilot breaks	Machine operator (or)	Operator striking pilot with work.	Instructing operator in more careful handling.
	work assembly	Work material pushing sideways on pilot.	Installing a resting fixture to support load and hold assembly level.

RIVET LENGTHS

All rivet lengths except countersunk head rivets are measured from the underside of the head to the end of the shank. In applications involving countersunk head rivets, overall length is measured from the top of the head to the end of the shank. AND length under head must also be specified.

EXAMPLE . . . If a semi-tubular rivet of 1/8″ dia. has been selected the length should be established as follows:

Combined Material Thickness . .	.110
Clinch Allowance	.062
Rivet Length	.172 = 3/16″ Long

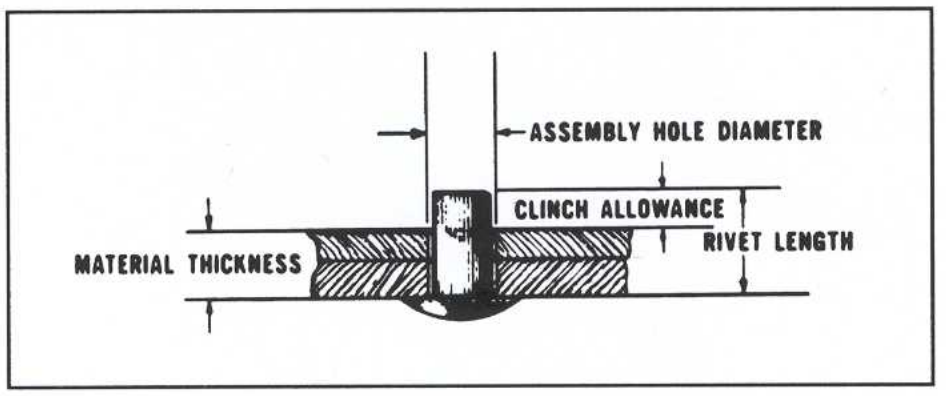


CHART OF STANDARD CLINCH ALLOWANCES

As a guide in determining proper rivet length, Chicago Rivet engineers have compiled a chart of Standard Clinch Allowances for the most popular rivet diameters. The term "clinch allowance" applies to the part of the rivet extending beyond the material thickness of the assembly. (See illustration above.) The listed clinch allowances are considered minimum. To determine rivet length, add combined material thickness and clinch allowance, then use the next high applicable increment. Rivets with body diameters from .060 to .098 are available in 1/64″ length increments; 1/8″ and larger diameters in 1/32″ length increments.

CAUTION: While long usage proves it generally satisfactory, this chart should be used as a guide only. Before recording the rivet length permanently, rivet and test a sample assembly. Certain assembly materials and various other conditions often cause a deviation from the established standard clinch allowances.

RIVET SHANK DIAMETER		.060″	.065″	.088″	.098″	1/8″	9/64″	5/32″	3/16″	7/32″	1/4″	5/16″	3/8″
CLINCH ALLOWANCE	SEMI TUBULAR	.032″	.032″	.045″	.055″	.062″	.093″	.093″	.110″	.140″	.156″	.187″	7/32″
	SPLIT AND DEEP HOLE			.062″	.078″	.093″	.125″	.125″	.156″	.175″	.187″	.210″	—
DIAMETER OF HOLE IN ASSEMBLY		.067″	.070″	.093″	.104″	.128″	.152″	.165″	.196″	15/64″	17/64″	21/64″	25/64″
DRILL NUMBER		51	50	42	37	30	24	19	9	15/64″	17/64″	21/64″	25/64″

Chicago Rivet

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