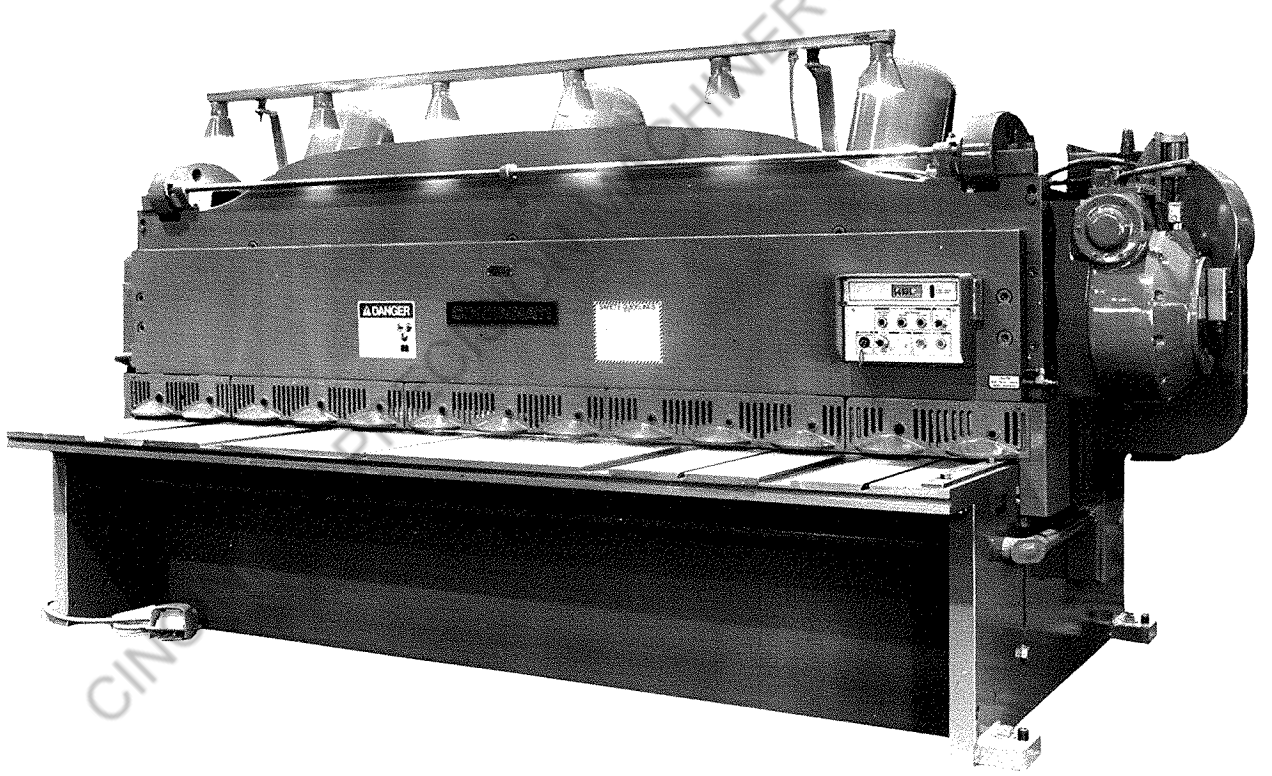
Mechanical Shear

OPERATION, SAFETY AND MAINTENANCE MANUAL

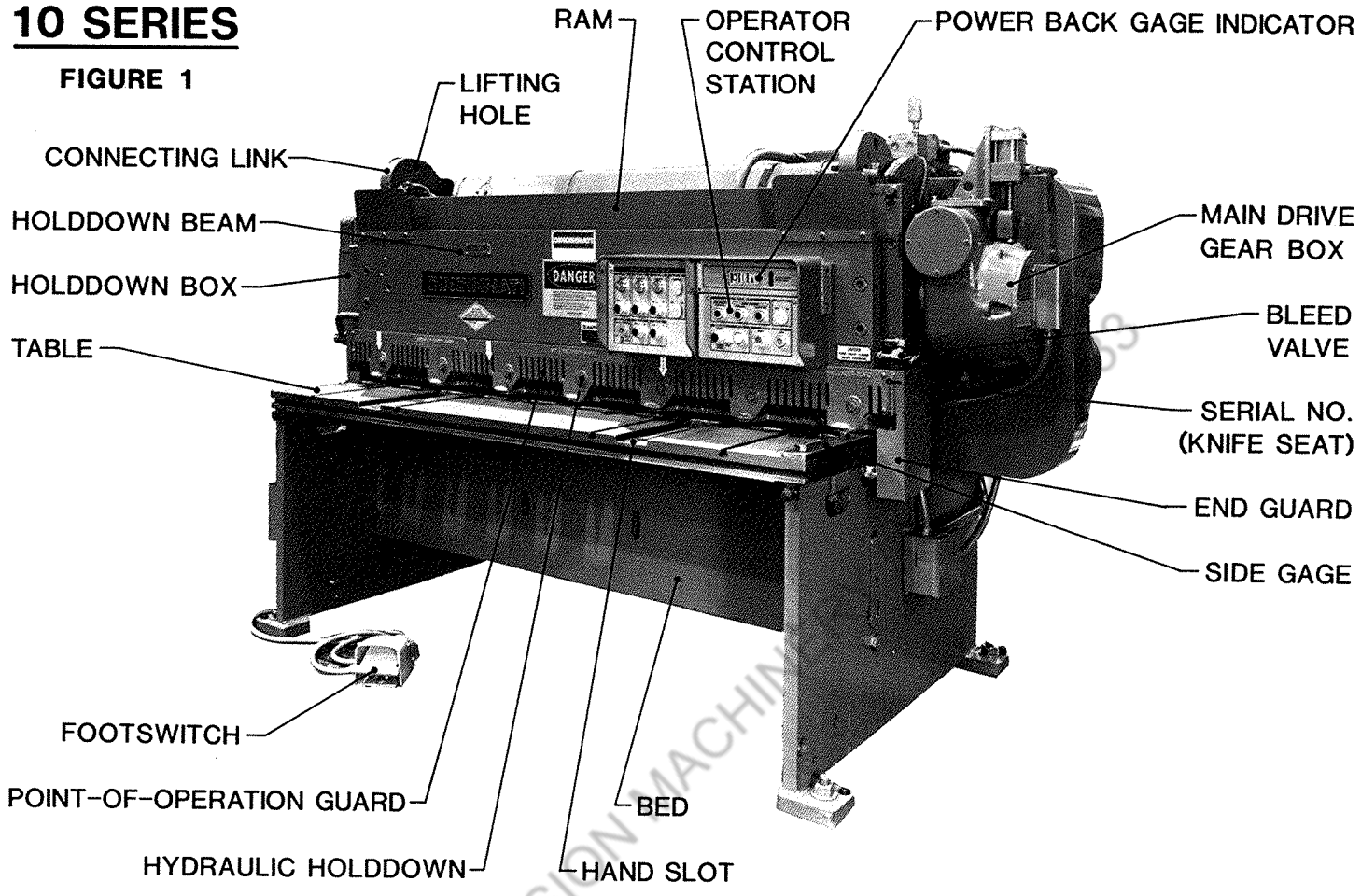


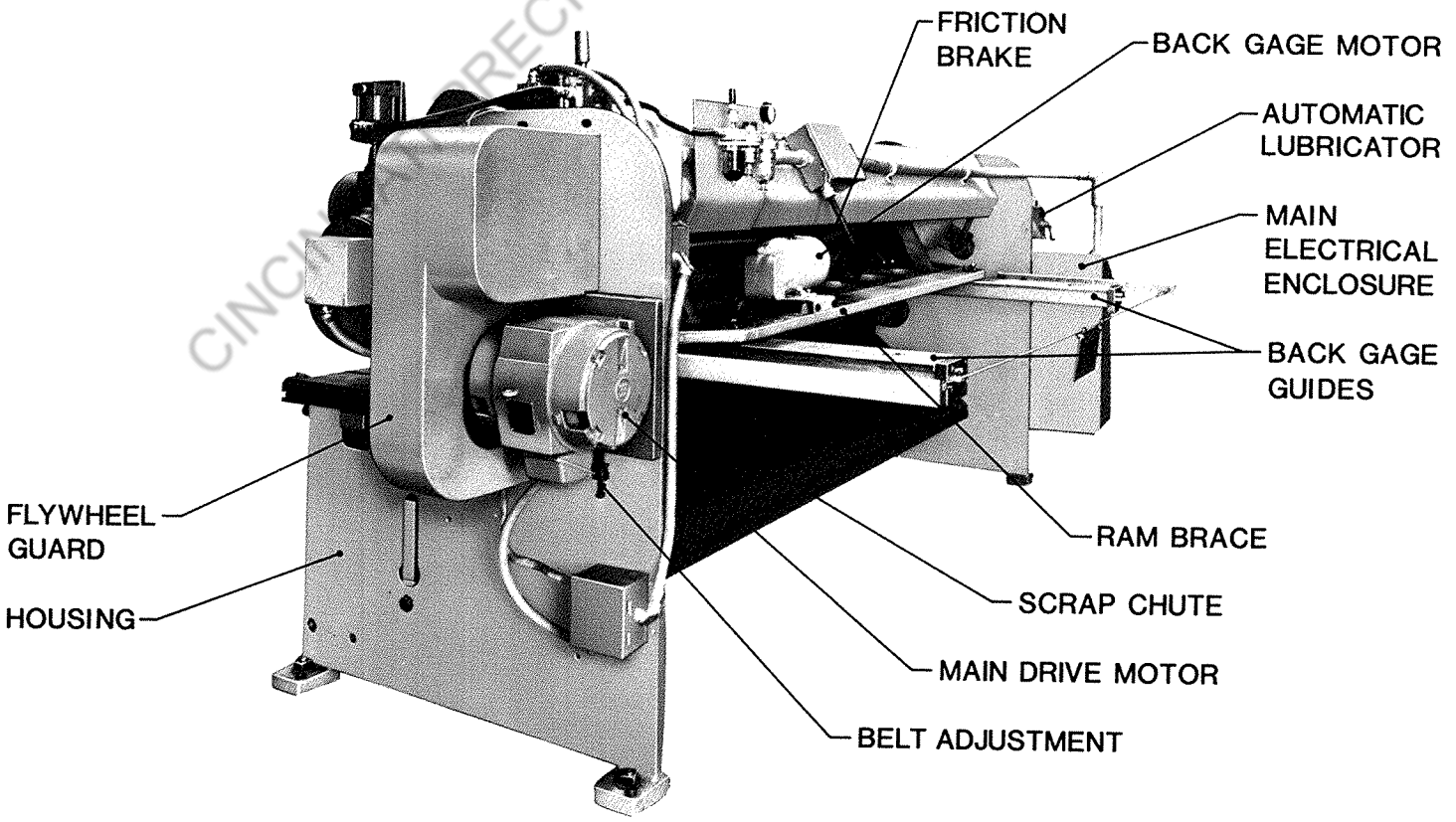
CINCINNATI

EM-280 (FEB 93)

10 SERIES

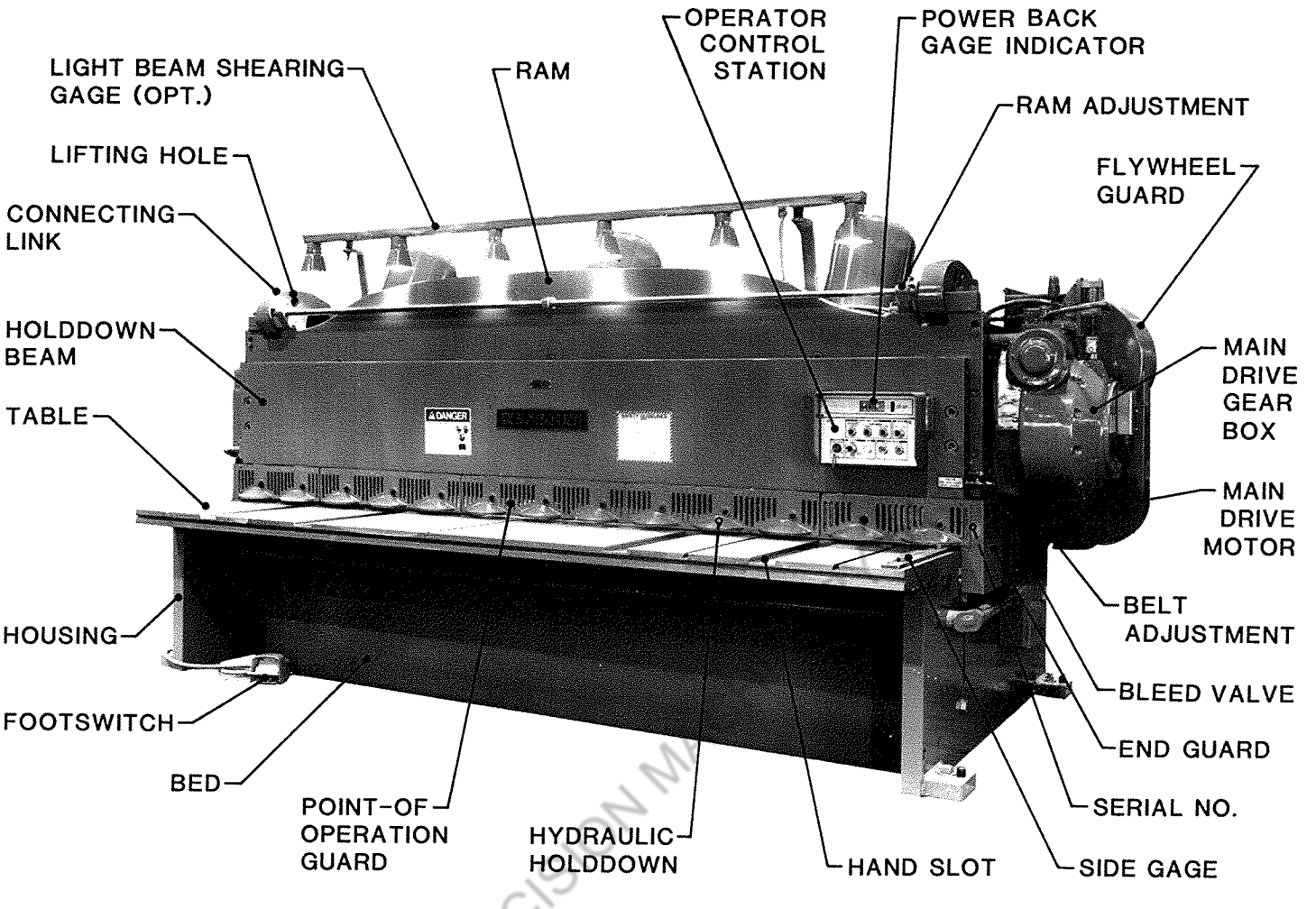
FIGURE 1

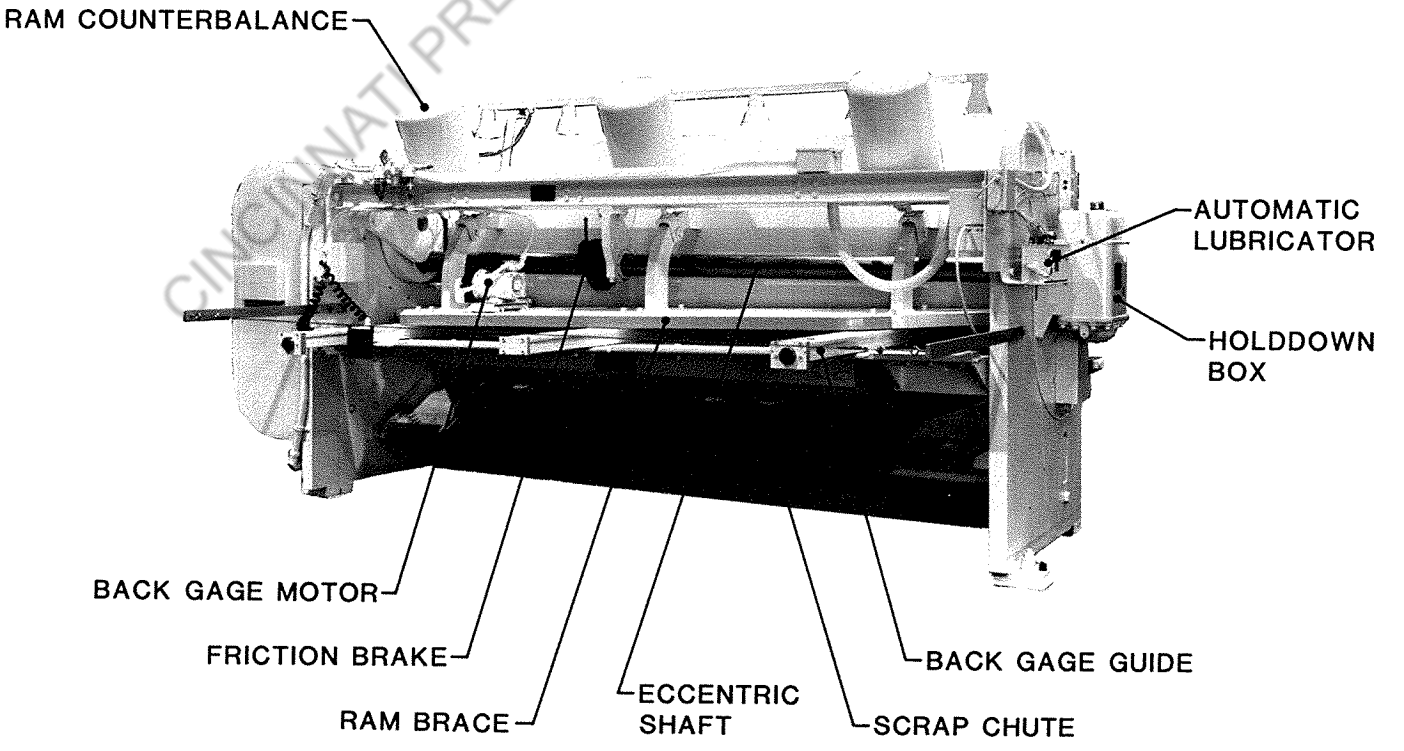




14-18-25 SERIES

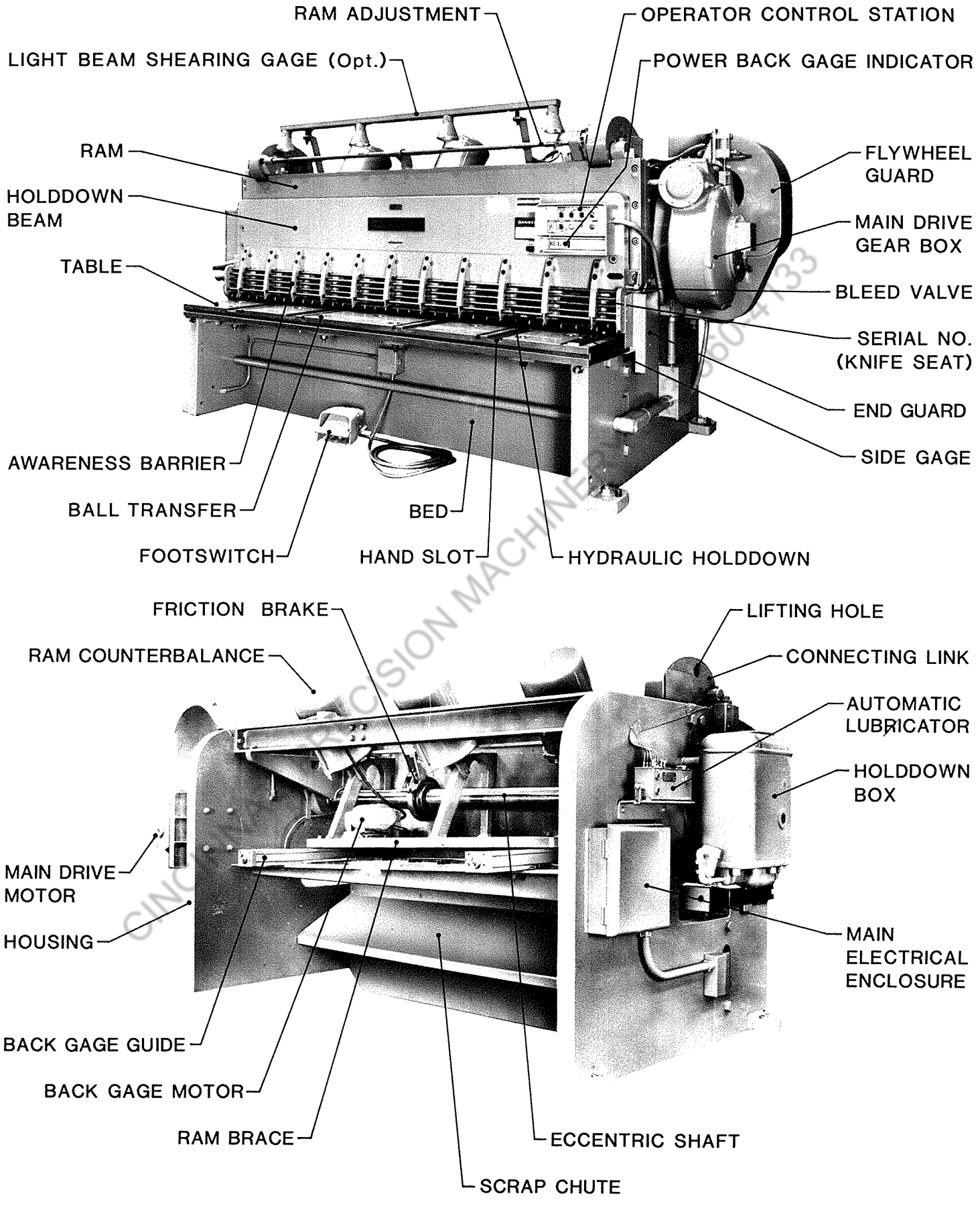
FIGURE 2





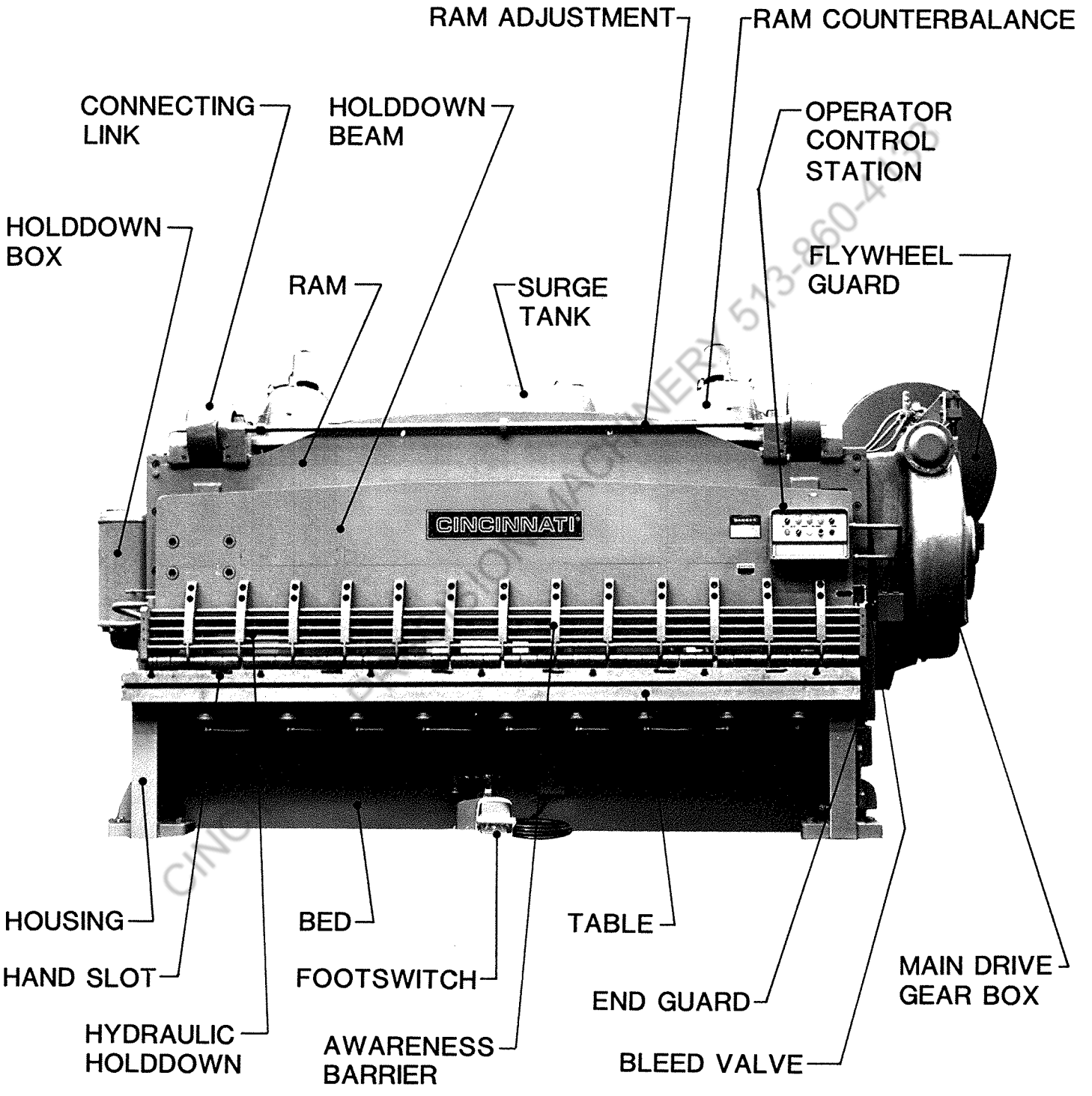
43 SERIES

FIGURE 3



62 - 100 SERIES

FIGURE 4



PJ

SERIES SHEAR	CAPACITY[1] (MILD STEEL) THICKNESS (IN.)	NOMINAL[2] LGT. (FT.)	APPROXIMATE SHIP. WEIGHT (LBS.)	STD. FRONT GAGE RANGE (IN.)	STD. BACK GAGE RANGE	STD. MAXIMUM STROKES/MIN.	STD. MOTOR HORSEPOWER[3]	DISTANCE UNDER HOLDDOWNS	HOLDDOWNS TO KNIFE EDGE	RAKE[4] (IN./FT.)	KNIFE SIZE[5] (IN.)
1004RA	12 GA.	4	7,800	48-1/2	36	65	5	1/4	5/8	9/64	1 x 3 x 54
1004R	10 GA.									7/32	
1004	3/16							3/8		3/8	
1006RA	12 GA.	6	9,500					1/4		9/64	1 x 3 x 78
1006R	10 GA.									7/32	
1006	3/16							3/8		3/8	
1008RA	12 GA.	8	10,800					1/4		9/64	1 x 3 x 102
1008	10 GA.									7/32	
1008R	3/16							3/8		3/8	
1010RA	12 GA.	10	13,000	51-1/2				1/4		9/64	1 x 3 x 126
1010	10 GA.									7/32	
1012RA	12 GA.	12	15,200	53-1/2			7-1/2			9/64	1 x 3 x 150
1012	10 GA.									7/32	
1013	12 GA.	13	16,000							3/16	1 x 3 x 174
1014	12 GA.	14	18,000							3/16	1 x 3 x 198
1404R	3/16	4	10,700	48-1/2	36	60	5	3/8	5/8	1/4	1 x 4 x 52
1404	1/4							1/2		5/16	
1406R	3/16	6	12,300					3/8		1/4	1 x 4 x 76
1406	1/4							1/2		5/16	
1408	3/16	8	14,400					3/8		1/4	1 x 4 x 100
1410	3/16	10	17,100	51-1/2			7-1/2			1/4	1 x 4 x 124
1412	3/16	12	19,900	53-1/2						1/4	1 x 4 x 148
1413	10 GA.	13	21,200	51-1/2				1/4		1/4	1 x 4 x 172
1414	10 GA.	14	24,200	53-1/2						15/64	1 x 4 x 196
1804R	1/4	4	11,000	51-1/2	36	60	5	1/2	5/8	1/4	1 x 4 x 52
1804	3/8						7-1/2	11/16		15/32	
1806R	1/4	6	13,200					1/2		1/4	1 x 4 x 76
1806	3/8						10	11/16		15/32	
1808	1/4	8	15,200				7-1/2	1/2		1/4	1 x 4 x 100
1810	1/4	10	18,100	53-1/2						1/4	1 x 4 x 124
1812	1/4	12	22,600	56-1/2			10			1/4	1 x 4 x 148
1813	3/16	13	23,200	53-1/2				3/8		1/4	1 x 4 x 160
1814	3/16	14	25,900	56-1/2						15/64	1 x 4 x 172
2504R	3/8	4	17,600	53-1/2	36	50	7-1/2	11/16	7/8	9/32	1 x 4 x 52
2504	1/2						10	15/16		7/16	
2506R	3/8	6	20,000				10	11/16		9/32	1 x 4 x 76
2506	1/2						15	15/16		7/16	
2508	3/8	8	23,000				10	11/16		9/32	1 x 4 x 100
2510	3/8	10	26,400	56-1/2						9/32	1 x 4 x 124
2512	3/8	12	33,300	60-1/2			15	1/2		9/32	1 x 4 x 136
2513	1/4	13	33,800	56-1/2						1/4	1 x 4 x 160
2514	1/4	14	36,000	57-1/2				7/16		1/4	1 x 4 x 172
2515	3/16	15	37,500							1/4	1 x 4 x 184
2516	3/16	16	40,300							7/32	1 x 4 x 196
2518	3/16	18	52,000	60-1/2		40				7/32	1 x 4 x 220

SERIES SHEAR	CAPACITY[1] (MILD STEEL) THICKNESS (IN.)	NOMINAL[2] LGT. (FT.)	APPROXIMATE SHIP. WEIGHT (LBS.)	STD. FRONT GAGE RANGE (IN.)	STD. BACK GAGE RANGE	STD. MAXIMUM STROKES/MIN.	STD. MOTOR[3] HORSEPOWER	DISTANCE UNDER HOLDDOWNS	HOLDDOWNS TO KNIFE EDGE	RAKE[4] (IN./FT.)	KNIFE SIZE[5] (IN.)
4304R	1/2	4	26,000	49	36	40	15	1-1/2	15/16	3/8	1-1/8 x 5 x 52
4304	5/8								1-5/16	1/2	
4306R	1/2	6	28,000						1"	3/8	1-1/8 x 5 x 76
4306	5/8									1/2	
4308R	5/8	8	31,400				20			1/2	1-1/8 x 5 x 100
4308	1/2						15			3/8	
4310	1/2	10	35,500					1-1/4		3/8	1-1/8 x 5 x 124
4312	1/2	12	41,000	53			20	1-3/32		3/8	1-1/8 x 5 x 148
4313	3/8	13	46,800					1-1/16	1-1/8	3/8	1-1/8 x 5 x 150
4314	3/8	14	50,200	56						23/64	1-1/8 x 5 x 172
4316R	1/4	16	59,000					1"		11/64	1-1/8 x 5 x 196
4316	3/8									21/64	
4318	1/4	18	66,000			30				5/16	1-1/8 x 5 x 220
4320	3/16	20	76,000			40		3/4		9/32	1-1/8 x 5 x 244
6204R	3/4	4	42,000	63-1/2	48	30	20	2-1/8	1-1/8	1/2	1-1/2 x 5-1/2 x 53
6204	1"						25			5/8	
6206R	3/4	6	48,000		36		20			1/2	1-1/2 x 5-1/2 x 77
6206	1"						25			5/8	
6208	3/4	8	53,000					1-3/4		1/2	1-1/2 x 5-1/2 x 101
6210R	5/8	10	58,000					1-7/16		3/8	1-1/2 x 5-1/2 x 125
6210	3/4									1/2	
6212R	5/8	12	68,000	66-1/2			30			3/8	1-1/2 x 5-1/2 x 149
6212	3/4									1/2	
6213R	1/2	13	71,000		48		25	1-5/16		3/8	1-1/2 x 5-1/2 x 161
6213	5/8						30			15/16	
6214R	1/2	14	76,000				25	1-1/4		3/8	1-1/2 x 5-1/2 x 173
6216	1/2	16	86,000	69-1/2					1-5/16	3/8	1-1/2 x 5-1/2 x 197
6217	1/2	17	92,000				30	1-3/16		3/8	1-1/2 x 5-1/2 x 209
6218	3/8	18	95,000					1-3/8	1-1/8	5/16	1-1/2 x 5-1/2 x 221
6220R	1/4	20	110,000	68		25		1-1/4		11/64	1-1/2 x 5-1/2 x 245
6220	3/8					30				5/16	
6222	1/4	22	123,000			25		1-5/32		3/16	1-1/2 x 5-1/2 x 269
10004R	1"	4	59,000	67	48	20	30	2-1/8	1-3/8	1/2	1-3/4 x 6-1/2 x 53
10004	1-1/4									3/4	
10006R	1"	6	66,000		36					1/2	1-3/4 x 6-1/2 x 77
10006	1-1/4									3/4	
10008R	1-1/4	8	72,000				40			3/4	1-3/4 x 6-1/2 x 101
10008	1"						30			5/8	
10010	1"	10	78,000				40	2-1/16		5/8	1-3/4 x 6-1/2 x 125
10010S	1-1/4		82,000		48		50		2-3/8	45/64	
10012	1"	12	90,000	70			40	2	1-3/8	5/8	1-3/4 x 6-1/2 x 149
10013	3/4	13	100,400					1-13/16		1/2	1-3/4 x 6-1/2 x 161
10014S	1"	14	108,000	72			50	1-5/8		35/64	1-3/4 x 6-1/2 x 173
10014	3/4		103,000	70						1/2	
10016S	3/4	16	120,000	72			40	1-1/2		.478	1-3/4 x 6-1/2 x 197
10016	5/8		114,000	70						1/2	
10018	1/2	18	127,000	68					1"	3/8	1-3/4 x 6-1/2 x 221
10020	1/2	20	137,000	70						3/8	1-3/4 x 6-1/2 x 245
10024	1/4	24	150,000	68-1/2		17	25	1"	7/8	11/32	1 x 4 x 293

SERIES SHEAR	CAPACITY (1) (MILD STEEL) THICKNESS (IN.)	NOMINAL (2) LGT. (FT.)	APPROXIMATE SHIP. WEIGHT (LBS.)	STD. FRONT GAGE RANGE (IN.)	STD. BACK GAGE RANGE	STD. MAXIMUM STROKES/MIN.	STD. MOTOR (3) HORSEPOWER	DISTANCE UNDER HOLDDOWNS	HOLDDOWNS TO KNIFE EDGE	RAKE (4) (IN./FT.)	KNIFE SIZE (5) (IN.)
15006	1-1/2	6	150,000	67-1/2	48	15	50	—	—	5/8	1-3/4 x 6-1/2 x 77
15008	1-1/2	8	160,000				75			3/4	1-3/4 x 6-1/2 x 101
15010R	1-1/4	10	175,000				50			9/16	1-3/4 x 6-1/2 x 125
15010	1-1/2						75			3/4	
15012R	1-1/4	12	195,000							9/16	1-3/4 x 6-1/2 x 149
15012	1-1/2									3/4	
15014R	1"	14	200,000				50			15/32	1-3/4 x 6-1/2 x 173
15014	1-1/4			71-1/2			75			11/16	
15016	1"	16	215,000	67-1/2			50			5/8	1-3/4 x 6-1/2 x 197
15018	3/4	18	230,000							7/16	1-3/4 x 6-1/2 x 221
15020	3/4	20	245,000							1/2	1-3/4 x 6-1/2 x 245

Notes:

1. Capacity - The above capacities are for mild steel. For relative capacities of other materials refer to "Shear And Shear Knife Capacities" Bulletin PT-30491, included with this manual.

2. Length between housings of all shears is the nominal length plus 3".

3. Standard Motor Horsepower and Strokes Per Minute: The standard motor is adequate for all normal shearing. However, this motor does not have sufficient horsepower to continuously make full length cuts on maximum capacity material. (Continuously means holding the footswitch down and cutting on each stroke of the shear.) Continuous cutting will require a motor with four to six times the horsepower of the standard motor.

   Attempting to shear more rapidly than the motor will allow could have two undesirable results. The electrical circuit will become overloaded, leading to premature failure of the control equipment and drive motor itself. The other problem will be excessive wear on the clutch and spider teeth because of operating below standard speed.

   If it is desired to shear continuously, consult the factory.

4. The rake of upper knife for 15 ft. and longer shears is reversed from standard. This places the large knife opening at the right end of the machine.

5. Knives 17 ft. and longer are in two sections.

FOUNDATION

A CINCINNATI Shear of standard design is not a self-contained machine; that is, the machine must be provided with a rigid foundation to insure maintaining the alignment of housings and cross framing members. The torque of the drive tends to rotate the housings relative to each other, so the foundation must have sufficient rigidity and torsional stiffness to keep the housings in alignment. The foundation must support the weight of the machine without cracking or settling out-of-level.

Refer to the certified Foundation Plan drawing for details of the foundation recommended for your shear. It is advisable, particularly where unusual soil conditions may exist, to have a local registered civil engineer specify the actual dimensions of the foundation. As a final check, see that the anchor bolts in your foundation coincide with the bolt hole spacing in the shear's housing feet.

UNLOADING

Upon receipt of your CINCINNATI Mechanical Shear, carefully remove contents of the one or more packing boxes shipped with the machine. All loose parts, such as leveling shims, wrenches, tools, front support arms, rear safety cable and supports, etc., will be found in these boxes. Check parts received against Packing List contained in tool box. Make a complete visual inspection of the shear to see if any damage has occurred to the machine during shipment. Claims for shortages should be made within ten (10) days to CINCINNATI INCORPORATED. Claims for damaged parts should be made to the carrier immediately.

Remove all shipping paper from the wrapped parts of the shear. Leave the skids under the machine until it has been moved to its final location.

LIFTING AND MOVING

The shipping weight of the assembled machine is shown on the Bill of Lading which accompanies the machine. It is also listed in the Shear SPECIFICATION, Section 2. Check this weight carefully before lifting or handling. Provide for safe handling to prevent injury to personnel or damage to the machine.

CINCINNATI Mechanical Shears are usually shipped assembled and on skids. They are readily handled by a crane of sufficient capacity. Use chains or cables adjusted to proper length for even lifting (refer to ANSI standard B30.9-1984). These chains or cables are looped around pins inserted into the pull-down links of the shear. A snug-fitting spreader must be placed between the pull-down links. The suggested size of the spreader would be a 4" x 4" wood timber for 25 Series and smaller, and 6" x 6" timber for 43 Series and larger. A typical hitch is shown in Figure 5.

Where crane facilities are insufficient in capacity or not available, rig the machine into final location directly over the foundation bolts. Be careful to keep machine supported evenly. CINCINNATI INCORPORATED recommends that professional riggers be employed to handle the machine to ensure against injury to personnel or damage to the machine.

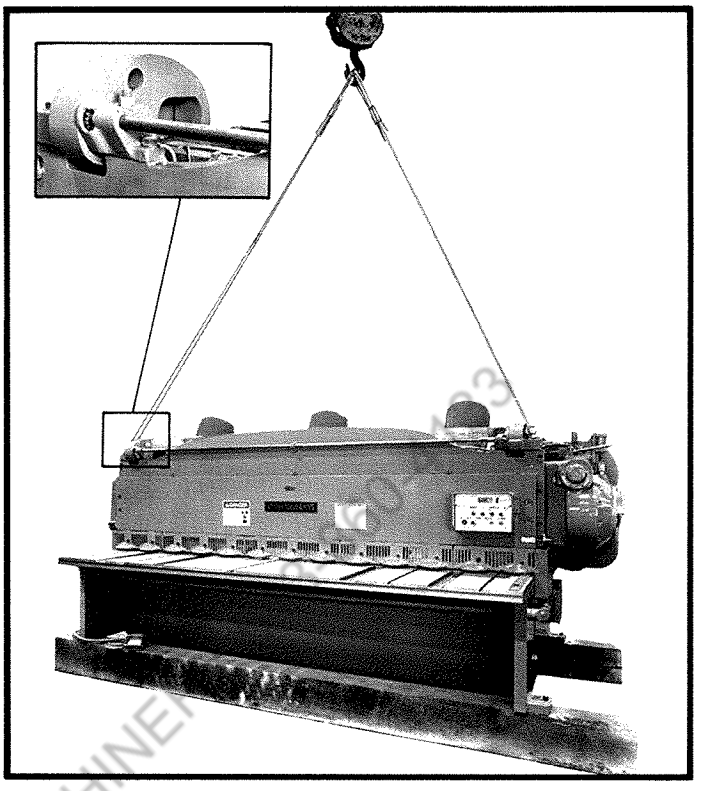


FIGURE 5

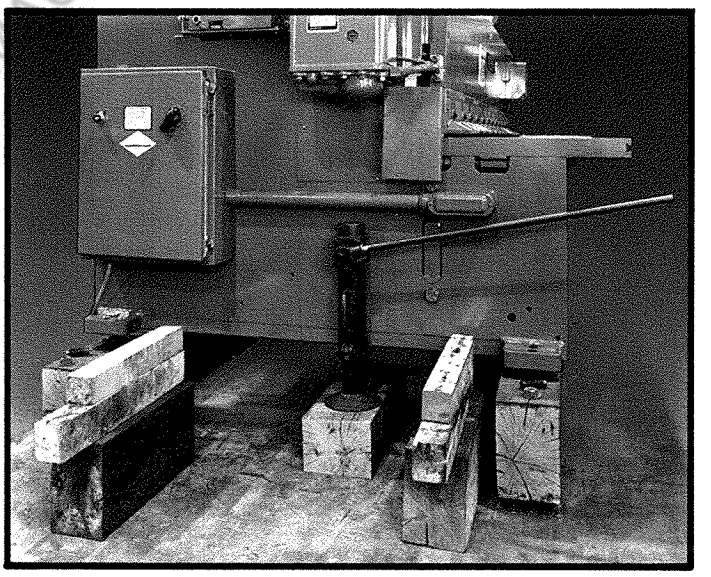


FIGURE 6

REMOVING SKIDS

Lift the machine with a crane to remove skids. If no crane is available, jack up the machine one end at a time in approximately 4" steps and block until skids can be removed as shown in Figure 6. Remove skids and lower each end alternately by removing blocking in steps of about 4" until foundation bolts extend into housing feet. On 43 Series and smaller machines, thread the hex socket leveling screws down through the feet and rest the machine on these screws. See Figure 7. On larger machines, jack lugs are provided on the housings for this purpose. Lower the machine onto the foundation. Do not allow the machine to rest on leveling screws permanently.

CLEANING

Remove all paper and plastic wrappings from the machine. Use an aliphatic solvent, such as Stoddards solvent or mineral spirits, to soften the protective grease and aid in its removal. Thoroughly clean protective grease from all parts of the machine by soaking it with solvent and wiping with clean rags. A stiff brush will get into corners. Do not use an air hose as pressure will drive grit and dirt into bearing surfaces. After cleaning the machine, wipe dry and lightly oil finished surfaces to prevent rust. Periodic cleaning of the machine after installation is recommended.

Note: It will be necessary to remove the point-of-operation guarding to clean the table and knives. Leave these guards off until after the knife clearance has been checked and reset. See Section 8, START-UP OF SHEAR.

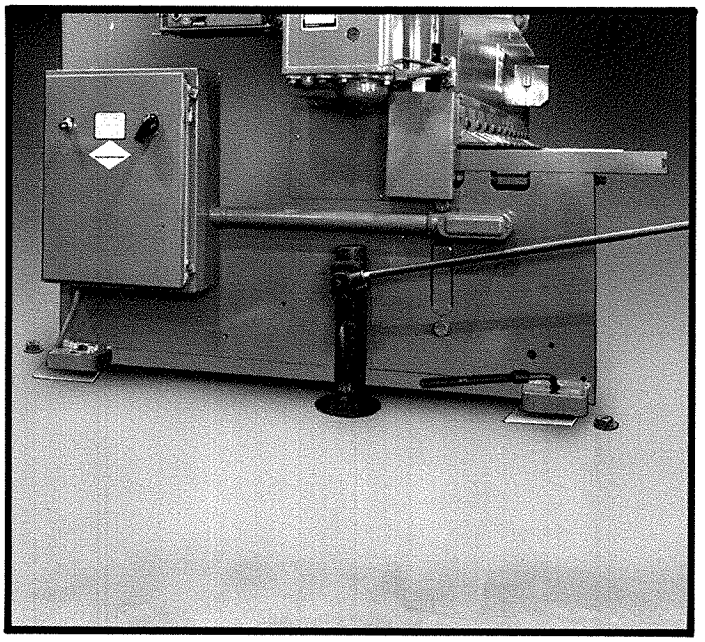


FIGURE 7

LEVELING

The purpose of leveling a CINCINNATI Shear is to establish the proper running clearance between the ram shoes and the ram guides. The first step is to get close to the proper clearance by leveling the table.

The table is leveled by placing flat steel shims of the proper thickness under the housing feet as required. The suggested form of these shims is shown on the Foundation Plan drawing for the shear. Packs of these shims of various thicknesses are furnished with all shears 43 Series and smaller.

Place a level on the shear table. Use a precision level with graduations reading .0005 inches per foot. Always wipe the base of the level and the table surfaces clean each time the level is placed. Give the bubble of the precision level a full half minute to come to rest before reading.

Each end or corner of the shear can be raised or lowered by use of the leveling screws in each housing foot. Refer to Figure 8. Use at least a two foot length of pipe on the proper size hex socket key in the leveling screws. Use the jacking lugs provided on the 62 and 100 Series shears. All shears shipped prior to May 1948 were not equipped with leveling screws or jacking lugs, so it is necessary to drive steel wedges under the housings to raise them for shimming.

LEVELING PROCEDURE:

1. Raise the shear until the thickest shim (1/4" thick) in each shim pack can be placed under each of the housing feet. Then lower the shear so that the feet are resting on these shims. Make certain that the housings and bed clear the floor and foundation.

2. Place suitable nuts and washers on foundation bolts and securely tighten the nuts. Read all levels with these nuts tightened. They must be loosened before adding shims.

3. Check level of shear from one end to the other. Place level in center of the table, close to the holddowns and parallel to the knives. Level the shear by raising the low end using the leveling screws in the low housing feet, both front and back equally. Place equal thickness shims under the feet and let the shear down so the feet are resting on these shims. Recheck lengthwise level. Repeat until the shear is level lengthwise.

4. Level the shear front-to-back with the level crosswise (front-to-back) on the table as shown in Figure 8. Start with the level at the right end of the shear. Insert or remove shims under the front or rear foot of the right housings as required, using the leveling screws to raise or lower the shear.

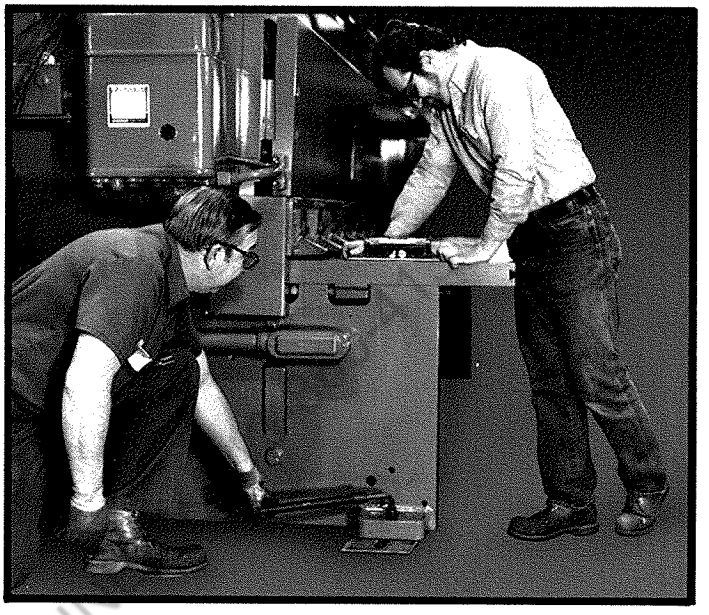


FIGURE 8

IMPORTANT

The shear feet must be resting on the shims and not the screws when reading the level. Foundation bolt nuts must be tight.

5. Level the left end of the shear front-to-back in the same manner. Level readings at both ends of the table must be alike within .001".

6. Recheck lengthwise level and adjust if necessary. Then recheck front-to-back level.

7. The nuts on 1" foundation bolts should be torqued to approximatley 454 ft. lbs. and the 1-1/2" diameter nuts should be torqued to approximately 1,200 ft. lbs.

8. The final and most important level check on the shear is made by checking clearances between the ram shoes on the rear of the ram, and the guide surfaces which are attached to the face of the housings. These shoes are located at each of the four corners of the ram. The clearance of the upper shoes is checked along the upper part of the face of the shoes, while the clearance of the lower shoes is checked along the lower part of the face of the shoes.

9. The desired level has been achieved when the ram shoes are .0015" feeler tight at the outside of the guides and the maximum clearance at the inside of the guides is .0035" measured with feeler gages. If there is not contact between any of the shoes and their guide, the housing at fault must be releveled to obtain the desired clearance regardless of the level reading on the table. This is done by changing the shims under its feet to correct the condition. If changes were required, the foundation nuts must be re-torqued as previously specified.

10. If the above specified clearances cannot be achieved, contact the CINCINNATI INCORPORATED Service Department.

11. Do not use any grout under the bed or housing feet.

12. Level may not be permanent, so level must be rechecked after two weeks and according to the maintenance schedule thereafter.

AIR SUPPLY

Compressed air requirements will be specified on the Foundation Plan drawing.

ELECTRICAL CONNECTION

Suitably sized leads must be brought through the foundation into the electrical control panel. The location of the leads is shown on the Foundation Plan drawing. This is the only electrical connection that is required. Be certain that the proper voltage is supplied to the shear, that the lines are of sufficient capacity, and that a suitable ground connector is attached. Do not start the main drive motor until thoroughly reading the safety and operation sections of this manual and a CINCINNATI INCORPORATED Service Representative is present.

PJ

Proper lubrication is of extreme importance if any piece of equipment is to have long life and trouble free operation. Strict observance of all lubrication instructions contained herein will pay dividends in lower maintenance cost for your shear.

CINCINNATI Shears are equipped with automatic sight feed lubricators that assure adequate oiling to all power driven bearings. The flywheel shaft, the drive gear, clutch and holddown mechanism all run in a bath of oil. CINCINNATI Shears are shipped with all reservoirs filled with the proper lubricant.

LUBRICATION POINTS & LUBRICANTS

The following lubrication points should be checked and serviced as recommended in the lubrication schedule found in the Maintenance Section. These points are shown in Figure 9 for 43 Series and smaller, and Figure 10 for 62 and 100 Series Shears.

GEAR BOX:

Keep gear box filled to proper level with worm gear oil, viscosity 1935-2365 SUS at 100° F with 5% acidless tallow (C.I. oil #F-2150).

IMPORTANT

Do not use any substitute for this oil as other oils will cause a reduction in the life of internal parts.

Oil is added at the top of the gear box, either through a plugged hole in a cover or by removing a small cover. A temperature rise of 70° F above room temperature in the gear box is normal. Gear box capacities are listed in the following chart:

SERIES SHEAR	CAP. (GAL.)	SERIES SHEAR	CAP. (GAL.)
10	3/4	43	4-1/2
14	1-1/2	62	5
18	1-1/2	100	5
25	2-1/2		

GEAR BOX OIL LEVEL:

Remove plug to check oil level. The flywheel must be stopped. The oil level should be at the hole. Add oil if required, but do not overfill.

NOTE: On some older shears, the oil level in the gear box may be seen in an oil sight window. This window must be cleaned periodically to keep it legible.

GEAR BOX DRAIN PLUG:

Run the shear flywheel to attain operating temperature and make the oil more fluid, then shut-off the electrical power to the shear. Drain the oil into a suitable container by removing this plug.

DRIVE MOTOR:

Lubricate the drive motor in accordance with the motor manufacturers recommendations. Do not over-lubricate.

HYDRAULIC HOLDDOWNS:

The hydraulic holddown system requires a light hydraulic oil, viscosity 135-165 SUS at 100° F with anti-rust, oxidation and anti-wear additives (C.I. oil B-150). This oil is added through a hinged lid or twist cap on top of the holddown box. Oil level is read through an oil sight window. A slight fluctuation in the oil level read in the window during a cycle is normal and also indicates that the window is giving a true reading of the oil level. It may be necessary to periodically clean the window. The holddown system capacities are as shown in following chart:

SERIES SHEAR	CAP. (GAL.)	SERIES SHEAR	CAP. (GAL.)
10	1-1/2	43	4-1/2
14	1-1/2	62	5
18	1-1/2	100	5
25	1-1/2		

HYDRAULIC HOLDDOWN DRAIN PLUG:

There are two drain plugs in the cylinder head under the holddown box. One is in the center of the domed section on all shears. The other drain plug on the 10-14-18 & 25 Series Shears is in the large rib adjacent to the dome. On the 43-62 & 100 Series the other drain plug is in the flat surface near the dome and it is stamped "DRAIN" on newer shears.

AUTOMATIC LUBRICATOR:

The automatic lubricator requires medium-heavy hydraulic oil, viscosity 284-348 SUS at 100° F with anti-rust, oxidation and anti-wear additives (C.I. oil B-315). The capacity is one gallon. The lubricator automatically feeds oil when the machine is operating. When the machine is started up after standing idle for 48 hours, turn the hand crank until oil appears at the ram guide farthest away from the lubricator. We recommend at least 40 turns of the hand crank.

BACK GAGE GUIDES:

The guides require a medium-heavy hydraulic oil, viscosity 284-348 SUS at 100° F with anti-rust, oxidation and anti-wear additives (C.I. oil B-315). This oil is poured through holes in the top of the guides (on some shears through the ram brace) into a cavity in the back gage nuts. To make these cavities accessible it is necesary to run the back gage to near the rear of its travel, where these cavities will line-up with the holes in the guides. On newer shears these holes are covered by swing covers.

FRICTION BRAKE ROLLER PIN (43 Series and smaller):

The lubricant for this pin is a #2 lithium soap base waterproof grease (C.I. grease H-2). The grease is applied by removing the plug in the end of the roller pin, and inserting a grease fitting. Add grease until it appears around pin at brake drum. Then remove grease fitting and replace original plug.

IMPORTANT

Do not over-lubricate. Wipe-up all excess grease so it will not get on the brake friction material.

RAM ADJUSTMENT (43-62 & 100 Series only):

The lubricant in this area is a #2 lithium soap base waterproof grease (C.I. grease H-2). The grease is applied through grease fittings.

AIR-LINE LUBRICATOR:

The lubricant for this reservoir is a medium hydraulic oil with a viscosity of 194-236 SUS at 100° F (C.I. oil B-215). The capacity of the reservoir is one pint.

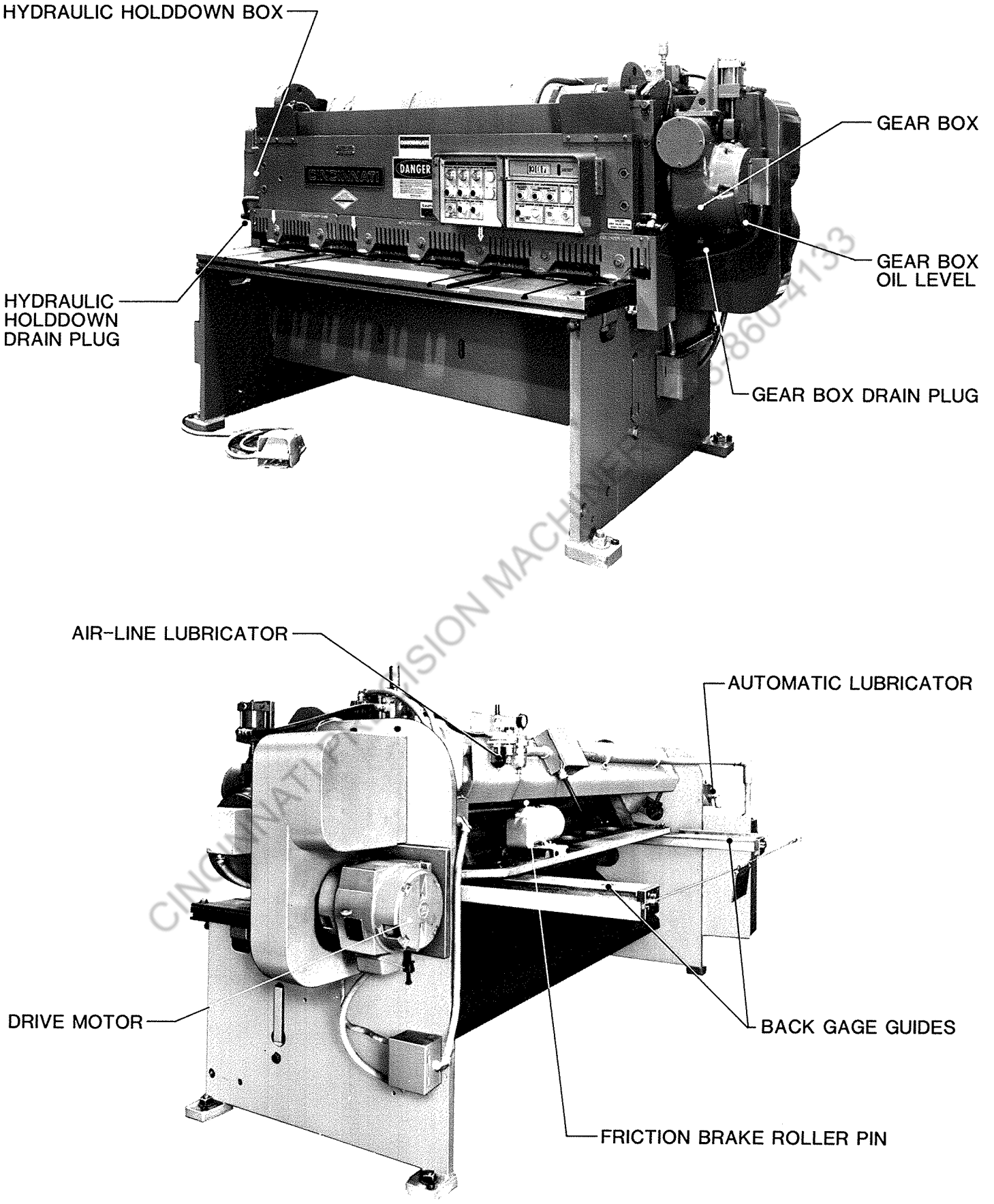
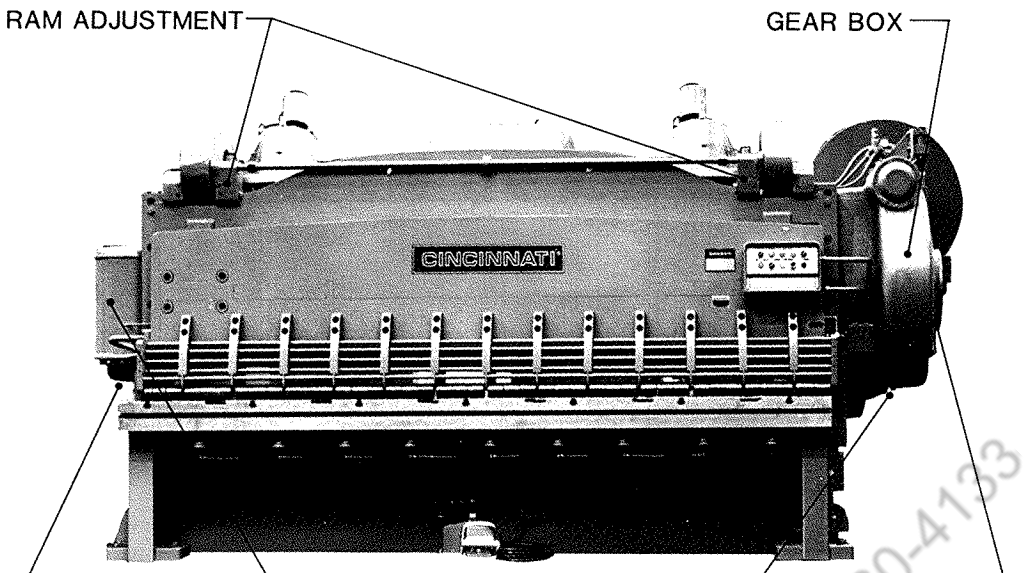


FIGURE 9



FOR OTHER LUBRICATION POINTS NOT SHOWN SEE FIGURE 9.

FIGURE 10

POWER BACK GAGE GEAR BOX:

SHEARS WITH POWER DRIVEN BACK GAGES SHIPPED PRIOR TO 1 JULY 1956. Refer to Figure 11.

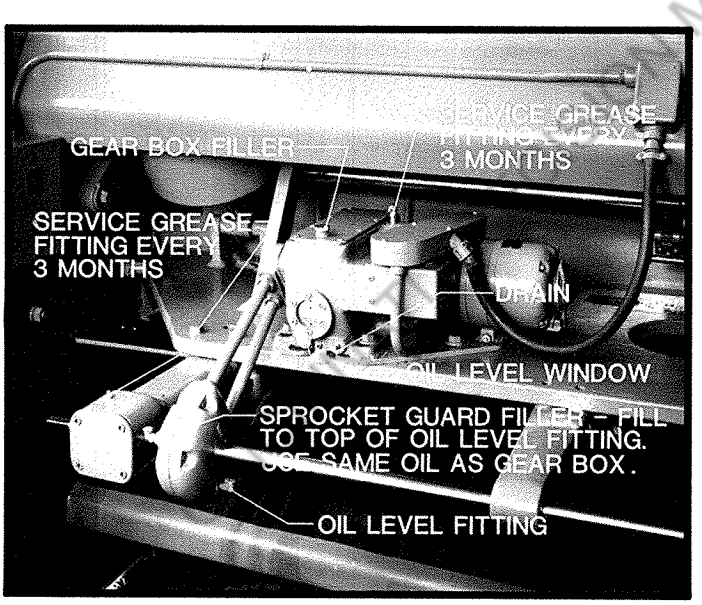


FIGURE 11

The required lubricant is a medium-heavy hydraulic oil, viscosity 284-348 SUS at 100° F. with anti-rust, oxidation and anti-wear additives (CI oil B-315). The capacity of the gear box is two quarts. The oil level is read through an oil sight window. This window must be cleaned periodically to remain legible.

SHEARS WITH POWER DRIVEN BACK GAGES SHIPPED AFTER 1 JULY 1956 AND PRIOR TO JUNE 1958. Refer to Figure 12.

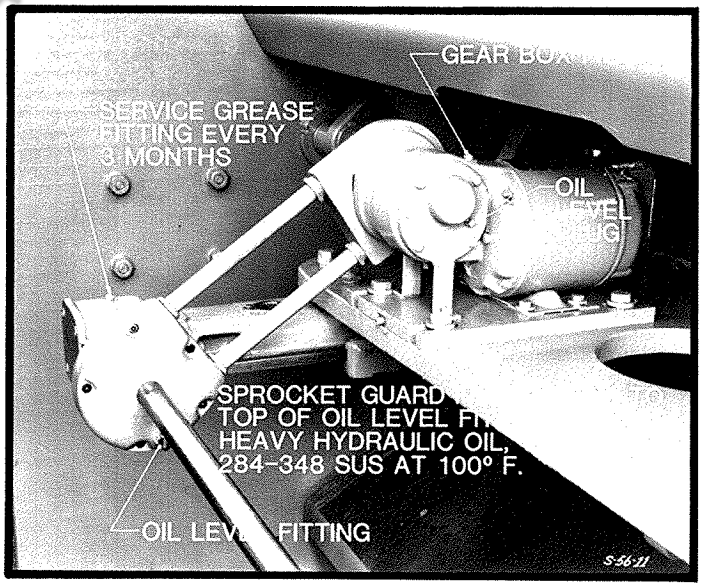


FIGURE 12

The required lubricant is a medium-heavy E.P. gear oil, viscosity 700-1000 SUS at 100° F with sulphur-phosphorus additives. The capacity of the gear box is one-half pint. Fill to the bottom of the oil level plug hole.

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SAFETY RECOMMENDATIONS FOR MECHANICAL SHEAR OPERATION

Shears manufactured today by CINCINNATI INCORPORATED comply with the construction requirements of the Occupational Safety and Health Act and the National Safety Standards of the American National Standards Institute.

CINCINNATI recommends you read and understand the safeguarding use and care requirements of the American National Standard for Power Squaring Shears, ANSI B11.4. This is available from the American National Standards Institute, 11 West 42nd Street, New York, N.Y. 10036. A copy is included in the manual pouch with each new machine.

For additional safety information we recommend:

- Securing applicable safety data sheets from the National Safety Council, 1121 Spring Lake Drive, Itasca, Illinois 60143-3201.
- Determining your responsibilities under your state and local safety codes.
- Requesting assistance from the loss prevention department of your workmen's compensation carrier.

Personnel responsible for your shear operator training program, maintenance and operations must read and understand this safety manual and operator's manual. **No one** should set-up, operate or maintain this shear until they thoroughly understand it and know how to do their job safely. This safety information is not intended as a substitute for the operation and maintenance sections of this manual.

FOR SAFE OPERATION OF YOUR CINCINNATI MECHANICAL SHEAR:

KEEP CLEAR OF WORK AREA

Keep fingers, hands, arms and all parts of your body out of the work area (point-of-operation). Be aware that this machine is a shear and it will cut almost anything that has entered the work area if the shear is activated. The shear is also equipped with powerful holddowns which exert tons of force, clamping material or anything else in the work area while the ram is cycled. This is why awareness barriers and point-of-operation guards were put on the shear. Do not remove the guards or try to get past them when operating the shear.

If the machine is operated by more than one person and an operator control is not provided for each helper, only the operator should have the responsibility for activating the machine. It should be his responsibility to see not only that his own body is clear of the work area and all moving parts, but that his co-workers and all bystanders are also clear and are entirely visible in a safe location before activating the shear. Make sure that no one is in the area below the moving ram brace and backgage mechanism. Injury could result from being struck by these moving parts or by being crushed between them and stacked material.

During set-up, maintenance or adjustments on the machine which requires working within the work area, the ram should be blocked so that the knives cannot close and the power supply should be entirely disconnected.

CONCENTRATE ON YOUR JOB

Daydreaming, worrying about other problems or improper operation of a machine could cripple you for life. Operating a shear requires your complete attention. Talking, joking, or participating in or watching horseplay could result in physical injury to you . . . and that is not something to joke about. So watch what you are doing and concentrate on your job.

NEATNESS IS IMPORTANT

Keep the floor of your work area clear of scrap and trash that could cause you to stumble. Put scrap in the proper containers and keep stock and finished work neatly arranged. Be sure slippery surfaces are cleaned up properly. Stumbling and slipping can result in painful and perhaps even fatal injuries.

Put all tools and equipment away when you are not using them. Only the material you are working with should be on the table when operating the machine. Even a screwdriver can be deadly if left on the table of the machine. Do not place your hand or any object on top of the holddown beam.

PROPER TOOLS ARE IMPORTANT

Use the proper tools when working on the shear. An improper tool might slip and cause cuts or bruises. When changing knives, making adjustments or making repairs to the machine, be sure the ram is blocked in place or is at the bottom of the stroke and the power source is disconnected. All blocks must be removed prior to returning the machine to normal service to prevent damage.

Loose or flowing clothes may be comfortable, but if they are caught on the machine, it could result in an injury for you. Keep jewelry to a minimum. That I.D. bracelet you got for Christmas could cost your hand or finger. Never work through the throat of the shear or between the housings to handle or support material.

LOOK THINGS OVER CAREFULLY

Before operating your CINCINNATI Mechanical Shear, look to see if your machine is in the proper condition. Are the knives worn or chipped? Is the floor clear of rubbish? Are your tools put away? Is the stock neatly arranged? Are the machine's covers and guards securely in place? Is the machine firmly anchored to the floor? Are all nuts, bolts and screws tight? Is everything in proper operating condition? If not, report unsafe condition and needed repairs to your supervisor and be sure the problem is corrected before beginning operations.

KNOW YOUR MACHINE'S CAPACITY

Check the "SHEAR SPECIFICATIONS" chart in this manual for the mild steel capacity of your shear. Check the charts in "Shear and Shear Knife Capacities" bulletin PT-30491 included with this manual for the capacity of your shear and knives for the metal you are shearing. Do not attempt to cut material thicker than the rated capacity of the machine. The maximum mild steel capacity for this shear is also shown on the capacity plate on front of the shear in center of the holddown beam.

NOTE: A shear rated to cur 1/4" x 10" will not cut 1/2" x 5" or even 3/8" x 1" without damage.

FOR SAFE OPERATION OF YOUR CINCINNATI MECHANICAL SHEAR FOLLOW THESE RULES:

1. Be sure you know how to operate and adjust your CINCINNATI Mechanical Shear. Inspect the machine to see that all guards are in place. Review the "STANDARD MACHINE CONTROLS", "SHEARING EXPLANATION" and "STANDARD GAGES" sections of this manual.
2. Be sure that the shear knives are sharp and have the proper clearance. Make certain adequate safeguarding is installed.
3. Use a hand tool to position or remove small pieces. **Keep your hands out of the knives and from underneath the holddowns.**
4. Use a bench brush to clean off the shear table. Never use your bare hands - metal slivers can be painful.
5. Protect your eyes from flying pieces of metal by always wearing your safety glasses.
6. **Never** place your hands under the holddown(s) or in the knives. **Do not** insert your hands into, through or underneath the safeguarding.
7. Be sure that your fingers are not between the workpiece and the table. The clamping force needed to hold the workpiece to the table is more than enough to crush or even amputate your hand or fingers.
8. Wear your safety shoes at all times. A heavy or pointed piece of stock could fall and cause serious injury to your foot.
9. Keep the shear table free of loose tools and materials. Do not place tools or your hands on top of the holddown beam.
10. Wear snug fitting hand and arm protection when handling rough or sharp-edged stock.
11. Place stock being sheared firmly against the stops or gages before pressing the footswitch or treadle. Always use the holddowns, even for small pieces of stock, to prevent "tip-up" injury. Never shear a piece that is not held by at least one holddown clamp.
12. When shearing capacity or near capacity thickness material, try to use at least two holddowns to prevent "tip-up". A work clamp may be required for narrow pieces. See Section 6 for instructions on shearing narrow pieces.
13. Keep the rear of the shear clear of scrap and sheared material. Use chutes, conveyors or metal receiving boxes. DO NOT operate shear until you make certain no one is in rear area of shear. Remember that the backgage guides and ram brace move up and down with the ram.
14. Make certain no one is exposed to any moving parts of the shear at the rear, front or sides before operation.
15. Turn "OFF" and lock OPERATOR CONTROL switch and remove key when you leave the machine, even if you will be away from the machine for only a few minutes.
16. Maintain proper lighting levels and eliminate light glare to prevent eye strain and eye fatigue.
17. Report all cuts, bruises, or other injuries to your supervisor or the medical department immediately. They are the best judges of the seriousness of your injury.

SAFETY SIGNS

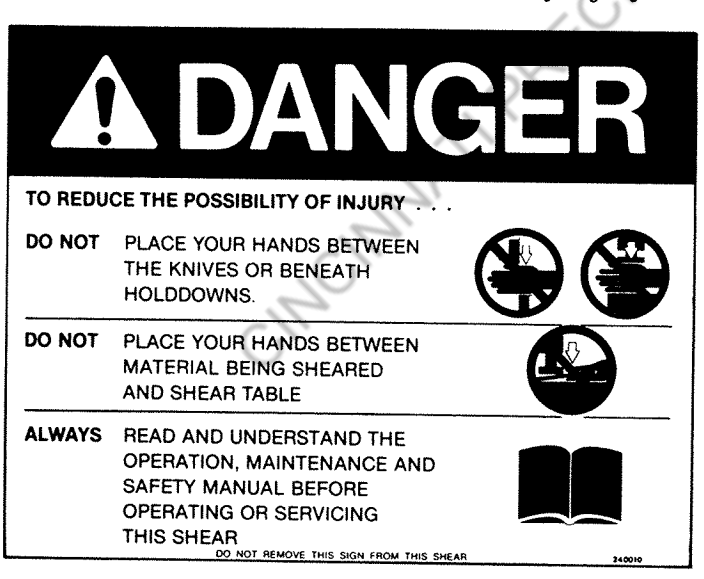
In order that shear operators and maintenance personnel may be warned of certain hazards that will exist - unless specified procedures are followed - a number of warnings signs are attached to all CINCINNATI mechanical shears. Warning signs are not intended to be a substitute for reading and understanding this Operation, Safety and Maintenance manual.

The warning signs are placed at strategic points on the shear for most effective use. It is intended that they become a permanent part of the equipment and, therefore, must not be removed, covered, hidden, or defaced. All signs installed on the machine by CINCINNATI INCORPORATED are identified by a small six-digit part number located in the lower right corner. If any of these signs become damaged or defaced, new ones should be ordered by contacting the factory or the nearest CINCINNATI Sales and Service office.

The following illustrations show the warning signs most commonly used on the mechanical shears. Other signs will be used when optional or special equipment is furnished on the machine. The user management should also include additional warning signs to cover any hazards that may be presented by customer-added auxiliary equipment.

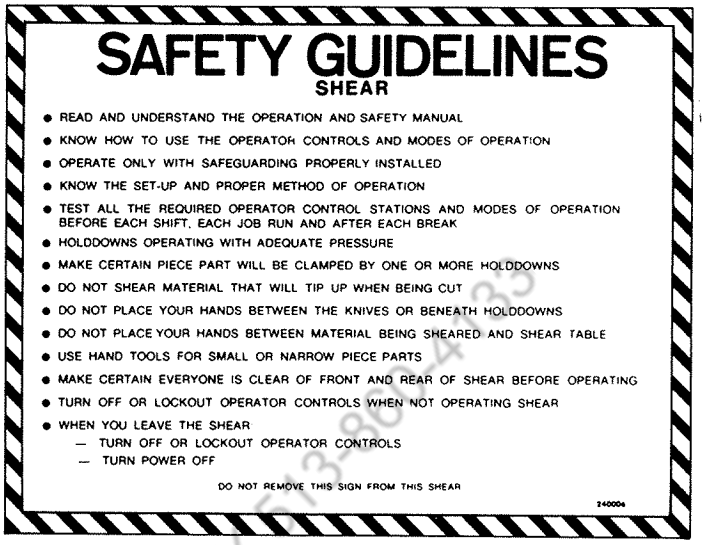
DANGER

This warning sign is attached to the front of the shear as a reminder to the machine operators or the maintenance personnel that certain procedures must be followed to prevent serious bodily injury.



SAFETY GUIDELINES

This sign is attached ajacent to the DANGER sign. It provides a checklist of safety considerations which should be observed before, during and after operation of the shear.



HAZARDOUS AREA

This sign warns of a hazardous area between the machine housings at the rear of the shear. One sign is attached to a steel restraining cable, which spans the space between bars attached to the housings. Another sign is attached to a rear surface of the machine. No one should enter this area when the machine is in operation.

SHEAR OPERATOR SAFETY GUIDELINES

- Be sure you know your shear - capacity, controls, operating modes, safeguarding.
- Adequate safeguarding properly installed.
- Knives sharp - clearance correct.
- Clamping mechanism / holddowns operating properly.
- Workpiece clamped by one or more holddowns.
- Work area clear - both front and rear.
- Keep shear table and holddown beam free of loose tools and materials.
- Hand tools, personal protective devices available and used - tools, safety glasses, gloves, safety shoes. Wear snug fitting clothes.
- Keep your hands out of the point-of-operation and from between workpiece and shear table.
- Make certain all personnel are away from the shear before operating.
- Keep alert - keep your mind on your job.
- When leaving your shear - turn the power "OFF" - controls inoperative.

SAFETY IS PART OF YOUR JOB . . . THE MORE ATTENTION YOU PAY TO DEVELOPING SAFE HABITS, THE LESS THE CHANCES OF INJURY TO YOU AND YOUR FELLOW EMPLOYEES.

SAFETY MAINTENANCE CHECK

- SAFEGUARDING at point-of-operation in proper adjustment and repair.
- PINCH POINT guarding properly installed.
- OPERATOR CONTROLS working properly.
- OPERATING MODES functioning properly.
- RAM starting and stopping properly.
- INSTRUCTION and WARNING SIGNS clean and easily read.
- KNIVES checked for sharpness and proper clearance.
- ELECTRICAL WIRING in good condition.
- HOLDDOWNS or clamping mechanism operating properly.
- CAUTION PAINTING in good condition.
- AUXILIARY EQUIPMENT checked - working properly.
- HAND TOOLS, personal equipment in good order - readily available.
- SAFETY MANUALS and OPERATOR MANUALS attached to machine.
- SCHEDULED NORMAL MAINTENANCE work completed.

FAILURE TO FOLLOW SAFE SHEAR OPERATING PROCEDURES MAY RESULT IN SERIOUS INJURY TO YOU OR ANOTHER EMPLOYEE.

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When shearing, there are several very important operation rules and precautions that must be followed. Observing these rules will promote accuracy and safer shear operation. Failure to adhere to the following recommendations will greatly increase the possibility of an accident, leading to serious personal injury and/or machine damage.

1. Never place your fingers underneath the material to be sheared. The preferred method for feeding material into the shear is to push it with the heel of your hands while wearing gloves at the handslot in the table.

   Be aware that the holddowns will clamp the material to the table, flattening out some of the waviness of the sheet or plate. This clamping action can cause injury if your hands are between the material and the table.

   Also, switching the air-operated ball transfers (if shear is so equipped) to the inoperative position will cause supported material to come down on table. The weight of material falling to top of table can cause injury to hands under material.

2. All CINCINNATI Shears are equipped with hydraulic holddowns which clamp the material being sheared to prevent movement or "tip-up" during shear. We recommend that the material be clamped by as many holddowns as possible, at least two or more. The minimum width of material on the table should be such that it will be clamped by the full diameter of the holddown foot. This width will be different for each size shear, and should be equal to or greater than the distance from the cutting edge of the lower knife to the outer edge of the holddown foot. See Figure 13.

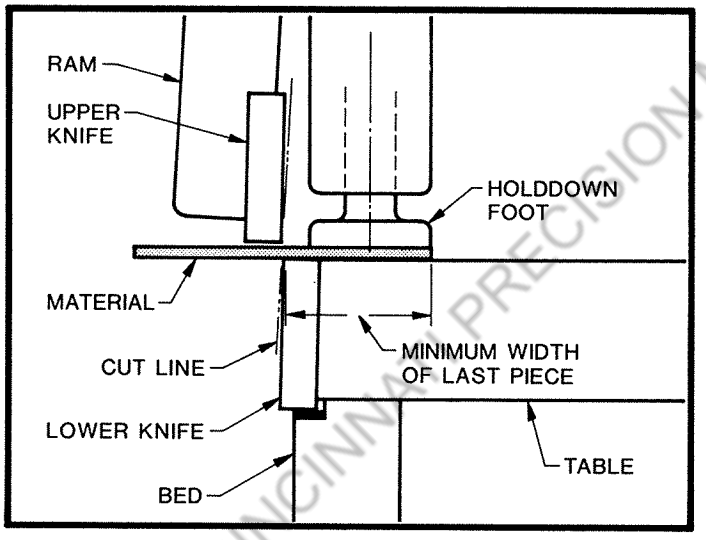


FIGURE 13

3. If the material being sheared is not wide enough to clamp with two holddowns, and is of maximum capacity for the shear, it may be necessary to provide a manual clamping device to prevent possible "tip-up". See Figure 14 for a suggested type of clamp.

4. Recommended shearing procedure is to position the material using whatever gages are applicable. Then, just as soon as the holddowns clamp the work, immediately remove your hands from the material.

5. There may be a tendency for the material to tip-up when sheared if using dull knives, improper knife clearance, over-capacity material, or inadequate holddown pressure. This is particularly true when shearing a piece held by only one holddown.

6. Be certain that the material being sheared is within the capacity of the shear.

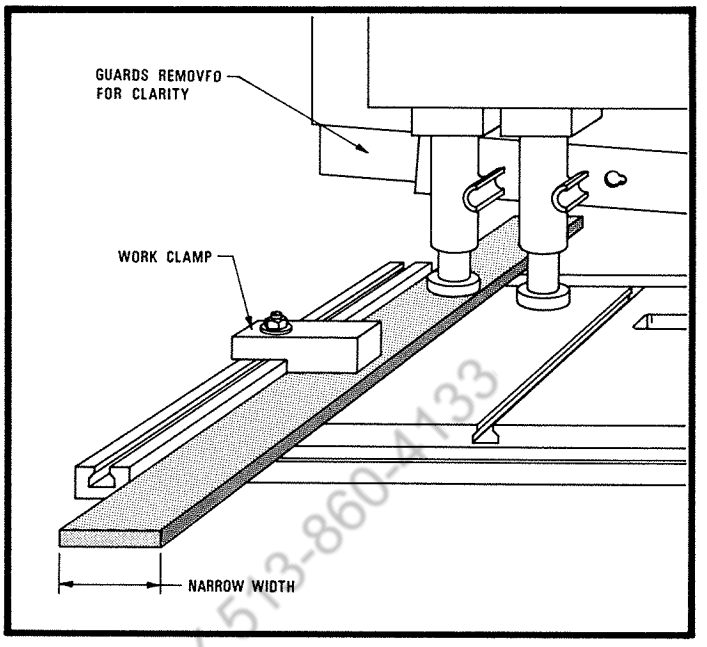


FIGURE 14

7. There is a potential hazard if the knife or the material shatters during a shear cut. This could be caused by shearing very hard, very brittle or over-capacity material, or even loose tools left on the table that get into the cut area. If this shattering occurs, flying pieces or slivers could cause painful injury. SAFETY GLASSES SHOULD BE WORN AT ALL TIMES.

8. Shears which are operated by foot treadle through mechanical linkage to the clutch have the potential for a second stroke unless the treadle is released immediately after initiating a stroke. If the treadle return spring is improperly set, the treadle may bounce on release and cause an inadvertent second stroke. On shears with electric clutch control, we recommend that the shear be operated in "SINGLE STROKE" or "NON-REPEAT" mode.

9. Never stack pieces on top of each other for shearing. This creates an overload, even though the total thickness may be less than maximum capacity. Instead of using the sharp knives to make the cut, shearing is being done by the material trying to shear adjacent sheets by a pinching action. This overload creates a hazard for the operator, as the holddowns may not be able to hold the material. The shear could also be damaged by folding some pieces between the knives.

10. There is a potential problem of catching the cut edge of the table workpiece on the upper knife during the up-stroke of the ram. This is particularly true on shears with longer strokes. Material pick-up is usually caused by the operator continuing to push the material in against the back gage throughout the stroke. A kink can be created in the table workpiece in this manner, and even possible injury to the operator could occur. The upper knife may be pulled out of position and shatter against the lower knife.

11. Cut pieces must periodically be removed from the rear of the shear. If they are allowed to stack up, a pinch point will be created at the rear of the shear. Whenever these cut pieces are removed, the clutch controls should be locked OFF before anyone enters this area. No one should ever be in this area behind the shear during operation, but this material build-up could cause an additional pinch point for anyone who is there. The whole ram, ram brace and back gage assemblies move down and up every stroke.

12. The use of all the gages possible for every cut will help produce more accurate pieces. For example, using both the back gage and the side gage.

SHEARING EXPLANATION

Shearing is the cutting of a sheet or plate into two pieces. It is the parting of a sheet or plate by forcing a hardened steel upper knife, mounted in the ram, through the sheet or plate which is supported by the table and the lower knife. The path of this upper knife is held in close proximity to the lower knife. The distance between the knives when passing is the knife clearance.

The energy for a cut is stored in the flywheel and is supplied by an electric motor through vee belts. The flywheel transmits this energy through a worm-wormwheel drive to the eccentric shaft controlled by a "jaw clutch". This "jaw clutch" is a full revolution clutch which means that once it is engaged, the eccentric shaft will make one full revolution before the clutch can be disengaged. The eccentrics on the shaft will pull the ram down through the cutting stroke by means of connecting links, which are attached to the ram and returns the ram to the top of its stroke.

Clutch engagement is controlled by the operator through any of several controls, whichever was supplied with the shear. This control can be a footswitch, treadle, the optional probes, or a combination of any of these depending on the operators choice and the shear's equipment.

Most shears have a friction brake which is automatically applied and stops the ram at the top of its stroke and holds it there until the clutch is engaged for the next stroke.

There are hydraulic holddowns (clamps) across the front of the shear which are automatically applied when the clutch is engaged. The purpose of these holddowns is to hold the material being sheared securely to the table during cut to prevent movement, as this affects accuracy. The holddowns will release the material at the bottom of the ram's stroke. Holddown pressure is adjustable.

When material is to be sheared, it is fed into the shear across the table, under the holddowns, and positioned using the selected gage or gages. Then the clutch is engaged by the operator control causing the cut to be made. The cut-off piece falls to the rear of the shear. The ram returns to the top of its stroke and is ready for the next cut.

GRADE OF MATERIAL

In addition to sharp knives and proper adjustments, accurate shearing requires good material. Material that is full of strains, buckled sheet, second stock, etc., will not give as accurate pieces as first grade stock. Twist, camber and bow will also be more pronounced.

DISTORTION OF PIECES

Shearing causes some distortion in the cut pieces, most of which is in the back or cut-off piece. Shearing edges, or strips, from sheets or plates will remove or release some inherent stresses that are present in the material. This will cause distortion and possibly a cut that is not straight.

The distortion in the back piece caused by shearing will be virtually non-existent when the width of the back piece approaches 16 times the material thickness. This distortion, which is primarily produced in the back piece, is usually a combination of bow, twist and camber.

The narrower the back piece, the greater the bow, twist and camber become.

BOW

Bow is the arching of the sheared piece out of its original flat plane. See Figure 15.

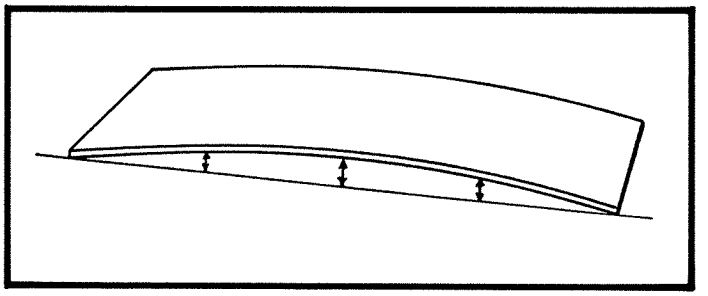


FIGURE 15

TWIST

Twist is the spiraling of the cut-off piece because of shearing. See Figure 16.

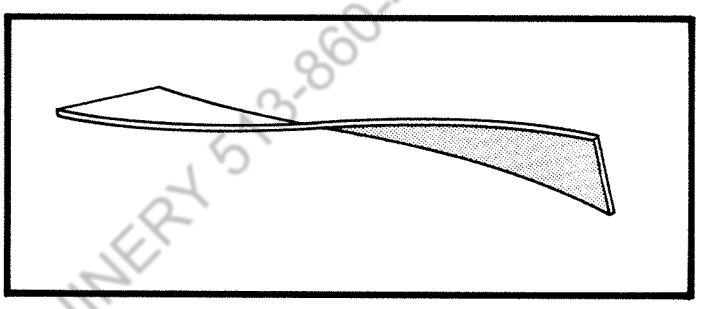


FIGURE 16

CAMBER

Camber is the curving of the sheared strip in the plane of the material. Some camber could appear in the edge of the piece left on the table. See Figure 17.

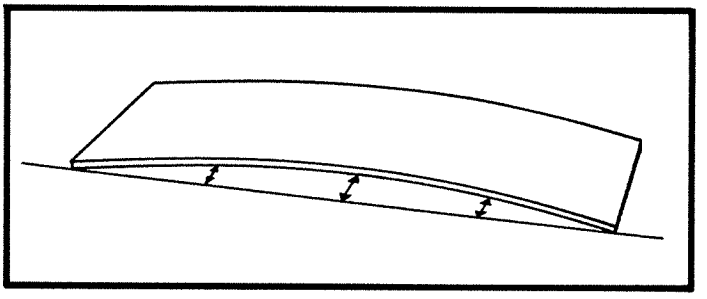


FIGURE 17

SHEARING PROCEDURE

1. Determine what type of shearing is to be done and which gages are to be used.
2. Turn the electrical power to the shear "ON" and start main drive motor.
3. Make certain that the footswitches or treadle are in the "OFF" or locked position.
4. Set the gage or gages to the desired position.
5. Turn ON footswitches or unlock treadle. Before cutting the first piece from a large sheet or plate, it is advisable to first take a trim cut from one edge. This will produce a clean straight edge which can be used for subsequent gaging. When making this initial trim the sheet or plate should be positioned against the side gage or squaring arm bar at the left end of the shear (or the right end on 16 ft. and longer shears which have the high end of the ram knife at the right end).

6. All sheets or plates must be positioned solidly against and in contact with the gage or gages used when being sheared.

7. The operator should hold the piece in position until the holddowns clamp it, and then remove his hands from the piece immediately before the cut starts.

CAUTION

DO NOT PLACE HANDS UNDER THE MATERIAL AS THEY COULD BE INJURED BECAUSE OF CLAMPING OR SHEARING ACTION.

The main electrical enclosure is located on the left housing for smaller series shears and on the right housing for larger series shears. See Section 1 - IDENTIFICATION. The main disconnect switch is located on this enclosure. It disconnects all electrical power to the shear. There is never a need for the operator to open this enclosure. If the machine does not function properly, maintenance personnel should be notified.

A ground connected light is mounted on the front of the main electrical enclosure on shears built after October 1974. The low voltage circuit is a grounded circuit. This is an internal chassis ground - it does not indicate the machine is grounded. When the light is lit it indicates the ground is connected. It is a push-to-test light. If the light does not come ON when the main disconnect is turned "ON", push it to test. If it does not come ON, the bulb is burned out. If the light does come ON, it indicates a blown fuse or that the ground wire is disconnected. In either case, contact maintenance personnel.

The clutch on CINCINNATI Mechanical Shears is a full-revolution type of clutch. This means that when the clutch is engaged the shear ram will make a complete cycle, regardless of whether the actuating control is released or remains depressed. The method of actuating the clutch to cycle the ram and to position the back gage has varied since the mechanical shears have been manufactured. Generally, these controls can be grouped into three time periods:

SHEARS SHIPPED AFTER OCTOBER, 1974 (CURRENT DESIGN)

A footswitch is used to actuate an air-electric operated clutch. The back gage is power driven and positioned by push-buttons. The controls for the clutch, back gage and the main drive motor are located in an electrical enclosure located on the holddown beam. See Figure 18. The function of these controls are:

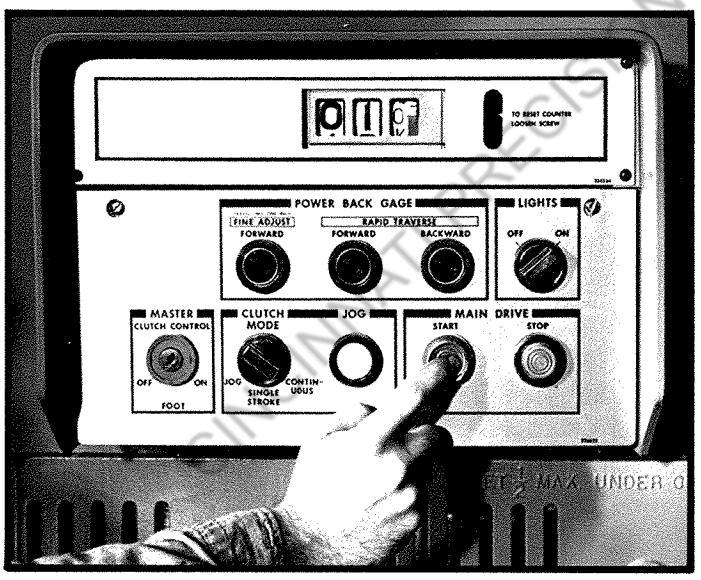


FIGURE 18

MAIN DRIVE "START" Pushbutton: Depressing the green guarded button will energize the main drive motor. It will not start if the CLUTCH MODE selector is in "JOG" position, the MASTER-CLUTCH CONTROL selector is in "OFF" position, or if the clutch is engaged.

MAIN DRIVE "STOP" Pushbutton: When this red button is depressed the main drive motor will be de-energized. The footswitch is also made inoperative so that the clutch cannot be engaged.

CLUTCH MODE Selector Switch: The operating mode of the shear is controlled by this key-lock, three position switch. It can be locked in any position to provide supervisory control of the shear's operation. The clutch operating modes are:

1. "JOG" - This mode is generally used for maintenance procedures where the ram must be moved slowly to a position or through a cycle.

2. "SINGLE STROKE" - This is the recommended operating mode. Depressing the footswitch will engage the clutch and cause the ram to make one complete stroke, stopping at the top of the stroke. The ram will make only one stroke, regardless of how long the footswitch is held depressed. Releasing the footswitch will not stop ram movement - it will continue to move until it stops at the top of the stroke. The footswitch must be fully released to start another stroke.

3. "CONTINUOUS" - An operating mode where the ram will continue to cycle as long as the footswitch is held depressed. When the footswitch is released, the ram will complete the stroke and stop at the top.

JOG Pushbutton: With the CLUTCH MODE selector in "JOG" position, depressing the JOG button energizes the main drive motor as long as the button is held depressed. The footswitch is also made active. The MASTER-CLUTCH CONTROL selector switch must be in the "ON" position to make the JOG button active. The clutch can be engaged by pressing the footswitch and momentarily pressing the JOG button. After the clutch is engaged, the ram can be moved slowly by alternately depressing and releasing the JOG button. Prolonged use of the JOG button may cause the main drive motor heaters to trip.

MASTER-CLUTCH CONTROL Selector Switch: A two position, key-lock switch is provided for use by the operator. In the "OFF" position the main drive motor cannot be started, the JOG button is inactive and the clutch cannot be engaged to cycle the ram. Turning the switch "OFF" when the main drive motor is running will not stop the motor, but the ram cannot be cycled. As a safety precaution, it is recommended that the operator locks the selector in "OFF" position and keeps the key whenever he leaves the operator's position to prevent anyone from operating the shear.

With the switch in the "ON" position the main drive motor can be started and/or the footswitch is made active to permit clutch engagement.

POWER BACK GAGE Pushbuttons: Three buttons are provided to position the power driven back gage. The back gage position is read on a counter located on an adjacent panel in the control enclosure.

RAPID TRAVERSE "BACKWARD" - The back gage will move away from the knives in fast speed as long as the button is held depressed. The gage will move back until it reaches a stop at the rear limit of travel, at which time the button must be released.

RAPID TRAVERSE "FORWARD" - The back gage will move forward towards the knives in fast speed as long as the button is held depressed. Care must be taken not to advance the gage into the lower knife.

FINE ADJUST "FORWARD" - The back gage will move forward in slow speed when the "FORWARD" button is held depressed. When setting the back gage position, the gage should be moved to the rear slightly beyond the desired position. Then it is moved slowly forward towards the position setting to minimize any backlash in the back gage guide screws. Final positioning is accomplished by "jogging" the FINE ADJUST "FORWARD" button.

NOTE: The gage should not be moved more than one inch using this button to prevent overloading the A.C. (alternating current) back gage motor on Shears shipped prior to 1 December 1976 and after 1 July 1956.

Optional accessories, described in Section 10, may have their controls mounted in the electrical enclosure on the holddown beam. These controls may be a separate selector switch, or can be an additional position on the CLUTCH MODE and/or MASTER selector switch. The standard controls will continue to operate as described above.

SHEARS SHIPPED PRIOR TO OCTOBER, 1974 AND AFTER JANUARY, 1957

CINCINNATI Shears manufactured in this period were equipped with mechanically actuated clutches and power driven back gages as standard equipment. An optional air-electric clutch was also available and the clutch was actuated by a footswitch.

The standard mechanically actuated clutch was engaged by stepping on the full-length foot treadle, which extends across the front of the shear. See Figure 19. The treadle has a locking pin located at the right end. When the locking pin is engaged the clutch cannot be engaged by stepping on the foot treadle.

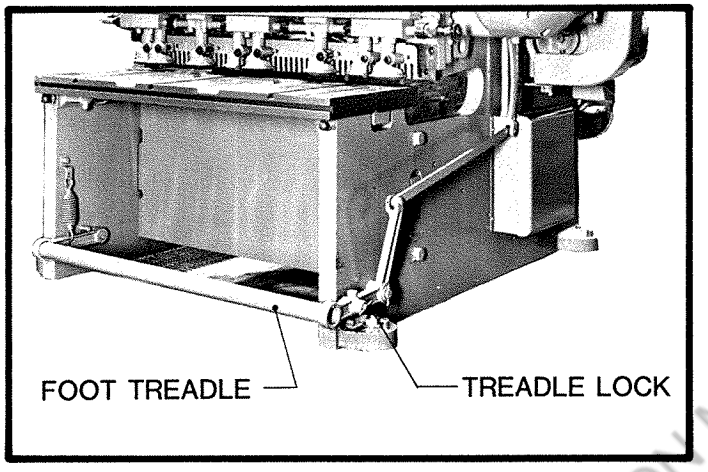


FIGURE 19

CAUTION

WHEN OPERATING THE SHEAR THE TREADLE MUST BE RELEASED IMMEDIATELY AFTER RAM STARTS TO MOVE. IF TREADLE IS HELD DEPRESSED AFTER RAM PASSES BOTTOM OF THE STROKE, THE RAM WILL MAKE MORE THAN ONE STROKE.

Controls for the power operated back gage and the main drive motor were located in an electrical enclosure mounted on the holddown beam. See Figure 20. The operation of the controls for the Power Back Gage are the same as described for SHEARS SHIPPED AFTER OCTOBER, 1974". The MAIN DRIVE "START" pushbutton will always start the motor when depressed. When the MAIN DRIVE "STOP" pushbutton is depressed the motor will be de-energized, however, the foot treadle and electric footswitch controls will still be active. The flywheel will slow down and eventually stop.

CAUTION

DEPRESSING THE OPERATING CONTROLS WITH THE FLYWHEEL ROTATING AFTER MAIN DRIVE "STOP" BUTTON IS DEPRESSED WILL ACTIVATE THE RAM.

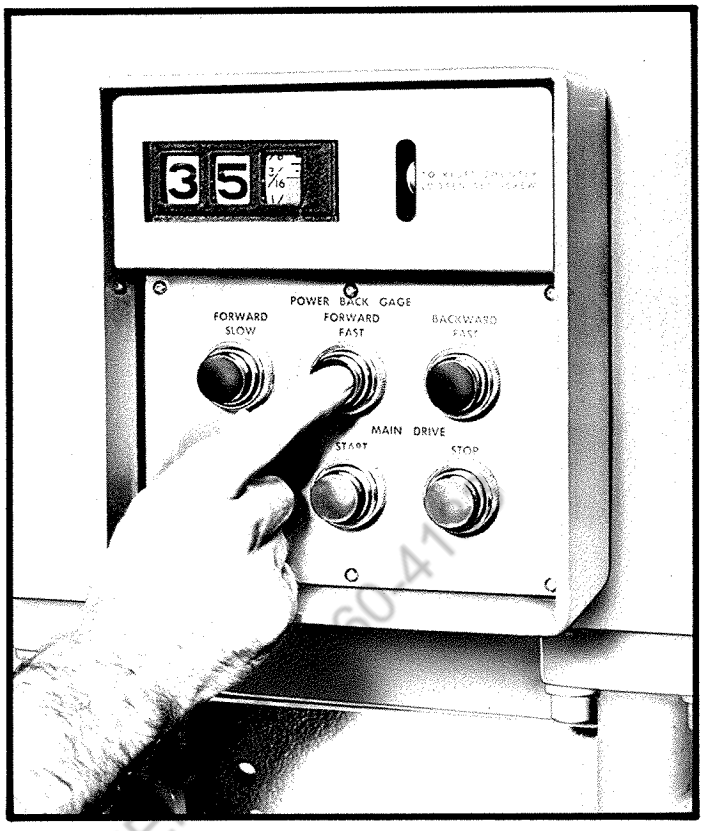


FIGURE 20

SHEARS SHIPPED PRIOR TO JANUARY, 1957

CINCINNATI Shears manufactured before 1957 were equipped with mechanically actuated clutches and manually positioned back gages as standard equipment. An optional electric solenoid operated clutch and/or power operated back gage was also available.

The standard electrical control was the MAIN DRIVE - "ON" and "OFF" pushbuttons. These were in a small electrical enclosure mounted on front of the holddown beam or the gear box near the right end.

The standard mechanically actuated clutch was engaged by depressing the foot treadle, as previously described.

The standard back gage was positioned manually using a handwheel and graduated dials. These controls are located on the end of the back gage guide, requiring the operator to enter the area at the rear of the shear.

CAUTION

BEFORE POSITIONING THE MANUAL BACK GAGE, THE TREADLE LOCK PIN MUST BE ENGAGED OR TURN "OFF" MAIN DISCONNECT SWITCH TO DE-ENERGIZE FOOTSWITCH TO PREVENT UNINTENDED RAM STROKE. INJURY CAN BE CAUSED BY THE MOVING RAM, RAM BRACE OR BACK GAGE ASSEMBLY.

STANDARD GAGES

All CINCINNATI Shears are furnished with a back gage, front gage, and graduated scales in the table as standard equipment. The back and front gages are movable stops against which the material to be sheared is positioned. These gages are set to control the size of sheared piece cut off or left on the table. The graduated scales in the table are a visual gage and are used to read the distance from the point of cut.

BACK GAGE:

The standard back gage is located in the rear of the shear and its gaging face (back gage angle) is parallel to the line of cut, extending from housing to housing. This gage is used as a back stop to control the size of the piece cut off. It is positioned either manually by use of a handwheel or powered by use of pushbuttons. Its location is shown on dials or counters which are normally graduated in inches and fractions. The manual handwheel and dials are shown in Figure 21. The Power Operated Back Gage is shown in Figure 22, and pushbutton counters and dials are shown in Figure 23.

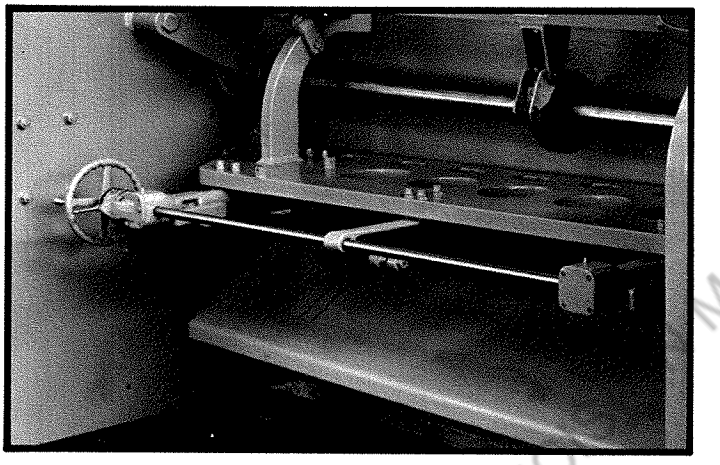


FIGURE 21

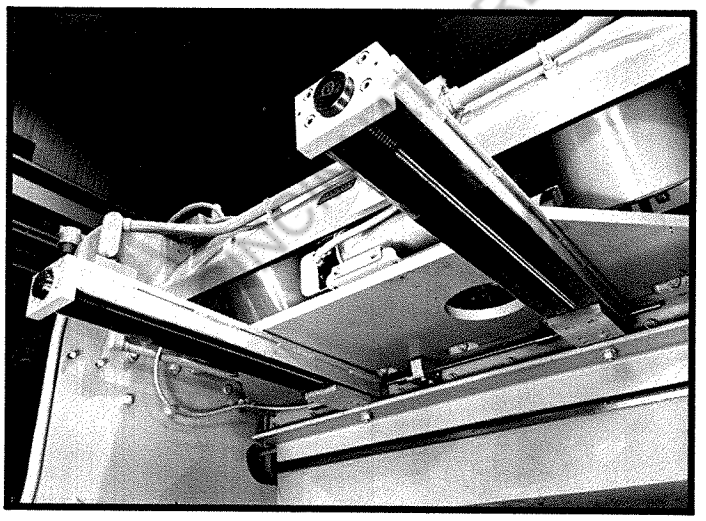


FIGURE 22

FIGURE 23

FRONT GAGE:

This is a stop or a series of stops located in the dovetail slots of the shear table and/or front support arms as shown in Figure 24. The stop is used to control the size of the cut-off piece or the piece remaining on the table.

On shears shipped prior to January 1952, a single bar, approximately as long as the table is used for front gaging. This bar is positioned manually parallel to the knives, set using a scale, and clamped to the table or front support arms with dovetail bolts and nuts.

On shears shipped after January 1952, individual stops are used for front gaging. Disappearing type (Figure 25) are furnished on 10, 14, 18, 25 and 43 Series and solid gage blocks on 62 and 100 Series shears. These stops slide in the dovetail slots in the table and/or front support arms. The stops have

two gaging surfaces approximately one-quarter inch apart. One surface is used for trim cuts and the other surface for the final size cut after the material has been rotated 180°. These stops are positioned manually using a scale, and are clamped in place by tightening their set screws.

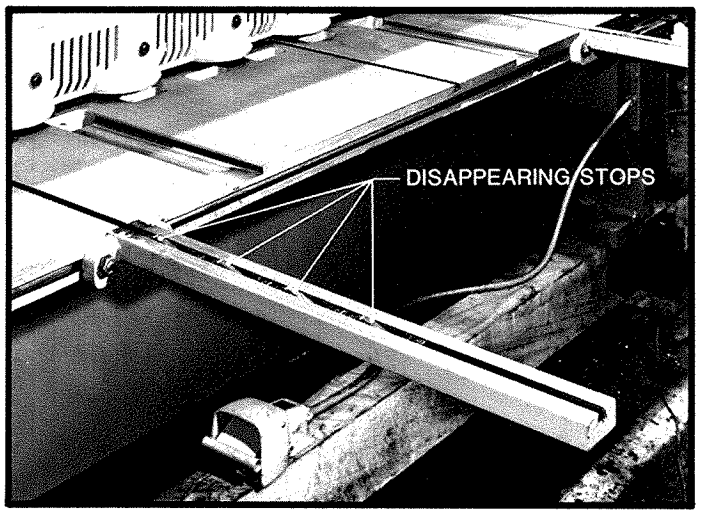


FIGURE 24

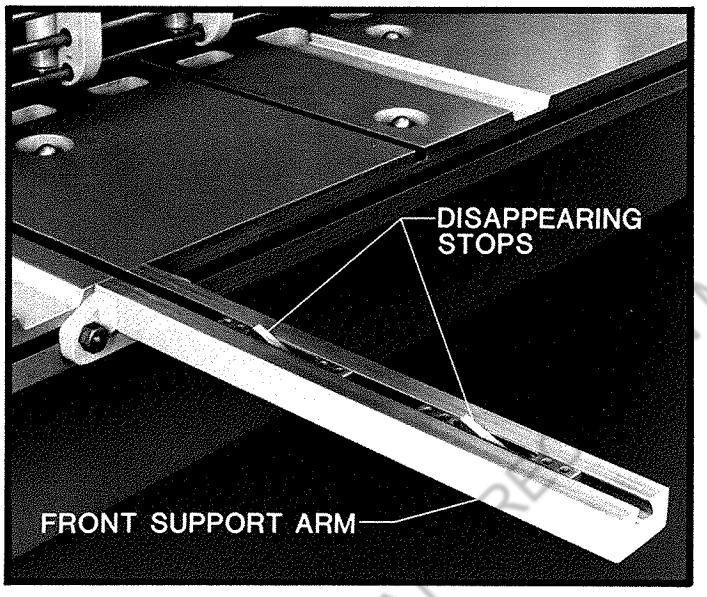


FIGURE 25

GRADUATED SCALES IN TABLE:

There are two graduated scales in the table, one near each end, supplied as standard equipment. These scales are graduated in inches and fractions. The scales can be set so that they accurately indicate the distance from the cutting edge of the lower knife. See Figure 26.

SIDE GAGE:

This is a steel bar which can be mounted on the surface of the table near either end. See Figure 26. The functions of the side gage are:

1. Provide side support to the material during the cut.
2. To guide the material as it is being fed through the shear so that it clears the inside surface of the housing.
3. Serve as a guide which is square to the lower knife.
4. Position material so that it will not be located beyond the end of the knife. The preferred location of the side gage is at the same end of the table as the high end of the upper knife. At this location, the side gage resists the tendency of the material to move during the cutting operation. When optional squaring arm is furnished, its preferred location is at the end of the table with the high end of the upper knife. The side gage is then placed at the other end of the table.

FIGURE 26

USE OF STANDARD GAGES

BACK GAGE:

The back gage is used for the majority of all shearing and is generally used with a side gage or squaring arm. The recommended procedure for positioning the back gage is to run it back beyond the desired setting and then move it slowly forward to that setting. The gage can be accurately positioned by use of the dials and/or counter. Final positioning of the power operated gage is done by intermittently tapping the FINE ADJUST "FORWARD" pushbutton as it approaches the desired position.

IMPORTANT

Do not run back gage in FINE ADJUST "FORWARD" for a distance of more than 1" to prevent possible damage to the back gage motor (shears shipped after 1 July 1956 and prior to 1 December 1976).

Using the side gage or squaring arm as a guide, push the material to be sheared across the table into the shear so that it is solidly against the gaging surface of the back gage and cannot be rocked against either gage. Do not exert excessive force on material that will compress back gage compensating springs. The material is now ready to be cut to size.

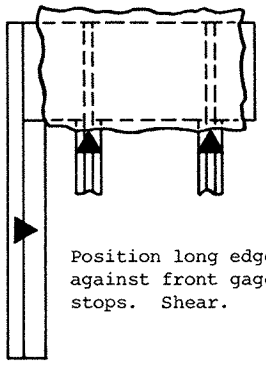
FRONT GAGING

There are many instances when use of the front gage stops are helpful. The SHEARING PROCEDURES on Page 25 show how the front gage stops can be used along with the side and back gages for trimming, stripping, and blanking. The use of the front stops with the optional squaring arm to produce accurate resquared blanks is also shown.

SHEARING PROCEDURES

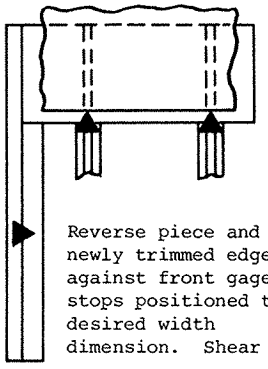
RESQUARING - NORMAL CONDITIONS

1. FIRST TRIM



Position long edge against front gage stops. Shear.

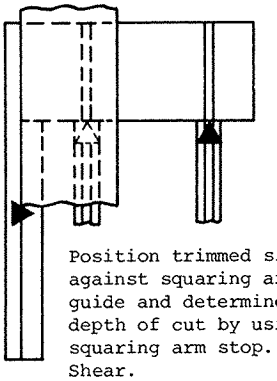
2. SECOND TRIM



Reverse piece and set newly trimmed edge against front gage stops positioned to desired width dimension. Shear

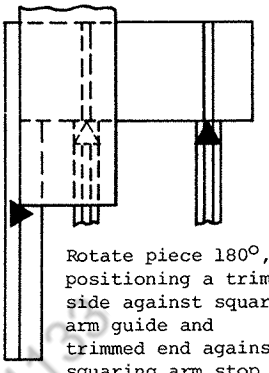
Width is now accurately cut - parallel and to size.

3. TRIM END



Position trimmed side against squaring arm guide and determine depth of cut by using squaring arm stop. Shear.

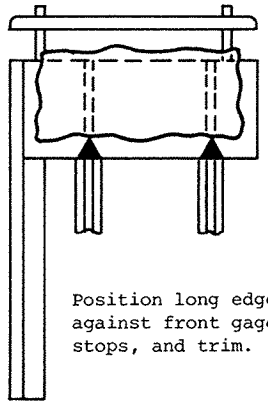
4. TRIM OTHER END



Rotate piece 180°, positioning a trimmed side against squaring arm guide and trimmed end against squaring arm stop which has been reset to required length dimension. Shear.

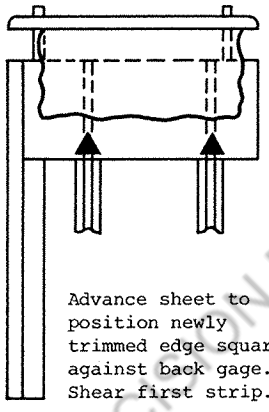
STRIPPING - NORMAL CONDITIONS

1. FIRST TRIM

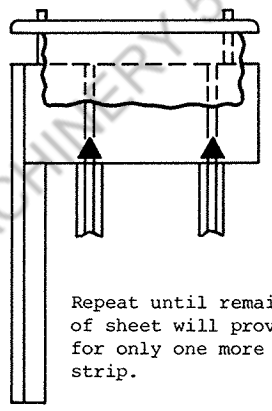


Position long edge against front gage stops, and trim.

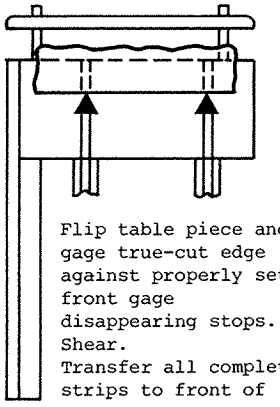
2. FIRST STRIP



Advance sheet to position newly trimmed edge squarely against back gage. Shear first strip.



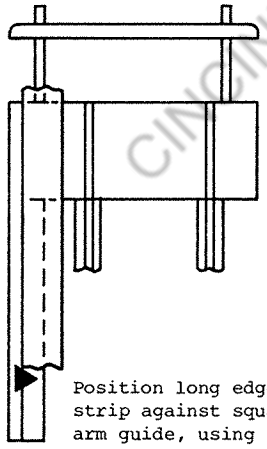
Repeat until remainder of sheet will provide for only one more strip.



Flip table piece and gage true-cut edge against properly set front gage disappearing stops. Shear.
Transfer all completed strips to front of shear in readiness for blanking operation.

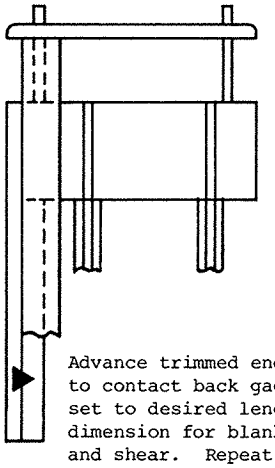
BLANKING - NORMAL CONDITIONS

1. TRIM END OF STRIP



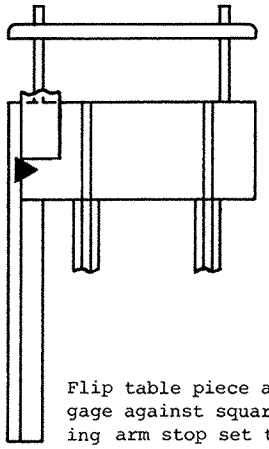
Position long edge of strip against squaring arm guide, using squaring arm stop to determine depth of trim. Shear.

2. CUT BLANKS



Advance trimmed end to contact back gage set to desired length dimension for blank, and shear. Repeat after each cut until only sufficient strip remains to provide one more blank.

3. CUT FINAL BLANK



Flip table piece and gage against squaring arm stop set to blanking length dimension. Shear.

▶ Indicates gage stops

TIPS FOR ABNORMAL CONDITIONS

1. To minimize camber, trim once or more, using front gages.
2. If blanks taper, fade back gage sufficiently to compensate. Various thicknesses of material require different fading adjustments.
3. If a 90° edge is desired, table piece cuts, using front gaging, produce best results.
4. It may become necessary to make additional trim cuts during shear production cycles to remove edge burr or reduce camber, when automatic probe shear is used.

When shearing very thin materials to a deep back width, they may sag enough to cause inaccurate width gaging by not properly contacting the face of the back gage angle. The material may even sag so much that it completely misses the back gage angle. Shearing heavier materials to a long back width may also be difficult since the operator cannot hold the material down on the shear table. Some sheet support devices may not operate properly with very thin material due to sag, or with very heavy materials due to weight limitations. When these conditions exist, front gaging is the preferred method to use. See Figure 27. It may be necessary to get additional sets of these front stops so that multiple settings can be made.

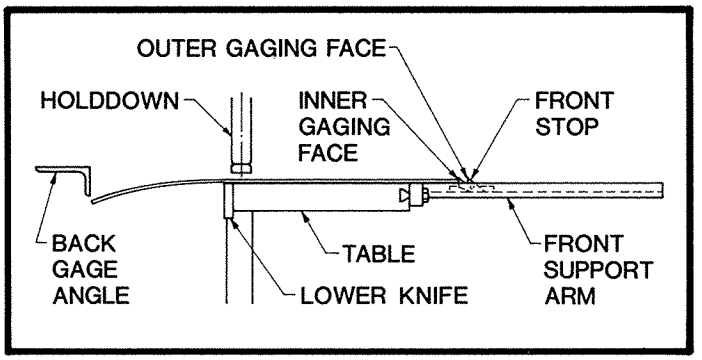


FIGURE 27

To set the standard two-step front stops, position the stops so that the distance from the cutting edge of the table knife to the inner gaging face of the stops is the same as the desired final size of the piece.

The first cut (trim) should be made with an edge of the material against the outer gage faces. After the first cut, rotate the material on the table 180° and place the first cut edge against the inner gage faces, and make the final trim. This will produce a finished piece as accurate as the gages were set.

SIDE GAGE:

The side gage can be used with either of the above gaging methods to guide the material into the shear and also to help hold the material in place as an aid to accuracy. The side gage should be set so that it is square with the cutting edge of the table knife. See Figure 26.

There are many options available for CINCINNATI Mechanical Shears which increase productivity and/or improve accuracy.

OPTIONS ADDED TO EXISTING SHEARS

LIGHT BEAM SHEARING GAGE:

This gage is a series of flood lights that illuminate the work area and provide a shadow line indicating the line of cut. See Figure 28. It allows shearing to a scribed line on the workpiece. The sharpness and location of the shadow line is controlled by movement of the slotted mounting brackets and the shield strip on top of the holddown beam. An "ON"/"OFF" selector switch is provided on the operator control panel.

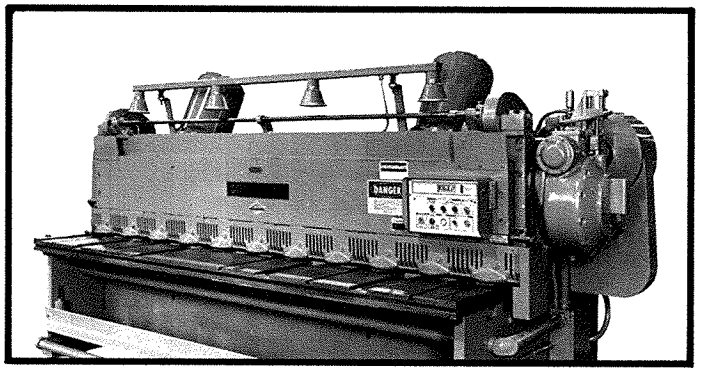


FIGURE 28

STANDARD SQUARING ARMS:

The squaring arm can be mounted at either end of the table and is set square with the table knife. (See MAINTENANCE Section 13.) It is used to guide the material into the shear and is used when resquaring material as shown on Page 25. The squaring arm contains a graduated scale and is equipped with an adjustable gaging stop, either solid or swinging, to aid in front gaging. See Figure 29.

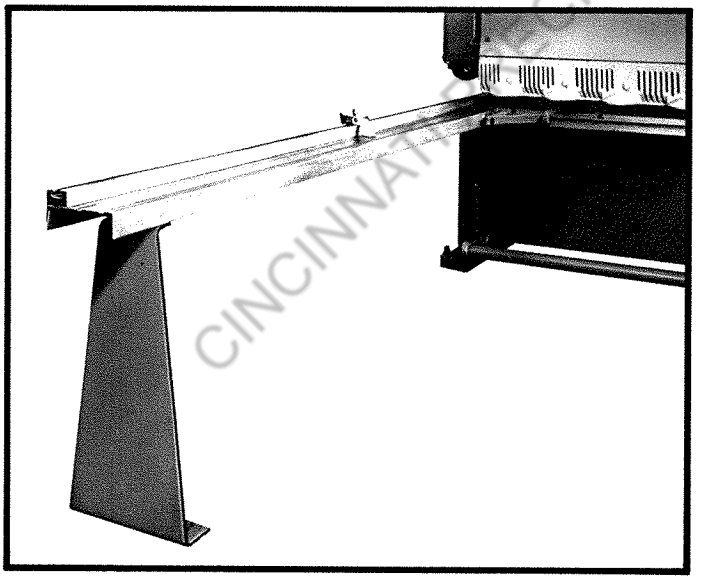


FIGURE 29

GRADUATED SCALES:

Standard scales in the table and squaring arm are graduated in fractions every 1/16" and marked every inch. These scales are available with decimal graduations every .050" and marked every inch. The scales are also available graduated in metrics every millimeter and marked every centimeter. Combination scales are also available with both fractional inches and metrics, or decimal inches and metrics.

BACK GAGE DIALS OR COUNTERS:

The standard back gage dials and counters are graduated in fractions. They are available graduated in decimal parts of the inch. Metric readouts are also available. It is possible to get an additional counter or dials to give combination readings, as on the graduated scales.

FRONT SUPPORT ARMS:

These arms are bolted to the front face of the table. Two or more support arms, depending on the shear length, are supplied with each shear as standard. Each of these arms has either a disappearing or solid stop. Optional extra long arms are available, which are approximately 24" longer than standard. The front support arms can also be supplied with graduated scales. See Figure 30.

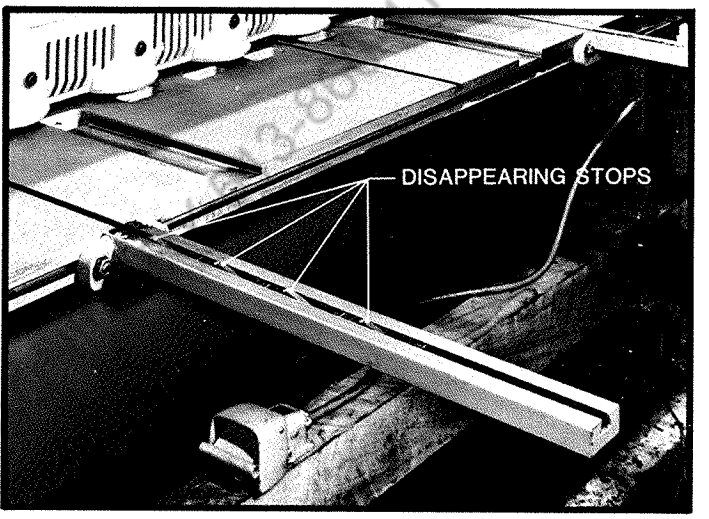


FIGURE 30

FRONT GAGE STOPS:

1. Solid front gage stops (Figure 31) are used in the dovetail slots of the table and front support arms.

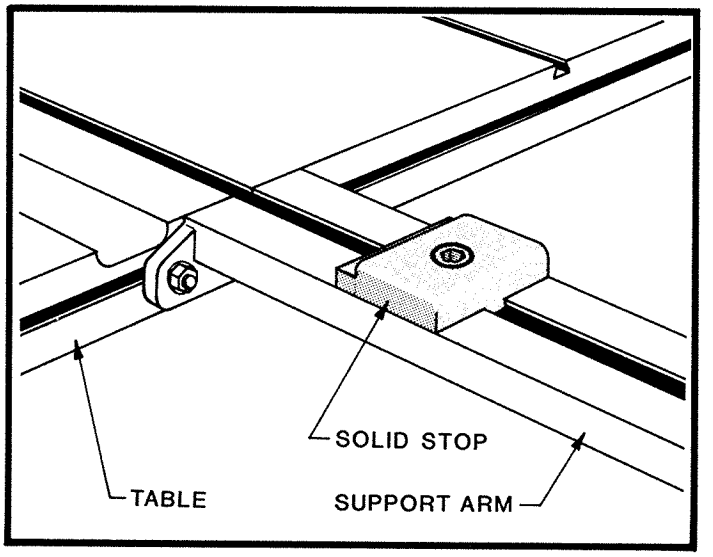


FIGURE 31

2. Disappearing stops (Figure 30) are used in the dovetail slots of the table and front support arms, and in the special squaring arm with dovetail slots.

3. One swinging stop is furnished with the standard squaring arm on 25 Series shears and smaller. Additional swinging stops can be used (Figure 32), providing rapid gaging from the squaring arm. The sheets slip under stops not in use.

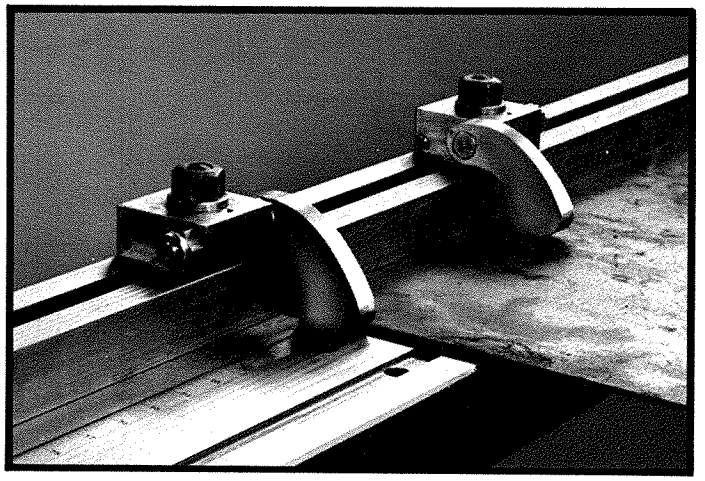


FIGURE 32

4. Solid stops (Figure 33) are used on standard squaring arms on 43, 62 and 100 Series shears. They are designed for gaging heavy material.

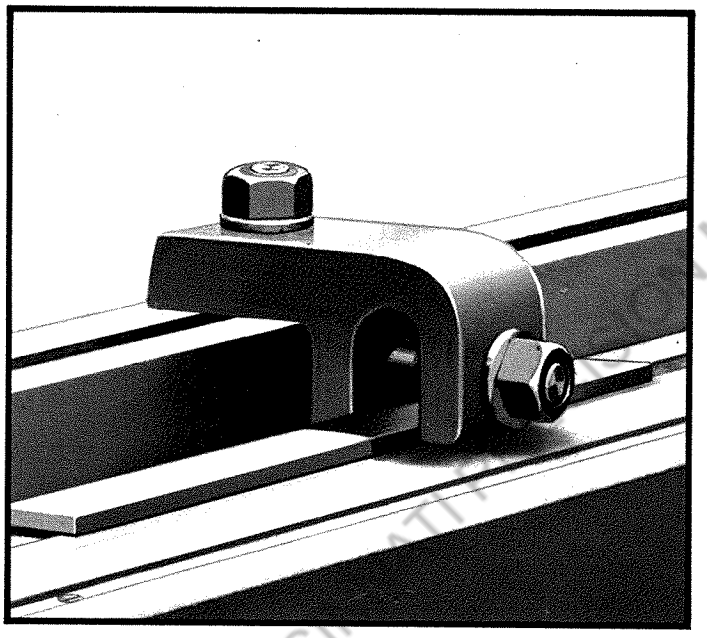


FIGURE 33

BACK GAGE RANGE:

The range of the back gage on CINCINNATI Shears is 0" to 24", 0" to 36", 0" to 48" and 0" to 60". The 0" to 24" range is no longer made, but the other sizes are all available. A larger range back gage may be desired to shear wider sheets. However, changing the range also affects the shear counterbalances and requires extensive modifications.

HINGED BACK GAGE:

Hinged back gage angle can be turned up, out of the material passline, to permit shearing pieces wider than the back gage range. Hinged back gage angles are available on all CINCINNATI Shears except those with magnetic sheet supports. They can be added to most existing shears, but due to the depth of the ram brace, a longer range back gage may be required.

MITER GAGE:

The miter gage (Figure 34) provides a means to shear at angles other than 90°. It consists of an adjustable block, a pivot block, and a slotted gage bar for side gaging the material. The pivot bolt can be located in any one of the standard dovetail slots in the top of the table. The adjustable block is mounted in the standard dovetail slot in the front edge of the table. The gage bar is set to the desired angle by means of a protractor, and then locked in position by tightening four nuts.

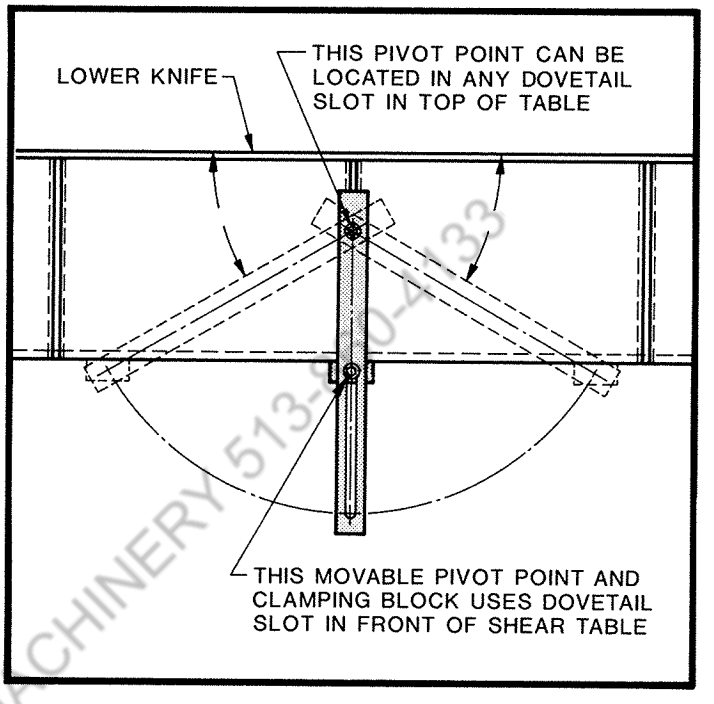
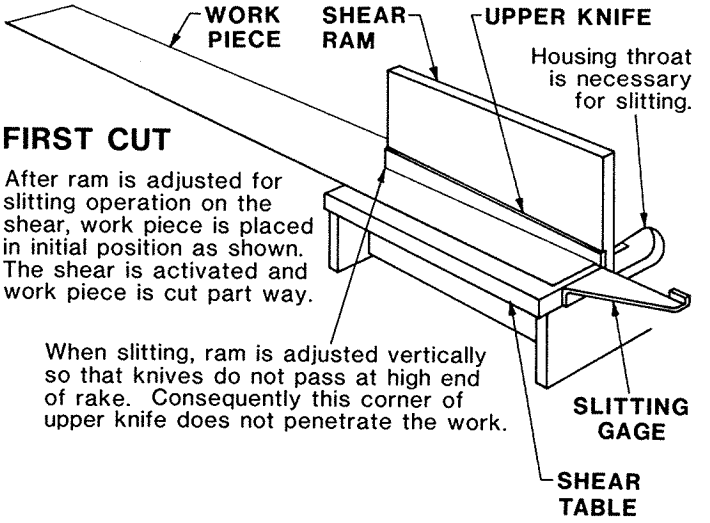
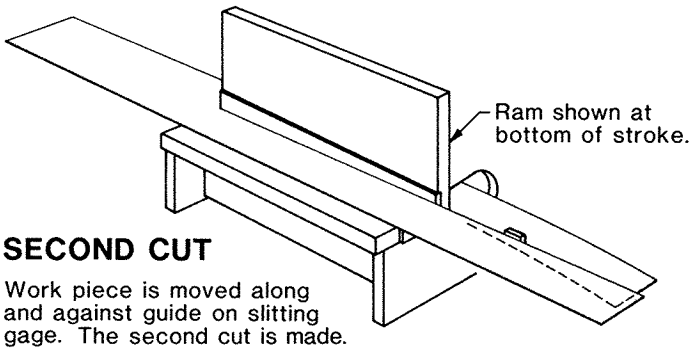


FIGURE 34

SLITTING GAGE:

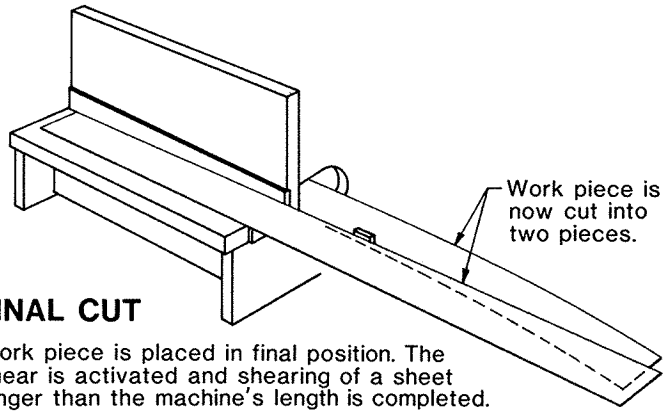
The slitting gage can be added to any CINCINNATI Mechanical Shear except 10 Series. This gage is an aid for positioning material for slitting, which is shearing material longer than the shear. The operation is explained in the following illustrations.





SECOND CUT

Work piece is moved along and against guide on slitting gage. The second cut is made.



FINAL CUT

Work piece is placed in final position. The shear is activated and shearing of a sheet longer than the machine's length is completed.

BALL TRANSFERS:

The purpose of the ball transfer units is to make moving material across the table surface easier. These units are located in the table (Figure 35) and they can be added to existing shears. However, addition of ball transfers to shears which were not originally equipped with them requires removal of the table for machining. The distance that the balls extend above the table surface is adjustable.

FIGURE 35

There are three types of ball transfer units available for CINCINNATI Shears. The solid unsprung units, used on 10, 14, 18 and 25 Series shears, are normally set 1/16" above the table surface. The spring loaded units, supplied as standard equipment on 43, 62 and 100 Series shears, are normally set 1/8" above the table surface. The air-operated units, which can be used on all shears,are usually set 3/16" above the table on 25 Series and smaller, and 3/8" above the table surface on 43 Series and larger shears.

The air-operated units are retracted into the table whenever the footswitch is depressed, or turned OFF by a selector switch. This footswitch is a three-position switch; the middle position retracts the ball units, and fully depressed will cycle the shear.

REAR CORNER SHEET SUPPORT:

This option will help minimize the distortion of the back, or sheared-off piece, particularly at the left end. It supports the piece, resisting the piece's tendency to fall due to its own weight during shearing. This support will help eliminate the bent down corner. It will also give a more nearly square cut edge on a small back piece sheared at the left end of the shear.

The support consists of a platen operated by an air cylinder that extends through the gap of the left housing into the cut area just below the passline. See Figure 36. It will be under the left end of the material being cut. This platen supports the piece being sheared and helps it resist the tendency to "fold-over" as it is being cut off. The upper knife and cut-off piece will force the platen down against the operating air pressure.

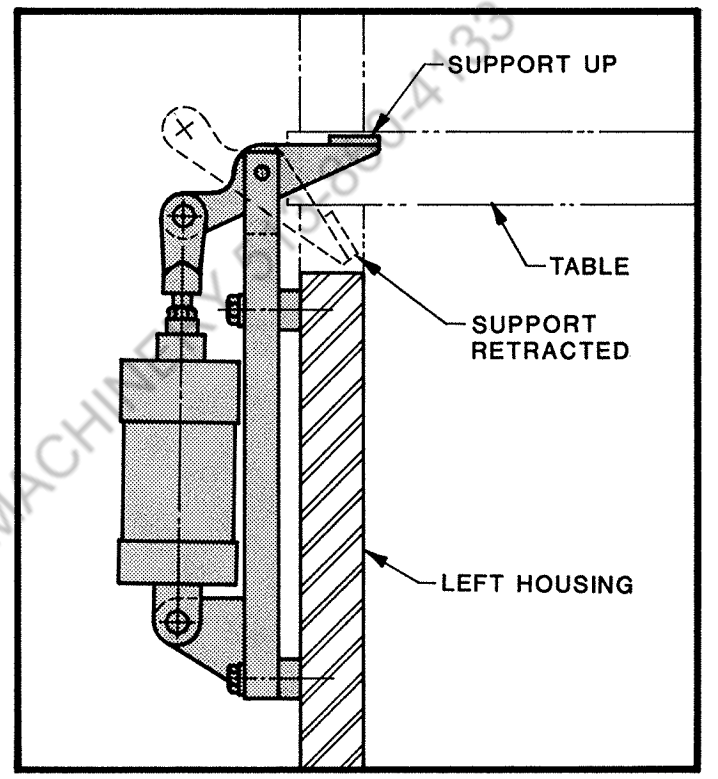


FIGURE 36

There are several size rear corner supports, one of which will fit any size mechanical shear.

A selector switch is provided to retract the platen, or cause the support to be active.

CONVEYOR:

All CINCINNATI Shears, 10 through 43 Series can be operated with a CINCINNATI Conveyor. (See Figure 37) Conveyors are an aid to production and promote safer shear operation. They will support the material being fed through the shear into the back gage, and will then convey the cut piece out from behind the shear. They eliminate the need for a person going in behind the shear to remove cut pieces.

Conveyors can be supplied with a Scrap Separator and/or a Stacker. There is a scrap bin furnished with the Scrap Separator to collect the trims and small scrap.

A separate Operation and Maintenance manual is provided for CINCINNATI Conveyors.

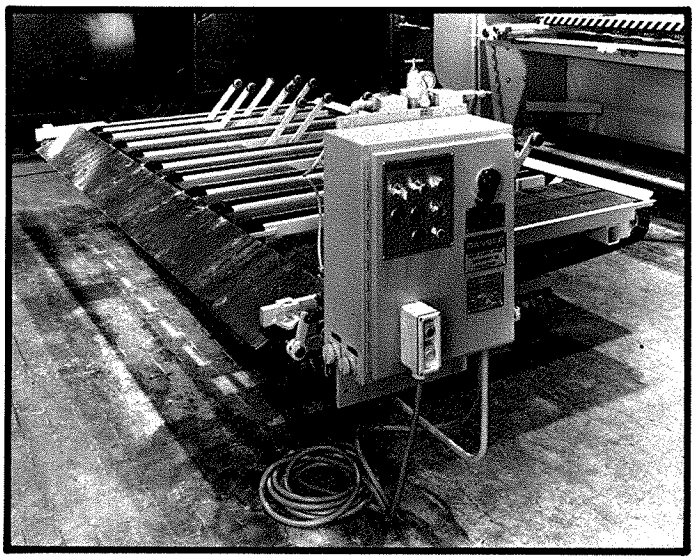


FIGURE 37

AUTO-SHEAR OR PROBES

The "AUTO-SHEAR" system is made up of a series of three to five (or more) contact points (probes) in the back gage angle. Each probe has an individual "ON"-"OFF" switch to make it active or inactive. See Figure 38. Each probe has an indicator light at the control station that will indicate when the material has made contact with that probe. The material being sheared must be able to conduct electricity. When the material to be sheared is in contact with the selected probe or probes, it will automatically trip the shear. This will speed-up production and improve accuracy.

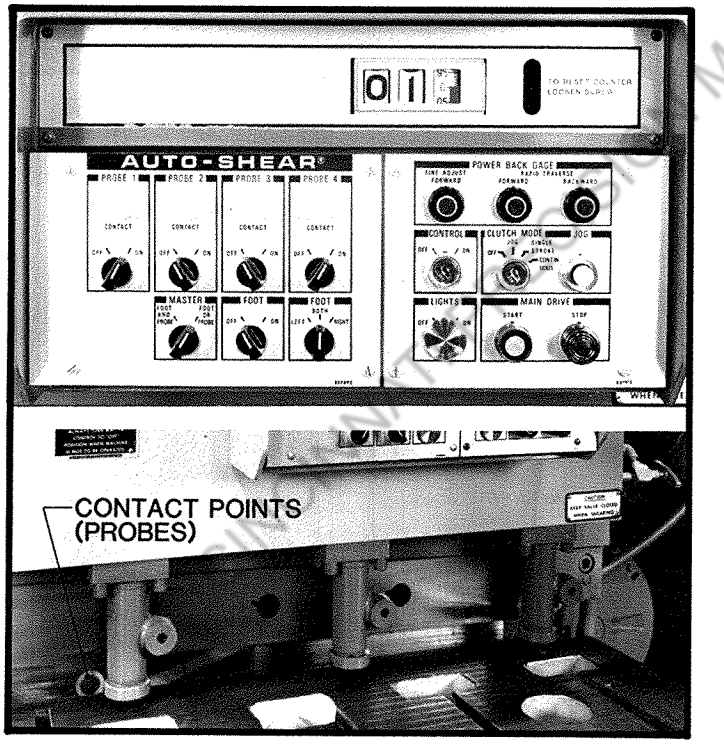


FIGURE 38

Setting the probes and maintaining them is covered in the MAINTENANCE Section 13.

This option can be added to any 10 through 43 Series CINCINNATI Shear that has an electrically controlled clutch.

The function of the AUTO-SHEAR controls are:

MASTER Selector Switch: This is a two-position selector switch which controls what is required to start a shear cycle.

1. "FOOT AND PROBE: The shear cycle can be started by depressing the footswitch(es) with the workpiece contacting the active probe(s) in the back gage angle. The FOOT selector switch must be in the "ON" position.

2. "FOOT OR PROBE": A shear cycle can be started either by depressing the footswitch or contacting the active probe(s) in the back gage angle with the workpiece.

FOOT Selector Switch: The footswitch(es) is active when this switch is turned to the "ON" position and inactive when turned to the "OFF" position.

PROBE Selector Switches: These are two-position selector switches which make the probes active or inactive. The probes are shown on the operator control station as they are located in the back gage angle with "PROBE 1" closest to the left housing. Any combination of probes may be made active by turning the respective PROBE selector switches to the "ON" position. All active probes must be contacted by the workpiece before the shear can be cycled.

When probes are used in combination with a squaring arm bar, we recommend that only one probe be active. In other cases, we recommend that two probes be active, "PROBE 1" and the probe closest to the right edge of the material being sheared.

CONTACT Light: This light goes "ON" when the probe is activated by turning the PROBE switch to the "ON" position. The CONTACT light goes "OFF" when an active probe is contacted by the workpiece. All active probes must be in contact with the workpiece to start a shear cycle.

CAUTION

DO NOT RUN BACK GAGE ANGLE UP AGAINST THE LOWER KNIFE. PROBE CONTACT ON THE KNIFE WILL CAUSE THE SHEAR TO CYCLE CONTINUOUSLY.

FOOTSWITCH

CINCINNATI Shears with electric clutch controls are usually operated by a single guarded footswitch. The electric clutch control is standard on all shears shipped after 1 October, 1974 (before this date, electric controls were optional).

An additional footswitch can be added to these shears. The second footswitch gives added safety, particularly on longer shears that have two persons feeding the material. This puts the shear in control of both persons, preventing the ram from stroking until both footswitches are depressed. A selector switch (Figure 39) is included with the second footswitch that allows the operator to select "LEFT", "RIGHT" or "BOTH footswitches.

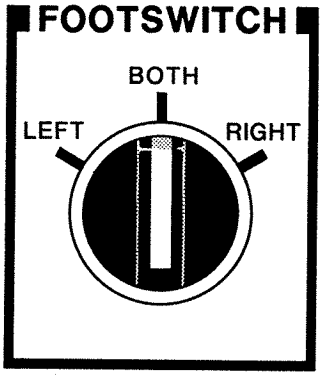


FIGURE 39

FOOT TREADLE (ELECTRIC CLUTCH)

A full length treadle can be added to shears having electrically controlled clutch. This allows the operator to cycle the ram from any location along the length of the machine. It can be used as an operating control with or without a footswitch and a selector switch.

HOLDDOWN CUPS

Holddown cups are pads that can be placed over the feet of the holddown plungers to minimize marking on soft or polished sheets. These cups are made of neoprene or urethane and are available for use on all shears except 62 and 100 Series.

CAUTION

POINT-OF-OPERATION GUARDS MUST BE REMOVED TO INSTALL HOLDDOWN CUPS. SEE MAINTENANCE SECTION 13. TURN "OFF" POWER TO THE SHEAR, TURN "OFF" FOOTSWITCH CONTROL OR LOCK FOOT TREADLE. REPLACE GUARDS BEFORE OPERATING SHEAR.

CUSHION CLAMP

The Cushion Clamp system can be added to any existing 10 through 43 Series shear having an electric clutch control. This system controls the speed of the holddown plungers contacting the material being sheared. The speed is adjustable and can be set to minimize the marking of soft or polished sheets by the holddowns due to impact. The plungers are pushed down by air pressure until they contact the material. Then the hydraulic pressure builds up tripping the shear for a normal stroke with full holddown pressure. A selector switch is provided which allows the selection of "CUSHION CLAMP" or standard shear operation (Figure 40).

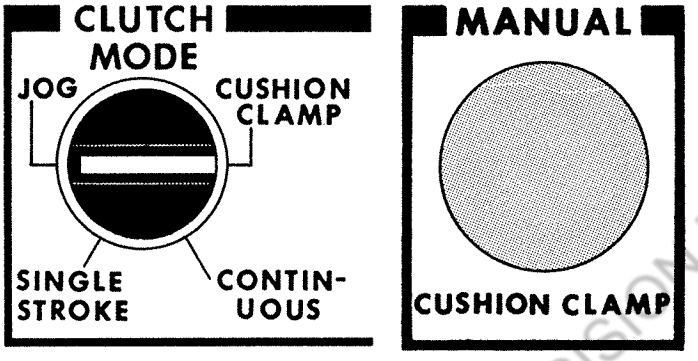


FIGURE 40

The "MANUAL CUSHION CLAMP" pushbutton is provided which will bring the plungers down on the material, clamping it without tripping the shear.

This is helpful when shearing to a line using the Light Beam Shearing Gage. If the material is properly aligned, the footswitch must be depressed to cycle the ram. However, if the material is improperly positioned, it can be repositioned before shearing by releasing the "MANUAL CUSHION CLAMP" button. See MAINTENANCE Section 13 for holddown speed adjustment.

INOPERATIVE HOLDDOWNS

Some users will shear extremely soft material, or material that cannot tolerate any clamping pressure during the shearing operation. Holddowns should not be used for these jobs. They can be made inoperative with an optional manually operated valve. This valve shuts-off all oil to the holddowns and bypasses it back into the holddown box.

The inoperative valve can be used on all 10 through 43 Series mechanical shears.

CAUTION

WITH VALVE TURNED "OFF" KEEP HANDS AND FINGERS AWAY FROM MATERIAL.

SCRAP CHUTE

Most shears were shipped with "short" scrap chutes. CINCINNATI can provide a "long" scrap chute that extends to just above the floor at the rear of the shear. See Figure 41.

The longer chute allows the material to discharge beyond the housing area, making removal easier. These chutes can be installed on all shears.

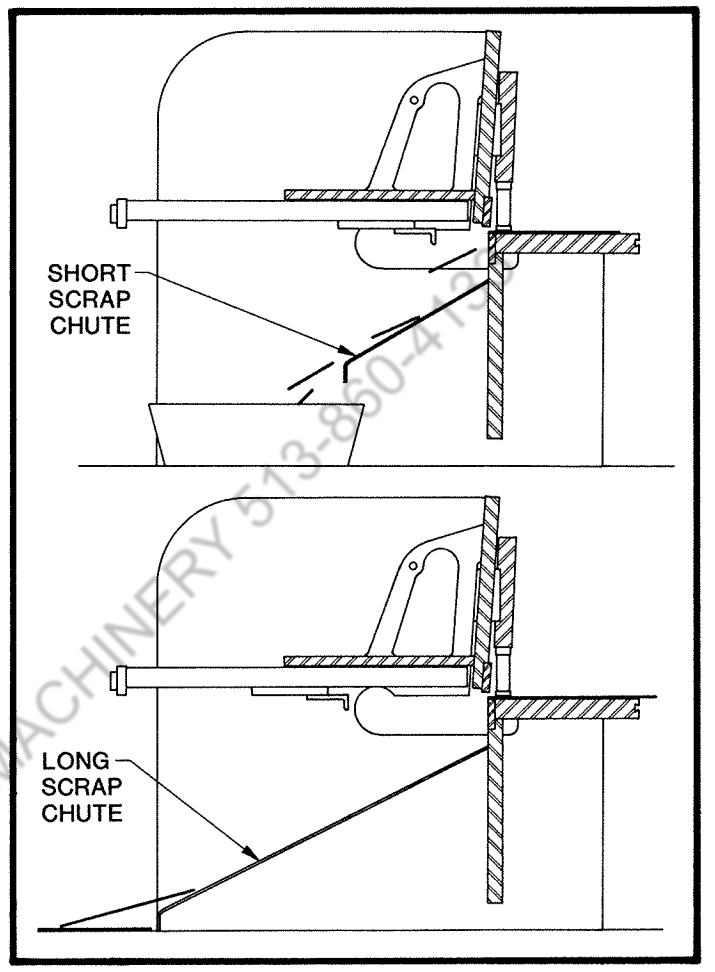


FIGURE 41

INCREASED SPEED AND HORSEPOWER

The speed of most CINCINNATI Mechanical Shears can be increased approximately 20% by changing the motor, sheave and veebelts. When the shear is used primarily for stripping work, increased speed is desirable.

At standard speeds, stripping or continuous shearing at machine capacity or near capacity (either material thickness or length) will require a higher horsepower drive motor. Standard shear drive motors are sized to permit six to twelve full length, capacity thickness cuts per minute over an extended period of time.

Product Technology Sheet No. PT-220 provides information on drive motor horsepower versus cuts per minute for continuous and intermittent shearing. If increased cuts per minute are desired, consult CINCINNATI INCORPORATED Service Department.

IMPORTANT

Standard speed cannot be increased on shears equipped with Pneumatic Sheet Support.

TORQUE TUBE

Many users mount CINCINNATI Mechanical Shears on shock mounts to reduce noise and vibrations created by the shearing operation. A torque tube is required to provide the rigidity to maintain housing alignment when shock mounts are used.

PRODUCTION COUNTER

Two types of production counters are available for CINCINNATI mechanical shears - mechanical and electrical. The mechanical counter is for shears having manual clutch control. It is mounted on the holddown beam and hooked to the ram to count strokes. See Figure 42. The electric production counter is wired through the clutch control circuit and will count clutch engagements. Both counters can be reset to zero.

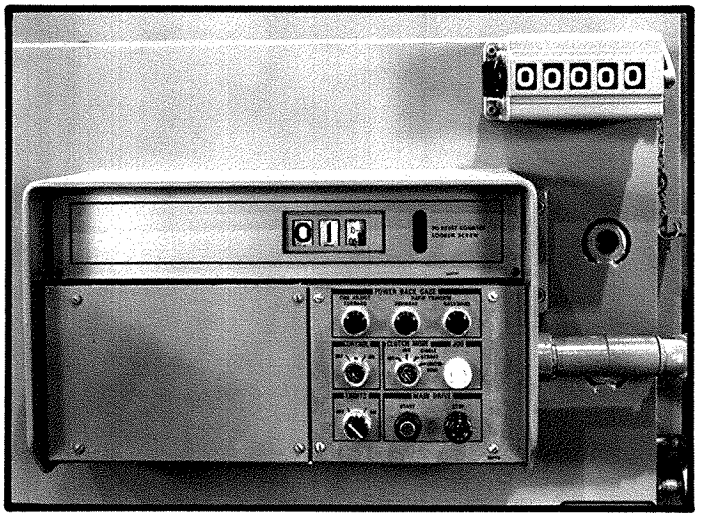


FIGURE 42

FACTORY INSTALLED OPTIONS

MAGNETIC SHEET SUPPORTS:

This support is made-up of a series of magnetic rollers in channels suspended from the ram brace at the passline. When material is fed into the shear it will contact the rollers as it passes the table knife. These rollers will support the sheet as it moves into the shear, and carry it back to the back gage angle. The magnetic sheet support insures accurately gaged pieces, as the normal sag of thin material is eliminated. After the cut has been made the sudden reversal of the ram at the bottom of its stroke will cause the sheet to fall free. See Figure 43.

The channels and rollers can be raised so they are clear of the passline and will have no effect on material fed into the shear. Lift rear of channel until pin (Figure 44) clears the through hole in ram brace. Turn jack-up collar until pin fits into spot drilled hole in ram brace. Raise front of channel and turn front pin to spot drilled hole. Repeat procedure for the other magnetic sheet support channels.

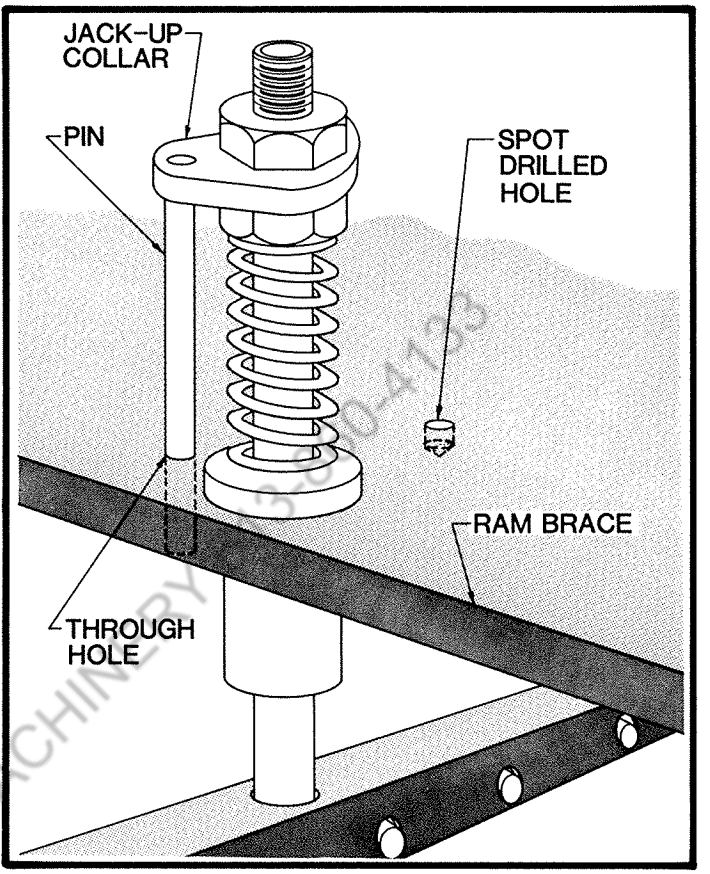


FIGURE 44

The maximum capacity of these magnets is 16 gauge mild steel. Any material to be handled by these magnets must respond to magnets. There will be no residual magnetism put into the material. Adjustments to these supports are covered in the MAINTENANCE Section 13.

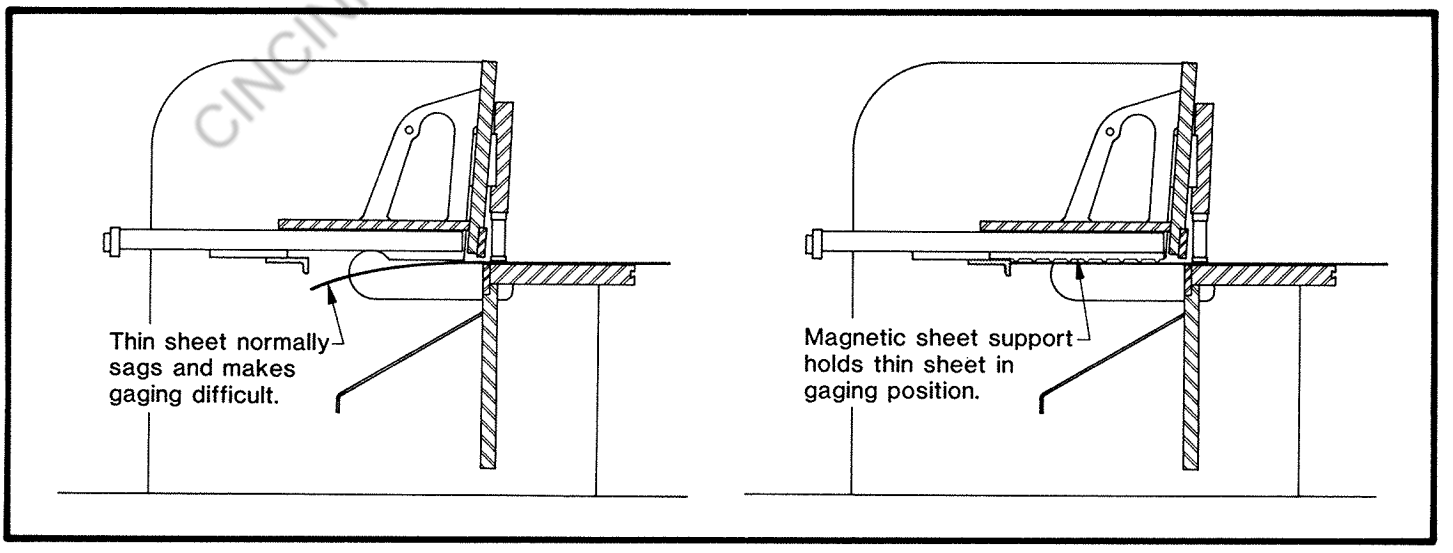


FIGURE 43

PNEUMATIC SHEET SUPPORT

Two models of this optional feature are available. One is for 1/4" mild steel and lighter, and the other model is for 3/8" mild steel and lighter CINCINNATI Shears. Its function is to support the material as it is fed into the shear between the table and the back gage angle. The 1/4" pneumatic sheet support is not effective on lighter than 10 gauge or heavier than 3/16" material between the 36" and 48" gaging range. The 3/8" pneumatic sheet support is not effective in lighter than 10 gauge or heavier than 1/4" material between the 36" and 48" gaging range.

The support is made-up of a series of support arms which are normally retracted in slots in the fabricated scrap chute. (See Figure 45). When activated (Figure 46), they swing up to a horizontal position at the passline and will support material 12" to 24" behind the lower knife. The arms extend through slots in the back gage angle and therefore will guide the material into the angle.

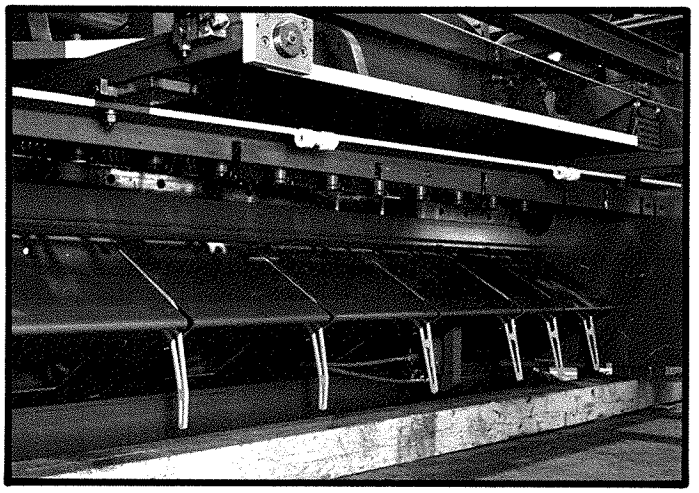


FIGURE 45

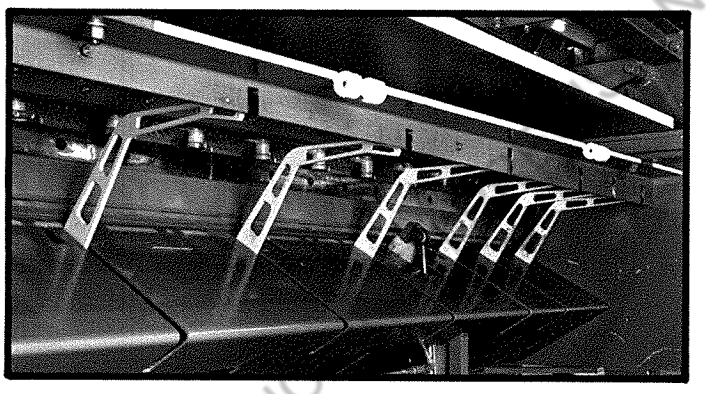


FIGURE 46

When the shear clutch is activated, the holddowns clamp the material and the arms retract rapidly downward back into the scrap chute. This will allow the cut-off piece to fall free.

A selector switch is provided to make the arms active or continually retracted into the scrap chute.

Adjustments are covered in a separate Operation and Maintenance manual. Standard strokes per minute should not be increased when shear is equipped with Pneumatic Sheet Support.

EXTRA HOLDDOWN UNITS

Each shear is normally equipped with one more holddown unit than the nominal shear length (in feet) and they are located on 12" centers. For example, a 10 ft. shear has eleven holddown units.

One or more additional units can usually be provided on most new CINCINNATI Shears. Each shear is an individual case because of the additional oil requirements. Consult the Engineering Department.

It is recommended that extra units be located as close to the end units as possible to help clamp narrow pieces.

SPECIAL DISTANCE UNDER HOLDDOWNS

If a shear is purchased to primarily shear aluminum and similar low tensile materials, more space or clearance under the holddowns may be desired. The shears are designed for a specified maximum thickness of mild steel, but when shearing aluminum, the shear has approximately 50% greater thickness capacity and increased clearance may be desired. The same is true if the mild steel plate normally processed by the user is not flat.

This additional clearance is only available on some shears, and each machine must be considered on an individual basis.

REVERSIBLE DELIVERY CHUTE

This is a two-position delivery chute. The operator can select rear delivery of finished blanks and front delivery of scrap, or rear delivery of scrap and front delivery of blanks. See Figure 47. Two types of reversible delivery chutes are available, powered by an air cylinder or manually operated.

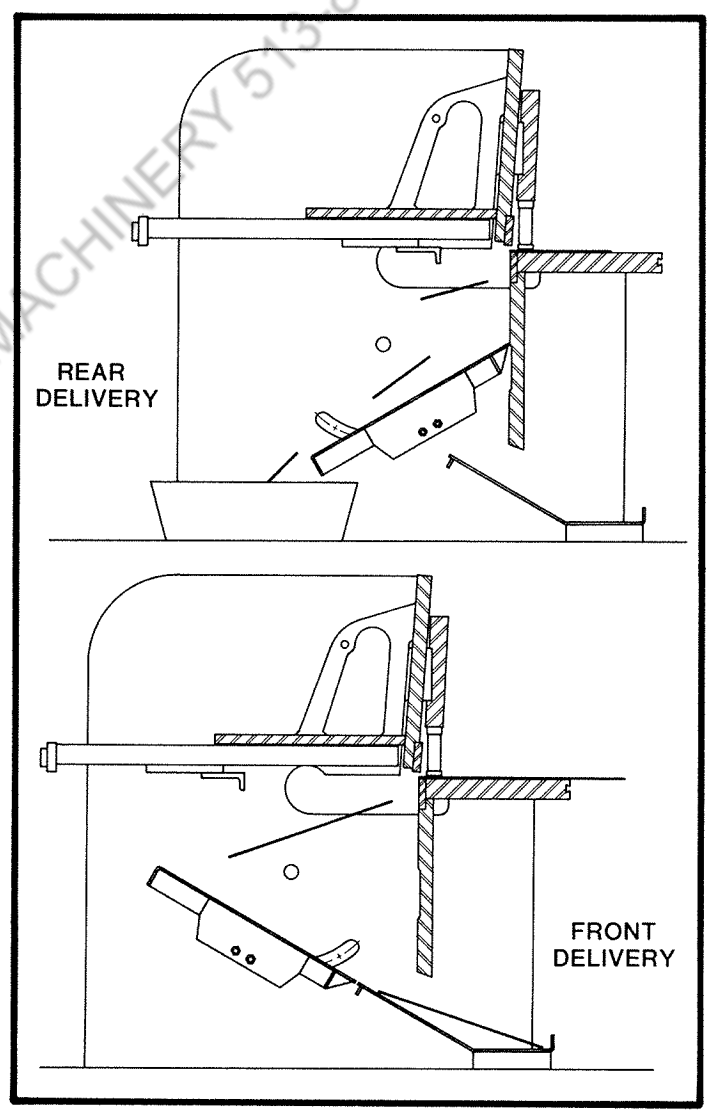


FIGURE 47

A selector switch controls the position of the powered delivery chute. A safety circuit holds the chute in position when electric power is turned "OFF". Powered reversing chutes are usually limited to 1/4" x 12 ft. and smaller shears. It may be necessary to raise the shear passline by setting the machine on riser blocks.

Manually operated reversible delivery chutes are limited to 10 ft. and smaller shears.

DEEPER THROAT IN HOUSINGS

All standard CINCINNATI Mechanical Shears have an 18" throat (or gap), except the 10 Series which has a 6" throat, and the 62 and 100 Series which have 24" throat as standard. All shears, except the 10 series, can be purchased with our standard 24" and 36" deep throats.

The main purpose or use of the deeper throat is to allow more clearance when slitting or notching.

FIXED FRONT DELIVERY CHUTE

The fixed front chute is similar to the reversing delivery chute except that all cut pieces are delivered to the front. It may be necessary to raise the shear passline.

DISAPPEARING STOP SQUARING ARM

This squaring arm is much thicker than the standard squaring arm and has a dovetail slot to accept one or more disappearing stops. It also includes a full length scale and squaring arm bar. See Figure 48. These arms are available on 43 Series and smaller shears.

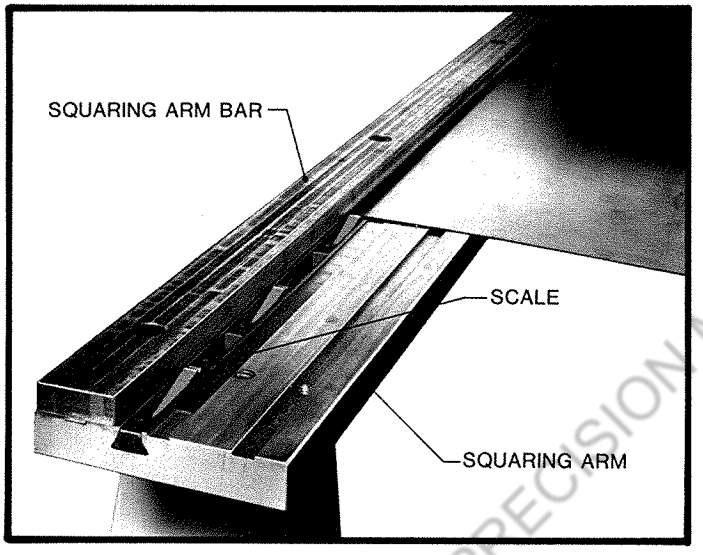


FIGURE 48

VERNIER PIN GAGE

The Vernier pin gaging system is used to produce blanks from a prepunched sheet, locating the sheared edge from these punched holes.

It consists of a special table with removable filler plates bolted to the table's top surface and two gaging arms. Each arm will accept any of six locating pins ranging from 3/32" to 3/4" diameter.

The gaging arms can be located anywhere along the surface of the table by removing the filler plate at the desired location. See Figure 49. Consult CINCINNATI INCORPORATED for detailed information on this optional feature.

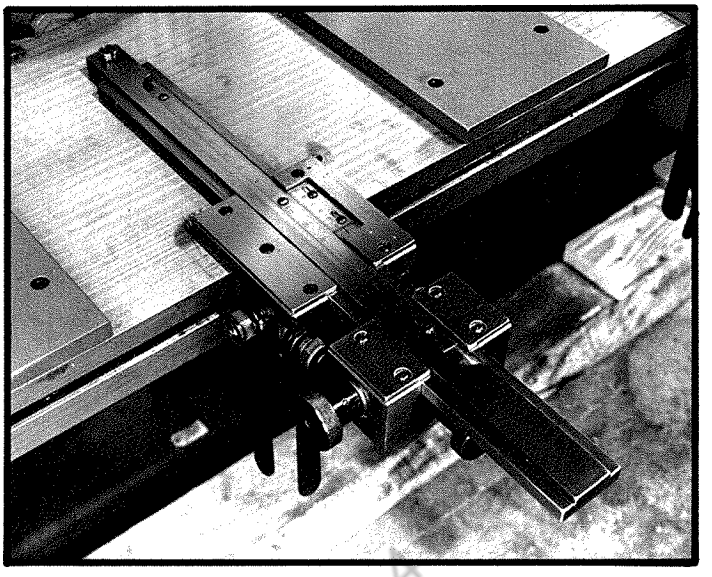


FIGURE 49

MICROCOMPUTER GAGE CONTROL

The microcomputer gage control was redesigned in early 1984. The redesigned control was furnished as standard equipment on microcomputer gage controls shipped after 1 June 1984.

MICROCOMPUTER GAGE CONTROLS (Shipped prior to 1 June, 1984)

The microcomputer provides a means to pre-program back gage positions. A program can be entered to position the back gage at up to 9 different positions. These positions are stored under function numbers 1 through 9. An LED display, push-buttons and a numerical keyboard are used to enter program information.

The shearing operation is performed by placing the material against the back gage and cycling the shear with the foot-switch. After the desired number of cuts are made, the gage must be moved to the next gaging position. The operator enters the information to show the next gaging position on the LED display. The C-S button is pressed to move the gage. When the gage reaches its position, the shear can be cycled.

MICROCOMPUTER GAGE CONTROL II (Shipped after 1 June, 1984)

The microcomputer provides a means to pre-program back gage positions and to individually or automatically sequence the back gage to these positions. A program can be entered to position the back gage at up to 15 different positions (steps). Up to 99 cuts can be programmed at each of these positions. An LED display, pushbuttons and a numerical keyboard are used to enter program information and to run the program.

The shearing operation is performed by placing the material against the back gage and cycling the shear with the foot-switch. In an auto sequence mode either the number of cuts will be reduced by one and the back gage remains at the same position, or if all cuts for the step are completed, the gage will automatically move to the next gaging position. The shear is again cycled with the footswitch to continue this sequence. Complete operation and maintenance instructions are contained in a separate manual.

MULTI-AXIS GAGE CONTROL

The MULTI-AXIS GAGE CONTROL system is a microcomputer control of the front gage and the back gage of a CINCINNATI Shear. The width of the material cut and the number of cuts at that width can be pre-programmed in up to fifteen steps. The control will then position the gage, display the number of cuts to be made at that position, and then advance to the next step and cut position when all cuts in that step are completed.

The back gage operates the same as the gage on a standard CINCINNATI Shear, except that its movement can also be controlled by the MULTI-AXIS GAGE CONTROL. The material is pushed through the shear knives to gage against the back gage angle and the ram is cycled. The cut-off sheet falls to the rear of the machine.

The front gage consists of a powered front gage guide and a combination squaring arm bar and front gage guide. Both gage guides have movable stops which are positioned by the MULTI-AXIS GAGE CONTROL. One stop is the gage position for the programmed width. This stop is indicated by two lights in the squaring arm. The material is placed on the shear table and the gage guide(s), and then moved back against the indicated stop. When the ram is cycled the cut-off piece falls to the rear of the shear and the front gage stops move to the next cutting position.

Operation and maintenance instructions are contained in a separate manual.

FAST SET-UP III CONTROL

The FSU III Shear features a microcomputer control of the powered back gage and powered front gages. The CNC SHEAR CONTROL CENTER is a pendant mounted control for the system. It contains all pushbuttons and selector switches to control shear operation as well as many optional accessories, such as back gage probes, material supports, material conveyor and cushion clamp holddown. A CRT display, eight control buttons and a numerical keyboard provides the means to enter a program for gage positions and to sequence the gages.

A program can be entered containing up to 99 gage positions (steps). The steps can position either the front or back gages, or both gages so that they operate in unison. The CRT display provides visual instructions to enter a program, to run the entered program and will indicate machine status information for production control, diagnostics and maintenance. The microcomputer control has available an optional direct numerical control (DNC) capability from a host (remote) computer through a communication link.

The shearing operation is performed by placing the material against the indicated front or back gaging surface and cycling the shear with a footswitch. The optional back gage probes will automatically cycle the shear when the material contacts the active probe units. Complete operation and maintenance instructions are contained in a separate manual.

Before starting your shear, the SAFETY Section 5 and STANDARD MACHINE CONTROLS Section 8 of this manual must be read and thoroughly understood by every operator assigned to this shear. Special emphasis should be given to the following:

- Never use the shear without all the guarding in place.
- Never place any part of your body into the point-of-operation.
- When the shear is not in use, or whenever the operator leaves the shear, the main drive motor should always be turned "OFF" and the CLUTCH MODE selector turned to the "OFF" position and the key removed. On treadle operated shears, the treadle locking pin must be engaged.

INITIAL START-UP

A CINCINNATI INCORPORATED Service Representative should be present during the initial start-up of your shear. Before starting the drive motor, the following checks must be made as prescribed in Sections 3 and 4.

1. Foundation - Must be as specified on the certified Foundation Plan drawing.
2. Cleaning - All paper and plastic wrappings, protective grease and wooden blocks must be removed from shear.
3. Leveling - The shear must be level.
4. Air Supply - An adequate air supply must be provided.
5. Lubrication - All lubrication points discussed in Section 4 must be checked or serviced. The automatic lubricator must be hand cranked until oil is seen dripping from each lubrication point.
6. Electrical Supply - The correct voltage is supplied to the shear through properly sized wires. The wires must be connected so that flywheel rotation is correct as indicated by the arrow on the flywheel guard and on the Foundation Plan drawing. This can be checked by turning "ON" the main disconnect switch (replacing main fuses) and then momentarily depressing the JOG button with the MODE SELECTOR in the "JOG" position and noting the direction of rotation. If your shear does not have a "JOG" button, this test can be made by pressing the "START" button followed immediately by pressing the "STOP" button and releasing the "START" button. Note direction of rotation. If direction is incorrect, the incoming electrical connection must be reversed before proceeding. Turn "OFF" the disconnect switch (or remove main fuses).
7. Knife Clearance - When the shear was shipped from the factory, the knife clearance was properly set. During shipment this clearance may have changed. To avoid possible damage to the knives on initial start-up, the table must be moved away from the ram to increase knife clearance. Refer to Figure 50.

   There are four or more clamp studs and nuts "C" holding the table tight against the housings and bed. These studs are located under the table, between the housings and in front of the bed. There are two clearance adjusting screws in each housing. Outer screws "A" are used to decrease knife clearance and inner screws "B" are used to increase clearance.

   The proper sequence for increasing clearance is as follows:

   a. Loosen all clamp nuts "C" 1/2 turn.

   b. Loosen both outer adjusting screws "A" approximately 1/2 turn.

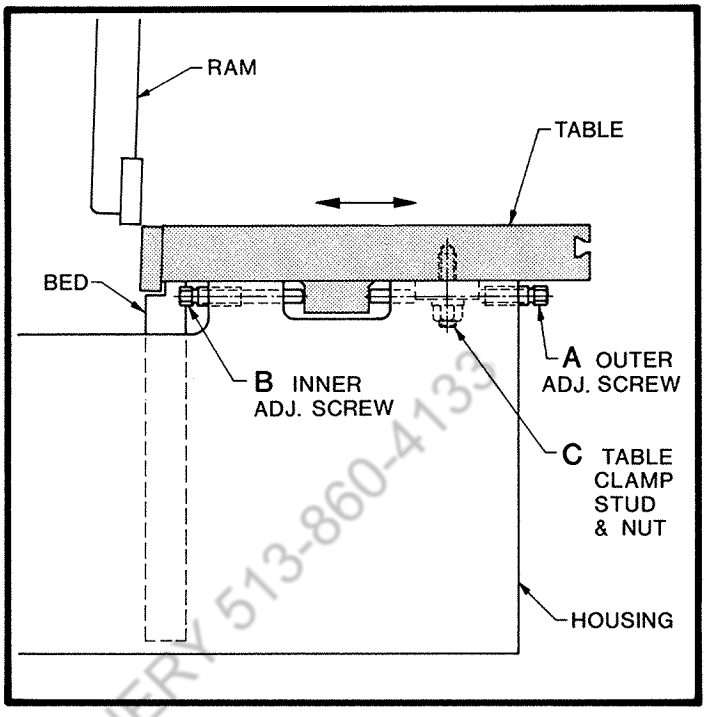


FIGURE 50

   c. Tighten both inner adjusting screws until they are tight.

8. All machine components and options have been installed on the shear.
9. No tools or other materials have been left on the shear.
10. Jog the shear through a stroke slowly and carefully to make certain that there is no interference. Use the following procedure:

    a. Turn the power at the main disconnect switch "ON".

    b. Turn the CLUTCH CONTROL selector to the "ON" position.

    c. Turn the CLUTCH MODE selector to the "JOG" position.

    d. Open the holddown bleed valve at the right end of the holddown beam.

    e. Depress the footswitch (or treadle) and momentarily depress the JOG button to engage clutch. Release the footswitch.

    f. Jog the ram through a stroke by intermittently tapping the JOG button. Observe all areas making certain that there is no interference to ram movement. (Shears without the JOG button can be pulled through this first stroke by hand. Turn the flywheel in a counterclockwise direction as you stand behind the shear facing front. The flywheel guard must be removed - see MAINTENANCE Section 13.)

CAUTION

DISCONNECT POWER FROM SHEAR WHEN TURNING FLYWHEEL BY HAND. KEEP FINGERS AND ALL PARTS OF YOUR BODY FROM BETWEEN VEE BELTS AND VEE GROOVES. SERIOUS INJURY COULD OCCUR FROM PINCHING ACTION OF THE BELTS AND GROOVES. RAM WILL RETURN TO TOP OF ITS STROKE ALMOST BY ITSELF AFTER PASSING THE BOTTOM. IT TAKES CONSIDERABLE PULL TO MOVE IT DOWN, SO BE ALERT.

NOTE: To start the main drive motor after the JOG button has been used, the ram must be at top of the stroke. Hold the JOG button depressed until the main drive motor has reached full speed. Depress the footswitch and allow ram to cycle two strokes. Release the JOG button and the footswitch. The ram will stop at top of the stroke.

Turn CLUTCH MODE selector to "SINGLE STROKE" and start the main drive motor.

g. Turn the CLUTCH CONTROL AND THE CLUTCH MODE selectors to "OFF" position. Turn the main disconnect switch to "OFF" position.

NOTE: The point-of-operation guarding must be removed to complete Steps No. 11 and 12. Refer to MAINTENANCE Section 13, REMOVING & INSTALLING GUARDS.

11. Set the knife clearance. See MAINTENANCE Section 13.

12. Set the back gage. See MAINTENANCE Section 13.

13. All guards must now be installed.

14. A complete visual inspection of the shear must be made to check that all the above steps have been completed.

15. SELECT ONE OF THE FOLLOWING STEPS NO. A, B OR C, DEPENDING ON TYPE OF CLUTCH CONTROL.

CAUTION

BEFORE STARTING MAIN DRIVE MOTOR MAKE SURE NO ONE IS NEAR RAM AND RAM BRACE AT REAR OF SHEAR AND ALL TOOLS AND MATERIALS HAVE BEEN REMOVED FROM SHEAR TABLE.

A. MACHINES WITH ELECTRIC-IAR CYLINDER OPERATED CLUTCH SHIPPED AFTER 1 OCTOBER, 1974. THESE MACHINES ARE EQUIPPED WITH A JOG CIRCUIT:

1. Prepare to start main drive motor.
2. Turn the CONTROL CIRCUIT switch to the "ON" position.
3. Turn the MODE SELECTOR switch to the "JOG" position.
4. Depress the footswitch and press the JOG button to start the main drive motor. Hold the footswitch and JOG button depressed until the flywheel comes up to full speed (10 to 12 strokes). Release the JOG button and footswitch when the ram is on the down stroke and the ram will stop at the top of the stroke.
5. Turn the MODE SELECTOR to the "CONTINUOUS" position. Start the main drive motor.
6. After the flywheel comes up to full speed, depress the footswitch to continuously cycle the ram.
7. Close the holddown bleed valve on the right end of the holddown beam while ram is cycling at full speed.
8. Release the footswitch while the ram is on a down storke and allow ram to stop at the top of stroke.
9. Turn CONTROL CIRCUIT and MODE SELECTOR switches to the "OFF" position.

B. MACHINES WITH ELECTRIC-AIR CYLINDER OPERATED CLUTCH SHIPPED BEFORE 1 OCTOBER, 1974 AND MACHINES WITH ELECTRIC-SOLENOID OPERATED CLUTCH:

1. Prepare to start main drive motor.
2. Turn the CONTROL CIRCUIT switch to the "ON" position.
3. Turn the MODE SELECTOR switch to "CONTINUOUS" or "RUN" position. Depress footswitch and start the main drive motor. Allow the flywheel to come up to full speed (10 to 12 strokes).
4. Close the holddown bleed valve on the right end of the holddown beam while the ram is cycling at full speed.
5. Release the footswitch while the ram is on a down stroke and allow ram to stop at the top of the stroke.
6. Turn CONTROL CIRCUIT and MODE SELECTOR switches to the "OFF" position.

C. MACHINES WITH MANUAL CLUTCH CONTROL:

1. Prepare to start main drive motor.
2. Disengage the treadle lock.
3. Depress the foot treadle and start the main drive motor. Allow the flywheel to come up to full speed (10 to 12 strokes).
4. Close the holddown bleed valve on the right end of the holddown beam while the ram is cycling at full speed.
5. Release the foot treadle while ram is on a down stroke and allow ram to stop at the top of its stroke.
6. Engage treadle lock.

DAILY START-UP

Each time the shear is started after an extended "OFF" period (48 hours or longer) the following procedure is recommended:

1. Operate the automatic lubricator by hand until oil appears at all bearing surfaces.
2. Check controls for proper operation.
3. Verify that all safety devices and procedures are being used and are operating properly.

☆

CAUTION

IN ALL SHEARING, NEVER REMOVE ANY GUARDING FROM SHEAR, ALWAYS USE HOLDDOWNS AND DO NOT PLACE HANDS OR FINGERS UNDER THE MATERIAL.

STRIPPING

This is a shearing operation where many narrow pieces, usually less than 3-4" wide, are sheared from a large sheet or plate. An example of stripping is shown on Page 25.

These strips are usually cut using the back gage, with a pair of front gage stops set in the front support arms for an initial trim.

Feed time and ram cycle time control the speed of this operation. Since the strips are narrow the feed time is minimal and there is a tendency to shear these strips rapidly or even continuously. When the material is at or near the maximum thickness and length capacity of the shear, the flywheel will start to run out of energy and the shear will slow-down. This slow-down should not be permitted, therefore it is necessary to take a slight pause between cuts to allow the motor to restore energy into the flywheel. If stripping is a frequent operation, a larger motor should be considered. Consult CINCINNATI INCORPORATED Service Department.

BLANKING

Ordinary blanks are made by shearing wide strips using the back gage and two sets of front gage stops. The outer set of front gage stops are set for making a trim cut, which should be at least as wide as the metal thickness. The back gage is set to the desired width of the blank and is used to shear all blanks except the last blank. This blank is sheared using the inner set of front gage stops.

After the first trim has been made, the material is fed against the back gage and strips are sheared until the original sheet or plate is so reduced in width that it cannot be fed against the back gage. Flip the remaining piece over and make the final trim using the inner front gage stops. This leaves the last blank on the table with the scrap falling behind.

Quite often it may be desired to shear the ends of these blanks. This will normally require use of the squaring arm and its gages. See Page 25.

RESQUARING BLANKS

This operation produces parts with opposite sides parallel and all corners square and all edges are clean. The squaring arm with its gages and the back gage are usually used for these pieces as shown on Page 25.

RESQUARING LARGE SHEETS OR PLATES

Page 25 describes this operation which requires use of the squaring arm with its gages and the front support arms with their gage stops.

MAKING TRIANGULAR GUSSETS

There are two recommended procedures to follow when making gussets, either of which will allow them to be produced safely. Production of gussets can be a hazardous operation if not done properly.

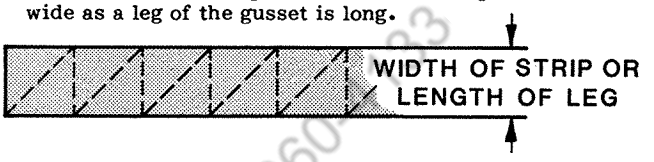
CAUTION

DO NOT REMOVE ANY GUARDS FROM THE SHEAR, AND NEVER PLACE YOUR HANDS NEAR OR UNDER THE MATERIAL DURING SHEAR, AS INJURY COULD RESULT.

PROCEDURE #1 (SEE FIGURE 51)

Use a miter gage, light beam shearing gage and the side gage or squaring arm bar.

1. Cut off a sufficient number of strips or blanks to give the desired number of gussets. These strips should be as wide as a leg of the gusset is long.



2. Set the miter gage at the desired angle (usually 45°) to the edge of the table. This gage must be positioned so that the strip will be centered under a holddown.

3. Feed the strip into the shear with one edge (side "A") against the miter gage until the corner of the strip away from the miter gage is right at the cutting edge of the lower knife. This position can be checked by using a light beam shearing gage.

4. Cycle the shear making the first cut.

5. Place the other edge (side "B") of the strip against the side gage or squaring arm.

6. Feed the strip into the shear until its beveled corner (on side "A" away from the side gage or squaring arm) is directly over the cutting edge of the lower knife.

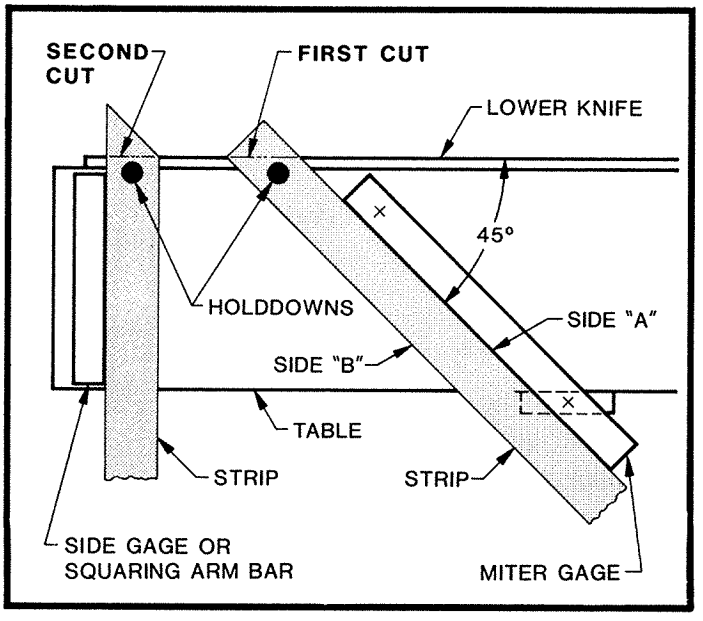


FIGURE 51

7. Cycle the shear making cut #2.

8. Repeat steps #3 through 7 as often as required.

IMPORTANT

We do not recommend making more than one cut per cycle.

PROCEDURE #2

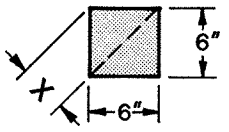
Use the back gage and a special tool similar to Figure 52. A light beam shearing gage could be helpful. The following procedure is for 45° gussets. The tool and set-up would vary for other angles.

1. Cut the material into strips or blanks with their width equal to the length of a gusset leg.

2. Cut the strips or blanks into squares.

3. Set the back gage so that the counters or dials read the same as the length of the side of the square multiplied by .707. For example, the back gage setting to shear a 6" square would be:

   X = 6 times .707
   X = 4.242"
   (X is back gage setting)



4. Make tool similar to Figure 52. (Note: Thickness "A" must be less than material thickness)

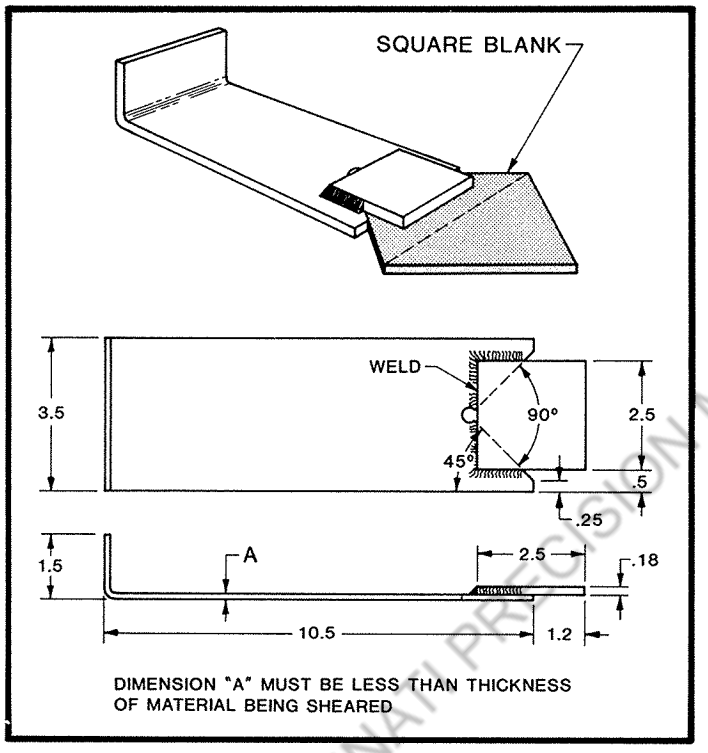


FIGURE 52

5. Place this tool over one corner of the square and feed the opposite corner into the shear under a holddown until it contacts the back gage angle.

CAUTION

BE CERTAIN THAT THE PIECE AND TOOL ARE CENTERED UNDER A HOLDDOWN.

6. Square up the piece so that the other two corners are at the line of cut over the lower knife. (The edge of the tool will be perpendicular to the knife and parallel to the side gage.) Another way to line up the blank and tool is to scribe a line on the table perpendicular to the front edge of the table to show the proper location for the edge of the tool. This line must be positioned so that the blank and tool will be directly under a holddown when the edge of tool is next to it.

7. Cycle the shear and the rear piece will fall off.

8. Use the tool to push the remaining piece through the knives until it falls from the table.

SLITTING

This is a method for cutting sheets or plate longer than the shear. It is done in stages and takes more than one cycle of the shear. The ram of the shear must be positioned higher than standard so that the high end of the upper knife is at least a material thickness above the lower knife when at the bottom of its stroke. Positioning the ram is explained in MAINTENANCE Section 13. If there is much slitting to be done, a slitting gage will be helpful and aid in accuracy.

To slit, the following procedure should be followed:

1. Remove the side gage or squaring arm bar from the table so that its top surface is clear of all tooling.

2. Remove the gap and end guards from the housings. Refer to REMOVING AND INSTALLING GUARDS in MAINTENANCE section.

CAUTION

EXTREME CARE MUST BE USED THROUGHOUT THIS PROCEDURE TO AVOID INJURY BECAUSE OF GUARD REMOVAL.

3. Position the sheet or plate using the back gage or light beam shearing gage, and locate the right end of the sheet or plate close to the right end of the shear. Do not go beyond the right end of the table knife.

4. Cycle the shear to make the first cut. (See Page 28)

5. Slide the sheet or plate to the right. It may be necessary to raise the cut piece so that it will slide through the housing throat (gap).

CAUTION

THE TREADLE OR CLUTCH CONTROLS MUST BE LOCKED IN THE "OFF" POSITION WHEN MOVING THE MATERIAL.

It may be necessary to move the back gage toward the rear to make it easier to move the material.

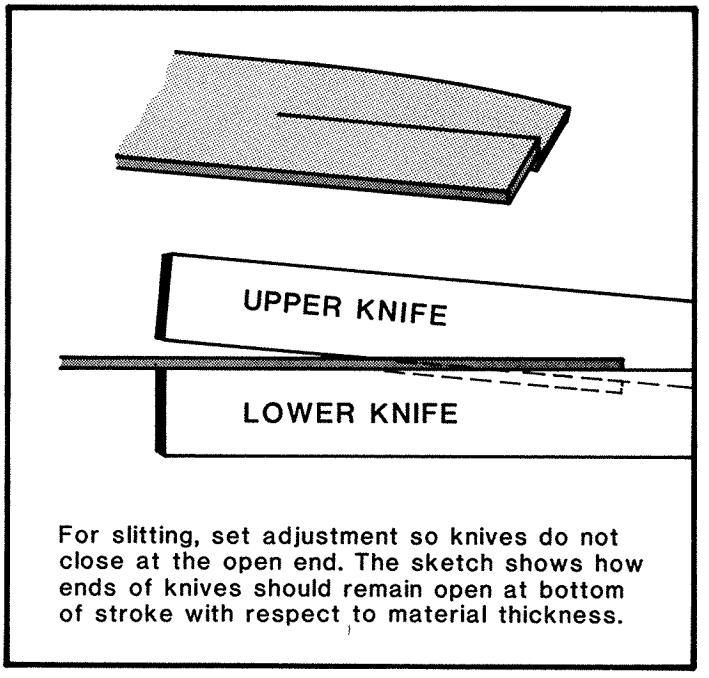


FIGURE 53

6. When the material has been moved sufficiently so that the cut can be completed, reset the back gage and position the material so that the ram will pick-up the unfinished cut and complete it.

7. Unlock the treadle or footswitch and cycle the shear to make the finishing cut. If the material is so long that a third cut is necessary, repeat steps No. 5 and 6.

8. It will be necessary to remove the cut-off piece through the housing throat.

CAUTION

THE TREADLE OR CLUTCH CONTROLS MUST BE LOCKED IN THE "OFF" POSITION WHEN REMOVING THE MATERIAL.

9. When slitting is finished, reposition the ram to its original setting, replace the guards and side gage or squaring arm bar.

SHEET SPLITTING

Material thickness guidelines have been established for splitting sheets where the back piece exceeds the back gage range. Maximum material thickness is 10 gauge (.1345") for a 0-36" range back gage and 3/16" (.1875") for a 0-48" range back gage. These thicknesses are valid as long as the material shape allows the sheet to freely clear the back gage angle. See Figure 54.

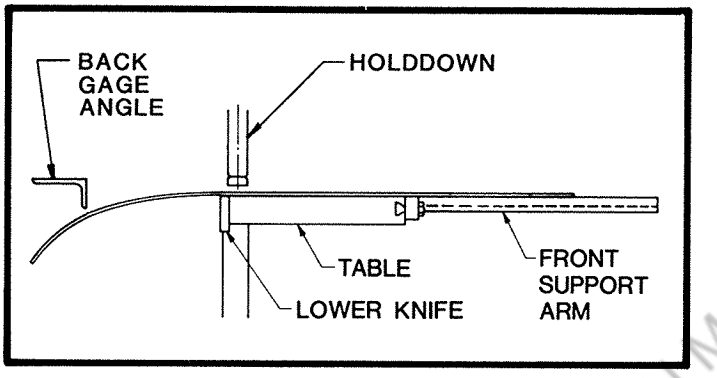


FIGURE 54

The back gage system, and the back gage angle in particular, is not designed to withstand the forces associated with bending the material.

If an application requires processing material in excess of these capacities, a hinged back gage angle (optional) is required or the standard back gage angle must be removed. If the angle is removed, refer to ADJUSTING BACK GAGE ANGLE PARALLELISM in the MAINTENANCE section.

NOTCHING

This is an operation that cuts a square notch out of the corner of a blank. It requires two cycles of the shear. The ram must be repositioned as in slitting, except that it must be set lower so that the high end of the upper knife leaves a definite mark or dent in the material. See Figure 55.

The procedure for notching is as follows:

1. Remove the gap guard and end guard. Refer to REMOVING AND INSTALLING GUARDS in MAINTENANCE section. Also remove the side gage or squaring arm bar from the left end of the shear.

2. Position the ram as stated above following the instructions in MAINTENANCE Section 13.

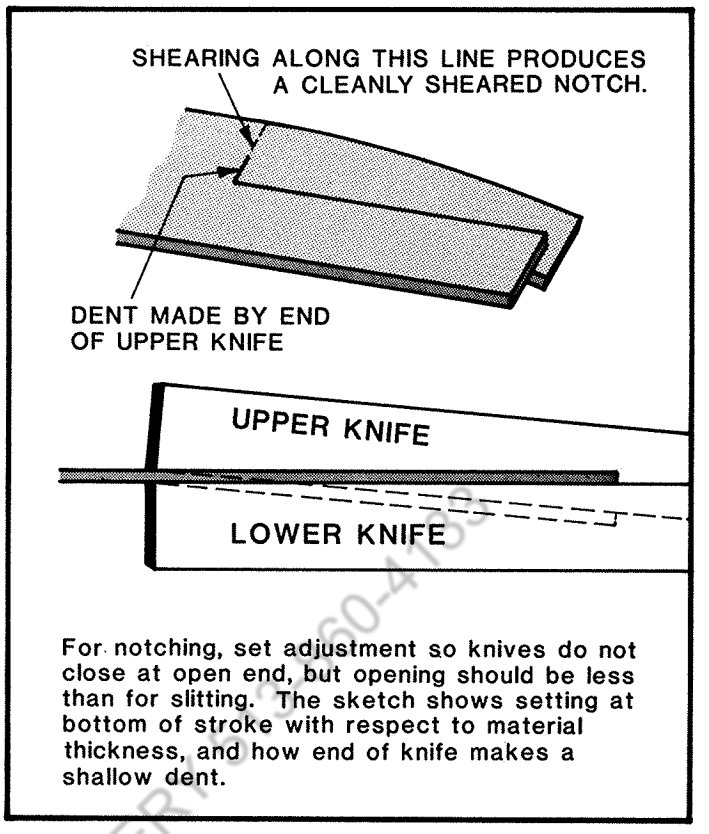


FIGURE 55

3. Scribe the location of the notch on the blank.

4. Place the blank on the table at the left end of the shear using the back gage or light beam shearing gage to position the blank.

5. Positioning the blank left-to-right must be done by locating it so that the left end of the lower knife coincides with the intended end of the notch.

CAUTION

EXTREME CARE MUST BE USED THROUGHOUT THIS PROCEDURE TO AVOID INJURY BECAUSE OF GUARD REMOVAL.

6. Cycle the ram to make the first cut.

7. To position the blank for the final cut, it must be rotated 90° clockwise about a vertical axis (while flat on the table) and then flipped over 180° about a horizontal axis (placing the un-cut edge nearest the operator). The blank must be held so that the first cut coincides with the end of the lower knife, and the mark or dent coincides with the cutting edge of the lower knife. (This mark is now on the bottom side of the blank.) It may be necessary to reposition the back gage.

8. Cycle the ram to make the second cut.

9. When the notching is finished, return the ram to its original setting, replace the gap and end guards and the side gage or squaring arm bar.

CHANGING OR ROTATING KNIVES

Shear knives have four cutting edges. They can be rotated until all four edges are dull. At that time they must be reground or replaced with a new set. Refer to procedure for REGRINDING KNIVES for specifications.

To rotate knives to a sharp cutting edge or change to a new or reground set of knives:

IMPORTANT

Do not proceed if the machine has two-piece knives. Contact the CINCINNATI INCORPORATED Service Department for further information.

CAUTION

TWO MEN ARE REQUIRED TO HANDLE THE KNIFE. ALWAYS WEAR GLOVES TO PROTECT YOUR HANDS WHILE HANDLING KNIVES. HEAVIER KNIVES, 1-1/8" x 5", 1-1/2" x 5-1/2" AND 1-3/4" x 6-1/2", REQUIRE A LIFTING DEVICE. ALWAYS PROTECT THE CUTTING EDGES OF THE KNIFE WHEN USING A LIFTING DEVICE.

1. Clear the area around the machine of all scrap.
2. Run the back gage all the way to the rear.

CAUTION

TURN OFF ALL POWER TO THE SHEAR AND LOCK OUT THE MAIN DISCONNECT SWITCH. REMOVE THE MAIN FUSES IF THE DISCONNECT CANNOT BE LOCKED OUT. PLACE THE CLUTCH CONTROL SELECTOR IN THE "OFF" POSITION AND REMOVE THE KEY. FOR MACHINES EQUIPPED WITH A MECHANICAL TREADLE, ENGAGE THE TREADLE LOCK.

3. Remove the point-of-operation guarding. Refer to section on REMOVING AND INSTALLING GUARDS.
4. Remove the flywheel guard. Refer to section on REMOVING AND INSTALLING GUARDS.
5. Place three 1" x 3" strips of wood "C"-clamped on the table, as shown in Figure 56, one on each end and one in the center of the table. These strips of wood must project under the upper knife.

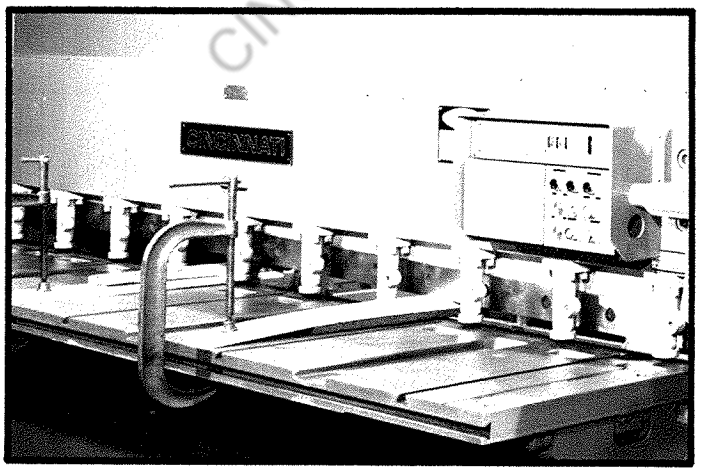


FIGURE 56

6. Position three wooden wedges, Figure 57, between the upper and lower knives. The wedges can be cut from a standard 2" x 4" lumber. Place these wedges on the 1" x 3" strips of wood previously installed. On some shears it may be necessary to use spacers under the wedges at the high end of the ram. DO NOT DRIVE THEM TIGHT.

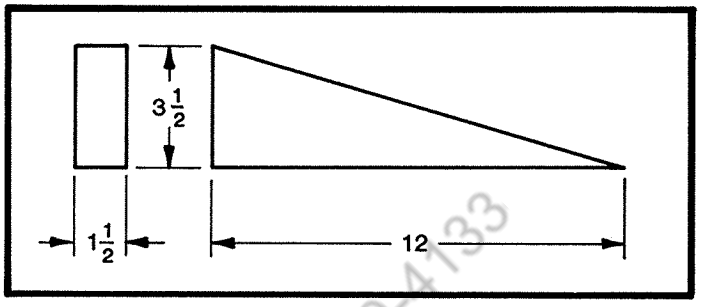


FIGURE 57

NOTE: Three wooden wedges are required for supporting the knife while the knife bolts are removed. While cutting these wedges make enough for seating the knives. Wedges are placed every two feet between the upper and lower knifes.

7. Remove all the nuts and washers from the upper knife bolts. Remove the bolts that are not in-line with a holddown unit.
8. Push the upper knife to the left as far as possible to remove the remaining bolts. Refer to Figure 58.

CAUTION

TO AVOID INJURY, DO NOT PUSH KNIFE WITH YOUR HANDS. USE A SOFT METAL BAR OR STRIP OF WOOD.

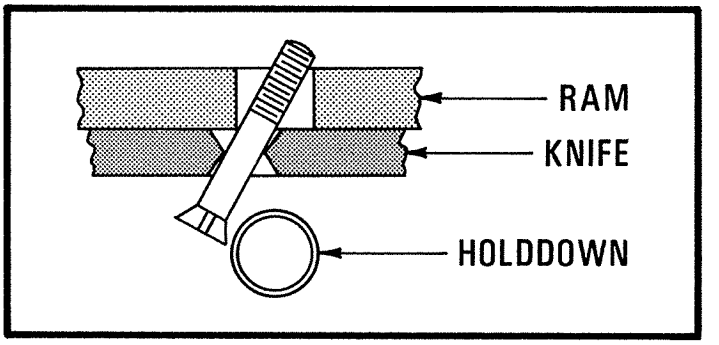


FIGURE 58

9. Slowly lower the upper knife to the 1" x 3" wood strips by removing the wedges. Do not allow the knife to drop. Use a pry bar in the knife bolt holes to assist in raising the knife, for removal of the wedges.
10. Remove the upper knife from the machine by sliding out the right end of the machine. Refer to Figure 59.
11. Place the upper knife on wooden blocks away from the immediate work area.
12. Remove the three wooden strips and "C"-clamps from the table. Place all the upper knife bolts, nuts, and washers with the upper knife.
13. Loosen, but do not remove, the nut and washer from the end bolt of the lower knife at right end. Remove the nut and washers from the remaining knife bolts and remove the bolts.

NOTE: Older machines were equipped with a table cover. This must be removed for access to the lower knife bolt nuts and washers.

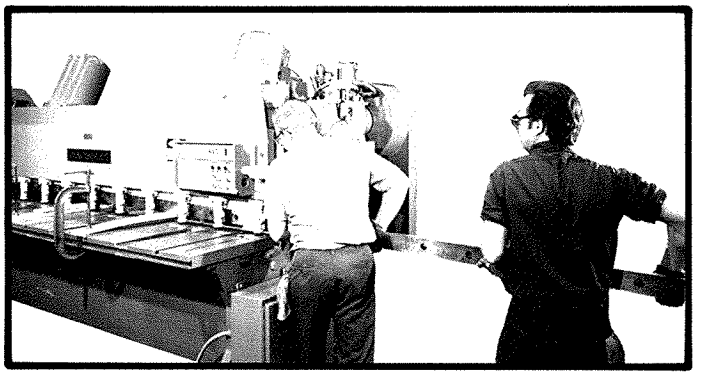


FIGURE 59

14. Unlock the main disconnect switch or replace the main fuses. Turn the disconnect switch to the "ON" position.

    NOTE: This step is not necessary on machines equipped with a manual back gage.

15. Run the back gage forward until the back gage counter or dial reads 2".

16. Turn the main disconnect switch "OFF".

17. Remove the remaining knife bolt, nut and washer and remove the bolt. Stand on the outside of the right housing and reach through the gap to remove bolt.

CAUTION

KNIFE IS NO LONGER HELD IN PLACE. KEEP CLEAR OF KNIFE WHEN REMOVING THIS BOLT.

18. Turn the electrical disconnect switch "ON".

    NOTE: This step is not necessary on machines equipped with a manual back gage.

19. Run the back gage forward until the back gage counter or dials read 1/4".

20. Turn the main disconnect switch "OFF".

21. Remove the lower knife by sliding it out the right end of the machine. Refer to Figure 59.

    Set the knife on wooden blocks away from the work area. Place all lower knife bolts, nuts and washers with this knife.

22. Turn the disconnect switch "ON". Run the back gage all the way to the rear.

23. Turn the main disconnect switch "OFF" and lock it out. Remove the main fuses if the disconnect switch cannot be locked in the "OFF" position.

24. Thoroughly clean the upper and lower knife seats with a aliphatic solvent, such as Stoddard solvent or mineral spirits. (Any further mention of solvent will mean this suggestion.) Clean, but do not disturb the location of the knife shims. Use an oil stone or file to remove all nicks and burrs from the knife seats.

CAUTION

SHIMS MAY HAVE SHARP EDGES. PROTECT YOUR HANDS FROM CUTS.

NOTE: If replacing knives with a new or reground set, refer to the procedure for SHIMMING THE LOWER KNIFE.

If rotating existing knives to a sharp cutting edge, proceed to Step No. 25.

25. Inspect the knife shims and shim pin assemblies:

    SHEARS SHIPPED AFTER 1 JUNE, 1985 - Replace any damaged shim with a new shim of the same thickness. Replace any bent pin or any pin where the adjusting screw in the end will not turn.

    If a shim pin is replaced, the height of the new pin must be adjusted. The top of the pin must be .015" to .025" below the top of the solid full length shim on top of the shim stack. Compress the shim stack when measuring the height of the pin. The screw end of the pin is inserted into the hole. Several adjustments may be required to obtain proper pin height. A magnet can be used to remove pin from hole.

    SHEARS SHIPPED PRIOR TO 1 JULY, 1985 - Replace any damaged shim with a new shim of the same thickness. Replace any bent or missing shim pins or springs. The spring is placed into the hole first and is used to keep pin engaged into the knife shim stack.

    NOTE: Older machines may not have pins and springs for retaining knife shims. The thickest shim should be on the top of the shim stack.

26. Lubricate the lower knife seat and shims with a light machine oil.

27. Unlock the main disconnect switch or replace the main fuses. Turn the disconnect switch to the "ON" position.

    NOTE: This step is not necessary on on machines equipped with a manual back gage.

28. Run the back gage forward until the back gage counter or dials reads 1/4".

29. Turn the main disconnect switch to "OFF".

30. Thoroughly clean both knives with solvent. Carefully use an oil stone on the flat surfaces to remove any high spots.

31. Position the lower knife to bring a sharp edge to the cutting position and slide the knife, from the right end of the machine, on to the lower knife seat. Center the knife bolt holes in the knife with the holes in the table.

IMPORTANT

SHEARS SHIPPED PRIOR TO 1 JUNE, 1985:

It will be necessary to compress the knife shim pins and springs while inserting lower knife. This can be done with a small screwdriver or a 6" machinist's scale holding one pin at a time as the knife is slid into position.

32. Clean and inspect all knife bolts, nuts and washers. Run the nuts on the knife bolts to insure the threads are not damaged. If necessary, hand fit or replace the bolts and nuts. Any nut with rounded corners must be replaced.

33. Turn the main disconnect switch "ON".

    NOTE: This step is not necessary on machines equipped with a manual back gage.

34. Move back gage to the rear until counter or dials read 2".

35. Install the two end knife bolts, nuts and washers. Snug up the nuts, DO NOT TIGHTEN. Stand on outside of the housing and reach through gap to install end bolts.

CAUTION

KNIFE IS NOT HELD IN PLACE. KEEP CLEAR OF THE KNIFE WHEN INSTALLING BOLTS.

36. Run the back gage all the way to the rear.

37. Turn the main disconnect switch "OFF" and lock it out or remove main fuses.

38. Install the remaining knife bolts, nuts and washers. Snug up the nuts, DO NOT TIGHTEN.

39. Lubricate the upper knife seat with a light machine oil.

40. "C"-clamp the three 1" x 3" strips of wood to the table as described in Step No. 5. These strips must project at least 1" over the cutting edge of the lower knife.

41. Position the upper knife to bring a sharp edge to the cutting position and slide the knife on to the wood strips from the right end of the machine.

42. Pry the upper knife with a soft bar or strip of wood into the upper knife seat. To raise the upper knife into the knife seat, place a soft bar or strip of wood under the knife. Pry up as far as possible, slide wedges under knife to hold in position. Continue this procedure until knife is in the seat. Refer to Figure 60.

    Use the three wooden wedges as shown in Figure 57 to support the knife

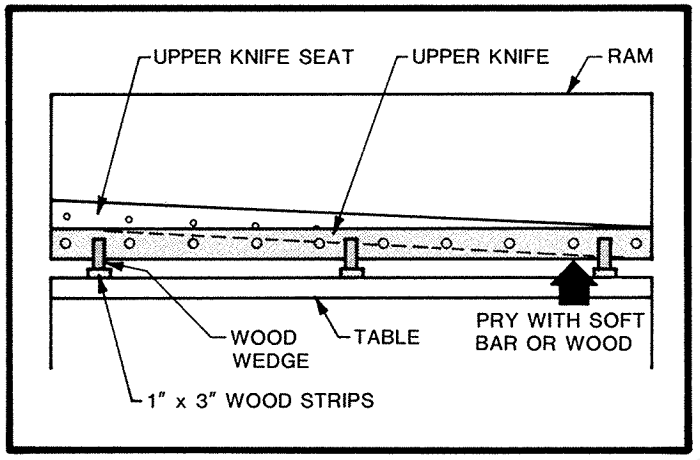


FIGURE 60

43. Push the upper knife to the left to install the knife bolts behind the holddown units. Refer to Figure 58.

CAUTION

TO PREVENT INJURY DO NOT PUSH KNIFE WITH YOUR HANDS. USE A SOFT BAR OR A STRIP OF WOOD.

44. Push the upper knife to the right and center the upper knife with the lower knife. Refer to Figure 61.

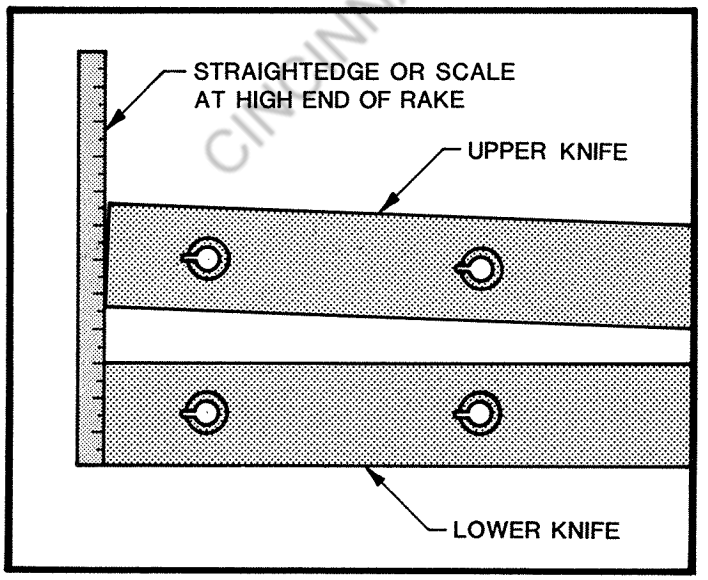


FIGURE 61

45. Install the remaining knife bolts and all the nuts and washers. Snug up the nuts, DO NOT TIGHTEN.

IMPORTANT

Each end bolt, for the upper knife, has a special washer. This washer has a ground flat to clear the lower ram shoe on each side. They must be installed in this position.

46. Remove the wedges and the 1" x 3" wood strips "C"-clamped to the table.

47. Position the wooden wedges, Figure 57, between the knives next to every other holddown unit for seating the knives. These wedges must be snug between the knives. It is not necessary to drive them tight.

48. Pull the clutch pin to engage the clutch:

    A. Machines equipped with mechanically actuated clutch: Disengage the treadle lock and step on the foot treadle.

    B. Machines equipped with an air-electric clutch: Raise the clutch pin with a pry bar. Refer to Figure 62.

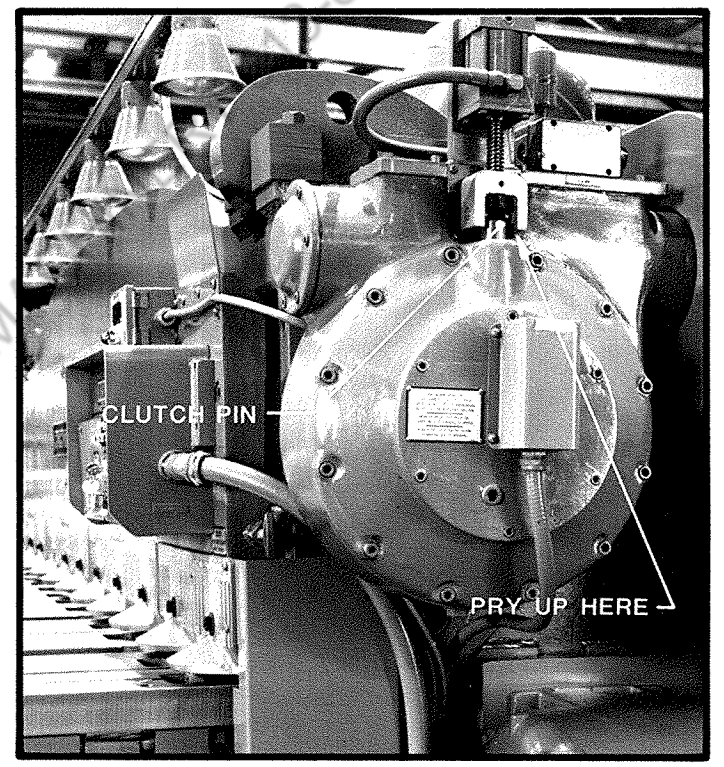


FIGURE 62

    C. Machines equipped with a solenoid operated clutch: Remove the solenoid cover and pry up on the clutch pin. Refer to Figure 63.

    D. 14-18 and 25 Series High Speed Shears: Remove the flywheel cover. Two people are required to manually engage the clutch, disengage the brake and to rotate the flywheel. One person must manually engage both the brake and clutch solenoids, while the other person will rotate the flywheel as described in Step No. 50.

49. Open the holddown bleed valve on the right end of the holddown beam.

50. Rotate the flywheel by hand in a counterclockwise direction (looking from the rear of the machine toward the flywheel). This will seat the knives by exerting pressure on the wooden wedges.

NOTE: It may be necessary to place a wooden wedge between the flywheel and the right housing. This will prevent the flywheel from rotating, which would loosen the pressure on the knives.

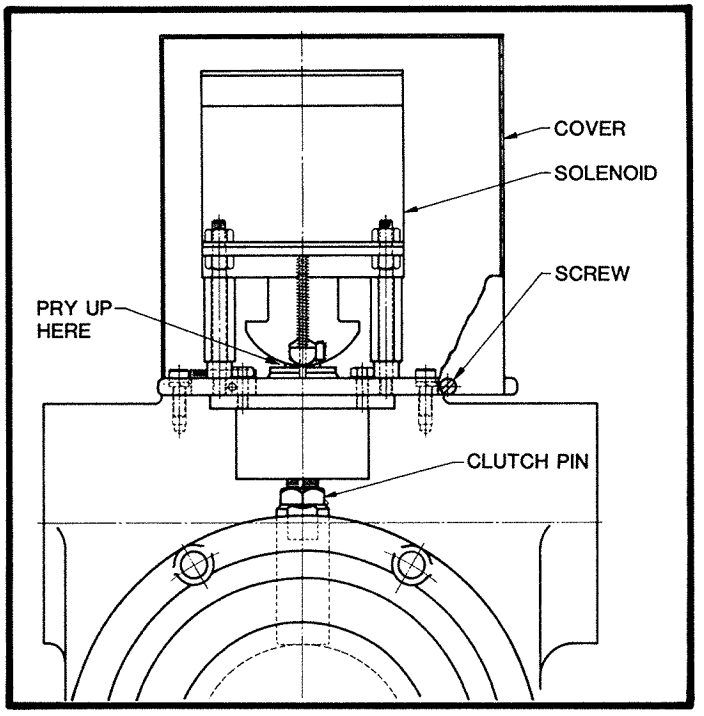


FIGURE 63

51. Tighten all knife bolt nuts to approximately the torque listed on the following chart:

BOLT DIA.	TORQUE	WRENCH LGT.
5/8"	175 ft. lbs.	12"
3/4"	300 ft. lbs.	24"
1"	400 ft. lbs.	30"

IMPORTANT

Do not use the long handle wrench supplied with the machine. This wrench is to be used only for adjusting the ram brace nuts to achieve knife clearance.

52. Release the pressure on all wooden wedges by turning the flywheel by hand, clockwise (looking from the rear of the machine toward the flywheel) and remove the wooden wedges.

53. Check both knife seats to insure the knives are .0015" tight. If not loosen all knife bolt nuts and repeat Steps No. 46 to 52.

54. Check height of lower knife. Refer to Figure 64. The scale should touch in the middle of the knife.

55. Thoroughly clean the knives of any foreign material, such as wood chips and wood splinters, to prepare for setting the knife clearance.

IMPORTANT

Machines equipped with a table cover removed in Item No. 13, clean and deburr for assembly. Install cover and tighten all bolts.

56. Proceed to ADJUSTING KNIFE CLEARANCE.

NOTE: The back gage counters or dials and table scales may require adjustment after a knife change is completed.

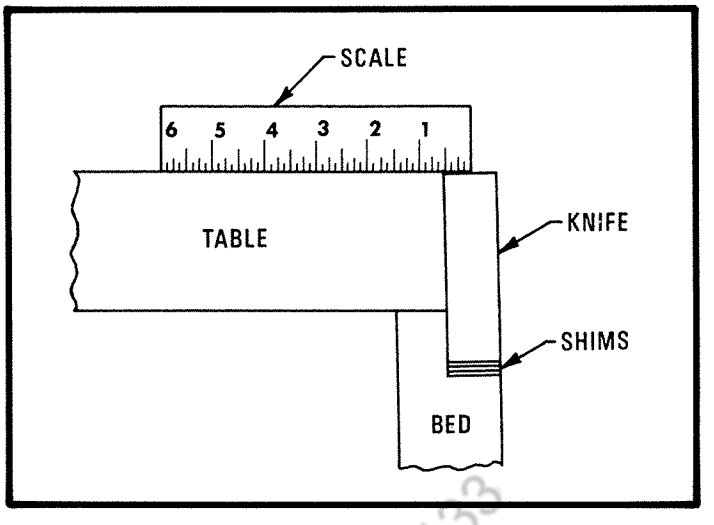


FIGURE 64

KNIFE CLEARANCE

When shearing mild steel, the best results will be obtained with a knife clearance of about seven percent of the thickness of the sheet or plate. CINCINNATI has developed standard knife clearances for general purpose shearing based on the maximum capacity of the shear. The knives are set about .002" closer at the center than at the ends for clearances greater than .004".

MAXIMUM THICKNESS	NORMAL MINIMUM THICKNESS	STD. KNIFE CLEARANCE		
		LEFT	CENTER	RIGHT
10 GA. thru 3/8"	20 GA.	.005"	.003"	.005"
1/2" - 5/8"	16 GA.	.010"	.008"	.010"
3/4" - 1" - 1-1/4"	10 GA.	.020"	.018"	.020"

FIGURE 65

Knive clearance should be changed to shear a material thinner than normal. For example: The knife clearance on a 1" mild steel capacity shear should be set to .010" - .008" - 010" to shear 16 gauge mild steel.

When shearing very thin mild steel, 22 gauge to 28 gauge, set the upper knife straight and use a uniform knife clearance of .002". Special care and instructions are required to set knife clearance closer than .003". Contact the CINCINNATI INCORPORATED Service Department for instructions. While setting knife clearance at .003" or less, the back gage angle must be all the way to the rear. Check to insure that there is clearance at the center of the knives.

IMPORTANT

Sharp knives must be used to shear very thin or soft materials.

If knife clearance has been adjusted closer than .003", the ram gib clearance must be adjusted accordingly. Refer to RAM CLAMP GIB ADJUSTMENT.

ADJUSTING KNIFE CLEARANCE

There are two conditions where knife clearance can be adjusted:

A. If knife clearance is to be checked or adjusted without changing or rotating knives. Steps No. 1 through No. 4 of the procedure for CHANGING OR ROTATING KNIVES

must be completed before proceeding to the following clearance adjustment.

B. If the knives have been changed or rotated to a sharp cutting edge proceed to the following instructions - refer to Figure 66.

IMPORTANT

Knife bolt nuts must be tight. Refer to torque specifications in the procedure for CHANGING OR ROTATING KNIVES.

To adjust clearance:

1. There are four or more clamp studs and nuts "C" holding the table tight against the housings and bed. These studs are located under the table, between the housings and in front of the bed. There are two clearance adjusting screws in each housing. Outer screws "A" are used to decrease knife clearance and inner screws "B" are used to increase clearance.

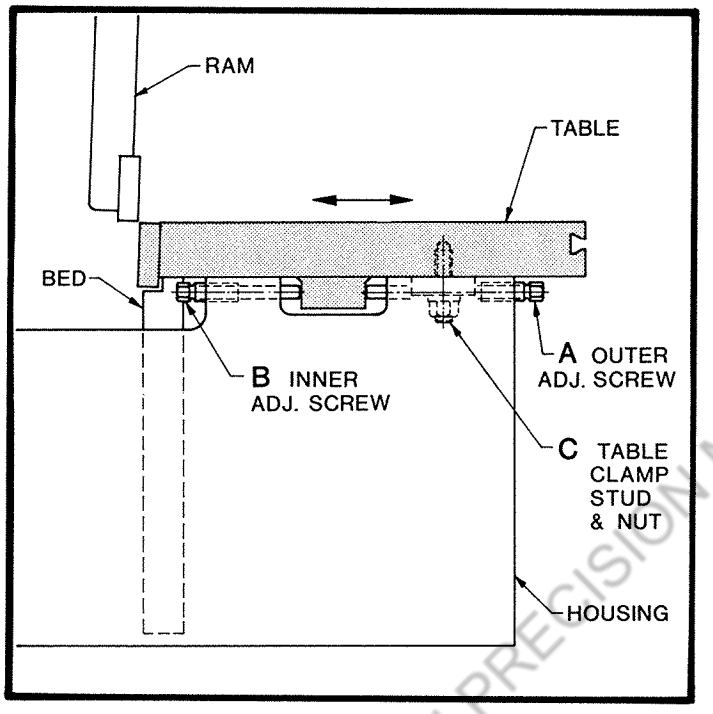


FIGURE 66

The proper sequence for increasing clearance is as follows:

a. Loosen all clamp nuts "C" one-half turn.

b. Loosen both outer adjusting screws four complete turns.

c. Tighten both inner adjusting screws "B" until the upper knife clears the lower knife by .010" to .015".

d. Tighten both outer adjusting screws "A".

CAUTION

MAKE CERTAIN ALL TOOLS HAVE BEEN REMOVED FROM THE TABLE.

2. Unlock the main disconnect switch or replace the main fuses. Turn the disconnect switch to the "ON" position.

3. Open the holddown bleed valve if it has not been previously opened.

4. Move the ram down until knives cross at high end of the ram:

A. SHEAR SHIPPED AFTER 1 OCTOBER 1974:

1. Unlock main disconnect switch and turn to "ON" position.

2. Procedure to jog the ram:

a. Turn the CLUTCH MODE selector to "JOG" position and CLUTCH CONTROL selector to "ON" position.

b. Depress the footswitch and momentarily depress the JOG button to engage clutch.

NOTE: Each time ram returns to top of the stroke this step must be repeated before starting another down stroke.

c. Use JOG button to jog ram to any selected position. The drive motor runs when JOG button is depressed.

d. Turn CLUTCH CONTROL selector to "OFF" position and remove the key. This will prevent unintended movement of the ram.

CAUTION

MAKE CERTAIN NO ONE IS IN POINT-OF-OPERATION WHEN YOU JOG THE SHEAR.

3. Use the procedure outlined to jog the ram down until knives cross at the high end of ram.

B. SHEARS SHIPPED PRIOR TO 1 OCTOBER 1974:

1. Engage clutch when ram is at top of the stroke:

a. Shears with mechanical treadle - Disengage the treadle lock pin and depress the foot treadle.

b. Shears with air-electric clutch control - Use a small pry bar under clutch pin clevis to raise clutch pin (See Figure 62).

c. Shears with electric solenoid clutch control - Remove solenoid cover and use small pry bar to raise clutch pin (See Figure 63).

2. Remove the flywheel guard. See section on REMOVING AND INSTALLING GUARDS. Turn the flywheel by hand, counterclockwise, looking from rear of the machine toward the flywheel, until the knives cross at the high end of ram. Each mention of ram movement or jogging will require this procedure.

5. Move the table forward (toward rear of machine) by loosening screw "B" and tightening screw "A" - See Figure 66. Adjust until the "GO" feeler gage (Figure 67) will go between the knives and the "NO GO" feeler gage will not. Both screws must be contacting the table.

MAXIMUM CAPACITY	FEELER GAGE	
	GO	NO GO
10GA. thru 3/8"	.010"	.011"
1/2" - 5/8"	.015"	.016"
3/4" - 1" - 1-1/4"	.025"	.026"

FIGURE 67

6. Jog or move the ram on the upstroke until knives just cross at the low end of the ram. Set clearance the same as other end (Step 5). Securely tighten nuts "C" (Figure 66), which fasten table to the bed and housings.

7. Jog or move the ram down until knives just cross on high end of ram. Check the clearance set in Step 5. Correct if necessary.

8. Jog or move the ram upwards, checking knife clearance as knives cross at each holddown unit. The knife clearance must decrease as you approach the center of ram. Clearance at center of ram should be .002" smaller than clearance set at each end. If clearance varies, realign ram by means of adjusting nuts "C" on Figure 68.

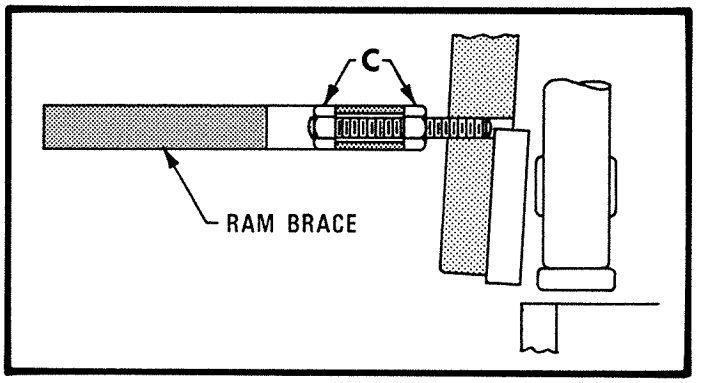


FIGURE 68

9. The rigid ram brace controls the alignment of the ram by means of studs and nuts. By loosening one adjusting nut "C", Figure 68, and tightening the other you can move the ram the desired amount. One man should check the clearance while another stands on the table to adjust the ram. The long handle wrench, shipped with the machine, is to be used to make this adjustment. Refer to Figures 69 and 70.

IMPORTANT

Do not stand on the ram brace while adjusting the ram, for knife clearance, your weight could affect knife clearance.

CAUTION

BE CAREFUL NOT TO SLIP OR FALL WHEN TIGHTENING RAM BRACE NUTS. THE WRENCH CAN SLIP OFF THE NUTS OR BREAK. WRENCH MUST BE FULLY ENGAGED ON NUTS.

FIGURE 69

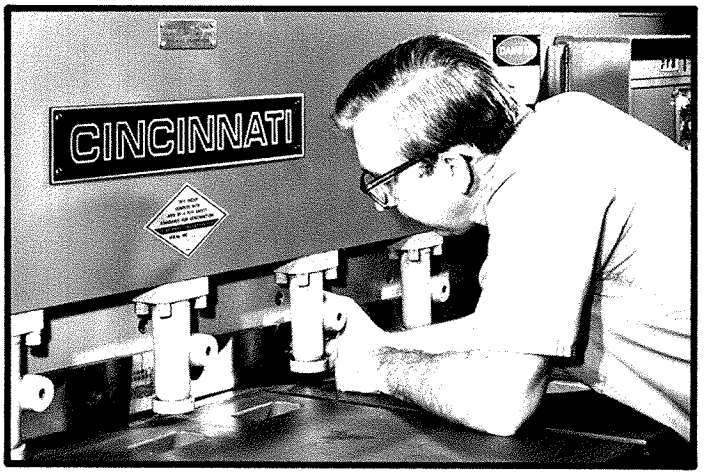


FIGURE 70

10. The knife clearance has been set the same at each end and .002" smaller at the center of knives. The table must now be moved to set the recommended knife clearance shown in Figure 65 in KNIFE CLEARANCE section.

    Loosen nut "C" (Figure 66) and repeat Steps 4 thorugh 7. Reduce the thickness of "GO" and "NO GO" feeler gages (Figure 67) by .005" to obtain the recommended knife clearance.

11. Securely tighten all table clamp stud nuts "C" (Figure 66).

12. Install the point-of-operation guarding. Refer to section on REMOVING AND INSTALLING GUARDS.

13. Install the flywheel guards. Refer to section on REMOVING AND INSTALLING GUARDS.

14. Unlock the main disconnect switch or replace the main fuses and turn the disconnect switch "ON".

CAUTION

THE CLUTCH IS ENGAGED - RAM WILL MOVE WHEN DRIVE MOTOR IS STARTED. MAKE SURE EVERYONE IS CLEAR OF RAM AND RAM BRACE. ALL TOOLS AND MATERIAL MUST BE REMOVED FROM SHEAR TABLE.

15. Start main drive motor:

    A. SHEARS WITH ELECTRIC AIR CYLINDER CLUTCH CONTROL SHIPPED AFTER 1 OCTOBER 1974:

        1. Turn CLUTCH CONTROL selector to "ON".

        2. Turn CLUTCH MODE selector to "JOG".

        3. Depress footswitch and press JOG button to start main drive motor. Hold both controls depressed until flywheel comes up to full speed (10 to 12 strokes). Release both controls when ram is on downstroke. Ram will stop at top of the stroke.

        4. Turn CLUTCH MODE selector to "CONTINUOUS" position. Start main drive motor.

        5. After flywheel reaches full speed, depress footswitch to continuously cycle ram. Close holddown bleed valve while ram is cycling at full speed.

        6. Release footswitch while ram is on a down stroke. Ram will stop at top of the stroke. Turn CLUTCH CONTROL and CLUTCH MODE selectors to "OFF".

B. SHEARS WITH ELECTRIC AIR CYLINDER CLUTCH CONTROL SHIPPED PRIOR TO 1 OCTOBER 1974, OR WITH ELECTRIC SOLENOID CLUTCH CONTROL:

1. Turn CLUTCH CONTROL selector to "ON".
2. Turn CLUTCH MODE selector to "RUN" or "CONTINUOUS" position.
3. Depress footswitch and start main drive motor. Hold footswitch depressed and allow flywheel to come up to full speed (10 to 12 strokes).
4. Close holddown bleed valve while ram is cycling at full speed.
5. Release footswitch while ram is on a down stroke. Ram will stop at top of the stroke. Turn CLUTCH CONTROL, CLUTCH MODE and main drive motor "OFF".

C. SHEARS WITH MECHANICAL TREADLE:

1. Disengage treadle lock.
2. Depress foot treadle and start main drive motor. Allow flywheel to come up to full speed (10 to 12 strokes).
3. Close holddown bleed valve while ram is cycling at full speed.
4. Release foot treadle while ram is on a down stroke. Ram will stop at top of the stroke. Engage treadle lock and turn "OFF" main drive motor.

SHIMMING LOWER KNIFE

Shim pins are used to hold shims in position on the lower knife seat. Shears shipped prior to 1 June 1985 use a solid pin and a spring. Shears shipped after this date use an adjustable height pin, as well as a 1/8" thick full length shim placed on top of the shim stacks.

ALL 62 SERIES AND LARGER SHEARS AND ALL 10 THROUGH 43 SERIES SHEARS SHIPPED PRIOR TO 1 JUNE 1985:

1. Remove the knife shim sections from the lower knife seat and place them on the table in their proper end-to-end location.
2. Clean and inspect each shim pack. Discard any damaged shims and replace them with the proper shims from spare shim pack envelopes shipped with the shear.

CAUTION

SHIMS MAY HAVE SHARP EDGES.
PROTECT YOUR HANDS FROM CUTS.

3. Inspect the pins and springs which retain the knife shims in the lower knife seat. Replace all damaged or broken pins and springs.

   NOTE: Older machines may not have pins and springs.

4. Lightly lubricate the lower knife seat with a light machine oil.
5. Unlock the main disconnect switch or replace the main fuses. Turn the disconnect switch to the "ON" position.

   NOTE: This step is not necessary if the machine has a manual back gage.

6. Run the back gage forward until the back gage counter or dial reads 1/4".
7. Turn the main disconnect switch "OFF".
8. Thoroughly clean the lower knife with solvent. Carefully use an oil stone on the flat surfaces of the knife to remove any high spots.
9. Slide the lower knife on to the lower knife seat from the right end of the machine. See Figure 59. Center the bolt holes in knife with bolt holes in the table.

IMPORTANT

It will be necessary to compress the knife shim pins and springs while inserting the lower knife. This can be done with a small screwdriver or a 6" machinist scale holding one pin at a time, as the knife is slid into position.

CAUTION

TWO MEN ARE REQUIRED TO HANDLE KNIFE. ALWAYS WEAR GLOVES TO PROTECT HANDS WHILE HANDLING KNIVES. HEAVIER KNIVES, 1-1/8" x 5", 1-1/2" x 5-1/2" AND 1-3/4" x 6-1/2", REQUIRE A LIFTING DEVICE. ALWAYS PROTECT THE CUTTING EDGES OF THE KNIFE WHEN USING A LIFTING DEVICE.

10. Turn the main disconnect switch "ON".

    NOTE: This step is not necessary for machines equipped with manual back gage.

11. Run the back gage to the rear until back gage counters or dials read 2".

CAUTION

KNIFE IS NOT HELD IN PLACE AT THIS TIME.
KEEP CLEAR OF KNIFE WHEN INSTALLING BOLTS.

12. Install the two end knife bolts, nuts and washers. Snug-up the nuts - DO NOT TIGHTEN. Stand on the outside of housings and reach through gap to install end bolts.
13. Run the back gage all the way to the rear.
14. Turn the main disconnect switch "OFF" and lock it out. If the disconnect switch cannot be locked in the "OFF" position, remove the main fuses.
15. Install a knife bolt, nut and washer in the center of the knife. Snug-up the nut - DO NOT TIGHTEN.
16. If shear is equipped with a table cover, it must be installed and securely fastened. Deburr and wipe cover and table clean before installing the table cover.
17. Place the knife shim sections, removed in Step No. 1, on top of the knife. Add or remove shims until each section is flush to slightly above the table top or table cover.

IMPORTANT

It may be necessary to use two shim packs for each section. If additional shims are required we recommend our standard shim packs as shown in Figure 71. Each pack consists of eight shims: one each of .005", .007", .010", .025" and two each of .050" and .093" in thickness.

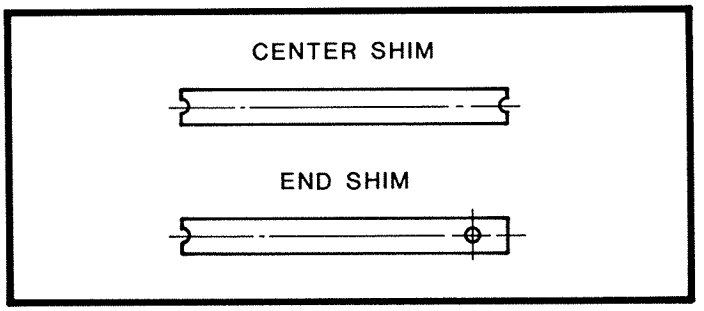


FIGURE 71

18. Compress the shims as shown in Figure 72 by moving the wedge block toward the knife. Check the thickness of the shim pack with a scale as shown in Figure 73. The scale should touch the shim pack at about the center of the knife. If necessary, add or remove shims to obtain the correct shim pack thickness.

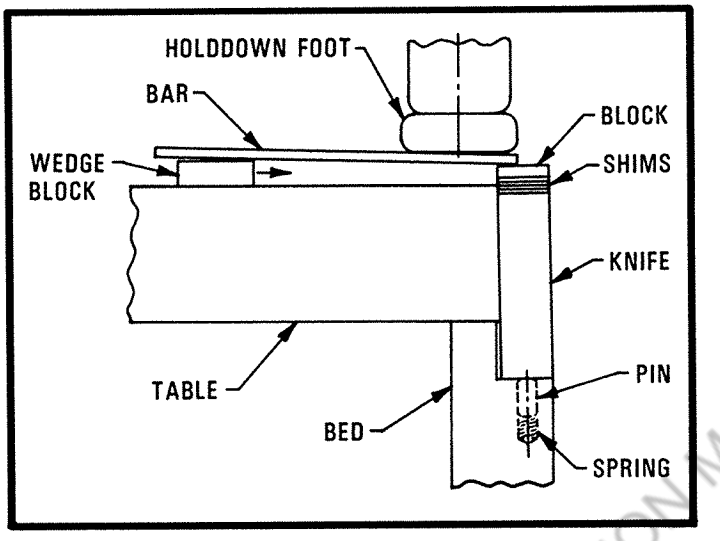


FIGURE 72

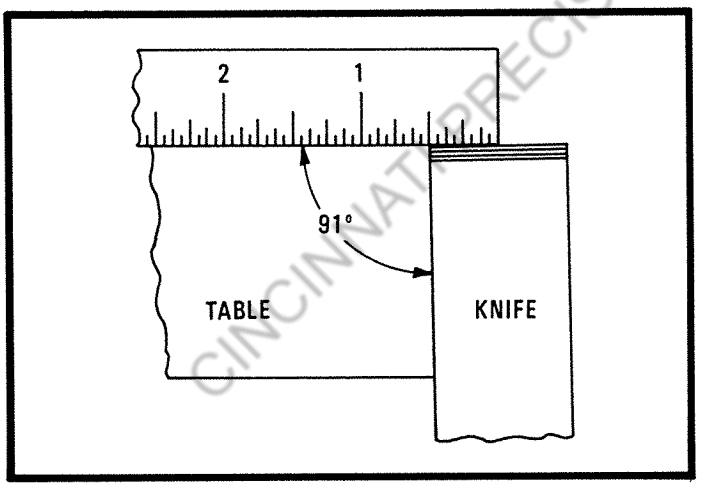


FIGURE 73

19. Repeat Step No. 18 using the holddown at the center of each shim pack. There must not be a difference in thickness of more than .003" between adjacent stacks of shims.

20. Place all unused shims in their proper envelopes.

21. If a table cover was installed in Step No. 16 it must be removed.

22. Insert a pry bar through a knife bolt hole to raise the knife as high as possible. Tighten the nuts on the three knife bolts.

23. Install the knife shim packs under knives:

    A. The thicker shim must be on top of the pack.

    B. Depress the spring loaded shim retaining pins with a small screwdriver or a 6" machinist scale.

CAUTION

NEVER PLACE YOUR FINGERS OR HANDS UNDER THE KNIFE WHILE INSTALLING THE SHIMS.

    C. Slide the selected shim pack under the knife until it is partially over the retaining pins. Remove the small screwdriver or 6" machinist scale.

    D. Slide the shim pack into its proper location. If necessary, slightly shift the shim pack to ensure the pins enter into the hole and/or slots in the shim pack.

    E. Use the same procedure to install the rest of the shim packs.

24. Loosen the nuts on the three knife bolts to allow the knife to slide down on the shim packs.

25. Install the remaining knife bolts, nuts and washers. Snug-up all the nuts. DO NOT TIGHTEN.

Proceed to Step No. 39 of the procedure for CHANGING OR ROTATING KNIVES.

ALL 10 THROUGH 43 SERIES SHEARS SHIPPED AFTER 1 JUNE 1985:

1. Remove the full length solid shim and set it on the shear table.

2. Remove the individual shim packs and place them on the table in their proper end-to-end location.

3. Remove adjustable height shim pins which retain knife shims in the lower knife seat. Clean and inspect the pins. Replace any bent pin or any with non-movable set screws in end of pin.

4. Clean and inspect each shim pack. Replace any damaged shim with proper shim from spare shim pack envelope.

CAUTION

SHIMS MAY HAVE SHARP EDGES. PROTECT YOUR HANDS FROM CUTS.

5. Clean the full length solid shim. Use an oil stone on flat surfaces to remove any nicks or burrs.

6. Lightly lubricate the lower knife seat with a light machine oil.

7. Unlock main disconnect switch and turn it to "ON" position.

8. Run the back gage forward until the counter reads 1/4". Turn the main disconnect switch to "OFF".

9. Clean the lower knife with solvent. Use an oil stone on the flat surfaces to remove any high spots.

10. Slide the lower knife onto lower knife seat from right end of machine. Refer to Figure 59. Center bolt holes in knife with bolt holes in the table.

CAUTION

TWO MEN ARE REQUIRED TO HANDLE KNIFE. ALWAYS WEAR GLOVES TO PROTECT HANDS WHILE HANDLING KNIVES. HEAVIER KNIVES, 1-1-8" x 5", 1-1/2" x 5-1/2" AND 1-3/4" x 6-1/2, REQUIRE A LIFTING DEVICE. ALWAYS PROTECT CUTTING EDGES OF KNIFE WHEN USING A LIFTING DEVICE.

11. Turn the main disconnect switch to "ON" position. Run the back gage to the rear until counter reads 2".

12. Install the two end knife bolts, nuts and washers. Snug-up the nuts - DO NOT TIGHTEN. Stand on outside of housing and reach through gap to install end bolts.

13. Run the back gage all the way to the rear. Turn the main disconnect switch "OFF" and lock it out.

14. Install a knife bolt, nut and washer in the center of the knife. Snug-up the nut - DO NOT TIGHTEN.

15. Insert a pry bar through a knife bolt hole and raise the knife as high as possible. Tighten nuts on the three knife bolts.

16. Slide the full length solid shim onto lower knife seat under the knife.

17. Hold lower knife up with a pry bar and loosen nuts on the three knife bolts. Lower knife down onto the solid shim. Snug-up the nuts on the three knife bolts - DO NOT TIGHTEN.

18. Place the individual knife shim packs, removed in Step 2, on top of the knife. Add or remove shims until each pack is flush to slightly above the table top.

IMPORTANT

It may become necessary to use two shim packs for each section. If additional shims are required we recommend our standard shim pack as shown in Figure 71. Each pack consists of eight shims: one each of .005", .007", .010", .025" and two each of .050" and .093" in thickness.

19. Compress the shims as shown in Figure 74 by moving the wedge block toward the knife. Check the thickness of the shim pack with a scale as shown in Figure 73. The scale should touch the shim pack at about the center of the knife. If necessary, add or remove shims to obtain the correct shim pack thickness.

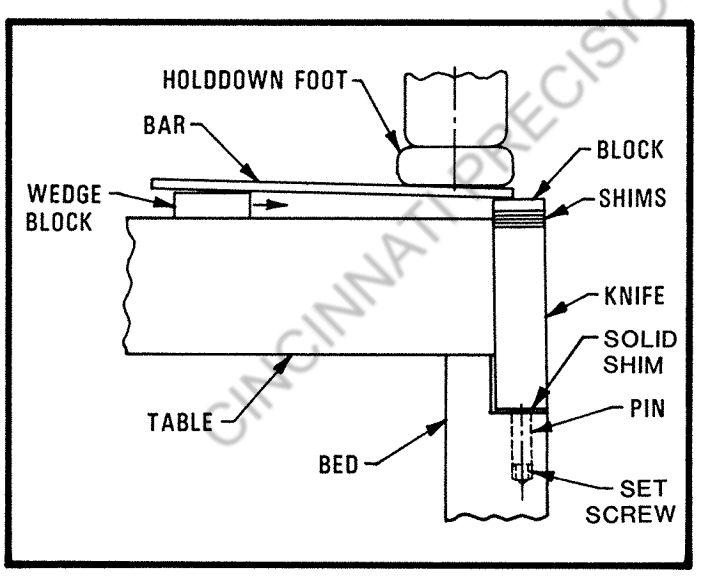


FIGURE 74

20. Repeat Step 19 using the holddown at center of each shim pack. There must not be a difference in thickness of more than .003" between adjacent stacks of shims.

21. Place all unused shims in their proper envelope. Remove the individual knife shim packs from knife and place them on shear table in their proper end-to-end position.

22. Remove the nut, washer and nut and bolt at center of the knife.

23. Unlock main disconnect switch and turn it "ON". Run back gage forward until counter reads 2". Turn main disconnect switch to "OFF" and lock it out.

24. Remove nut, washer and knife bolt at each end of knife. Stand outside of housing and reach through gap to remove these bolts.

25. Turn the main disconnect switch to "ON". Run the back gage forward until the counter reaches 1/4". Turn main disconnect switch to "OFF".

26. Remove lower knife by sliding it out of right end of machine. Place knife on wooden blocks away from work area. Put all bolts, nuts and washers with knife.

27. Turn main disconnect switch to "ON". Run back gage all the way to rear. Turn main disconnect switch to "OFF" and lock it out.

28. Remove full length solid shim from knife seat and place on shear table.

29. Place individual shim packs on lower knife seat in their proper end-to-end position. Holes in shim pack must line-up with pin holes in shear bed.

30. Place full length solid shim on top of shim packs. Line-up the pin holes.

31. Adjust and install shim pins. They are adjusted by means of a set screw in the end of pin. These should be adjusted so that top of pin is .015-.025" below top of the solid shim. The adjusting screws are self-locking. The shim pins should be installed, screw end first, into the holes. A magnet could be helpful when removing the pins for adjustment. Compress shim stack when checking height of pins.

32. Unlock main disconnect switch and turn it to "ON". Run the back gage forward until counter reads 1/4". Turn disconnect switch to "OFF".

33. Slide lower knife onto lower knife seat from right end of machine. See Figure 59. Use care not to disturb the shims. Center bolt holes in knife with bolt holes in the table.

CAUTION

TWO MEN ARE REQUIRED TO HANDLE KNIFE.
ALWAYS WEAR GLOVES WHEN HANDLING KNIVES.

34. Turn main disconnect switch to "ON". Run the back gage to rear until counter reads 2".

35. Install the two end knife bolts, nuts and washers. Snug-up the nuts - DO NOT TIGHTEN. Stand outside the housing and reach through the gap to install bolts.

36. Run back gage all the way to the rear. Turn main disconnect switch to "OFF" and lock.

37. Install the remaining lower knife bolts, nuts and washers. Snug-up the nuts - DO NOT TIGHTEN.

Proceed to Step No. 39 of procedure for CHANGING OR ROTATING KNIVES.

REGRINDING KNIVES

Shear knives must be ground carefully to give good results. We recommend you send your knives to a shear knife manufacturer for regrinding. They are experienced in the care and handling of knives. They also have the proper equipment to obtain an accurate grind.

CINCINNATI INCORPORATED offers this grinding service. For more information contact the Parts Department.

When returning knives for grinding to anyone other than CINCINNATI INCORPORATED, specify the grinding limits listed below:

GRINDING LIMITS

WIDTH - Parallel within .005" from end to end.

THICKNESS - Parallel within .003" from end to end.

No variation greater than .001" within any 12" of length.

Knives may be reground a number of times within these limits until knives reach minimum size.

MINIMUM KNIFE SIZE -

NEW KNIFE SIZE	MINIMUM GRIND DIMENSION
1" x 3"	3/4" x 2-5/8"
1" x 4"	3/4" x 3-5/8"
1-1/8" x 5"	7/8" x 4-5/8"
1-1/2" x 5-1/2"	1-1/4" x 5-1/8"
1-3/4" x 6-1/2"	1-1/2" x 6"

REMOVING & INSTALLING GUARDS

Guards often may have to be removed to perform a maintenance or adjustment procedure. After that procedure is completed the guards must be replaced before any machine operation is attempted. Remove any loose tools or material before starting machine. The following procedures describe how to remove and install the various types of machine guards.

POINT-OF-OPERATION GUARDING

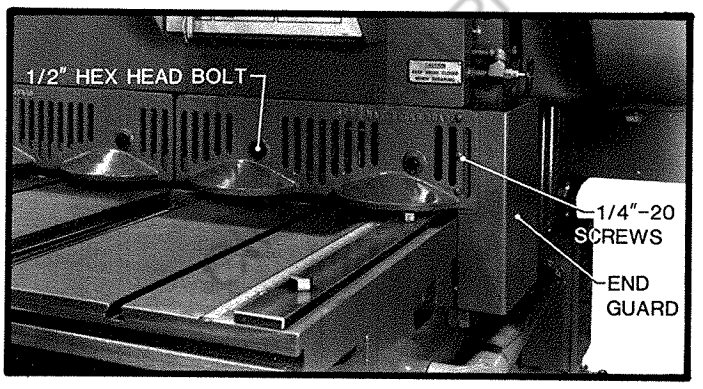
1. Remove the point-of-operation guarding. Refer to one of the following steps (A through D), depending upon the type of guards, for instructions:

   A. 1. Remove the three 1/4"-20 screws to remove each end guard.

   2. Remove four 1/4"-20 screws to remove each gap guard.

   3. Remove the 1/2" hex head bolts holding the guard sections.

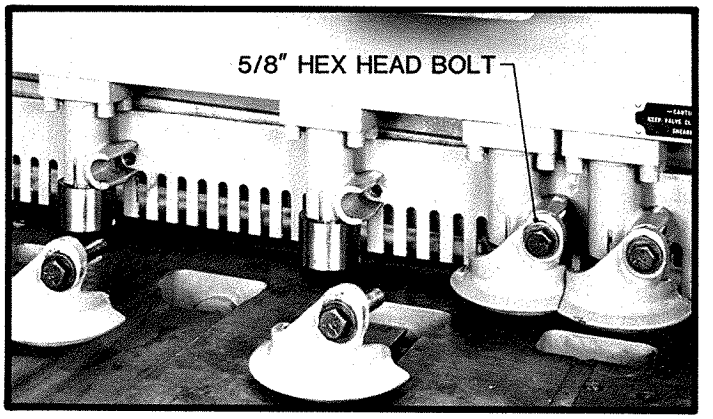
   NOTE: These guard sections must be reinstalled in the same location.



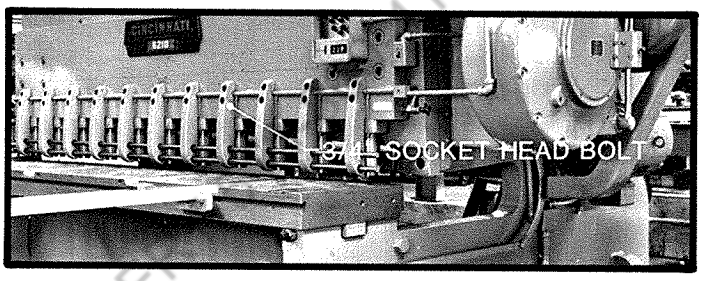
   B. 1. Remove the 5/8" hex head bolts holding the holddown and knife guard.

   2. The holddown guards can be removed individually.

   3. The knife guard can be removed by sliding it out the end of the machine.



   C. 1. Remove the 3/4" socket head bolts holding the guard to the holddown beam. This guard is removed as an assembly. To remove it from the machine a lifting device should be used.



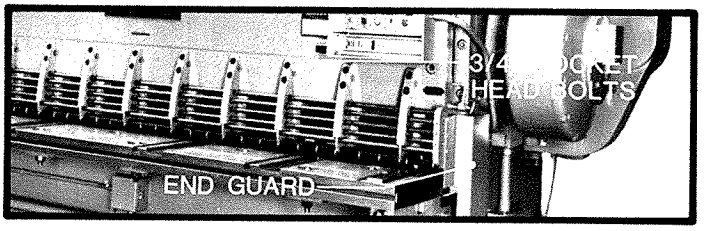
IMPORTANT

The guards shown in "B" and "C" do not meet ANSI B11.4 Standard. They should be replaced. Contact CINCINNATI INCORPORATED Parts Department.

   D. 1. Remove the five 5/16" hex head bolts to remove the end guards.

   2. Remove the four 3/8" hex head bolts to remove each gap guard.

   3. Remove the 3/4" socket head bolts holding the guard to the holddown beam. This guard is removed as an assembly. To remove it from the machine a lifting device should be used.



2. Install the point-of-operation guarding. Refer to one of the following steps (A through D), depending upon the type of guards as illustrated above, for instructions:

   A. Install guarding:

   1. Position all guard sections in the same location as they were removed.

   2. Install all 1/2" hex head bolts with flat washers.

   3. Set the height of the guard section to the dimension embossed on the guard.

   4. Securely tighten all 1/2" hex head bolts.

5. Install both gap guards with the 1/4" - 20 bolts.

6. Install both end guards with the 1/4"-20 screws.

B. Install guarding:

1. Slide the knife guard into position from the end of the machine.

2. Position the holddown guards at each holddown.

3. Start the 5/8" hex head bolts, through each holddown guard, into the knife guard. DO NOT TIGHTEN.

4. Set the height of each holddown guard. Place a 1/2" hex socket key between the guard and table to give proper clearance.

5. Securely tighten the 5/8" hex head bolts.

C. Install guarding:

IMPORTANT

This guard was removed as an assembly. A lifting device must be used to install.

1. Position the guard in place and start all 3/4" socket head bolts.

2. Securely tighten all bolts.

D. Install guarding:

IMPORTANT

This guard was removed as an assembly. A lifting device must be used to install.

1. Position the guard in place and start all 3/4" socket head bolts.

2. Securely tighten all bolts.

3. Install both gap guards with the 3/8" hex head bolts.

4. Install both end guards with the 5/16" hex head bolts.

FLYWHEEL GUARD

1. Remove the flywheel guard:

For 10, 14-18 and 25 Series machines proceed as follows:

A. If the shear was purchased after May 1, 1972 or has been retrofitted with a new flywheel guard, there may be an inner guard attached to the flywheel guard near the motor shaft. If so, remove the two 1/4" cap screws and the inner guard.

B. The flywheel guard is attached to the housing by three hex head screws, two at the top and one at the bottom. Remove the one at the bottom first.

CAUTION

THE FLYWHEEL GUARD IS AN AWKWARD PART TO HANDLE, SO CARE MUST BE USED IN HANDLING IT TO PREVENT INJURY. WE SUGGEST USING TWO MEN.

C. Hold the flywheel guard against the housing and remove the remaining screws.

D. Slowly lower the flywheel guard until it rests on the flywheel, then carefully pull it away from the shear and place it on the floor.

For 43 through 150 Series machines the procedure is the same except a lifting device must be used for lifting the flywheel guard. A nut is welded to the top of the guard for an eyebolt.

2. Install the flywheel guard:

For 10, 14-18 and 25 Series machines proceed as follows:

A. Two men are required to lift flywheel guard and set it on the flywheel.

B. Support guard and lift it so that the two upper hex head bolts can be installed.

CAUTION

THE FLYWHEEL GUARD IS AN AWKWARD PART TO HANDLE. USE CARE IN HANDLING GUARD TO PREVENT INJURY.

C. Install the lower hex head bolt. Tighten all three bolts.

D. Replace inner guard if removed.

For 43 through 150 Series machines, the procedure is the same except a lifting device must be used for lifting the flywheel guard. A nut is welded to the top of the guard for an eyebolt.

RAM ADJUSTMENT

All model shears, except 10 series, are equipped with a ram adjusting mechanism located on top of the ram. The position of the ram at the bottom of the stroke can be adjusted vertically. Adjustment may be required for squaring, slitting, notching, or to compensate for changed or reground knives.

To adjust the ram:

1. Turn OFF power to the shear and lock out main disconnect switch. Remove the main fuses if disconnect cannot be locked-out. Place the CLUTCH CONTROL selector in the "OFF" position and remove the key. For machines equipped with a mechanical treadle, engage the treadle lock.

2. Remove the point-of-operation guarding, if not previously removed, from end of machine with the greatest distance between knives. Refer to section on REMOVING AND INSTALLING GUARDS.

3. Remove the flywheel guard. Refer to the section on REMOVING AND INSTALLING GUARDS.

4. Pull the clutch pin to engage the clutch. Select either Step "A", "B", "C" or "D", depending upon type of clutch:

A. Air-electric clutch: Use a large screwdriver or pry bar to raise clutch pin to engage clutch. Refer to section on CHANGING OR ROTATING KNIVES, Step 48-B.

B. Solenoid operated clutch: Remove solenoid cover and using large screwdriver or pry bar, pry up on solenoid plunger to engage clutch. Refer to section on CHANGING OR ROTATING KNIVES, Step 48-C.

C. Mechanically operated clutch: Disengage treadle lock, depress foot treadle pipe to engage clutch, and remove foot from foot treadle pipe.

D. High speed clutch (14-18 and 25 series):

Two people are required to manually engage the clutch, disengage the brake and to rotate the flywheel. One person must manually engage both the clutch and brake solenoids, while the other person rotates the flywheel as described in Step 6.

5. Open the holddown bleed valve on right end of holddown beam.

6. Rotate the flywheel by hand in a counterclockwise direction (looking from rear of machine towards flywheel) until ram is at bottom of the stroke.

The ram position for normal shearing is to have the upper knife cross the lower knife by 1/16" at the high end of the knives. This is not a fixed position when ram is at the bottom of the stroke. The ram position must be adjusted after new or reground knives are installed, due to difference in their size compared to previous knives. Other ram positions are required for slitting and notching, and these positions are specified in section on SHEARING OPERATIONS.

To set ram position for 10 Series shears, proceed to Step 7. To set ram position for 14 Series and larger shears, proceed to Step 8.

7. Adjust ram position (10 Series) - Refer to Figure 75:

   Adjustment can be made on the 10 Series by by changing shims under each end of pins on top of the ram. When changing shims, loosen screws at both sides but only completely remove one at a time. Be sure to shim the same amount at all four points. Do not shim more than 5/8" total thickness. Figure 76 shows dimensions of shims. After shims are installed, SECURELY TIGHTEN SCREWS. Complete removal of shims will permit slitting with new knives. Proceed to Step 9.

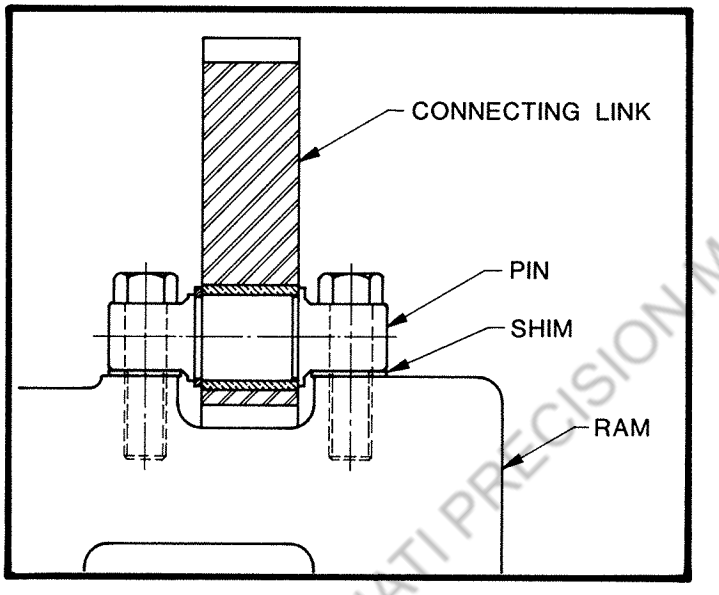


FIGURE 75

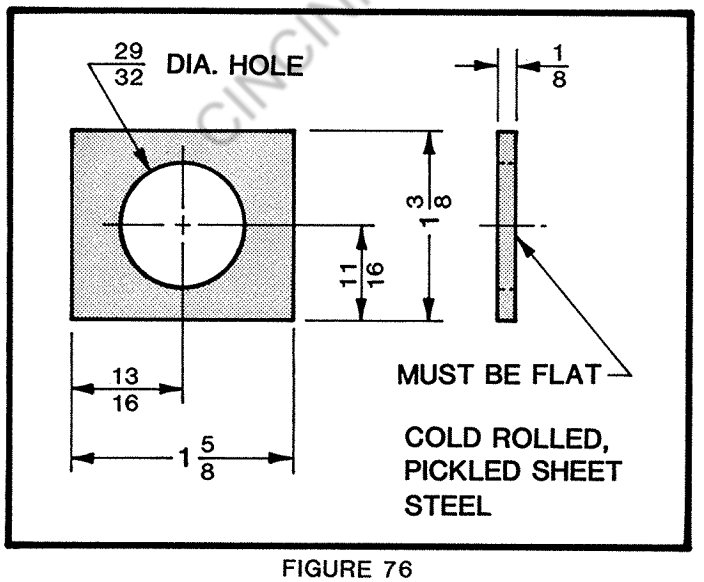


FIGURE 76

IMPORTANT

Minimum thread engagement is 1-1/4". If necessary, use longer screws to obtain minimum thread engagement.

8. Adjust ram position (14 Series and larger). Refer to Figure 77:

   A. Loosen nut "D" at each end of ram enough to move the teeth of clamp block "B" out of mesh with the teeth of eccentric gear. Block "B" is spring loaded. As nut "D" is loosened, block "B" raises, disengaging the teeth.

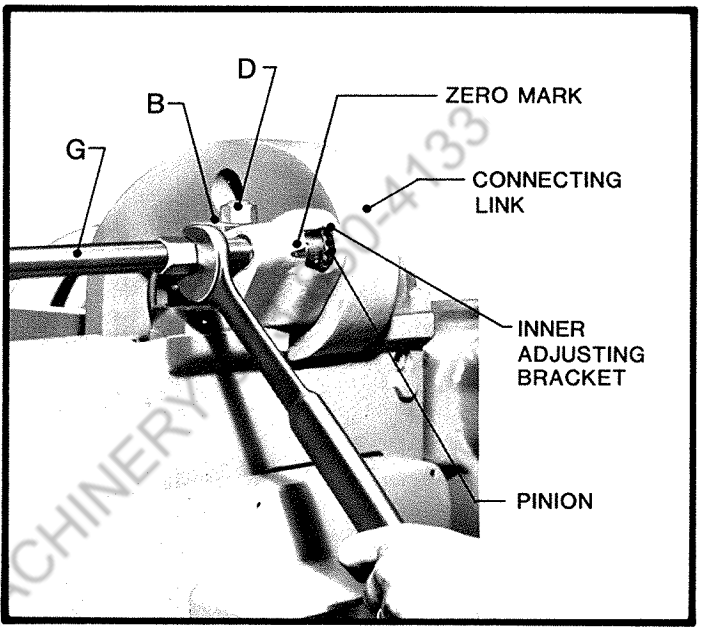


FIGURE 77

   B. Rotate adjusting shaft "G" until the desired knife position is reached, and one of the graduations on pinion is in-line with the zero mark.

      The distance the ram is raised from the bottom of stroke position for each graduation setting is shown in Figure 78.

   C. Tighten nut "D" at left end of ram until resistance is felt. Then rotate adjusting shaft "G" slightly in both directions to centralize the teeth of eccentric gear with those in clamp block "B". Tighten nut "D" securely.

      Just to the outside of nut "D", each clamp block "B" has a through hole in which there is a small indicator pin. Whe clamp block "B" is properly seated, the pin is flush with its top surface.

   D. Repeat the procedure in Step "C" at the right end of the ram. TIGHTEN NUT "D" SECURELY.

IMPORTANT

Do not attempt to run shear without first securely tightening nut "D" at each end of the ram. If the shear is operated with a loose clamp block, the pull of connecting link will rotate the adjusting eccentric to its lowest position. This will either twist shaft "G" or break teeth from the pinions. If either problem occurs it will be necessary to retime the eccentrics. Operating the shear in this condition will bind the ram and cause galling of ram clamps. For instructions to retime the ram adjustment mechanism, contact CINCINNATI INCORPORATED Service Department.

RAM ADJ. SETTING	DISTANCE RAM IS RAISED FROM LOWEST POSITION			
	14-18-25	43	62	100
0	0	0	0	0
1	0	0	0	1/32
2	1/32	1/32	1/32	1/16
3	1/16	1/16	1/16	3/32
4	1/8	3/32	3/32	5/32
5	3/16	5/32	5/32	7/32
6	1/4	3/16	7/32	5/16
7	5/16	1/4	5/16	3/8
8	13/32	5/16	13/32	15/32
9	1/2	13/32	1/2	9/16
10	9/16	1/2	19/32	11/16
11	5/8	9/16	11/16	25/32
12	21/32	5/8	25/32	7/8
13	11/16	11/16	27/32	15/16
14	11/16	23/32	15/16	1-1/32
15		3/4	1"	1-3/32
16		25/32	1-1/16	1-5/32
17		13/16	1-3/32	1-7/32
18		13/16	1-1/16	1-1/4
19			1-5/32	1-1/4
NORMAL SETTING	#6	#7	#6	#6

FIGURE 78

9. Install the point-of-operation guarding. Refer to section on REMOVING AND INSTALLING GUARDS.

10. Install the flywheel guard. Refer to the section on REMOVING AND INSTALLING GUARDS.

11. Unlock the main disconnect switch or replace the main fuses. Turn the disconnect switch "ON".

CAUTION

THE CLUTCH PIN WAS PULLED TO POSITION RAM. THE RAM WILL MOVE WHEN MAIN DRIVE MOTOR IS STARTED. BEFORE STARTING MOTOR, MAKE SURE NO ONE IS NEAR RAM OR RAM BRACE AT REAR OF SHEAR AND THAT ALL TOOLS AND MATERIAL HAVE BEEN REMOVED FROM SHEAR TABLE.

12. Start the main drive motor. The first time the motor is started the clutch will make a loud knocking noise, except on the high speed machines. This will stop after the flywheel reaches full speed and the ram is cycled a few times.

13. Close the holddown bleed valve on right end of holddown beam while ram is cycling.

RAM CLAMP GIB ADJUSTMENT

The machine must be level to obtain proper ram clamp gib clearance. Refer to section on LEVELING. The ram clamp gib running clearance is .002" to .004" for all series shears.

This procedure is for standard rake machines having the high end of knives on left end of machine. For reverse rake machines, reverse the procedure when an operation is to be done at a specified end of the machine. This gib adjustment procedure is for shears with a mechanical jaw clutch and a friction brake on the drive shaft. It is followed by a second procedure for high-speed shears with an air-disc clutch and a brake on the wormshaft.

To adjust ram clamp gib clearance:

1. Stop ram at top of stroke and turn OFF all power to the shear and lock out the main disconnect switch. Remove the main fuses if the disconnect cannot be locked out. Place the CLUTCH CONTROL selector (if furnished) in the "OFF" position and remove the key. For machines equipped with a mechanical treadle, engage the treadle lock.

2. Adjust top left and top right ram clamp gibs only. Refer to Figure 79:

   Loosen locknuts "W" and tighten the three set screws "V" until they are snug. IMPORTANT: DO NOT OVER-TIGHTEN. Back off screw "V" one-quarter turn and tighten locknuts "W" while maintaining position of screw "V". This provides approximately .003" ram gib running clearance. When knife clearance has been set at .003" or less, back-off screw "V" one-eighth turn instead of one-quarter turn. This provides about .0015-.002" ram gib clearance.

   NOTE: To avoid interference with gearbox and/or pump box, a special 1/4" hex key wrench will be required. Reduce length of short leg of key to 1/4" (inside dimension).

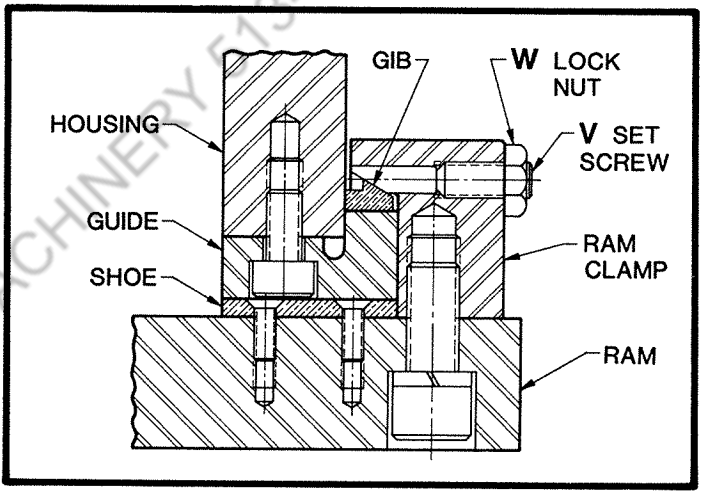


FIGURE 79

3. Remove flywheel/belt guard from the machine. Refer to section on REMOVING AND INSTALLING GUARDS.

4. End guards and gap guards were furnished as standard on shears shipped after 1 October 1974. These guards must be removed. Refer to section on REMOVING AND INSTALLING GUARDS.

5. Open holddown bleed valve located on the right side of holddown beam.

6. Pull the clutch pin to engage the clutch:

   A. Machines equipped with mechanically actuated clutches:

      Disengage the treadle lock pin and step on the foot treadle.

   B. Machines equipped with air-electric operated clutches - refer to Figure 62:

      Raise the clutch pin with a pry bar. Refer to section on CHANGING OR ROTATING KNIVES, Step 48-B.

   C. Machines equipped with solenoid operated clutches:

      Remove the solenoid cover and pry up on the clutch pin. Refer to section on CHANGING OR ROTATING KNIVES, Step 48-C.

7. Rotate the flywheel by hand in a counterclockwise direction (looking from rear of machine towards flywheel) until right ram clamp is even with bottom of the right guide. Adjust this gib as explained in Step 2 above.

CAUTION

KEEP FINGERS AND ALL PARTS OF YOUR BODY FROM BETWEEN VEE BELTS AND VEE GROOVES. SERIOUS INJURY COULD OCCUR FROM PINCHING ACTION OF BELTS AND GROOVES.

8. Rotate the flywheel again until the left ram clamp is even with bottom of the left guide. Adjust this gib as explained in Step 2.

IMPORTANT

Failure to have full length gib bearing to the guide when the gib is being adjusted can result in bending gib over the top of guide. If ram is stroked with gib in this position, the assembly will be damaged.

9. Reinstall the flywheel/belt guard. Refer to section on REMOVING AND INSTALLING GUARDS.

10. Reinstall the gap guards and end guards. Refer to section on REMOVING AND INSTALLING GUARDS.

11. Unlock and remove tag from main disconnect switch or replace fuses.

CAUTION

THE CLUTCH IS ENGAGED - RAM WILL MOVE WHEN DRIVE MOTOR IS STARTED. MAKE SURE EVERYONE IS CLEAR OF RAM AND RAM BRACE. ALL TOOLS AND MATERIAL MUST BE REMOVED FROM SHEAR TABLE.

12. Start main drive motor:

A. SHEARS WITH ELECTRIC AIR CYLINDER CLUTCH CONTROL SHIPPED AFTER 1 OCTOBER 1974:

1. Turn CLUTCH CONTROL selector to "ON".
2. Turn CLUTCH MODE selector to "JOG".
3. Depress footswitch and press JOG button to start main drive motor. Hold both controls depressed until flywheel comes up to full speed (10 to 12 strokes). Release both controls when ram is on downstroke. Ram will stop at top of the stroke.
4. Turn CLUTCH MODE selector to "CONTINUOUS" position. Start main drive motor.
5. After flywheel reaches full speed, depress footswitch to continuously cycle ram. Close holddown bleed valve while ram is cycling at full speed.
6. Release footswitch while ram is on a down stroke. Ram will stop at top of the stroke. Turn CLUTCH CONTROL and CLUTCH MODE selectors to "OFF".

B. SHEARS WITH ELECTRIC AIR CYLINDER CLUTCH CONTROL SHIPPED PRIOR TO 1 OCTOBER 1974, OR WITH ELECTRIC SOLENOID CLUTCH CONTROL:

1. Turn CLUTCH CONTROL selector to "ON".
2. Turn CLUTCH MODE selector to "RUN" or "CONTINUOUS" position.
3. Depress footswitch and start main drive motor. Hold footswitch depressed and allow flywheel to come up to full speed (10 to 12 strokes).
4. Close holddown bleed valve while ram is cycling at full speed.
5. Release footswitch while ram is on a down stroke. Ram will stop at top of the stroke. Turn CLUTCH CONTROL, CLUTCH MODE and main drive motor "OFF".

C. SHEARS WITH MECHANICAL TREADLE:

1. Disengage treadle lock.
2. Depress foot treadle and start main drive motor. Allow flywheel to come up to full speed (10 to 12 strokes).
3. Close holddown bleed valve while ram is cycling at full speed.
4. Release foot treadle while ram is on a down stroke. Ram will stop at top of the stroke. Engage treadle lock and turn "OFF" main drive motor.

HIGH SPEED SHEARS - 14, 18 and 25 Series

The machine must be level to obtain proper ram clamp gib clearances. Refer to section on LEVELING. The gib running clearance is also .002" to .004" for high speed shears. Ram clamp gib clearance is adjusted by peeling laminated shims to reduce their thickness. These shims are located between the ram clamp and the ram. See Figure 80.

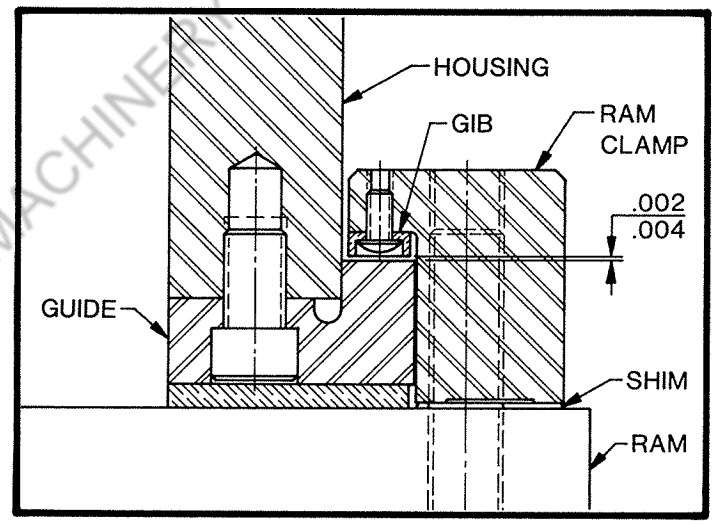


FIGURE 80

To adjust ram clamp gib clearance:

1. Stop ram at top of stroke and turn OFF main drive motor. Turn main disconnect switch "OFF", lock and tag.
2. End guards and gap guards were furnished as standard equipment on shears shipped after 1 October, 1974. These guards must be removed. DO NOT remove the point-of-operation guards. Refer to section on REMOVING AND INSTALLING GUARDS.
3. Using a set of feeler gages, measure the ram clamp gib clearance on the top and bottom of each ram clamp. Measurements are made between face of ram clamp gib and back surface of ram guide. Record these measurements.
4. Clean top of ram and entire ram clamp area with clean rags and mineral spirits. Dry with clean rags. DO NOT USE COMPRESSED AIR, which may drive dirt or grit into bearing surfaces.
5. Loosen all of the ram clamp screws four full turns at one end of machine. These are socket head screws located in the front of the ram.
6. Tap the head of the ram clamp screws, using a brass rod and hammer, to drive the ram clamp away from the ram.

CAUTION

ALWAYS WEAR SAFETY GLASSES WHEN USING THE BRASS ROD AND HAMMER.

It is not necessary to remove the ram clamp dowel pins because the laminated shims are slotted for the dowel pins.

7. Remove the upper two ram clamp screws. Remove the shim from between the ram clamp and the ram.

8. Using the measurements recorded in Step 2, peel the proper number of laminations from the shim to obtain a .002" to .004" ram clamp gib running clearance. Each lamination is .002" thick.

   EXAMPLE: Assume the running clearance measured .007". To obtain desired tolerance of .002" to .004", then .004" (or two laminations) must be removed from the shim. Before removing laminations, measure shim thickness with a micrometer. Using a sharp knife, peel lamination(s) from shim and remeasure thickness with the micrometer until the thickness has been reduced by .004".

CAUTION

THE SHIM IS SHARP SO GLOVES MUST BE WORN TO PROTECT YOUR HANDS.

9. Reinstall shim and replace the two ram clamp screws, but do not tighten the screws.

10. Remove the two lower ram clamp screws and repeat Steps 7 through 9.

11. Tighten all the ram clamp screws. Torque to 417 foot pounds.

12. Recheck the upper and lower ram clamp gib clearances. The clearance must be .002" to .004".

13. Repeat Steps 5 through 12 for other end of machine.

14. Reinstall gap guards and end guards. Refer to section on REMOVING AND INSTALLING GUARDS.

15. Unlock and remove tag from main disconnect switch and turn the switch "ON".

16. Start the main drive motor. Stroke the shear in "CONTINUOUS" mode for twenty to thirty strokes, or about twenty seconds.

17. Feel ram clamp and gib area for any heat. Heat indicates a lack of ram clamp gib running clearance. Repeat this procedure if heat exists.

ADJUSTING BACK GAGE ANGLE PARALLELISM

It may become necessary to adjust the back gage angle parallel to the lower knife. A properly adjusted solid back gage angle should be straight or approximately .002" concave (hollow) in the center. This will help to insure solid contact between the edge of the sheet or plate and the gaging surface of the back gage angle. Consistent gaging cannot be obtained unless the angle is slightly concave (hollow). A hinged angle is straight and cannot be adjusted concave.

The adjustment of the back gage angle is as follows:

CAUTION

EXTREME CARE MUST BE TAKEN WHEN ADJUSTING THE BACK GAGE ANGLE PARALLEL TO THE LOWER KNIFE. HANDS AND/OR FINGERS WILL BE CLOSE TO THE CUTTING EDGE OF THE KNIVES.

1. Check for parallelism:

   A. Position the back gage angle at 1-1/64" or 1.016" depending on the style of back gage counter or dial.

   B. Make a test cut on a full length piece of light gauge material (16 or 18 ga.).

   C. Measure the part with vernier calipers or micrometers. Record these dimensions for later reference if the cut piece is not parallel.

2. Turn OFF all power to the shear and lock-out the main disconnect switch. Remove the main fuses if the disconnect cannot be locked out. Place the CLUTCH CONTROL selector in the "OFF" position and remove the key. For machines equipped with a mechanical treadle, engage the treadle lock.

3. Remove the point-of-operation guarding. Refer to section on REMOVING AND INSTALLING GUARDS.

4. Check the back gage angle for parallelism to the lower knife at each end. Place a one inch gage block between the back gage angle and the lower knife, flush with the top of the knife. Use a feeler gage with this gage block to determine the back gage position.

   NOTE: We recommend using a gage block (Figure 81) with at least a 6" handle to keep hands and fingers as far from the cutting edge of the knife as possible.

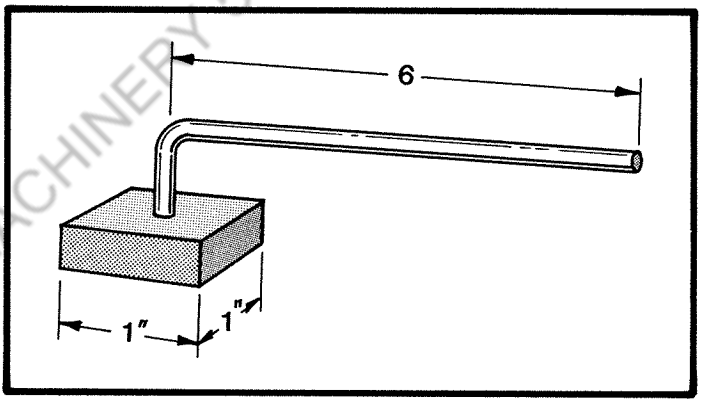


FIGURE 81

5. If the gage is not parallel within .002", adjustments must be made.

SELECT ONE OF THE FOLLOWING STEPS NO. 6, DEPENDING UPON THE TYPE OF BACK GAGE, TO PARALLEL THE BACK GAGE ANGLE WITH THE LOWER KNIFE.

6. Parallel the back gage angle to the lower knife - Shears with back gage connecting shaft at rear of back gage guides:

   STANDARD BACK GAGE ANGLE - FIGURE 82

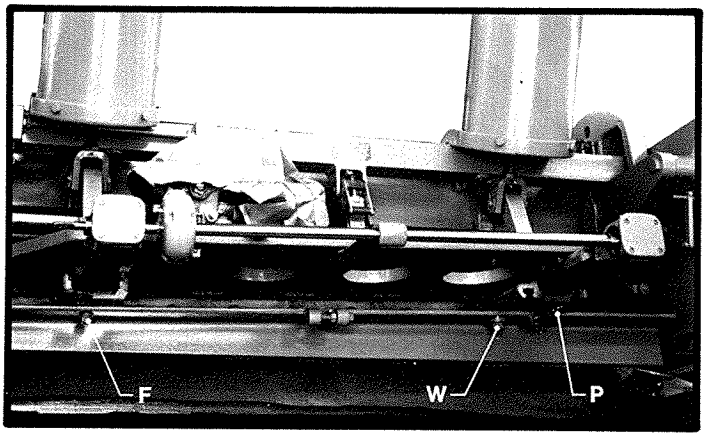


FIGURE 82

A. The left end of the gage is the only side that can be adjusted. Loosen the tee bolt "W". Then by moving the adjusting nuts at "P", move the left end in or out to equal the right end dimension, as measured in Step No. 4. DO NOT loosen pivot nut "F".

B. After adjustment is complete tighten all bolts and recheck parallelism.

PROCEED TO STEP NO. 7

HINGED BACK GAGE ANGLE - FIGURE 83

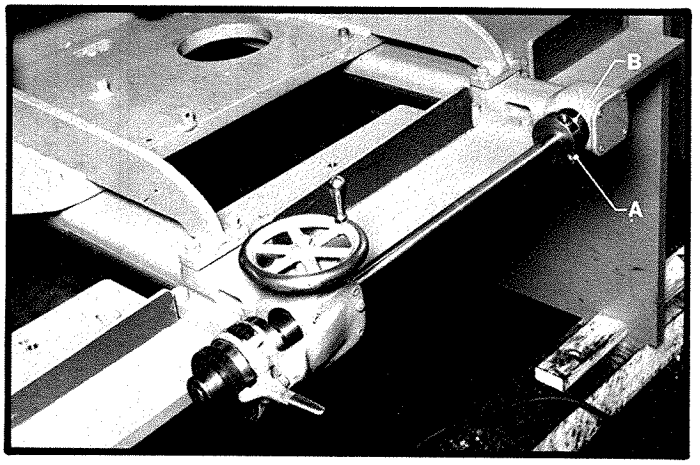


FIGURE 83

A. There is an adjustable coupling on the connecting shaft used to move one screw independently of the other. Loosen locknut "A" and turn screw "B" to position the left end equal to the right end.

B. After adjustment is complete tighten locknut "A" and recheck parallelism.

PROCEED TO STEP NO. 7.

6. Parallel the back gage to the lower knife - Shears with back gage connecting shaft at front of back gage guide. See Figure 84.

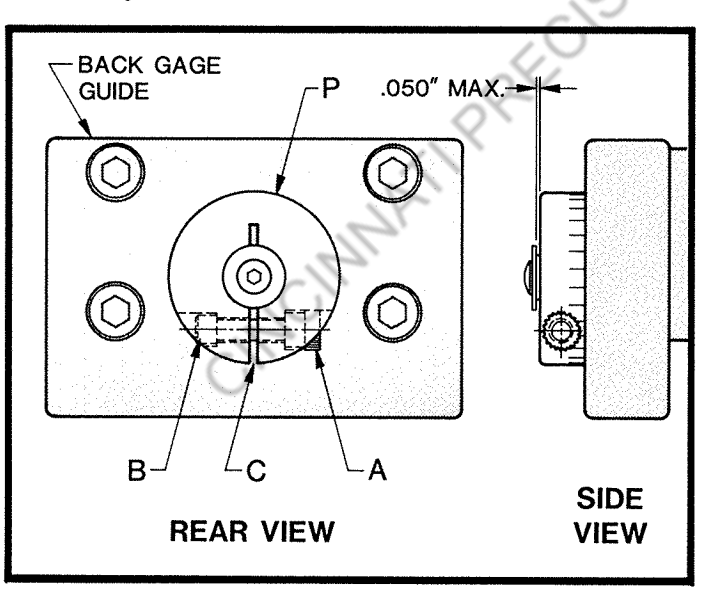


FIGURE 84

FINE ADJUSTMENT:

A. Loosen locknut "A" and socket head cap screw "B". Adjustment can be made at either or both guides, depending upon the amount of movement required.

B. Adjust nut "P" until the back gage is parallel to the lower knife.

1. Each graduation on adjusting nut "P" moves the back gage angle .001" at the centerline of the guide.

2. Clockwise rotation moves the angle away from the knife and counterclockwise rotation moves the angle closer to the knife.

3. There is a .050" maximum travel on the adjusting nut "P". It should not be screwed-in to the point where it bottoms out, nor should it be screwed-out to the point where there is no spring tension on the nut.

C. After adjusting nut "P" has been set, first tighten socket head cap screw "B". Then tighten the locknut "A".

D. There must be clearance at slot "C" after screw "B" and locknut "A" are tight.

IF BACK GAGE IS PROPERLY SET, PROCEED TO STEP NO. 7. IF BACK GAGE CANNOT BE ADJUSTED, GO TO "COARSE ADJUSTMENT".

COARSE ADJUSTMENT:

If there is not enough adjustment on the nuts to parallel the back gage angle, it will be necessary to adjust the connecting shaft:

A. Unlock main disconnect switch and turn it ON.

B. Run the back gage to mid-range position.

C. Turn OFF the main disconnect switch and lock.

D. Position adjusting nuts "P" in both guides to the center of their .050" travel.

E. Using a tape measure, check between the lower knife and the back gage angle to determine which side is farther from knife.

F. There are two couplings "Y", Figure 85, that connect the two back gage guides by means of connecting shaft "F". It will be necessary to loosen the coupling "Y" from the guide of the farthest side, as found in Step "E". This will allow the guide screws to be rotated independently from each other.

G. Remove the lock screw "L" and socket set screw "N". Wormshaft "J" can now be rotated.

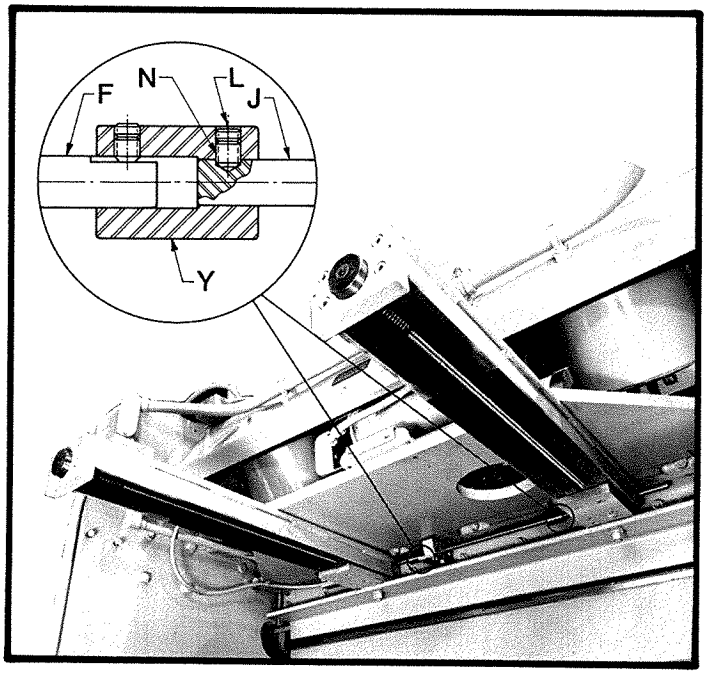


FIGURE 85

H. Turn wormshaft "J" clockwise, looking at shaft from left end of shear, to make back gage angle move closer to lower knife. One rotation of wormshaft "J" will move the angle about 1/8".

I. Again measure to see if the left and right ends of the angle are within 1/32" of each other. Continue to rotate wormshaft "J" until this dimension is reached.

J. Before installing socket set screw "N", make sure its hole lines-up with relief drilled in wormshaft "J". This is necessary to prevent coupling "Y" from slipping.

K. Install socket set screw "N" and then lock screw "L".

L. Coarse Adjustment is now complete. To make the Fine Adjustment, unlock the main disconnect switch and turn to "ON".

M. Run back gage in to 1-1/64" (or 1.016") dimension.

N. Turn "OFF" main disconnect switch and lock.

O. Repeat Step No. 4 to check parallelism and Step No. 6 to fine adjust back gage angle.

7. The hollow in the center of solid angles may now be checked with a gage block. Use the special gage block described in Step No. 4. Place the gage block flush with top of lower knife and against the back gage angle. Measure the distance between the gage block and lower knife with a feeler gage.

8. The back gage angle is set straight or hollow by adjusting bolt(s) "X", Figure 86:

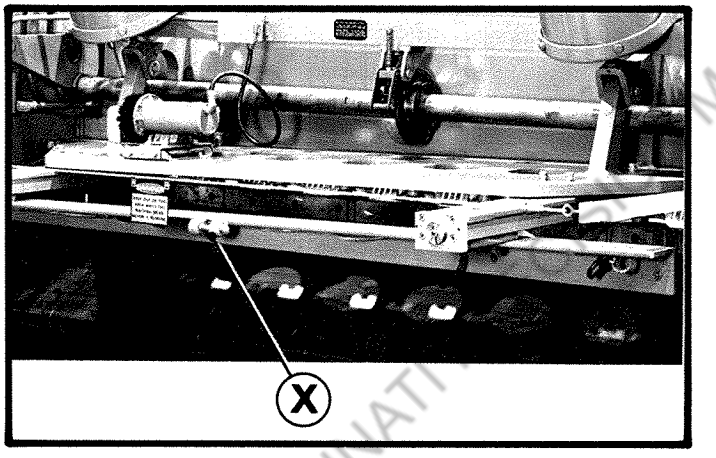


FIGURE 86

A. To make the solid back gage angle hollow, loosen outside nut and tighten inside nut. After correct setting has been made, tighten the outside nuts. Recheck parallelism and hollow settings.

B. Hinged back gage angles have no adjustment for hollow. If this angle is not straight or is concave more than .002/.004", it is necessary to remove the angle and have it machined. Contact CINCINNATI INCORPORATED Service Department.

9. Reinstall point-of-operation guarding. Refer to section on REMOVING AND INSTALLING GUARDS.

10. Unlock main disconnect switch and turn it to "ON".

11. Start the main drive motor and run back gage towards rear of the shear. Then move it forward to 1.000".

12. Unlock CLUTCH CONTROL selector and turn "ON", or unlock foot treadle. Make a trim cut on a full length piece of light gauge material (16 or 18 ga.).

13. Position cut edge of sheet against back gage angle and make a cut. This piece will be used for measurement.

14. Measure the piece with vernier calipers or micrometer at each end.

15. If the cut piece does not measure within .005" end-to-end, the back gage is not parallel to the lower knife. Repeat the adjustment procedure beginning at Step No. 2.

16. After the back gage angle has been adjusted, it may be necessary to reset the dial or counter. Refer to section ADJUSTING BACK GAGE DIALS AND COUNTERS.

ADJUSTING BACK GAGE DIALS OR COUNTERS

After changing, regrinding knives or adjusting back gage angle, the dials or counters may not correspond exactly to the size of the cut piece, due to different dimensions.

IMPORTANT

Friction brake must be properly adjusted for accurate shearing. Refer to section on FRICTION BRAKE ADJUSTMENT.

The proper procedure for adjusting the dials or counters is as follows:

1. Set the back gage at a one inch dimension.

2. Start with a sheared edge by taking a one inch trim cut from a piece of light gauge material (16 or 18 ga.).

3. Position the material against the back gage angle and cut another piece. This piece will be used for measurement.

4. Measure the test piece with a vernier caliper or micrometers.

5. Refer to Figures 87, 88 or 89 for location of set screw "R" for adjustment.

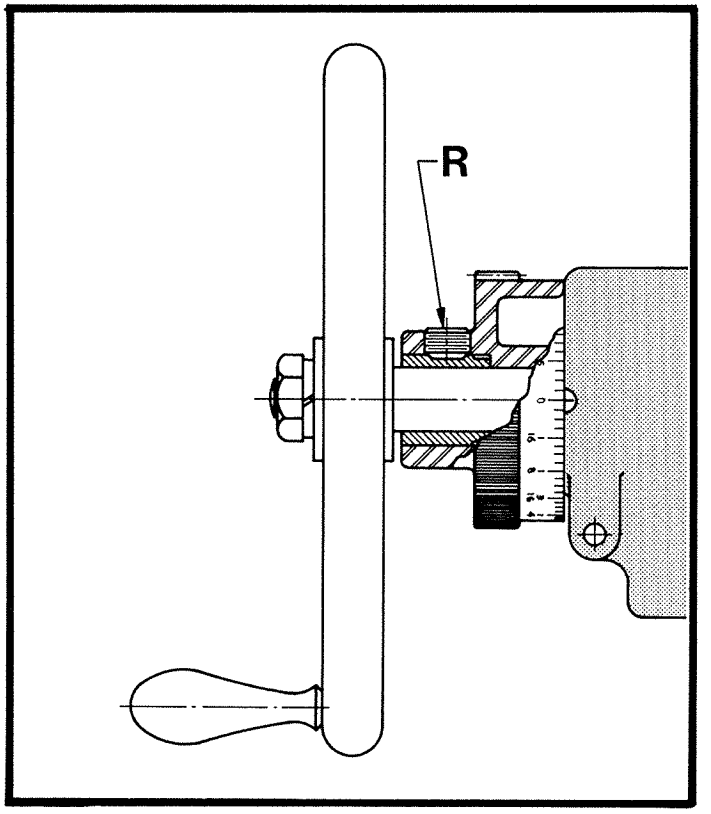


FIGURE 87

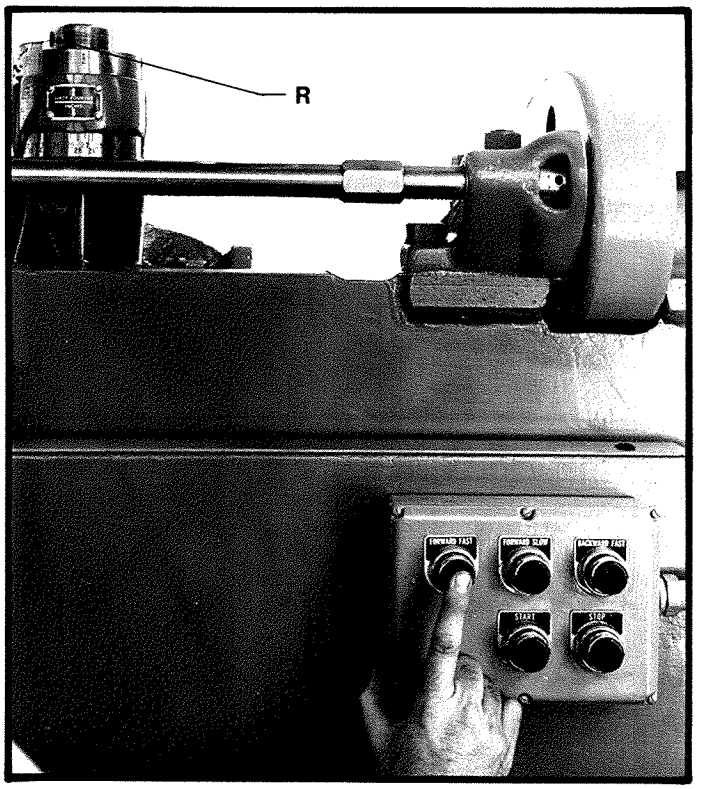


FIGURE 88

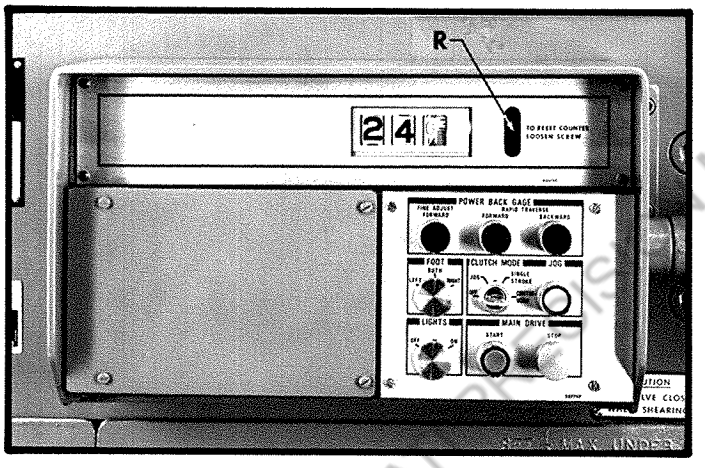


FIGURE 89

6. On both types back gage dials, loosen the set screw "R" and rotate the dial to exact dimension of test piece. On the E-4 or E-5 back gage counter, loosen set screw "R" through slot in legend plate. Turn the couplings using the hex socket key, to set the counter to the exact dimension. Tighten set screw "R".

7. Repeat procedure until test piece measures the dial or counter setting.

SQUARING ARM ADJUSTMENT

A properly adjusted squaring arm must be level in relation to the shear table and perpendicular to lower knife over the length of squaring arm. If the squaring arm will not allow blanks to be sheared within 1/32" across the diagonals, the squaring arm must be adjusted.

If the gaging surface on side of the squaring arm bar is not flat, the bar must be replaced or remachined.

To adjust squaring arm:

1. Check the level of squaring arm left-to-right and front-to-back as shown in Figure 90. Adjust level as required.

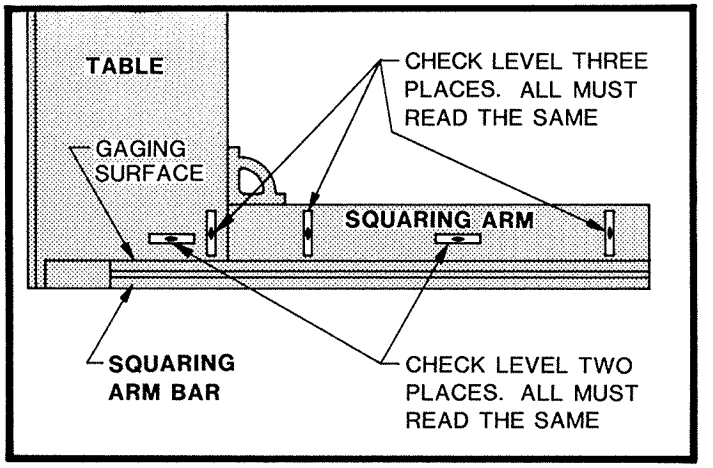


FIGURE 90

2. Trim a full length sheet, preferably as long as the squaring arm or the maximum length of the shear, of 16 gauge material. Adjust level as required.

3. Place sheared edge of the material against gaging surface of squaring arm bar.

4. Check for alignment of bar to the sheared edge:

   A. Sheet lays on table and against squaring arm bar as shown on Figure 91.

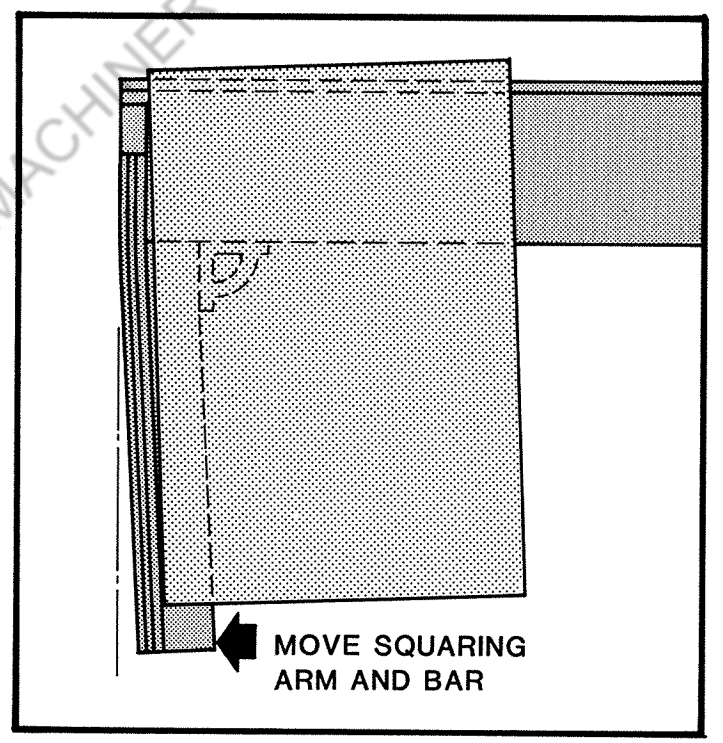


FIGURE 91

1. Loosen or remove anchor bolts for squaring arm leg. Loosen bolts which fasten the squaring arm gusset to table and squaring arm. Loosen nuts which fasten squaring arm to the table. Move the squaring arm to left as shown in Figure 91 until sheared edge is tight against squaring arm bar full length.

   Remove full length sheet. If possible install and tighten the anchor bolts. Do not install new anchors for the bolts at this time.

2. Level squaring arm as described in Step 1.

3. Shear both edges of another piece of material to obtain a 36" width. Place one sheared edge against squaring arm bar and make a trim cut. Turn the sheet over, keeping the same edge against the squaring arm bar and shear other end to obtain a piece about 40" long.

4. Measure distances L1 and L2 (Figure 92) with a tape measure. If they are not the same length, loosen front socket head screw "A" (Figure 96) and either set screw "B" or "C". If L1 is longer, loosen set screw "C" and tighten screw "B" to move squaring arm bar towards sheet. If L2 is longer, loosen screw "B" and tighten screw "C" to move bar away from sheet. Tighten screw "A" and either screw "B" or "C".

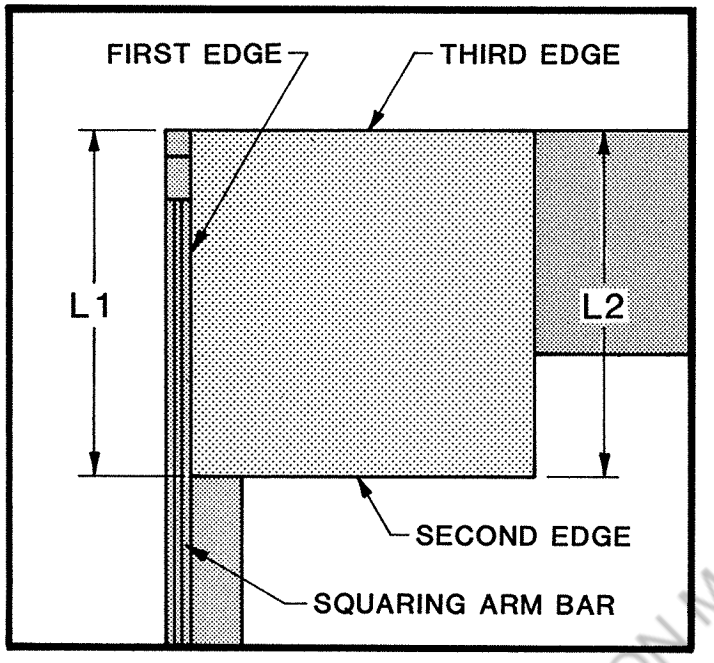


FIGURE 92

5. Keep the same sheared edge against squaring arm bar and trim both ends as in Step No. 3. Remeasure distances L1 and L2. If necessary, repeat adjustments in Step No. 4 until L1 and L2 are the same length within 3/64" on a 36" x 36" blank. (This is the same as having diagonals the same length within 1/32").

6. Place full length sheet, removed in Step No. 1, with sheared edge against the squaring arm bar. If necessary, move outer end of squaring arm to obtain full length contact on the squaring arm bar.

   The squaring arm anchor bolts must be loosened or removed to move end of squaring arm. After full length contact is obtained, install anchor bolts. If necessary, install new anchors and then install bolts. Securely tighten anchor bolts.

   If necessary, place shims between squaring arm gusset and table or squaring arm. See Figure 93. Securely tighten bolts for the gusset. If necessary, shim between squaring arm and the table and securely tighten nuts. Check contact between sheared edge of full length sheet and the squaring arm bar. Repeat this step is required.

B. Sheet lays on table and against the squaring arm bar as shown in Figure 94.

   Use the procedure outlined under "A", except that the initial movement of the squaring arm is to the right as shown in Figure 94.

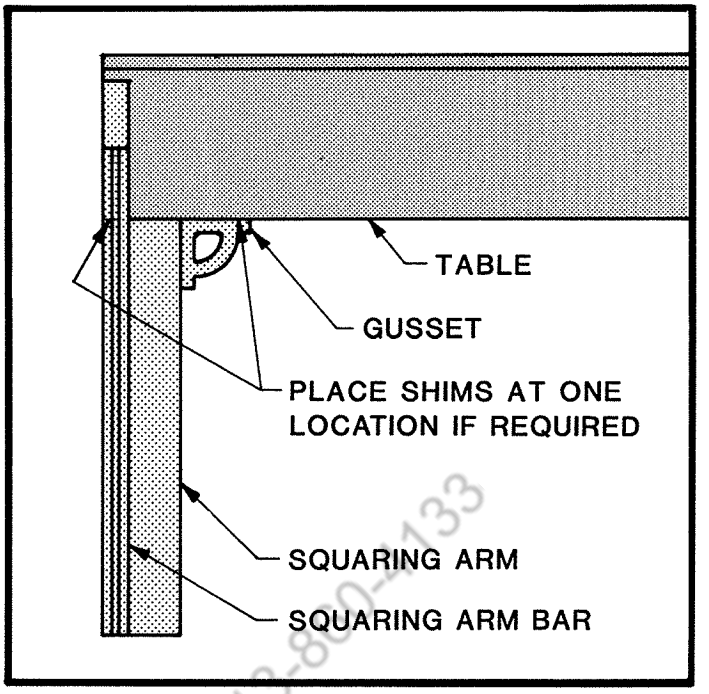


FIGURE 93

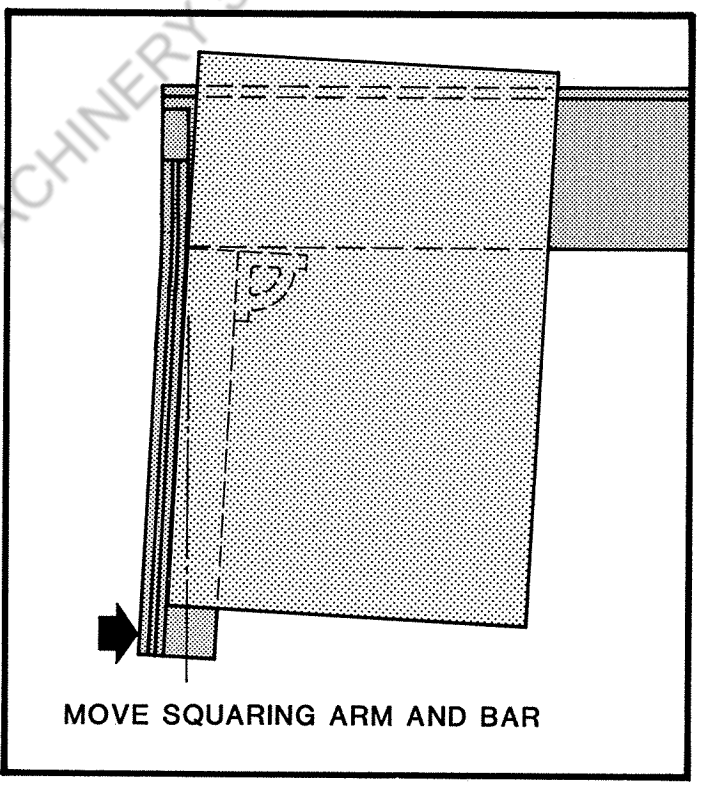


FIGURE 94

C. Sheet lays on table and against the squaring arm bar as shown in Figure 95.

   1. Move end of squaring arm bar on table to left or right as shown in Figure 95. To adjust, loosen front socket head screw "A" (Figure 96) and either socket set screw "B" or "C" in side of squaring arm bar. Then use opposite set screw "B" or "C" to move squaring arm bar flush with sheared edge of sheet. Tighten screw "A" and the loosened screw "B" or "C". Remove the full length sheet.

   2. Make the final adjustment of the squaring arm by using the procedure outlined in Steps A-3 through A-6.

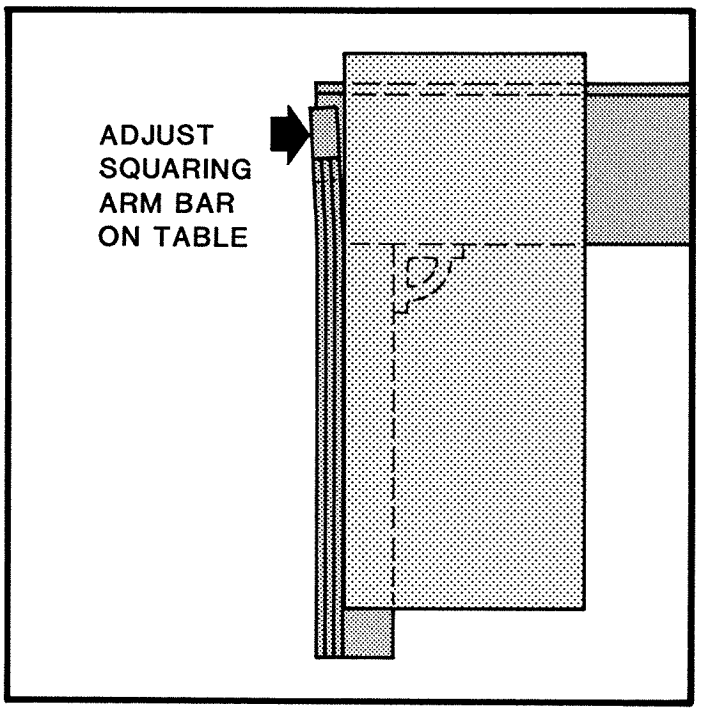


FIGURE 95

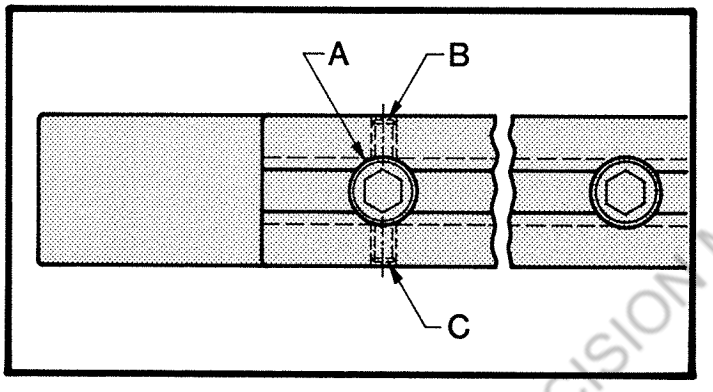


FIGURE 96

HOLDDOWN SYSTEM

The hydraulic holddown system consists of the holddown pump box mounted on the left housing and a series of independent cylinders mounted along the holddown beam with plungers that clamp the work to the shear table. The holddown pump box, Figure 97, is made up of the box, the top cover, and the cylinder head assembly as shown. The cylinder head assembly contains a cylinder in which there is a piston fitted with a roller. The main drive shaft extends into the holddown pump box and carries a cam on its end against which this roller rides. Behind the cylinder is the ball check valve and then the accumulator pin.

The system operates as follows: When the shear is idle with the ram at the top of its stroke, the piston roller rests against the small diameter of the cam. As the ram strokes, the cam turns with the drive shaft and pushes the piston down. The oil displaced by the piston goes through the bent pipe to individual holddown units, pushing the plungers down. The piston always displaces a little more oil than is necessary to push the plungers down. After the plungers are down on either workpiece or the shear table, they can go no further and pressure is built up. When the proper pressure is reached, the accumulator pin under the large spring raises up and the excess oil is expelled through relief ports. Since the accumulator pin raises up 1" before reaching the first port, it acts as an accumulator to make up for the slight leakage of oil past the piston thus maintaining pressure through the shearing stroke. The pressure can be easily changed by adjusting the two nuts over the pressure plate on top of the spring. See chart in Figure 99 for the recommended pressure. As the ram passes the bottom of its stroke the cam starts to reduce to a smaller diameter. The spring under the piston pushes the piston up against this smaller diameter, drawing oil back from the holddown units. Oil is also drawn in through the ball check valve to make up for the oil expelled through the accumulator. The cam then turns on around to where its small diameter is against the roller as the ram stops at the top of its stroke.

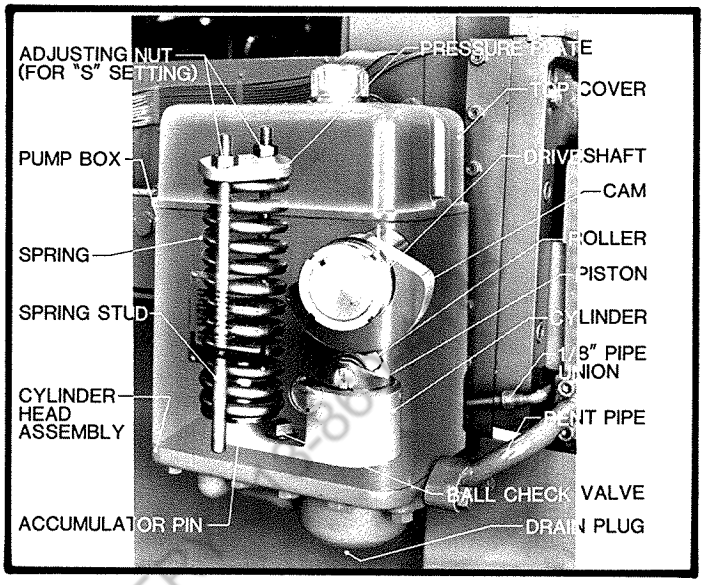


FIGURE 97

The accumulator pin seats with a "thump" after the down stroke. This thump is normal at the bottom of the stroke and does not indicate a malfunction of the machine.

OIL SPECIFICATIONS

Refer to the LUBRICATION section for the proper type and quantity of oil for the holddown system.

CHANGING OIL

Change oil in the holddown system annually, or when the oil becomes discolored prior to the scheduled annual oil change. To change the oil in the holddown system, use following procedure:

1. Turn OFF all power to the shear and lock out the main disconnect switch. Remove main fuses if the disconnect cannot be locked out. Place the CLUTCH CONTROL selector in the "OFF" position and remove the key. For machines equipped with a mechanical treadle, engage the treadle lock.

2. Remove pipe plug from bottom of domed section of the cylinder head. Drain oil into a five gallon container and discard oil.

3. Refer to Figure 98 to determine the type of holddown units, bracket or flanged, on the shear. Remove the pipe plug from either the holddown bleed valve or bottom of the holddown beam, depending upon type of holddown unit. Use a pint container to collect oil that drains from the hole.

NOTE: To gain access to pipe plug under holddown beam, the point-of-operation guard at that location must be removed. See the section on REMOVING AND INSTALLING GUARDS.

4. Using compressed air in pipe plug hole in Step 3, blow oil back through the holddown system and out through hole in cylinder head.

5. Replace all pipe plugs. Wrap threads with teflon tape. The first two threads should be free of tape. Open holddown bleed valve.

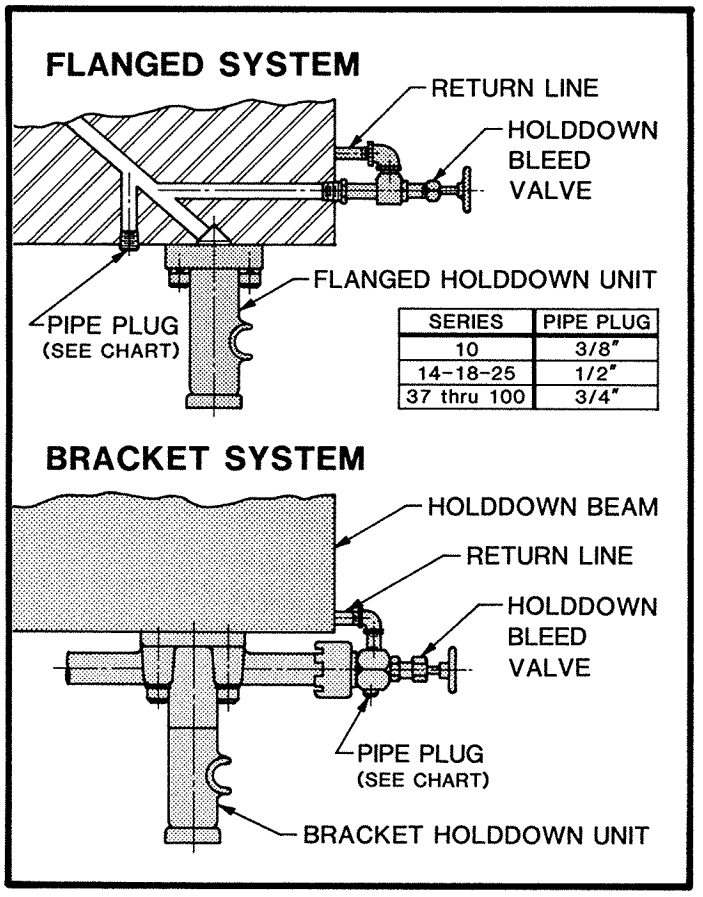


FIGURE 98

6. Remove top cover from pump box and inspect inside of pump box for contamination. If contamination is found in bottom of pump box, proceed to section on FLUSHING AND CLEANING HOLDDOWN SYSTEM.

7. Inspect cam and roller surfaces for wear or damage. If these parts appear worn, contact CINCINNATI INCORPORATED Service Department.

8. To minimize trapped air in the holddown system the accmumulator pin must be removed from the cylinder head, allowing oil to fill the cavity below the piston.

   Remove the accumulator pin - refer to Figure 99: Remove two adjusting nuts "T" from spring studs. Then lift pressure plate "P" and spring from the accumulator pin "M". Lift accumulator pin "M" out of seat.

9. Fill the pump box until the oil level is even with center of the roller.

10. Reinstall accumulator pin "M", spring, pressure plate "P" and adjusting nuts "T" to the spring studs.

11. At each stroke of the shear, the holddown system oil pressure is built up to a point determined by the spring pressure on accumulator pin "M". Adjust the pressure ("S" setting) by turning nut "T" to obtain the "S" dimension, selected from the chart in Figure 99 for the appropriate size shear.

12. Inspect gasket on bottom of the top cover. Replace gasket if damaged.

13. Install top cover to pump box.

14. Unlock main disconnect switch or replace fuses and turn disconnect to "ON". Insert key and turn CLUTCH CONTROL selector to "ON".

15. Start the machine and cycle the ram a dozen times. Close the holddown bleed valve as the ram cycles. At this time the "thump" after the bottom of the stroke, mentioned earlier, should be heard. If the "thump" is heard, proceed to Step 17. If no "thump" occurs, then air is trapped in the holddown system. Proceed to Step 16.

16. To remove trapped air, open the holddown bleed valve and cycle the ram fourty times. Then close the holddown bleed valve as the ram cycles.

17. Check the holddown oil level with the ram stopped at top of the stroke. Add oil if necessary.

18. Cycle ram and listen for "thump" in pump box. If the thump can be heard, this CHANGING OIL procedure is complete. Proceed to PRESSURE CHECK HOLDDOWN SYSTEM.

    However, if the "thump" cannot be heard, turn OFF all power to the shear and lock out the main disconnect switch. Remove the main fuses if the disconnect cannot be locked out. Turn CLUTCH CONTROL selector to "OFF" and remove key. Then repeat Steps 8 through 15.

FLUSHING & CLEANING HOLDDOWN SYSTEM

When contamination is found in bottom of pump box during the CHANGING OIL procedure, the holddown system must be flushed and cleaned. Proceed as follows:

1. Remove the accumulator pin - refer to Figure 99: Remove two adjusting nuts "T" from spring studs. Then lift pressure plate "P" and spring from accumulator pin "M". Lift accumulator pin "M" out of seat.

2. Wipe inside of pump box with kerosene soaked rags. Pour several quarts of kerosene around inside of pump box to flush.

3. Replace all pipe plugs.

4. Fill pump box with a mixture of half kerosene and half oil. The level should be even with center of roller.

5. Reinstall accumulator pin "M", spring, pressure plate "P" and adjusting nuts "T" to the spring studs. Adjusting nuts "T" should be flush with top of spring studs.

6. Install top cover on pump box.

7. Unlock main disconnect switch or replace fuses and turn disconnect to "ON". Insert key and turn CLUTCH CONTROL selector to "ON".

8. Start machine and cycle ram continuously for twenty to thirty minutes. Open and close holddown bleed valve once a minute while ram is cycling.

CAUTION

IF POINT-OF-OPERATION GUARD WAS REMOVED TO ACCESS PLUG UNDER HOLDDOWN BEAM, USE CARE SO THAT NO PART OF YOUR BODY IS IN POINT-OF-OPERATION WHEN OPENING AND CLOSING HOLDDOWN BLEED VALVE.

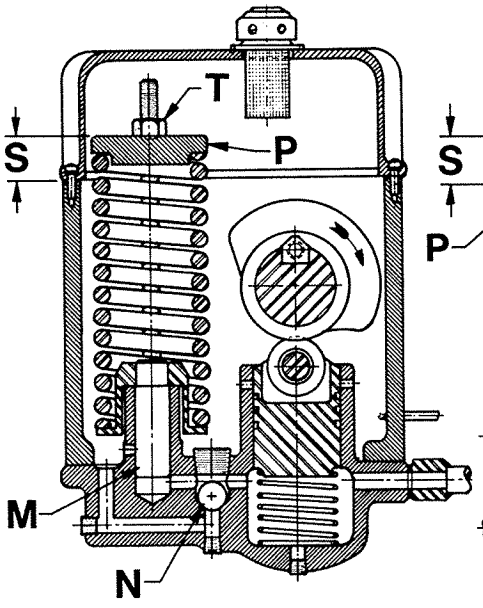
9. Stop machine and turn OFF all power. Lock out main disconnect switch. Remove main fuses if disconnect cannot be locked out. Place CLUTCH CONTROL selector in the "OFF" position and remove key. For machines equipped with mechanical treadle, engage the treadle lock.

10. Remove pipe plug from bottom of domed section of cylinder head. Drain oil/kerosene mixture into five gallon container and discard.

11. Remove pipe plug from either holddown bleed valve or bottom of holddown beam (as previously determined) and drain oil/kerosene mixture into a pint container.

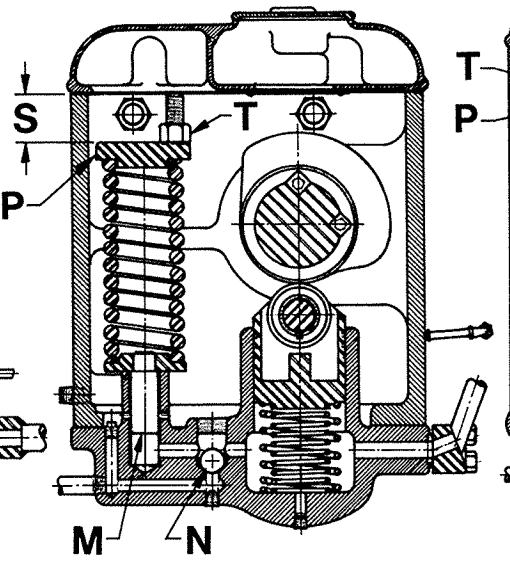
12. Using compressed air in pipe plug hole in Step 11, blow oil back through holddown system and out through hole in cylinder head.

10 THRU 25 SERIES

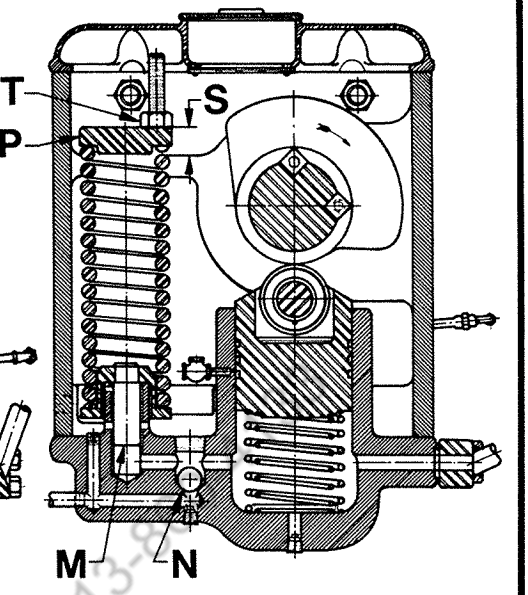


SERIES SHEAR	"S" DIMENSION (INCHES)	OIL PRESSURE (LBS./SQ. IN.)
10	2-1/16	600
14	1-5/8	700
1804 & 1806	3-1/8	900
1804R to 1812	1-3/16	800
1813 & 1814	1-5/8	700
2504 & 2506	2-13/32	1200
2504R to 2512	2-21/32	1100
2513 & 2514	1-3/16	800
2515 to 2518	1-5/8	700

43 SERIES



62 AND 100 SERIES



SERIES SHEAR	"S" DIMENSION (INCHES)	OIL PRESSURE (LBS./SQ. IN.)
4304 to 4312	3-1/16	1200
4313 to 4316	2-19/32	1000
4318	2-1/8	800
4320	1-7/8	700
6204 to 6214	2-1/2	1500
6216	3-1/4	1200
6218 & 6220	3-1/2	1100
10004 to 10014	2"	1700
10016 & larger	Contact C.I. Service Dept.	

FIGURE 99

13. Remove top cover from pump box. Remove two adjusting nuts "T" from spring studs. Then lift pressure plate "P" and spring from accumulator pin "M". Lift accumulator pin "M" out of seat.

14. Replace all pipe plugs.

15. Fill pump box with oil until level is even with center of roller.

16. Reinstall accumulator pin "M", spring, pressure plate "P" and adjusting nuts "T". Adjusting nuts "T" should be flush with top of spring studs.

17. Install top cover on pump box.

18. Unlock main disconnect switch or replace fuses and turn disconnect "ON". Insert key and turn CLUTCH CONTROL selector to "ON".

19. To flush system again, repeat Steps 8 through 13.

20. Replace all pipe plugs. Wrap pipe threads with teflon tape. The first two threads should be free of tape to prevent tape particles getting into the system.

21. Fill pump box with oil until level is even with center of roller.

22. Reinstall accumulator pin "M", spring, pressure plate "P" and adjusting nuts "T". Adjust nuts "T" to obtain "S" setting pressure, selected from chart in Figure 99 for the appropriate size shear.

23. Inspect gasket on bottom of the top cover. Replace gasket if damaged.

24. Install top cover to pump box.

25. Unlock main disconnect switch or replace fuses and turn disconnect "ON". Insert key and turn CLUTCH CONTROL selector to "ON".

26. Start the machine and cycle the ram a dozen times. Close the holddown bleed valve as the ram cycles. At this time the "thump" after the bottom of the stroke, mentioned earlier, should be heard. If a "thump" in the pump box is heard, proceed to Step 28. If no "thump" occurs, then air is trapped in the holddown system. Proceed to Step 27.

27. To remove trapped air, open the holddown bleed valve and cycle the ram forty times. Then close the holddown bleed valve as the ram cycles.

28. Check the holddown oil level with the ram stopped at the top of the stroke. Add oil if necessary.

29. Cycle ram and listen for "thump" in pump box. If a "thump" can be heard, the CHANGING OIL and FLUSHING AND CLEANING HOLDDOWN SYSTEM procedures are complete. Proceed to PRESSURE CHECK HOLDDOWN SYSTEM.

    However, if the "thump" cannot be heard, turn OFF all power to the shear and lock out main disconnect switch. Turn CLUTCH CONTROL selector to "OFF" and remove key. Then repeat Steps 13, 15 and 22 through 29.

PRESSURE CHECK HOLDDOWN SYSTEM

Insufficient pressure in the holddown system can cause material to tip-up or move under the holddown units as it is being sheared. Material movement will cause inaccurately sheared pieces and possibly damage the shear if material is pulled between the knives.

Pressure check must be made after holddown system oil change, anytime the material moves, after knives are changed or rotated, or every six months.

To check the hydraulic holddown pressure use a vertical reading, snubbered type pressure gage. We recommend a Schrader #630-9020 pressure gage or its equivalent. Due to the different size pipe plugs in the holddown beam or holddown bleed valve (See Figure 98), reducer bushings will be required to adapt the pressure gage.

To check the hydraulic holddown system pressure:

1. Turn OFF all power to shear and lock out main disconnect switch. Remove the main fuses if disconnect cannot be locked out. Place CLUTCH CONTROL selector in the "OFF" position and remove key. For machines with mechanical treadle, engage the treadle lock.

2. Remove necessary point-of-operation guards if required to access pipe plug under holddown beam. Refer to section on REMOVING AND INSTALLING GUARDS. If you have just completed the OIL CHANGE procedure, these guards are already removed.

3. Open holddown bleed valve. Remove pipe plug from either the holddown bleed valve or under the holddown beam. Install pressure gage with pipe reducer into pipe tapped hole.

4. Close the holddown bleed valve.

5. To engage the clutch select either step "A", "B", "C" or "D", depending upon type of clutch:

   A. Air-electric clutch: Use a large screwdriver or pry bar to raise clutch pin to engage clutch. If machine is equipped with a "JOG" button, this step is not necessary.

   B. Solenoid operated clutch: Remove solenoid cover and using large screwdriver or pry bar, pry up on solenoid plunger to engage clutch.

   C. Mechanically operated clutch: Disengage treadle lock, depress foot treadle to engage clutch, and remove foot from foot treadle.

   D. High Speed Shear: See Step 7-C.

6. Unlock disconnect switch or replace fuses and turn disconnect "ON". DO NOT START SHEAR.

7. Position the ram on the front half of its stroke. This position will occur when the knives are crossed halfway across the length of the shear when the ram is moving down.

   A. Machines equipped with JOG button: Turn CLUTCH MODE selector to "JOG" position. Depress footswitch and tap JOG button to engage clutch. By rapidly pressing and releasing JOG button, the ram can be slowly moved to the front half position.

   B. For all other standard clutch machines: Since the clutch pin has been pulled to engage the clutch, intermittently tapping the MAIN DRIVE "START" and "STOP" buttons will slowly move the ram until it reaches the front half position.

   C. High speed clutch machines: Turn the CLUTCH MODE selector to "CONTINUOUS" position. Start the main drive motor, cycle ram, and press "STOP" button. Then manually depress air valve so that brake will release and clutch will be engaged. Since power to motor is turned off, the flywheel will coast, gradually slowing down. When the flywheel is moving slowly and the ram nears the front half, release both air valves. This will disengage the clutch and engage the brake, stopping the ram. If ram does not stop in proper position, repeat procedure.

CAUTION

IF POINT-OF-OPERATION GUARD WAS REMOVED TO ACCESS PLUG UNDER HOLDDOWN BEAM, USE CARE SO THAT NO PART OF YOUR BODY IS IN THE POINT-OF-OPERATION WHEN RAM IS POSITIONED.

8. After ram is stopped at front half position, observe pressure reading on the pressure gage. Continue to observe the gage for a full thirty seconds. A slight pressure drop is normal and a thirty percent drop in thirty seconds is acceptable. If the pressure drop exceeds thirty percent, refer to sections on CHECKING HOLDDOWN BLEED VALVE and CHECKING CYLINDER HEAD.

9. Refer to chart on Figure 99 for the recommended pressure of the shear being tested. If the pressure reading taken in Step 8 does not agree with recommended pressure, make the "S" setting adjustment to correct the holddown system pressure. Note that the "S" setting dimensions are approximate and may have to be varied slightly to achieve the desired pressure.

10. If "S" setting adjustment was made to correct pressure, recheck pressure as previously described.

11. If correct holddown system pressure is achieved, turn OFF all power to shear and lock out main disconnect switch. Remove main fuses if disconnect cannot be locked out. Place CLUTCH CONTROL selector in the "OFF" position and remove key. For machines equipped with a mechanical treadle, engage the treadle lock.

12. Open the holddown bleed valve. Remove pressure gage and pipe reducer. Install pipe plug with teflon tape wrapped around threads. First two threads should be free of tape to prevent tape particles getting into the system.

13. Replace point-of-operation guarding, if removed. Refer to section on REMOVING AND INSTALLING GUARDS.

14. Replace solenoid cover on machines with solenoid operated clutches.

15. The clutch was engaged when the clutch pin was pulled to position the ram on the front half of shear stroke. this means that the ram will move when the drive motor is started.

CAUTION

BEFORE STARTING MAIN DRIVE MOTOR MAKE SURE THAT NO ONE IS NEAR RAM OR RAM BRACE AT REAR OF SHEAR AND THAT ALL TOOLS AND MATERIAL HAVE BEEN REMOVED FROM SHEAR TABLE.

16. Start main drive motor:

A. SHEARS WITH ELECTRIC AIR CYLINDER CLUTCH CONTROL SHIPPED AFTER 1 OCTOBER 1974:

1. Turn CLUTCH CONTROL selector to "ON".

2. Turn CLUTCH MODE selector to "JOG".

3. Depress footswitch and press JOG button to start main drive motro. Hold both controls depressed until flywheel comes up to full speed (10 to 12 strokes). Release both controls when ram is on downstroke. Ram will stop at top of the stroke.

4. Turn CLUTCH MODE selector to "CONTINUOUS" position. Start main drive motor.

5. After flywheel reaches full speed, depress footswitch to continuously cycle ram. Close holddown bleed valve while ram is cycling at full speed.

6. Release footswitch while ram is on a down stroke. Ram will stop at top of the stroke. Turn CLUTCH CONTROL and CLUTCH MODE selector to "OFF".

B. SHEARS WITH ELECTRIC AIR CYLINDER CLUTCH CONTROL SHIPPED PRIOR TO 1 OCTOBER 1974, OR WITH ELECTRIC SOLENOID CLUTCH CONTROL:

1. Turn CLUTCH CONTROL selector to "ON".

2. Turn CLUTCH MODE selector to "RUN" or "CONTINUOUS" position.

3. Depress footswitch and start main drive motor. Hold footswitch depressed and allow flywheel to come up to full speed (10 to 12 strokes).

4. Close holddown bleed valve while ram is cycling at full speed.

5. Release footswitch while ram is on a down stroke. Ram will stop at top of the stroke. Turn CLUTCH CONTROL, CLUTCH MODE and main drive motor "OFF".

C. SHEARS WITH MECHANICAL TREADLE:

1. Disengage treadle lock.

2. Depress foot treadle and start main drive motor. Allow flywheel to come up to full speed (10 to 12 strokes).

3. Close holddown bleed valve while ram is cycling at full speed.

4. Release foot treadle while ram is on a down stroke. Ram will stop at top of the stroke. Engage treadle lock and turn "OFF" main drive motor.

CHECKING HOLDDOWN BLEED VALVE

If the hydraulic holddown system is losing pressure during a ram stroke or not holding pressure, the holddown bleed valve should be checked first. To check this valve for leakage:

1. Turn OFF main drive motor.

2. Make sure holddown bleed valve is securely closed.

3. Disconnect 1/8" pipe union on the return line. Refer to Figure 97. Turn the 1/8" streel elbow in holddown box to raise end of union above oil level in holddown box. Place a rag over the union.

4. Start main drive motor and cycle the ram.

5. If oil comes from the union, the bleed valve is defective and must be replaced.

6. If no oil comes from the union, turn OFF main drive motor and reconnect the pipe union. Then proceed to CHECKING CYLINDER HEAD to determine cause of pressure loss.

CHECKING CYLINDER HEAD

Loss of pressure in the holddown system can occur in several areas of the cylinder head. Check the following:

1. Low oil level in the pump box will simulate the lack of holddown system pressure, even though the cylinder head is functioning properly. Check oil level to insure level is even with center of roller with ram at top of the stroke.

2. Leakage around the piston or the accumulator pin will cause a pressure drop. To check for leakage, stop the ram on the front half of the stroke as described in PRESSURE CHECK HOLDDOWN SYSTEM. Remove the top cover from pump box and check oil for bubbles coming from piston or the accumulator pin. If bubbles can be seen, contact CINCINNATI INCORPORATED Service Department.

3. If the above checks do not locate cause, then the ball check "N" (Figure 99) may be at fault. Contact CINCINNATI INCORPORATED Service Department for further instructions.

MATERIAL MARKING

Marking of soft, polished or thin gauge materials by the holddown plungers may occur at the recommended pressure settings. This marking generally occurs due to holddown impact or pressure. On older machines the table can become worn, creating marking by the holddowns.

Marking can be minimized by use of Cushion Clamp (optional), rubber cups on the holddown plungers (optional), or by a reduction in the holddown pressure. CINCINNATI INCORPORATED does not recommend a pressure reduction greater than 50% on the 10, 14 or 18 Series shears, and never cut more than 25% of the shear's capacity with this reduced pressure. We do not recommend reducing the holddown pressure on any 25 Series or larger shears.

CAUTION

FAILURE TO MAINTAIN SUFFICIENT HOLDDOWN PRESSURE RELATIVE TO MATERIAL THICKNESS WILL RESULT IN MATERIAL TIP-UP, WHICH COULD RESULT IN FOLDING MATERIAL BETWEEN KNIVES.

FRICTION BRAKE ADJUSTMENT

The purpose of the friction brake on the driveshaft is to bring the driveshaft and other moving parts to a stop at the top of the stroke. If the brake is allowed to become loose, the radius of the clutch will strike the clutch pin. When this happens, a single loud thump will be heard in the drive gearbox just as the driveshaft stops at the end of each stroke.

A brake that is not adjusted properly can cause inaccurate shearing. It may also cause the clutch to "knock". If the clutch knocks continuously as it disengages, the brake should be gradually loosened. If this does not eliminate the knock with the band completely loose, check over the shear as outlined under "Clutch knocks at top of stroke" in TROUBLE-SHOOTING section.

For the proper adjustment of the friction brake refer to one of the following procedures for the appropriate shear size and date of manufacture:

NOTE: If any of the following procedures fail to correct the problem, contact the CINCINNATI INCORPORATED Service Department.

10, 14, 18 & 25 SERIES WITH SPRING SET FRICTION BRAKE - BUILT AFTER OCTOBER 1963. REFER TO FIGURE 100.

1. Check the vertical clearance "C". If the clearance has closed to .020", loosen locknut No. 1 and turn brake adjusting nut No. 2 to set the clearance at .060".

2. Retighten locknut No. 1.

IMPORTANT

The brake will not operate without clearance at this point.

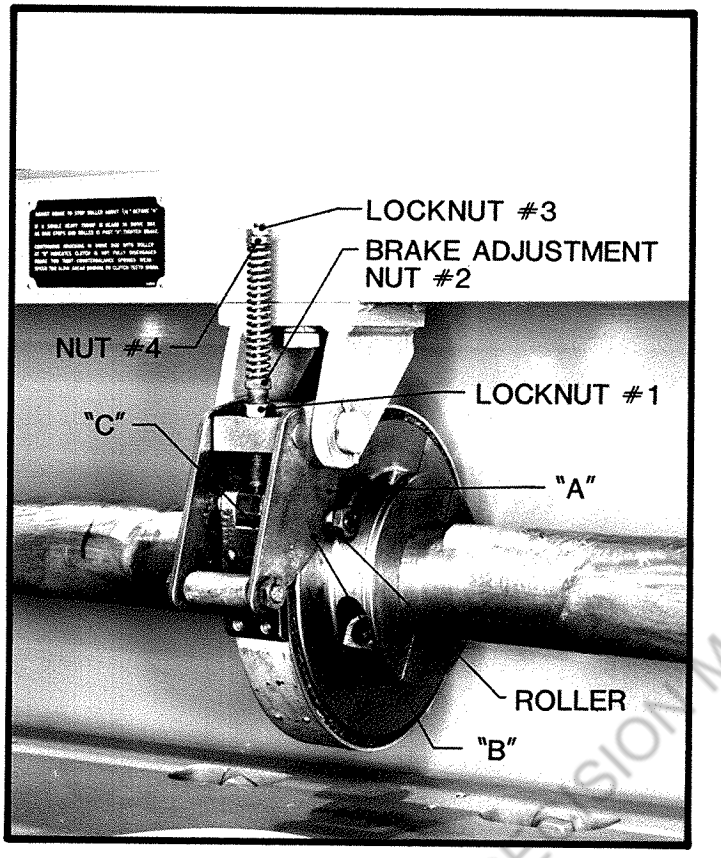


FIGURE 100

3. If the brake is still too loose, loosen locknut No. 3 and tighten nut No. 4 until the roller stops 1/4" before "A" when the shear has stopped.

IMPORTANT

Further tightening creates unnecessary load on the brake and causes the ram to stop before the top of the stroke.

4. Retighten locknut No. 3.

10, 14, 18, 25, 37 & 43 SERIES - BUILT PRIOR TO OCTOBER, 1963: REFER TO FIGURE 101.

1. Loosen locknut No. 1.

2. Tighten adjusting nut No. 2 until the roller stops 1/4" before "A" when the shear has stopped.

3. Retighten locknut No. 1.

43 SERIES WITH SPRING SET FRICTION BRAKE - BUILT AFTER OCTOBER, 1963: REFER TO FIGURE 102.

1. Check the vertical clearance "C". If the clearance has closed up to 1/16", loosen locknut No. 1 and turn brake adjusting nut No. 2 to set the clearance at 3/16".

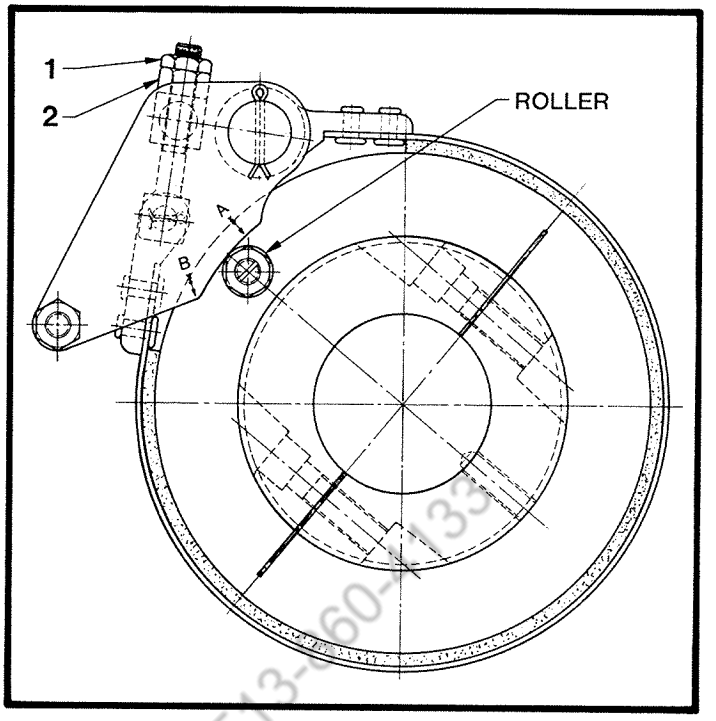


FIGURE 101

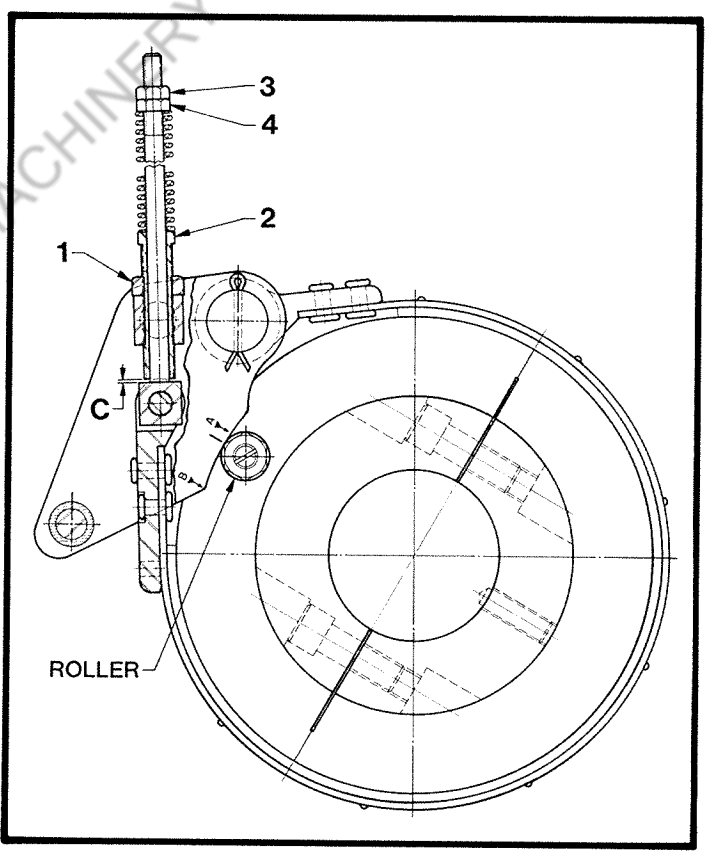


FIGURE 102

2. Retighten locknut No. 1.

IMPORTANT

The brake will not operate without clearance at this point.

3. If the brake is still loose, loosen locknut No. 3 and tighten nut No. 4 until the roller stops 1/4" before "A" when the shear has stopped.

IMPORTANT

Further tightening creates unnecessary load on the brake and causes the ram to stop before the top of the stroke.

4. Retighten locknut No. 3.

63 & 100 SERIES - BUILT AFTER 1974: REFER TO FIGURE 103.

IMPORTANT

Before making any adjustments, check air pressure on gage attached to air regulator. The regulator is on end of air surge tank mounted between the air counterbalance units. The air pressure must be set at figure shown on tag, mounted on the housing brace. Correct pressure must be set to maintain balance between action of air counterbalance units and brake release chamber, since both operate from same air supply.

Adjust the brake so the arrow stamped on the brake drum stops between "A" and "B" stamped on the brake shoe:

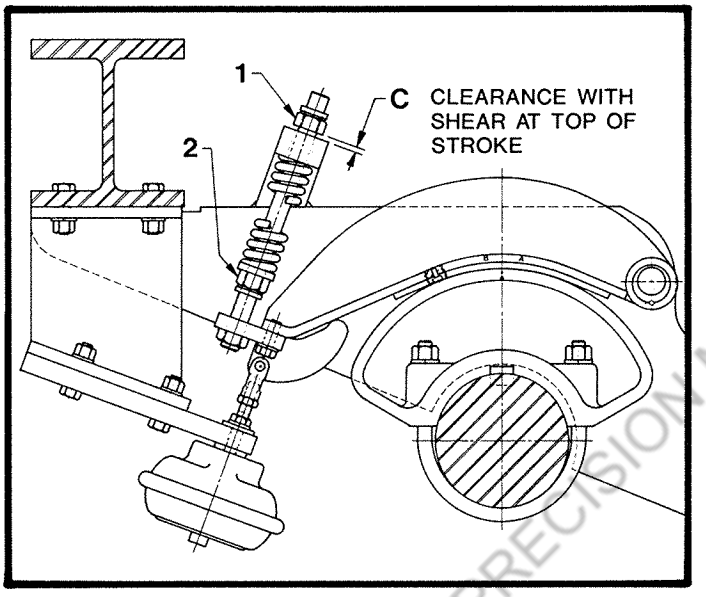


FIGURE 103

1. Adjust nut No. 1 for 1/4" clearance "C". This adjustment must be done with the shear ram at top of stroke.

2. If the arrow on the brake drum goes too close to point "A", the clutch helix will stop on the clutch pin, stopping the machine. When this occurs, a loud thump will be heard from the gearbox. To properly adjust the brake, tighten nut No. 2 until the arrow is between point "A" and "B" when the shear has stopped.

3. If the arrow on the brake drum is near point "B", the clutch will not pull out far enough, causing a continuous knocking of the clutch. If this occurs, loosen nut No. 2 until the brake stops at the correct location.

   If loosening nut No. 2 does not stop the clutch from knocking, contact CINCINNATI INCORPORATED Service Department.

62 & 100 SERIES - BUILT BETWEEN 1951 AND 1974: REFER TO FIGURE 104.

The friction brake on this model shear is operated by an air chamber. The air chamber is controlled by a valve mounted on the large cover of the drive gearbox. No adjustments are necessary on this friction brake for normal use of the shear. If the brake is not stopping, within the distance between "A" and "B", contact CINCINNATI INCORPORATED Service Department.

IMPORTANT

Before making any adjustments, check air pressure on gage attached to air regulator. The regulator is on end of air surge tank mounted between the air counterbalance units. The air pressure must be set at figure shown on tag, mounted on the housing brace. Correct pressure must be set to maintain balance between action of air counterbalance units and brake release chamber, since both operate from same air supply.

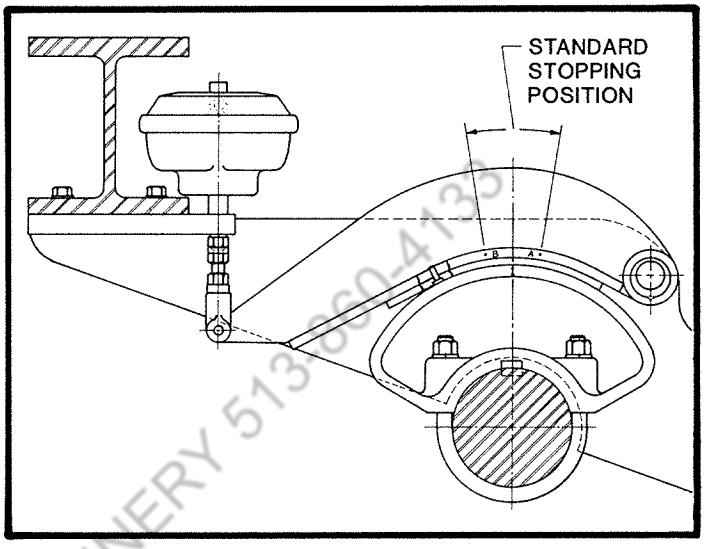


FIGURE 104

62 & 100 SERIES - BUILT PRIOR TO 1951: REFER TO FIGURE 105.

IMPORTANT

Before making any adjustments, check air pressure on gage attached to air regulator. The regulator is on end of air surge tank mounted between the air counterbalance units. The air pressure must be set at figure shown on tag, mounted on the housing brace. Correct pressure must be set to maintain balance between action of air counterbalance units and brake release chamber, since both operate from same air supply.

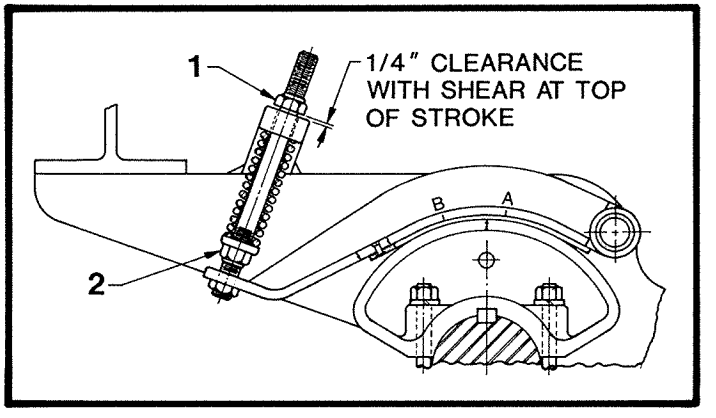


FIGURE 105

Adjust the brake so the arrow stamped on the brake drum stops between "A" and "B" stamped on brake shoe:

1. Adjust nut No. 1 for 1/4" clearance. This adjustment must be done with the shear ram at top of stroke.

2. If the arrow on the brake drum goes too close to point "A", the clutch helix will stop on the clutch pin, stopping the machine. When this occurs, a loud thump will be heard from the gearbox. To properly adjust the brake, tighten nut No. 2 until the arrow is between point "A" and "B" when the shear has stopped.

3. If the arrow on the brake drum is near point "B", the clutch will not pull out far enough, causing a continuous knocking of the clutch. If this occurs, loosen nut No. 2 until the brake stops at the correct location.

   If loosening nut No. 2 does not stop the clutch from knocking, contact the CINCINNATI INCORPORATED Service Department.

14, 18 & 25 SERIES HIGH SPEED WITH DIAPHRAGM TYPE AIR CHAMBER BRAKE: REFER TO FIGURE 106.

This brake is operated by a diaphragm type air chamber and is self-adjusting. The friction rings (No. 1) are bonded to the brake disc, thus giving a maximum amount of material for wear.

The brake disc can be inspected for wear by looking through the brake body (No. 2). When the friction rings on the brake disc are worn down to approximately 1/16" thickness, they should be replaced or have new material bonded on the brake disc. Contact the CINCINNATI INCORPORATED Service Department.

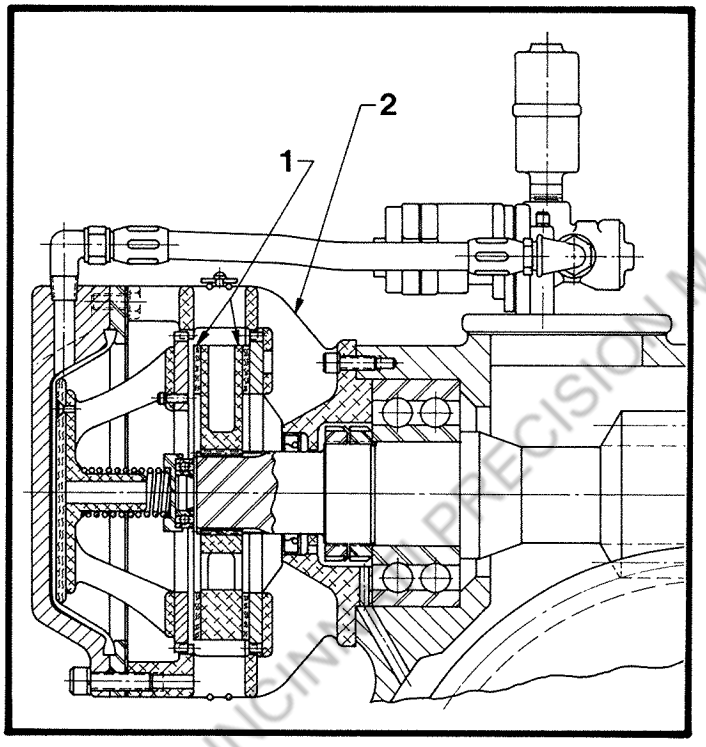


FIGURE 106

CLUTCH OPERATION

A full revolution clutch is used on all standard mechanical shears, except the High Speed shears. The clutch, Figure 107, has multiple jaws on its inside face. The clutch slides on the sleeve and is splined to it. The sleeve is keyed and driven on tapered end of driveshaft and is retained by a nut. The clutch is constantly pushed toward the spider by a spring between it and the sleeve. In the idle position the clutch is held away from the spider by the clutch pin. When the clutch pin is withdrawn, by depressing the footswitch or foot treadle, the spring forces the clutch jaws into mesh with revolving jaws on the spider. This causes the driveshaft to turn. As long as the footswitch (in "RUN" or "CONTINUOUS" mode of operation) or the foot treadle is held depressed, the driveshaft will continue to turn and the shear ram will make continuous strokes. When the footswitch or treadle is released the clutch pin moves in, and at the proper time engages a helix on the clutch, pulling it out of engagement with the spider.

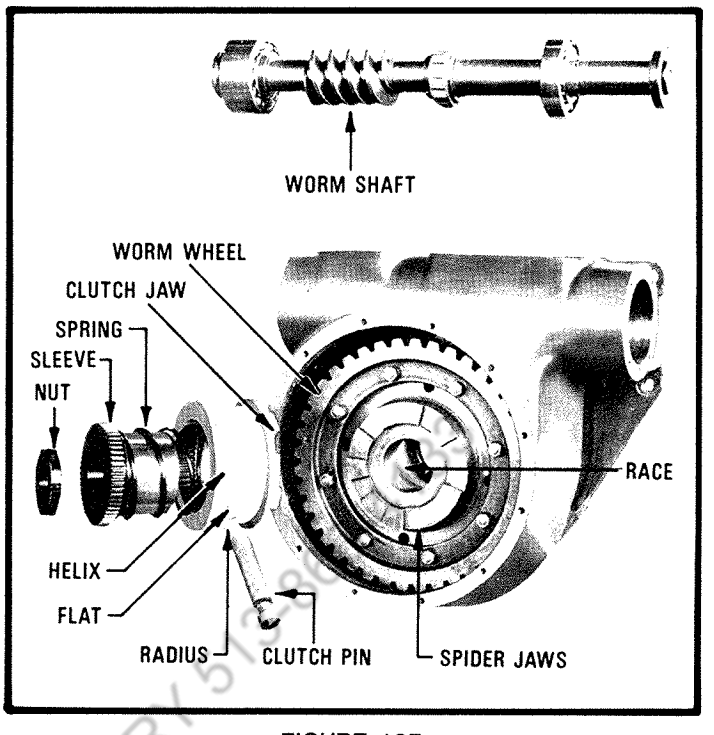


FIGURE 107

The clutch is driven by the spider as long as its jaws are in mesh with spider jaws. However, in order to get complete disengagement of jaws, the clutch must continue to turn slightly beyond point of disengagement. Normally the momentum of drive shaft and other moving parts, together with help of spring or air counterbalances to offset weight of ram, will continue rotating the clutch. It will rotate until the full length of the helix has moved past the clutch pin. At the end of the helix there is a flat portion and then a semicircular pocket or a radius forming a positive stop. When clutch is properly disengaged, this flat portion should rest on the clutch pin. No adjustment or change in timing should be necessary for the life of the clutch.

CLUTCH REPEATING

This procedure applies to shears equipped with a mechanical foot treadle. Shears with solenoid or air-electric clutch control will not have these conditions.

If the shear fails to stop at the top of stroke and repeats a stroke, it may be caused by:

1. Holding the foot treadle down too long before releasing it.

2. A treadle that bounces when released. This may be caused by hitting the treadle with the foot and letting it snap back suddenly.

3. A weak spring for returning the treadle. The hook can be fastened to the housing at a higher point to increase the tension on the extension spring. See Figure 108. The preload on the compression type spring can be increased by turning nut on stop spring retainer. See Figure 109.

4. Looseness in the linkage. The clutch pin should be pushed all the way in when the treadle is up. If looseness prevent this, it should be corrected by replacing worn pins, bushings or linkage.

5. Any of the levers becoming bent. With the treadle locked in the up position, heat the lever and bend it to make the clutch pin go in as far as it will go.

6. The helix on the clutch and the end of the clutch pin may be rounded, causing the clutch pin to jump out. See Figure 107. If this condition exists, replace the clutch.

Contact CINCINNATI INCORPORATED Service Department for instructions.

NOTE: A treadle guard and a compression type return spring should be installed on shears shipped prior to 1 October 1974, in order to comply with ANSI B11.4 Standard. Contact CINCINNATI INCORPORATED Service Department.

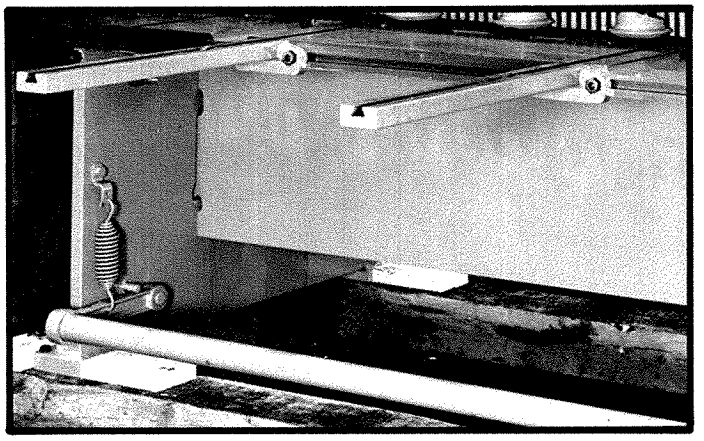


FIGURE 108

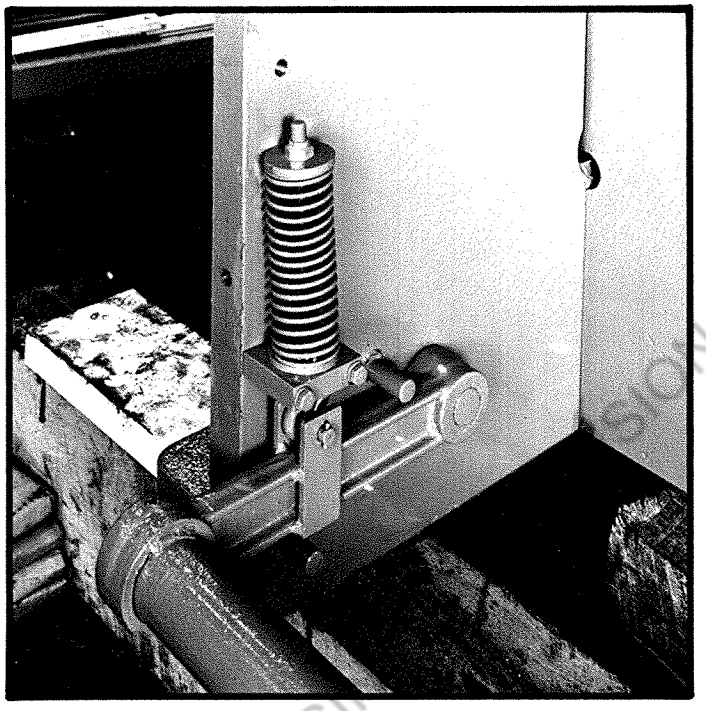


FIGURE 109

FLYWHEEL FRICTION MOUNTING ADJUSTMENT

OPERATION

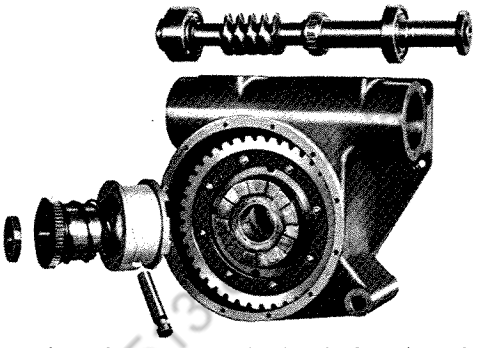
The drive system of the mechanical shears is an electric motor, connected to a flywheel with vee-belts, then through a worm and wormwheel reduction unit and jaw clutch to the drive shaft. The flywheel is mounted on the wormshaft and drives it through a friction mounting. This friction mounting is used on all mechanical shears except the 10 Series and the High Speed shears with air clutch and brake.

Slipping of the flywheel on the friction mounting should only occur during a machine overload. The shear should make a full length, rated capacity cut without slipping. If the machine will not make a capacity cut, check the friction mounting as follows:

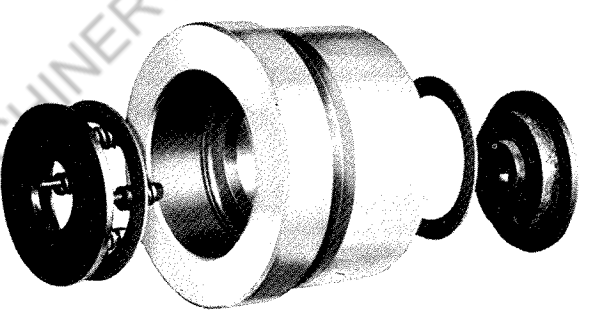
1. Turn OFF all power to the shear and lock-out main disconnect switch. Remove the main fuses if the disconnect cannot be locked-out. Place the CLUTCH CONTROL selector in "OFF" position and remove key. For machines equipped with mechanical foot treadle, engage the treadle lock.

2. Remove the flywheel guard. Refer to section on REMOVING AND INSTALLING GUARDS.

3. Mark the flywheel and the friction mounting with chalk to check for slippage. A single line on face of friction mounting and an adjacent mark on inside diameter of flywheel will provide reference points. Refer to Figure 110.



Cincinnati spring operated clutch is tripped with minimum effort.



Flywheel rim is carried by an adjustable friction clutch.

FIGURE 110

4. Install the flywheel guard. Refer to the section on REMOVING AND INSTALLING GUARDS.

5. Unlock main disconnect switch or replace main fuses. Turn disconnect switch "ON" and start main drive motor. Turn CLUTCH CONTROL selector to "ON".

6. Make a full length capacity cut by splitting a 12" wide piece of material.

7. If the shear did not make the full length cut, repeat Steps 1 and 2.

CAUTION

BEFORE REMOVING FLYWHEEL GUARD ALLOW FLYWHEEL TO COME TO A COMPLETE STOP.

8. Observe the chalk marks made in Step 3. If they do not line-up, proceed to Step 9. However, if the marks are still in alignment, contact CINCINNATI INCORPORATED Service Department for assistance.

9. Manually return ram to top of the stroke:

   A. Turn flywheel clockwise (looking at flywheel from rear of shear) by hand until ram reaches top of stroke. Two people will be required to turn flywheel on 43 Series and larger shears.

B. Unlock main disconnect switch or replace main fuses and turn disconnect switch to "ON". Move back gage towards rear of shear to clear the 12" wide material.

C. Turn OFF main disconnect switch and lock-out or remove main fuses if disconnect cannot be locked out.

D. Push material through knives to clear point-of-operation. Material may be difficult to remove from machine - use care in handling to prevent injury.

10. Remove the safety wires or cotter keys from nut No. 1. Refer to Figure 110.

    Note: 14-18 Series have four nuts No. 1.
    25 Series and larger have eight nuts No. 1.

11. Tighten each nut No. 1 one-quarter turn.

12. Install safety wire or cotter keys. Always use new wire or new keys. Cotter keys should be tapped into position before bending tabs.

13. Install the flywheel guard. Refer to section on REMOVING AND INSTALLING GUARDS.

14. Unlock main disconnect switch or replace main fuses. Turn disconnect switch "ON".

CAUTION

CLUTCH IS STILL IN ENGAGED POSITION. THE RAM WILL STROKE WHEN MAIN DRIVE MOTOR IS STARTED. MAKE SURE NO ONE IS NEAR RAM OR RAM BRACE BRACE AT REAR OF SHEAR WHEN STARTING MOTOR.

15. Start main drive motor:

    A. SHEARS WITH ELECTRIC AIR CYLINDER CLUTCH CONTROL SHIPPED AFTER 1 OCTOBER 1974:

        1. Turn CLUTCH CONTROL selector to "ON".

        2. Turn CLUTCH MODE selector to "JOG".

        3. Depress footswitch and press JOG button to start main drive motor. Hold both controls depressed until flywheel comes up to full speed (10 to 12 strokes). Release both controls when ram is on downstroke. Ram will stop at top of the stroke.

        4. Turn CLUTCH MODE selector to "CONTINUOUS" position. Start main drive motor.

        5. After flywheel reaches full speed, depress footswitch to continuously cycle ram. Close holddown bleed valve while ram is cycling at full speed.

        6. Release footswitch while ram is on a down stroke. Ram will stop at top of the stroke. Turn CLUTCH CONTROL and CLUTCH MODE selectors to "OFF".

    B. SHEARS WITH ELECTRIC AIR CYLINDER CLUTCH CONTROL SHIPPED PRIOR TO 1 OCTOBER 1974, OR WITH ELECTRIC SOLENOID CLUTCH CONTROL:

        1. Turn CLUTCH CONTROL selector to "ON".

        2. Turn CLUTCH MODE selector to "RUN" or "CONTINUOUS" position.

        3. Depress footswitch and start main drive motor. Hold footswitch depressed and allow flywheel to come up to full speed (10 to 12 strokes).

        4. Close holddown bleed valve while ram is cycling at full speed.

        5. Release footswitch while ram is on a down stroke. Ram will stop at top of the stroke. Turn CLUTCH CONTROL, CLUTCH MODE and main drive motor "OFF".

    C. SHEARS WITH MECHANICAL TREADLE:

        1. Disengage treadle lock.

        2. Depress foot treadle and start main drive motor. Allow flywheel to come up to full speed (10 to 12 strokes).

        3. Close holddown bleed valve while ram is cycling at full speed.

        4. Release foot treadle while ram is on a down stroke. Ram will stop at top of the stroke. Engage treadle lock and turn "OFF" main drive motor.

16. Make a full length capacity cut by splitting a 12" wide piece of material.

17. If the shear makes a capacity cut, the adjustment is completed. However, if the shear did not make a capacity cut, repeat the adjustment procedure beginning at Step 7.

COUNTERBALANCE UNITS

All CINCINNATI Shears are provided with counterbalance units set at an angle to counterbalance the weight of the moving ram assembly and to hold the ram back against the guides. On the 10, 14, 18, 25 and 43 Series shears these are spring units, and on the 62 and 100 Series they are air units. When the balancing force is correct, the ram assembly should be slightly overbalanced with the ram at maximum up stroke. This balance is necessary to obtain proper disengagement of the clutch.

SPRING COUNTERBALANCE UNITS

These counterbalance assemblies do not require adjustment to maintain their operating efficiency, but they should be periodically inspected.

CAUTION

COUNTERBALANCE UNITS WERE ASSEMBLED WITH SPRINGS COMPRESSED TO 3000 POUNDS OF FORCE. NEVER ATTEMPT DISASSEMBLY OR REMOVAL OF THESE UNITS WITHOUT FIRST OBTAINING INSTRUCTIONS FROM CINCINNATI INCORPORATED SERVICE DEPARTMENT.

To inspect the spring counterbalance units: Refer to Figure 111 or 112.

1. Inspect sheet metal cover for bulges around the diameter. A bulge in this area may indicate a broken spring.

   A bulge in the top of this cover (Figure 111) indicates a broken stud. If upper spring seat is tight against safety retainers (Figure 112) it would indicate a broken stud.

CAUTION

IF THE STUD IS BROKEN, DO NOT REMOVE THE SPRING COVER. THIS COVER IS RETAINING THE COMPRESSED SPRINGS. CONTACT CINCINNATI INCORPORATED SERVICE DEPARTMENT FOR INSTRUCTIONS.

2. Inspect spring studs and the bronze bushing in lower spring seat for wear as follows:

   A. Position the ram at the bottom of the stroke to expose maximum portion of spring stud. Select one of the following steps, depending upon the type of clutch control:

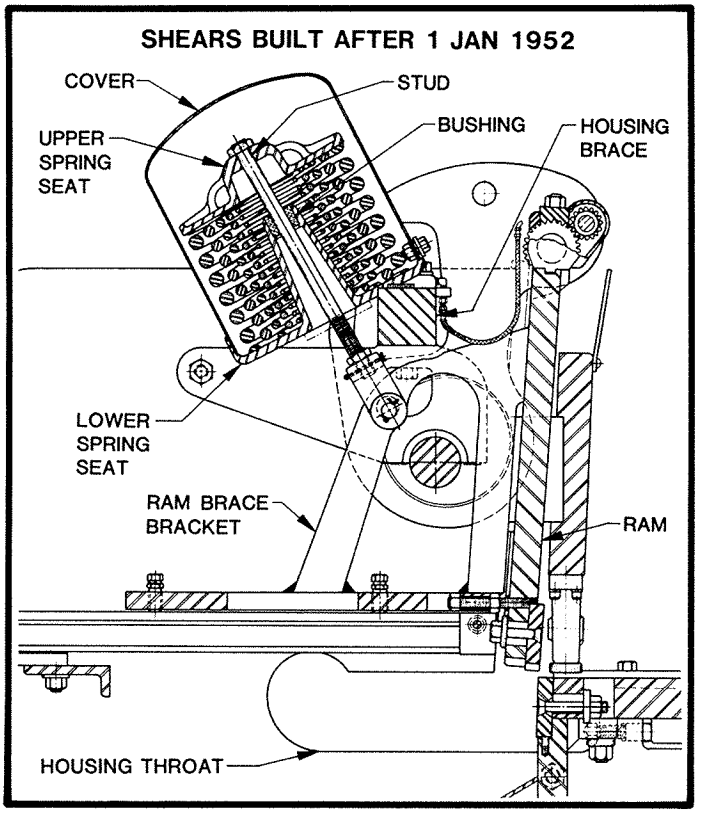


FIGURE 111

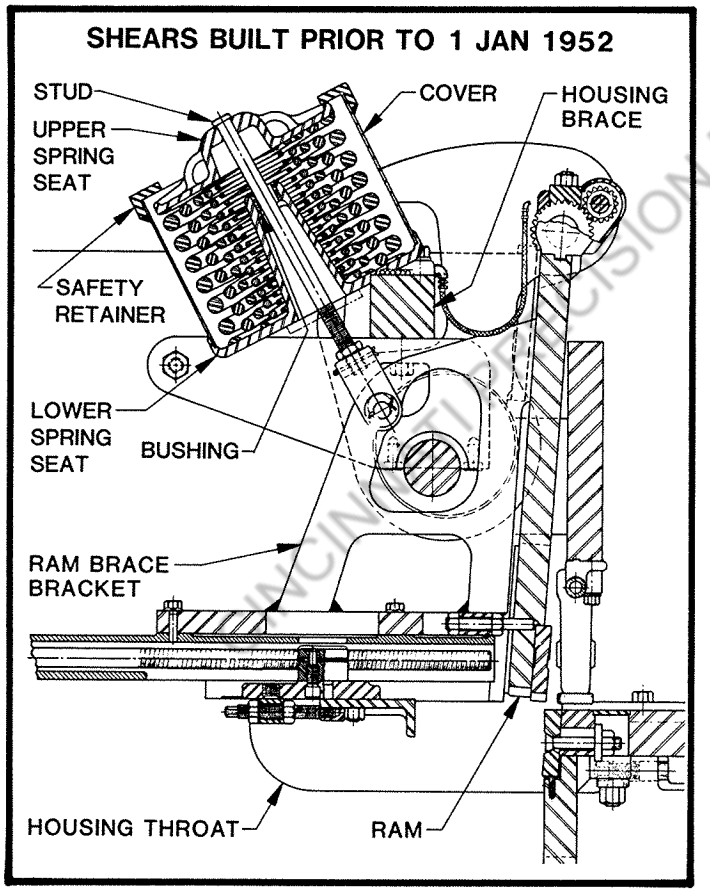


FIGURE 112

Air-Electric clutch control with "JOG" button:

1. Open holddown bleed valve located at right end of holddown beam.

2. Turn CLUTCH CONTROL selector to "JOG" position. Depress footswitch and tap "JOG" button to engage clutch. By rapidly pressing and releasing "JOG" button the ram can be slowly moved to or near the bottom of stroke.

3. Turn OFF all power to the shear and lock-out main disconnect switch. Place the CLUTCH CONTROL selector in "OFF" position and remove the key.

Air-Electric clutch without "JOG" button, Solenoid Operated clutch control, and mechanically (treadle) operated clutch:

1. Turn OFF all power to the shear and lock-out main disconnect switch. Remove the main fuses if the disconnect switch cannot be locked out. Place CLUTCH CONTROL in "OFF" position and remove the key. For machines equipped with mechanical treadle, engage the treadle lock.

2. Remove the flywheel guard. Refer to section on REMOVING AND INSTALLING GUARDS.

3. To engage the clutch, select one of the following steps:

   Air-Electric clutch: Use a large screwdriver or pry bar to raise clutch pin to engage clutch. Refer to section on CHANGING OR ROTATING KNIVES, Step 48-B.

   Solenoid operated clutch: Remove solenoid cover and using large screwdriver or pry bar, pry up on solenoid plunger to engage clutch. Refer to section on CHANGING OR ROTATING KNIVES, Step 48-C.

   Mechanically operated clutch: Disengage treadle lock, depress foot treadle pipe to engage clutch, and remove foot from treadle pipe.

4. Open holddown bleed valve located at right end of holddown beam.

5. Turn flywheel by hand in counterclockwise direction (looking from rear of machine towards flywheel) until the ram is at or near bottom of the stroke.

High Speed Shears:

1. Turn the CLUTCH CONTROL selector to "CONTINUOUS" position.

2. Start main drive motor, cycle ram, and press MAIN DRIVE "STOP" button.

3. Manually depress air valve so that brake will release and clutch will be engaged. Since power to motor is turned OFF, the flywheel will coast, gradually slowing down. When the flywheel is moving slowly and the ram nears the front half, release both air valves. This will disengage the clutch and engage the brake, stopping the ram. If ram does not stop in proper position, repeat procedure.

4. Turn OFF all power to the shear and lock-out main disconnect switch. Place CLUTCH CONTROL selector in "OFF" position and remove the key.

B. The spring stud is extended for inspection from rear of machine. Use a light and mirror to inspect the portion of the spring stud and bronze bushing in recess of lower spring seat. If any wear is found around the stud diameter or bushing, the worn part must be replaced. We recommend replacing the bronze bushing when replacing a spring stud.

Note: If the stud has worn through the bushing and into the cast iron lower spring seat, this seat must also be replaced.

C. If the flywheel guard was removed for this inspection, it must be replaced. See section on REMOVING AND INSTALLING GUARDS.

CAUTION

REMOVE ALL TOOLS AND EQUIPMENT FROM RAM BRACE.

D. Unlock main disconnect switch or replace main fuses. Turn the disconnect switch to "ON".

E. Start main drive motor:

1. SHEARS WITH ELECTRIC AIR CYLINDER CLUTCH CONTROL SHIPPED AFTER 1 OCTOBER 1974:

   a. Turn CLUTCH CONTROL selector to "ON".

   b. Turn CLUTCH MODE selector to "JOG".

   c. Depress footswitch and press JOG button to start main drive motor. Hold both controls depressed until flywheel comes up to full speed (10 to 12 strokes). Release both controls when ram is on downstroke. Ram will stop at top of the stroke.

   d. Turn the CLUTCH MODE selector to the CONTINUOUS" position. Start the main drive motor.

   e. After flywheel reaches full speed, depress footswitch to continuously cycle ram. Close holddown bleed valve while ram is cycling at full speed.

   f. Release footswitch while ram is on a down stroke. Ram will stop at top of the stroke. Turn CLUTCH CONTROL and CLUTCH MODE selectors to "OFF".

2. SHEARS WITH ELECTRIC AIR CYLINDER CLUTCH CONTROL SHIPPED PRIOR TO 1 OCTOBER 1974, OR WITH ELECTRIC SOLENOID CLUTCH CONTROL:

   a. Turn CLUTCH CONTROL selector to "ON".

   b. Turn CLUTCH MODE selector to "RUN" or "CONTINUOUS" position.

   c. Depress footswitch and start main drive motor. Hold footswitch depressed and allow flywheel to come up to full speed (10 to 12 strokes).

   d. Close holddown bleed valve while ram is cycling at full speed.

   e. Release footswitch while ram is on a down stroke. Ram will stop at top of the stroke. Turn CLUTCH CONTROL, CLUTCH MODE and main drive motor "OFF".

3. SHEARS WITH MECHANICAL TREADLE:

   a. Disengage treadle lock.

   b. Depress foot treadle and start main drive motor. Allow flywheel to come up to full speed (10 to 12 strokes).

   c. Close holddown bleed valve while ram is cycling at full speed.

   d. Release foot treadle while ram is on a down stroke. Ram will stop at top of the stroke. Engage treadle lock and turn 'OFF" main drive motor.

4. HIGH SPEED SHEARS:

   a. Turn CLUTCH CONTROL selector to "CONTINUOUS" position.

   b. Depress footswitch and start main drive motor. Allow flywheel to come up to full speed (10 to 12 strokes).

   c. Close holddown bleed valve while ram is cycling at full speed.

   d. Release footswitch while ram is on a down stroke. Ram will stop at top of the stroke. Turn CLUTCH CONTROL and main drive motor "OFF".

3. Check for weak counterbalance springs:

A. Turn OFF all power to the shear and lock-out main disconnect switch. Remove main fuses if the disconnect switch cannot be locked out. Place CLUTCH CONTROL selector in the "OFF" position and remove the key. For machines equipped with a mechanical treadle, engage the treadle lock.

B. Check the machine level. Refer to INSTALLATION section, LEVELING.

C. Adjust the ram clamp gibs. Refer to RAM CLAMP GIB ADJUSTMENT in this section.

D. Check and record clearance found between lower ram guide and ram shoe on both sides.

E. Place a 150 pound weight at the rear of ram brace near one end as shown in Figure 113.

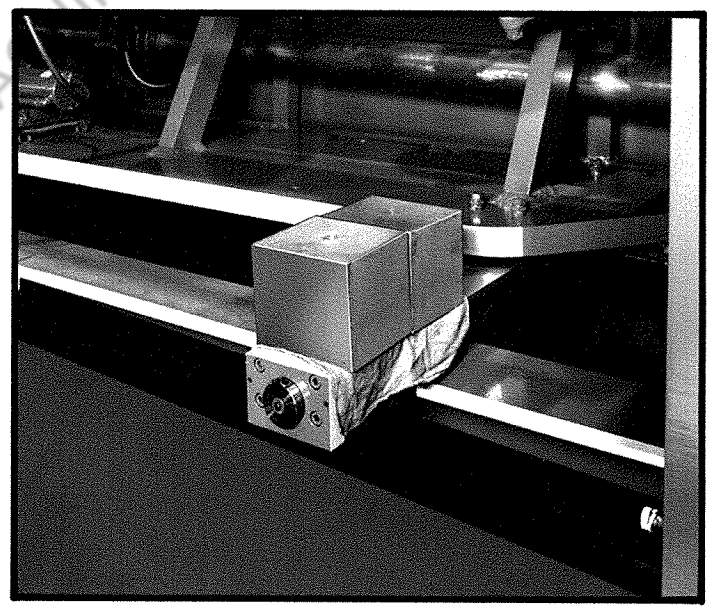


FIGURE 113

F. Check and record clearance between lower guide and ram shoe at end of machine having the additional weight.

G. Move the weight to other end of ram brace. Check and record clearance between guide and shoe at this end of machine.

H. If the clearance recorded in Step "D" did not open more than .0015", add 50 pounds of additional weight and repeat the procedure.

If any weight less than 250 pounds opens the guide clearance more than .0015", the counterbalance springs are weak and should be replaced. Contact CINCINNATI INCORPORATED Service Department for instruction to replace the counterbalance springs.

AIR COUNTERBALANCE UNITS

The air pressure must be maintained as specified on the legend plate mounted on the housing brace. No adjustments are required for these units.

PROBES (AUTO-SHEAR) ADJUSTMENT

The probes (contact points) are a group of switches located in the back gage angle. The shear is tripped when the workpiece contacts the probes, completing an electrical circuit through the material to table. The front surface of the probe should extend .004" to .005" beyond the face of back gage angle. This distance provides enough clearance to prevent workpiece from contacting back gage angle.

To adjust the probe units:

1. Check and adjust back gage angle as described in section on ADJUSTING BACK GAGE ANGLE PARALLELISM.

2. Position back gage angle all the way to the rear.

3. Turn OFF all power to the shear and lock-out main disconnect switch. Remove the main fuses if the disconnect switch cannot be locked out. Place the CLUTCH CONTROL selector in the "OFF" position and remove the key. For machines equipped with a mechanical treadle, engage the treadle lock.

4. Indicate from face of back gage angle to face of each probe and record these measurements.

   NOTE: All probes must protrude .004" to .005" beyond face of back gage angle. Any probe not measuring this distance must be adjusted.

5. Remove shroud "A" to expose rear of probe assembly. Refer to Figure 114.

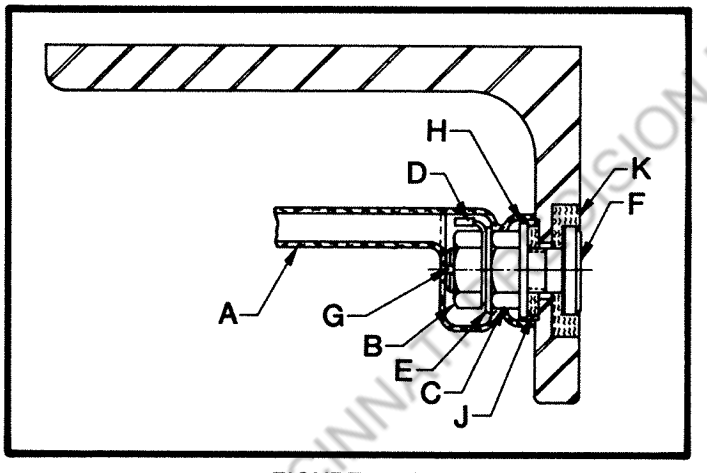


FIGURE 114

6. Hold nut "C" and remove nut "B".

7. Remove wire lead "D" and washer "E" from rear of probe "F".

8. Place screwdriver in slot "G" at end of probe "F" and remove nut "C", washer "H" and nylon washer "J".

9. Remove probe "F" from probe insulator "K".

   NOTE: Do not lose the shims on stub shaft of probe "F".

10. Remove probe insulator "K" from back gage angle.

11. Inspect nylon washer "J" and probe insulator "K" for being deformed and/or embedded metal particles. Clean or replace as required.

12. Using dimension obtained in Step 4, add or subtract shims on probe "F" stub shaft to obtain .004" to .005" protrusion.

    EXAMPLE: Measured dimension obtained in Step 4 was .002". It will be necessary to add .002" to .003" in shims to obtain the desired probe protrusion.

13. Reinstall the new or thoroughly cleaned and undistorted probe insulator "K" in the back gage angle.

14. Reinstall the properly shimmed probe "F" in the probe insulator "K". Add nylon washer "J", washer "H" and nut "C" to rear of probe "F" and tighten nut "C" securely.

15. Check probe adjustment by indicating face of probe "F" from face of back gage angle.

16. If probe "F" is not .004" to .005" above back gage angle face, reshim as necessary.

17. Reinstall washer "E", wire lead "D" and nut "B" to rear of probe "F".

18. Hold nut "C" to keep probe assembly from turning and tighten nut "B".

IMPORTANT

Do not twist wire lead "D" when tightening nut "B".

19. Replace shroud "A" on rear of probe assembly.

20. Repeat above procedure for any probe that does not measure within the .004" to .005" dimension as indicated in Step 4.

LIGHT BEAM SHEARING GAGE

The 10 through 43 Series shears use the flood lamp type light beam shearing gage (optional). To achieve the sharpest shadow line on the material at the cutting edge of lower knife, adjust the light beam as follows - refer to Figure 115:

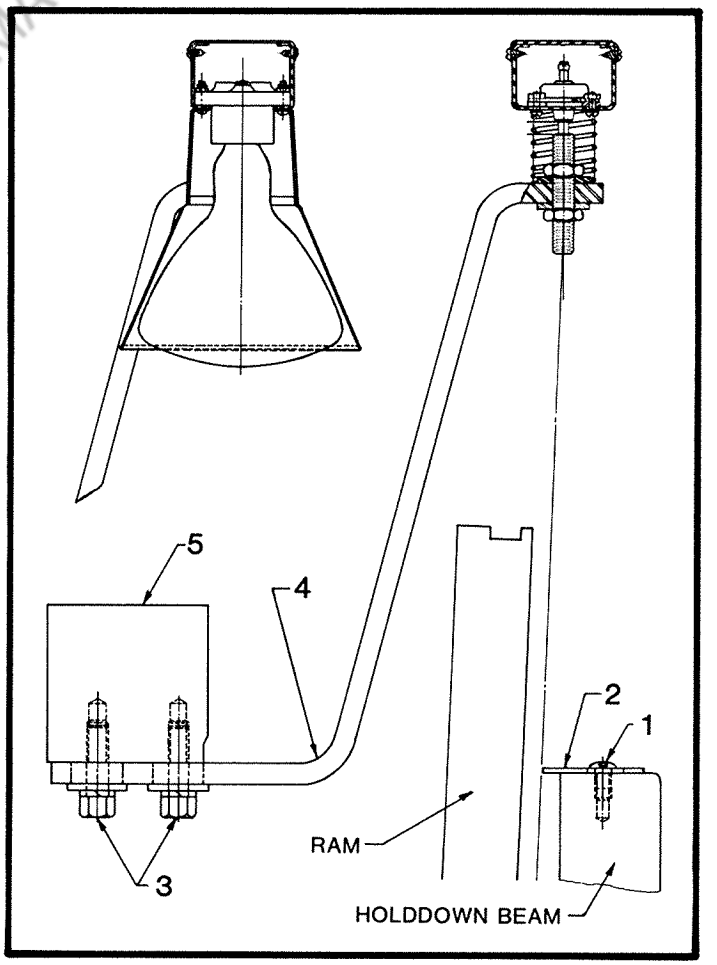


FIGURE 115

1. Loosen the six 3/8" button head screws No. 1. Slide light shield No. 2 towards the front of shear.

2. Scribe a line on two pieces of approximately 24" square sheet. Position one sheet at each end of table under the holddowns. Carefully line-up the scribed line with cutting edge of the lower knife.

3. Loosen the four 1/2" hex head screws No. 3 that hold mounting bracket No. 4 to housing brace No. 5.

4. Move brackets No. 4 front-to-back until the intensity of light on the two sheets of material is at maximum brightness.

5. Tighten the four 1/2" hex head screws No. 3.

6. Move light shield No. 2 until shadow line is on scribed line of both sheets of material.

7. Tighten the six 3/8" button head screws No. 1.

8. Remove the piece of material from the high end of the knives. Shear the remaining piece, which is still aligned with the shadow line, to insure that adjustments are correct.

9. Position the other piece at the high end of the knives and under the holddowns. Align the shadow line with the scribed line. Cut the material and check to insure adjustments are also correct at this end of machine.

10. If sheared pieces are not sheared accurately to the scribed line, repeat this entire procedure.

MAGNETIC SHEET SUPPORT

Magnetic sheet supports may mark the material and can cause inaccurately cut pieces if the channels are improperly adjusted. The sheet support system will not support capacity material (16 gauge) if the channels are out of alignment, the magnet pins are worn or there are missing magnets. Replace worn or missing parts.

To adjust the magnetic sheet support channels:

1. Stop the ram at the top of the stroke.

2. Check back gage angle parallelism and adjust if necessary. See section on ADJUSTING BACK GAGE ANGLE PARALLELISM.

3. Point-of-operation guarding must be removed to adjust the channels. Remove the guarding if it was not removed in Step 2. Refer to section on REMOVING AND INSTALLING GUARDS.

4. Move back gage forward until it just touches lower knife. Use the "FINE ADJUST - FORWARD" button for the last one-quarter inch of travel.

IMPORTANT

Do not jam angle against lower knife.

5. Turn OFF all power to the shear and lock-out main disconnect switch. Remove the main fuses if the disconnect switch cannot be locked out. Place the CLUTCH CONTROL selector in "OFF" position and remove the key. For machines equipped with a mechanical treadle, engage the treadle lock.

CAUTION

EXTREME CARE MUST BE TAKEN WHEN WORKING ON MAGNETIC SHEET SUPPORTS. HANDS AND FINGERS WILL BE CLOSE TO CUTTING EDGE OF THE KNIVES.

6. Mark the full width of back gage angle with a fine line using the lower knife as a guide. This line represents the passline.

7. Unlock main disconnect switch or replace main fuses. Turn disconnect switch "ON".

8. Position face of back gage angle under center of the first magnet "H", shown in Figure 116.

9. Turn main disconnect switch "OFF" and lock-out. Remove main fuses if disconnect switch cannot be locked-out.

10. Position and clamp top edge of a 12" scale to passline mark on face of back gage angle at first channel at one end of shear. See Figure 117. If necessary, adjust front of the

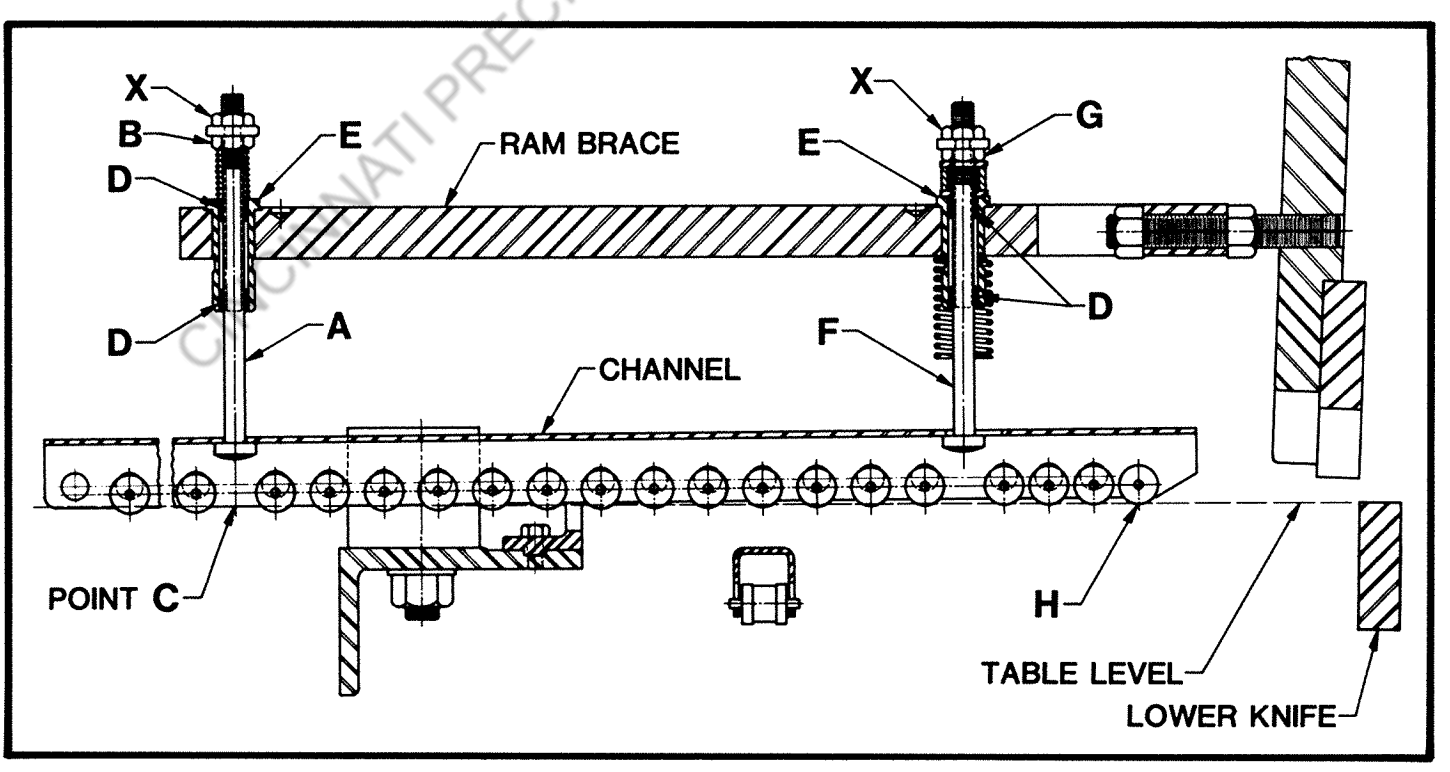


FIGURE 116

channel until magnet "H" just touches the top of scale. To adjust height of magnet, hold nut "G" and loosen nut "X" on support rod "F" (Figure 116). Then turn nut "G" clockwise to raise magnet or counterclockwise to lower magnet. When magnet "H" is in correct position, hold nut "G" and securely tighten nut "X".

Remove clamps holding scale to back gage angle. To check this adjustment, scale should line-up with marked line on face of angle when top of scale touches bottom of magnet "H". If scale does not line-up, readjust this magnet.

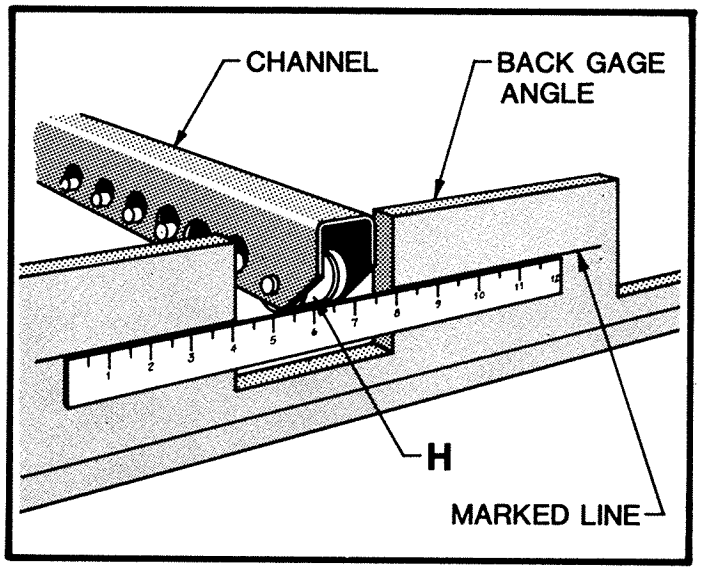


FIGURE 117

11. Repeat Step 10 for all remaining sheet support channels.

12. Unlock main disconnect switch or replace main fuses. Turn disconnect switch "ON".

13. Position face of back gage angle at point "C" (Figure 116), which is the center of support rod "A" at rear of channels.

14. Turn main disconnect switch "OFF" and lock-out. Remove main fuses if disconnect switch cannot be locked out.

15. Check and adjust, if necessary, the position of the channel at point "C" at one end of shear. The procedure is the same as for Step 10, except that the 12" scale and the passline is positioned to bottom of the channel. This provides a slight downward slope to the channel.

16. Repeat Step 15 for all remaining sheet support channels.

17. Replace all point-of-operation guarding. Refer to section on REMOVING AND INSTALLING GUARDS.

18. Unlock main disconnect switch or replace main fuses. Turn disconnect switch "ON". Turn CLUTCH CONTROL selector "ON". For machines with a mechanical treadle, disengage treadle lock.

19. Cut a piece of light gauge, polished material. Check for marking caused by the magnets or channels.

20. If the material is marked, contact the CINCINNATI INCORPORATED Service Department for repair instructions.

BALL TRANSFERS

Three types of ball transfer units are used on mechanical shears. The distance the ball protrudes above the table surface for each type of unit is shown in Figure 118.

Inspect ball of each transfer unit. If ball does not turn freely, replace unit.

SERIES MACHINE	TYPE UNIT	BALL HEIGHT ABOVE TABLE
10, 14-18, 25	SOLID UNSPRUNG	1/16"
43, 62, 100	SPRING LOADED	1/8"
10, 14-18, 25	AIR	3/16"
43, 62, 100	AIR	3/8"

FIGURE 118

To adjust ball transfer height:

SOLID UNSPRUNG TYPE - Refer to Figure 119:

1. Loosen nut "A" and turn stud "B" unti ball extends 1/16" above table surface. Hold stud "B" to maintain this position while securely tightening nut "A".

2. Repeat Step 1 for all transfer units requiring adjustment.

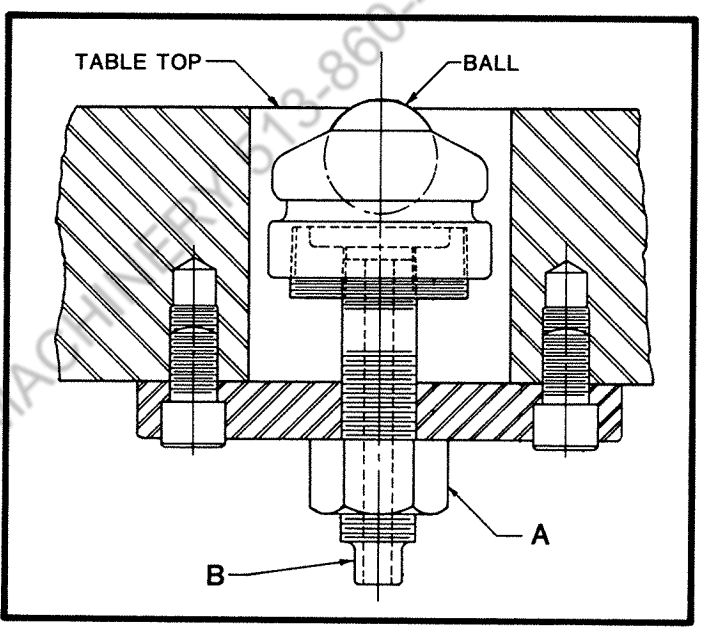


FIGURE 119

SPRING LOADED TYPE - Refer to Figure 120:

1. Loosen nut "A" and turn stud "B" until ball extends 1/8" above table surface. Hold stud "B" to maintain this position while securely tightening nut "A".

2. Repeat Step 1 for all transfer units requiring adjustment.

AIR OPERATED TYPE - Refer to Figure 121:

1. Remove all tools and material from table. Turn Ball Transfer control "ON". Measure each unit from table surface to top of ball. Record the measured height of any transfer unit that does not agree with dimensions shown in Figure 118.

2. Stop ram at top of stroke. Turn OFF all power to the machine and lock-out main disconnect switch. Remove main fuses if disconnect switch cannot be locked out. Place the CLUTCH CONTROL selector in the "OFF" position and remove the key. For machines equipped with a mechanical treadle, engage the treadle lock.

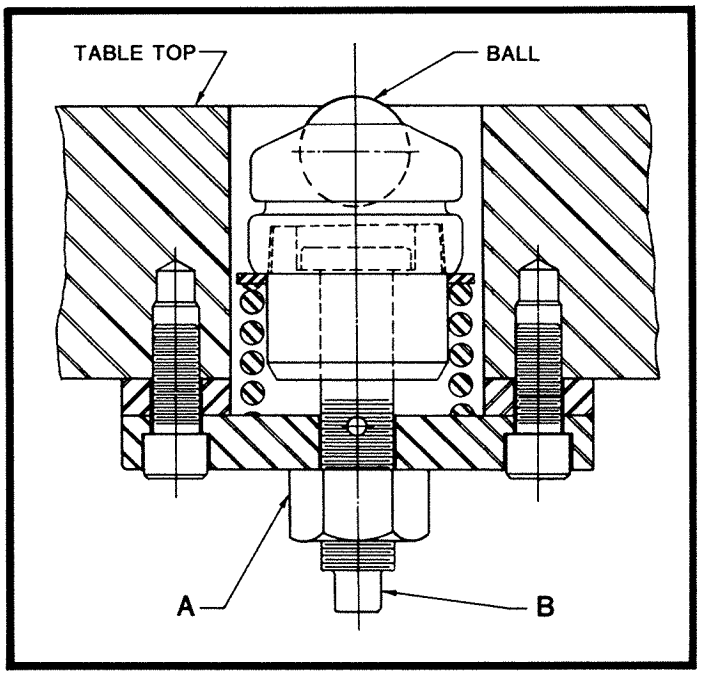


FIGURE 120

IMPORTANT

62 and 100 Series Shears only: if machine is equipped with end guards, they must be removed from ends. Support both ends of ram with a screw jack. This is done to assure that ram does not fall when air is removed from the machine. Always protect finished surfaces of the ram when using a screw jack.

3. Turn air supply OFF and bleed air from the system.

4. Remove nut "A" and air line from elbow fitting "B".

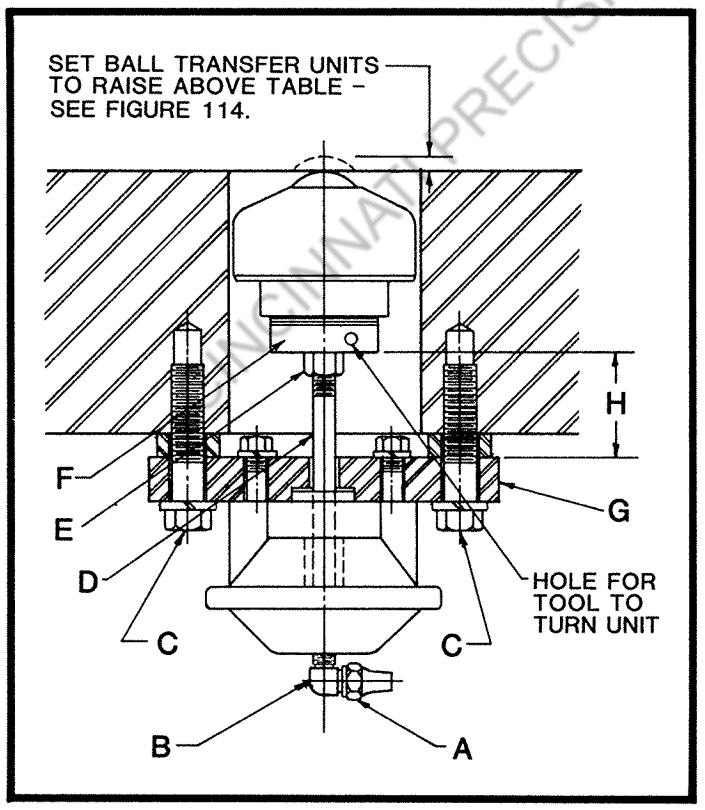


FIGURE 121

5. Remove hex head bolts "C" and remove ball transfer unit from table.

6. Adjust height of ball transfer unit:

   A. Measure distance "H" (Figure 121).

   B. Hold rod "D" with visegrip pliers and loosen nut "E".

   C. Distance "H", measured in Step 6-A, must be changed by the amount of difference between the desired height shown in Figure 118 and the measured height of ball in Step 1. Distance "H" must be decreased if ball unit was too high above table and increased if ball unit was too low. Hold rod "D" with visegrip pliers and turn ball adapter "F" to change distance "H". A tool inserted in the hole in side of ball adapter "F" is used to turn the ball adapter.

   D. When distance "H" is correct, hold rod "D" with visegrip pliers and securely tighten nut "E".

7. Replace ball transfer unit in table and securely tighten screws "C". Reconnect the air line.

8. Repeat the above procedure for all remaining ball transfer units that require adjustment.

9. Turn ON air supply to ball transfer system.

   62 and 100 Series Shears: Remove the screw jacks and replace end guards at both ends of ram.

10. Unlock the main disconnect switch or replace the main fuses. Turn the disconnect switch "ON".

11. Actuate ball transfer units and check height of each unit above table surface. Repeat entire procedure for any unit whose height does not agree with dimension in Figure 118.

CUSHION CLAMP

The Cushion Clamp system controls the speed of holddown plunger onto the material, thereby reducing marking of polished and/or light gauge material, and the noise level.

To obtain proper Cushion Clamp operation, make the following adjustments:

1. Check holddown system pressure and reset if necessary. Refer to section on HOLDDOWN SYSTEM - PRESSURE CHECK HOLDDOWN SYSTEM.

2. Turn OFF all power to the shear and lock-out main disconnect switch. Remove the main fuses if disconnect switch cannot be locked-out. Place the CLUTCH CONTROL selector in "OFF" position and remove the key. For machines equipped with a mechanical treadle, engage the treadle lock.

3. Set air pressure regulator "A" (Figure 122) to 60 p.s.i. air pressure.

The Cushion Clamp adjusting controls are located either on the bed of the machine beneath the table (Figure 123) or in a box on outside of left housing beneath the holddown pump box (Figure 124).

4. The shear will cycle when the pressure setting on the pressure switch is attained. Adjust the pressure setting as follows:

   A. Remove four screws and front cover of pressure switch.

   B. Loosen lock screw "E" (Figure 125) and turn adjusting screw "F" clockwise about two turns.

   C. Place a continuity checker across the common and the normal open contacts (contacts with attached wires).

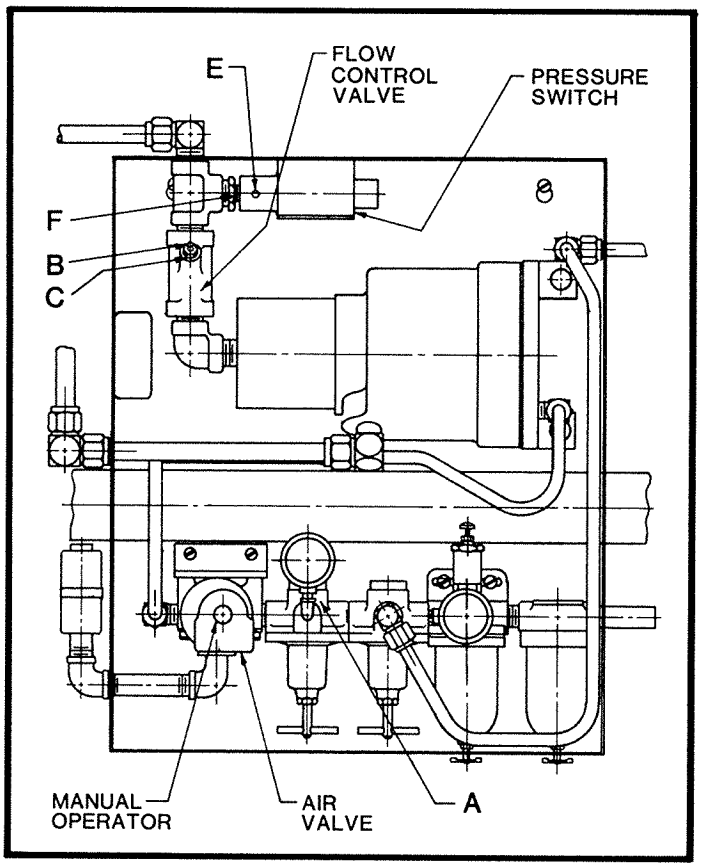


FIGURE 122

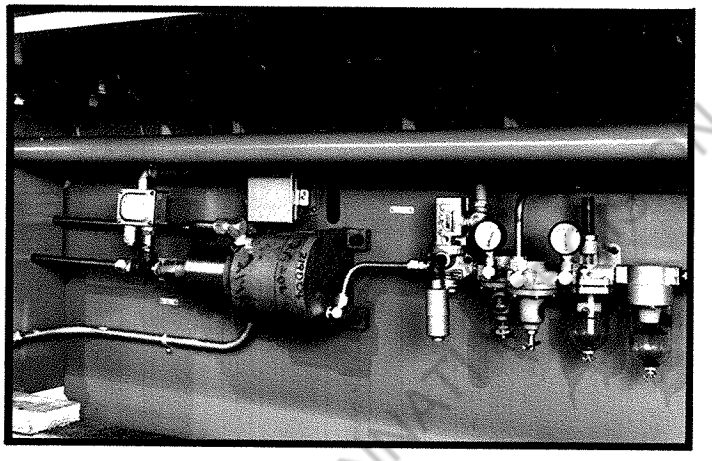


FIGURE 123

D. Depress the manual operator on the air valve (Figure 122) to build-up oil pressure in the holddown system. The pressure switch should not change state (contacts should not close). Turn adjusting screw "F" in increments of one-quarter turn until the pressure switch contacts change state (close).

E. Lock adjusting screw "F" in position by tightening lock screw "E".

F. Replace front cover and four screws on pressure switch.

G. Reset air pressure regulator "A" (Figure 122) to 70 p.s.i. air pressure.

H. Unlock the main disconnect switch or replace the main fuses. Turn the disconnect switch "ON".

5. Adjust speed of the holddown plungers:

A. Hold adjusting stem "B" and loosen nut "C" of flow control valve (Figure 122).

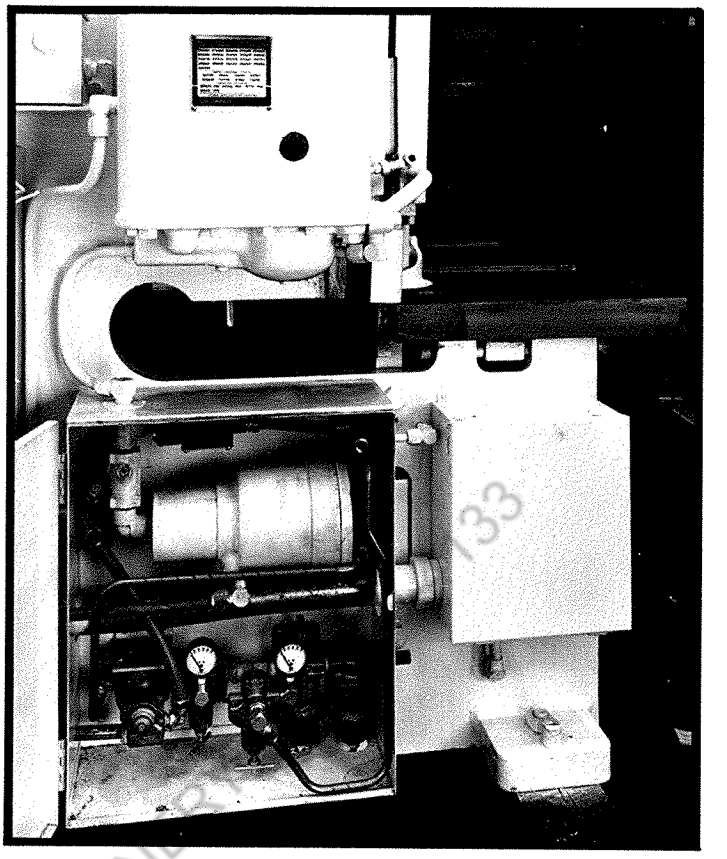


FIGURE 124

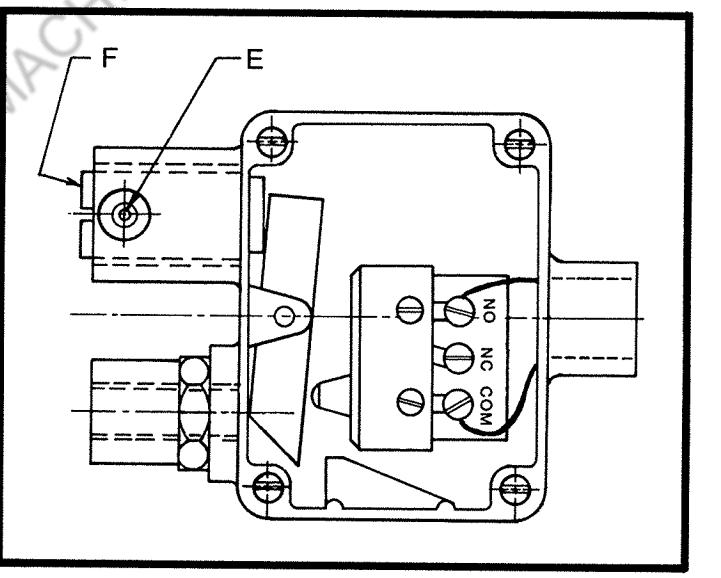


FIGURE 125

NOTE: Adjusting stem "B" may have flats on stem for a wrench, a slot in end of stem for a screwdriver, or a hex socket in end of stem for a hex key.

B. Turn adjusting stem "B" clockwise to increase holddown plunger speed and counterclockwise to decrease the speed. Adjust so that the plungers contact the material without an impact.

NOTE: The shear will not stroke until the material has been clamped by the holddown plungers. Reducing holddown plunger speed will increase the time required to clamp material and will decrease the strokes per minute of the shear.

C. Hold the adjusting stem "B" and securely tighten nut "C".

6. Cycle shear to check Cushion Clamp adjustments.

TROUBLESHOOTING

Effective and safe troubleshooting procedures are acquired through experience and a thorough knowledge of the machine and its operation. The use of maintenance instructions, assembly drawings and schematics included in this manual will be helpful in resolving problems with the machine.

The following chart was developed to aid in troubleshooting problems with the machine. The chart contains the questions frequently asked by our customers.

If major repairs are required or if the problem has not been identified by using the chart, contact the Service Department at CINCINNATI INCORPORATED for assistance.

PROBLEM	POSSIBLE CAUSE	REPAIR
Drive Motor will not start	1. No power to shear.	1. Turn disconnect switch to "ON" position. 1.1 Check incoming power source.
	2. Line fuse blown.	2. Check fuses and replace as required.
	3. Motor starter heaters tripped	3. Check, reset or replace as required.
	4. Defective control (ICR) relay.	4. Replace.
	5. Faulty or improperly set air pressure switch (62 & 100 Series only)	5. Check, reset or replace as required.
	For shears shipped after 1 Oct. 74, also check the following:	
	6. CONTROL CIRCUIT switch	6. Turn CONTROL switch "ON".
	7. MODE selector switch	7. Turn MODE selector switch to "RUN" or "CONTINUOUS".
	8. Footswitch contacts.	8. Contacts are factory set. Contact CINCINNATI INCORPORATED Service Department.
	9. Ram not at top of stroke and 1LS limit switch not in closed position.	9. Select "JOG" mode on MODE selector switch and jog ram to top of stroke. 9.1 Adjust 1LS to be closed with ram at top of stroke. Contact CINCINNATI INCORPORATED Service Department.
Shear will not stroke.	1. Main drive motor not running.	1. Start main drive motor.
	2. Shear controls are improperly set.	2. See MACHINE CONTROL section.
	3. Footswitch inoperable.	3. Check footswitch cable wiring and adjustment of footswitch contacts. Contact CINCINNATI INCORPORATED Service Department.
	4. Clutch pin does not pull. (Air cylinder operated clutches.)	4. Turn air supply ON and set at recommended setting. See tag on air regulator. 4.1 Control valve exhausting air continuously. Manually reset valve. See ROSS VALVE instruction booklet. 4.2 Check cylinder rod to clutch pin yoke. Must be tight to cylinder rod. 4.3 Clean clutch pin of foreign matter or burrs. Contact CINCINNATI INCORPORATED Service Department. 4.4 Stone gald from clutch helix. Contact CINCINNATI INCORPORATED Service Department. 4.5 Check air valve for electrical and mechanical function. (Prior to 1974) 4.6 Check air cylinder for function. Replace if faulty. 4.7 Check for blocked exhaust muffler.

PROBLEM	POSSIBLE CAUSE	REPAIR
Shear will not stroke. (CONT.)	5. Clutch pin does not pull. (Solenoid operated clutches.)	5. Solenoid defective. Replace. Contact CINCINNATI INCORPORATED Service Department. 5.1 Adjust clutch pin height. Contact CINCINNATI INCORPORATED Service Department. 5.2 Cylinder/plunger system faulty. Contact CINCINNATI INCORPORATED Service Department. 5.3 Clean clutch pin of foreign matter or burrs. Contact CINCINNATI INCORPORATED Service Department. 5.4 Stone gald from clutch helix. Contact CINCINNATI INCORPORATED Service Department.
Clutch knocks at top of stroke	1. Shear out of level. 2. Shear improperly lubricated. 3. Friction brake improperly adjusted or in need of repair. 4. Shear improperly counterbalanced due to binds or broken springs. 5. Shear operating at reduced speed. 6. Ram gibs too tight. 7. Cold temperature affects oil in gearbox.	1. Level shear. See INSTALLATION Section. 2. Lubricate shear. See LUBRICATION section. 3. Adjust brake. See MAINTENANCE section. If repair is required, contact CINCINNATI INCORPORATED Service Department. 4. Check counterbalance units for binding or broken components. **CAUTION** DO NOT REMOVE COVERS FROM COUNTER-BALANCE UNITS. CONTACT CINCINNATI INCORPORATED SERVICE DEPARTMENT. 4.1 Has additional weight been added to or subtracted from ram brace assembly. 4.2 Check air vents on top cover of counterbalance unit for continuous air leakage. If air is leaking, replace seals. Contact CINCINNATI INCORPORATED Service Department for instructions. 5. Stop shearing action and allow fly-wheel to come to full speed, then cycle shear one stroke. 5.1 Check type and size of replacement motor. Contact CINCINNATI INCORPORATED Service Department. 6. Check and adjust. See MAINTENANCE section. 7. Warm oil by continuously stroking shear or install strip heaters on gearbox.
Holddowns will not clamp	1. Low oil level. 2. Bleed valve open. 3. Bleed valve leaking through. 4. Holddown pressure too low. 5. Holddown pressure not being maintained during stroke.	1. Check level and fill. See LUBRICATION section. 2. Close valve while ram is cycling. 3. Replace valve. Contact CINCINNATI INCORPORATED Service Department. 4. Set pressure as recommended. See MAINTENANCE section. 5. Check pressure. See MAINTENANCE section.

PROBLEM	POSSIBLE CAUSE	REPAIR
Holddowns will not clamp (CONT.)	6. Cam and/or roller damaged.	6. Remove top holddown box cover and inspect for damage. Replace if damaged. Contact CINCINNATI INCORPORATED Service Department.
	7. Table of shear worn excessively.	7. Contact CINCINNATI INCORPORATED Service Department.
Sheared pieces are inaccurate	1. Backgage angle not parallel to lower knife.	1. Check and realign. See MAINTENANCE section.
	2. Backgage angle surface worn and/or grooved	2. Remachine gaging surface. Contact Service Department at CINCINNATI INCORPORATED.
	3. Backgage angle bent and/or twisted.	3. Straighten and remachine. Contact Service Department at CINCINNATI INCORPORATED.
	4. Dull knives and/or improper knife clearances.	4. Rotate or replace knives. 4.1 Reset knife clearance. See MAINTENANCE section.
	5. Material sag.	5. See STANDARD GAGES section in Manual.
	6. Material moves during shear cut.	6. Check and reset holddown pressure. See MAINTENANCE section.
	7. Backgage inaccurately positioned.	7. See STANDARD GAGES section.
	8. Backgage compression spring is compressed.	8. See STANDARD GAGES section.
	9. Bleed valve open.	9. Close bleed valve. Refer to HOLDDOWN TROUBLESHOOTING section.
	10. Squaring arm not square to lower knife.	10. Resquare. See MAINTENANCE section.
	11. Lower knife improperly shimmed.	11. See CHANGING OR ROTATING KNIVES procedure in MAINTENANCE section.
	12. Brake not stopping shear at top of stroke.	12. Reset brake. See MAINTENANCE section.
	13. Material stresses releasing upon cutting material.	13. See SHEARING EXPLANATION AND PROCEDURE section.
	14. Backgage system worn.	14. Contact Service Department at CINCINNATI INCORPORATED.
	15. Ram brace tie bolts stretched.	15. Contact Service Department at CINCINNATI INCORPORATED.
Sheared material has unacceptable sheared edge.	1. Dull knives.	1. See CHANGING OR ROTATING KNIVES procedure.
	2. Improper knife clearance for material thickness.	2. See KNIFE CLEARANCE procedure.
Knife shims work out from below lower knife.	1. Bed resting on foundation.	1. Raise shear to clear foundation and relevel. See INSTALLATION section.
	2. Table not tight to bed.	2. See CHANGING OR ROTATING KNIVES procedure.
	3. Knives not properly seated and/or knife bolts are not tight.	3. See CHANGING OR ROTATING KNIVES procedure.
	4. Knife seat burred, dirty, and/or damaged.	4. See CHANGING OR ROTATING KNIVES procedure.
	5. Shims improperly installed.	5. See SHIMMING LOWER KNIFE procedure.
	6. Shim pin beveled or too short. (Shears shipped prior to 1 June 1985.)	6. Pin to be 3/4" long and end square.
	7. Shim pins binding on shims.	7. See SHIMMING LOWER KNIFE procedure.
	8. Shim pins and/or springs missing.	8. Replace as necessary.
	9. Adjustable shim pin adjusted to incorrect height (Shears shipped after 1 June 1985).	9. See SHIMMING LOWER KNIFE procedure.

MAINTENANCE CHECK LIST - MECHANICAL SHEARS

	CHECK OR ADJUSTMENT	DAILY	WEEKLY	MONTHLY	3 MONTHS	6 MONTHS	YEARLY
1	Check holddowns for proper operation – make sure bleed valve is closed	X					
2	Check ram stopping point at top of stroke – adjust brake if necessary	X					
3	Inspect knives for nicks or wear – turn, replace or sharpen if necessary	X					
4	Clean back gage probes (optional equipment)	X					
5	Drain air filters & surge tank of condensate (machines equipped with air operated equipment)	X					
6	Check to see that all guards & barriers are in place & in good condition	X					
7	Check table adjusting screws and nuts holding table to bed – tighten if necessary		X				
8	Check knife bolts & ram adjusting nuts – tighten if necessary		X				
9	Observe the clutch pin. It should rotate at least 1/2 turn near end of cycle – free up pin if necessary to assure proper stopping		X				
10	Check knife & ram guide clearance – adjust if necessary			X			
11	Check machine level – relevel if necessary			X			
12	Check tightness of main drive vee belts				X		
13	Check entire machine for loose fasteners, especially back gage & holddown beam bolts – tighten if necessary					X	
14	Check holddown system pressure					X	
15	Check for broken counterbalance springs – replace if necessary					X	
16	Change position of main drive worm & worm wheel (machines with high speed drives)					X	
	LUBRICATION SCHEDULE						
1	Check automatic lubrication oil level and turn crank 40 turns – add oil if necessary	X					
2	Check air pressure & air-line lubricator oil level, drain air-line filter (machine with air operated clutch)	X					
3	Fill back gage nut reservoirs with oil		X				
4	Check holddown reservoir oil level – add oil if necessary			X			
5	Grease brake roller pin				X		
6	Check condition of oil in holddown system – drain & replace if necessary					X	
7	Check worm gear box oil level – add oil if necessary					X	
8	Drain, clean & refill holddown system – see Operator's Manual						X
9	Disassemble & clean magnetic filter when holddown system is cleaned						X
10	Drain, clean & refill drive box						X

A PERIODIC MAINTENANCE INSPECTION SHOULD BE MADE ON THIS MACHINE AS INDICATED ABOVE. INTERVALS ARE BASED ON ONE SHIFT OPERATION. DETAILED INSTRUCTIONS FOR SERVICING THE MACHINE CAN BE FOUND IN THIS MANUAL.

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SECTION 14 ORDERING REPAIR PARTS OR SERVICE

ORDERING REPAIR PARTS

When ordering repair parts, be sure to give this information:

1. Serial number of the CINCINNATI Shear. This is located on the machine's capacity plate and on the right end of the upper knife seat.
2. The part number and part name, obtained from the assembly drawings included with this manual.
3. As complete description of the part as possible.
4. Delivery required.
5. It is sometimes necessary to furnish sub-assemblies instead of single parts. In such cases, we reserve the right to ship and to invoice accordingly.

RETURNING PARTS FOR CREDIT

1. No item is to be returned without prior authorization. Please write or call (513/367-7100) the factory for instructions and the returned goods authorization number.
2. The returned goods authorization number must be shown on the outside of the package being returned. Unauthorized shipments will be returned to the sender freight collect.

SERVICE

CINCINNATI INCORPORATED Service includes:

1. Established field service having numerous local offices for prompt service assistance. Factory trained servicemen are available to assist you with any service problems you might be having. This includes service ranging from minor repairs and adjustments to major reconditioning jobs.
2. Planned Maintenance Service (PMS). This is a program designed to give you comprehensive inspections and recommendations concerning the condition of your equipment. PMS is specifically tailored to your needs to give you timely inspections, qualified recommendations and expert field assistance with repairs to your equipment.
3. Total Knife Service (TKS). This is a program designed to eliminate the problems involved in turning and adjusting shear knives. Also, the program includes simple adjustment checks that will provide you with some indications of the status of your equipment.