OPERATION, SAFETY AND MAINTENANCE MANUAL FOR

CINCINNATI

100 SERIES HYDRAULIC SHEAR

CINCINNATI

CINCINNATI INCORPORATED
CINCINNATI, OHIO 45211

EM-289 (JAN 93)

100 SERIES HYDRAULIC SHEAR INDEX

INTRODUCTION

CINCINNATI 100 SERIES HYDRAULIC SHEAR

The 100 Series shear is a hydraulically driven, microprocessor-controlled shear. Linear encoders constantly monitor the bed-to-ram position, feeding this information to the Control. The solid state microprocessor control ensures high reliability. Electronically variable cut length and rake angle result in fast stroking speeds. Quick response-time valves along with the microprocessor control are the key reasons for faster processing and higher productivity.

A wide range of materials and thicknesses can be processed with optimum results through electronic setting of rake angle. Part distortion is minimized and cut blank quality is improved.

PART QUALITY

The following factors affect part quality:

- Shear's condition
- Operator's ability
- Condition of the knives
- Quality of material

CINCINNATI machines are designed to be rugged and durable, requiring low maintenance. However, an out of adjustment condition or lack of maintenance can reduce the quality of parts produced on these machines. Superior part edge condition is ensured by proper use of the knife clearance adjustment. Clean edges and minimum burr result from a more perpendicular cut.

Operator ability obviously affects part quality and production rate. CINCINNATI INCORPORATED provides many design features in the machine to aid the operator to produce consistent parts. For example, hydraulic holddowns provide tons of force to clamp the material and prevent movement during cutting. The operator or set-up person must select the type of gaging, material supports, safeguarding and special equipment to be used for each application to obtain optimum results. Selecting the proper shearing sequence is important to obtain quality parts and for operator safety.

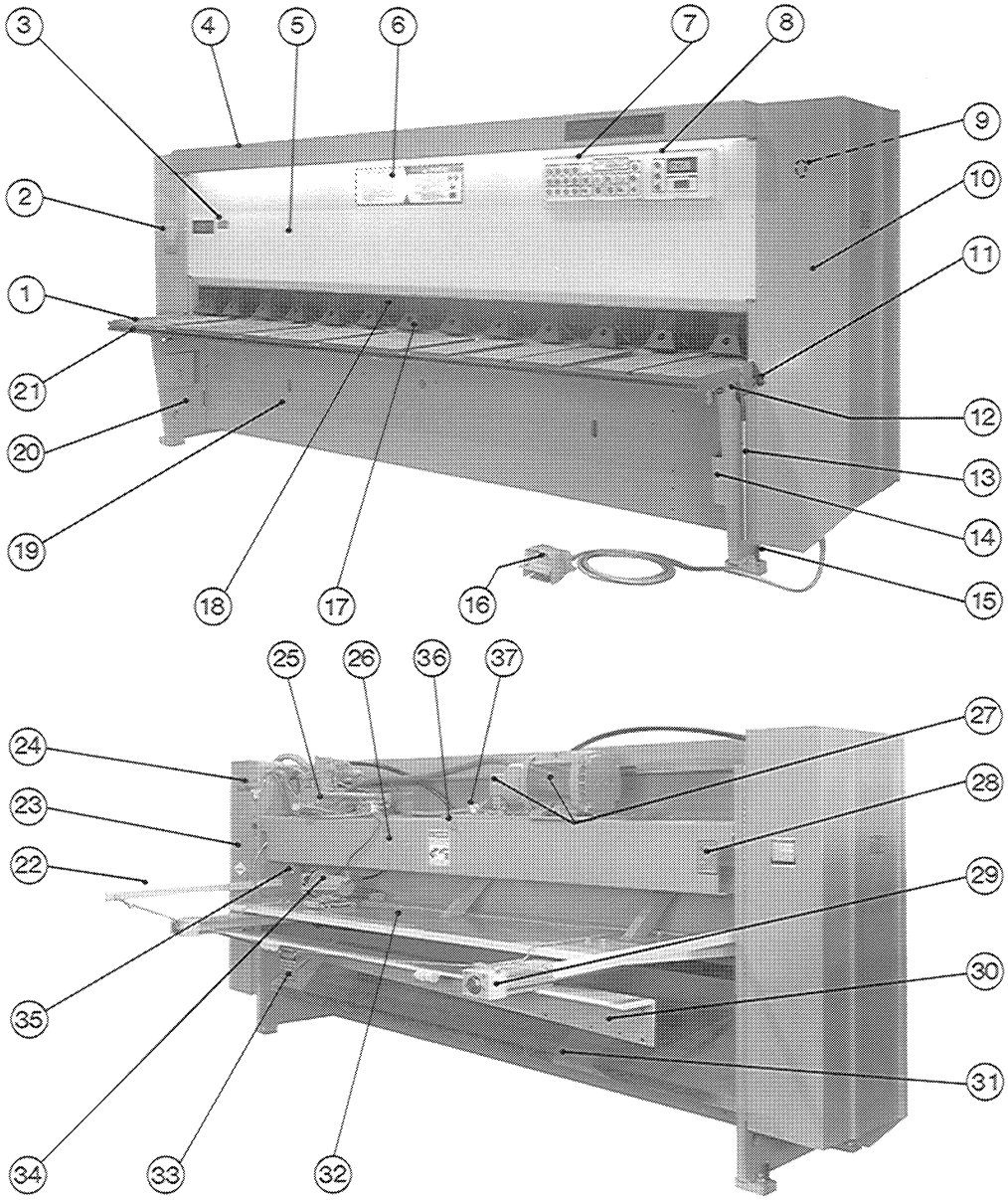
Worn, damaged or poor quality knives can directly affect the part quality. Using sharp knives, selecting the correct type of knives for the material and setting the correct knife clearance is essential for producing good quality parts.

Quality of material can affect the quality of the sheared edge. Commercial steels may have hard and soft spots in the metal which can result in a ragged sheared edge. Using a good grade of material, along with sharp and properly adjusted knives will produce good quality sheared parts.

SECTION 1 IDENTIFICATION

135-250 SERIES

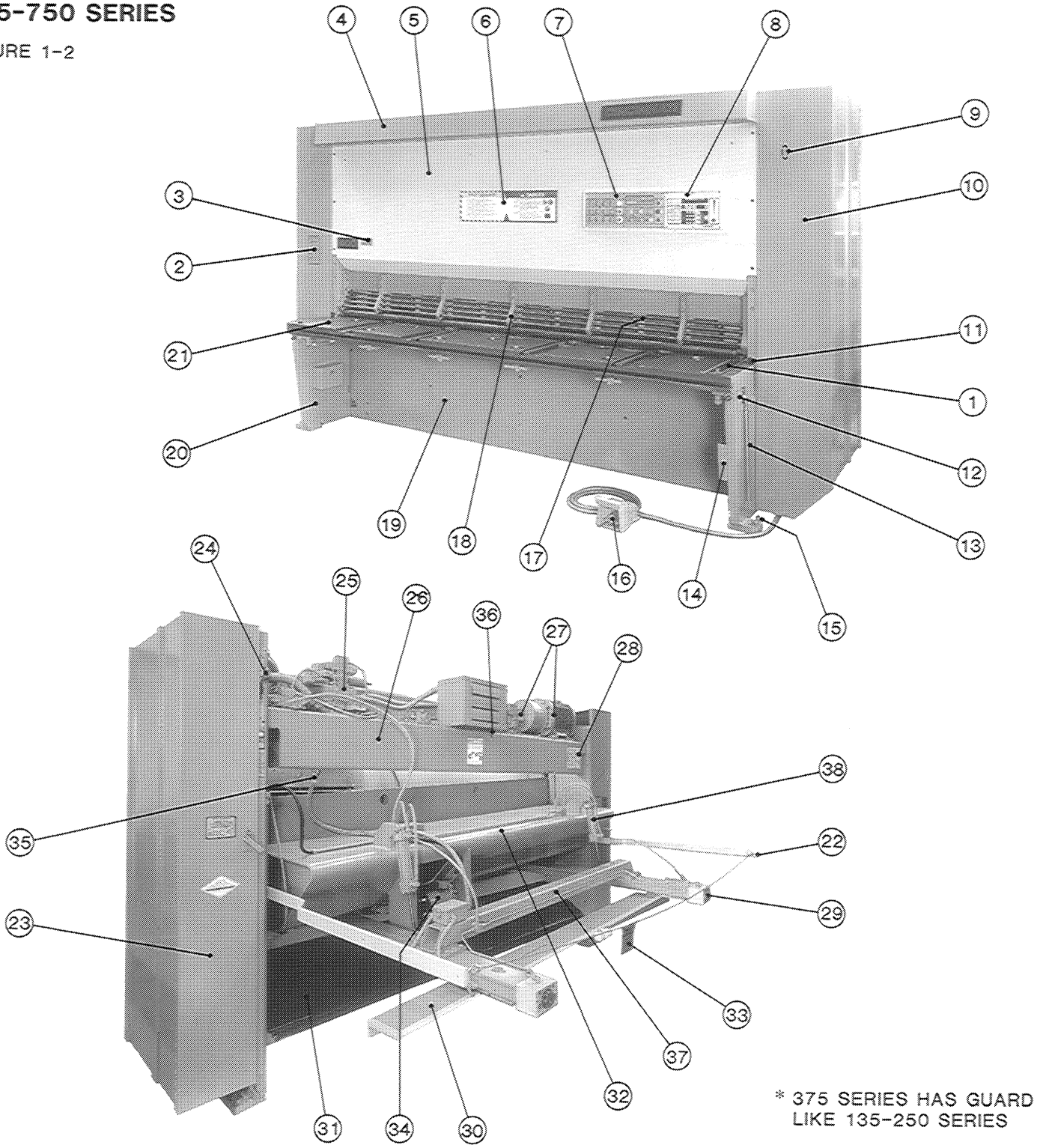
FIGURE 1-1



1. SIDE GAGE
2. TABLE SHIM LEGEND PLATE
3. CAPACITY/SERIAL NO. PLATE
4. TOP LIGHT HOOD
5. FRONT COVER
6. SAFETY PLATE
7. SHEAR CONTROL CENTER
8. GAGE CONTROL CENTER
9. LIFTING HOLE (IN HOUSINGS)
10. CYLINDER GUARDS
11. KNIFE CLEARANCE SHIMS
12. SERIAL NUMBER
13. KNIFE CLEARANCE ADJUSTING WRENCH
14. MANUAL POCKET
15. LEVELING SCREW (250 ONLY)
16. FOOTSWITCH
17. HYDRAULIC HOLDDOWN
18. POINT-OF-OPERATION GUARD
19. BED
20. HOUSING
21. TABLE
22. REAR BARRIER GUARD
23. MAIN ELECTRICAL ENCLOSURE
24. DISCONNECT SWITCH
25. HYDRAULIC MANIFOLD
26. HOUSING BRACE/HYDRAULIC RESERVOIR
27. PUMP AND MOTOR
28. HYDRAULIC FLUID SPECIFICATION
29. BACK GAGE GUIDE
30. BACK GAGE ANGLE
31. SCRAP CHUTE
32. RAM BRACE
33. REAR BARRIER SIGN
34. BACK GAGE MOTOR
35. HYDRAULIC RESERVOIR DRAIN
36. OIL SIGHT GAGE
37. OIL FILLER-BREATHER CAP

375-750 SERIES

FIGURE 1-2



* 375 SERIES HAS GUARD LIKE 135-250 SERIES

1. SIDE GAGE
2. TABLE SHIM LEGEND PLATE
3. CAPACITY/SERIAL NO. PLATE
4. TOP LIGHT HOOD
5. FRONT COVER
6. SAFETY PLATE
7. SHEAR CONTROL CENTER
8. GAGE CONTROL CENTER
9. LIFTING HOLE (IN HOUSINGS)
10. CYLINDER COVER
11. KNIFE CLEARANCE SHIMS
12. SERIAL NUMBER
13. KNIFE CLEARANCE ADJUSTING WRENCH
14. MANUAL POCKET
15. LEVELING SCREW
16. FOOTSWITCH
17. HYDRAULIC HOLDDOWN
18. AWARENESS BARRIER *
19. BED
20. HOUSING
21. TABLE
22. REAR BARRIER GUARD
23. MAIN ELECTRICAL ENCLOSURE
24. DISCONNECT SWITCH
25. HYDRAULIC MANIFOLD
26. HOUSING BRACE/HYDRAULIC RESERVOIR
27. PUMP AND MOTOR
28. HYDRAULIC FLUID SPECIFICATION
29. BACK GAGE GUIDE
30. BACK GAGE ANGLE
31. SCRAP CHUTE
32. DELTA RAM BRACE
33. REAR BARRIER SIGN
34. BACK GAGE MOTOR
35. HYDRAULIC RESERVOIR DRAIN
36. OIL SIGHT GAGE
37. BACK GAGE TORQUE TUBE
38. BACK GAGE LIFT CYLINDER

SECTION 2 INSTALLATION

UNLOADING

Upon receipt of your CINCINNATI Hydraulic Shear, carefully remove contents of the one or more packing boxes with the machine. All loose parts, such as 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. Claims for shortages or damaged parts should be made within ten (10) days. Remove all shipping paper from the wrapped parts of the shear.

LIFTING AND MOVING

CINCINNATI Hydraulic Shears are usually shipped assembled and on skids. They are readily handled by a crane of sufficient capacity, with chains or cable adjusted to proper length for even lifting (Refer to ANSI Standard B30.9). Refer to specification chart in Section 4 for approximate weights. A typical lifting arrangement is shown in Figure 2-1.

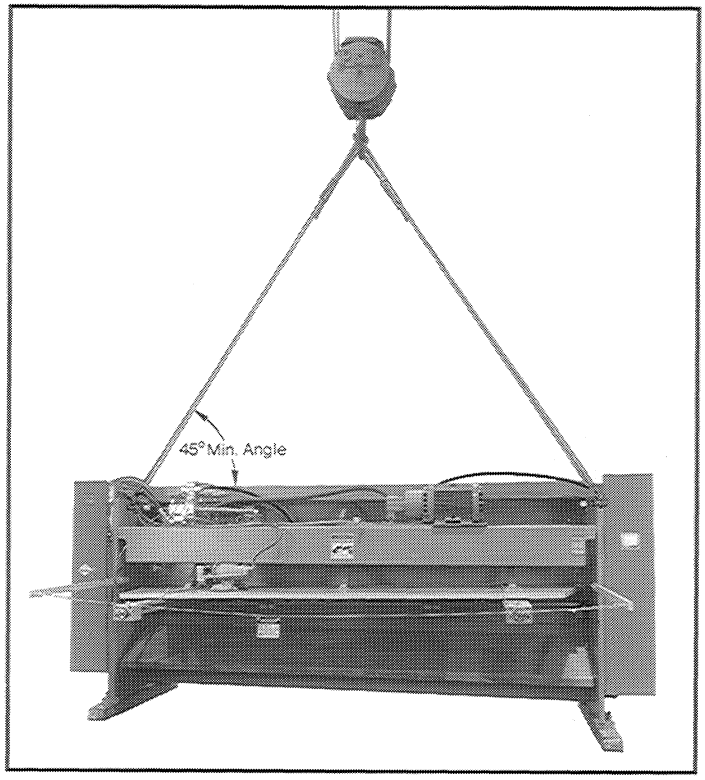


FIGURE 2-1 - Lifting

Where crane facilities are insufficient in capacity or not available, rig the machine into final location. Where rolling is easy, it is frequently desirable to rig the machine into final location even where crane service is available. Be careful to keep machine supported evenly. We recommend professional riggers be employed to handle the machine to ensure against damage to the machine or injury to workers.

FOUNDATION

A rigid foundation is essential. It must be able to support the machine without settling. Money spent on a proper foundation is a good investment. For details of foundation, refer to certified Foundation Plan drawing previously furnished. As a final check, see that the anchor bolts in your foundation coincide with the bolt hole spacing in the housing feet.

135 Series only - Check height of foundation bolt from bottom of shear foot. Height cannot exceed dimension shown on the Foundation Plan drawing.

REMOVING SKIDS

Lift the machine with a crane to remove skids. If no crane is available, the shear should be rigged into position directly over the foundation bolts. Jack up the shear one end at a time in approximately 4" (100mm) steps and block until skid can be removed. Remove skids and lower each end alternately by removing blocking in steps of about 4" (100mm) until foundation bolts extend into housing feet.

IMPORTANT: Shears equipped with a optional pneumatic sheet support or conveyor will require riser blocks to be placed on the foundation bolts before the shear is lowered into position.

On the **135 Series** Shears, remove foot support channel (do not discard) and place loose housing feet directly over the foundation studs before the shear is lowered into position. See Figure 2-2.

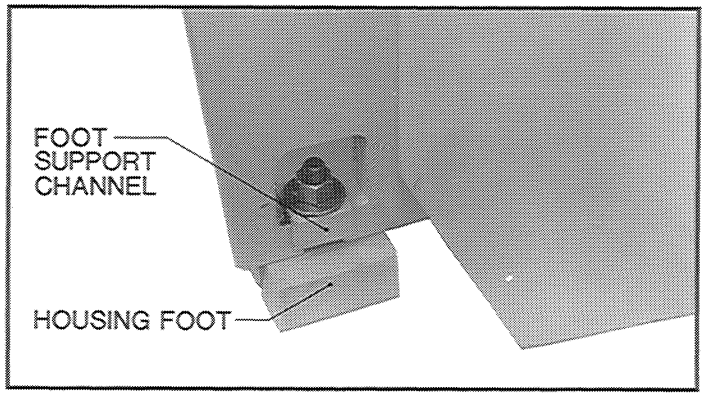


FIGURE 2-2 - 135 Series housing foot

On the **250** through **750 Series** shears, run the hex leveling screws down so that the shear rests on these screws. Lower the shear onto the foundation. Do not allow shear to permanently rest on leveling screws. See Figure 2-3.

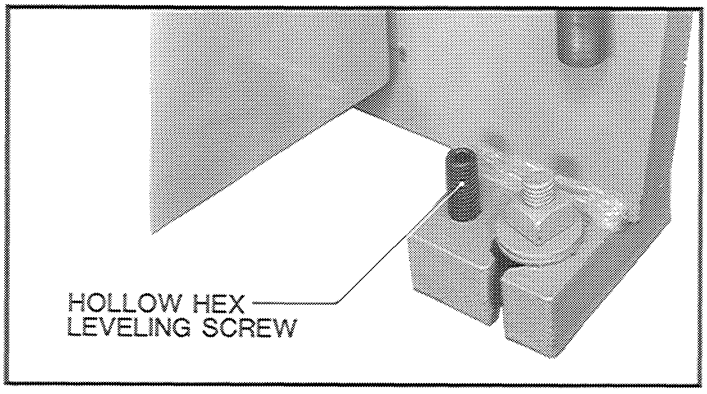


FIGURE 2-3 - 250/750 Series housing feet

CLEANING

Remove all paper and plastic wrappings from the machine. Thoroughly clean protective grease from all parts of the machine. Use a rag wet with an aliphatic solvent, such as mineral spirits, and go over this grease, allowing it to soak. Use rags instead of waste. A stiff brush will get into the corners. Do not use an air hose as its pressure will drive grit and dirt into bearing surfaces. After cleaning thoroughly, wipe dry and make sure no grease or grit is left. Do not remove the blocks under the cylinder clevis — the CINCINNATI INCORPORATED Service Representative will remove them at start-up. Periodic cleaning of the machine after installation is advisable.

LEVELING

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

The table is leveled by placing flat steel shims of proper thickness under the housing feet as required. These shims are furnished with the machine. Use a precision level - not a carpenter's or machinist's level. Always wipe level and table surface clean before placing the level. Give the bubble of the precision level a full half minute to come to absolute rest before reading.

On the **135 Series**, the machine is raised by driving steel wedges under the housing or jacking under the bed extension.

On the **250** through **750 Series**, the shear can be raised or lowered by using the leveling screws and at least a two ft. (610mm) length of pipe on the handle of the wrench.

LEVELING PROCEDURE

1. Raise the shear until the thickest shim, 1/4" (6.3mm) 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 (and channel sections on **135 Series**) on foundation bolts. 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 or steel wedges, 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 2-4. 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 or steel wedges to raise or lower the shear.

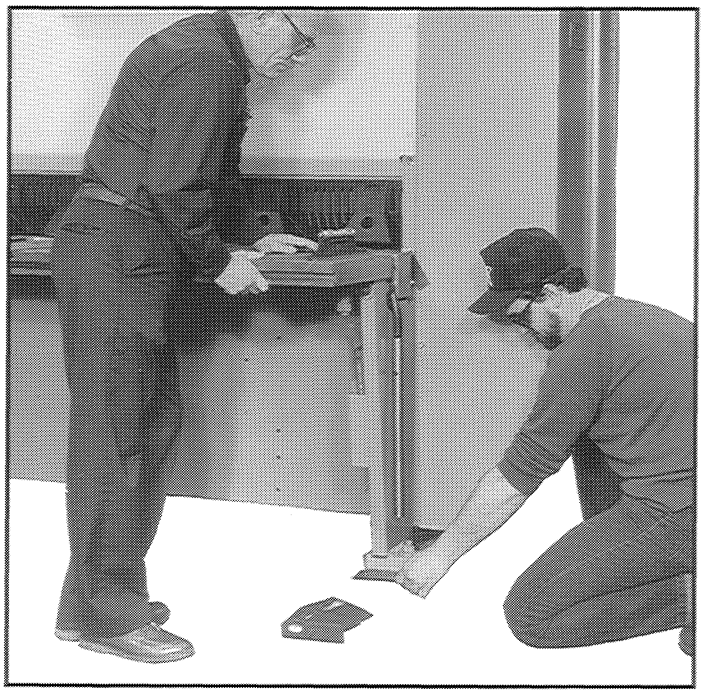


FIGURE 2-4 - Leveling the table

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

5. Level 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" (.025mm).

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

7. The nuts on 3/4" (19mm) foundation bolts should be torqued to about 188 ft. lbs. (255 Nm), and 1" (25.4mm) bolts are torqued to about 454 ft. lbs (616 Nm).

8. Do not use any grout under bed or housing feet.

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

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, unless the optional oil heater is supplied. 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 until thoroughly reading the "SAFETY" and "OPERATION" sections of this manual and a CINCINNATI INCORPORATED Service Representative is present.

IMPORTANT: At this point call the CINCINNATI INCORPORATED Service Representative before proceeding any further. DO NOT START THE MACHINE. The Service Representative will check the installation and machine thoroughly before start-up.

OIL TANK DRAIN

The oil reservoir is supplied with a drain valve (Item #35, Figure 1-1 and 1-2). Before starting the pump, open this valve to drain any water that may have collected in the tank during shipment. If no water comes out, or when oil starts coming out, close the valve securely. Repeat this check monthly.

INITIAL LUBRICATION

CINCINNATI hydraulic shears are shipped with the hydraulic reservoir filled with oil. Before starting your hydraulic shear, make the following lubrication checks:

1. Check oil level in sight glass on rear of hydraulic reservoir.

   The automatic lubrication system has the lubricating oil supplied directly from the hydraulic reservoir. It is particularly important to check and maintain reservoir oil level for these machines.

2. The automatic lubrication system requires manually cycling the hydraulic control valve until all the lubrication points are sufficiently supplied with oil. To manually cycle valve:

   A. Turn OPERATOR CONTROLS selector to "OFF".

   B. Start main drive motor.

   C. Manually energize lube valve solenoid. See Figure 2-5.

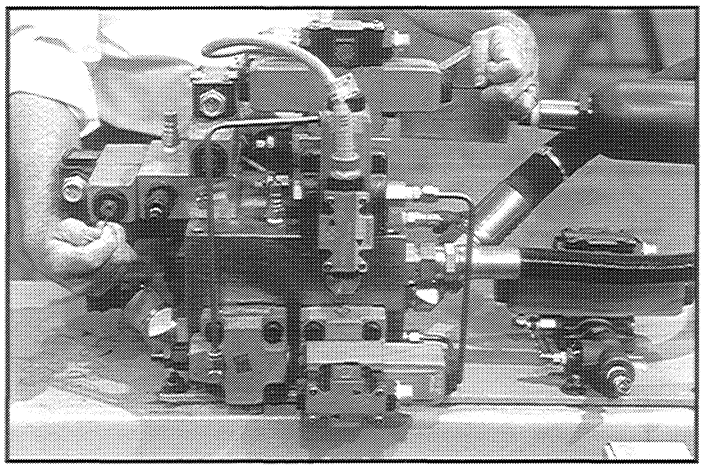


FIGURE 2-5 - Lube valve solenoid

   D. While keeping the lube valve energized, manually energize solenoid 2A. Pulse solenoid 2A "OFF" and "ON" until oil is supplied to all lubrication points.

FINAL LEVEL CHECK

Check the clearance between the ram and gibs. With the ram hanging free, there should not be any clearance at the top rear and bottom front. There should be .000" to .001" (0-.025mm) clearance at the top front and bottom rear. Check with .0015" (.038mm) feeler gage.

With the main drive motor ON, the OPERATOR CONTROLS turned "OFF" and the ram at top of the stroke, the ram should fall freely if solenoid 4 is energized manually. See Figure 2-6.

If the ram does not fall freely there is a twist in the ram, which must be corrected regardless of the level reading on the table. Raise or lower the rear corner

of either housing by adding or removing shims to relieve this twist so that the clearance will be as specified above.

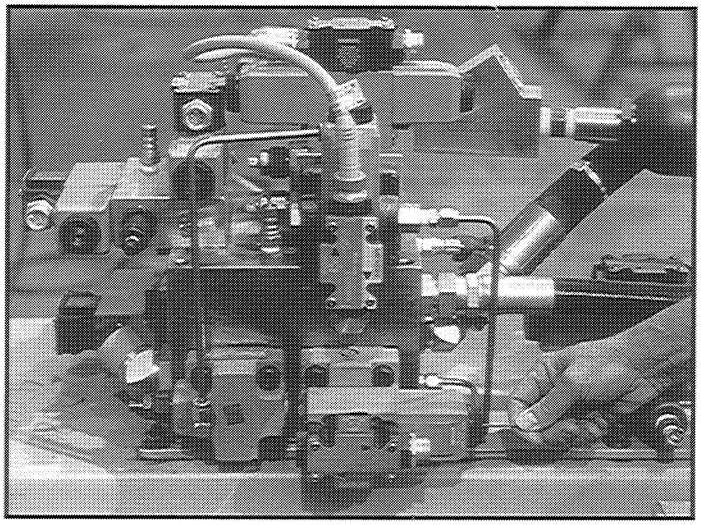


FIGURE 2-6 - Energizing solenoid 4

INITIAL START-UP

Before starting your shear, the SAFETY Section 3, SET-UP AND USE Section 5, MACHINE CONTROL Section 6 and OPERATION Section 7 of this manual must be read and thoroughly understood by every operator assigned to this shear. Special emphasis should be given to the following:

- **WHEN MACHINE IS NOT IN USE, ALWAYS RUN RAM TO BOTTOM OF STROKE.**
- **WHENEVER LEAVING THE SHEAR, ALWAYS TURN THE "OPERATOR CONTROLS" SELECTOR TO "OFF" POSITION AND REMOVE KEY.**
- **NEVER PLACE ANY PART OF YOUR BODY IN THE KNIFE OR HOLDDOWN AREA.**

IMPORTANT: A CINCINNATI INCORPORATED Service Representative should be present during initial start-up of your Shear. Before starting the drive motor the following checks should be made:

1. Installation has been completed as determined by a CINCINNATI INCORPORATED Service Representative, including:
   a. Foundation
   b. Cleaning
   c. Leveling
   d. Initial lubrication (including oil level and water in the reservoir)
   e. Electrical connections and service
2. All machine options have been installed on the machine.
3. A complete visual inspection of the machine has been made.
4. Before stroking the ram, the table and lower knife should be moved toward the front, away from the upper knife to avoid any possibility of the knives clashing. Refer to "ADJUSTING KNIFE CLEARANCE", Section 9.

TO START MACHINE

1. Turn the main disconnect switch "ON".
2. Turn the OPERATOR CONTROLS selector and the MODE selector to the "OFF" position.
3. Jog the drive motor with the START and STOP buttons and make certain that pump rotation is counterclockwise (looking from pump end). If the rotation is not correct, reverse two incoming leads to the main disconnect switch. Now press START button and bring the pump up to full speed.
4. Turn the OPERATOR CONTROLS selector to the "ON" position.
5. Turn the MATERIAL LENGTH adjusting knob to the maximum length setting.
6. Turn the MATERIAL THICKNESS adjusting knob to the maximum thickness setting.
7. Turn the MODE selector to the "INCH" position.
8. Depress the footswitch momentarily to activate the READY light.

You are now ready for a full length stroke. Use the footswitch and cycle the shear for at least twenty strokes to work any air out of the system. Stop the ram at the top.

All controls, electrical functions and safety features should be checked for proper operation.

Before you do any shearing it will be necessary to check and adjust knife clearance. Refer to the explanation of "KNIFE CLEARANCE" and "USE OF KNIFE SHIMS" in Section 7 and to "ADJUSTING KNIFE CLEARANCE" in Section 9.

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SAFETY RECOMMENDATIONS FOR HYDRAULIC 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 HYDRAULIC 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.

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 Hydraulic 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. Be sure that the rake is properly set for the material you are going to cut. 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 the left end of the front cover.

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

1. Be sure you know how to operate and adjust your CINCINNATI Hydraulic Shear. Inspect the machine to see that all guards are in place. Review the "MACHINE CONTROLS" and "OPERATION" 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.
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. 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 5 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 the "OPERATOR CONTROLS" selector switch, lock it and take the 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 hydraulic 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 hydraulic 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.

SAFETY GUIDELINES - DANGER

This warning sign, Figure 3-1, is attached to the front of the shear. The "Guidelines" portion of the sign provides a checklist of safety considerations which should be observed before, during and after operation of the shear. The "Danger" portion of the sign is a reminder to the machine operators or the maintenance personnel that certain procedures must be followed to prevent serious bodily injury.

HAZARDOUS AREA

This sign, Figure 3-2, warns of a hazardous area 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.

FIGURE 3-2 - Hazardous area sign

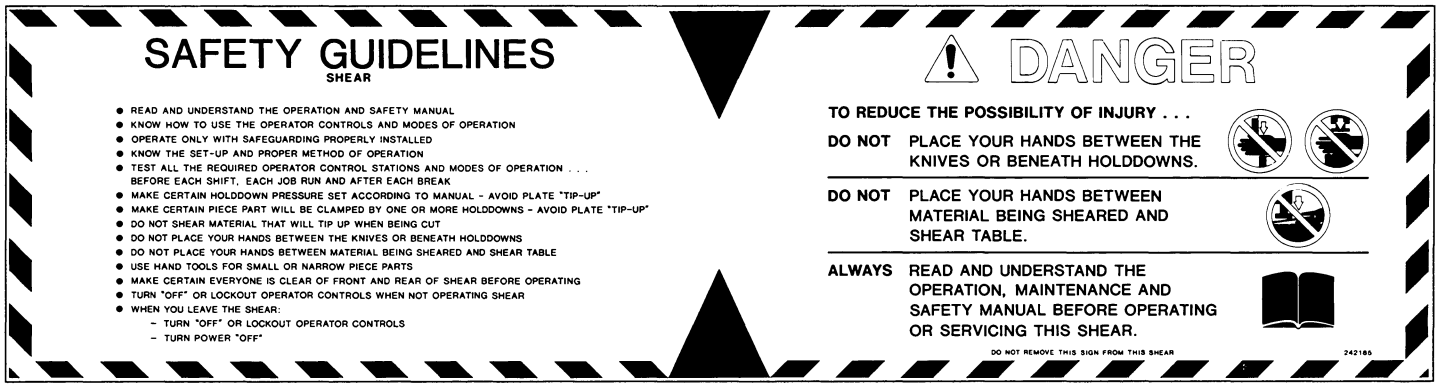

FIGURE 3-1 - Guidelines/Danger sign

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 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.

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

SPECIFICATIONS

CAPACITY MILD STEEL (Inches) ①	MIN. MAT. THICK. (Inches)	SERIES	MAX. RAKE (In./ft.)	HOLDDOWNS				GAGE RANGE		RAM SPEED (In./Min.)		STROKES/ MINUTE		MOTOR	KNIFE SIZE (Inches)	APPROX. SHIP. WEIGHT (Lbs.)
				FORCE (Tons)	NO.	DISTANCE UNDER HOLD-DOWNS (Inches)	DISTANCE UNDER GUARDS (Inches)	BACK (Inches)	FRONT (Inches)	UP	FULL LOAD DOWN	MAX. ②	MIN. ③	H.P.		
.135	26 Ga. (.0179)	135 x 6	.250	3.5	8	.50	.25	36	48.5	483	302	85	60	15	1 x 3 x 78	8,600
		135 x 10		5.3	12				48.5			70	38		1 x 3 x 126	11,000
.250	26 Ga. (.0179)	250 x 6	.375	5.7	8	.50	.50	36	55.0	308	178	65	32	15	1 x 3 x 78	14,000
		250 x 8		7.1	10				55.0			63	26		1 x 3 x 102	15,000
		250 x 10		8.5	12				55.0			60	20		1 x 3 x 126	16,000
		250 x 12		9.9	14				58.5			58	18		1 x 3 x 150	17,000
		250 x 14		11.3	16				63.5			52	16		1 x 3 x 174	18,000
.375	26 Ga. (.0179)	375 x 10	.438	14.9	13	.63	.63	48	58.5	271	150	55	15	20	1 x 3 x 126	18,500
		375 x 12		17.2	15				63.5			52	13		1 x 3 x 150	20,000
		375 x 14		19.5	17				61.9	219	126	41	7		1 x 4 x 172	31,000
.500	22 Ga. (.0299)	500 x 10	.500	20.6	13	1.00	1.00	48	53.9	219	126	45	11	25	1 x 4 x 124	25,000
		500 x 12		23.8	15				58.9			43	9		1 x 4 x 148	28,000
.750	20 Ga. (.0359)	750 x 10	.750	32.3	13	1.50	1.50	48	54.0	310	163	45	10	40	1.12 x 5 x 124	35,000
		750 x 12		37.3	15				59.0			43	8		1.12 x 5 x 148	39,000

CAPACITY MILD STEEL (mm) ①	MIN. MAT. THICK. (mm)	SERIES	MAX. RAKE (degree)	HOLDDOWNS				GAGE RANGE		RAM SPEED (mm/sec)		STROKES/ MINUTE		MOTOR	KNIFE SIZE (mm)	APPROX. SHIP. WEIGHT (kg)
				FORCE (kN)	NO.	DISTANCE UNDER HOLD-DOWNS (mm)	DISTANCE UNDER GUARDS (mm)	BACK (mm)	FRONT (mm)	UP	FULL LOAD DOWN	MAX. ②	MIN. ③	(KW)		
3	0.5	135 x 6	1°12'	31	8	12.7	6.3	914	1231	205	128	85	60	11.2	25x76x1981	3,910
		135 x 10		47	12				1231			70	38		25x76x3200	4,990
6	0.5	250 x 6	1°47'	51	8	12.7	12.7	914	1397	130	75	65	32	11.2	25x76x1981	6,360
		250 x 8		63	10				1397			63	26		25x76x2590	6,810
		250 x 10		76	12				1397			60	20		25x76x3200	7,260
		250 x 12		88	14				1485			58	18		25x76x3810	7,720
		250 x 14		101	16				1612			52	16		25x76x4419	8,170
9	0.5	375 x 10	2°5'	133	13	15.9	15.9	1219	1485	115	64	55	15	14.9	25x76x3200	8,400
		375 x 12		153	15				1612			52	13		25x76x3810	9,080
		375 x 14		173	17				1572	93	53	41	7		25x102x4368	14,070
12	0.75	500 x 10	2°23'	183	13	25.4	25.4	1219	1371	93	53	45	11	18.6	25x102x3149	11,340
		500 x 12		212	15				1498			43	9		25x102x3759	12,710
19	0.9	750 x 10	3°35'	287	13	38.1	38.1	1219	1371	131	69	45	10	29.8	28x127x3149	15,880
		750 x 12		332	15				1498			43	8		28x127x3759	17,700

① The above capacities are for mild steel with 60,000 psi (413,700 kPa) maximum tensile strength. For relative capacities of other materials, refer to "SHEAR AND KNIFE CAPACITIES" bulletin PT-30491 included with this manual.

② Maximum strokes per minute - 12" (300mm) cut length with minimum rake angle.

③ Minimum strokes per minute - full length capacity at maximum rake angle.

SHEARING OPERATING PRINCIPLE

CINCINNATI Hydraulic Shears have a single outlet fixed displacement, vane type pump driven through a flexible coupling by an electric motor. When the shear is idling, all oil displaced by the pump is discharged back to the tank through the dual relief valve and then through the return filter. Stepping on the footswitch shifts the dual relief valve to the low pressure side. The holddown clamp valve shifts

simultaneously, followed by the shifting of the holddown release valve causing full pump discharge to go into the holddown cylinders, forcing the holddown plungers to clamp the sheet or plate on the table. This clamping pressure is controlled by the holddown pressure switch. The clamping pressure is pre-set at the factory. A surplus amount of oil goes into the accumulator, which is used to maintain holddown pressure throughout the cutting stroke. Some of this oil goes into the backgage back-off cylinders (**250-750** Series only), which pulls the backgage angle back after the material is securely clamped, to clear the piece cut off.

When the pre-set pressure on the holddown pressure switch is reached, it initiates the cut cycle. The holddown clamp valve closes, trapping the oil in the holddown system under pressure. It also shifts the dual pressure relief valve to the high pressure side so that full pump output is discharged into the top of the left cylinder. This causes the ram to descend. The pressure and resultant force is limited by an adjustment to the high side of the dual pressure relief valve. If the holddown pressure drops below the pressure switch setting during the cut cycle, the ram will stop and the hydraulic fluid will be diverted to the holddown cylinders. When the switch pressure setting is reached, the ram cycle will continue.

As the left piston descends, the oil in the piston end (bottom) of the cylinder, which is displaced by the piston, is discharged into the top of the right cylinder. The area below the left piston is equal to the net area above the right piston (cylinder area minus rod area). The result is that the right piston will move down along with the left piston, and exactly the same amount. This is why the cylinders are of different size.

At the bottom of the stroke three valves shift. The holddown release valve releases the trapped oil from the holddowns and the backgage back-off cylinders into the tank. This allows the holddowns to return to their up position, and the backgage angle to reset itself (**250-750** Series only). The dual pressure relief valve shifts to the low pressure side. The up valve shifts and changes the pump output from the top of the left cylinder to the bottom of the right cylinder, causing the ram to go up.

The rake control valve is also electrically activated if a rake correction is required. In "SINGLE STROKE" mode, the rake valve will be activated at top of every stroke if required. In "CONTINUOUS", the rake valve will be activated once every 100 strokes, if the footswitch is not released.

At the top of stroke the up valve closes and dual pressure relief valve shifts to vented center position.

RAKE AND STROKE CONTROL

Rake is the slope of the upper knife from one end to the other and is designated in inches rise per foot (degrees). The steeper the rake, the smaller the area of material that will be in shear at one time. This will reduce the force necessary for shearing. Conversely, lowering the rake will increase the area in shear at one time which will raise the force necessary for shearing. To change rake on a shear, one end of the ram must be raised or lowered relative to the other end. Rake cannot be changed on the **135 Series**.

One of the advantages of a hydraulic shear is the fact that its rake can be easily changed. It can be increased so that the shear will cut heavy plate, or it can be decreased to cut thinner sheet with less distortion of the backpiece.

On a CINCINNATI Hydraulic shear the oil between the lower side of the left piston and the upper side of the right piston is trapped. This forms a closed circuit maintaining the relative positions of the two pistons. If oil is added to this closed circuit under pressure, it will raise the left piston, increasing the rake. The right piston cannot go down as it is held up by the counterbalance valve. If some of this trapped oil is drained out, the left piston will come down, decreasing the rake. Adding or draining oil in this closed circuit is accomplished by a solenoid operated valve.

The length of the ram stroke is adjustable on a CINCINNATI Hydraulic shear. The stroke length required for a cut depends on the length of the cut and the material thickness. Thicker materials and longer cuts require longer strokes.

Rake and stroke are controlled by the electronic rake and stroke control system. This system consists of a linear potentiometer mounted on each cylinder, one or two rotary potentiometers on the Control Center and the rake and stroke controller.

The rods on the linear potentiometers mounted on the cylinders are connected to the cylinder clevis. See Figure 4-1. The rods retract as the ram moves down. The function of these potentiometers is to indicate the position of each cylinder piston to the controller. They each output a voltage which is proportional to their respective cylinder piston positions.

The two rotary potentiometers on the Control Center are used by the operator to adjust the rake and stroke. See Figure 6-2. The MATERIAL THICKNESS potentiometer (except for **135 Series**) adjusts the rake and the MATERIAL LENGTH potentiometer adjusts the stroke. Like the linear

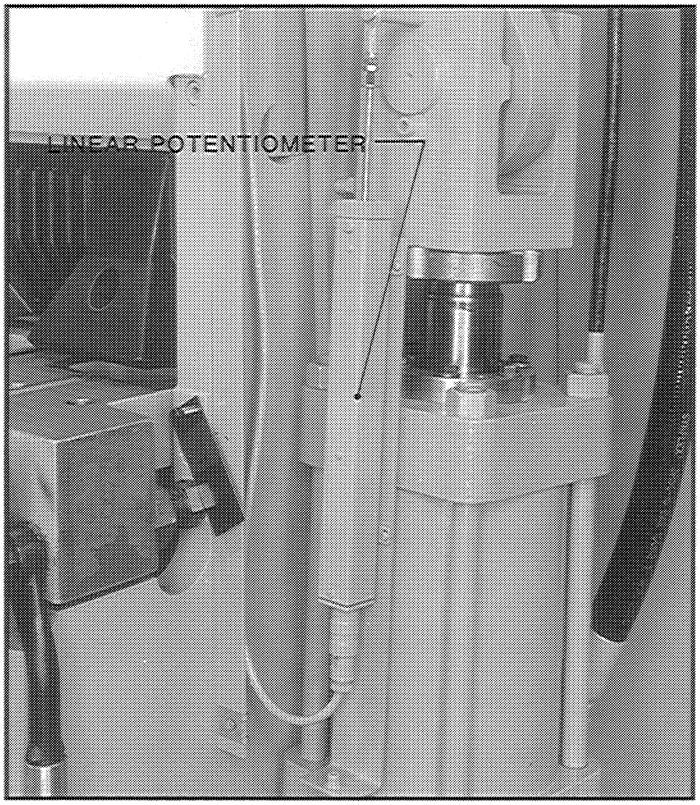

FIGURE 4-1 - Linear Potentiomer

potentiometers, they also output a voltage to the controller which is proportional to their set positions.

The controller compares the output voltages from these various potentiometers to control the rake and stroke. The output voltage from the linear potentiometer mounted on the left cylinder is matched to the output voltage from the "MATERIAL LENGTH" potentiometer on the Control Center to control the ram stroke. The difference in output voltages from the two linear potentiometers on the cylinders is matched to the output voltage from the "MATERIAL THICKNESS" potentiometer on the Control Center to control the rake.

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OPERATING RULES AND PRECAUTIONS

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 hand slot locations 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.

2. 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 one holddown.

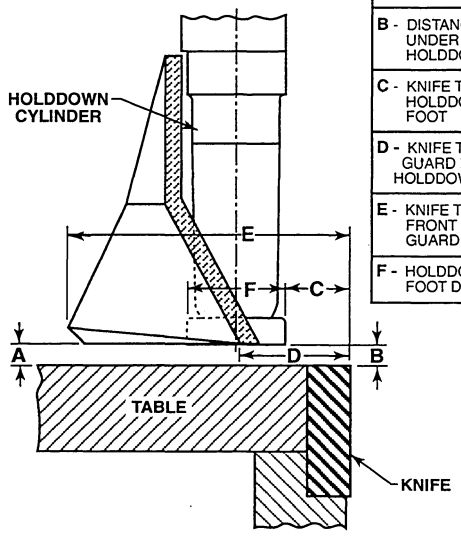
3. **There is a potential problem of catching the cut edge of table workpiece on the upper knife during the up-stroke of ram.** This is particularly true on shears with longer strokes or at the right side. Material pick-up is usually caused by the operator continuing to push the material in against the backgage throughout the stroke. A kink can be created in the table workpiece in this manner and even possible injury to the operator could occur.

4. **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.**

   Figure 5-1 shows the two types of guards and the relationship the relationship of the holddown foot to the shear table and to the cutting line at the lower knife. The minimum width of material on the table should be clamped by the full diameter of the holddown foot (dimension "C" plus "F"). The practical minimum depth of material that can be handled without special tools is limited by the guard-to-knife distance (dimension "D" or greater).

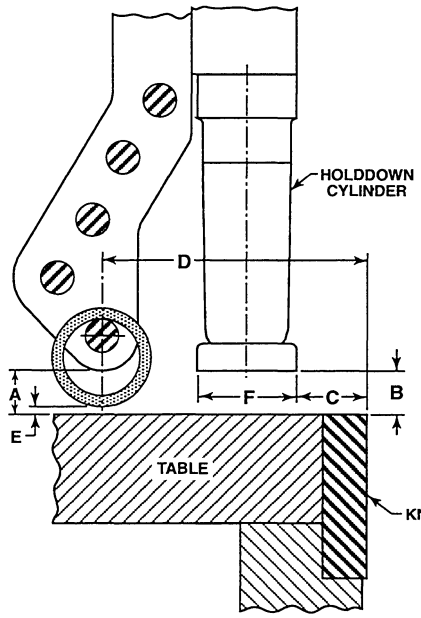
5. **Cut pieces must periodically be removed from the rear of the shear. If they are allowed to stack up, a pinch point will be created at the rear of the shear.** Stacked pieces can also cause damage to these blanks and to the machine. Whenever cut pieces are removed, the controls should be locked OFF 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

135 - 375 SERIES



	135	250	375
A - DISTANCE UNDER GUARD	0.25 (6.4)	0.50 (12.7)	0.63 (15.9)
B - DISTANCE UNDER HOLDDOWN	0.50 (12.7)	0.50 (12.7)	0.63 (15.9)
C - KNIFE TO HOLDDOWN FOOT	0.63 (15.9)	1.50 (38.1)	1.50 (38.1)
D - KNIFE TO GUARD BET. HOLDDOWNS	0.75 (19.1)	2.50 (63.5)	3.75 (95.3)
E - KNIFE TO FRONT OF GUARD	3.38 (85.7)	6.25 (158.8)	7.50 (190.5)
F - HOLDDOWN FOOT DIA.	2.25 (57.2)	2.25 (57.2)	2.25 (57.2)

500 - 750 SERIES



	500	750
A - DISTANCE UNDER GUARD	1.00 (25.4)	1.50 (38.1)
B - DISTANCE UNDER HOLDDOWN	1.00 (25.4)	1.50 (38.1)
C - KNIFE TO HOLDDOWN FOOT	1.63 (41.3)	1.75 (44.5)
D - KNIFE TO CENTERLINE OF BAR	6.06 (153.9)	7.43 (188.7)
E - MAX. OPENING UNDER MOVEABLE SECTION	0.19 (4.8)	0.25 (6.4)
F - HOLDDOWN FOOT DIA.	2.25 (57.2)	3.00 (76.2)

FIGURE 5-1 - HOLDDOWNS AND GUARDING

ram, ram brace and backgage assemblies move down and up every stroke.

6. 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 gets into the cut area. If this shattering occurs, flying pieces or slivers could cause painful injury. **Safety glasses should be worn at all times.**

7. 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 of the shear. 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.

8. If the material being sheared is not long 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 5-2 for a suggested type of clamp.

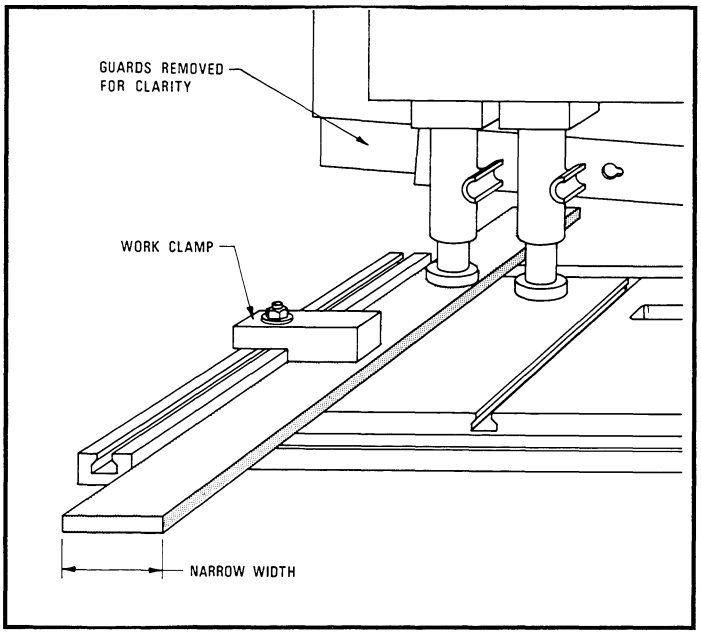


FIGURE 5-2 - Manual clamping device

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

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

11. We recommend that the shear be operated in the "SINGLE STROKE" mode of operation wherever practical.

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

Ram motion is controlled by the operator through one of several controls supplied with the shear, including a footswitch, probe contact devices in the backgage angle (optional) or a combination of these controls.

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

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 footswitch is depressed by the operator causing the cut to be made. The cut-off pieces fall to the rear of the shear. The ram returns to the top of its stroke and is ready for the next cut.

SHEARING AT LEFT OR RIGHT END

The 100 Series Hydraulic Shears are designed so that the following features and options are to be used with the material being sheared oriented at the left end:

1. Material Length Control
2. Probes
3. Pneumatic Sheet Support
4. Multi-Axis Gage Control
5. Rear corner support

Therefore, it is preferable to mount the optional squaring arm at the left end of the machine.

The shear can be short stroked at the right end. However, there are certain disadvantages to this type of operation in addition to those noted above. The right end short-stroke feature is achieved by the operator's control of the footswitch while using

CONTINUOUS mode of operation. The effectiveness of this mode of operation relies on the operator's skill. This can have the following adverse results:

1. Incomplete cuts, resulting in damaged material if the footswitch is released before the cut is completed.

2. Damaged edge of the table piece, dislodging the upper knife and/or damage to the shear, caused by releasing the footswitch too long after the cut is complete. This occurs by allowing the top edge of the upper knife to travel below the material and table.

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

BOW

Bow is the arching of the sheared piece out of its original flat plane. See Figure 5-3.

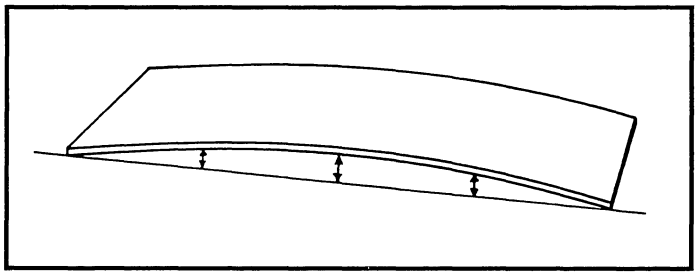


FIGURE 5-3 - Bow

TWIST

Twist is the spiraling of the cut-off piece because of shearing. See Figure 5-4.

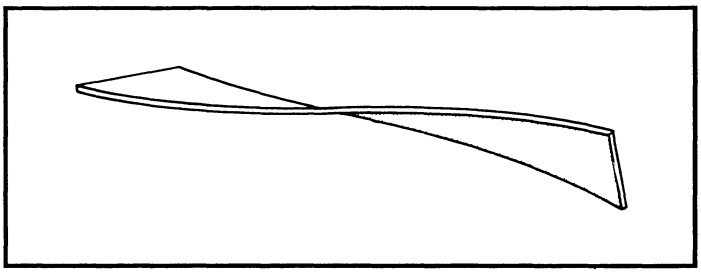


FIGURE 5-4 - Twist

CAMBER

Camber is the curving of a sheared strip in the plane of the material. Some camber could appear in the edge of the piece left on the table. See Figure 5-5.

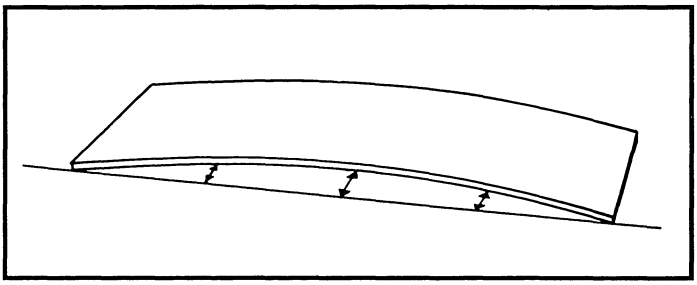


FIGURE 5-5 - Camber

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 the MODE selector is turned "OFF".

4. Set the gage or gages to the desired position.

5. Turn the MODE selector to the desired operating mode. 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.

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

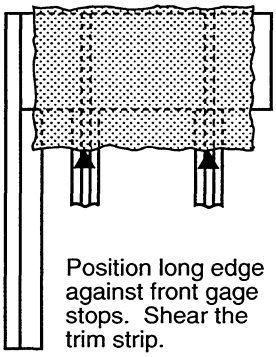
7. Operator should hold the piece in position until holddowns clamp it, and then remove his hands from the piece immediately before cut starts.

CAUTION

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

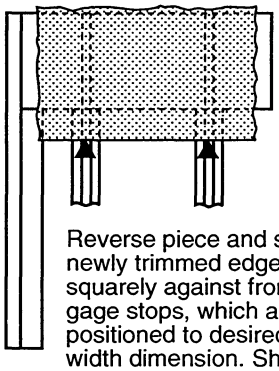
SQUARING - NORMAL CONDITIONS

1. FIRST TRIM



Position long edge against front gage stops. Shear the trim strip.

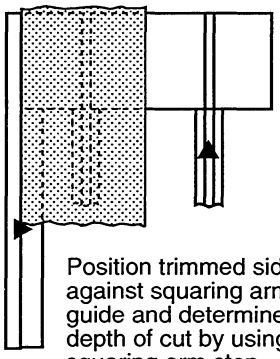
2. SECOND TRIM



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

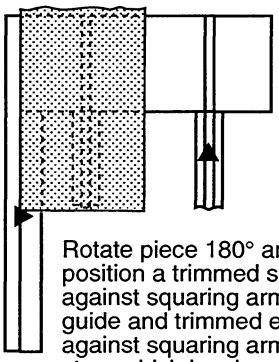
Width is now accurately cut parallel and to size.

3. TRIM END



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

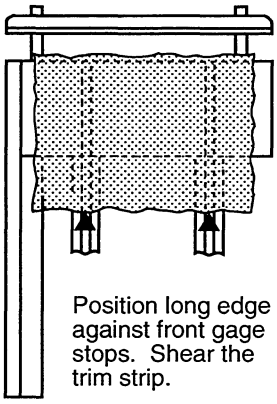
4. TRIM OTHER END



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

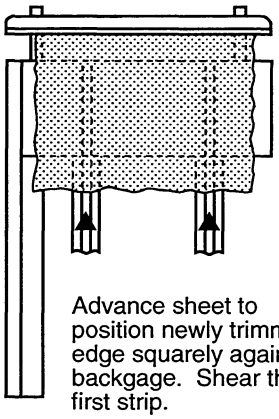
STRIPPING - NORMAL CONDITIONS

1. FIRST TRIM



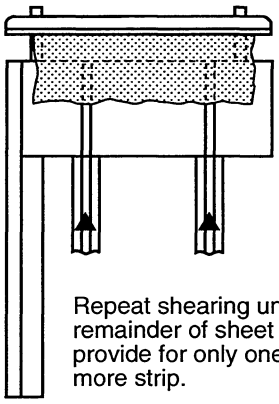
Position long edge against front gage stops. Shear the trim strip.

2. FIRST STRIP



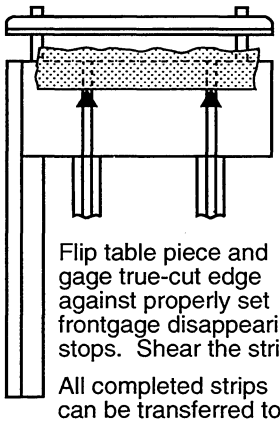
Advance sheet to position newly trimmed edge squarely against backgage. Shear the first strip.

3. CUT STRIPS



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

4. FINAL TRIM

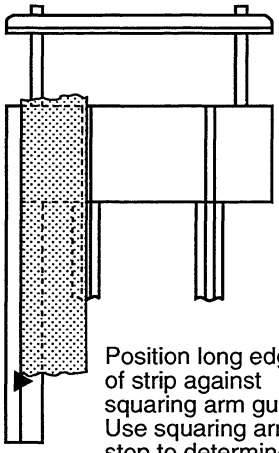


Flip table piece and gage true-cut edge against properly set frontgage disappearing stops. Shear the strip.

All completed strips can be transferred to front of shear for blanking operation.

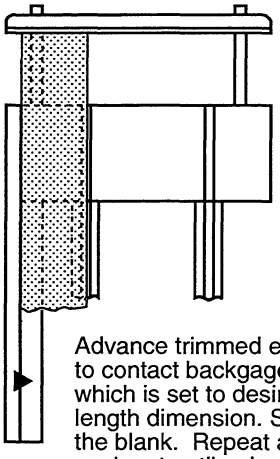
BLANKING - NORMAL CONDITIONS

1. TRIM END OF STRIP



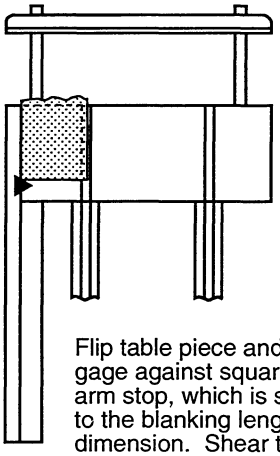
Position long edge of strip against squaring arm guide. Use squaring arm stop to determine depth of trim. Shear the trim strip.

2. CUT BLANKS



Advance trimmed end to contact backgage, which is set to desired length dimension. Shear the blank. Repeat after each cut until only a sufficient strip remains to provide one more blank.

3. CUT FINAL BLANK



Flip table piece and gage against squaring arm stop, which is set to the blanking length dimension. Shear the strip.

▶ Indicates gage stops.

TIPS FOR ABNORMAL CONDITIONS:

1. To minimize camber, trim one or more times, using the frontgage.
2. If blanks taper, fade backgage 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 the best results.
4. It may become necessary to make additional trim cuts during shear production cycles to remove edge burr or to reduce camber when automatic probe shear is used.

FIGURE 5-6 - Shearing operations

SHEARING OPERATIONS

STRIPPING

This is a shearing operation where many narrow pieces, usually less than 3" or 4" (76 or 102mm) wide, are sheared from a large sheet or plate. An example of stripping is shown on Figure 5-6. These strips are usually cut using the backgage, with a pair of frontgage stops set in the front support arms for an initial trim.

SHEARING NARROW WIDTHS

Extra precautions must be taken when shearing narrow pieces to make sure the clamping force is sufficient to hold the piece flat against the table during the cut. This is especially true when shearing material at or near the thickness capacity of the shear. If the clamping force is not sufficient, the material will raise off the table during the cut and then reclamp after the cut is complete. This creates a potential pinching hazard between the material and the table. Dull knives, excessive knife clearance and improper holddown pressure can contribute to this problem.

It is recommended that the following procedure be used when shearing narrow width material:

1. Use sharp knives.
2. Set knife clearance at a minimum.
3. Make a test cut, exercising extreme caution, anticipating the material may raise off the table.
4. If material does raise, reposition along the table so at least two holddowns are clamping the material. Another method is to provide an external clamping mechanism. For example, a work clamp bolted to dovetail slot in the squaring arm or the table. See Figure 5-2.

BLANKING

Ordinary blanks are made by shearing wide strips using the backgage and two sets of frontgage stops. The outer set of frontgage stops are set for making a trim cut, which should be at least as wide as the metal thickness. The backgage 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 backgage and strips are sheared until the original sheet or plate is so reduced in width that it cannot be fed against the backgage. Flip or rotate 180° the remaining piece and make the final trim using the inner front gage stops. This leaves the last blank on the table with the scrap falling behind the shear.

Quite often it may be desired to shear the ends of these blanks. This will normally require use of the blanking arm and its gages. See Figure 5-6.

SQUARING 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 backgage are usually used for these pieces as shown on Figure 5-6.

SQUARING LARGE SHEETS OR PLATES

Figure 5-6 illustrates the squaring 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.

PROCEDURE #1 (See Figure 5-7)

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

CAUTION

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

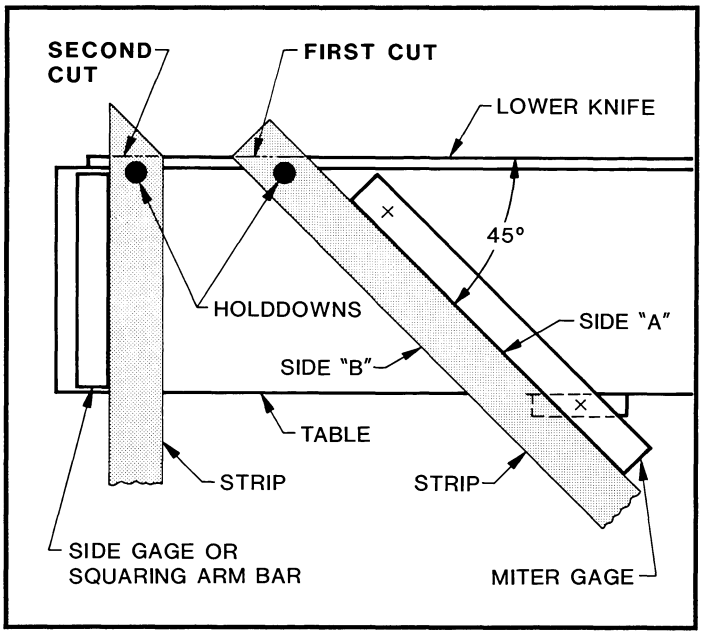


FIGURE 5-7 - Triangular gussets

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.

7. Cycle the shear making cut #2.

8. Repeat steps 3 through 5 as often as required.

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

PROCEDURE #2

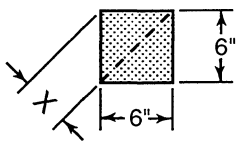
Use the backgage and a special tool similar to Figure 5-8. A light beam shearing gage could be helpful. The following procedure is for 45° gussets. The tool and set-up would vary for other angles.

1. Cut 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 backgage so that the counters or dials read the same as the length of the side of the square multiplied by .707. For example, the backgage setting to shear a 6" (152mm) square would be:

   X = 6" (152mm) times .707
   X = 4.242" (107.46mm)
   (X is back gage setting)



4. Make tool similar to Figure 5-8. (Note: Thickness "A" must be less than material thickness).

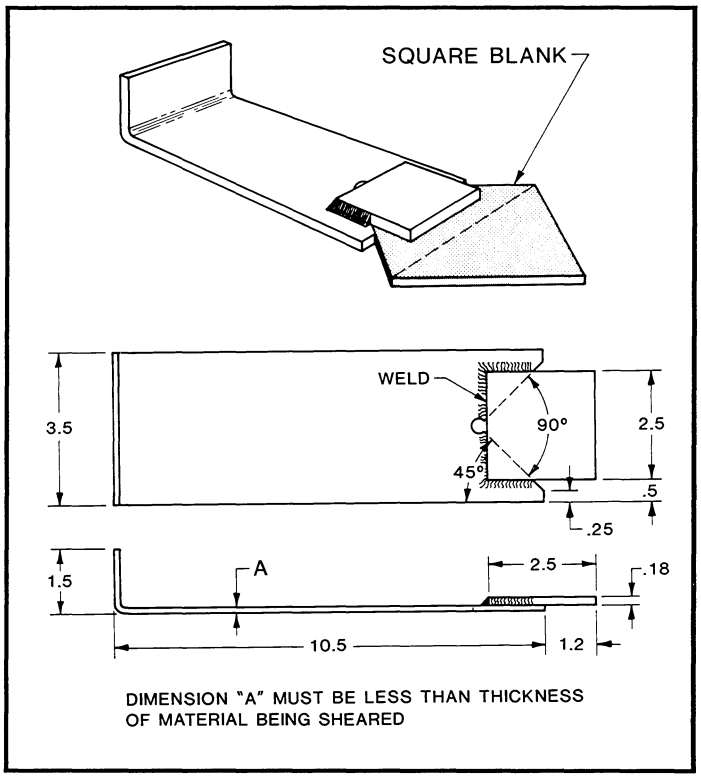


FIGURE 5-8 - Gusset shearing tool

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 backgage angle. Note that repeated use of this technique of pushing the material into the backgage angle can eventually cause a groove to be worn into the face of the angle.

CAUTION

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

6. Square up the piece so 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 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.

SHEET SPLITTING

Material thickness guidelines have been established for splitting sheets where the back piece exceeds

the backgage range. The maximum thickness for a 36 inch (914mm) range backgage is 10 gauge (.135"/3.416mm) and for a 48 inch (1219mm) range backgage is 3/16" (.188"/4.763mm). Shear must be set on full length stroke and maximum capacity setting (**135 or 250 only**).

These thicknesses are valid as long as the material shape allows the sheet to freely clear the backgage angle. The backgage system, and the backgage angle in particular, are not designed to withstand forces associated with bending the material.

If an application requires processing a material in excess of these capacities, the backgage angle on the 135 or 250 Series must be removed. The 375 Series and larger shears have a swing-up backgage so that any material within the capacity of the shear can be split.

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STANDARD CONTROLS

MAIN ELECTRICAL ENCLOSURE

The main electrical enclosure on CINCINNATI Hydraulic Shears is located on the outside of the right housing. See Figure 6-1. The main disconnect switch is on this enclosure. It disconnects all electrical power to the machine. 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 main electrical enclosure facing rear of machine. The low voltage circuit is a grounded circuit. This is an internal chassis ground - it does not indicate that 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 in to test. If it does not come ON, the bulb is burned out or it indicates a blown fuse. If the light does come ON, it indicates that the ground wire is disconnected. In either case, contact maintenance personnel.

The standard operator controls are located on the right end of the front cover. They are divided into two units, the SHEAR CONTROL CENTER (Figure 6-2) and the GAGE CONTROL (Figure 6-4).

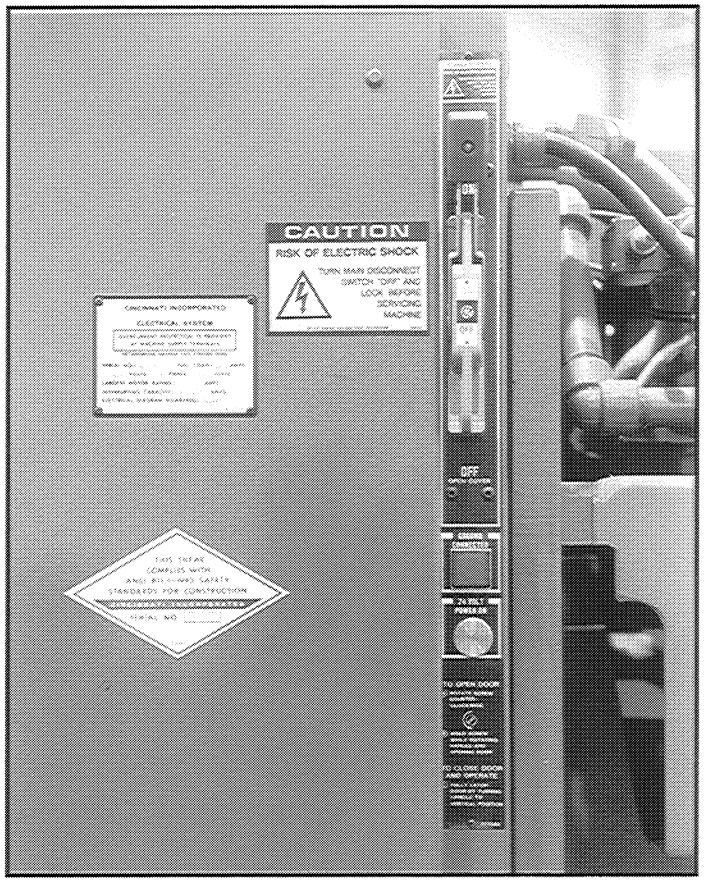

FIGURE 6-1 - Main electrical enclosure

SHEAR CONTROL CENTER

The SHEAR CONTROL CENTER provides controls for the shear's various functions. The standard controls are mounted on this panel, and while the positions for the optional controls are marked, the control openings are covered with plug buttons.

MAIN DRIVE "START" pushbutton: To start the main drive motor depress the "START" pushbutton. If the internal checks indicate that all components are functioning properly, the

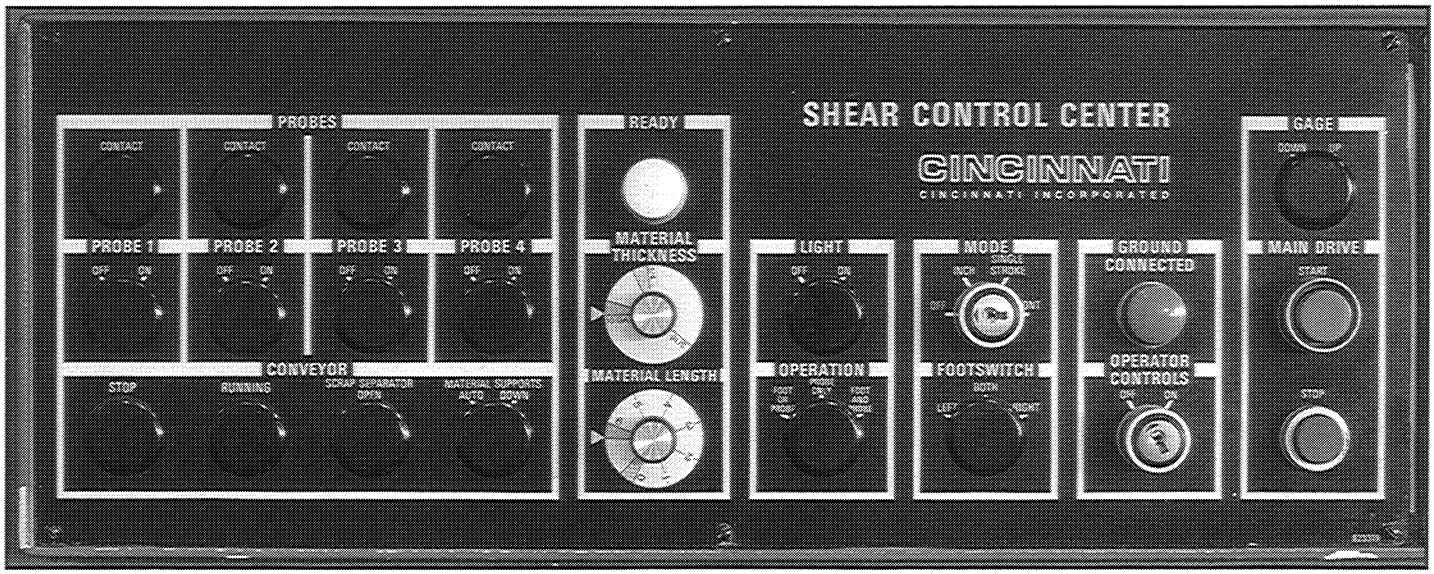

FIGURE 6-2 - Shear Control Center

motor will start. The green light on the "START" pushbutton will light, indicating that the motor has started.

MAIN DRIVE "STOP" pushbutton: When the red button is depressed all power to the motor is turned OFF. The motor and hydraulic pump will stop.

GROUND CONNECTED light: The low voltage circuit is a grounded circuit. This is an internal chassis ground - it does not indicate that the machine is grounded. When the light is lit it indicates the ground is connected. It should stay ON as long as the main disconnect is ON.

MODE Selector: Operation of the shear is controlled by a four-position keylock MODE selector switch and one (or two) three-position footswitch(es). The four positions of the MODE selector switch are as follows:

1. "OFF" - In this position all controls which cause or allow ram motion are deactivated, including the footswitch, "MATERIAL" adjustment knob and "LENGTH" adjustment knob. When MODE selector is turned "OFF", drive motor and pump will remain running.

2. "INCH" - With this position selected, the ram will move continuously whenever the footswitch is fully depressed until it reaches the top of the stroke. If the footswitch is raised to its mid or top position, ram motion will cease. Re-activation of the footswitch will start ram moving again in the same direction as before. This mode is normally used for set-up procedures and maintenance.

3. "SINGLE STROKE" - This is the recommended operating mode. Fully depressing the footswitch will cause the ram to make one complete cycle, stopping at the top of the stroke. The ram will only make 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 stroke. The footswitch must be fully released to start an other stroke.

4. "CONTINUOUS" - An operating mode where the ram will continue to cycle as long as the footswitch is **held depressed**. When the footswitch is released to the mid-position, the holddowns will remain down and the ram will stop. When the footswitch is completely released, the holddowns will raise and the ram will return to the top regardless of its position in the stroke. This mode is useful when stripping or blanking narrow widths of light gauge material where it is not necessary to stop the ram at the top of the stroke to allow for feeding the material. The CONTINUOUS mode may also be used to short stroke on the right. This is achieved by completely releasing the footswitch after the cut at any point during the down stroke. Short stroking on the right can have adverse results as listed on Page 5-2.

Depressing the footswitch only to its mid-position allows for independent operation of the holddowns in all operating modes. This feature is used for checking the material position when using the light beam shearing gage to shear to a scribed line. Release of the footswitch returns the holddowns to their normal up position.

Depressing the footswitch to its full down position starts motion of the shear ram. Releasing the footswitch will not stop ram movement (except in "INCH" and "CONTINUOUS") - it will continue to move until it stops at the top of the stroke. See Figure 6-3.

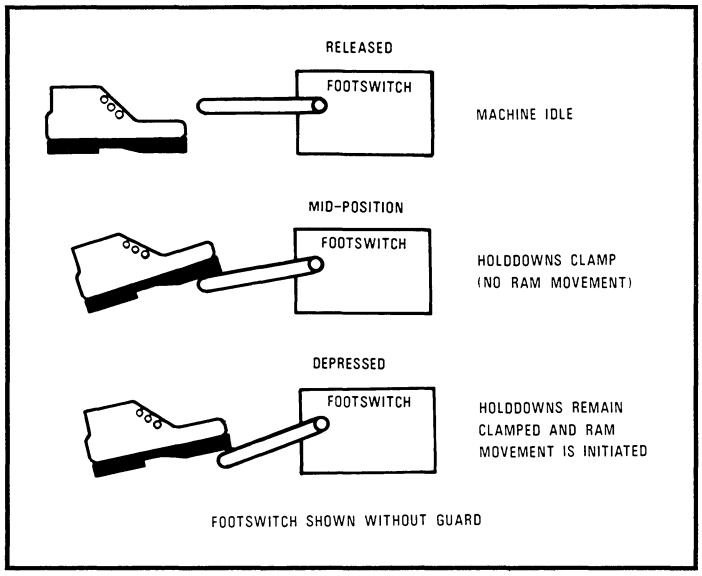

FIGURE 6-3 - Footswitch operation

OPERATOR CONTROLS Selector: This is a two-position keylock selector switch. In the "OFF" position all ram and backgage motion is prevented. The main drive motor, optional lights, and optional oil heater are still active.

The OPERATOR CONTROLS selector should be placed in "OFF" position and the key removed any time that ram motion is to be prevented, such as when removing material from the rear of machine. The "OFF" position should also be used when performing maintenance functions which require pump and motor to be running.

When the OPERATOR CONTROLS selector is turned to the "ON" position, all operator controls are made active.

CAUTION

MAKE SURE EVERYONE IS CLEAR OF MACHINE BEFORE TURNING THE "OPERATOR CONTROLS" SELECTOR TO THE "ON" POSITION.

MATERIAL THICKNESS Adjustment Knob (250-750 Series only): This MATERIAL THICKNESS knob adjusts the rake of the upper knife. It is graduated in mild steel thickness. To make a rake adjustment merely turn the knob to bring the mild steel thickness in-line with the indicator (the solid triangle at the 9:00 o'clock position). If shearing other than mild steel, set for the equivalent mild steel thickness as specified in the "Shear & Shear Knife Capacities" bulletin PT-30491.

CAUTION

MAKE SURE EVERYONE IS CLEAR OF MACHINE BEFORE ADJUSTING "MATERIAL THICKNESS". IF "OPERATOR CONTROLS" SELECTOR IS TURNED TO "ON" POSITION AND THE "MODE" SELECTOR IS NOT TURNED "OFF", LEFT END OF THE RAM WILL MOVE AS SOON AS KNOB IS TURNED.

MATERIAL LENGTH Adjustment Knob: The MATERIAL LENGTH knob adjusts the stroke of the shear ram. The graduations on the MATERIAL LENGTH adjustment knob are for the cut length in feet. To make a length adjustment, merely turn the knob to bring the desired length in-line with the indicator. This adjustment automatically provides enough stroke for any rake setting.

It is possible to leave the length adjustment at the maximum settings. However, doing this will increase the cycle time of the shear.

The shear will not adjust for a longer length unless the OPERATOR CONTROLS selector is turned to the "ON" position and the MODE selector is turned to the "SINGLE STROKE" or "CONTINUOUS" position.

CAUTION

DO NOT INCREASE THE LENGTH SETTING BEFORE MAKING CERTAIN EVERYONE IS CLEAR OF THE MACHINE SINCE THE RAM MAY MOVE.

The shear will not adjust for a shorter length until the machine is cycled, regardless of the MODE selector position. The ram will stop at the correct position for the shorter length on the return stroke.

READY Light: When the light is ON it indicates the shear is ready to cycle. Stepping on the footswitch will initiate a cycle. If the light is OFF it indicates the shear is not ready to cycle for one or more of the following reasons:

1. The main disconnect is OFF.
2. The main drive motor is not running.
3. The OPERATOR CONTROLS selector is in the "OFF" position.
4. The MODE selector is in the "OFF" position.
5. For first cycle after starting main drive motor the footswitch may not initiate a cycle. When the machine condition does not agree with MATERIAL, LENGTH or GAGE UP-DOWN settings, stepping on the footswitch will activate these controls. The READY light will go OFF while the machine adjusts to agree with the setting.

GAGE CONTROL (Refer to Figure 6-4)

The standard GAGE CONTROL provides a selection of various backgage positions plus a production stroke counter.

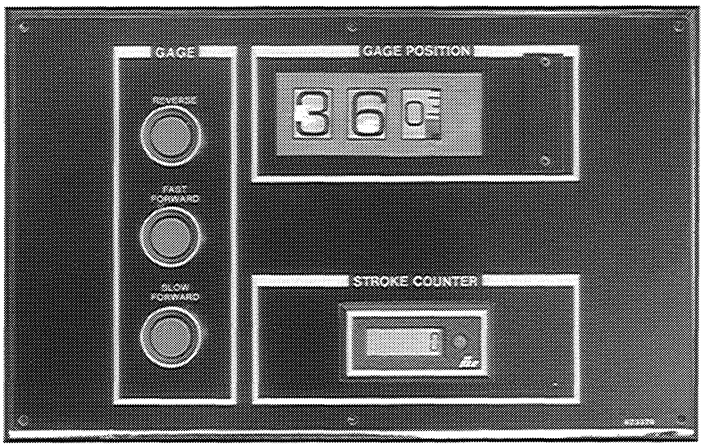

FIGURE 6-4 - Gage Control

GAGE POSITION Counter: The position of the backgage is controlled by the FORWARD and REVERSE pushbuttons and shown on this counter. The counter is available with fractional, decimal or metric graduation readouts.

GAGE - "SLOW FORWARD" Pushbutton: The backgage will move forward (towards the knives) in the slow speed (10 IPM or 254mm/min) when the "SLOW FORWARD" button is held

depressed. When setting the backgage 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 backgage guide screws. Final position is accomplished by "JOGGING" the "SLOW FORWARD" button.

GAGE - "FAST FORWARD" Pushbutton: The backgage will move forward towards the knives in fast speed (60 IPM or 1524mm/min) as long as the button is held depressed. Care must be taken not to advance the backgage into the lower knife.

IMPORTANT: Backgage cannot be moved forward unless the main drive motor is running and the OPERATOR CONTROLS selector is in the "ON" position.

GAGE - "REVERSE" Pushbutton: The backgage will move away from the knives in fast speed (60 IPM or 1524mm/min) as long as the button is held depressed. The backgage will move back until it reaches a stop at the rear limit of travel, at which time the button must be released.

GAGE - "DOWN-UP" Selector (375, 500 & 750 Series Only): With the selector in the "DOWN" position the backgage will be in its normal active position, where it is used to gage the depth of the backpiece. In this position the gage pushbuttons or the optional MICRO-COMPUTER GAGE CONTROL are active.

When the selector is turned to "UP" position, the backgage will move to rear position and will raise to its inactive position. In this position the backgage angle is above the passline of the shear, permitting the shearing of backpiece depths greater than backgage range. In the "UP" position the gage pushbuttons or MICRO-COMPUTER GAGE CONTROL are not active. If selector is turned to the "DOWN" position, backgage will move down to the active position.

This selector is only active when main drive motor is running and OPERATOR CONTROLS selector is turned to the "ON" position.

STROKE COUNTER: The stroke counter is a six-digit electronic L.C.D. resettable counter that counts each stroke of the ram. It is used mainly for production count. A manual reset button is provided to reset the count back to zero.

OPTIONAL CONTROLS

SHEAR CONTROL CENTER

The SHEAR CONTROL CENTER with optional controls is shown in Figure 6-5. The standard controls operate as previously described and the optional controls are described in the following paragraphs:

LIGHT Selector: The optional area lights and light beam shearing gage lights are always ON when the main drive motor is running. When the main drive motor is off, the lights can be turned "OFF" or "ON" with the selector switch.

OPERATION Selector: This is a three-position, keylock selector switch to identify the use of either footswitch, probes, or both. The three positions of the OPERATION selector switch are as follows:

1. "FOOT OR PROBE" - This allows a shear cycle to be initiated by depressing either the footswitch(es) or by contacting the active probes in backgage angle with the workpiece.

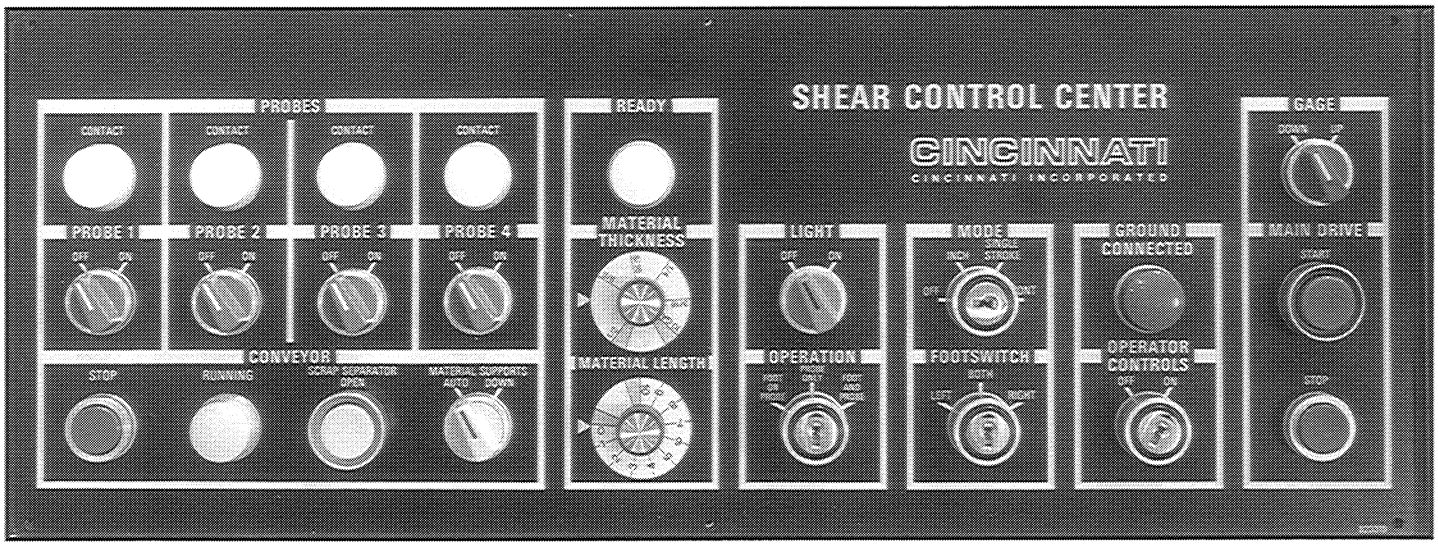

FIGURE 6-5 - Optional Controls

2. "PROBE ONLY" - This position allows a shear cycle to be initiated only by contacting the active probes in the backgage angle with the workpiece.

3. "FOOT AND PROBE" - This requires that the footswitch(es) must be depressed and the active probes in the backgage angle must be contacted with the workpiece to initiate a shear cycle.

PROBE Switches: These are two-position "OFF"-"ON" selector switches which make the probes inactive or active. The probes are shown on the SHEAR CONTROL CENTER as they are located in the backgage 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.

CONTACT Lights: When illuminated, this light indicates that the probe is active. When the workpiece makes contact with an active probe, the "CONTACT" light goes out. All active probes must be in contact with the workpiece to initiate a shear cycle. The material being sheared must be able to conduct electricity. The use of probes will speed-up production and improve accuracy.

CAUTION

DO NOT RUN THE BACKGAGE ANGLE UP AGAINST THE LOWER KNIFE. THE PROBE CONTACT ON THE KNIFE WILL CAUSE THE MACHINE TO CYCLE CONTINUOUSLY.

CONVEYOR: The optional conveyor is located at the rear of the shear and has its own control panel. Operating controls for the conveyor are provided on the optional shear control panel (Figure 6-5) for the convenience of the operator. The function of these controls are:

"STOP" Pushbutton: When the button is depressed all power to the conveyor motor is turned off. The motor can also be stopped at the conveyor control panel.

"RUNNING" Light: The indicator light will turn ON when the conveyor is running. The conveyor can only be started at the conveyor control panel.

"SCRAP SEPARATOR - OPEN" Pushbutton: When the pushbutton is depressed, the pushbutton will light up and the scrap separator door will open. The door remains open while a trim cut is made. After the trim piece clears the back of the conveyor, the scrap separator door automatically closes. Complete operation and maintenance instructions for the Conveyor are contained in a separate manual EM-315.

MATERIAL SUPPORT Selector: If the shear is equipped with a conveyor, the material supports are part of the conveyor. The selector switch on the conveyor control panel must be turned to "ON" to make this selector on the shear active. An optional Pneumatic Sheet Support system is also available when there is no conveyor. In either case, a two-position selector is provided to control the supports. In the "AUTO" position, the material support arms will raise to support the material being sheared and retract automatically when the shear is cycled. When "DOWN" is selected, the material supports will retract to the down position. They will remain down until the "AUTO" mode is selected. Complete operation and maintenance instructions for the Pneumatic Sheet Supports are contained in a separate manual EM-261.

FOOTSWITCH Selector: CINCINNATI Shears are usually operated by a single, guarded footswitch. An additional footswitch can be added to these shears. The second footswitch provides 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. This option includes the extra footswitch and a selector switch (Figure 6-5) that allows the operator to select the left, right or both footswitches.

MICROCOMPUTER GAGE CONTROL II:

The microcomputer provides a means to pre-program backgage positions and to individually or automatically sequence the backgage to these positions. A program can be entered to position the backgage at up to 15 different positions (steps). Up to 99 cuts can be programmed at each of these positions. An light emitting diode (LED) display, pushbuttons and a numerical keyboard are used to enter program information and to run the program. See Figure 6-6.

The shearing operation is performed by placing the material against the backgage and cycling the shear with the footswitch. In an auto sequence mode either the number of cuts will be reduced by one and the backgage remains at the same position, or if all cuts for the step are completed the backgage 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 (EM-288).

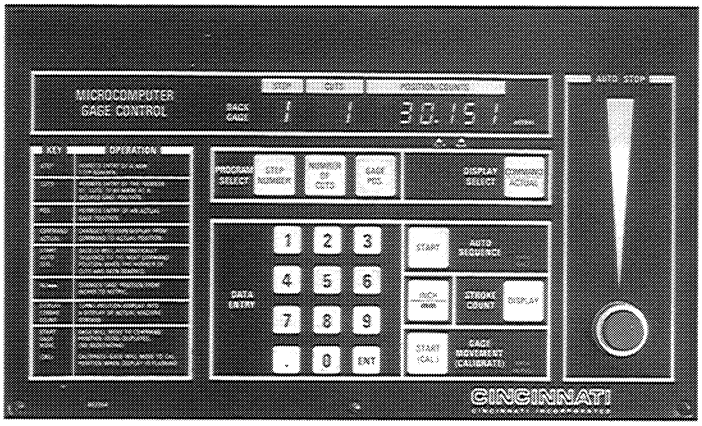

FIGURE 6-6 - MGC II Controls

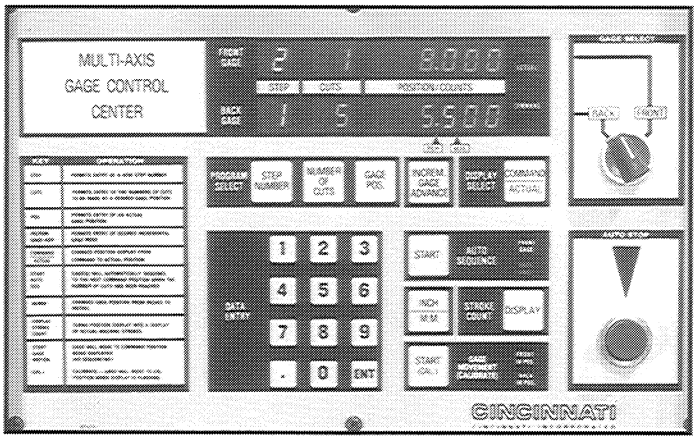

FIGURE 6-7 - Multi-Axis Controls

IMPORTANT: The backgage cannot be calibrated or positioned unless the main drive motor is running and the OPERATOR CONTROLS selector is in the "ON" position.

MULTI-AXIS GAGE CONTROL

The Multi-Axis Gage Control system is a micro-computer control of the frontgage and the backgage 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 made at that position, and then advance to the next step and cut position when all cuts in that step are completed. Refer to Figure 6-7.

The backgage 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 backgage angle and the ram is cycled. The cut-off piece falls to the rear of the machine.

The frontgage consists of a powered frontgage guide and a combination squaring arm bar and frontgage guide. Both frontgage guides have moveable stops, which are positioned by the Multi-Axis Gage Control. One stop is the frontgage 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 frontgage 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 frontgage stops move to the next cutting position. Operation and maintenance instructions are contained in a separate manual EM-274.

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DAILY START-UP

At beginning of a new shift, after every break, at start of a new job, or when machine is started after an extended off period (several hours or longer), the following procedure is recommended:

1. Check reservoir oil level.
2. Turn the main disconnect switch ON.
3. Depress the MAIN DRIVE - START pushbutton.
4. Let pump idle for a few minutes to warm oil.
5. Check that GROUND CONNECTED lights are ON.
6. Check that all required safety devices and procedures are operating properly and are being used.
7. Make certain that the table, knife area and rear of machine are clear of tools, loose material and personnel.
8. Turn the OPERATOR CONTROLS selector to the "ON" position.
9. Turn the MODE selector to the "INCH" position.
10. Depress footswitch and cycle the shear to the top of the stroke.
11. Check controls for proper operation.
12. Check the following for set-up or job to be run:
    - All controls are positioned correctly.
    - Knife clearance is correct.
    - Gages are set-up correctly.

POWER DOWN

To ensure that the shear is powered down in a safe and systematic way, the following procedure should be followed:

1. Turn the MODE selector to the "INCH" position.
2. Turn the OPERATOR CONTROLS selector to the "ON" position.
3. Depress footswitch and move the ram to the bottom of the stroke.
4. Turn the MODE selector and OPERATOR CONTROLS selector to the "OFF" position.
5. Depress the MAIN DRIVE - STOP pushbutton.
6. Turn the main disconnect switch OFF.

KNIFE CLEARANCE

To minimize the shearing load and to yield high quality sheared edges (free of double shear and heavy edge burr), it is necessary to adjust the knife clearance on **250** through **750 Series** hydraulic shears for different materials, material thicknesses, and back piece depths. However, the **135 Series** shear uses one knife clearance for all material conditions. This knife clearance can be set with adjusting screws shown in Figure 7-1.

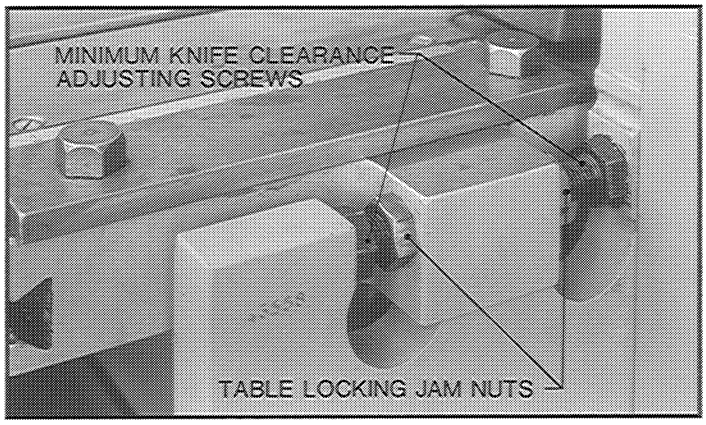

FIGURE 7-1 - 135 Series knife clearance

On your CINCINNATI **250** through **750 Series** Hydraulic Shear the knife clearance is easily changed. See Figure 7-2. There are four distinct predetermined clearances which can be used by positioning the shear table (including lower knife) to different positions with respect to the upper knife. The shear table is held snug against the top of the bed and housings by studs preset with double nuts. These **do not** require adjustment when changing clearances. The inner position of the table (minimum knife clearance) is controlled by the inner table adjusting screws, which are preset at

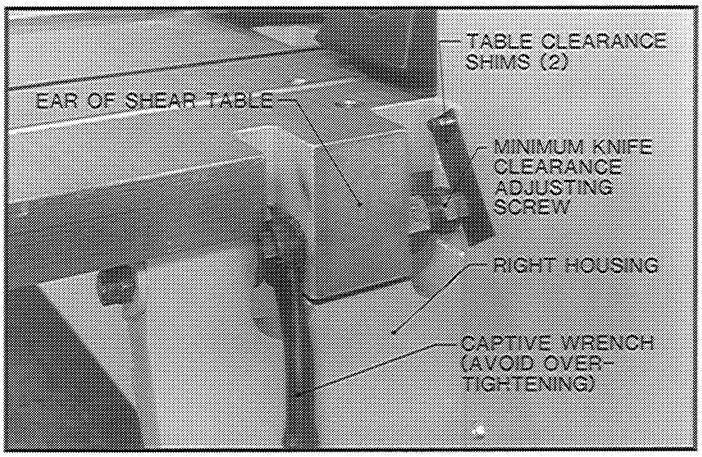

FIGURE 7-2 - 250 thru 750 Series knife clearance

the factory and locked with jam nuts. They should not be changed except when changing knives. With the block on the bottom of the table firmly against the inner adjusting screw, the clearance is preset at its minimum value. Setting the inner adjusting screws and locking with the jam nuts prevent the knives from clashing.

USE OF TABLE SHIMS

The hydraulic shear is supplied with captive table clearance shims located on the right and left side of the table to adjust knife clearance. These shims are used in certain instances to get a better cut edge than can be obtained with the minimum knife clearance. Their use can also significantly reduce the force required to shear material. The determination of what shim to use, if any, for a particular job is largely a matter of operator experience. The following general guidelines will be helpful until the operator becomes familiar with the use of the shims.

On narrow back pieces (trim cuts), a better sheared edge will generally be obtained with close knife clearances while on deep back pieces, a better edge will generally be obtained with wide knife clearances when cutting near capacity material.

The use of the table shims is shown on a legend plate attached to the front of both the right and left cylinder cover. Figure 7-3 is the legend plate for a **500 Series** shear. For mild steel, it recommends using **no shim** on narrow (trim cut) back pieces. The legend plate recommends which colored shim to use for various thicknesses for larger back piece depths. Because of variation in material properties the use of the next thinner shim may yield a more satisfactory edge condition.

To use the shims, adjust the table so that the lower knife moves away from the upper knife by using the captive wrenches on each side of the machine, turning the hex head studs **clockwise**.

IMPORTANT: Do not over-torque these studs in a counterclockwise direction as this could possibly strip the threads in the table due to the leverage available.

Insert the selected shim(s) in the gap between the housing and the minimum knife clearance adjusting screw and adjust the table until the shim is clamped in position. Use the same shim on both sides of the table. Do not overtighten, as this may strip the threads in the table or distort the shims.

TABLE SHIM AND MATERIAL THICKNESS SELECTION

1. DO NOT USE A TABLE SHIM WHEN:
   A. MAKING TRIM CUTS
   B. SHEARING GUSSETS
   C. SHEARING STAINLESS STEEL
   D. SHEARING SUPER ALLOYS WITH HIGH NICKEL CONTENT
   E. SHEARING MATERIAL THINNER THAN 1/4"
2. USE CHART BELOW WHEN SHEARING OTHER THAN DESCRIBED IN ITEM #1:

MATERIAL THICKNESS	MACHINE SET-UP	MATERIAL TYPE				
		MILD STEEL AND A 36 (51 K.S.I. MAX.)	ALUMINUM (HARD)	ALUMINUM (SOFT)	STAINLESS STEELS, NICKEL ALLOYS AND SUPERALLOY	HIGH STRENGTH STEELS, A 36 (OVER 51 KSI) AR 250 (MAX.)
10 GA.	TABLE SHIM	NONE	NONE	NONE	NONE	NONE
	MATERIAL THICK ADJ.	10 GA.	10 GA.	10 GA.	1/2-3/16"	3/16"
3/16"	TABLE SHIM	NONE	NONE	NONE	NONE	NONE
	MATERIAL THICK ADJ.	3/16"	3/16"	10 GA.	1/2"-1/4"	1/4"
1/4"	TABLE SHIM	GREEN	GREEN	NONE	NONE	NONE
	MATERIAL THICK ADJ.	1/4"	1/4"	3/16"	1/2"-3/8"	3/8"
5/16"	TABLE SHIM	GREEN	GREEN	NONE	NONE	GREEN
	MATERIAL THICK ADJ.	5/16"	5/16"	1/4"	1/2"	1/2"
3/8"	TABLE SHIM	RED	RED	NONE	NONE	GREEN
	MATERIAL THICK ADJ.	3/8"	3/8"	1/4"	1/2"	1/2"
1/2"	TABLE SHIM	BOTH	BOTH	NONE		
	MATERIAL THICK ADJ.	1/2"	1/2"	3/8"		

3. FOR MATERIALS OTHER THAN THOSE LISTED ABOVE, REFER TO SHEAR CAPACITY BULLETIN PT-30491.
4. LOOSEN LOCK SCREW ONLY WHEN CHANGING THE MINIMUM KNIFE CLEARANCE.

CAUTION: MATERIALS WITH A HARDNESS OF 300 BHN (30 HRC) OR ABOVE CAN CAUSE SEVERE KNIFE PROBLEMS.

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FIGURE 7-3 - Table shim legend plate

IMPORTANT: The 135 through 375 Series Hydraulic Shears are designed to cut material as thin as 26 gauge (.457mm), the 500 Series as thin as 22 gauge (.759mm) and the 750 Series as thin as 20 gauge (912 mm). To cut thin material with a relatively burr- free edge it is very important to have sharp knives and close running ram gib clearance. Before cutting light gauge material, be certain that table shims are removed and the minimum clearance adjusting screw is tight against the housing. The shear could be damaged by bending material over the lower knife.

There is one other very important fact to keep in mind when operating a hydraulic shear and changing knife clearance. It is a general assumption that a hydraulic shear is safe and cannot be harmed by overloads. This is true, as the main relief valve will dump and stop the ram if an attempt is made to shear material which is too thick for the rake set, or available, on the shear. However, the shear can be damaged by excessive spreading force (front-to-

back) caused by excessive knife clearance. The relief valve only controls the vertical shearing force and cannot control the resulting spreading force. This spreading force becomes excessive with too wide a knife clearance because it tends to fold the metal over instead of shearing it. This is especially true for stainless steel.

IMPORTANT: Always reset knife clearance when changing to thinner material to avoid damage to the shear.

GAGES

All CINCINNATI Shears are furnished with a backgage, side gage and graduated scales as standard equipment. An optional frontgage is also available. 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 remaining on the table. The side gage is used to guide and position one side of the material being sheared. The graduated scales in the table are a visual gage and are used to read the distance from the point of cut.

BACKGAGE

The standard back gage is located in the rear of the shear and its gaging face 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 moved by a motor and its position is adjusted by use of pushbuttons. Its location is shown on a counter, which is normally graduated in inches and fractions. Refer to Section 6 - MACHINE CONTROLS for an explanation of the backgage control pushbuttons.

FRONT GAGE (Optional)

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 7-4. The stop is used to control the size of the cut-off piece or the piece remaining on the table. The stops have two gaging surfaces approximately one-quarter inch (6mm) 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.

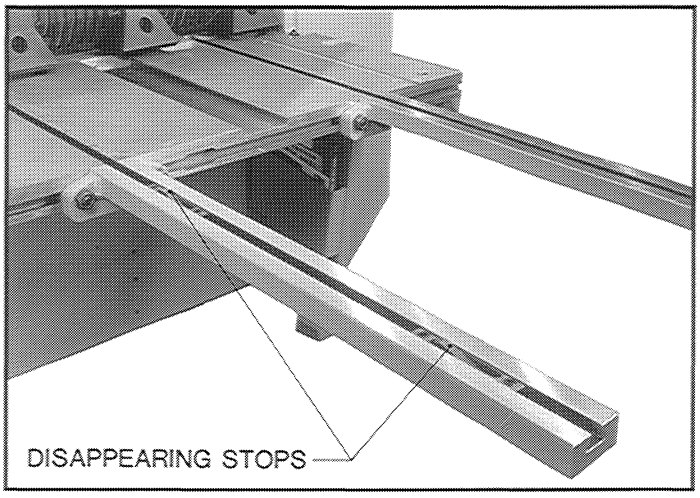

FIGURE 7-4 - Front gage stops in front support arms

SIDE GAGE

This is a steel bar which can be mounted on the surface of the table near either end. Normally it is positioned at the left end. See Figure 7-5. 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 with 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 left end of the table. 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 left end of the table. The side gage is then placed at the other end of the table.

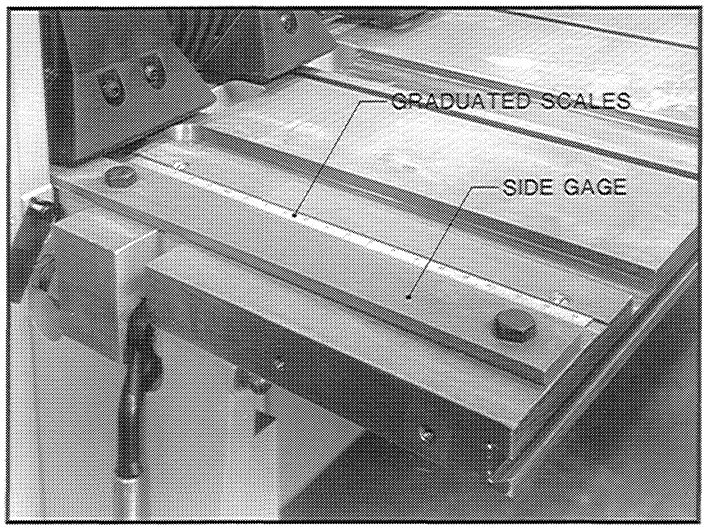

FIGURE 7-5 - Side gage and table scales

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 fractions of an inch, although other graduations are available. The scales can be set so they accurately indicate the

distance from the cutting edge of the lower knife. See Figure 7-5.

USE OF GAGES

BACKGAGE

The backgage 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 backgage 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 counter. Final positioning of the power-operated gage is done by intermittently tapping the "SLOW FORWARD" pushbutton as it approaches the desired position.

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

FRONTGAGE

There are many instances when use of the front-gage stops are helpful. The Shearing Operations in Figure 5-6 show how the frontgage stops can be used along with the side and backgages for trimming, stripping, and blanking. Also shown is the use of the front stops with the optional squaring arm to produce accurate resquared blanks.

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 backgage angle. The material may even sag so much that it completely misses the backgage 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 7-6. It may be necessary to get additional sets of these front stops so that multiple settings can be made.

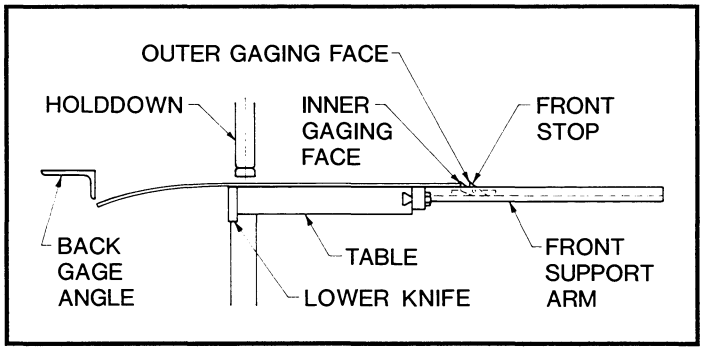

FIGURE 7-6 - Front gaging

To set the standard two-step front stops, position the stops so 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. See Figure 7-7.

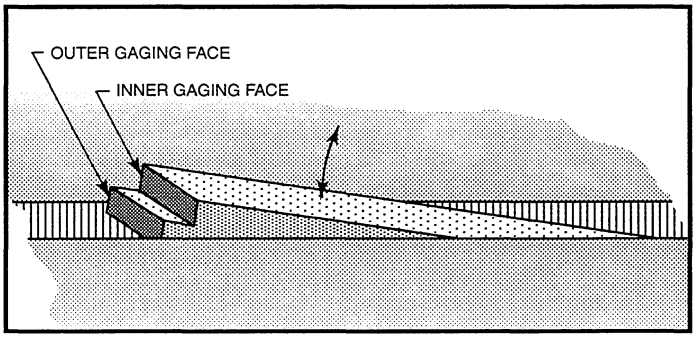

FIGURE 7-7 - Front gage stops

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 7-5.

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SECTION 8 OPTIONS

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

CONVEYOR

All 100 Series Shears can be operated with a CINCINNATI Conveyor. See Figures 8-1 and 8-2. Conveyors are an aid to production and promote safer shear operation. They will support the material being fed through the shear into the backgage, and they will then convey the cut piece from behind the shear. Conveyors eliminate the need for a person to go behind the shear to remove cut pieces.

Conveyors can be supplied with a scrap separator to collect the trim pieces and small scrap.

A separate operation and maintenance manual EM-315 is provided for CINCINNATI Conveyors.

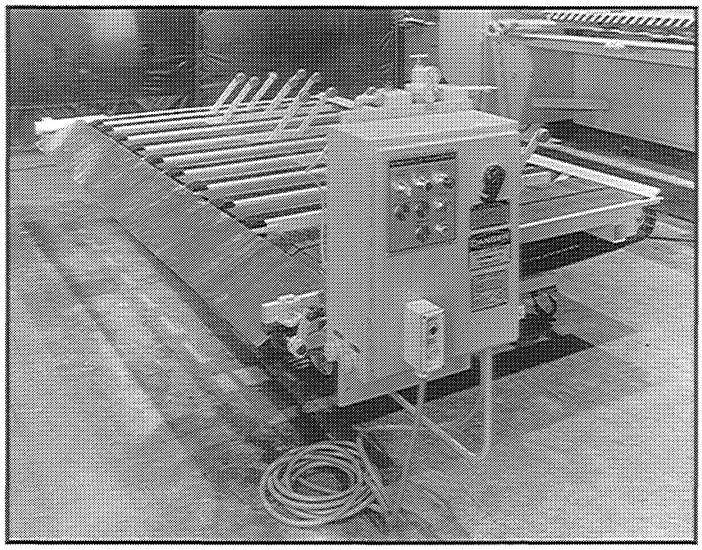

FIGURE 8-1 - CINCINNATI Conveyor

SERIES SHEAR	SERIES CONVEYOR	HEIGHT OF CONVEYOR BELTS inch (mm)	REQUIRED SHEAR TABLE HEIGHT inch (mm)
135	2CV	24.50 (622)	32 (813)
250	2CV	24.50 (622)	34 (864)
375	4CV	24.50 (622)	36 (914)
500	4CV	24.50 (622)	36 (914)
750	6CV	24.00 (610)	40 (1016)

FIGURE 8-2 - Conveyor specifications

SQUARING ARM

The squaring arm can be mounted at either end of the table and is set square with the table knife. It is recommended that it be located at the left end. The MATERIAL LENGTH adjustment knob positions the ram for shearing short pieces on the left end of the shear. (See SET-UP AND USE - Section 5). It is used to guide the material into the shear and is used when squaring material as shown on Figure 5-6. 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 8-3.

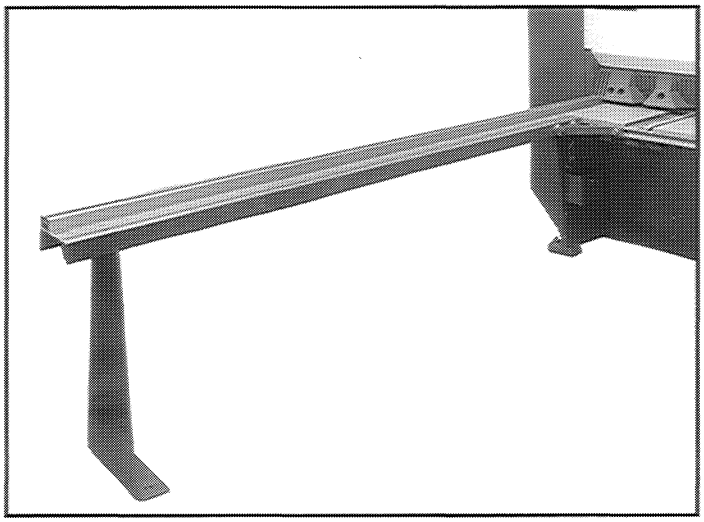

FIGURE 8-3 - Squaring arm

GRADUATED SCALES

Standard scales in the table and squaring arm are graduated in fractions every 1/16" and marked every inch. Optional scales are available with decimal graduations every .050" and marked every inch. Combination scales are also available with fractional inches and metrics.

BACKGAGE COUNTERS

The standard backgage counter is graduated in fractions. It is also available graduated in decimals of an inch or metric readouts.

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 as optional equipment. Each of these arms has either a disappearing or solid stop. See Figures 8-4 and 8-5.

FRONT GAGE STOPS

Front gage stops are used in many front gaging operations, such as trimming, stripping or blanking. See "GAGES" in Section 7 - OPERATION. The gage stops are manually set by measuring the

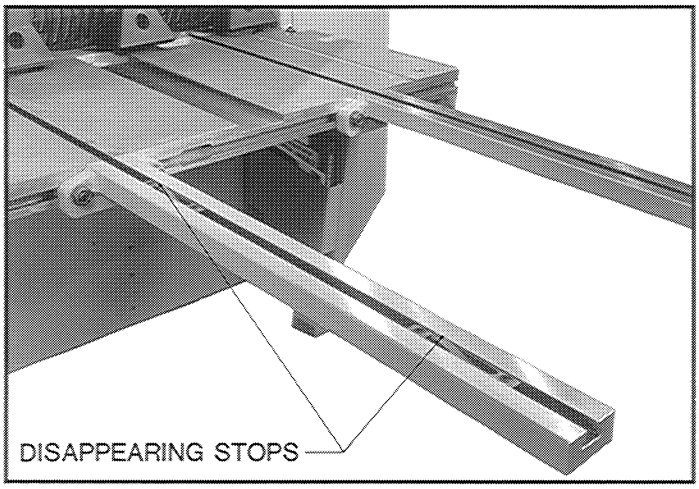

FIGURE 8-4 - Front support arm / disappearing stops

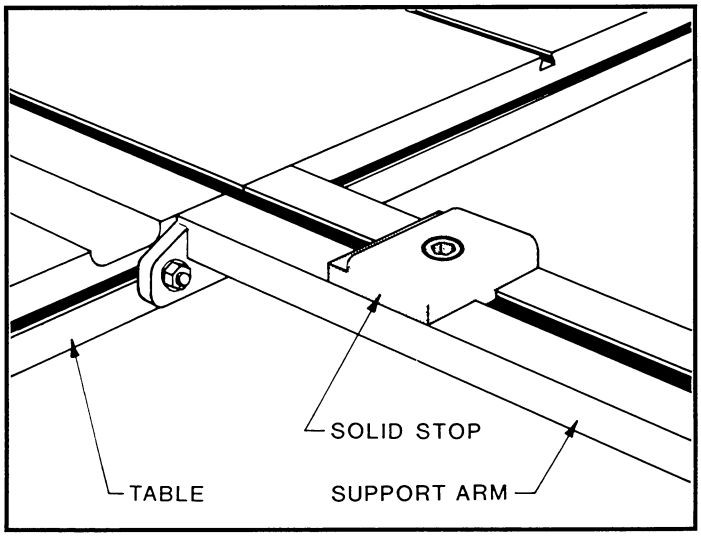

FIGURE 8-5 - Solid stop for front support arm or table

distance from lower knife to the gaging surface of the stop.

Disappearing and solid stops are available for the table and front support arms. Both types have two gaging surfaces, one for a trim cut and the other for the finish dimension cut. The disappearing stop (Figure 8-4) pivots down to be flush with the table top or turns up for gaging. It may also be used in the special disappearing stop squaring arm. The solid stop (Figure 8-5) is also used in the dovetail slot of the table and front support arm.

Swinging and solid stops are available for the squaring arm. These stops are also manually set and have one gaging surface. One swinging stop is furnished with the squaring arm. Multiple swinging stops (Figure 8-6) can be used to provide rapid gaging from the squaring arm. The sheet slips under stops not in use. Solid stops (Figure 8-7) are designed for gaging heavy materials.

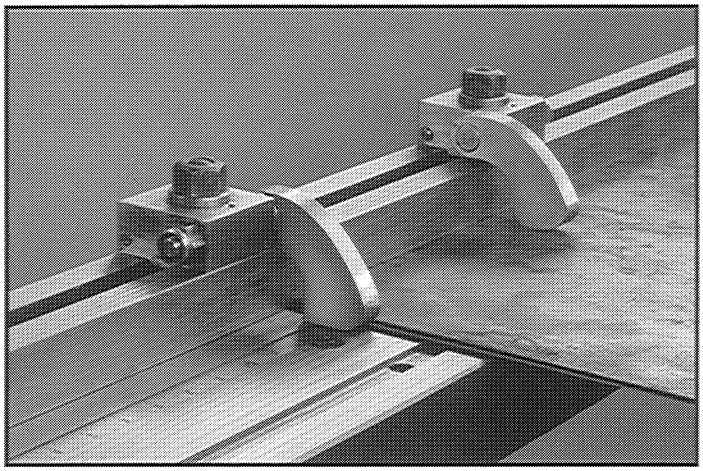

FIGURE 8-6 - Swinging stops for squaring arm

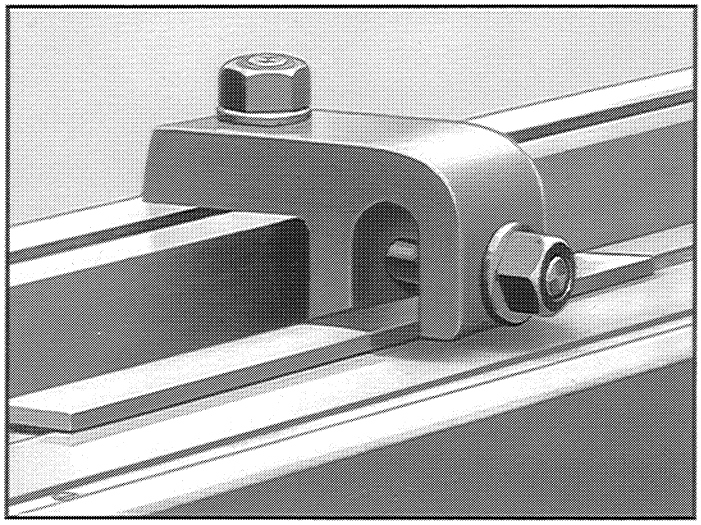

FIGURE 8-7 - Solid stop for squaring arm

LIGHT BEAM SHEARING GAGE/AREA LIGHTS

This machine option consists of two rows of fluorescent lamps located inside the top front cover. The front row of lights illuminates the work area.

The rear row of lights is the light beam shearing gage, which provides a shadow line on the workpiece to indicate the line of cut. 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. All lights are ON when the main drive motor is running. An "ON/OFF" selector switch, located on SHEAR CONTROL CENTER, provides control for the lights when the main drive motor is OFF See Figure 8-8.

PNEUMATIC SHEET SUPPORT

This optional feature is available on **135** through **375 Series** CINCINNATI Shears. Its function is to support the material as it is fed into the shear between the lower knife and backgage angle. The support is made-up of a series of four to six support

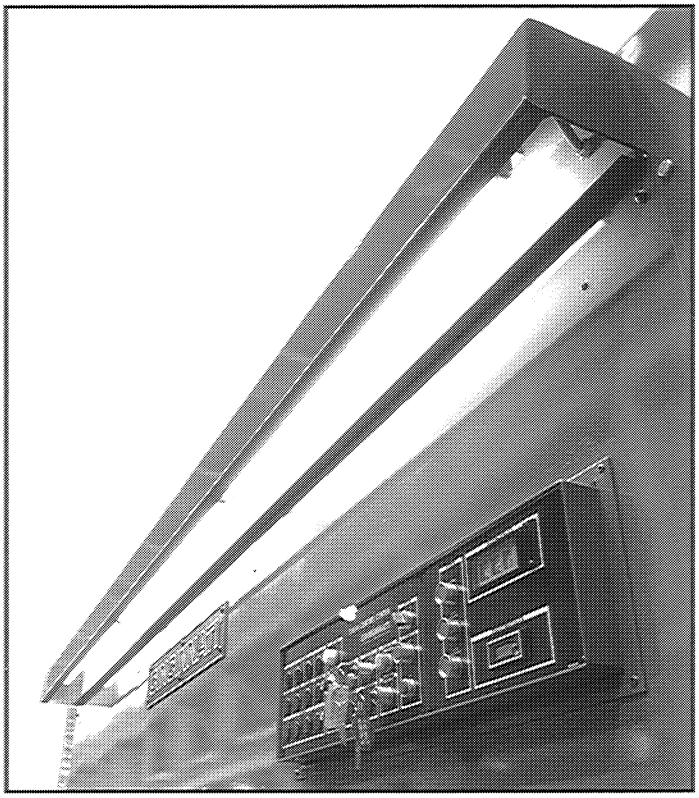

FIGURE 8-8 - Area lights / Light beam shearing gage

arms, which are normally retracted in slots in the fabricated scrap chute. (See Figure 8-9). When activated (Figure 8-10), they swing up to a horizontal position at the passline to support the material behind the lower knife. The arms extend through slots in the backgage angle and therefore will guide the material into the angle.

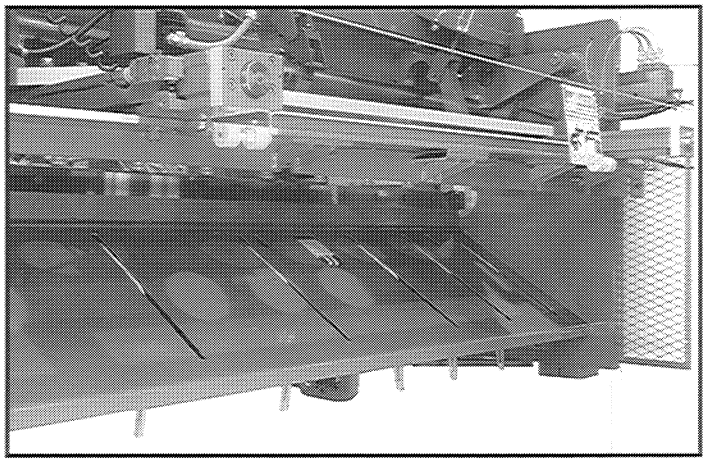

FIGURE 8-9 - Pneumatic sheet support

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

An "AUTO"-"DOWN" selector switch is provided on the SHEAR CONTROL CENTER to make the arms active or continually retracted into the scrap chute.

For more detailed information, refer to the supplement manual EM-261.

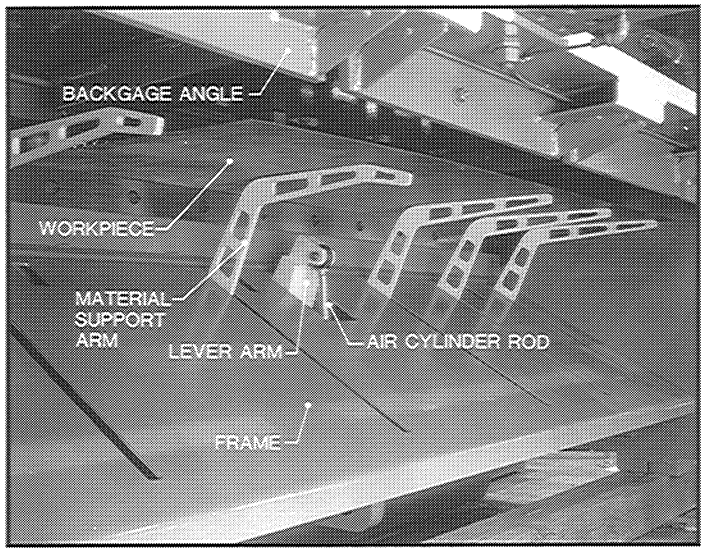

FIGURE 8-10 - Supports raised

PROBES

The probe system is made up of four contact probes and five dummy probes. The six foot shears have three contact probes and four dummy probes. See Figure 8-11. Each contact probe has an individual "ON-OFF" switch to make it active or inactive. Each probe has an indicator light at the control station that will indicate when the material has made contact with that probe. See Figure 6-5. 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 increase production and improve accuracy.

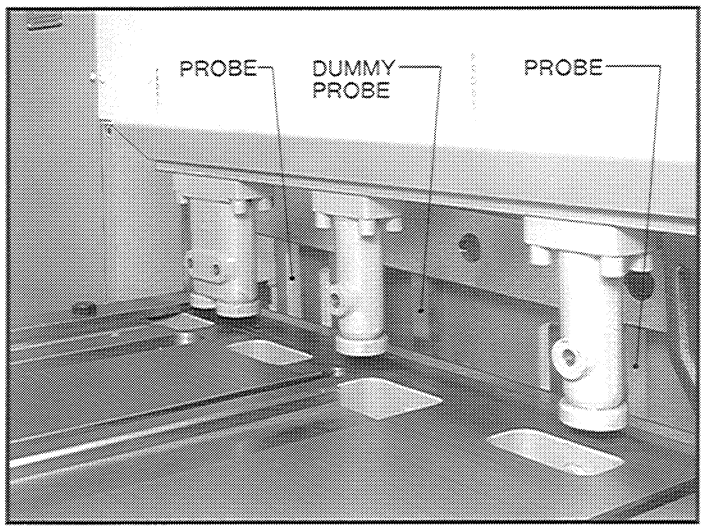

FIGURE 8-11 - Probes

We recommend that two probes be active - "PROBE 1" and the probe closest to the right edge of the material. When probes are used in combination

with a squaring arm bar, we recommend only one probe be active.

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. The cups are made of neoprene or plastic and are available for use on all **135-750 Series** Shears.

HYDRAULIC OIL HEATER

The oil heater can be added to all of the **135-750 Series** Hydraulic Shears. It is a thermostatically controlled unit to be installed on shears being placed in a very cold location. A customer supplied 115 volt, 15 amp electrical service is required.

ADDITIONAL FOOTSWITCH

A second footswitch can be provided which allows operation from either end of the shear, or both can be used to allow two operators to handle large sheets. Both footswitches must be depressed to allow the shear to cycle. The footswitch selector is on the SHEAR CONTROL CENTER.

MICROCOMPUTER GAGE CONTROL II

This programmable backgage option is briefly described in Section 6 under OPTIONAL MACHINE CONTROLS. More detailed information is provided in a separate manual (EM-288).

MULTI-AXIS GAGE CONTROL

This programmable option controls the backgage and a powered frontgage guide/squaring arm. A brief description is also found in Section 6 under OPTIONAL MACHINE CONTROLS. More detailed information is provided in a separate manual (EM-274).

REAR CORNER SUPPORT

The angle of fracture can vary as the shearing process approaches the end of the material. The last several inches of the cut can be affected by the weight of the entire back piece. The same unsheared section does not have enough rigidity to resist the shearing forces which can distort the end of the back piece. These conditions are more prevalent on ductile and materials 1/4" (6mm) thickness and heavier.

An optional rear corner support will minimize these distortions by holding the back piece in position until shearing is complete. This device can only be used in a fixed position at the left end of the shear.

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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:

CAUTION

TWO PERSONS ARE REQUIRED TO HANDLE THE KNIFE. ALWAYS WEAR GLOVES TO PROTECT YOUR HANDS WHILE HANDLING KNIVES.

1. Clear the area around the machine of scrap. If the shear is equipped with a conveyor, remove the conveyor from behind the shear. Also remove the material deflectors from both housings, if the shear is so equipped.
2. Run the backgage all the way to the rear.
3. Set MATERIAL LENGTH control to maximum and cycle shear to the top of the stroke. Set MATERIAL THICKNESS control as listed below:

   135 SERIES - The 135 Series has a fixed rake. Raise the ram to its maximum up position by manually energizing solenoids SOL-2A and SOL-4 at the same time. When the ram stops moving up, release SOL-4, then release SOL-2A. Refer to Figure 9-44.

   250, 357, 500 and 750 SERIES - Set the MATERIAL THICKNESS control to minimum.
4. Turn the OPERATOR CONTROLS selector to the "OFF" position and remove the key. Turn the MODE selector to the "OFF" position and remove key.
5. Open the cylinder guards. Refer to "REMOVING AND INSTALLING GUARDS" on Page 9-10.

CAUTION

DO NOT ENTER AREA BEHIND SHEAR WITH BOTH THE MAIN DRIVE MOTOR RUNNING AND THE "OPERATOR CONTROLS" SELECTOR IN THE "ON" POSITION.

6. Measure the distance between top of the cylinder and bottom of piston rod clevis on each end of the shear. Cut two 2" x 4" (51 x 102mm) wood blocks for each measurement obtained. Place the 2" x 4" (51 x 102mm) blocks on opposite sides of both piston rods and securely tape or tie in position. Refer to Figure 9-1. Fit of wood blocks must be snug to prevent ram drift while changing knives.

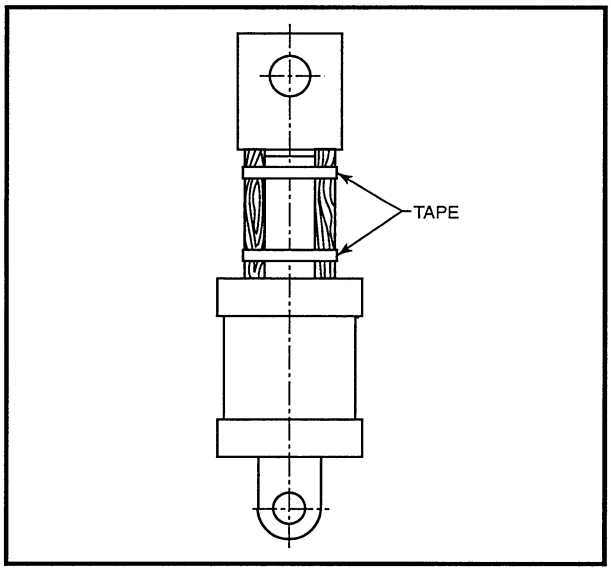


FIGURE 9-1 - Tape blocks to piston rod

7. Prepare knife changing fixtures for mounting on the backgage angle to remove lower knife. Clamp bracket mounting bolt must be in the upper or lower hole as indicated in chart (Figure 9-2). Remove upper knife holder (Figure 9-4) from both fixtures and install lower knife holder (Figure 9-3) on both fixtures.

SERIES	SHORT FIXTURE		LONG FIXTURE	
	CLAMP BRACKET HOLE LOCATION	FIXTURE POSITION-KNIFE BOLT HOLE FROM RIGHT END	CLAMP BRACKET HOLE LOCATION	FIXTURE POSITION-KNIFE BOLT HOLE FROM RIGHT END
135 x 6	LOWER	THIRD	UPPER	FIRST
135 x 10			LOWER	THIRD
250 x 6	LOWER	THIRD	UPPER	THIRD
250 x 8			LOWER	
250 x 10		SEVENTH		
250 x 12				
250 x 14				SIXTH
375 x 10	LOWER	FIFTH	LOWER	FIFTH
375 x 12				
375 x 14				SIXTH
500 x 10	LOWER	FIFTH	LOWER	SEVENTH
500 x 12				
750 x 10	UPPER	FIFTH	LOWER	FIFTH
750 x 12				

FIGURE 9-2 - Knife bolt hole location

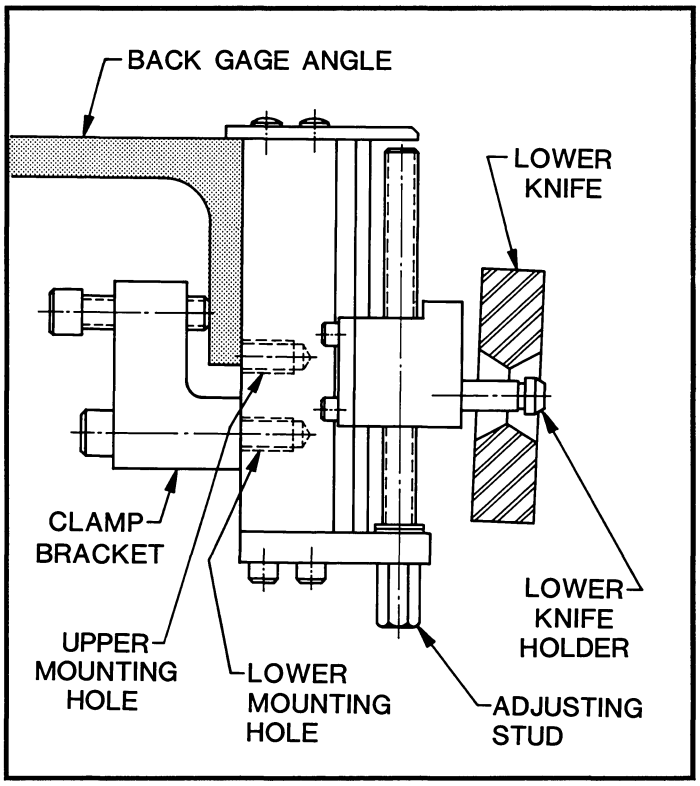


FIGURE 9-3 - Lower knife holder

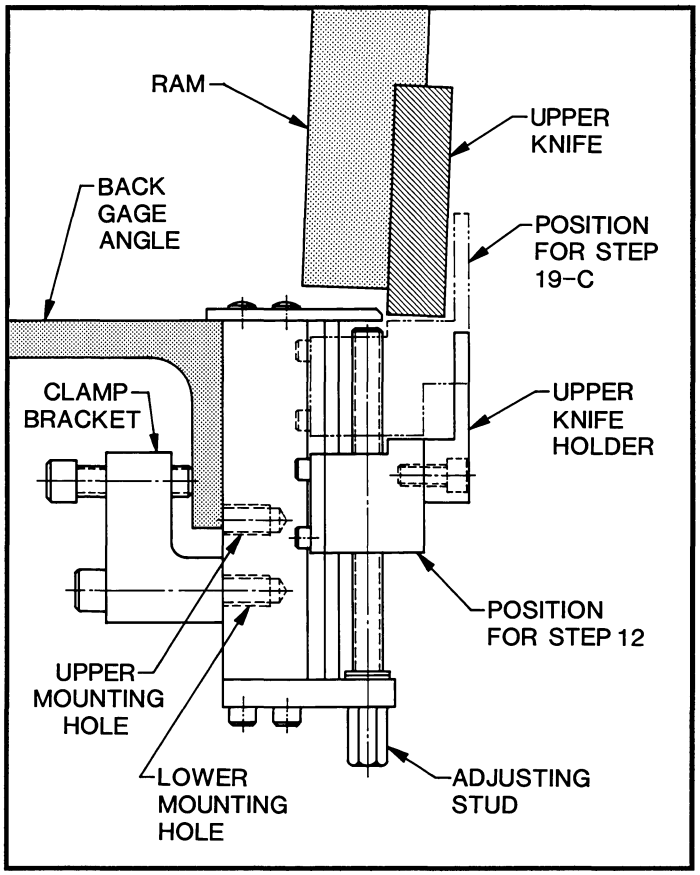


FIGURE 9-4 - Upper knife holder

8. Mount the fixtures on the back gage angle so the fixture position corresponds to the knife bolt hole location indicated in Figure 9-2. Also refer to Figure 9-3.

NOTE: The knife bolt hole location is as viewed from the front of the shear.

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

10. Remove the lower knife:

    A. Remove all knife bolts, nuts and washers from lower knife, except for one at the center.

    B. Turn the OPERATOR CONTROLS selector to the "ON" position. Position the backgage at 6" (152 mm).

NOTE: If the machine has the optional Microcomputer Gage Control or Multi-Axis Control, the backgage can be manually positioned. To use this feature, enter Step 19. The display will show actual gage position. The keys "1", "2" and "3" can now be used to manually position backgage as follows:

- Press the "1" key and the gage will move in forward slow.
- Press the "2" key and the gage will move in forward fast.
- Press the "3" key and the gage will move in reverse fast.

The control limits the gage travel when this feature is active. When pressing the "1" key, the gage will stop when it reaches approximately .020" (.51mm) gage position. When pressing the "2" key, the gage will stop when it reaches approximately .200" (5.08mm) gage position. When pressing the "3" key, the gage will stop at maximum gage range. Pressing any other key or the AUTO STOP button will deactivate this feature and the control will go to Step 1.

IMPORTANT: If the shear is equipped with backgage probes, position the backgage to positions one inch less than the dimensions given in this procedure.

Turn OPERATOR CONTROLS selector to "OFF" position and remove key. Check alignment of lower knife holders to the lower knife bolt holes. Adjust position of fixtures so the holders are centered in the bolt holes. Vertical adjustment is made by turning adjusting studs on the fixtures with a 9/16" wrench.

C. Turn the OPERATOR CONTROLS selector to the "ON" position. Move the backgage position towards the lower knife so the knife holders are positioned in the bolt holes as shown in Figure 9-3.

D. Turn the OPERATOR CONTROLS selector to the "OFF" position and remove the key. Remove the knife bolt, nut and washer at the center of the lower knife.

E. Adjust both fixtures to raise the knife above the shims and pins in lower knife seat by turning the adjusting studs.

F. Turn the OPERATOR CONTROLS selector to the "ON" position. Position the backgage 1/2" (12.7mm) toward the rear.

CAUTION

STOP! CHECK AND MAKE CERTAIN THE KNIFE IS FULLY ENGAGED ON THE KNIFE HOLDERS.

Position the backgage at maximum gage range. Turn the OPERATOR CONTROLS selector to "OFF" position and remove key.

G. Remove knife from the fixtures and place it on wood blocks away from immediate area.

11. Prepare the knife fixtures for removing the upper knife. Remove the lower knife holders from both fixtures. Install the upper knife holders on the fixture faces. The fixtures should be in the same position as used to remove the lower knife. Refer to Figures 9-2 and 9-4.

12. Turn the adjusting studs on the fixtures to position the top of the upper knife holders flush or below the top of the fixtures as shown in Figure 9-4.

IMPORTANT: The upper knife holders will hit the upper knife if not set flush or below the top of the fixtures.

13. Three wood wedges are required for supporting the upper knife while knife bolts are removed. The wedges can be cut from standard 2" x 4" (51 x 102mm) lumber. Refer to Figure 9-5.

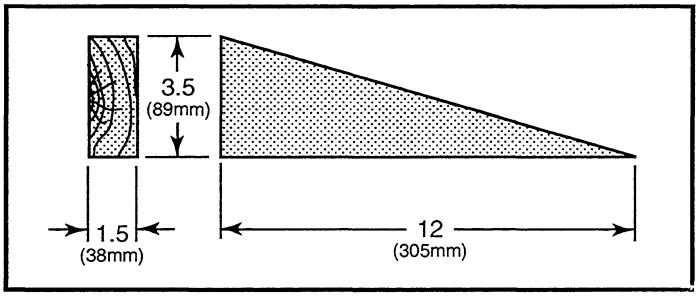


FIGURE 9-5 - Upper knife holder

NOTE: While cutting these wedges make enough for seating the knives. When seating the knives, wedges are placed every two feet (610mm) between the upper and lower knives.

14. Place three 1" x 3" (25 x 76mm) strips of wood "C"-clamped on the table, one near each end and one in the center of the table. These strips must project under the upper knife. Position a wood wedge on top of each wood strip between the upper and lower knife. **Do not drive them tight**. Refer to Figure 9-6. Extra blocks may be required under wedges at left end.

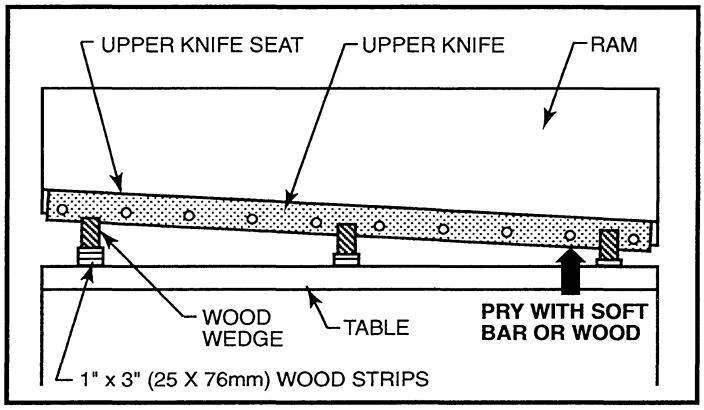


FIGURE 9-6 - Block upper knife

15. Loosen all upper knife bolt nuts so knife can be moved from side-to-side. Remove all knife bolts, nuts and washers, except for the second one from each end. Knife bolts are removed from behind holddown units as shown in Figure 9-7.

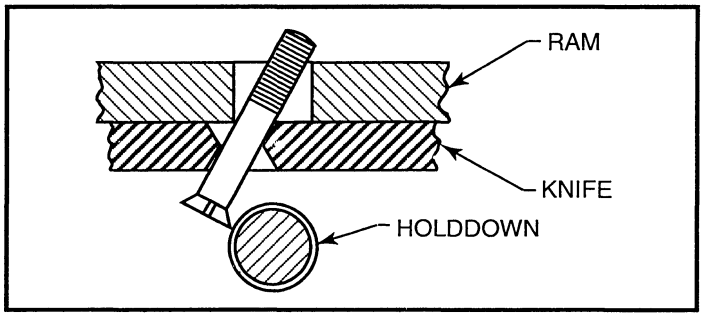


FIGURE 9-7 - Upper knife holder

16. Snug-up the two remaining knife bolt nuts. Remove the wedges and wood strips from between the knives.

17. Remove the upper knife:

A. Turn the OPERATOR CONTROLS selector to "ON" position. Position the backgage to 6" (152mm). Turn the OPERATOR CONTROLS selector to "OFF" position and remove the key. Check and make certain the upper knife holder will clear the lower knife seat and the upper knife.

B. Turn the OPERATOR CONTROLS selector to the "ON" position. Position the backgage so

the upper knife holders can be raised into position to support the upper knife. Refer to Figure 9-4. Turn OPERATOR CONTROLS selector to "OFF" position and remove key.

C. Use a 9/16" wrench to adjust both fixtures until the upper knife holders are in position to support the upper knife.

D. Remove the two remaining knife bolts, nuts and washers.

E. Use a 9/16" wrench to adjust both fixtures until the top of the upper knife is flush or below the top of the fixtures. This position will allow the upper knife to clear the knife seat when the backgage is retracted.

F. Turn the OPERATOR CONTROLS selector to the "ON" position. Position the backgage at maximum gage range. Turn the OPERATOR CONTROLS selector to "OFF" position and remove the key. Remove the knife from the fixtures and place it on wood blocks away from the immediate area.

18. Thoroughly clean both knives and the upper and lower knife seats with an aliphatic solvent, such as mineral spirits. Clean, but do not disturb, the location of the knife shims. Use an oil stone or file to remove any knicks or 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 procedure for "SHIMMING THE LOWER KNIFE" on Page 9-9.

If rotating existing knives to a sharp cutting edge, proceed to Step 19.

19. Inspect the knife shims and pins. Replace any damaged shims and bent or missing pins.

20. Lubricate the knives, knife seats and shims with a light machine oil.

21. Clean and inspect all knife bolts, nuts and washers:

    Run the nuts on the knife bolts to ensure the threads are not damaged. If necessary, hand fit or replace bolts and nuts. Any nut with rounded corners **must** be replaced.

22. Reposition the upper knife on the fixtures so a sharp edge will be in the cutting position.

23. Turn the OPERATOR CONTROLS selector to the "ON" position. Position the backgage at 6" (152mm). Turn the OPERATOR CONTROLS selector to "OFF" position and remove the key. Check to make certain the knife holders will clear the lower knife seat and the top of knife will clear upper knife seat. Turn OPERATOR CONTROLS selector to the "ON" position. Adjust the position of the backgage so the knife will clear the face of upper knife seat as it is raised into position. Turn the OPERATOR CONTROLS selector to "OFF" position and remove the key.

24. Use a 9/16" wrench to turn the fixture adjusting studs and raise the knife into position where the knife bolts can be installed.

IMPORTANT: Do not attempt to seat the knife with the fixtures.

25. Install all knife bolts, washers and nuts where possible and hand tighten.

IMPORTANT: Be sure the tongues on the knife bolt heads go into the keyways in the knife.

26. Use a 9/16" wrench to turn the adjusting studs until top of the upper knife holders are below the bottom of the knife.

27. Turn the OPERATOR CONTROLS selector to the "ON" position. Position the backgage at the maximum gage position. Turn the OPERATOR CONTROLS selector to "OFF" position and remove the key.

28. Reinstall the wood strips and wedges as described in Step 14.

29. Install the remaining knife bolts, washers and nuts. It may be necessary to loosen the bolts previously installed so the knife can be moved side-to-side.

30. Pry the upper knife with a soft bar or strip of wood into the upper knife seat. Pry up as far as possible and slide wedges under knife to hold in position. Continue this procedure until the knife is in the seat. Refer to Figure 9-6. Snug-up the knife bolt nuts enough to hold the knife in place. **Do not tighten**. Remove the wedges and wood strips.

31. Remove upper knife holders from the fixtures.

32. Replace the lower knife holders in both fixtures. Place the lower knife on the fixtures so that a sharp edge will be in the cutting position.

33. Turn the OPERATOR CONTROLS selector to "ON" position. Position the backgage at 6"

(152mm). Turn OPERATOR CONTROLS selector to "OFF" position and remove the key. Use a 9/16" wrench to turn the adjusting studs to provide clearance between the bottom of the knife and the shims on the lower knife seat and between top of the knife and the upper knife.

34. Turn the OPERATOR CONTROLS selector to the "ON" position. Position the backgage so the knife is 1/16" (1.59mm) from the table. Turn the OPERATOR CONTROLS selector to "OFF" position and remove the key. Turn the adjusting studs to lower the knife until it is resting on the shims.

35. Install a knife bolt, washer and nut at the center of the knife. Tighten enough to hold the knife against the table.

36. Turn the adjusting studs so the lower knife holders are centered in knife bolt holes, providing clearance to retract backgage.

37. Turn the OPERATOR CONTROLS selector to the "ON" position. Position the backgage at maximum gage position. Turn the OPERATOR CONTROLS selector to the "OFF" position and remove the key. Remove the fixtures from the backgage angle.

38. Install the remaining knife bolts, washers and nuts. Snug-up the nuts. **Do not tighten.**

IMPORTANT: Be sure the tongues on the knife bolt heads go into the keyways in the knife.

39. Move the table to increase knife clearance as described in "ADJUSTING KNIFE CLEARANCE" on this page.

40. Remove the wood blocks from both cylinder piston rods.

41. Position the wood wedges 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.

42. Turn the MODE selector to the "INCH" position and turn the OPERATOR CONTROLS selector to the "ON" position. Use the footswitch to slowly inch the ram down until the force on the wood wedges has seated the knives.

43. Turn the OPERATOR CONTROLS selector to the "OFF" position and remove the key.

44. Tighten all upper and lower knife bolt nuts to approximately the torque listed on the following chart:

BOLT DIA. INCHES	TORQUE FT. LBS. (Nm)	WRENCH LENGTH INCHES (mm)
5/8	175 (237)	12 (305)
3/4	300 (407)	24 (610)

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

45. Turn the MODE selector to the "INCH" position, turn the OPERATOR CONTROLS selector to the "ON" position. Depress the footswitch, which will cause the ram to move to the top of the stroke. Turn the OPERATOR CONTROLS selector to "OFF" position and remove the key. Stop the main drive motor.

46. Remove the wood wedges. Check the upper and lower knife seats to ensure the knives are .0015" (.038mm) feeler tight. If not, loosen all knife bolt nuts and repeat Steps 41 through 46.

47. Check height of lower knife. The **135** and **250 Series** has a 91° knife seat. A scale on the table should touch the middle of lower knife as shown in Figure 9-8 The **375, 500** and **750 Series** has a 90° knife seat. The knife should be .000" - .004" (.000-.102mm) below the table surface.

NOTE: Some early models of 375, 500 and 750 Series had 91° knife seat. On these shears the scale should touch in the middle of the knife.

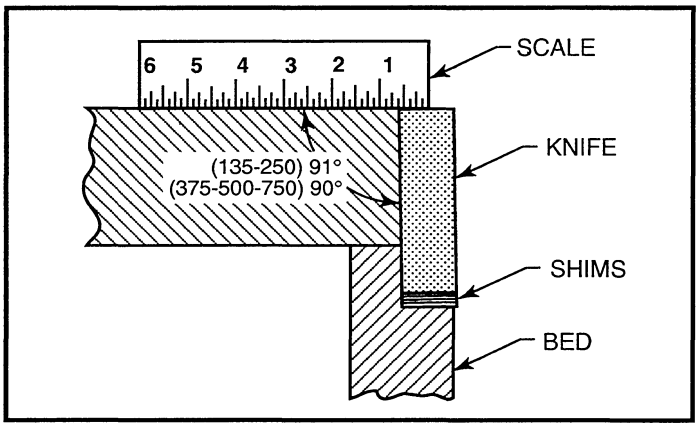


FIGURE 9-8 - Lower knife seat

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

49. Proceed to following section on "ADJUSTING MINIMUM KNIFE CLEARANCE".

ADJUSTING MINIMUM KNIFE CLEARANCE

Figure 9-9 lists the standard minimum knife clearances for various size machines:

SERIES	LEFT INCHES (mm)	CENTER INCHES (mm)	RIGHT INCHES (mm)
135-250-375	.002 (.051)	.002 (.051)	.002 (.051)
500-750	.005 (.127)	.003 (.076)	.005 (.127)

FIGURE 9-9 - Minimum knife clearance

The method for changing minimum knife clearance is described below. One procedure is for 135 Series and the other is for 250 through 750 Series.

135 Series (Refer to Figure 9-10)

There are two adjusting screws in the table at both housings. Outer adjusting screws "B" and inner adjusting screw "A" are used to move the table front-to-back to change the minimum knife clearance by loosening one and tightening the other. Before turning the adjusting screws, loosen jam nuts "C" and "D". Also, nuts on the five table lock-down blocks (located under the table) must be loosened. Both adjusting screws must be tight when the proper knife clearance is obtained. Also, the nuts on table lock-down blocks must be tight.

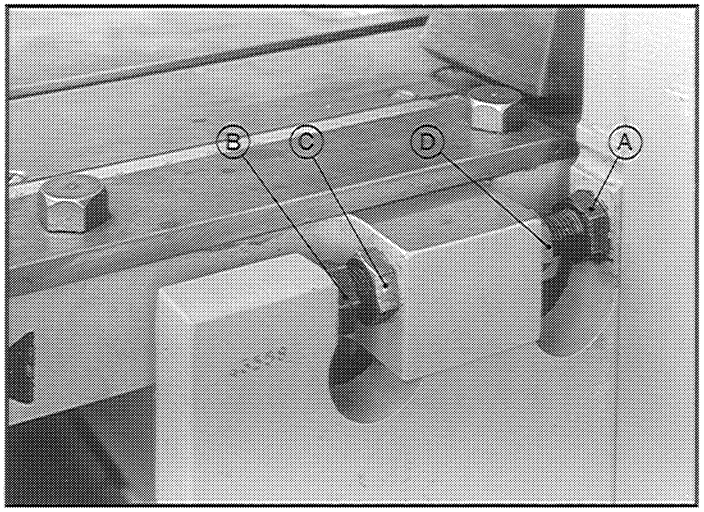


FIGURE 9-10 - Table adjusting screws (135 Series)

250 through 750 Series (Refer to Figure 9-11)

There are captive wrenches on the outer adjusting screw "A" in the table at both housings, which are used to move the table front-to-back. To change the minimum knife clearance, loosen jam nut "C" on inner adjusting screw "B". Adjust both the inner and outer adjusting screws so the inner adjusting screw head is tight against the housing with the jam nut tight when proper knife clearance is obtained.

There are two conditions where knife clearance may be adjusted:

A. If knife clearance is to be checked or adjusted without changing or rotating knives, the following must be completed first:

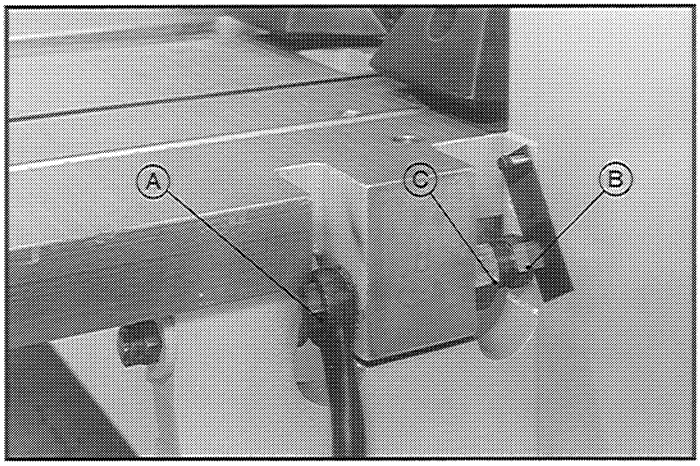


FIGURE 9-11 - Table adjusting screws (250-750 Series)

1. Clear the area around the machine of scrap.
2. Run the backgage all the way to the rear.
3. Set the MATERIAL LENGTH control and the MATERIAL THICKNESS control **(250-750 Series only)** to maximum. Cycle the shear to the top of the stroke.
4. Stop the main drive motor. Turn the OPERATOR CONTROLS selector to the "OFF" position and remove the key.
5. Remove the point-of-operation guarding. Refer to instructions on "REMOVING AND INSTALLING GUARDS" on Page 9-10.

B. If the knives have been changed or rotated to a sharp edge, move the table with the adjusting screws to insure clearance between the knives as the ram moves down.

IMPORTANT: Knife bolts must be tight. Refer to torque setting in Step 44 (Page 9-5) in the procedure "CHANGING OR ROTATING KNIVES".

CAUTION

MAKE CERTAIN ALL TOOLS HAVE BEEN REMOVED FROM THE TABLE.

To adjust knife clearance, proceed as follows:

1. Turn the OPERATOR CONTROLS selector to the "OFF" position and start the main drive motor. Set the OPERATOR CONTROLS selector to "ON", set the MODE selector to "INCH" and use the footswitch to inch the ram down until the knives just cross at the right end. Turn the OPERATOR CONTROLS selector to "OFF".
2. Move the table at the right end with the inner and outer adjusting screws until a .010" (.254mm) feeler will go between the knives and a .011" (.279mm) feeler will not. Both adjusting

screws should be tight when the .010" (.254mm) clearance is obtained.

3. Use the procedure in Step 1 to move the ram down until the knives are crossed just before the left end of the knives. Turn the OPERATOR CONTROLS selector to "OFF".

4. Move the table at the left end with the inner and outer adjusting screws until a .010" (.254mm) feeler gage will go between the knives and a .011" (.279mm) feeler will not go. Both adjusting screws should be tight when the .010" (.254mm) clearance is obtained.

5. Turn the OPERATOR CONTROLS selector to the "ON" position and use the footswitch to cycle the ram to the top of its stroke.

6. Use the footswitch to inch the ram down until the knives just cross at the right end. Turn the OPERATOR CONTROLS selector to "OFF". Recheck the knife clearance to ensure that a .010" (.254mm) feeler goes and a .011" (.279mm) does not go.

7. Alignment between the upper and lower knife is accomplished by one of the following methods:

135 and 250 Series:

The rigid ram brace controls the alignment of the ram by means of studs and nuts. By loosening one adjusting nut ("C" on Figure 9-12) and tightening the other, the ram can be moved to obtain the correct knife clearance while another stands on the table to adjust the clearance. The long handle wrench shipped with the machine is used to make this adjustment. Refer to Figures 9-13 and 9-14.

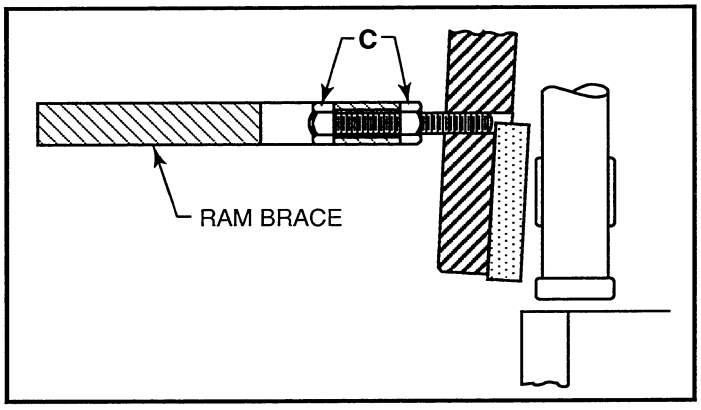


FIGURE 9-12 - Ram alignment

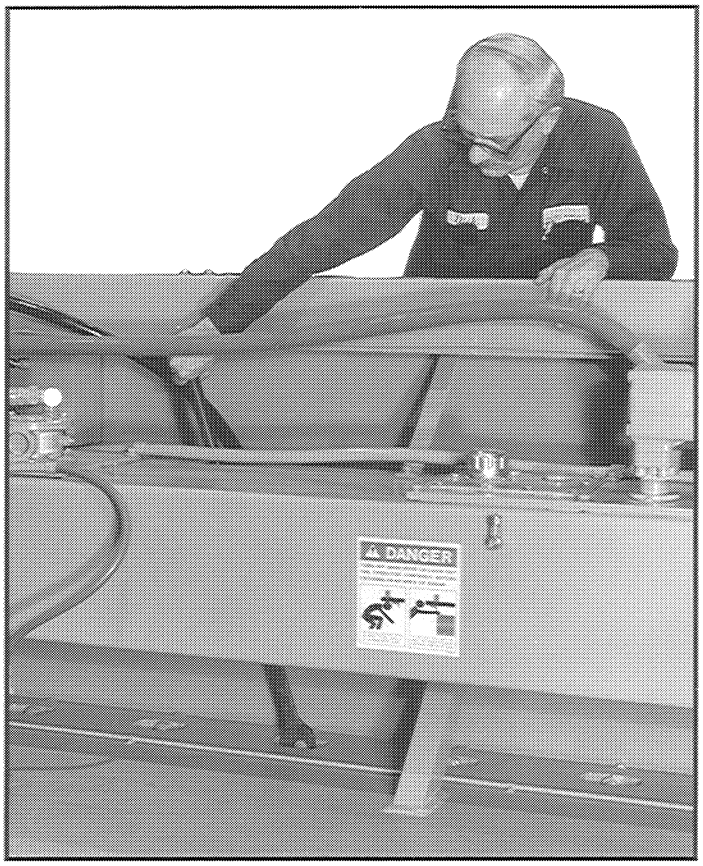


FIGURE 9-13 - Adjusting knife clearance (135 Series)

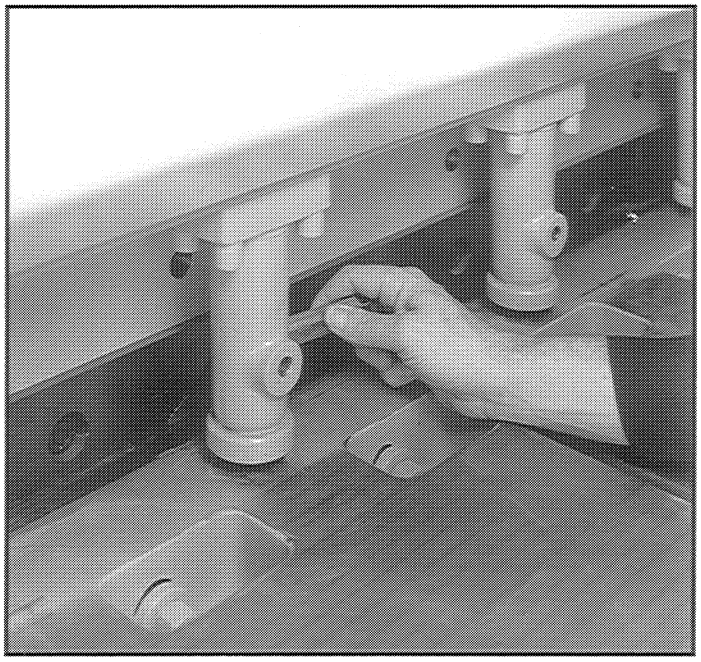


FIGURE 9-14 - Check clearance (135 Series)

375, 500 and 750 Series:

The stiff front portion of the table controls alignment of the lower knife by means of studs and nuts. By loosening one nut ("C" on Figure 9-15) and tightening the other, the lower knife can be moved to obtain the correct knife clearance at each stud. One person should check the clearance while another stands on the table to adjust the clearance. The long handle wrench shipped with the machine is used to make this adjustment. Refer to Figures 9-15 and 9-16.

IMPORTANT: Do not stand on the ram brace while adjusting ram (135-250 only) for knife clearance. Your weight could affect clearance.

CAUTION

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

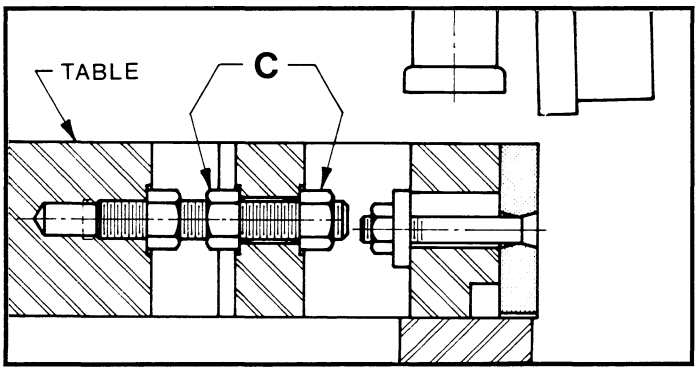


FIGURE 9-15 - Lower knife adjustment (375-750 Series)

FIGURE 9-16 - Check clearance (375-750 Series)

8. The knife clearance must be checked at each adjusting stud and adjusted to provide the clearance shown in the following chart:

SERIES	LEFT INCHES (mm)	CENTER INCHES (mm)	RIGHT INCHES (mm)
135-250-375	.010 (.254)	.010 (.254)	.010 (.254)
500-750	.010 (.254)	.008 (.203)	.010 (.254)

Both nuts on each adjusting stud must be tight when correct clearance is obtained.

9. To check and adjust the clearance, set the OPERATOR CONTROLS selector to "ON" and the MODE selector to "INCH". Use the footswitch to inch the ram down until the knives cross at the first adjusting stud from the right end. Turn the OPERATOR CONTROLS selector to "OFF" before checking clearance.

10. Repeat Step 9 for each adjusting stud, working from the right end to the left end.

11. The table must be moved to set the final clearance. Use the procedure in Step 1 to move the ram down until the knives are crossed just before the left end of the knives. Move the table at the left end with the inner and outer adjusting screws until the knife clearance indicated in Figure 9-9 is obtained. Tighten the jam nuts "C" and/or "D" on the left side. Refer to Figure 9-10 or 9-11.

IMPORTANT (135 Series) - Make certain the nuts on the five table lock-down blocks are tight.

12. Turn the OPERATOR CONTROLS selector to "ON" position and use the footswitch to cycle the ram to the top of the stroke.

13. Use the footswitch to inch the ram down until the knives just cross at the right end. Turn the OPERATOR CONTROLS selector to the "OFF" position. Move the table at right end with the inner and outer adjusting screws until the knife clearance indicated in Figure 9-9 is obtained. Both adjusting screws must be tight when the correct clearance is obtained. Tighten the jam nuts "C" and/or "D" on the right side. Refer to Figure 9-10 or 9-11.

14. Recheck the knife clearance at each adjusting stud and adjust as necessary to obtain the knife clearance indicated in Figure 9-9.

15. Turn the OPERATOR CONTROLS selector to the "ON" position and cycle the ram to the top of the stroke. Turn the OPERATOR CONTROLS SELECTOR to the "OFF" position, remove the key and stop the main drive motor.

16. Install the point-of-operation guarding. Close and secure the cylinder guards. Refer to instructions on "REMOVING AND INSTALLING GUARDS" on Page 9-10.

17. If the shear is equipped a conveyor, reinstall the material deflectors on both housings and/or the conveyor.

CAUTION

REMOVE ALL TOOLS AND EQUIPMENT FROM TABLE.

NOTE: Backgage counter or encoder, optional frontgage encoder, and table scales may need to be adjusted. Refer to instructions on "ADJUSTING BACKGAGE COUNTER" (Page 9-14) or separate manual for MICROCOMPUTER GAGE CONTROL II or MULTI-AXIS GAGE CONTROL for instructions.

The ram UP and DOWN limits also may need to be adjusted. Refer to instructions on "MATERIAL AND LENGTH CONTROL" on Page 9-26.

SHIMMING LOWER KNIFE

After the knives have been reground or when knives are replaced with new knives, it is necessary to change the shims under the lower knife. Shims are used to bring the cutting edge to the proper level with respect to the table surface. For this purpose use the standard shim packs shown in Figure 9-17.

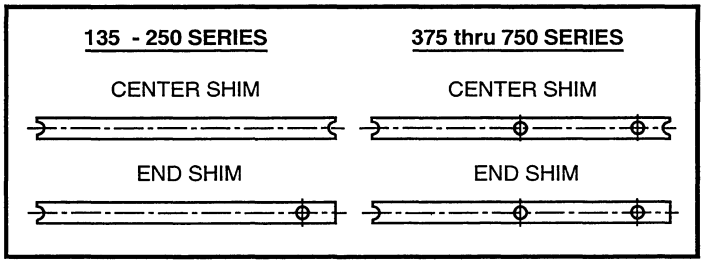


FIGURE 9-17 - Knife shims

The lower knife should be shimmed with one full-length solid shim, in addition to the shim packs. Shim packs consist of shims of various thicknesses.

To change the shims proceed as follows:

1. Remove the knife shims from the lower knife seat and place the shim sections on the shear table in their proper end-to-end location.

2. Clean and inspect each stack of shims. Discard any damaged shims and replace them with new shims of the same thickness.

CAUTION

SHIMS HAVE SHARP EDGES. PROTECT YOUR HANDS FROM CUTS.

3. Remove and inspect the pins which retain the knife shims in the lower knife seat. Replace all damaged or broken pins. **Do not reinstall pins at this time.**

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

NOTE: If shear has a full length shim, clean shim, remove any burrs and place it on the knife seat.

5. Remove the upper knife holders from the knife changing fixtures. Install lower knife holders in the fixtures. Place the lower knife on the fixtures. Turn OPERATOR CONTROLS selector to the "ON" position. Position the backgage at 6" (152mm). Turn OPERATOR CONTROLS selector to "OFF" position and remove the key. Use a 9/16" wrench to turn the adjusting studs to provide clearance between bottom of the knife and the knife seat. Turn OPERATOR CONTROLS selector to the "ON" position. Position the backgage so the knife is about 1/16" (1.6mm) from the table. Turn OPERATOR CONTROLS selector to "OFF" position and remove the key. Turn the adjusting studs to lower the knife until it is resting on knife seat. Install a knife bolt, washer and nut at each end of the knife. Tighten just enough to hold the knife against the table.

6. Place the knife shims, removed in Step 1, on top of the knife.

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 9-17. Each pack for the 135 & 250 Series consists of eight shims: one each of .005", .007", 010", .025" (.127, .178, .254, .635mm) and two each of .050" and .093" (1.270 & 2.362 mm) in thickness. The pack for the 375, 500 & 750 Series consists of three each of .020", .022", .025" and .028' (.508, .559, .635 & .711mm) thickness.

7. Compress the shims as shown in Figure 9-18 by moving the wedge block toward the knife. Check thickness of the shim pack with a scale as shown in Figure 9-19. The scale should touch shim pack at about the center of the knife. **(135 and 250 only)**. The **375, 500 and 750 Series**

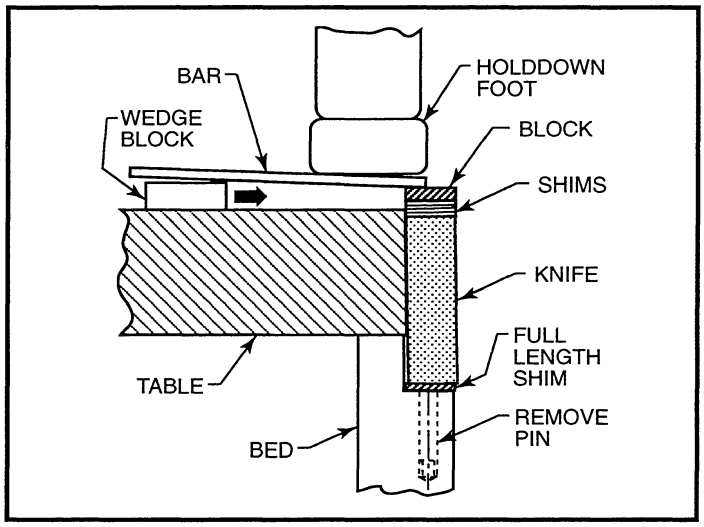


FIGURE 9-18 - Compress shims

shears have a 90° knife seat. The knife should be .000"-.004" (.000-.102mm) below the top surface of the table. If necessary, add or remove shims to obtain the correct shim pack thickness.

NOTE: Some early models of 375, 500 and 750 Series had a 91° knife seat and should be shimmed as the 135-250 Series.

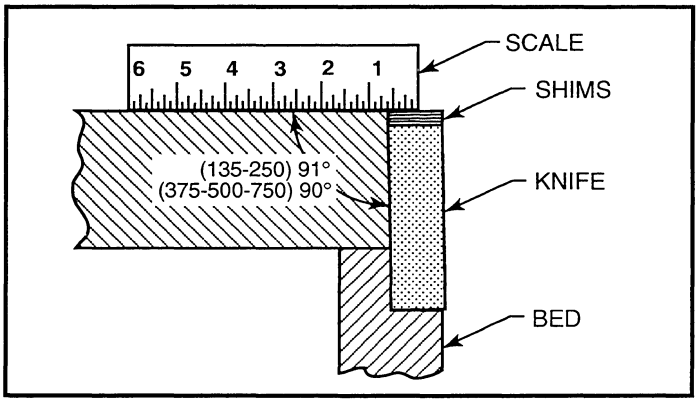


FIGURE 9-19 - Check shim pack thickness

8. Repeat Step 7 using the holddown at the center of each shim pack. There must not be a difference in thickness of more than .003" (.076mm) between adjacent stacks of shims.

9. Place all unused shims in their proper envelopes.

10. Place the shim stacks along the table in their proper end-to-end location.

11. Use a 9/16" wrench and adjust both fixtures by turning the adjusting studs to raise the knife above the knife seat. Turn OPERATOR CONTROL selector to the "ON" position. Position backgage 1/2" (152mm) toward the rear.

CAUTION

STOP ! CHECK AND MAKE SURE THE KNIFE IS ON THE KNIFE HOLDERS CORRECTLY.

Position the backgage at maximum gage position. Turn the OPERATOR CONTROLS selector to "OFF" position and remove the key. Remove the knife from the fixtures and place it on wood blocks away from the immediate area. Remove the lower knife holders. Reinstall the upper knife holders on the fixture.

12. Place shim stacks on the knife seat. The thickest shim must be on top. If the shear has a full-length shim, place it on top of the shim stacks.

13. Adjust and install the shim pins. They are adjusted by means of a set screw in one end of the pin.

IMPORTANT: The pins must be adjusted so the end of the pin is just below the top of the shim stacks when the shims are compressed.

14. Proceed with Step 22 in the section "CHANGING OR ROTATING KNIVES" on Page 9-4.

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" (.127mm) from end-to-end.

THICKNESS - Parallel within .003" (.076mm) from end-to-end.

No variation greater than .001" (.025mm) within any 12" (305mm) of length.

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

SURFACE FINISH - 16 microinch

MINIMUM KNIFE SIZE

SIZE - NEW KNIFE INCHES (mm)	MINIMUM GRIND DIMENSION INCHES (mm)
1.0 x 3.0 (25.4 x 76.2)	0.75 x 2.625 (19.1 x 66.7)
1.0 x 4.0 (25.4 x 101.6)	0.75 x 3.625 (19.1 x 92.1)
1.125 x 5.0 (28.6 x 127)	0.875 x 4.625 (22.2 x 117.5)

REMOVING AND INSTALLING GUARDS

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

POINT-OF-OPERATION GUARDING

To remove point-of-operation guarding, refer to one of the following steps (1 or 2) depending upon the type of guards:

1. **135, 250, 375 Series** (Refer to Figure 9-20):

   Use hex key wrench to remove the button head screws holding the guard sections in place.

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

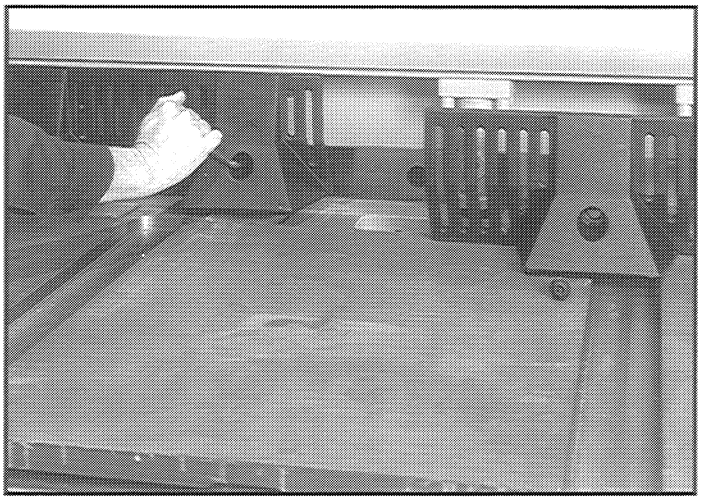


FIGURE 9-20 - Knife and holddown guards

2. **500, 750 Series** (Refer to Figure 9-21):

   Remove the socket head screws holding the guard assembly to the holddown beam. There is a series of brackets with the socket head screws in each bracket. This guard is removed as an assembly. To remove it from the machine a lifting device must be used.

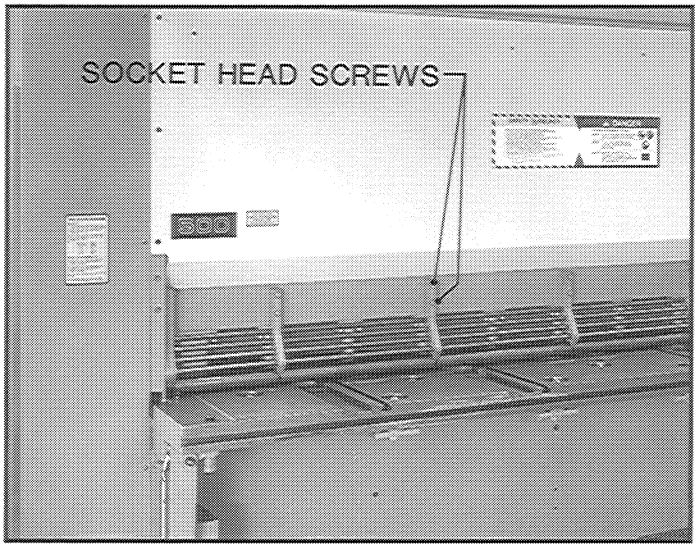


FIGURE 9-21 - Awareness barrier

To install point-of-operation guarding, refer to one of the following steps (1 or 2), depending upon the type of guards:

1. **135, 250, 375 Series:**

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

   B. Install all of the button head screws.

   C. Securely tighten all button head screws.

2. **500, 750 Series:**

   A. Position the guard in place and start all of the socket head screws. This guard was removed as an assembly and a lifting device must be used to install it.

   B. Securely tighten all socket head screws.

CYLINDER GUARDS

To open the cylinder guards:

1. Disengage the captive fasteners on the cylinder guards by turning them counterclockwise. Refer to Figure 9-22.

2. The guard is hinged and can be swung open after all of the fasteners have been disengaged.

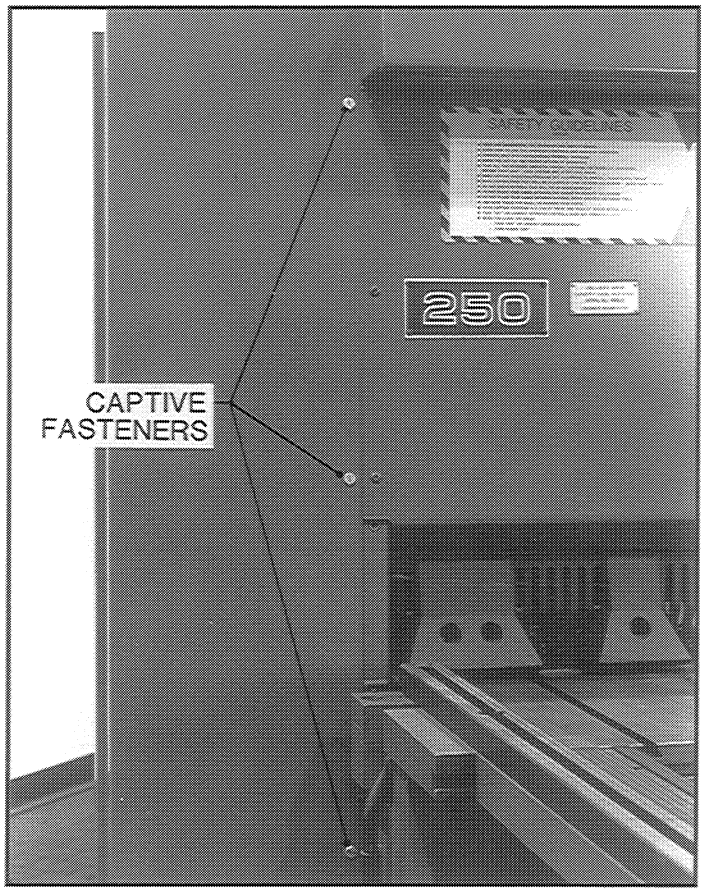


FIGURE 9-22 - Cylinder guards

To secure the cylinder guards:

1. Close the cylinder guards and align the captive fasteners with their mating holes.
2. Turn the captive fasteners clockwise to engage and tighten them.

ADJUSTING BACKGAGE ANGLE PARALLELISM

It may become necessary to adjust backgage angle parallel to the lower knife. A properly adjusted solid backgage angle should be straight or approximately .002" (.05mm) concave (hollow) in the center. This will help to ensure solid contact between the edge of the sheet or plate and gaging surface of the backgage angle. Consistent gaging cannot be obtained unless the angle is slightly concave.

CAUTION

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

Adjustment of the backgage angle is as follows:

1. Check for parallelism:
   A. Position the backgage angle at 1-1/64", or 1.016" (25.8mm), depending on the style of backgage counter or display.
   B. Make a test cut on a full length piece of 16 or 18 gauge (1.5-1.2mm) material.
   C. Measure the part with vernier calipers or micrometers. Record these dimensions for later reference if the cut piece is not parallel.
2. Place the OPERATOR CONTROLS selector in the "OFF" position and remove the key.
3. Remove the point-of-operation guarding. Refer to section "REMOVING AND INSTALLING GUARDS" on Page 9-10.
4. Check the backgage angle for parallelism to the lower knife at each end. Place a one inch (25.4mm) gage block between backgage angle and the lower knife, flush with the top of the knife. If backgage angle has probes (optional), place gage block between a "dummy" block and the lower knife. Use a feeler gage with this gage block to determine the backgage position.

NOTE: A gage block (Figure 9-23) with at least a 6" (150mm) handle must be used to keep hands and fingers as far from the cutting edge of the knife as possible.

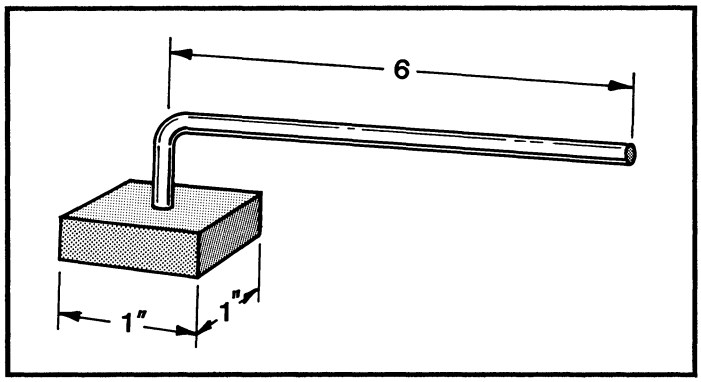


FIGURE 9-23 - Gage block

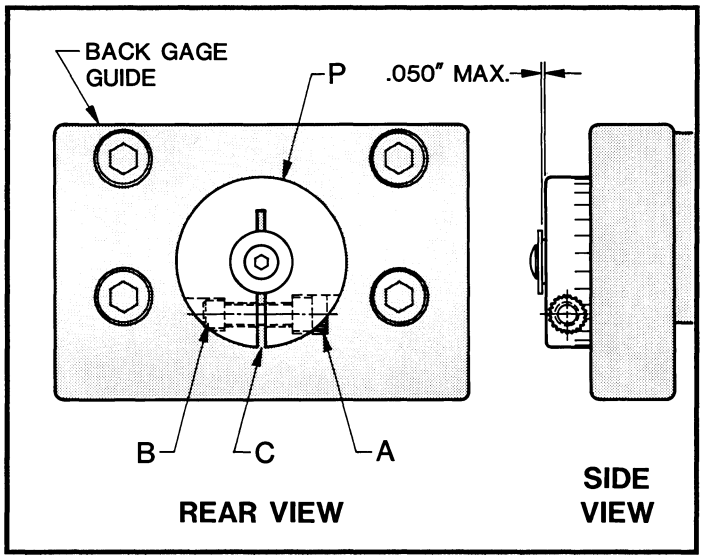


FIGURE 9-24 - Guide adjustment

5. If the gage is not parallel to lower knife within .002" (.05mm), adjustments must be made.
6. Adjust backgage angle:

FINE ADJUSTMENT

A. Loosen locknut "A" and socket head cap screw "B", Figure 9-24. Adjustment can be made at either or both guides, depending upon the amount of movement required.

B. Adjust nut "P" until the backgage is parallel to the lower knife.
   1. Each graduation on adjusting nut "P" moves the backgage angle .001" (.025mm) at the centerline of the guide.
   2. Clockwise rotation moves the angle away from the knife and counterclockwise rotation moves angle closer to the knife.
   3. There is a .050" (1.27mm) 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 BACKGAGE IS PROPERLY SET, PROCEED TO STEP NO. 7. IF BACKGAGE CANNOT BE ADJUSTED, GO TO "COARSE ADJUSTMENT".

COARSE ADJUSTMENT

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

A. Turn the OPERATOR CONTROLS selector to the "ON" position.

B. Run the backgage to mid-range position.

C. Turn the OPERATOR CONTROLS selector to "OFF" position and remove the key.

D. Position adjusting nuts "P" in both guides to the center of their .050" (1.27mm) travel.

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

F. There are two couplings ("Y" on Figure 9-25) that connect the two backgage 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.

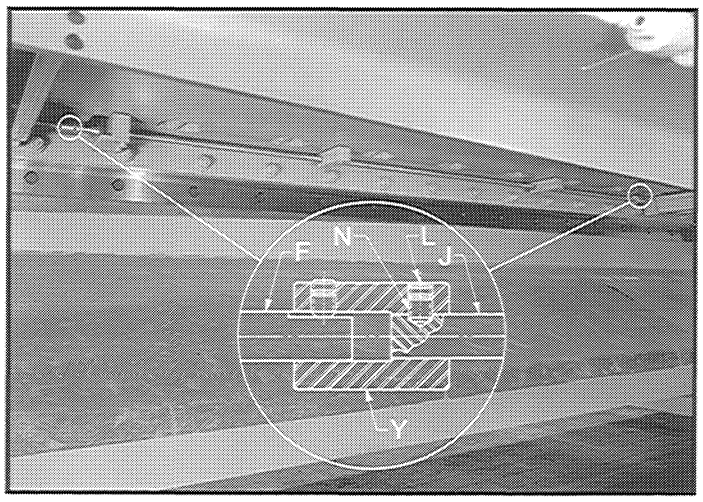


FIGURE 9-25 - Connecting shaft couplings

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

H. Turn wormshaft "J" clockwise, looking at shaft from left end of shear, to make backgage angle move closer to lower knife. One rotation of wormshaft "J" will move the angle about 1/8" (3.18mm).

I. Again measure to see if the left and right ends of the angle are within 1/32" (.79mm) 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, turn OPERATOR CONTROLS selector to "ON" position.

M. Run backgage in to 1-1/64" (or 1.016" or 25.8mm) dimension. Turn OPERATOR CONTROLS selector to "OFF" position and remove the key.

N. Repeat Step No. 4 to check parallelism and Step No. 6 to fine adjust backgage 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 backgage angle. Measure the distance between the gage block and lower knife with a feeler gage.

8. The backgage angle is set straight or hollow by adjusting bolt(s) "X", Figure 9-26. There will be one or two adjustments depending on the length of the shear. (**135 Series x 6** has no adjustment).

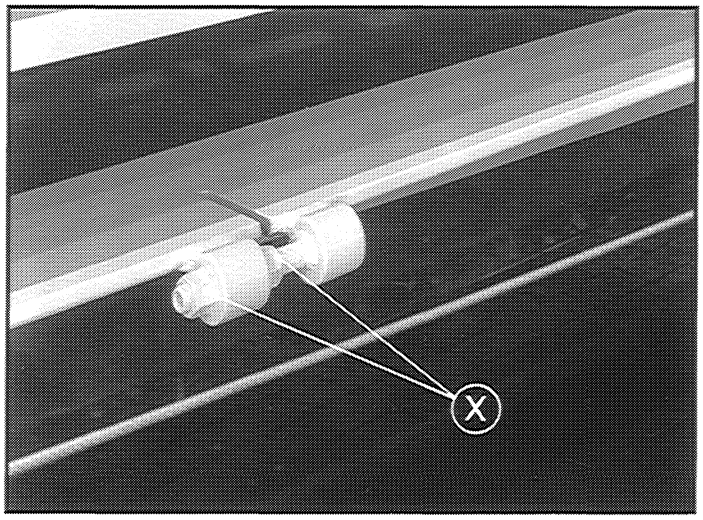


FIGURE 9-26 - Backgage angle adjustment

To make the solid backgage angle hollow, loosen outside nut and tighten inside nut. After

correct setting has been made, tighten the outside nuts.

9. Reinstall point-of-operation guarding. Refer to instructions on "REMOVING AND INSTALLING GUARDS" on Page 9-10.
10. Turn OPERATOR CONTROLS selector to the "ON" position.
11. Run backgage towards rear of shear. Then move it forward to 1.000" (25.4mm).
12. Make a trim cut on a full length piece of 16 or 18 gauge (1.5-1.2mm) material.
13. Position cut edge of sheet against backgage 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" (.127mm) end-to-end, the backgage is not parallel to the lower knife. Repeat the adjustment procedure beginning at Step No. 2.
16. After the backgage angle has been adjusted, it may be necessary to reset the counter or encoder. Refer to following instructions "ADJUSTING BACKGAGE COUNTER".

ADJUSTING BACKGAGE COUNTER

After changing or regrinding knives or adjusting backgage angle, the counter or display may not correspond exactly to the size of the cut piece, due to different knife dimensions.

NOTE: If the shear is equipped with MICRO-COMPUTER or MULTI-AXIS GAGE CONTROL, refer to separate manual EM-288 or EM-274 for adjusting the encoder.

The proper procedure for adjusting the counter is as follows:

1. Set backgage at a one-inch (25.4mm) dimension.
2. Start with a sheared edge by taking a one-inch (25.4mm) trim cut from a piece of 16 or 18 gauge (1.5-1.2mm) material.
3. Position the material against the backgage angle and cut another piece. This piece will be used for measurement.
4. Measure the test piece with a vernier caliper or micrometer.
5. Remove the cover over slot in the GAGE CONTROL legend plate. Loosen set screw "R" through the slot in legend plate. Refer to Figure 9-27 for location of set screw "R". Turn the coupling, using hex socket key, to set the counter to dimension measured in Step 4. Tighten set screw "R".

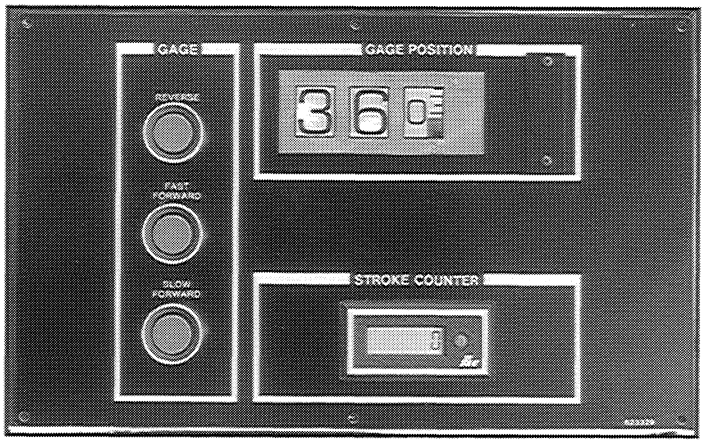


FIGURE 9-27 - Backgage counter

6. Repeat procedure until test piece measures the same as the counter setting.
7. Reinstall the cover over slot in the legend plate.

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" (.81mm) across the diagonals, the squaring arm must be adjusted.

If the gaging surface on the 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 9-28. Adjust level as required.

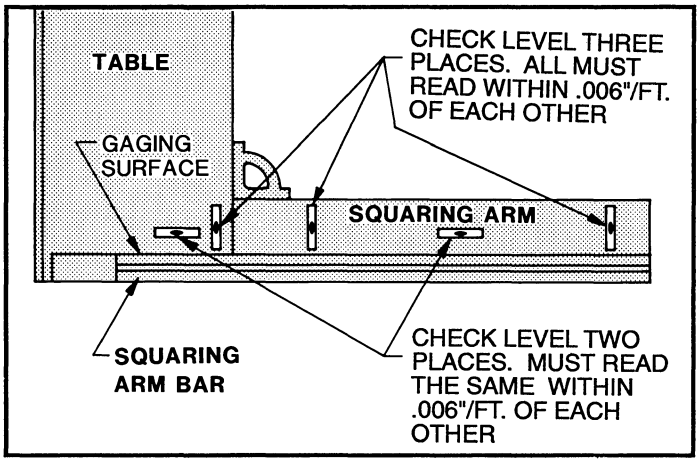


FIGURE 9-28 - Leveling squaring arm

2. Trim a full length sheet, preferably as long as the squaring arm or the maximum length of the shear, of 16 gauge (1.5mm) material. Trim several times to get camber to a minimum.

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 the squaring arm bar as shown on Figure 9-29.

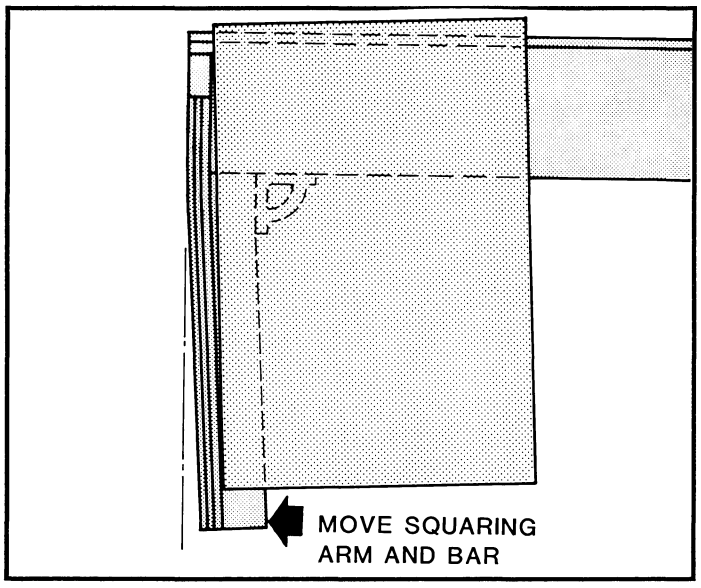


FIGURE 9-29 - Align squaring arm bar

1. Loosen or remove anchor bolts for squaring arm leg. Loosen the bolts which fasten the squaring arm gusset to the table and channel. Loosen the nuts which fasten the squaring arm channel to the table. Move squaring arm channel to the left as shown on Figure 9-29 until the sheared edge is tight against the squaring arm bar full length. Remove full length sheet. If possible, re-install and tighten the anchor bolts. Do not install new anchors for the bolts at this time.

2. Relevel squaring arm as described in Step 1.

3. Shear both edges of another piece of material to obtain a 36" (914mm) width. Place one sheared edge against the 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" (1016mm) long.

4. Measure the distances L1 and L2 (Figure 9-30) with a tape measure. If they are not the same length, loosen front socket head screw "A" in Figure 9-31 and either set screw "B" or "C". If L1 is longer, loosen 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 squaring arm bar away from sheet. Tighten screw "A" and either screw "B" or "C".

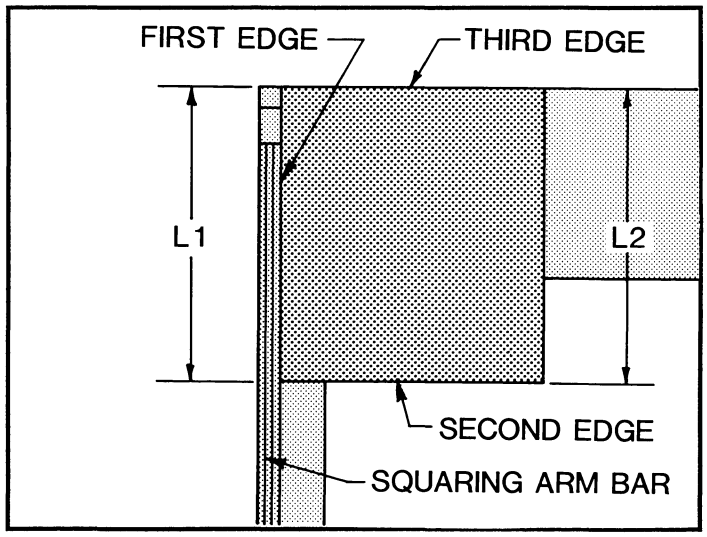


FIGURE 9-30 - Fine adjust bar

5. Keep the same sheared edge against the squaring arm bar and trim both ends as in Step 3. Remeasure distances L1 and L2. If necessary repeat adjustments (Step 4) until distances L1 and L2 are the same length within 3/64" (1.191mm) on a 36" x 36" (914 x 914mm) blank. This is the same as having the diagonals the same length within 1/32" (.813mm).

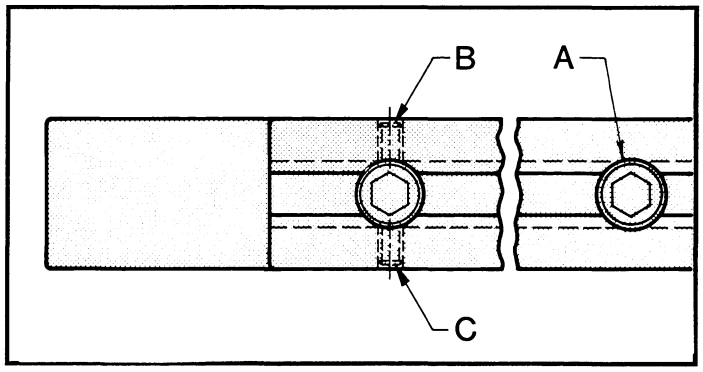


FIGURE 9-31 - Bar adjusting screws

6. Place the full length sheet (removed in Step A-1) with sheared edge against 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 outer end of squaring arm. After full length contact is obtained, install the anchor bolts. If

necessary, place shims between the squaring arm gusset and the table and/or channel. See Figure 9-32. Securely tighten bolts for the gusset. If necessary, shim between squaring arm channel and the table and securely tighten nuts. Check the contact between the sheared edge of the full length sheet and the squaring arm bar. Repeat this step if required.

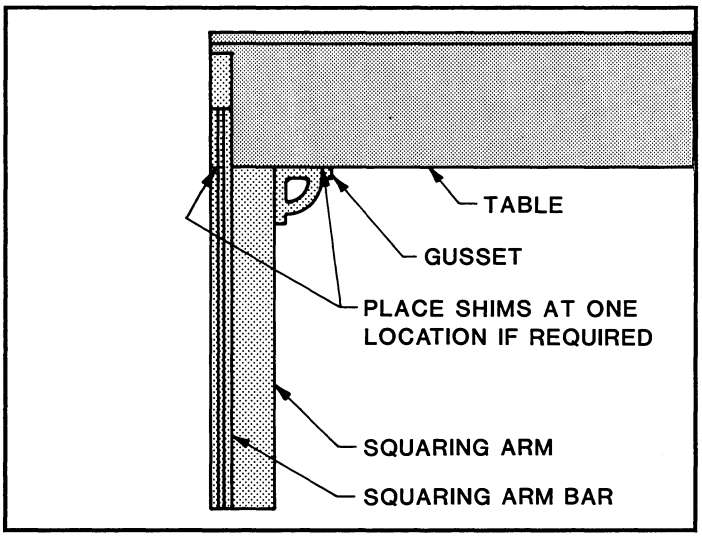


FIGURE 9-32 - Shim gusset

B. Sheet lays on table and against the squaring arm bar as shown on Figure 9-33.

Use the procedure outlined on Page 9-15 under "A", except the initial movement of the squaring arm is to the right as shown on Figure 9-33.

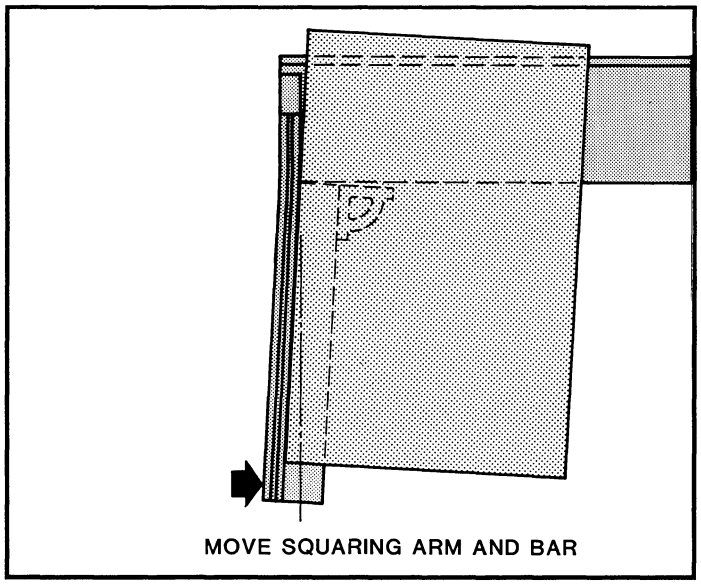


FIGURE 9-33 - Move squaring arm and bar

C. Sheet lays on table and against the squaring arm bar as shown on Figure 9-34.

1. Move the end of squaring bar on table to left or right as shown on Figure 9-34. To adjust, loosen front socket head screw "A" (Figure 9-31) and either socket set screw "B" or "C" in the 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 loosen set screw "B" or "C". Remove the full length sheet.

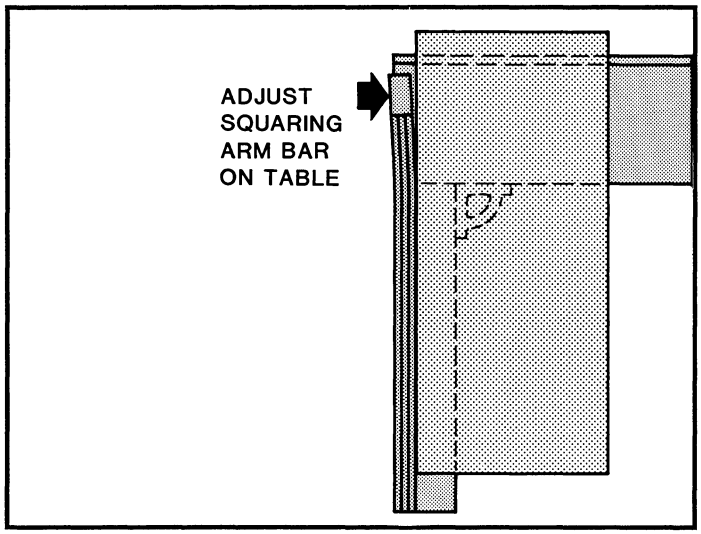


FIGURE 9-34 - Adjust squaring arm bar

2. Make the final adjustment of the squaring arm by using the procedure outlined on Page 9-15 in Steps A-3 through A-6.

RAM GIB ADJUSTMENT

The ram gibs, located in the housings (Figure 9-35) are located inside the cylinder guards, which must be opened before starting adjustments. Refer to instructions on "REMOVING AND INSTALLING GUARDS" on Page 9-10.

1. Back off table to obtain about .020" (.508mm) knife clearance.

2. To adjust the gibs, cycle the shear so the ram is at the top of its stroke with the MATERIAL LENGTH selector and MATERIAL THICKNESS selector (**except 135 Series**) set at maximum. Run the backgage all the way to the rear. Turn the OPERATOR CONTROLS selector "OFF" and remove the key. Loosen the four square head adjustment screws on both the left front and right front gibs (total of eight). Then tighten the four hex head adjustment screws, using a six inch (152mm) long wrench, on both the left and right front gibs (total of eight). Ram bearing surface must contact front and rear gibs in area where screws are being adjusted. Use "INCH" mode to position ram before making the

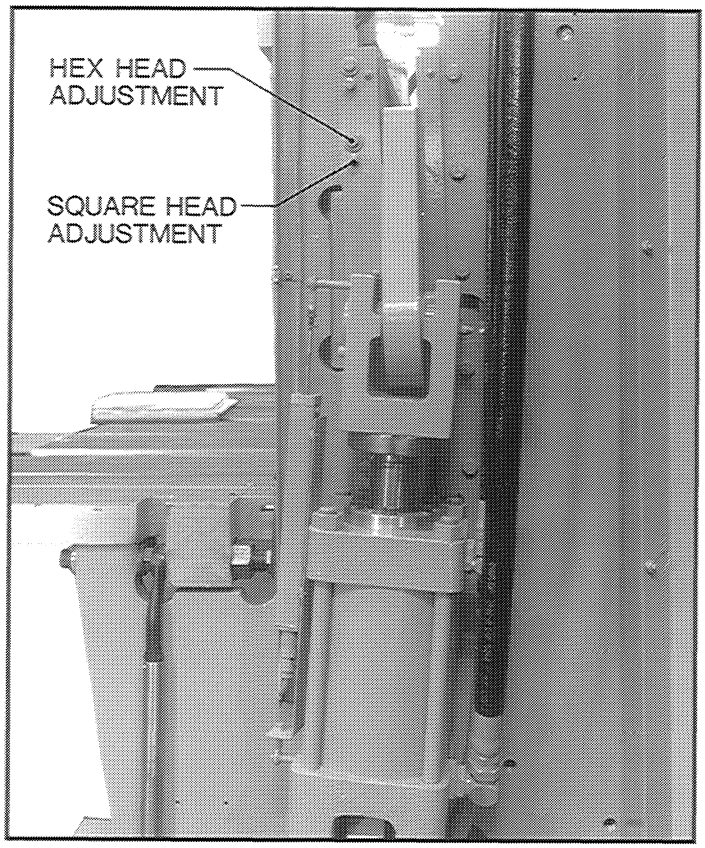


FIGURE 9-35 - Ram gib adjustment

adjustment. Tighten all hex head screws evenly. Back-off all eight hex head adjustment screws one turn and tighten all eight square head adjustment screws.

CAUTION

DURING THE FOLLOWING PROCEDURE MAKE CERTAIN EVERYONE IS CLEAR OF THE RAM, AS IT WILL MOVE DOWN.

3. Cycle the shear two or three times.

4. With the motor running and the OPERATOR CONTROLS selector "OFF", manually override SOL-4 by depressing the pin in the end of the solenoid cover and observe whether the ram drifts down or not.

   If the ram does not drift down, proceed to Step 5.

   If ram does drift down, proceed to Step 6.

5. Loosen all eight hex head adjustment screws 1/4 turn and tighten all eight square head adjustment screws. Repeat Step 4.

6. Check for clearance, using .0015" (.038mm) feeler gage, between the housings and top edge of the front gibs on both sides. Also, check for clearance between the gib wear surface and the ram face. Check only at the bottom rear and top front of each gib.

   If no clearance is found between the gib and housing and between gib and ram, the gib adjustment is complete. Proceed to Step 11.

   If clearance is found on either side between gib and housing, proceed to Step 7.

   If clearance is found on either side between gib and ram, proceed to Step 8.

7. Turn MODE selector to "SINGLE STROKE" and OPERATOR CONTROLS selector to "ON". Cycle the shear to the top of the stroke. Set up and shear a piece of six-inch (152mm) wide capacity thickness material at each end of the machine. Turn OPERATOR CONTROLS selector "OFF" and remove the key. Recheck for clearance between the housing(s) and top edge of the front gib(s) on the side(s) where clearance was found in Step 6.

   If no clearance is found between gib and housing and there is clearance between gib and ram, proceed to Step 8.

   If clearance is found between gib and housing, repeat Step 7.

8. Loosen the four square head adjustment screws on the side(s) where clearance was found. Tighten the four hex head adjustment screws 1/4 turn on the side(s) where clearance was found. Then tighten all square head adjustment screws that were loosened.

9. With motor running and OPERATOR CONTROLS selector "OFF", manually override SOL-4 and observe whether the ram drifts down or not.

   If ram does not drift down, proceed to Step 10.

   If ram does drift down, repeat Steps 8 and 9.

10. Loosen the four hex head adjustment screws 1/8 turn on the side(s) that was adjusted in Step 8. Tighten the four square head adjustment screws.

    Repeat Step 6.

11. Reset knife clearance. See instructions for ADJUSTING MINIMUM KNIFE CLEARANCE on Page 9-5.

LUBRICATION

Proper lubrication is of extreme importance if any piece of equipment is to have long life and troublefree operation. Strict observance of all lubrication instructions contained in this manual will pay dividends in lower maintenance costs for your shear.

MANUAL LUBRICATION POINTS

The following grease points should be checked and lubricated at regular intervals with No. 1 or No. 2 extreme pressure lithium soap base grease (CINCINNATI grease H-1EP or H-2EP).

CYLINDER SPHERICAL BEARINGS - Two lubrication points are located at each end of the shear. Lubricate every three months. See Figure 9-36.

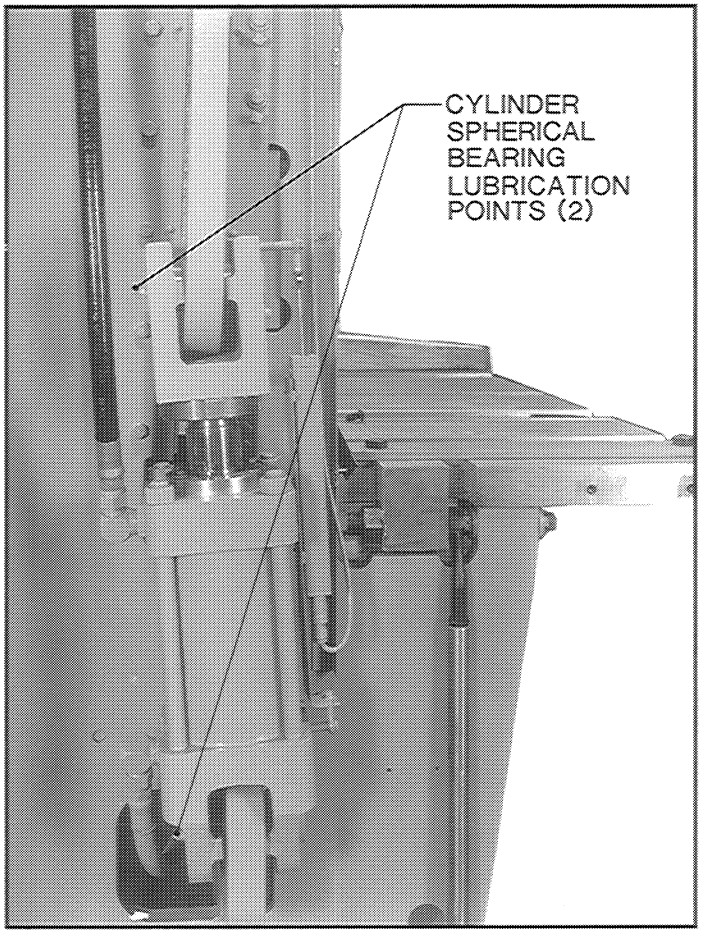


FIGURE 9-36 - Cylinder lube points

BACKGAGE LIFT CYLINDER SPHERICAL BEARINGS (375 through 750 Series) - There are two lubrication points on each cylinder. Lubricate every three months. See Figure 9-37.

BACKGAGE GUIDE PIVOT BLOCKS (375 through 750 Series) - There are two lubrication points for each guide. Lubricate every three months. See Figure 9-37.

AUTOMATIC LUBRICATION POINTS

The automatic lubrication system lubricates the front gibs, rear gibs, ram alignment dowel, backgage guides and optional Multi-Axis frontgage guides. Refer to Figures 9-37 through 9-40. The lubrication system is cycled automatically every 200 strokes of the ram and each time the shear is restarted after turning main disconnect switch. Each point is lubricated every time the system cycles.

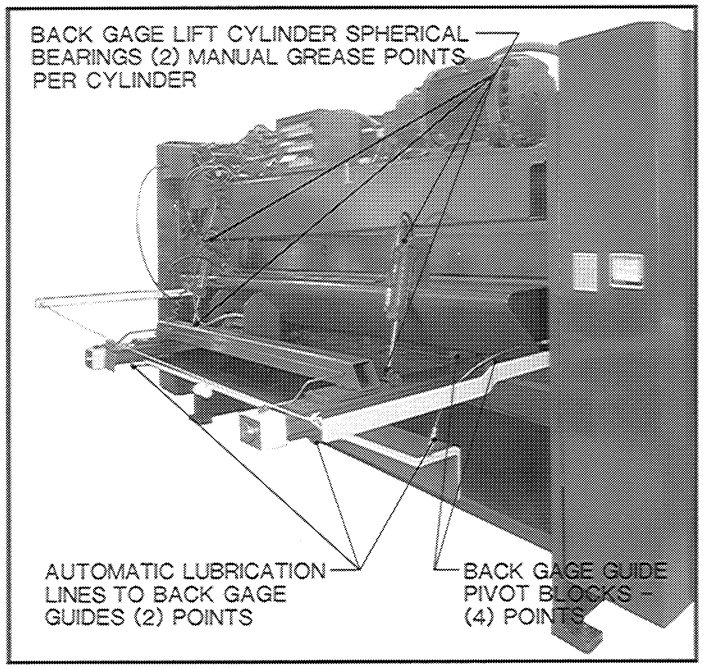


FIGURE 9-37 - Backgage lube points

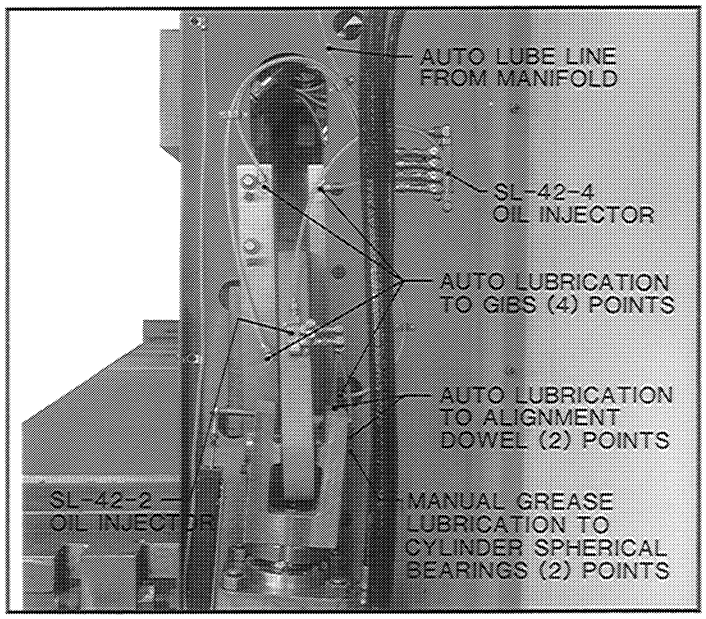


FIGURE 9-38 - Right automatic lube points

The cylinder spherical bearings are manually lubricated with grease as specified above.

The system uses Lincoln oil injectors which meter the oil to the lubrication points. The output of the injectors can be adjusted to suit the application. Short strokes and shearing light gauge material requires less lubrication. Turning the shear on and off frequently increases the number of lube cycles. The oil flow per cycle can be decreased for these type applications. Oil flow to the backgage guides should be adjusted to suit the frequency of backgage adjustment.

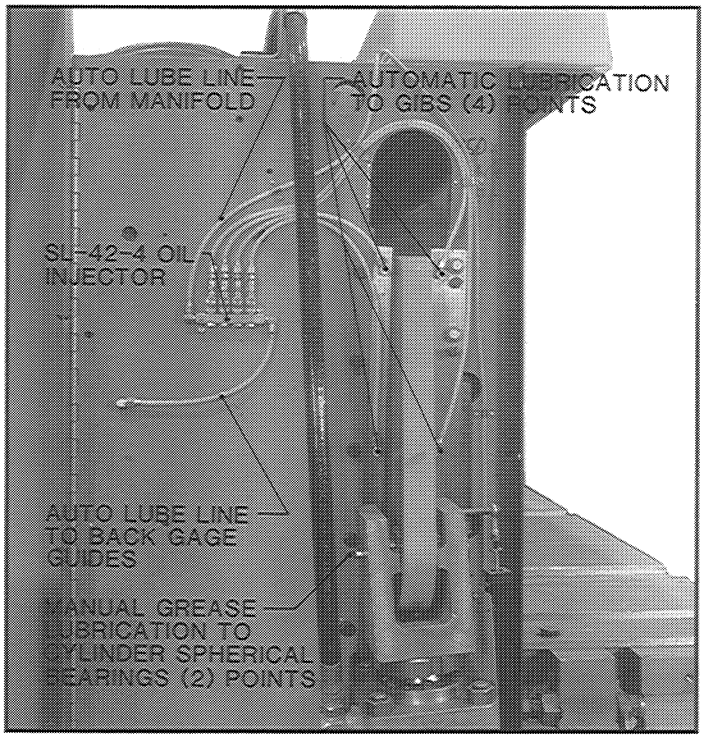


FIGURE 9-39 - Left automatic lube points

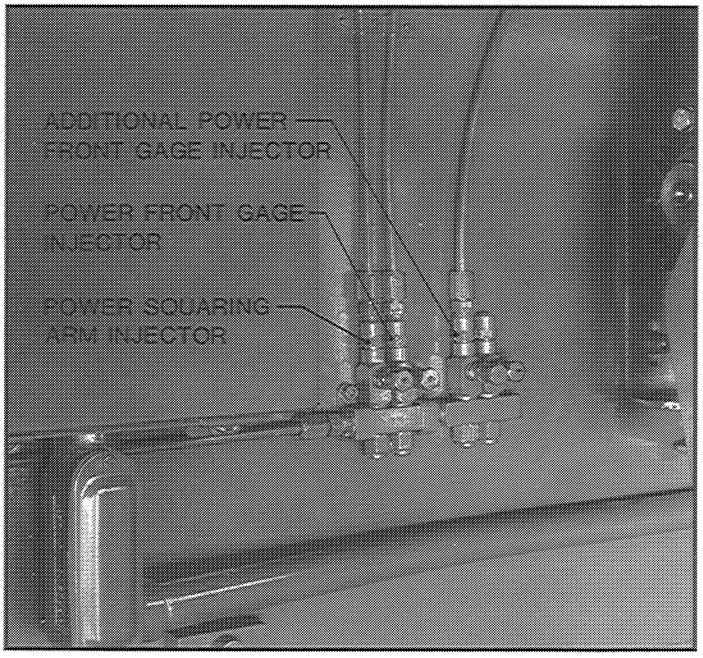


FIGURE 9-40 - Frontgage automatic lube points

Two size injectors are used on CINCINNATI Shears - SL-42 and SL-43. Both sizes have a minimum flow of .001 cu. in. (.016 cu. cm) with the indicator cap hand tight against its stop. The SL-42 will dispense a maximum flow of .003 cu. in. (.049 cu. cm) with the indicator cap retracted two full turns. The SL-43 will dispense a maximum of .008 cu. in. (.131 cu. cm) with the indicator cap retracted five full turns. Retracting the cap further will not increase the lubricant output.

INJECTOR ADJUSTMENT

Injector output is controlled by the position of the indicator cap, which limits the travel of the packing retainer. See Figure 9-41. With the injector cap hand tightened clockwise against its stop, the lubricant output is decreased to the minimum amount. Retract the indicator cap the desired amount counterclockwise to increase the output. Retain the setting by tightening locknut against face of indicator cap.

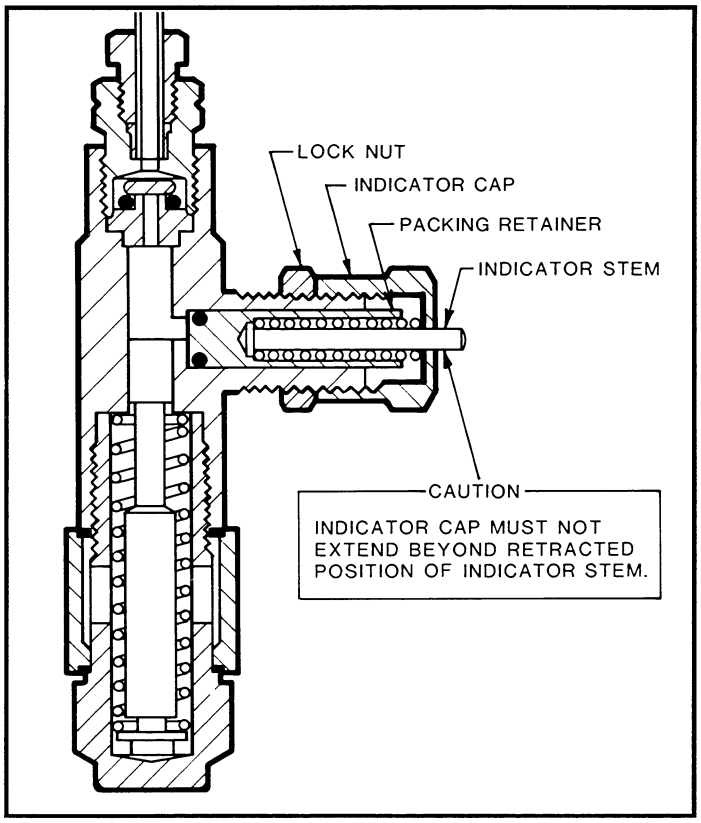


FIGURE 9-41 - Oil injector

The adjustment ranges and factory settings for specific lube point injectors are:

FRONT GIB - .001 to .003 cu. in. (.016-.049 cu. cm.) - Factory set at two full turns retracted (.003 cu. in. or .049 cu. cm.).

REAR GIB - .001 to .003 cu. in. (.016-.049 cu. cm.) - Factory set at two full turns retracted (.003 cu. in. or .049 cu. cm.)

RAM ALIGNMENT DOWEL - .001 to .003 cu. in. (.016-.049 cu. cm.) - Factory set at hand-tight position.

BACKGAGE GUIDES - .001 to .008 cu. in. (.016-.131 cu. cm.)- Factory set at five turns open (.008 cu. in. or .131 cu. cm.)

POWER SQUARING ARM AND FRONTGAGES - .001 TO .008 CU. IN. - Factory set at five turns open (.008 cu. in.).

The injectors are set at the factory for the most severe application. The injectors will require adjustment if there is evidence of excess lubrication.

PUMPING UNIT

Proper lubrication is of the utmost importance to obtain long life and trouble-free operation. The initial lubrication procedures are covered on Page 2-3.

HYDRAULIC OIL

The hydraulic reservoir, Item "26" (Figure 1-1 and 1-2), should be filled to the mark on the oil sight gage, Item "36", with the ram at the bottom of its stroke and the MATERIAL THICKNESS selector set at maximum. Item "37" is a combination filler-breather cap. Medium hydraulic oil (viscosity 215 SUS @ 100°F) with anti-wear, anti-rust and anti-oxidation additives (CINCINNATI Oil B-215) should be used.All shears are shipped with this type oil in the reservoir. Any brand of equivalent oil can be used. The Lubrication Recommendation chart included with this manual lists brand names and numbers which meet CINCINNATI specifications. The oil reservoir capacity is shown in Figure 9-42.

SERIES	RESERVOIR CAPACITY GALLONS (LITERS)
135 x 6	30 (114)
135 x10	50 (189)
250 x 6	30 (114)
250 x 8	40 (151)
250 x 10 and larger	50 (189)
375	
500	
750	100 (379)

FIGURE 9-42 - Reservoir capacity

CAUTION

STANDARD HYDRAULIC SHEARS ARE DESIGNED FOR AND SHIPPED WITH A PETROLEUM BASED HYDRAULIC FLUID. THIS IS FLAMMABLE. CHECK APPLICABLE FIRE CODES FOR SPECIAL PRECAUTIONS.

It is very important that the oil be clean. All precautions must be taken to keep the oil clean, free of chips, grit, water, sludge, coolants, cutting oil, etc. When adding oil to the reservoir, it should be pumped through a 10 micron filter. The oil should be drained and replaced after one year's service or sooner if sludge or other contamination is evident. The drain valve is located in the bottom of the reservoir. This valve should be cracked once a month to eliminate any accumulated moisture. Check the oil level daily.

OIL FILTERS

There are two filters provided on each shear; a suction filter and a return line filter.

The suction filter is a sump type strainer with a 100 mesh filter element. This filter is located in the reservoir on the end of the intake pipe to the pump. To inspect or replace filter element, remove the hex head screws from cover that contains the air breather and then remove the cover. Refer to Figure 9-43.

CAUTION

DO NOT ATTEMPT TO INSPECT OR REPLACE THE FILTER UNLESS OIL IN RESERVOIR EITHER HAS BEEN DRAINED OR OIL TEMPERATURE IS BELOW 100°F.

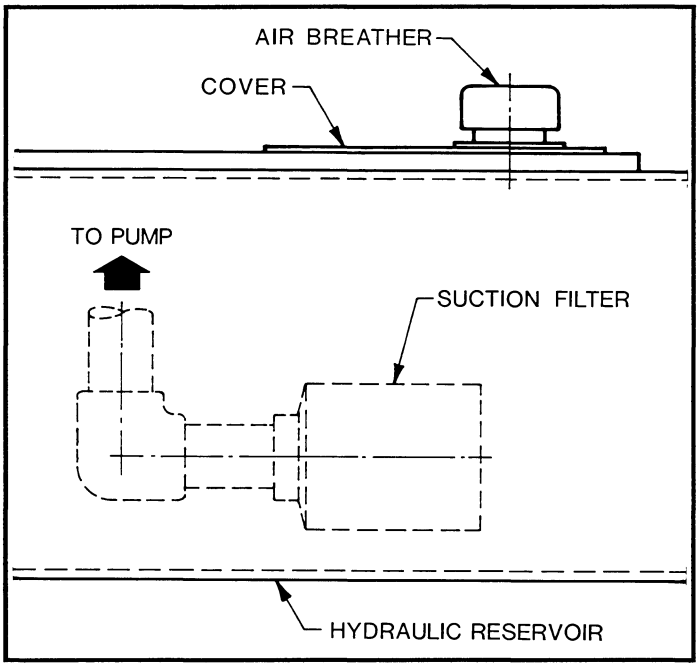


FIGURE 9-43 - Suction filter

The filter can then be unscrewed from the intake pipe. The new filter should be installed hand-tight. Re-install the cover and hex head screws. It is recommended that this filter be replaced, rather than cleaned, unless it can be cleaned by back flushing (from inside out).

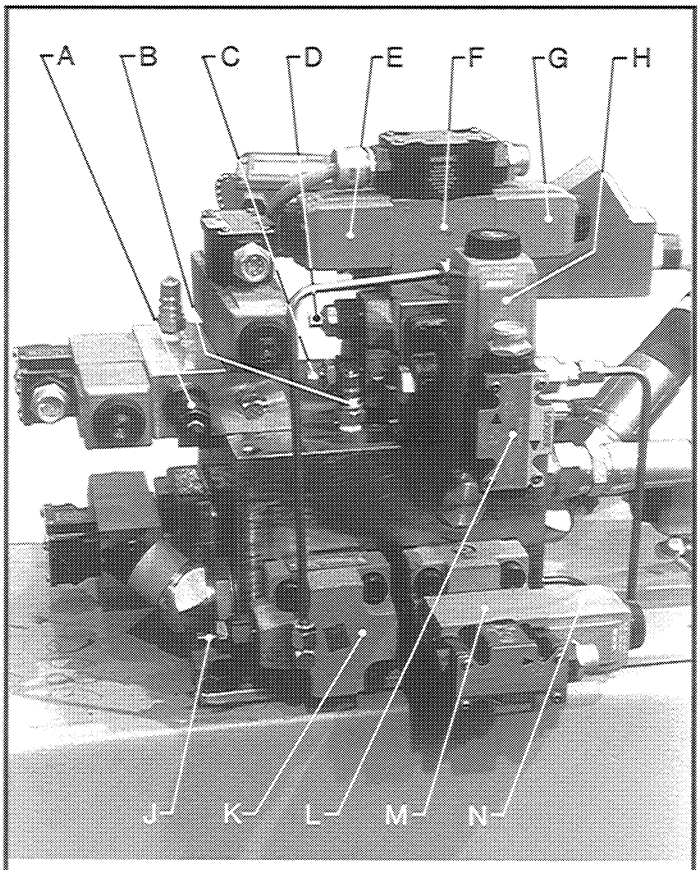
The return line filter ("BB" on Figure 9-46) contains a 10 micron element and is suspended into the tank. It is equipped with a color coded dirt alarm ("AA" on Figure 9-46). When the pointer is in the green area, full flow filtration is obtained. When the pointer is in the yellow area full flow filtration is still being obtained, but the element should be serviced. When the pointer is in the red area the filter is in bypass condition and element must be replaced.

IMPORTANT: Dirt alarm gage arrow may be in the red area when oil is cold. Check gage when oil is 100°F or above.

To service this filter remove the six-bolt cap assembly. Remove and discard the pleated paper filter element. Clean filter interior and all parts with a lint free rag. Inspect and lubricate "O" ring. Install new filter element. Replace and tighten six-bolt cap assembly.

AIR BREATHERS

Item "37" (Figure 1-1) is a combination filler-breather. It has a fine mesh strainer for filtering all oil added to the reservoir. As the oil is pumped out of the reservoir to the cylinders during operation, the oil is replaced by air. The filler cap incorporates a 40 micron element which filters the air as it enters the reservoir. This element may require periodic cleaning.

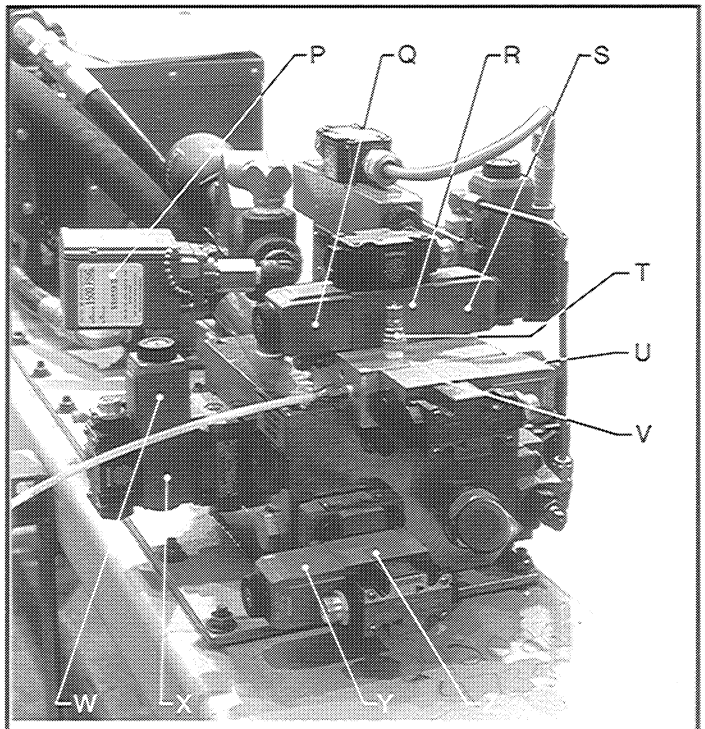


A. LUBE RELIEF PRESSURE ADJUSTMENT
B. TEST POINT #2
C. HIGH PRESSURE ADJUSTMENT
D. LOW PRESSURE ADJUSTMENT
E. SOLENOID 2B - HIGH RELIEF & DOWN
F. DOWN & DUAL RELIEF VALVE
G. SOLENOID 2A - LOW RELIEF
H. SOLENOID 14
J. COUNTERBALANCE PRESSURE ADJUSTMENT
K. COUNTERBALANCE VALVE
L. COUNTERBALANCE PILOT VALVE
M. UP VALVE
N. SOLENOID 4 - RAM UP

FIGURE 9-44 - Down and dual relief, counterbalance, and up valves

VALVES

The hydraulic control valves, except for the rake, lubrication and backgage lift, are cartridge or logic element type and are mounted on the main manifold. Refer to Figure 9-44 through 9-46.



P. HOLDDOWN PRESSURE SWITCH
Q. SOLENOID 3A - DECREASE RAKE
R. RAKE CONTROL VALVE
S. SOLENOID 3B - INCREASE RAKE
T. TEST POINT #4
U. SOLENOID 8 - LUBE
V. LUBE VALVE
W. SOLENOID 6 - HOLDDOWNS DOWN
X. HOLDDOWN CLAMP VALVE
Y. SOLENOID 7 - HOLDDOWNS UP
Z. HOLDDOWNS UP VALVE

FIGURE 9-45 - Rake control, holddowns up and down valves

IMPORTANT: Different types of valves are similar in appearance. Care should be taken to install them in the correct location on the manifold.

The location of valves can be identified from metal tags on the manifold or from the manifold assembly drawing. The following series of photographs, Figures 9-47 through 9-51, identify valve components shown on the hydraulic schematic.

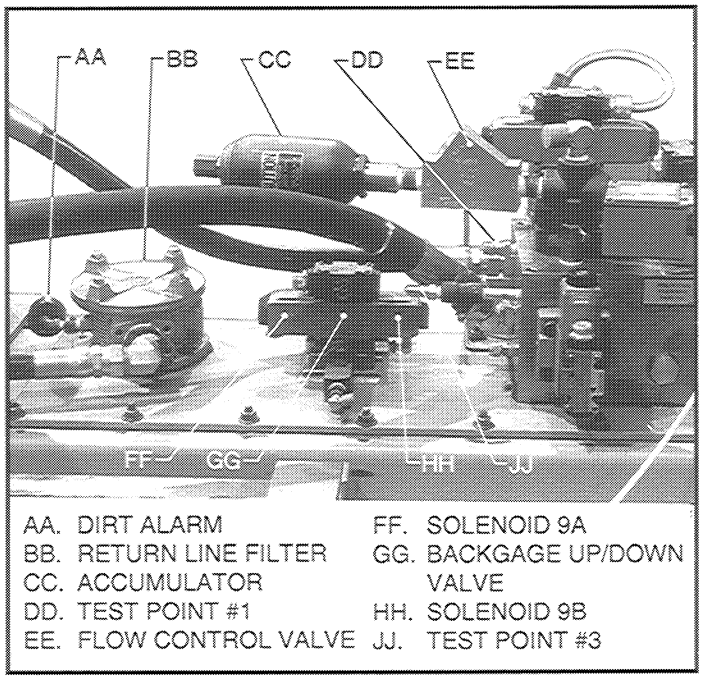


FIGURE 9-46 - Backgage up/down and flow control valves

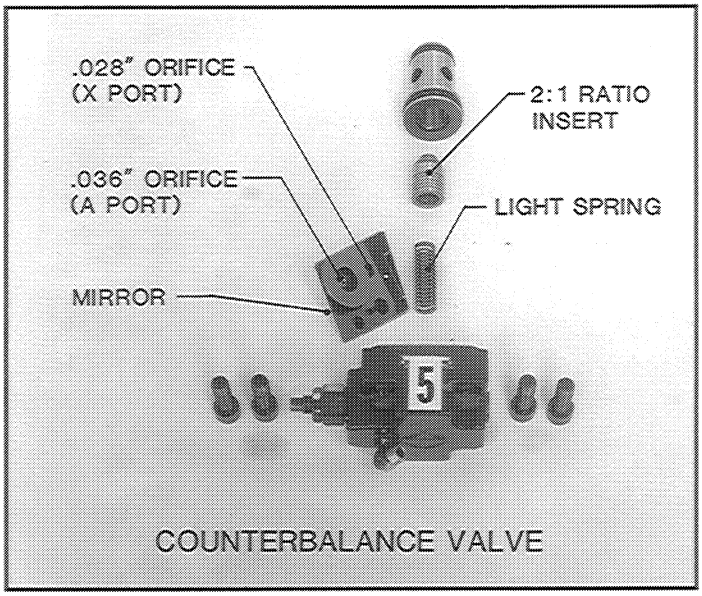


FIGURE 9-47 - Counterbalance valve

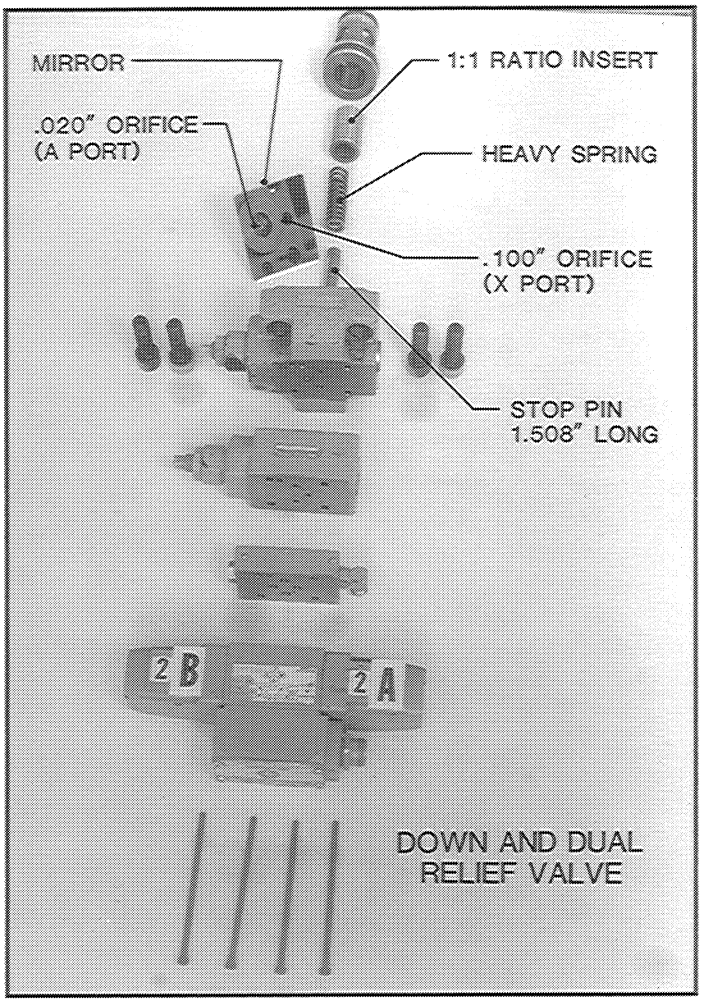


FIGURE 9-48 - Down and dual relief valve

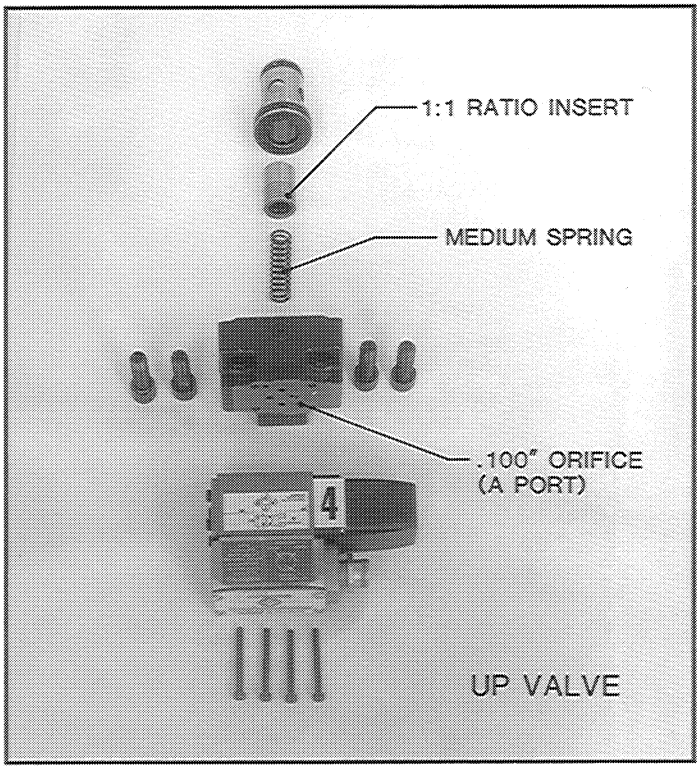


FIGURE 9-49 - Up valve

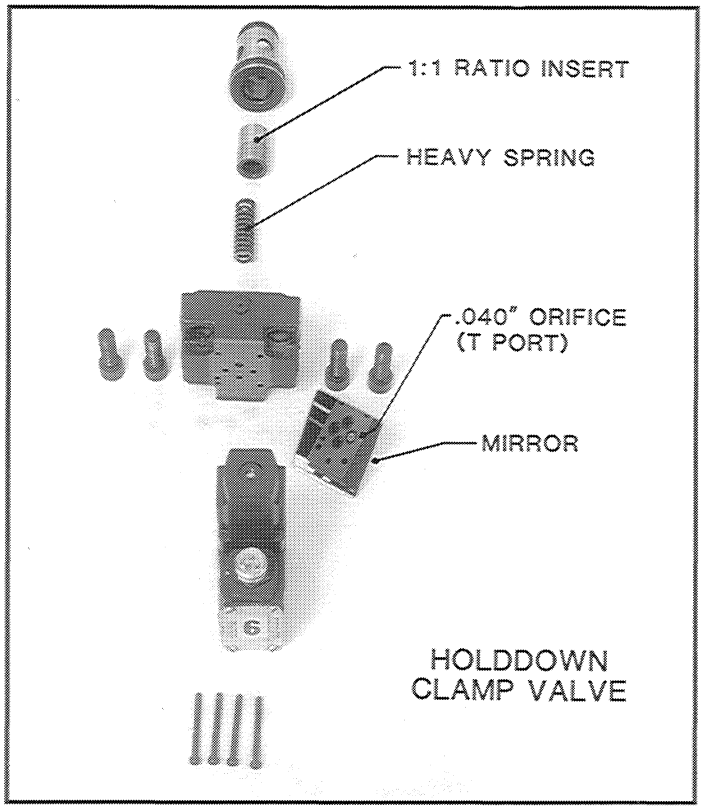


FIGURE 9-50 - Holddown clamp valve

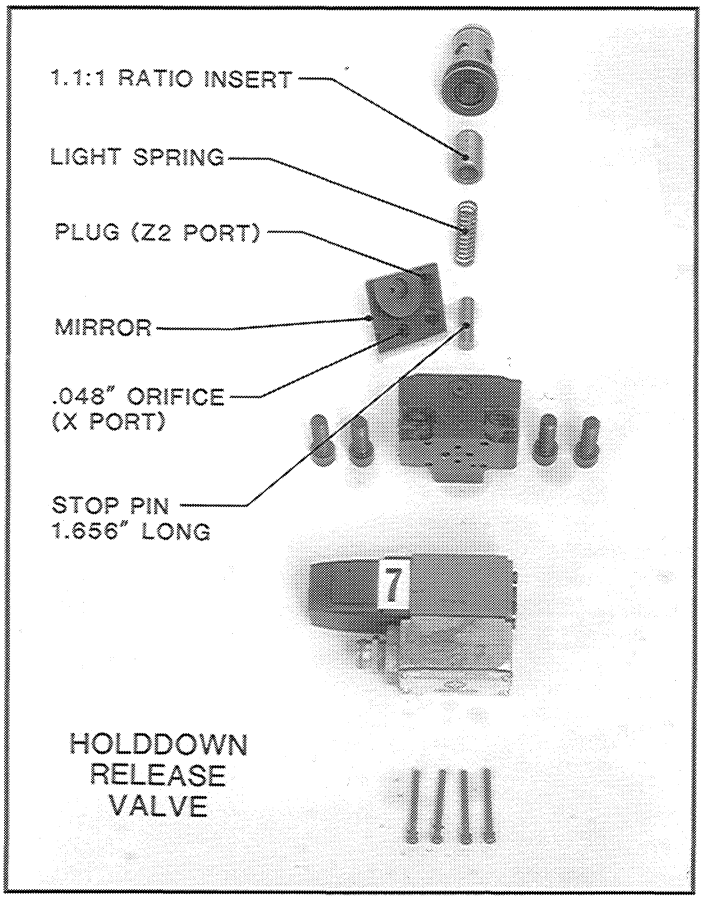


FIGURE 9-51 - Holddown release valve

CHECKING AND SETTING PRESSURES

IMPORTANT: Before checking and setting pressures, operate the shear through full length strokes to bring the hydraulic oil up to an operating temperature of 120°F (48.9°C) or above.

DUAL RELIEF PRESSURES

The dual relief valve ("F" on Figure 9-44) has two pressure adjustments. The lower adjustment on the side of the valve is for the HI pressure and the upper adjustment is for the LOW pressure. A pressure test point T.P. 1 ("DD" on Figure 9-46) with a male quick-disconnect fitting is provided for checking these pressures.

CAUTION

WHILE CHECKING AND SETTING PRESSURES, MAKE CERTAIN EVERYONE IS CLEAR OF THE RAM AS IT MAY MOVE.

To check the HI or LOW relief pressure, install a 5000 PSI (34,475 kPa) gage with female quick-disconnect fitting at T.P. 1. Turn the MODE selector to "SINGLE STROKE" and the OPERATOR CONTROLS selector to "ON". Cycle the ram two or three times and stop at the top of the stroke. Turn the OPERATOR CONTROLS selector to "OFF" and remove the key. Manually override SOL-4 ("N" on Figure 9-44) by depressing the pin in the end of solenoid. Ram should drift to bottom. If not, refer to "RAM GIB ADJUSTMENT" on Page 9-16. Adjust until ram does drift to bottom.

TO CHECK HI RELIEF PRESSURE

Manually override SOL-2B ("E" on Figure 9-44) by depressing the pin in the end of the solenoid cover and read the pressure, then release the solenoid pin. The pressure should be as indicated in Figure 9-52. If the pressure is not correct, reset by loosening locknut on the lower adjustment and turn adjustment clockwise to increase the pressure or counterclockwise to decrease pressure. Tighten the locknut and recheck the pressure setting.

SERIES	RELIEF PRESSURE PSI (kPa)		HOLDDOWN PRESSURE PSI (kPa)	ACCUMULATOR PRECHARGE PSI (kPa)
	HIGH	LOW		
135	3000 (20,685)	1500 (10,343)	500 (3448)	300 (2069)
250			800 (5516)	600 (4137)
375	3300 (22,754)		1300 (8964)	1000 (6895)
500		2000 (13,790)	1800 (12,411)	1400 (9653)
750			1800 (12,411)	1400 (9653)

FIGURE 9-52 - Pressure settings

TO CHECK LOW RELIEF PRESSURE

Manually override SOL-2A ("G" on Figure 9-44) by depressing the pin in the end of the solenoid cover and read the pressure, then release the solenoid pin. The pressure should be as indicated in Figure 9-52. If the pressure is not correct, reset by loosening locknut on the upper adjustment and turn adjustment clockwise to increase the pressure or counterclockwise to decrease the pressure. Tighten locknut and recheck the pressure setting.

COUNTERBALANCE PRESSURE

IMPORTANT: Counterbalance pressure should only be checked or set with oil temperature at 120°F (48.9°C) or higher.

A pressure test point T.P.2 ("B" on Figure 9-44) with a male quick-disconnect fitting is provided for checking counterbalance pressure. The adjustment for this pressure is the adjusting screw on the counterbalance valve ("J" on Figure 9-44).

To check counterbalance pressure, follow this procedure:

1. Install a 2000 PSI (13,790kPa) gage with female quick-disconnect fitting at T.P.2 (Figure 9-44).
2. Start the main drive motor, set the MODE selector to "SINGLE STROKE", MATERIAL LENGTH selector to maximum and MATERIAL THICKNESS selector (**except 135 Series**) to minimum and OPERATOR CONTROLS to "ON".
3. Run machine through several strokes while checking the pressure on the down stroke only. Pressure should be between 150 PSI and 300 PSI (1,034-2,069 kPa) with oil temperature at 120°F (48.9°C) or above.

To set counterbalance pressure, follow the above procedure, then continue with Step 4 below:

IMPORTANT: For shear to operate at maximum efficiency, the counterbalance pressure should be set as LOW as possible. Also, the down limit must be set correctly to properly adjust the counterbalance valve. Refer to instructions on "MATERIAL AND LENGTH CONTROL" on Page 9-26.

4. To set counterbalance pressure, continue to stroke the shear. Loosen locknut on the counterbalance adjustment and slowly turn adjusting screw counterclockwise, which will decrease the pressure. Continue decreasing until piston bottoms on the down stroke (a loud "thump" will be heard) or until the adjustment does not change pressure.
5. Turn adjusting screw clockwise 1/4 turn to increase pressure and eliminate the "thump". If the piston **did not** bottom, adjust the screw until the pressure starts to increase.
6. Tighten locknut after correct setting is obtained.

HOLDDOWN PRESSURE

The holddown pressure switch ("P" in Figure 9-45) controls the holddown pressure. If the holddown pressure is too low the pressure switch will not allow the ram to stroke.

To check the holddown pressure switch setting, use the following procedure:

1. Install a 2000 PSI (13,790 kPa) gage with female quick-disconnect fitting at T.P. 3 (Figure 9-46).
2. Start the main drive motor, set the MATERIAL THICKNESS to maximum (**except 135 Series**), MATERIAL LENGTH to maximum, turn MODE selector to "SINGLE STROKE" and OPERATOR CONTROLS to "ON" position. Cycle the ram to the top of its stroke.
3. Cycle ram through full length strokes. Observe holddown pressure gage at bottom of stroke. Pressure should be equal to that shown in Figure 9-52.
4. If holddown pressure is too low, check the low relief pressure on dual relief valve ("F" on Figure 9-44) before setting holddown pressure.

To set the holddown pressure, follow the above procedure, then continue with Step 5 below:

5. Remove the cover from the holddown pressure switch ("P" on Figure 9-45).
6. Adjust holddown pressure switch while repeating Step 3 until recommended pressure (Figure 9-52) is obtained at bottom of stroke. A slight pressure drop of 200 PSI (1,379 kPa) or less is normal during a full length stroke.
7. Replace the pressure switch cover.

AUTOMATIC LUBRICATION PRESSURE

The automatic lubrication relief pressure must be set correctly for proper operation.

To check the lube relief pressure, install a 5000 PSI (34,475 kPa) gage with female quick-disconnect fitting at T.P. 4 ("T" on Figure 9-45). This test point is located on top of the auto lube manifold.

Turn the OPERATOR CONTROLS selector to "OFF", remove the key and start the main drive motor. Manually override SOL-2A and the lube valve

solenoid at the same time by depressing the pins in the end of the solenoid covers (Figure 2-5) and read the pressure. The pressure should be 1000 PSI (6,895 kPa). If pressure is not correct, reset by loosening the locknut on the adjustment at the lube relief valve and turn the adjustment clockwise to increase pressure or counterclockwise to decrease pressure. Tighten locknut and recheck the pressure.

ACCUMULATOR

The accumulator ("CC" on Figure 9-46) is in the holddown circuit. Its purpose is to maintain holddown pressure during the cutting stroke by replacing any oil that may leak past the valves. The accumulator has a precharge as indicated in Figure 9-52. The pressure should be checked yearly.

PRECHARGING AND RECHARGING

Hydraulic pressure must be "0" PSIG before precharging is done.

1. Connect hose to pressure regulator on nitrogen cylinder. Use "oil-pumped or dry nitrogen".

CAUTION

DO NOT USE OXYGEN !

2. Attach swivel connector of hose assembly to gas valve. Sufficiently hand tighten to compress gasket swivel connector in order to prevent gas leakage.
3. Precharge bladder slowly to about 10 PSIG (69 kPa) before completely tightening valve stem nut.
4. Proceed to inflate accumulator to predetermined pressure by **slowly** opening the pressure regulator valve on nitrogen cylinder, closing it occasionally to allow needle on pressure gage to stabilize (thus giving accurate reading of precharge pressure). When correct precharge has been reached, close pressure regulator valve on nitrogen cylinder securely.
5. Bleeder valve can be used to let out any gas pressure in excess of desired precharge.
6. Replace dynaseal and valve guard.

NOTE: For recharging only - Exhaust all hydraulic pressure from the system. Remove the valve guard and dynaseal. Then follow "PRE-CHARGING BLADDER" Steps 1 through 6 above.

HEAT EXCHANGER

The **500** and **750 Series** machines are equipped with an air type heat exchanger. The heat exchanger is equipped with a thermostatically controlled electric fan. The thermostat should be set to start the fan at 120° F (48.9°C).

LIGHT BEAM SHEARING GAGE AND AREA LIGHTS (Optional)

The light beam shearing gage and area lights option consists of a series of fluorescent lamps. The row of lamps located above the shear table are the area lights and the row of lamps above the ram is the light beam shearing gage. There are two, three or four lamps in each row depending on length of the shear.

To achieve the sharpest shadowline on material at the cutting edge of the lower knife, adjust the light beam shearing gage as follows. Position the reflectors to direct the light toward the front side of the upper knife. Loosen all of the nuts (two for

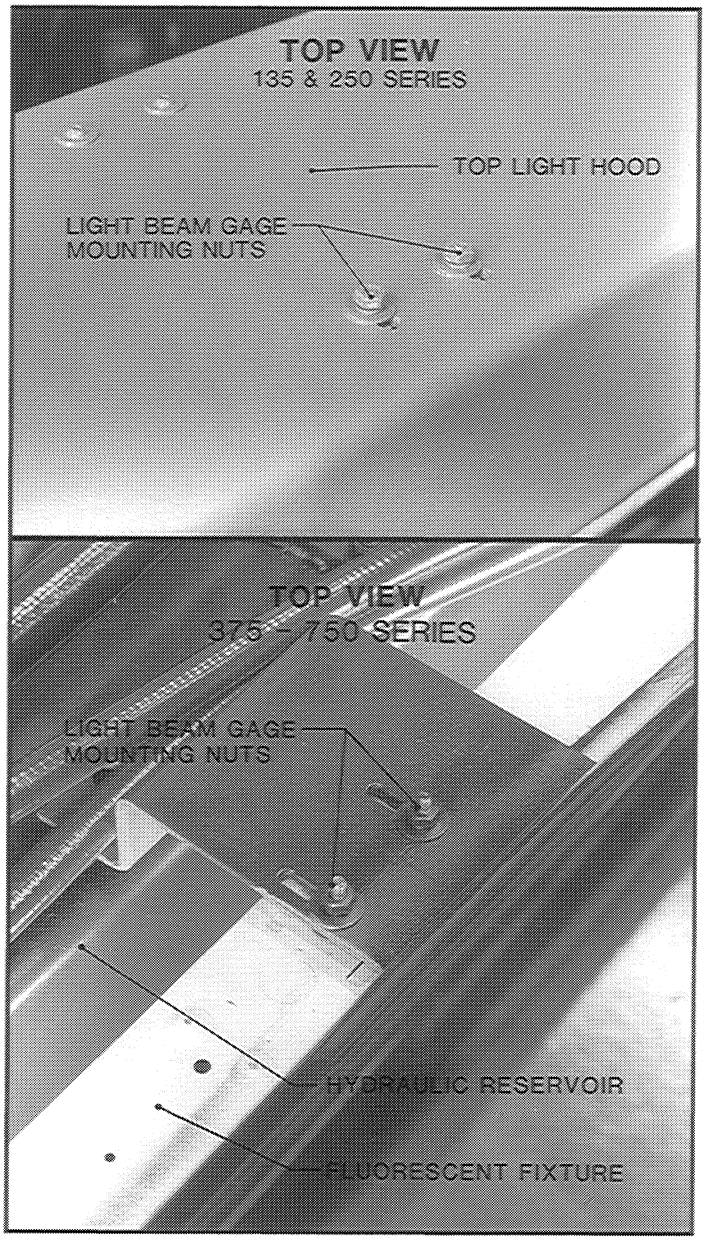


FIGURE 9-53 - Light beam shearing gage & area lights

each fixture) shown in Figure 9-53. Move the fixtures front-to-back to achieve the sharpest shadow line at the cutting edge of the lower knife. Tighten all nuts.

To replace the fluorescent lamps there is a locking tab that first must be removed at each end of each lamp by pulling down on the tabs.

IMPORTANT: After replacing a fluorescent lamp, the locking tabs must be reinserted to prevent the lamp from being vibrated out of its socket.

MATERIAL AND LENGTH CONTROL

If any of the components of the material and length control are replaced or repaired, it may be necessary to readjust these controls. These components would include the following:

- Linear potentiometer (pot) printed circuit board.
- Linear potentiometer.
- MATERIAL LENGTH control potentiometer.
- MATERIAL THICKNESS control potentiometer.

IMPORTANT: Always observe static control precautions when handling electrostatic sensitive devices by using Static Control Kit included with the machine.

1. Remove the six screws holding the Shear Control Center legend plate and carefully swing down until it is held by the restraining cables.

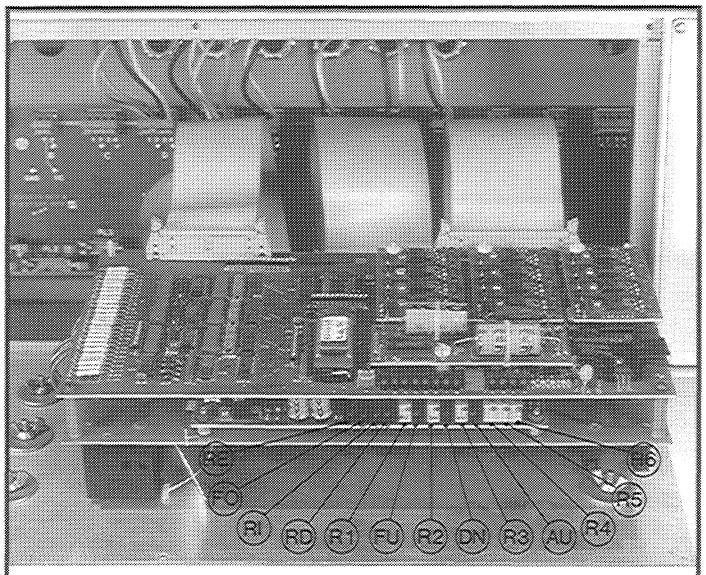
2. Six rotary pots are located on the front edge of the Linear Pot board. Preliminary adjustments must be made on these pots before turning ON power to the machine. See Figure 9-54. The pot adjusting tool is used to set trim pots R1 through R6 as follows:

   R1 - Rotate trim pot. 25 turns CCW
   R2 - Rotate trim pot. 25 turns CCW
   R3 - Rotate trim pot. 25 turns CW
   R4 - Rotate trim pot. 25 turns CCW
   R5 - Rotate trim pot. 25 turns CW, then 4 turns CCW
   R6 - Rotate trim pot. 25 turns CCW

CAUTION

THIS PROCEDURE CALLS FOR VOLTAGE TO BE APPLIED TO THE BOARD WHILE EXPOSED. THIS VOLTAGE IS 5, 12 AND 24 VOLTS DC. BE CAREFUL NOT TO SHORT ANY COMPONENTS.

3. Turn MATERIAL THICKNESS control (except **135 Series**) and MATERIAL LENGTH control fully CW. Turn OPERATOR CONTROLS selector to "OFF" position.



RE - READY LIGHT
FO - FAULT LIGHT
RI - RAKE INCREASING LIGHT
RD - RAKE DECREASING LIGHT
R1 - FIXED UP LIMIT ADJUSTMENT
FU - FIXED UP LIMIT LIGHT
R2 - DOWN LIMIT ADJUSTMENT
DN - DOWN LIMIT LIGHT
R3 - MAXIMUM ADJUSTABLE UP LIMIT ADJUSTMENT
AU - MINIMUM ADJUSTABLE UP LIMIT LIGHT
R4 - MINIMUM ADJUSTABLE UP LIMIT ADJUSTMENT
R5 - MINIMUM RAKE ADJUSTMENT
R6 - MAXIMUM RAKE ADJUSTMENT

FIGURE 9-54 - Linear pot PC board

4. Unlock main disconnect switch and turn it to "ON". Push MAIN DRIVE - START pushbutton.

IMPORTANT: When starting the main drive motor and until all of the following calibrations are complete, be ready to stop the main drive motor. Push the MAIN DRIVE "STOP" button if:

- **Ram at either end runs to cylinder limit and stalls.**
- **Ram rake is reversed.**
- **Any condition develops that seems unusual to normal operation.**

5. The ram should be at the bottom of the stroke with both hydraulic cylinders fully retracted.

CAUTION

THIS PROCEDURE CALLS FOR YOU TO MANUALLY OVERRIDE VALVE SOLENOIDS WHICH WILL CAUSE THE RAM TO MOVE.

STAY CLEAR OF MOVING RAM !

   A. Extend the left cylinder fully by manually overriding solenoids 2A and 3B at the same time. Refer to Figures 9-44 and 9-45.

B. Lower the ram to the bottom by manually overriding solenoid 4. Refer to Figure 9-44. This should bottom-out the right cylinder.

C. Retract the left cylinder fully by manually overriding solenoids 2A and 3A at the same time. Refer to Figures 9-44 and 9-45.

CAUTION

DURING THE FOLLOWING PROCEDURES IT WILL BE NECESSARY TO MAKE MEASUREMENTS IN THE KNIFE AREA FROM THE REAR. MAKE CERTAIN THE "OPERATOR CONTROLS" SELECTOR IS TURNED TO "OFF" AND KEY REMOVED WHEN MAKING MEASUREMENTS.

6. Adjust trim pot R6 so the rake increase (RI) and rake decrease (RD) lights are both "OFF". Refer to Figure 9-54.

7. Adjust the Fixed Up Limit:

   A. Set MATERIAL LENGTH and MATERIAL THICKNESS controls fully clockwise, the MODE selector to "SINGLE STROKE" and the OPERATOR CONTROLS selector to "ON".

   B. Depress the footswitch. The ram should move to the top of the stroke and stop.

   C. Run the backgage all the way to the rear. This provides clearance for measuring the distance between the upper and lower knives from the rear of the shear. Turn the OPERATOR CONTROLS selector to "OFF" and remove the key.

   D. Measure the distance between the knives at the center of the holddown plunger on the right end. Alternately adjust trim pot R1 clockwise and cycle ram with the footswitch until the distance measured is 1/8 inch (3.18mm) greater than distance between the holddown plunger and table. **OPERATOR CONTROLS selector must be in "OFF" position and key removed when making measurements.**

8. Adjust the Down Limit:

   A. Set MATERIAL LENGTH control fully counterclockwise and the OPERATOR CONTROLS selector to "ON". Use the footswitch to cycle the shear.

   B. Turn OPERATOR CONTROLS selector to "OFF" and remove the key.

   C. Manually override solenoid 4 until the knives cross by 1/8 inch (3.18mm) at the left end. Refer to Figure 9-44. The solenoid must be overridden for very short durations to make certain the knives do not cross more than 1/8 inch (3.18mm).

   D. Adjust trim pot R2 clockwise until the down limit (DN) light turns OFF, then turn trim pot R2 counterclockwise to the point where the down limit (DN) light turns ON.

9. Adjust the Minimum Rake:

   If machine is **135 Series**, proceed to Step 13.

   A. Set OPERATOR CONTROLS selector to "ON".

   B. Use the footswitch to cycle the shear and stop at top of the stroke. Turn OPERATOR CONTROLS selector to "OFF" and remove the key.

   C. Determine the rake. Measure the distance between the knives at the center of the holddown plunger on each end. Subtract the right measurement from the left measurement. Divide the difference found by nominal length of the shear. Alternately adjust trim pot R5, cycle the shear and determine the rake until the calculated rake is equal to the minimum rake listed for the machine model in Figure 9-55.

   OPERATOR CONTROLS selector must be in "OFF" position when making measurements.

SERIES	MAXIMUM RAKE IN/FT (mm/m)	MINIMUM RAKE IN/FT (mm/m)
135	1/4 (2.08)	N.A.
250	3/8 (3.12)	15/64 (1.95)
375	7/16 (3.65)	13/64 (1.69)
500	1/2 (4.17)	3/16 (1.56)
750	3/4 (6.25)	3/16 (1.56)

FIGURE 9-55 - Shear rake

10. Adjust the Maximum Rake:

   A. Set MATERIAL THICKNESS controls fully clockwise and the OPERATOR CONTROLS selector to "ON".

   B. Use the footswitch to cycle the ram to the top of the stroke. Turn OPERATOR CONTROLS selector to "OFF". and remove the key

   C. Determine the rake. Measure the distance between the knives at the center of the holddown plunger on each end. Subtract the right measurement from the left measurement. Divide the difference found by nominal length of the shear. Alternately

adjust trim pot R6, cycle the shear and determine the rake until the calculated rake is equal to the maximum rake listed for the machine model in Figure 9-55. **OPERATOR CONTROLS selector must be in "OFF" position with key removed when making measurements.**

If machine is a 135 Series, proceed to Step 13.

11. Repeat Steps 9 and 10 until the MATERIAL THICKNESS control can be changed between fully clockwise and fully counterclockwise with no trim adjustments required.

12. If the ram should start oscillating when the MATERIAL THICKNESS control is changed between fully clockwise and fully counterclockwise, adjust trim pot R6 three turns counterclockwise. Alternately adjust trim pot R5, cycle ram and determine the rake with the MATERIAL THICKNESS control fully clockwise and then fully counterclockwise until both the minimum and maximum rakes are equal to those listed for the machine model in Figure 9-55. **OPERATOR CONTROLS selector must be in "OFF" position with key removed when making measurements.**

13. Adjust the Minimum Adjustable Up Limit:

    A. Set MATERIAL THICKNESS control to fully clockwise, set MATERIAL LENGTH control fully counterclockwise and the OPERATOR CONTROLS selector to "ON".

    B. Use the footswitch to cycle the ram. Alternately adjust trim pot R4 clockwise and cycle the shear until the bottom of the upper knife is even with the bottom of the holddown plunger on the left end. **OPERATOR CONTROLS selector must be in "OFF" position with key removed when making measurements.**

14. Adjust the Maximum Adjustable Up Limit:

    A. Set MATERIAL LENGTH controls fully clockwise and the OPERATOR CONTROLS selector to "ON".

    B. Use the footswitch to cycle the ram and stop at the top of the stroke.

    C. Open the cylinder guard on the right end. Refer to instructions on "REMOVING AND INSTALLING GUARDS" on Page 9-10.

    D. Measure and record the distance between the top of the right linear pot housing and the washer on the linear pot shaft. See Figure 9-56. If there is no washer, measure to bottom of the double nuts.

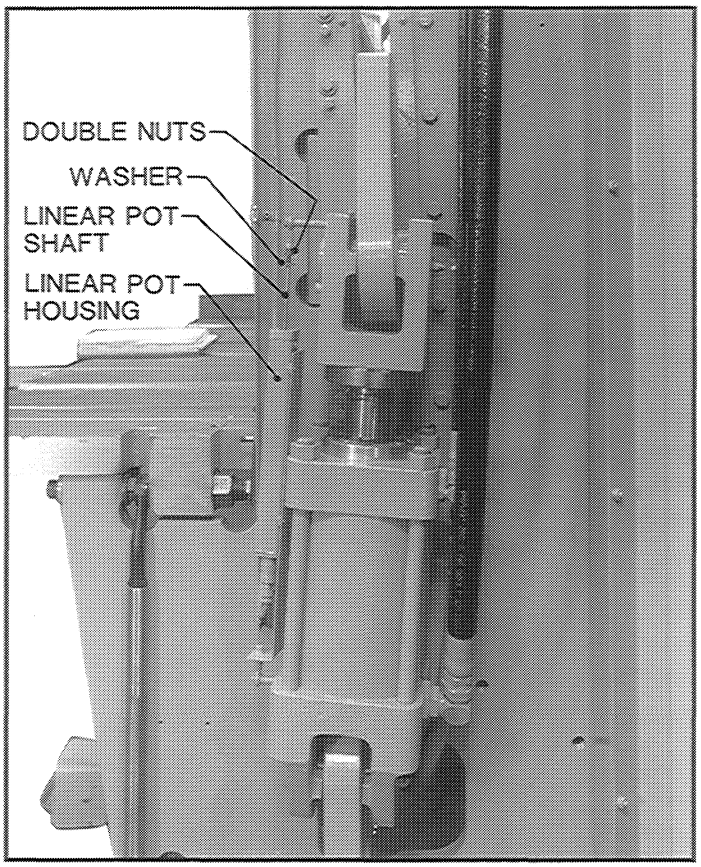


FIGURE 9-56 - Measure linear pot shaft

    E. Adjust trim pot R3 counterclockwise until the maximum adjustable up limit (AU) light turns ON.

    F. Alternately cycle the ram and adjust trim pot R3 until the linear pot shaft dimension measurement obtained in Step 14-D is reduced by 1/16" (1.59mm).

15. Press the MAIN DRIVE - STOP pushbutton.

16. Close the cylinder guard. Refer to instructions "REMOVING AND INSTALLING GUARDS" on Page 9-10.

17. Remove the static grounding cables from the enclosure.

18. Swing the Shear Control Center cover up, making sure there are no interference problems with cables, and install the six screws removed in Step 1.

19. Replace grounded wrist strap and the static control mat into the Static Control Kit and store.

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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 with 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 questions frequently asked by our customers.

If major repair is 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 stalls	Down and dual relief valve HI pressure set too high.	Reset relief valve - See Page 9-23.
	Electrical leads to shear are too small.	Check if wire size is sufficient for amperage shown on main electrical enclosure - replace if necessary.
	Insufficient supply voltage at shear.	Check factory supply. Correct factory wiring or contact local electric utility. See Page 9-27
Ram will not move	Ram tries to go up, but cannot because a piston is against its upper cylinder head.	Readjust the fixed UP limit - See Page 9-27 in MAINTENANCE Section.
	Ram tries to go down, but cannot because a piston is against its lower cylinder head.	Readjust the fixed DOWN limit - See Page 9-27 in MAINTENANCE Section.
	Faulty footswitch.	Repair or replace as necessary.
	Down and dual relief valve or up valve not operating.	Check electrical circuit for valve not operating.
		Check valve not operating and repair or replace.
		Reset down and dual relief Low pressure - See Page 9-24 in MAINTENANCE Section.
	Holddown pressure switch set too high.	Reset pressure switch - See Page 9-24.
	Holddown pressure switch stuck closed.	Repair or replace pressure switch.
	Counterbalance pilot valve not shifting.	Valve checked by shifting manually- Repair or replace
Ram stalls during cut	Rake set too low (except **135 Series**).	Reset MATERIAL THICKNESS control to match material thickness or increase to higher rake.
	Down and dual relief valve HI pressure set too low.	Reset relief valve - See Page 9-23
	Improper knife clearance.	Reset clearance - See Page 9-5.
	Improper knife clearance knife shim.	Use proper shim - See Page 7-2 in OPERATION.
	Attempting to shear material beyond capacity.	See Shear Capacities Bulletin PT-30491.
	Malfunction in down and dual relief valve.	Repair or replace.
	Worn pump cartridge.	Replace pump cartridge.
	Actual rake does not agree with MATERIAL THICKNESS control setting.	Readjust MATERIAL THICKNESS control - See Page 9-26 in MAINTENANCE Section.
	Counterbalance pressure too high.	Reset.
Rake cannot be increased or decreased (Except **135 Series**)	MATERIAL THICKNESS control pot is not functioning.	Check MATERIAL THICKNESS control pot operation & replace if necessary - See Page 9-26.
	Linear pot P.C. board malfunctioning.	Check linear pot board and replace if necessary - See Page 9-26 in MAINTENANCE Section.
	Rake control valve not functioning.	Check valve and repair or replace if necessary. Bottom both pistons before removing valves.
	Down and dual relief valve fails to shift to provide pressure.	Check operation of valve and electrical circuit. Repair or replace as necessary.
	Low relief pressure set too low.	Reset relief valve - See Page 9-24.
	Ram gibs set too tight.	Reset ram gib clearances - See Page 9-16.

PROBLEM	POSSIBLE CAUSE	REPAIR
Ram falls evenly (both sides) when sitting idle	Insufficient counterbalance pressure.	Reset counterbalance pressure - See Page 9-24.
	Faulty counterbalance valve and/or counterbalance pilot valve.	Repair or replace counterbalance and/or pilot valve. Bottom both pistons before removing valve.
	Faulty UP valve.	Repair or replace UP valve. Bottom both pistons before removing valves.
Ram falls unevenly when sitting idle	Faulty piston seals allow fluid to leak past pistons.	Replace piston seals.
	Rod seal leaking.	Replace rod seal.
	Faulty rake control valve allowing fluid to leak past valve.	Repair or replace rake valve. Bottom both pistons before removing valves.
Holddowns do not hold or material raises from table during cut	Insufficient holddown pressure.	Reset down and dual relief Low pressure - See Page 9-23 in MAINTENANCE Section.
	Pressure switch set too low.	Reset pressure switch - See Page 9-23.
	Pressure falls immediately due to ruptured bladder or no pre-charge.	Replace bladder and/or recharge accumulator.
	Holddown clamp valve not operating properly.	Check operation of valve and electrical circuit. Repair or replace as necessary.
	Holddown release valve valve not operating properly.	Check operation of valve and electrical circuit. Repair or replace as necessary.
	Dull knives.	Rotate or change knives.
	Improper knife clearance.	Reset knife clearance - See Page 9-5.
	Down and dual relief valve failing to shift to provide pressure.	Check operation of valve and electrical circuit. Repair or replace as necessary.
	Back-off cylinders leaking or sticking.	Repair or replace.
Ram stops at top of stroke with severe "thump"	Fixed UP and auxiliary UP limits are set incorrectly allowing piston to strike upper cylinder head.	Readjust MATERIAL and LENGTH control - See Page 9-26 in MAINTENANCE Section.
	Maximum rake setting incorrect.	Readjust MATERIAL and LENGTH control
Ram reverses at bottom of stroke with severe "thump"	Fixed DOWN limit is set incorrectly allowing piston to strike lower cylinder head.	Readjust fixed DOWN limit - See MAINTENANCE Section.
	Minimum and/or maximum rake setting incorrect.	Readjust MATERIAL and LENGTH control - See Page 9-26 in MAINTENANCE Section.
	Counterbalance pilot valve not operating correctly.	Repair or replace pilot valve.
	Counterbalance valve not operating correctly.	Repair or replace counterbalance valve.
	Counterbalance pressure set too low	Reset counterbalance pressure - See Page 9-24 .
	UP valve not operating correctly.	Repair or replace UP valve.
	Dual relief valve not shifting.	Repair or replace dual relief valve.
	Low relief pressure too low.	Adjust relief pressure.
Ram does not maintain rake during operation	Faulty piston seals allowing fluid to leak past pistons.	Replace piston seals.
	Faulty rake control valve.	Check valve and repair or replace as necessary.
	Electrical malfunction.	Check MATERIAL THICKNESS control electrical circuitry and correct as necessary.
	R.H. Piston rod seal leaking.	Replace piston rod seal.
Pneumatic sheet supports won't raise	No fixed UP limit output from Linear Pot board when ram is at the top for a full length stroke.	Adjust fixed and auxiliary UP limits - See Pages 9-27 and 9-28 MAINTENANCE Section.

PROBLEM	POSSIBLE CAUSE	REPAIR
Hydraulic fluid excessively hot (Shears with heat exchanger)	Temperature control set too high.	Adjust temperature control.
	Dirty filter.	Replace filter.
Hydraulic fluid excessively hot (Shears without heat exchanger)	Dirty filter.	Replace filter.
Ram hesitates during down stroke	Holddown clamp valve or release valve not operating properly.	Repair or replace as necessary - See Figure 9-45 in MAINTENANCE Section.
	Holddown pressure switch closed-to-open differential too small. (200PSI or 1379 kPa minimum).	Replace pressure switch.
	Accumulator flow control valve backwards. (Should be free flow into accumulator.)	Reverse mounting of flow control valve.
	Accumulator charge low.	Recharge accumulator - See Page 9-25.
	Accumulator bladder blown.	Replace accumulator bladder.
Main drive motor won't start	Blown fuse.	Replace 1FU, 2FU, 3FU, 4FU, 5FU, 6FU, or 7FU.
	No output from 24 VDC power supply.	Replace power supply fuse or replace power supply.
	Fault light on Shear Logic board illuminated. (Do not turn Main Disconnect OFF before checking.):	
	LED 1 illuminated - output fault #1	Check output mod #1 electrical circuitry and correct as necessary.
	LED 2 illuminated - output fault #2	Check output mod #2 electrical circuitry and correct as necessary.
	LED 3 illuminated - output fault #3	Check output mod #3 electrical circuitry and correct as necessary.
	LED 4 illuminated - MPU fault	Replace Shear Logic board.
	LED 5 illuminated - linear pot fault	Check linear pot electrical circuitry and correct as necessary.
	LED 6 illuminated - run timer fault	Replace Shear Logic board.

MAINTENANCE CHECKLIST - 135 thru 750 SERIES HYDRAULIC SHEARS

	CHECK OR ADJUSTMENT	DAILY	WEEKLY	MONTHLY	3 MONTHS	6 MONTHS	YEARLY
1	Check holddowns for proper operation - correct if necessary.	X					
2	Inspect knives for nicks or wear - turn, replace or sharpen if necessary.	X					
3	Check to see that all guards and barriers are in place and in good condition.	X					
4	Check LENGTH control - adjust if necessary.			X			
5	Check MATERIAL control - adjust if necessary.			X			
6	Check knife bolts and alignment adjusting nuts - tighten if necessary.			X			
7	Check knife and ram gib clearance - adjust if necessary.			X			
8	Check entire machine for loose fasteners - tighten if necessary.				X		
9	Check machine level - relevel if necessary.					X	
10	Check accumulator precharge pressure and recharge if necessary.						X
11	Check hydraulic pressures - adjust if necessary.						X
	LUBRICATION SCHEDULE						
1	Check hydraulic reservoir oil level - add oil if necessary.		X				
2	Check for water in hydraulic reservoir.			X			
3	Grease cylinder spherical bearings.				X		
4	Grease backgage pivot blocks and lift cylinder clevises (375, 500 and 750 Series)				X		
5	Check oil temperature in reservoir - adjust temperature control if necessary.					X	
6	Replace return line filter cartridge.					X	
7	Clean intake strainer or replace.						X
8	Drain, clean and refill hydraulic reservoir. Use a 10 micron filter when filling. Replace return line filter in Step 6 at this time.						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 SECTION 9 OF THIS MANUAL.

SECTION 10 SERVICE AND PARTS

ORDERING REPAIR PARTS

When ordering repair parts, be sure to furnish the following information:

1. Serial number of the CINCINNATI Shear. This is located on the machine's capacity plate and on the outside of the right housing.
2. The part number and part name, obtained from the assembly drawing included with this manual.
3. As complete a 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 good authorization number.
2. 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 recondit-ioning 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.

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