OPERATION, SAFETY AND MAINTENANCE MANUAL

CINCINNATI®

90-350 XFORM (XF) HYDRAULIC PRESS BRAKE

CINCINNATI®

EM-599 (N-09-25)

XFORM (XF) PRESS BRAKE CONTENTS

INTRODUCTION

SECTION 1 IDENTIFICATION

SECTION 2 INSTALLATION

SECTION 3 SAFETY

SECTION 4 SPECIFICATIONS

SECTION 5 SETUP AND USE

SECTION 6 MACHINE CONTROLS

SECTION 7 OPERATION

SECTION 8 OPTIONS

SECTION 9 MAINTENANCE AND ADJUSTMENTS

SECTION 10 SERVICE AND PARTS

INTRODUCTION

CINCINNATI XFORM (XF)

The XF is a hydraulically driven press brake. Linear encoders constantly monitor the bed-to-ram position, feeding this information to the control. The HMI Control is a self-contained industrial PC with an integrated touchscreen display, Control ON-OFF keyswitch, Ram Up button, Main Drive START-STOP buttons, Next Ram Movement lights, Operator Station lights, Emergency Stop button, USB connector, palmbuttons, keyboard and pointing device. The active program in the HMI Control controls the vertical movement of the ram and the movement of the backgage. After a program is created or opened, the machine can be run and the program and setup information can be saved in internal memory for future use

PART QUALITY

The following factors affect part quality:

- Press brake condition and repeatability
- Operator ability
- Condition of tooling
- Quality of material

CINCINNATI machines are designed to be rugged and durable. However, improper adjustment or lack of maintenance can reduce the quality of parts produced. A machine that will not consistently reverse at the same position or drifts out-of-level will not produce consistent parts.

Operator ability affects part quality and production rates. CINCINNATI provides many machine design features and optional accessories to aid operators in producing quality parts. The type of gaging, material supports or other equipment will affect how the part is produced. Selecting the proper bend sequence is important to obtain quality parts and for operator safety. CINCINNATI offers both Operator and Maintenance training programs to address these topics. Training programs cover subjects from the fundamentals of forming to the use of the machine's controls.

The operator or setup person must select the best tooling from those available. Worn, damaged, or poor quality dies and tool holders can directly affect part quality. Using good tooling that is correct for the job with proper setup can help achieve quality parts.

Material quality can affect bend angle tolerances. This is due to normal material thickness variations found in commercial steels and soft spots in the material. Using a good grade of material will minimize variation.

The contents of this manual will assist in understanding the operation, safe use, and maintenance of the CINCINNATI XF hydraulic press brake. Read this manual before operating the machine.

Figure 1-1 Front View

1. LEFT CYLINDER COVER
2. LEFT CYLINDER
3. RAM
4. BED
5. HOUSING FEET (4)
6. RIGHT CYLINDER COVER
7. RIGHT CYLINDER
8. HMI CONTROL (AND PALMBUTTON OPERATOR STATION)
9. FOOTSWITCH OPERATOR STATION

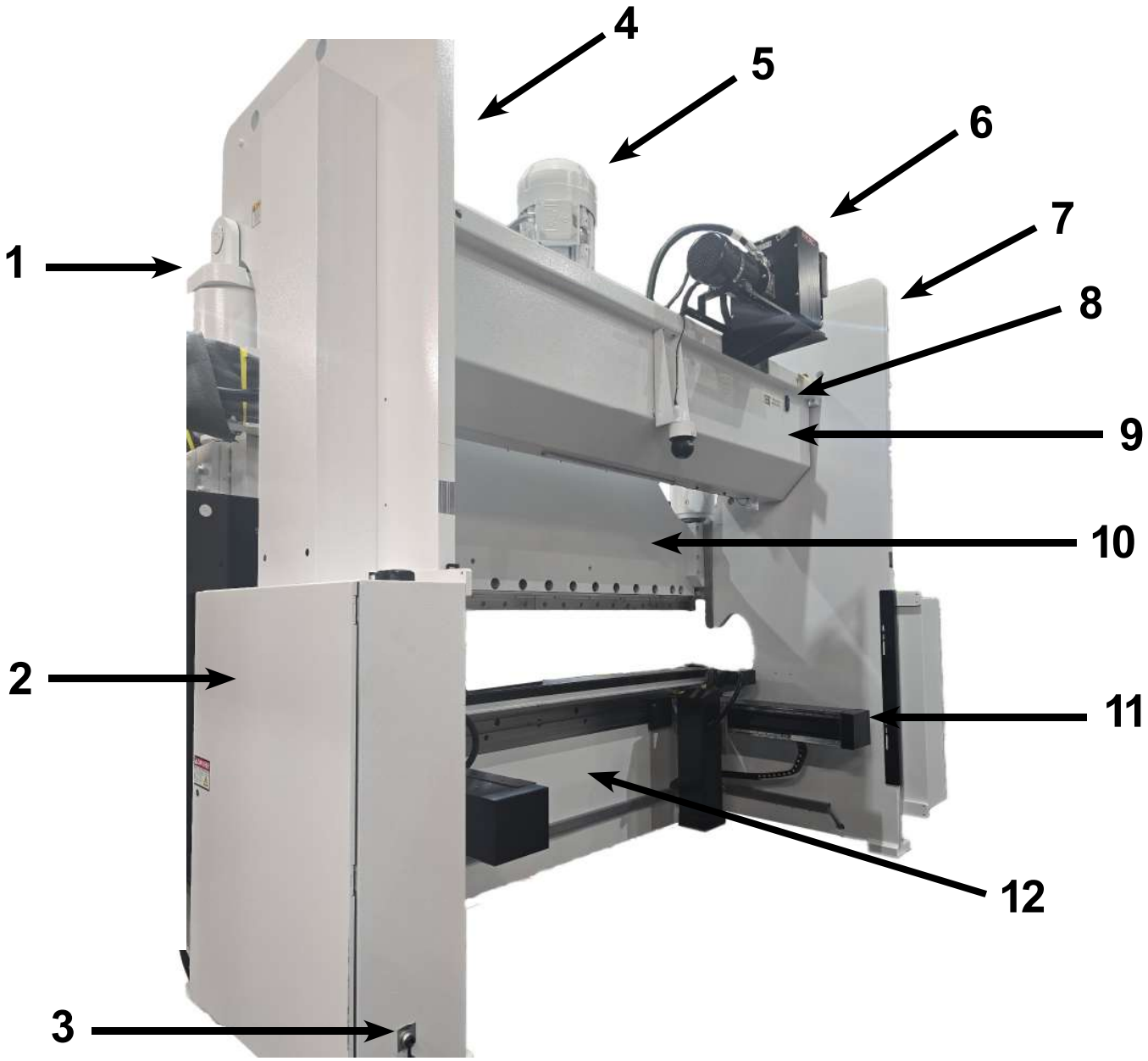


Figure 1-2 Rear View

1. RIGHT CYLINDER
2. ELECTRICAL ENCLOSURE
3. ETHERNET CONNECTION
4. RIGHT HOUSING
5. MOTOR
6. HEAT EXCHANGER
7. LEFT HOUSING
8. HYDRAULIC OIL SIGHT GLASS
9. HYDRAULIC OIL RESERVOIR
10. RAM
11. BACKGAGE (Rear Guard Not Shown)
12. BED

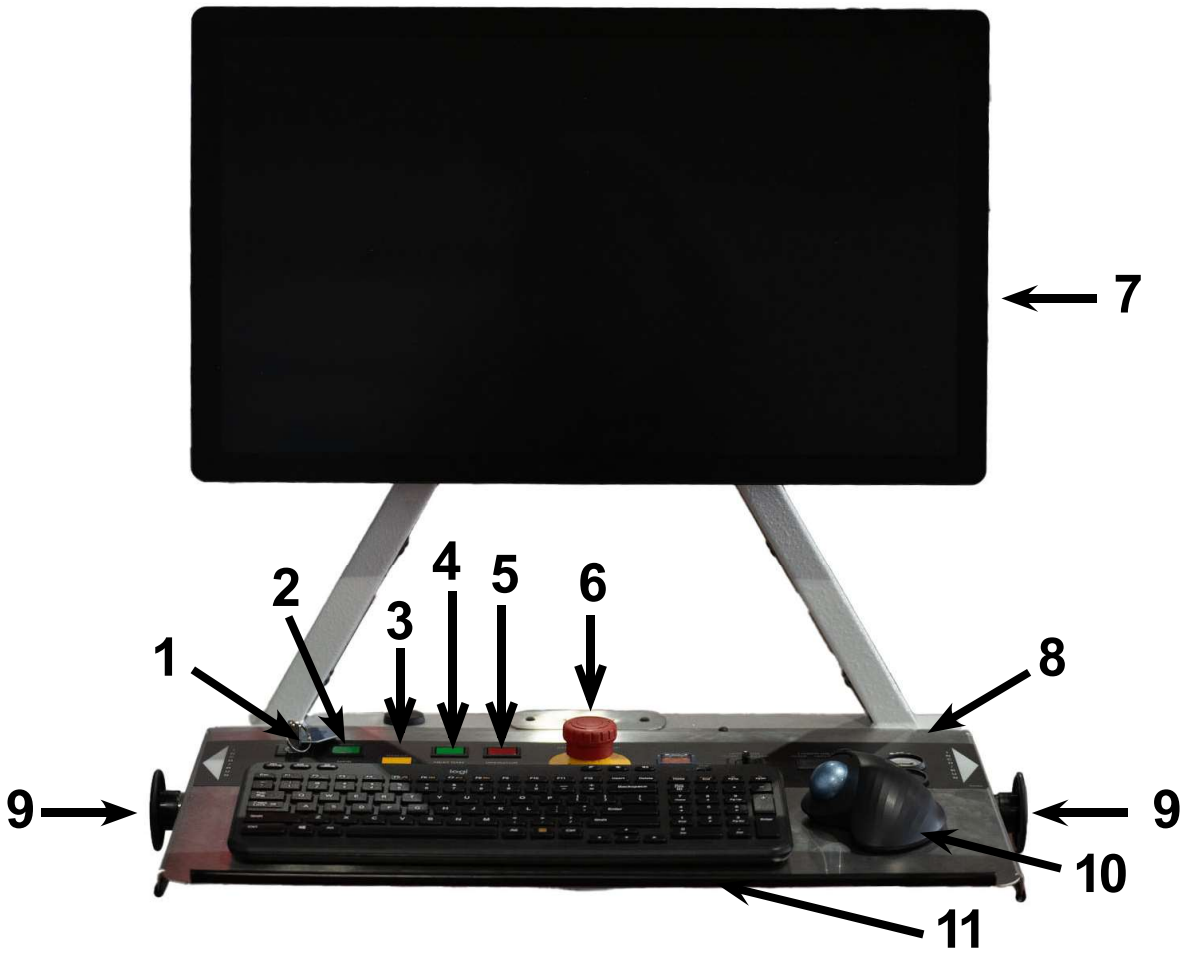


Figure 1-3 HMI Control

1. CONTROL ON-OFF KEYSWITCH
2. MAIN DRIVE START-STOP BUTTONS
3. RAM UP BUTTON
4. NEXT RAM MOVEMENT LIGHTS
5. PALMBUTTON OPERATOR STATION LIGHTS
6. EMERGENCY STOP BUTTON
7. TOUCHSCREEN DISPLAY
8. USB CONNECTOR
9. PALMBUTTON OPERATOR STATION
10. POINTING DEVICE
11. KEYBOARD

UNLOADING

After receiving the press brake, carefully remove the contents of the one or more boxes shipped with the machine. All of the machine's optional accessories and small parts are in these boxes, such as wrenches and leveling shims. Check all of the contents with the packing list. Claims for shortages should be made within ten days.

LIFTING AND MOVING

The machine can be handled by a crane(s) of sufficient capacity and with chains or cables of adequate size (refer to **American Society of Mechanical Engineers *B30.9***). The shipping weight of the machine is listed on the Bill of Lading for the shipment. Check this weight carefully before lifting or handling. Use chains or cables adjusted to the proper length for even lifting. A typical hitch is shown in Figure 2-1. The chains or cables should be long enough to minimize side loading on the housings. If short cables are used, fit a spreader beam between the housings near the lifting holes.

If the crane does not have sufficient capacity, or if a crane is not available, rig the machine into the final location.

⚠ WARNING

BE EXTREMELY CAREFUL TO KEEP THE MACHINE SUPPORTED EVENLY AND TO GUARD AGAINST TIPPING.

CINCINNATI INCORPORATED recommends that professional riggers be employed to handle the machine. This is to guard against injury to personnel and prevent damage to the machine. If jacks are used to lower the machine onto the foundation anchor bolts, care should be taken to prevent twisting of the machine.

FIGURE 2-1 Lifting The Machine

FOUNDATION

XF press brakes must be installed with a rigid foundation to ensure that alignment of the housings and cross frame members is maintained. The foundation must support the weight of the machine without cracking or settling out of level. For details regarding the foundation recommended for the machine, refer to the Foundation Plan. It is advisable, particularly in localities where unusual soil conditions may exist, to have the Foundation Plan approved by a local registered civil engineer.

As a final check before locating the press brake on the foundation, see that the anchor bolts in the foundation match the bolt hole spacing in the housing feet. Check the width of the bed pit (when required) and the distance from the centerline of the front foundation anchor bolts to the front edge of the bed pit. They should agree with the dimensions shown on the Foundation Plan drawing.

INSTALLATION

Open the shim packages shipped with the machine and place the thickest shim from each package on the floor at each anchor bolt location. The top surfaces of the shims must be about level. Additional shims can be added to obtain this level position. A transit can be used to check the level. Next add 1/8" shims at the front leveling jack screw locations to make the front of the machine high. It is easier to raise the rear of the machine to obtain final level.

Lift the machine with a crane to remove the shipping skids. If no crane is available, secure against tipping as soon as the skidded machine is placed on the foundation and before the skids are removed. To secure against tipping use a block and tackle. Run one from the housing lifting hole to the rear of the machine and secure to a solid anchor in the building. Run another block and tackle from the other housing lifting hole to the front and secure. To remove the shipping skids, raise the machine in about 2" (51mm) steps with the aid of blocking and jacks of sufficient capacity. The jacks should be placed under the front and rear of the housings. Use the leveling screws in the housing feet for inserting and removing the jacks. Block up the housings, about 2" (51mm) at a time, until there is enough clearance to remove the skids. Lower the machine by removing the blocking about 2" (51mm) at a time from alternate housings. Temporarily bolt the machine in place on the foundation. Remove the block and tackle used to secure machine against tipping. Remove the shipping blocks from between the bed and ram.

MACHINES SHIPPED WITH THE BED REMOVED

⚠ WARNING

THE MACHINE IS TOP HEAVY TO THE REAR ON SOME MODELS WITH BED ATTACHED ON REAR OF HOUSING. USE EXTREME CAUTION AND ENSURE MACHINE IS SECURED AGAINST TIPPING BEFORE REMOVING SHIPPING SKIDS.

Remove the "X" type shipping braces bolted to the front of the housings and thoroughly clean the protective grease from the front faces of the housings. Remove the grease with a clean rag soaked in solvent, such as mineral spirits. Wipe with clean rags. A stiff brush will get into the corners. Do not use compressed air because the pressure could drive grit and dirt into the bearing surfaces.

The front vertical bed mounting faces of the housings must be plumb. This can be checked with the level in squaring head of an ordinary machinist's square or with any level that can be used on a vertical surface. If the housings are not plumb, loosen the nuts on the foundation anchor bolts. Use the leveling screws in the housing feet to raise or lower the machine. Do not allow the machine to permanently rest on these screws. Insert flat steel shims under the housing feet as required. Lower the housings and retighten the anchor bolt nuts. Recheck the plumb on the housing faces and repeat the above procedure if necessary until the housings are plumb.

Remove the bed from the rear of the housings using a chain or cable of adequate capacity. DO NOT USE THE HOUSING SLOT IN THE BED TO LIFT THE BED. Remove the bed shoes and the bed bolts from the shipping box. Clean the bearing surfaces of the housings and the matching bed surfaces, bed shoes and bolts. Carefully lubricate all finished surfaces of the housings where the bed fits. Also, lubricate the top and bottom surfaces of the bed shoes. Use EP #2 Lithium grease (C.I. grease H-2EP). Place the bed shoes into position on the housings. Match the markings on the housings and bed shoes. Place the bed into position on the housings and insert the bed bolts into the bed. Loosen all foundation anchor bolt nuts and tighten the bed bolts securely. Retighten the foundation anchor bolt nuts securely. See the following chart for seating torques.

BOLT DIAMETER	SEATING TORQUES Ft.-Lbs. (Nm)	
	BED BOLT	FOUNDATION ANCHOR BOLT NUT
3/4”	297	-
	(403)	-
1”	734	295
	(995)	(400)
1-1/4”	1189	530
	(1612)	(719)
1-1/2”	2033	-
	(2757)	-

Check your work with feeler gages. There should be zero clearance between the bearing surfaces of the housings and the bed. If there is clearance, either the bed bolts are not tight or there is grit between the bearing surfaces. There should also be zero clearance between the bed shoes and the bed.

FIGURE 2-2 Leveling The Machine

CLEANING

Thoroughly remove the protective grease applied at the factory prior to shipment. Remove the grease with a rag saturated in cleaning solvent (mineral spirits) and wipe with clean rags. A stiff brush will get into the corners. Do not use an air hose. The pressure could drive grit and dirt into bearing surfaces. After cleaning, wipe the machine dry. Make sure no dirt or grit is left, then lightly oil the bed and ram’s finished surfaces. Periodic cleaning of the machine after installation is recommended.

LEVELING

The machine is leveled by placing flat steel shims of the proper thickness under the housing feet as shown in Figure 2-2. The machine can be raised or lowered by using the leveling jack screws in the housing feet. Use at least a two foot length of pipe on the wrench. The foundation anchor bolt nuts must be loosened, **not removed**, before jacking the machine. Before checking the level of the machine, the foundation anchor bolt nuts must be securely tightened to the specified torque.

Start leveling by checking the machine level lengthwise. Use a precision level, not a carpenter or machinist level. Always wipe the level and bed surface clean and remove burrs before positioning the level. Place the level lengthwise on the bed in the center of the machine. Level the machine lengthwise by placing the required metal shim under the low housing feet, both front and back. Lower the machine and check level. Repeat until the machine is level lengthwise.

Next, level the machine front-to-back with the level crosswise on the bed. Check with the level at the right and left ends of the bed. Add or remove shims under the front and back housing feet as required. Level readings on both ends of the bed must be alike within .001” (.025 mm). Recheck lengthwise level and repeat the above procedure until the machine is level in all directions. After the machine is level, tighten the foundation anchor bolt nuts securely. See the preceding chart for seating torques.

Check the ram guide and slide alignment to make sure there is no twist in the machine. This is done by loosening the ram clamp bolts until the ram hangs free of the guides. Using a feeler gauge, measure the clearance between the ram slide liner and the ram guide at the top and bottom. See Figure 2-3. Measure at both the left and right guide. The top measurement is always given a plus (+) value and the bottom is always given a minus (-) value.

EXAMPLE #1:

	Left Clearance	Right Clearance
At top	+.005” (.127mm)	+.000”
At bottom	-.020” (.508mm)	-.015” (.381mm)
Then total	-.015” (.381mm)	-.015” (.381mm)

Since the values are equal, the guides are in the same plane and there is no twist in the machine.

EXAMPLE #2:

	Left Clearance	Right Clearance
At top	+.005” (.127mm)	+.020” (.508mm)
At bottom	-.015” (.381mm)	-.000”
Then total	-.010” (.254mm)	+.020” (.508mm)

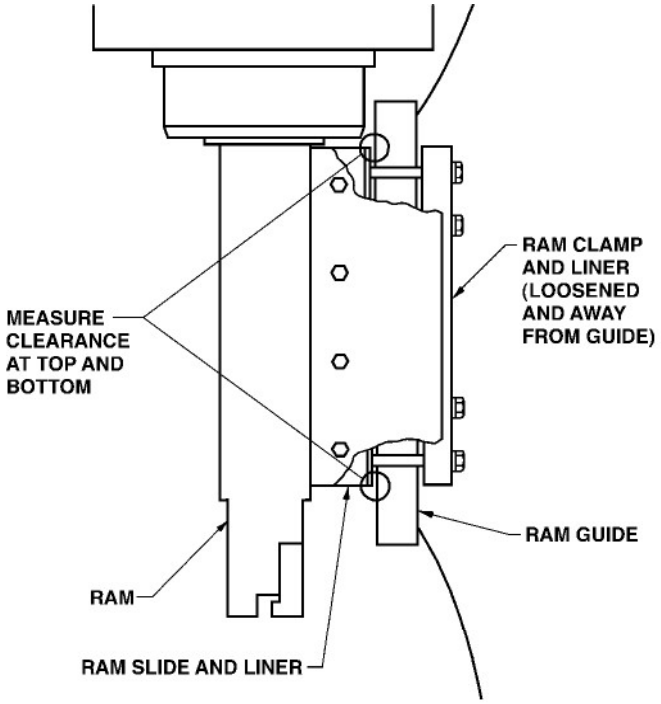


FIGURE 2-3 Ram Slide and Guide Alignment

The amount of clearance is not important. However, the difference between the clearance of the left and right ram guide and slide indicates the amount of misalignment. The maximum allowable difference is .004” (.102mm). In this example, the difference is .030” (.762mm), which indicates there is twist in the machine.

This condition is corrected by adding or removing shims under one of the rear housing feet. In Example #2 the excessive clearance was at the right guide and slide. Since this measurement was positive, the clearance was at the top. To bring the alignment into tolerance, shims could be added under the right rear housing foot, or removed from the left rear housing foot. The alignment must be corrected even if it causes the bed to be out-of-level.

After the machine is level, retighten the foundation anchor bolt nuts securely. Recheck the guide and slide alignment.

IMPORTANT: Before running the machine, tighten the guide clamp bolts to 60 ft.-lbs. (81.4Nm) and lubricate the slide liners with light hydraulic oil. Use the tool shown in Figure 2-4 supplied by CINCINNATI.

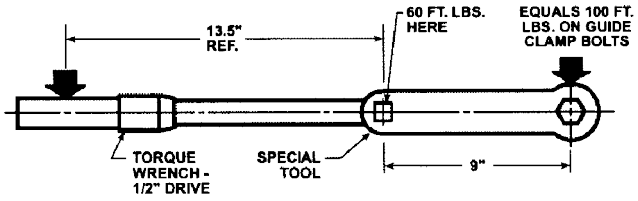


FIGURE 2-4 Tool For Guide Clamp Bolts

IMPORTANT: After loosening and tightening the guide clamp bolts for ram guide and slide alignments, the linear encoders should be checked and possibly reset. Contact Cincinnati Technical Service at (513) 367-7100.

Alignment may not be permanent. Recheck level in a few weeks. Do not use any grouting around the machine. For machines where the bed goes below floor level, leave the bed pit empty and cover the exposed pit opening with a steel plate.

HYDRAULIC RESERVOIR OIL CHECK

Water may have collected in the reservoir during shipment. The hydraulic reservoir is equipped with a drain valve. Before starting the machine, crack the drain valve open. If no water comes out, or when oil starts coming out, close the drain valve securely. Repeat this check monthly.

LUBRICATION BEFORE STARTUP

Proper lubrication is of extreme importance to the machine. The following lubrication points should be checked before startup and at regular intervals after startup.

FIGURE 2-5 Lubrication Points

1. *Hydraulic Oil*: Before starting the machine, check for proper oil level using the sight gauge located on the top of the oil reservoir. The ram must be in the full UP position to properly check the fluid level.

⚠CAUTION

CINCINNATI XF press brakes are designed for and shipped with petroleum-based hydraulic fluid, which can be flammable. Check applicable fire codes for special precautions.

2. *Cylinder Clevis Pins*: Lubricate the clevis pins while cycling the ram under load, such as obtained with a bumping die. Lubricate once a month. Use #2 lithium base grease with "moly" additive (C.I. grease H-2M). This must also be done after electrical connections are made and the machine is running. See Figure 2-5.

⚠CAUTION

Keep clear of moving ram.

3. *Ram Guides and Slide Liners*: Wipe clean and flush with light hydraulic oil. See Figure 2-5.

4. *Backgage:* Clean and lubricate all exposed guide rails with a light coating of spray lubricant or #10 oil. The X-Axis and R-Axis ball screws should also be lubricated with a light coating of spray lubricant or #10 oil. These ball screws are easily accessed by removing the protective covers. Do not use grease on the ball screws. See SECTION 9 MAINTENANCE AND ADJUSTMENTS for more specific details.

BACKGAGE INSTALLATION

The XF press brake includes a 5-Axis Backgage as standard. See Figure 2-6. The backgage is normally shipped assembled to the machine. If the backgage is not assembled to the machine contact CINCINNATI Technical Service at (513) 367-7100 for installation instructions. Backgage alignment instructions are located in Section 9.

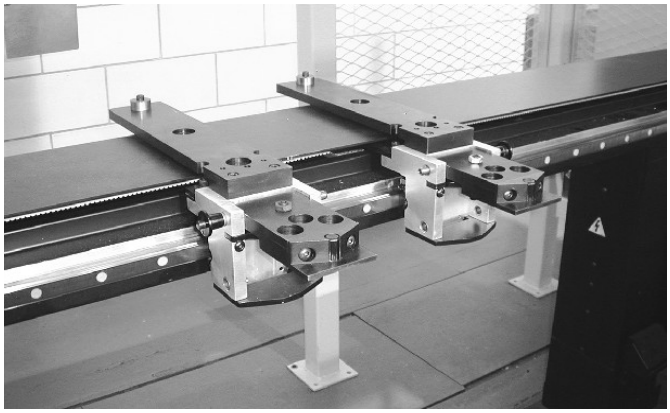


FIGURE 2-6 5-Axis Backgage

ELECTRICAL CONNECTION

Suitable electrical leads must be brought to the machine as shown on the Foundation Plan drawing. These leads are connected to the incoming side of the electrical disconnect switch in the main electrical enclosure. Be certain the leads are sized correctly and the proper voltage is fed to the machine. CINCINNATI equipment requires that the incoming line supply at the machine does not vary by more than $\pm$ 10% from nominal. Some installations may require additional line conditioning other than supplied with the machine. Contact CINCINNATI Technical Service at (513) 367-7100 for further information.

The machine must be connected to a good earth ground. A ground lug on the electrical panel near the main disconnect is provided for this purpose. Refer to local and state codes for acceptable grounding methods.

Note: *If a CINCINNATI Service Representative is not present, call CINCINNATI before proceeding any further or starting the machine. A CINCINNATI service representative will complete all electrical connections and check motor rotation.*

SECTION 3 SAFETY

SAFETY RECOMMENDATIONS FOR PRESS BRAKE OPERATION

Press brakes manufactured by CINCINNATI comply with the construction requirements of the Occupational Safety and Health Act and the National Safety Standards of the American National Standards Institute.

The CINCINNATI XF is a hydraulic press brake with advanced microprocessor controls and backgage. A press brake is a versatile and multipurpose machine. We recommend evaluating each press brake operation in order to determine the method of point-of-operation safeguarding which best meets that operation. The press brake, tooling, workpiece and method of feed and removal must be evaluated for each job before deciding on the safeguarding to be used. See **CINCINNATI Safeguarding Bulletin PI-50686** for ideas on types of safeguarding available.

CINCINNATI recommends that the operator read and understand the safeguarding, use, and care requirements of the American National Standard for Press Brakes, **ANSI B11.3**. This is included with the complete machine manual, and is also available from the American National Standards Institute via their website (www.ansi.org), or via their New York City Office located at 1180 6th Ave, 10th floor, New York, NY 10036.

For additional safety information we recommend:

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

Personnel responsible for press brake operator training program, tooling setup, maintenance, and operations must read and understand this Operation, Safety, and Maintenance manual. No one should set up, operate, or maintain this press brake until thoroughly understanding it and knowing how to do the job safely. Read this manual in its entirety.

LOCKOUT / TAGOUT – POTENTIAL HAZARDOUS ENERGY

Lockout / Tagout is a term used to address practices and procedures that are necessary to disable machinery or equipment and to prevent the release of potentially hazardous energy while maintenance and servicing activities are being performed. These practices and procedures usually involve the devices on or near machinery or equipment that is used to turn the machinery completely off or drain down stored energy to a safe level. Some examples are a lockable electrical disconnect, which can shut down all electrical energy to a machine, or a lockable air valve that prevents shop air pressure from reaching the machines' air cylinders. Examples of hazardous energy sources on machinery are rotating flywheels, springs being compressed or stretched, hydraulic pressure (accumulators), air pressure (tanks), and machine rams that are up in their stroke and unblocked.

Employers will have a Lockout / Tagout Program that the operator will learn about while being trained to operate and work around this and other machines in the shop. In general, Lockout / Tagout requirements do not apply to daily checks during normal production operations (i.e. lubrication, cleaning, minor adjustments or simple tooling changes) as long as measures are taken to provide effective protection to workers.

Reading the OPERATION section of this manual will tell which devices were furnished with the machine to protect workers from uncontrolled releases of energy. Check with the supervisor to learn about any other equipment or machinery placed at or near the machine which the user may come in contact with. Make sure to know where these energy sources and protective devices are located and how to use them.

IMPORTANT: If the CINCINNATI press brake is equipped with a "Point-of-Operation" safeguarding device, such as a light curtain or laser guard, refer to Light Curtain configuration in SECTION 7 of this Operation, Safety, and Maintenance Manual.

Follow the instructions given in this manual closely while installing or removing tooling from the press brake. Some energy sources cannot be completely shut down when this type of activity is being performed.

FOR SAFE OPERATION OF THE CINCINNATI PRESS BRAKE

KEEP CLEAR OF THE POINT-OF-OPERATION

The purpose of a press brake is to bend metal. The tonnage capacity will sever arms, hands, fingers or any other part of the body that is in the point-of-operation when the ram is activated.

During operation, all parts of the body must be completely clear of the work area. **NEVER PLACE ANY PART OF THE BODY IN THE POINT-OF-OPERATION (Die Area).**

If operation by more than one person is required, operator controls must be furnished for each person. If foot controls are used, and if the evaluation of that specific operation indicates safeguarding is necessary, provide the necessary safeguarding before any work is performed. (See **ANSI B11.3** and **CINCINNATI Safeguarding Bulletin PI-50686**.)

If operation by more than one person is required, one person should be responsible to see that all personnel are clear of the point-of-operation and all moving parts, and that everyone is clear and entirely visible in a safe location, before the press brake is operated.

During setup, maintenance, or other work on the machine which necessitates manipulation within the point-of-operation, either the ram should be at the bottom of the stroke or it should be blocked so the dies cannot close. The power supply should be disconnected and locked out.

CONCENTRATE ON THE JOB

Improper operation of a machine, whether caused by daydreaming or worrying about other problems, could cripple the user for life. Operating a press brake requires complete attention. Watch and concentrate on the job. Talking, joking, participating in, or watching horseplay could result in physical injury.

NEATNESS IS IMPORTANT

Keep the floor of the work area clear of scrap and trash that could cause someone 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 not in use. Only the part being worked on should be on the machine when it is operating. Even a screwdriver can be deadly if left on the press brake or lower die.

PROPER TOOLS ARE IMPORTANT

Use proper tools when working on the press brake. An improper tool might slip and cause lacerations. When making repairs on the machine, disconnect the power source and lock it out. Be sure the ram is at the bottom of the stroke or blocked in place.

ELIMINATE LOOSE AND FLOWING CLOTHING

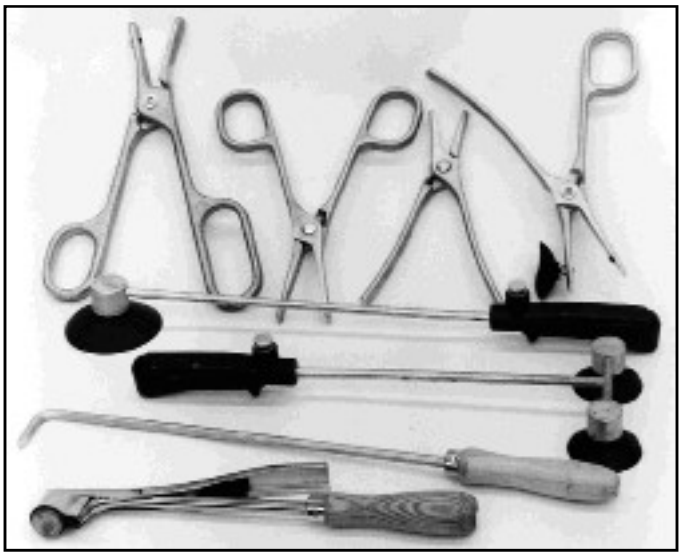
Loose or flowing clothes may be comfortable, but if caught on the machine, could result in an injury. Keep jewelry to a minimum. A bracelet or ring could cost a hand or finger.

LOOK THINGS OVER CAREFULLY

Before operating the CINCINNATI press brake, look to see if the machine is in proper condition. Are the dies worn? Are the machine's covers and guards securely in place? Is the machine securely anchored to the floor? Are all nuts, bolts and screws tight? Is everything in proper operating condition? If not, report any unsafe condition or needed repair to the supervisor and be sure the problem is corrected before beginning operations. The XF press brake will not produce a tonnage much greater than the maximum rated machine capacity (see capacity plate). However, when using short or small area dies, the tonnage must be reduced to avoid damage to the tooling or the bed and ram of the machine. Too much tonnage may also cause a die to rupture and cause injury. Consult the **Press Brake Capacities booklet PI-50691** for the load required to do the job. If this is less than maximum machine capacity, program the control not to exceed the required force by more than 10%.

RULES FOR SAFE OPERATION

1. Never place any part of the body in the point-of-operation. Placing hands or any part of the body in the point-of-operation may result in serious injury or amputation.
2. Evaluate each operation to determine the point-of-operation safeguarding to be used.
3. Use the point-of-operation safeguarding selected, or method of operation selected to minimize the exposure to potential hazards at the point-of-operation.
4. For small part insertion and removal, use a hand tool. DO NOT place hands in the point-of-operation.



5. Know how to safely operate and adjust the CINCINNATI press brake. Review the OPERATION and MAINTENANCE sections of this manual.

6. Adjust the ram stroke for the shortest workable distance to reduce the opening of the die area.

7. Maintain proper lighting levels and eliminate light glare to prevent eye strain and eye fatigue.

8. Protect the eyes from flying pieces of metal by always wearing safety glasses.

9. Always wear safety shoes. A heavy or pointed piece of stock could fall and cause a serious foot injury.

10. Wear snug fitting hand and arm protection when handling rough or sharp edged stock.

11. Keep the die area free of loose tools and materials. When placing stock in the machine for forming, be certain the gages and stops are correctly set and the edge of the stock is against the gages.

12. Stand clear of the workpiece with arms slightly extended to avoid being hit if the workpiece whips up or down as the bend is made. Be sure to know how the workpiece will react to the bend being made. If the workpiece whips up, place the thumbs and fingers below the material. If the workpiece whips down, use the clamp/stop feature of the machine control so hands can be removed from the workpiece when the bend is made. Set the forming speed to avoid excessive part whip.

13. When leaving the machine, place the ram at the bottom of the stroke or place safety blocks in position under the ram. Turn the Control ON-OFF keyswitch “OFF” and remove the key, even if away for only a few minutes.

14. Have the routine scheduled maintenance and adjustments performed as shown on the Maintenance Checklist in SECTION 9 MAINTENANCE AND ADJUSTMENTS.

15. Check the alignment of the dies before operating the machine after the dies have been changed or if the machine has been idle overnight. Improper alignment could cause chipping and flying chips can cause lacerations and eye injuries.

16. Report any cuts, bruises and all other injuries to the supervisor or the medical department immediately. They are the best judges of the seriousness of the injury.

INSTALLING, REMOVING, AND TRANSFERRING TOOLING (DIES)

Installing, removing, and transferring tooling can be hazardous and should be done with proper supervision by experienced setup workers. Improper handling techniques can cause muscle strains, hernias, or serious disabling injuries.

1. Transfer dies using the proper techniques for the weight of the die(s) being handled.

   If the punch or die has tapped holes for lifting attachments, be sure the proper size bolts are used. A bolt smaller in diameter than the tapped hole will slip out and cause serious injury. If no lifting attachments are provided, use only approved slings so the dies will not be nicked or scratched.

   Lift the dies high enough to clear any obstructions, but no higher.

⚠ DANGER

Stay clear of dies while they are being transferred, particularly when being lifted. If a die should slip, serious injury, including a loss of a hand, foot, or even life, could result.

2. When installing and setting up dies in the press brake:

   a. Clean the machine and filler block surfaces where the dies will be fastened. Always turn the Control ON-OFF keyswitch “OFF” when working in the die area.

b. Inspect the dies for chips, cracks or other hazardous conditions. Wipe them off with a clean cloth.

c. Place the machine control mode selector in the SETUP position so the ram can only be moved by the use of the palmbuttons or the RAM UP button.

d. Never reach into or through the die area when aligning the dies or setting the gaging.

3. When removing dies from the press brake:

a. Clear the work areas of all stock, containers, tools and other equipment.

b. After placing safety blocks between the dies and turning the Control ON-OFF keyswitch "OFF", clean both upper and lower dies using a bench brush and finally wipe clean with a cloth.

c. Place the machine control mode selector in the SETUP position so the ram can only be moved by use of the palmbuttons or the RAM UP button.

d. Never loosen the ram die clamp bolts unless the dies are in a closed position and the Control ON-OFF keyswitch is in the "OFF" position.

Detailed step-by-step instructions for installing and removing tooling are provided in SECTION 5, SETUP AND USE. These instructions should be followed for safe installation and removal of tooling from the CINCINNATI press brake.

Also included in SECTION 5, SETUP AND USE are instructions for making bends, gaging and use of the machine controls.

SAFETY SIGNS

In order that press brake operators and maintenance personnel may be alerted to certain potential hazards that may exist, unless specified procedures are followed, a number of safety signs are attached to CINCINNATI press brakes. Safety signs are not intended to be a substitute for reading and understanding this SECTION 3 SAFETY of the manual.

The safety signs are placed at strategic points on the press brake for the 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 safety signs installed on the machine by CINCINNATI are identified by a small six digit part number in the lower right corner. If any of these safety signs become damaged or defaced, new signs should be ordered by contacting CINCINNATI at (513) 367-7100.

The following illustrations represent the safety signs most commonly used on hydraulic press brakes. Additional safety signs may be furnished to cover possible hazards due to special equipment or machine features. The user's management should also include additional safety signs to cover any hazards that may be presented by customer-added auxiliary equipment.

HAZARDOUS AREA (232913)

This DANGER sign alerts the operator and maintenance personnel of a hazardous area between the machine housings at the rear of the press brake. No one should enter this area while the main drive motor is running or the control is energized.

DIE AREA (153724)

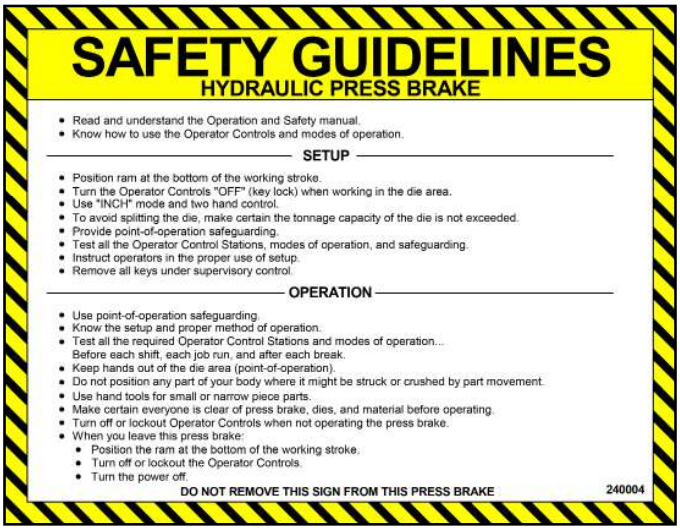
This DANGER sign alerts operators to keep hands out of the Point-Of-Operation (Die Area). The sign is usually attached to one end of CINCINNATI dies and not on the press brake. These adhesive backed signs have been furnished in safety update packages and are available from CINCINNATI INCORPORATED.

DANGER (240008)

This DANGER sign is attached to the press brake ram, which is the most visible location on the machine. This sign alerts the operator and maintenance personnel that certain procedures must be followed to prevent serious bodily injury.

SAFETY GUIDELINES (240004)

This SAFETY GUIDELINES sign is attached to the ram adjacent to the DANGER sign. It provides a checklist of safety considerations that should be observed before, during and after operation of the press brake.



GUARD AGAINST TIPPING (416875)

The design of the CINCINNATI XF hydraulic press brake is such that much of the weight of the machine is concentrated toward the front of the machine. This WARNING sign alerts the operator and maintenance personnel that the machine should be guarded against tipping until it is anchored to the floor. The sign refers to the Operator's Manual for complete installation instructions.

PRESS BRAKE OPERATOR SAFETY GUIDELINES

- Be sure to know the press brake capacity, controls, operating modes, and safeguarding.
- Know and understand the job about to be performed: material placement, feeding, and movement of material being formed.
- Never place hands in the die area.
- Make sure no one is in backgage area at the rear of machine.
- Make sure that tooling, press brake, and gaging are properly setup for the job.
- Always cycle the press brake at least twice without a part in dies before each shift and each job.
- Keep die area free of all unnecessary material and tools.
- Do not hang tools on the ram.
- Adequate safeguarding is available and used.
- Keep the body clear of the workpiece.
- Keep the work area clean and orderly.
- Keep alert; Keep the job in mind.
- Hand tools - personal protective devices are available and used.
- Make certain all persons are clear of the machine and material before operating.

- When leaving the press brake:
    - Place the ram at the bottom of the stroke or place blocks under the ram.
    - Turn the Control ON-OFF Keyswitch “OFF” and remove the key.
    - Turn the Main Drive Motor “OFF” by pressing the STOP button on the HMI control.

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

SAFETY MAINTENANCE CHECK

- SAFEGUARDING at the point-of-operation is properly adjusted and operating properly
- PINCH POINT guarding properly installed
- OPERATOR CONTROLS are working
- OPERATING MODES are functioning properly
- RAM starting and stopping properly
- WARNING PLATES and SAFETY SIGNS are clean and easily read
- ELECTRICAL WIRING in good condition
- CAUTION PAINTING in good condition
- AUXILIARY EQUIPMENT checked - working properly
- HAND TOOLS and personal protective equipment in good order - readily available
- SAFETY MANUALS and OPERATOR MANUALS attached to machine
- SCHEDULED NORMAL MAINTENANCE work completed

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.

SECTION 4 SPECIFICATIONS

PERFORMANCE AND RATINGS

SERIES	LENGTH Nominal ft. (m)	CLEAR DISTANCE BETWEEN HOUSINGS ft-in. (m)	TOTAL OVERALL DIE SURFACE ft. (m)	SHIPPING WEIGHT (1) MACHINE with backgage lbs. (kg)	BED TOP ABOVE FLOOR in. (mm)	BED TOP WIDTH in. (mm)	BENDING CAPACITY (Mild Steel) (2) Ga. x ft. (mm x m)	BENDING CAPACITY (Mild Steel) (2) VEE in. (mm)	MOTOR HP (kw)
90XF	6’	6’-6-1/2”	8’	19,700	34”	3.5”	3/16” x 6.8’	1.5”	20
	(1.83)	(2)	(2.44)	(8.936)	(864)	(89)	(4.7mm x 2m)	(40)	(14.9)
	8’	8’-6-1/2”	10’	22,200	34”	3.5”	10 Ga. x 9’	1.125”	20
	(2.44)	(2.6)	(3.05)	(10,070)	(864)	(89)	(3.4mm x 2.7m)	(30)	(14.9)
135XF	8’	8’-6-1/4”	10’	24,700	34”	3.5”	1/4” x 7.5’	1.5”	25
	(2.44)	(2.6)	(3.05)	(11,200)	(864)	(89)	(6mm x 2.2m)	(40)	(18.6)
	10’	10’-6-1/4”	12’	27,500	34”	4.5”	3/16” x 10.3’	1.5”	25
	(3.05)	(3.2)	(3.66)	(12,475)	(864)	(114)	(4.7 mm x 3.1m)	(40)	(18.6)
175XF	8’	8’-7.5”	10’	25,600	34”	4.5”	5/16” x 7.5’	2.5”	25
	(2.44)	(2.6)	(3.05)	(11,612)	(864)	(114)	(8 mm x 2.2m)	(65)	(18.6)
	10’	10’-7.5”	12’	29,100	34”	4.5”	1/4” x 10’	2”	25
	(3.05)	(3.2)	(3.66)	(13,200)	(864)	(114)	(6mm x 3.05m)	(51)	(18.6)
230XF	10’	10’-7.5”	12’	40,300	34”	5.5”	5/16” x 9.9’	2.5”	25
	(3.05)	(3.2)	(3.66)	(18,280)	(864)	(140)	(8mm x 3m)	(65)	(18.6)
	12’	12’-7.5”	14’	38,500	34”	5.5”	1/4” x 12.8’	2”	25
	(3.66)	(3.8)	(4.27)	(17,470)	(864)	(140)	(6mm x 3.9m)	(51)	(18.6)
350XF	10’	10’-7.5”	12’	44,300	34”	5.5”	1/2” x 12’	5”	30
	(3.05)	(3.2)	(3.66)	(20,095)	(864)	(140)	(12.7mm x 3m)	(127)	(22.4)
	12’	12’-7.5”	14’	49,600	34”	5.5”	3/8” x 12.4’	3”	30
	(3.66)	(3.8)	(4.27)	(22,500)	(864)	(140)	(9.5mm x 3.78m)	(76)	(22.4)

(1) SHIPPING WEIGHTS DO NOT INCLUDE FILLER BLOCKS AND ADDITIONAL OPTIONS

(2) BENDING CAPACITIES ALLOW FOR 15% RESERVE OF RATED TONNAGE TO COVER POSSIBLE INCREASES IN MATERIAL THICKNESS, TENSILE STRENGTH AND YIELD STRENGTH.

SPECIFICATIONS

SERIES	MACHINE CAPACITY		STROKE LENGTH in. (mm)	THROAT DEPTH in. (mm)	DIE SPACE in. (mm)		RAM SPEED (1) in./min. (mm/sec.)			OVERALL HEIGHT ABOVE FLOOR in.(mm)
	MAX SPEED AT FULL TONNAGE in./min. (mm/sec.)	MAX TONNAGE AT FULL FORM SPEED Tons (kN)			CLOSED HEIGHT	OPEN HEIGHT	APPROACH	FORMING	RETURN	
90XF	75	90	14”	18”	7”	21”	650	1 to 75	1 to 565	129.9
	(32)	(801)	(355)	(457)	(178)	(533)	(275)	(1 to 32)	(1 to 239)	(3300)
135XF	55	135	14”	18”	7”	21”	650	1 to 55	1 to 540	130.4
	(23)	(1201)	(355)	(457)	(178)	(533)	(275)	(1 to 23)	(1 to 228)	(3312)
175XF	45	175	16”	18”	7”	23”	550	1 to 45	1 to 485	136.6
	(19)	(1557)	(406)	(457)	(178)	(584)	(232)	(1 to 19)	(1 to 205)	(3470)
230XF	35	230	16”	18”	7”	23”	550	1 to 35	1 to 430	138.6
	(15)	(2046)	(406)	(457)	(178)	(584)	(232)	(1 to 15)	(1 to 182)	(3520)
350XF	30	350	16”	18”	8”	24”	300	1 to 30	1 to 330	145.6
	(13)	(3114)	(406)	(457)	(203)	(610)	(127)	(1 to 13)	(1 to 140)	(3698)

(1) RAM SPEEDS ARE APPROXIMATE (± 15%) AND BASED ON 1800 RPM MOTOR @ 60 Hz. AND RUNNING IN NO-LOAD CONDITION

PRINCIPLE OF OPERATION

The XF is a hydraulically driven press brake. Linear encoders constantly monitor the bed-to-ram position, feeding this information to the control. The HMI Control is a self-contained industrial PC with an integrated touchscreen display, Control ON-OFF keyswitch, Ram Up button, Main Drive START-STOP buttons, Next Ram Movement lights, Operator Station lights, Emergency Stop button, USB connector, palmbuttons, keyboard and pointing device. The active program in the HMI Control controls the vertical movement of the ram and the movement of the backgage. After a program is created or opened, the machine can be run and the program and setup information can be saved in internal memory for future use.

DEFINITION OF TERMS

PUMP: A motor driven hydraulic pump provides the flow and pressure for advancing, retracting, and loading the power cylinders.

SERVO VALVES: These are variable orifice valves with spool position feedback. The valves control both the direction and amount of flow from the pump to the cylinders. They provide precise flow/speed control of the cylinders.

LINEAR ENCODERS: Each end of the machine is equipped with a high resolution encoder. These encoders constantly monitor the ram position and ram speed.

HMI CONTROL: The HMI (Human Machine Interface) Control is the operator interface for programming the machine ram and backgage movements.

STROKE LENGTH: Hydraulic pressure from the pump forces the cylinder pistons down or up to move the ram. The amount of stroke is programmable per step. The maximum stroke length is shown in the preceding Specifications table.

TONNAGE CAPACITY: Tonnage is programmable from approximately 5% of full tonnage to full machine tonnage. Full tonnage is determined by the cylinders, pistons and the limits of the frame design. The machine capacity plate and the preceding Specifications Table show the maximum tonnage capacity. Also, see the **CINCINNATI Press Brake Capacities booklet PT-50691** included with the complete machine manual.

DIE SPACE: A fixed amount of space to accommodate the tooling and filler block. OPEN HEIGHT is the maximum die space. It is the distance from the bed top to the ram nose when the ram is at the full up position. CLOSED HEIGHT is the minimum die space. It is the distance from the bed top to the ram nose when the ram is at the full down position. See Figure 4-1.

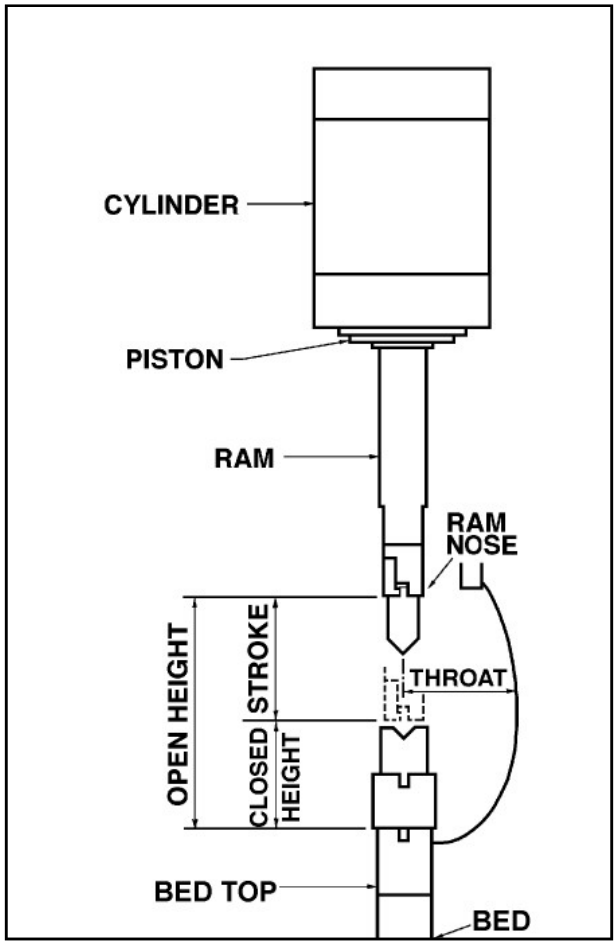


FIGURE 4-1 Die Space

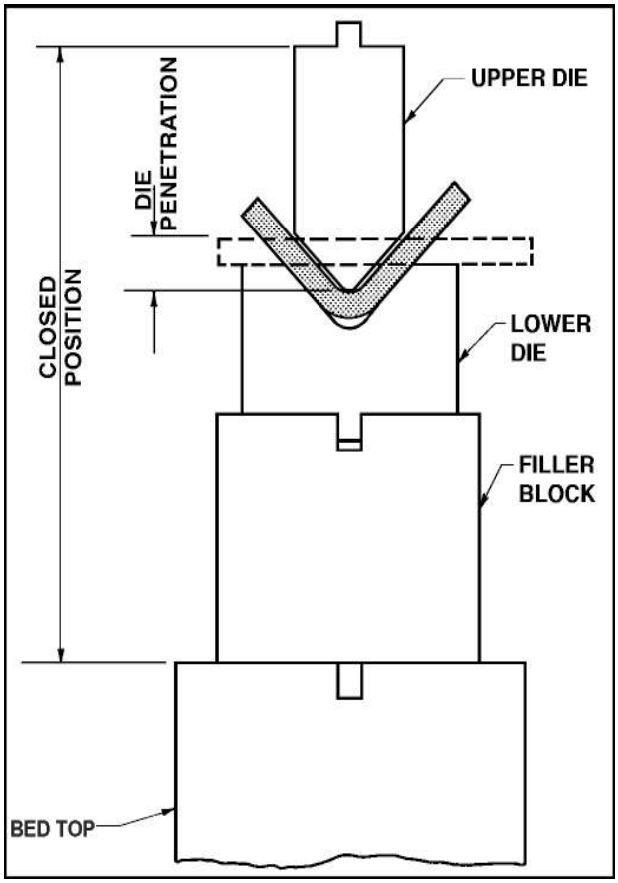


FIGURE 4-2 Die Penetration

THROAT: Most forming on press brakes is done between the housings. However, when forming long materials or when forming at one end of the machine, the housing throat provides space for the material. This space is limited by the throat depth. The throat depth is shown in the preceding Specifications table. Details of the throat are found on the Throat Detail drawing.

DIE PENETRATION: The distance the upper die penetrates the lower die to achieve the desired bend angle. For a 90° air bend the die penetration is approximately 40% of the vee die opening. See Figure 4-2.

RAM REVERSAL POSITION: The distance between the bed and ram when the ram is at the bottom of the stroke and adjusted to make the proper bend angle.

The combined height of the dies and filler block when the ram is adjusted to make the proper bend angle must be more than the closed height but less than the open height. The difference between this combined height and the open height is the maximum amount of stroke that can be used for a particular setup.

FILLER BLOCKS: Filler blocks provide a means of aligning the dies and holding and clamping the lower die. Various types of filler blocks are available. Filler blocks are optional and should be selected to suit the tooling and avoid part interference.

MICROCROWN: On XF press brakes, a crown is machined into the bed. The amount of crown is designed so the bed and ram will be parallel under load at 1/2 to 2/3 of full tonnage with the load uniformly distributed over the nominal length of the machine. Under normal forming loads Microcrown reduces the amount of shimming required to reduce angular variation along the length of the bend.

OTHER CAPACITIES

STRIPPING CAPACITY

A stripping load is a force that occurs on the up stroke of the ram. The direction of this type of load is down on the ram and ram nose, and up on the bed (the reverse of forming loads). The chart shows the maximum stripping capacity available when centered on the machine, dependent on the distributed load (part length). The slope of the line is 0.391 Tons/inch (0.137 kN/mm). When the distributed load is long enough an overall maximum stripping load is reached. See Figure 4-3.

SERIES	MAXIMUM STRIPPING LOAD TONS (kN)
90XF	6.5
	(58)
135XF	8.5
	(75.6)
175XF	9.5
	(84.5)
230XF	10.5
	(93)
350XF	17.0
	(151)

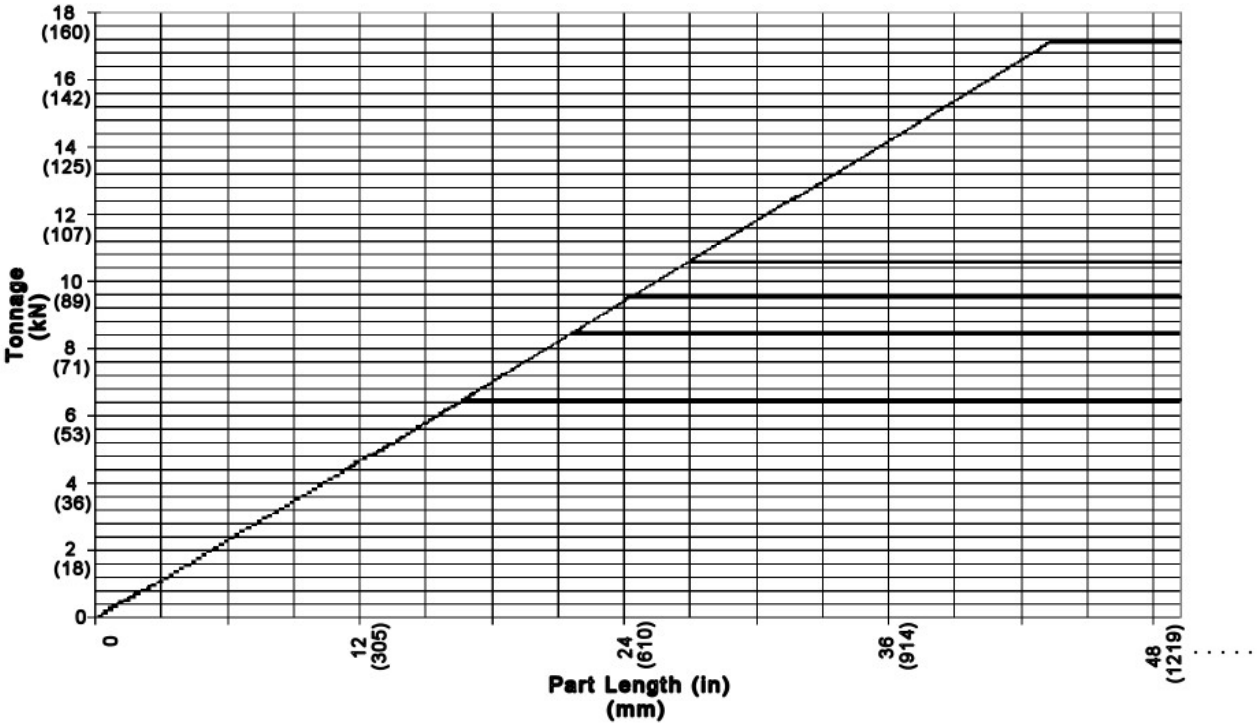


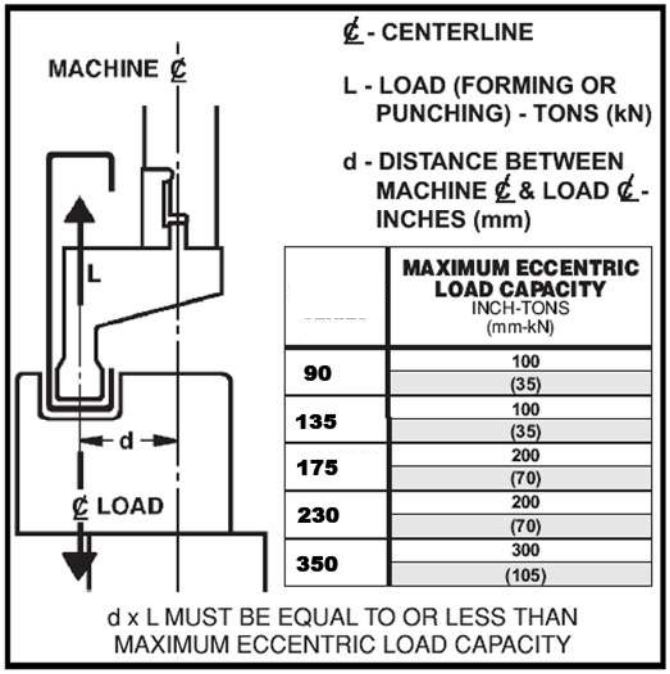
FIGURE 4-3 Stripping Capacity

PUNCHING CAPACITY

CINCINNATI XF press brakes are not intended for punching applications requiring dies sets, stripping of parts, or tools with urethane inserts.

ECCENTRIC LOAD CAPACITY (FRONT-TO-BACK)

Occasionally special forming setups are made which do not have the load centered on the bed and ram front-to-back centerline. When this condition exists, care must be taken not to exceed the maximum eccentric (front-to-back) load capacity of the machine. See Figure 4-4.



	MAXIMUM ECCENTRIC LOAD CAPACITY INCH-TONS (mm-kN)
90	100
	(35)
135	100
	(35)
175	200
	(70)
230	200
	(70)
350	300
	(105)

FIGURE 4-4 Eccentric Load Capacity

⚠ DANGER

Exceeding the eccentric load capacity could overstress the bed, die clamp, and ram nose attachment bolts causing them to shatter and possibly cause serious injury to personnel. Damage could also occur to the slides and guides.

OFF-CENTER LOAD CAPACITY (LEFT-TO-RIGHT)

Most forming jobs are centered left-to-right on the bed where full machine tonnage is available. When the load is not centered left-to-right on the bed, only a portion of the full machine tonnage is available. See Figure 4-5.

For example, a 175 ton hydraulic press brake has 100% of its full tonnage capacity available for bending at the left-right centerline of the machine. At either housing, regardless of machine length, only 50% of the full tonnage capacity is available.

To determine the available tonnage at a point between the machine centerline and either housing, the ratios shown in Figure 4-4 can be used. A 175XF10 press brake is approximately 128” (3251 mm) from housing to housing (L). A point at .3 of this length is 38.4” (975 mm) (.3 x 128”/3251 mm). At 38.4” (975 mm) from the centerline of the machine, 62% (108.5 tons, 1064 kN) of the full tonnage is available.

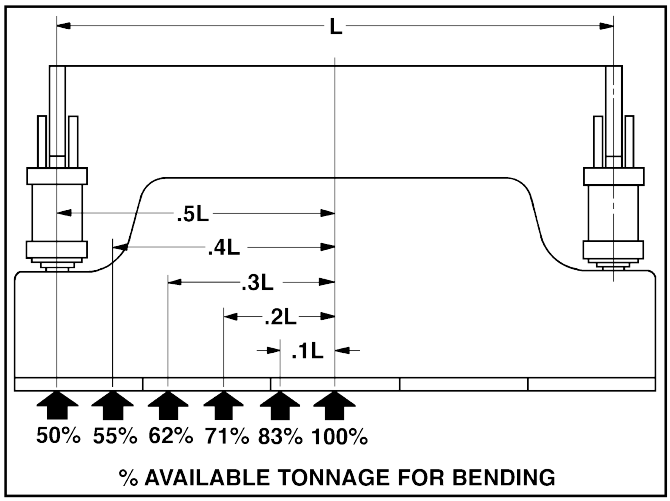


FIGURE 4-5 Off-Center Load Capacity

PRESS BRAKE TOOLING

A hydraulic press brake is a versatile bending machine capable of exerting high forces between the bed and ram. These forces are applied and directed into the material being formed by the use of tooling (dies).

The type and shape of the dies are the principle factors in establishing the shape of the part to be formed. There are many varieties of press brake dies. Some have a special and unique shape. The most common and widely used are Vee Dies. See Figure 5-1. These are referred to in the following instructions.

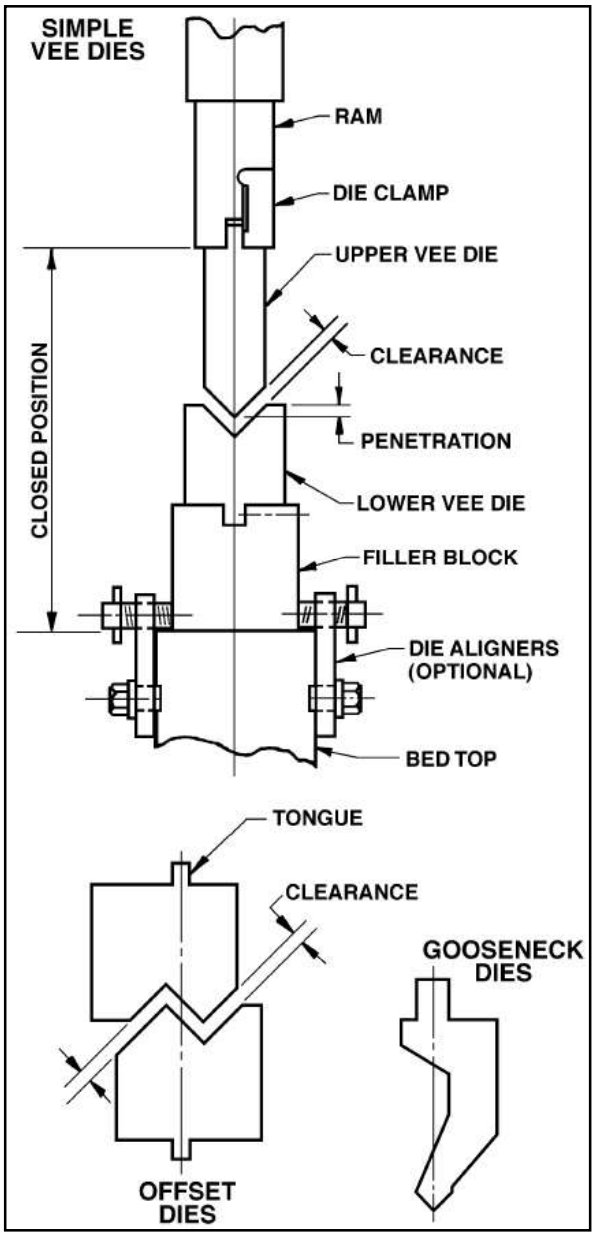


FIGURE 5-1 Vee Dies

TYPES OF DIES

AIR BEND DIES: These dies are made with a die angle less than the bend angle. The metal being formed only contacts the nose of the upper die and the shoulders of the lower die. See Figure 5-2. All of the force is used in forming and none in squeezing the metal. Bend angles greater than the die angle can be formed by adjusting the die penetration. See the **CINCINNATI Press Brake Capacities booklet PT-50691**, included with this manual for further information.

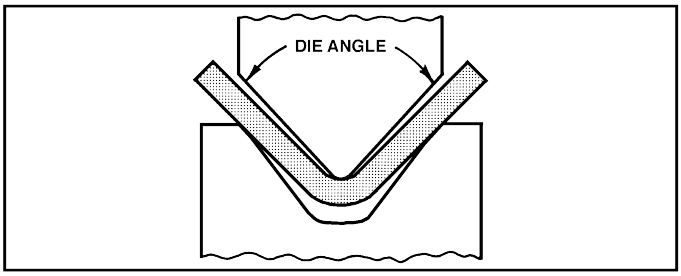


FIGURE 5-2 Air Bend Dies

BOTTOMING DIES: The primary purpose of bottoming dies is to "set" the material in order to overcome springback and improve angular accuracy. Bottom bending will increase the forming tonnage. Bottoming dies are made in matched pairs, according to the thickness of the material to be formed and the desired radius. See Figure 5-3. Bottoming die angles are approximately the same as the desired bend angle (88°, 89° or 90°). There are three different types of forming classified as "bottom" bending; bottoming with springback, true bottoming and coining. When the upper die embeds, or displaces metal, in order to obtain a sharper than one metal thickness inside radius, the term "coining" is applied. The required tonnage will be at least five times the air bend tonnage. Other types of bottoming dies are multiple bend, channel and radius bend dies. Do not use ANGLE mode when bottom bending. Use POSITION or TONNAGE mode for Ram Reversal.

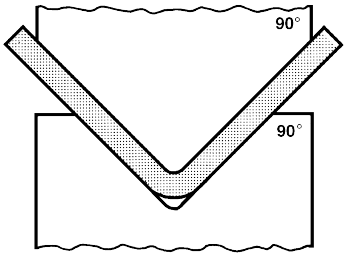


FIGURE 5-3 Bottoming Dies

CINCINNATI can provide many other types of dies, some of which are shown in Figure 5-4.

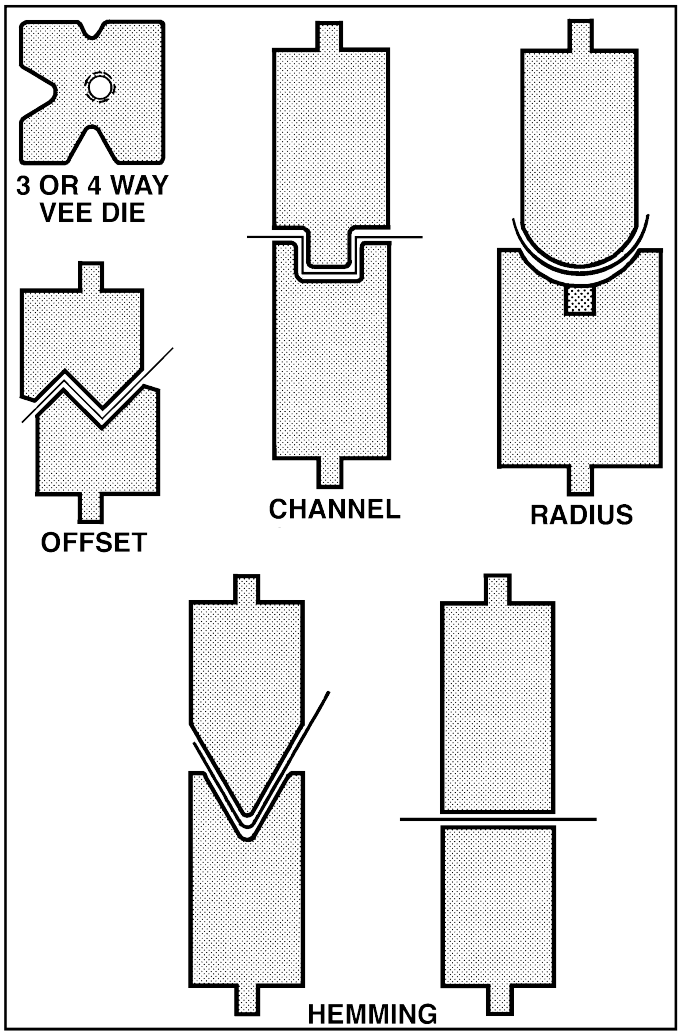


FIGURE 5-4 Other Types Of Dies

DIE SETS: Special care and precautions should be taken when operating die sets with guide pins and bushings.

Depending on the working height of the die set, the OPEN HEIGHT of the press brake may cause the guide pins and bushings on the die set to separate. Re-entry of the guide pins into the bushings may be difficult, if not impossible. Each die set application should be reviewed for this condition.

CINCINNATI recommends that the working height of all die sets be such that the guide pins never leave the bushings when the ram is in the full up position.

INSTALLING TOOLING

To install tooling, use the following procedure:

1. If the press brake is not already powered on, turn the Main Disconnect switch “ON”.

2. Press the Main Drive START button on the HMI control. Hold the button until the motor starts.

3. Log on to the HMI control. Verify that the palmbuttons are enabled for SETUP mode. To do this, press the OP STATION button in the toolbar.

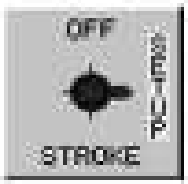
Click on the SETUP mode tab of the Operator Stations dialog.

Ensure that the Station 1 check box is checked. If it is not checked, click on the white box to enable it. Then press “OK” to accept the change and close the dialog.

⚠CAUTION

Before proceeding, also read in ***SECTION 3 - Installing Tooling***.

4. Set the Stroke Mode Select button to SETUP.



Use the palmbuttons to move the ram down and the RAM UP button to move the ram up.

5. Though SETUP mode is independent of the page displayed on the control, the Job Setup page should be referred to first. Some users prefer to set the control to the Run/Edit page or to Quick Bend. In addition to displaying the ram position, like the Run/Edit page, Quick Bend also allows retracting of the backgage.

   To view other diagnostic information, such as independent left and right ram position or actual gage position, use the Maintenance | Diagnostics | Encoders/ Tonnage or Maintenance | Diagnostics | Gage Positions menu items.

6. Turn the Control ON-OFF keyswitch “ON”.

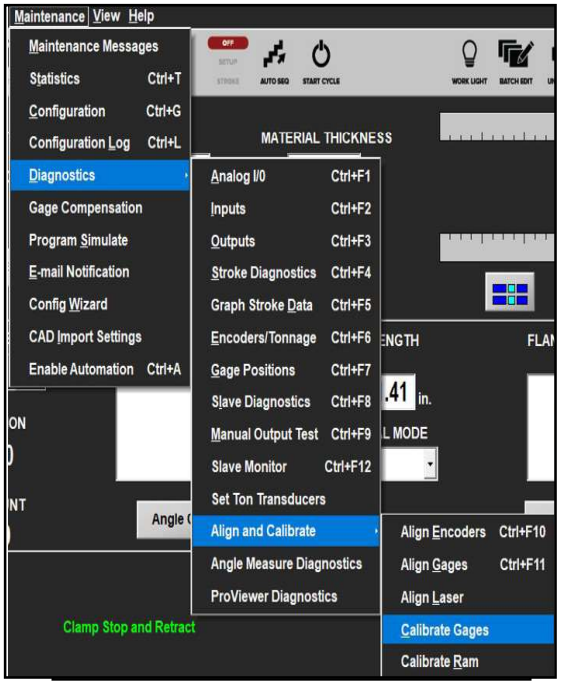
7. Press the RAM UP button on the HMI Control to move the ram up. If held pressed the ram will move to the full up position and stop. When the ram stops, continue with the next step.

8. Press and hold the palmbuttons to lower the ram until the ram stops at the full down position.

⚠CAUTION

Make sure the area behind the machine is clear before calibrating or retracting the backgage.

9. If the backgage is in the way, of the ram either press the Gage Retract button on the toolbar or force a gage calibration using the Maintenance/Diagnostics/ Calibrate Gages menu item.



10. Turn the Control ON-OFF keyswitch "OFF" and remove the key. Keyswitch "OFF" will not allow movement of the ram or backgage.

11. If a filler block (die holder) has not already been installed, deburr, clean and lightly oil the bed top. Place nuts for the filler block screws in the proper bed cross-slots. Place the filler block on the bed and lightly bolt in place. At this time, also install die aligners (three front and three back) to the front and back of the bed. If a filler block is not used and the die is be placed directly on the bed make sure the die is secured. Deburr, clean and lightly oil the top of the filler block.

If additional space is required to install the filler block or the lower die, turn the Control ON-OFF keyswitch "ON", and use the RAM UP button to raise the ram so there is just enough space. Turn the Control ON-OFF keyswitch "OFF" and remove the key.

12. Loosen the filler block set screws. Insert the lower die on the filler block leaving it extended several inches past the end of the filler block. See Figure 5-5. Visually center the filler block so the lower die is aligned with the slot in the ram nose.

13. Loosen the ram die clamp bolts approximately .125" (3.2 mm).

14. If additional space is required to install the upper die, turn the Control ON-OFF keyswitch "ON" and move the ram so there is just enough space. Use the palmbuttons to move ram down or the RAM UP button to move ram up. Turn the Control ON-OFF keyswitch "OFF" and remove the key.

15. Insert and rest the upper die on the extended portion of the lower die. Make sure the tongue of the upper die is in the ram nose slot and the upper die is trapped by the lower die and the ram die slot. See Figure 5-5. Slide the upper die into lengthwise position with the lower die. Slide the set of dies into a centered position on the machine. Tighten the filler block set screws to clamp the lower die.

Note: *Short, lightweight dies may be installed as a set and slid into position.*

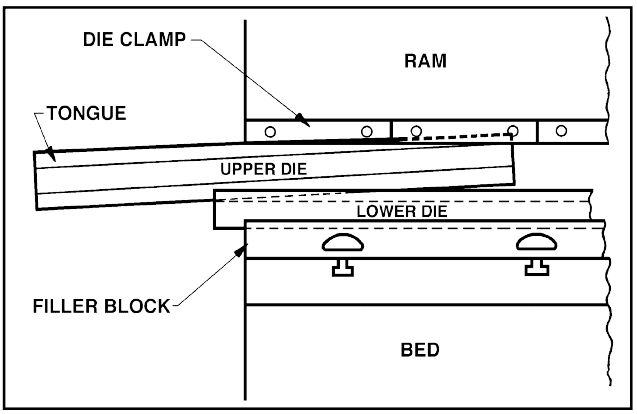


FIGURE 5-5 Installing Tooling

16. Moderately tighten the ram die clamp bolts to prevent the upper die from falling when the ram is raised. Turn the Control ON-OFF keyswitch "ON".

17. Press the RAM UP button to raise the ram .125" to .25" (3.2 to 6.4 mm). Turn the Control ON-OFF keyswitch "OFF" and remove the key.

18. Align the upper and lower dies by using the die aligners to shift the filler block front-to-back.

19. Turn the Control ON-OFF keyswitch "ON".

20. Use the palmbuttons to move the ram down until the upper die is seated. In SETUP MODE, the machine tonnage is automatically limited to 10% of full tonnage. For example, for a 175 ton XFe press brake the tonnage is limited to 17.5 tons.

IMPORTANT: ***When seating dies it may be advisable to place wood blocks or soft metal between the dies to prevent damage to the dies. Short dies must have sufficient shoulder area to prevent sinking into the ram, bed or filler block.***

The hydraulic components and machine frame members are safeguarded against overload by a pressure transducer and a relief valve in the hydraulic circuit. However, care must be taken to provide enough area under the upper and lower dies to prevent them from sinking into the ram nose or bed top due to highly concentrated loads. This is the shaded area shown in Figure 5-6. The minimum area, sq. inches, for each die to prevent sinking may be calculated by this formula:

Die Area = MAXIMUM TONNAGE / 15

Example: for a 175 ton press brake, the minimum die area for a capacity load is 175 divided by 15, or 11.7 square inches.

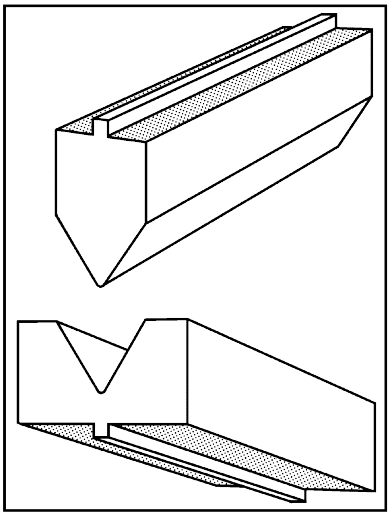


FIGURE 5-6 Seating Dies

21. Turn the Control ON-OFF keyswitch "OFF" and remove the key.

22. Fully tighten the ram clamp bolts after seating the upper die. Confirm that the upper die is seated tightly against the ram nose by checking the shoulders of the upper die with a .002" (.05 mm) feeler gauge.

23. Turn the Control ON-OFF keyswitch "ON". Move the ram up to provide clearance between the dies. The clearance should be equal to at least the metal thickness. Turn the Control ON-OFF keyswitch "OFF" and remove the key. Check the front-to-back die alignment over the full length of the dies. Realign if necessary by moving the filler block with die aligners. For precision bending requirements, a more accurate alignment is required. Feeler gauges should be used to measure front-to-back clearances between the upper and lower dies at both ends and at the center of the dies.

24. Tighten the filler block nuts to secure the filler block to the bed.

GAGING – BACKGAGE

XF press brakes come standard with a 5-Axis. The backgage has programmable 24" in-out (X1 X2) Axes, programmable left-to-right (Z1 Z2) Axes (range is dependent on machine length) and programmable 8" vertical (R) Axis. The backgage is positioned and sequenced by the active program in the HMI control. Additional information on the 5-Axis Backgage can be found in CINCINNATI manual EMA-9, 5-AXIS BACKGAGE OPERATION.

5-AXIS BACKGAGE CAPACITY

The 5-Axis Backgage is designed for parts up to 1/4" (6.4 mm) thick that weigh less than 150 lbs. (68 Kg). Thicker materials weighing up to 150 lbs, but not requiring a crane assist can be processed when reasonable care is exercised,

IMPORTANT: Heavy shock loads can damage the gage.

5-AXIS GAGE FINGER ASSEMBLIES

The 5-Axis Backgage includes two flip-up gage finger assemblies with interchangeable finger tips, two 1/4" step tips with dowel pins, and two 1" block tips. The gage finger assemblies can be mounted in either the upper or lower position. See Figure 5-8. The lower position is used primarily with short lower dies. The dowel pin and the front surface of the gage finger tip are gage points for the workpiece. The long horizontal surface on the top of the backgage contains three additional gage points for parts

with long flange lengths and parts requiring rear support. Two-point gaging is recommended to minimize camber as shown in Figure 5-7. Spreading the gage points as wide as possible is recommended to reduce rocking and improve flange accuracy.

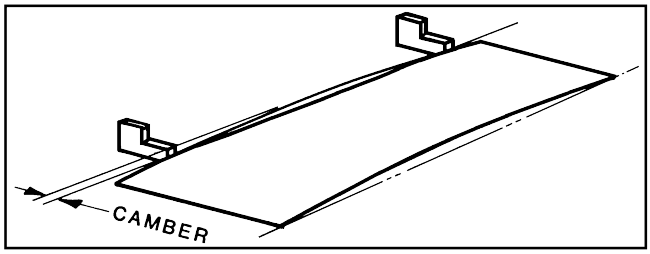


FIGURE 5-7 Two-Point Gaging

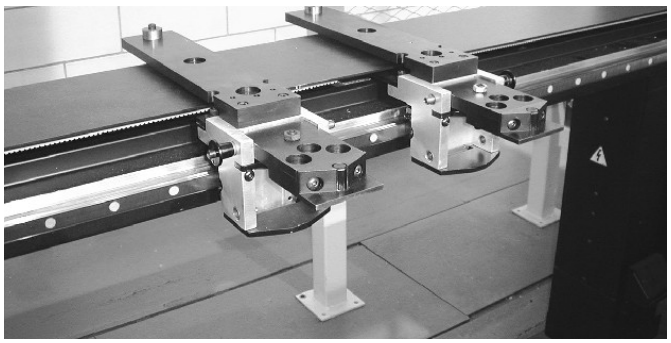


FIGURE 5-8 5-Axis Gage Finger Assemblies

⚠CAUTION

If the backgage bar or gage fingers are to be positioned over the top of the lower die, care should be taken to make this height adjustment before moving the backgage forward. This will avoid a collision between the gage finger and the lower die.

PROGRAMING BACKGAGE POSITIONS

The backgage finger positions are programmed with the HMI control. Additional instructions are provided in **SECTION 7**. The horizontal gage range is 24" from the ram centerline. See Figure 5-9. The distance from the centerline to the gage point is determined by two program inputs, *Flange Dimension and Gage Allowance.* The actual gage position is the sum these two values. See Figure 5-10.

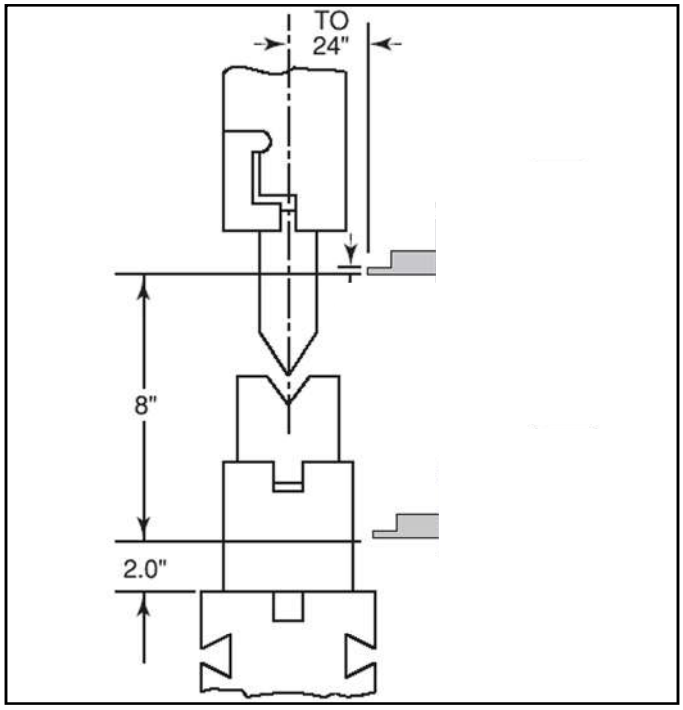


FIGURE 5-9 Vertical (R-Axis) Backgage Range

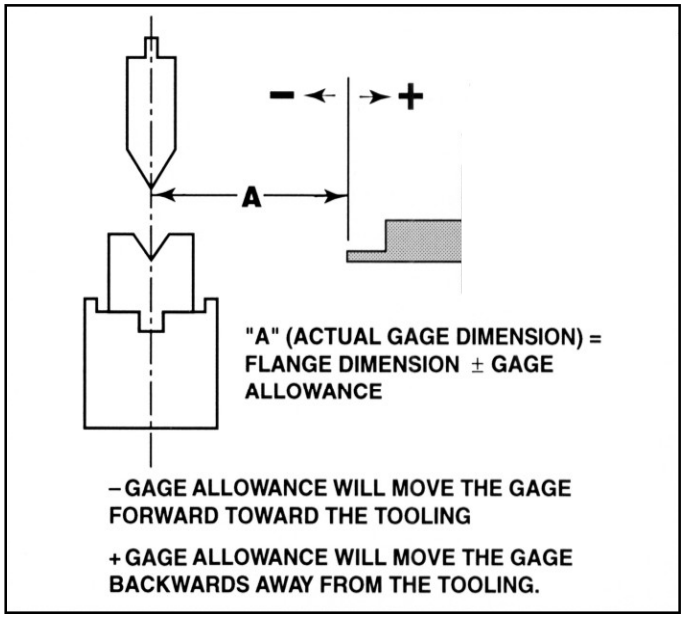


FIGURE 5-10 Figuring Actual Gage Position

The vertical gage range is 8" as shown in Figure 5-9. The HMI control software provides automatic calculation of offsets to account for the selected gage point and the upper or lower position.

OPERATING TECHNIQUES

The following guidelines will help the operator avoid operating problems, avoid producing bad parts, or causing injury to himself or damage to the tooling or machine.

TOOLING AND SETUP

- **DO** inspect the tooling carefully before starting any job. It may be impossible to compensate for badly worn dies and they could create a safety hazard.
- **DO** select tooling which is correct for the job and compatible with the machine capacity. It is especially important to use the same tools when opening a program from storage.
- **DO** ensure that tool shoulders are tightly seated against the ram nose and filler block, and that the upper and lower dies are aligned front-to-back.
- **DO NOT** attempt to air bend a part to the same bend angle as the die angle. Dies must have sufficient allowance for material springback so the material does not hit bottom in the die. It is recommended to use a 75° (or less) die angle when air bending to allow for materials with large springback. See Figure 5-11.
- **DO NOT** attempt to air bend a part using TONNAGE Ram Reversal mode (refer to SECTION 7). Bottoming dies must be used when reversing on tonnage. See Figure 5-12.

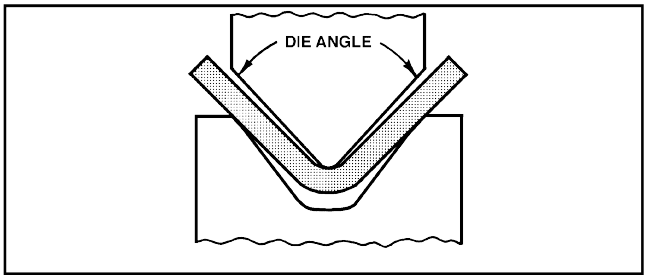


FIGURE 5-11 Air Bend

Note: Air bend or bottoming dies can be used with Ram Reversal POSITION mode (refer to SECTION 7). However, sufficient clearance under the bottom of the material is necessary to avoid excessive tonnage build-up.

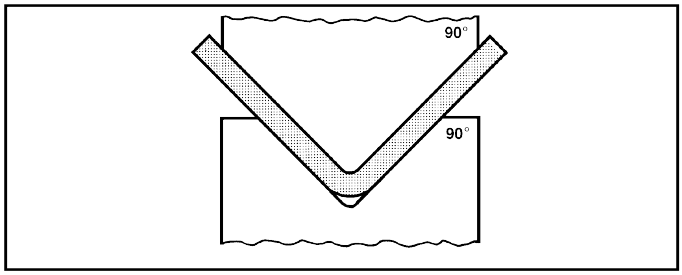


FIGURE 5-12 Bottom Bend

- **DO** use the recommended vee opening when air bending. Smaller vee openings are more sensitive to material thickness variations, deflections and tooling height variations. Refer to **CINCINNATI Press Brake Capacities booklet PT-50691** for vee openings.
- **DO** use a ram opening that is as short as possible to reduce the point-of-operation hazard area and improve productivity while still allowing part insertion and removal.
- **DO** make ram tilt and crowning adjustments as soon as possible during setup as they may affect program values.

RUNNING

- **DO NOT** run a job until the proper methods and safeguards to protect the operator and others from injury are understood and in place.
- **DO NOT** jog the ram motion through the bend.
- **DO** remove burrs or keep burrs facing up on the material for more consistent bends.

- **DO NOT** make angle corrections in the middle of a production run unless two or more consecutive bends are out of tolerance.
- **DO** determine if the program changes should be saved. Select SAVE to keep the changes.
- **ALWAYS** block the ram or position the ram at the bottom of the stroke, turn the Control ON-OFF keyswitch "OFF" and remove the key whenever leaving the machine.

FORMING SPEED AND SPEED CHANGE

- **DO** ensure that the programmable forming speed is appropriate for the part being formed. Too high of a speed may cause "whip-up", which could be hazardous to the operator or cause part damage.
- **DO** ensure that the speed change position is compatible with the forming speed. If a high forming speed is programmed and the speed change point is close to the material (less than .25"/6.35 mm), inconsistent ram motion and bend angles may occur.

IMPORTANT: When using Hand/Foot Sequence, the speed change point should be no higher than 0.25" above the material.

When using high forming speeds and small ram openings (short strokes) it is recommended to eliminate the speed change by raising the Speed Change Down position above the Ram Opening value. In many instances, this will provide more strokes per minute and smoother ram motion.

BACKGAGES

- **DO** ensure that gaging surfaces will not interfere with the tooling or the ram when setting up or running a job.
- **DO** use the gaging surface that provides the largest possible gaging target.
- **DO** spread the gage fingers as far as possible to achieve the best gaging accuracy.
- **DO** support the workpiece in the gaging position, both in front and rear of the bed.

REMOVING TOOLING

To remove tooling:

1. Turn the Main Disconnect switch "ON".

⚠ CAUTION

See SECTION 3 - SAFETY for proper method to remove tooling.

2. Press and hold the Main Drive START button on the HMI control. Hold the button until the motor starts.
3. Log on to the HMI Control. Verify that the palmbuttons are enabled for SETUP mode. To do this, press the OP STATION button on the toolbar. Click on SETUP mode tab of the Operator Station dialog. Ensure that the Station 1 check box is checked. If not, click on the white box to enable it. Then press the "OK" to accept the change and close the dialog.
4. Set the STROKE Mode Select button to "SETUP" Use the palmbuttons to move the ram down and use the RAM UP button to move the ram up.
5. Turn the Control ON-OFF keyswitch "ON".
6. Use the palmbuttons to lower the ram to a position where there is .06" to .12" (1.5 mm to 3.1 mm) clearance between the upper and lower dies. See Figure 5-13.
7. Loosen the ram die clamp bolts to unclamp the upper die. Loosen the filler block set screws to unclamp the lower die.
8. Turn the Control ON-OFF keyswitch "OFF" and remove the key.

IMPORTANT: When loosening the upper die clamp bolts make sure upper die will remain trapped between the lower die and the slot in the ram nose See Figure 5-13.

9. The dies can now be removed from the end of the machine. Dies may be removed together or individually, depending on their size and weight. Use proper material handling equipment and methods.

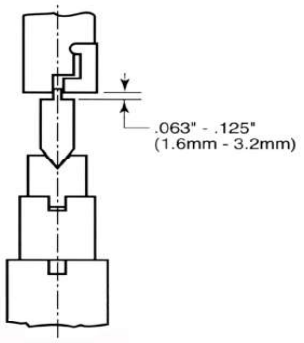


FIGURE 5-13 Removing Tooling

HMI CONTROL

The HMI Control is a self-contained industrial PC with an integrated touchscreen display Figure 6-1, Control ON-OFF keyswitch, Ram Up button, Main Drive START-STOP buttons, Next Ram Movement lights, Palmbutton Operator Station lights, Emergency Stop button, USB connector, palmbutton operator station, pointing device and keyboard. The program controls vertical movement of the ram and movements of the backgage. After a program is entered, the machine can be run and the program and setup information can be saved in internal memory for future use.

FIGURE 6-1 HMI Control (And Palm Button Operator Station)

FIGURE 6-2 HMI Control (And Palm Button Operator Station) With Optional OMNI-ARM® And Dual Monitors

TOUCHSCREEN DISPLAY

The touchscreen is the main point of interaction with the HMI Control. Information is primarily entered via the touchscreen. A pointing device and keyboard are also provided.

USB CONNECTOR

A USB connector is provided on the HMI control to allow operators and maintenance personnel to save or load programs, files and perform software updates. This is helpful when a network server is not available.

CONTROL ON-OFF KEYSWITCH

The Control ON-OFF keyswitch must be in the "ON" position to allow the active Palmbutton Operator Station or Footswitch Operator Station to cycle the ram. See Figure 6-3.

FIGURE 6-3 Control ON-OFF Keyswitch and Main Drive START-STOP Pushbuttons

When the Control ON-OFF keyswitch is in the "OFF" position, the palmbuttons and footswitch are prevented from cycling the ram, even though the main drive motor may be running. The ram cannot be moved with the RAM UP button when the CONTROL ON-OFF keyswitch is in the "OFF" position.

⚠WARNING

The operator should turn the Control ON-OFF keyswitch "OFF" and remove the key when leaving the machine or performing adjustments to prevent anyone from cycling the machine.

MAIN DRIVE START-STOP BUTTONS

To start the main drive motor, press and hold the Main Drive START button. If the internal check indicates all components are operating properly, the motor will start. The Main Drive START button will illuminate to indicate the drive motor is running.

When the Main Drive STOP button is pressed, all power to main drive motor and valves is turned off. The main drive motor and hydraulic pump will stop.

Note: If a machine fault should occur during operation, it is recommended that power is turned off by pressing the Emergency Stop button or the Main Drive STOP button on the HMI control.

PALMBUTTON OPERATOR STATION

One palmbutton is located on each side of the HMI control. As a safety feature, both must be pressed at about the same time to actuate ram movement. The palmbuttons will cycle the ram in SETUP mode and when selected as the operator control for STROKE mode. Releasing either palmbutton will stop the ram. Both palmbuttons must be released, and pressed again to resume ram motion.

FOOTSWITCH OPERATOR STATION

A cable-connected footswitch is also provided to actuate ram movement. The footswitch is enclosed to minimize inadvertent actuation of the switch which could be caused by falling objects. When the foot is inserted the front gate is pushed open, and drops closed when the foot is removed. A handle is provided on the footswitch for ease of positioning. Figure 6-5.

RAM UP BUTTON

Pressing the Ram Up button will cause the ram to go UP regardless of the next movement of the ram. With the button held pressed, the ram will continue to move up until it reaches the full up position. The ram will stop when the button is released. The palmbutton or footswitch must be pressed agaain to resume ram motion. See Figure 6-4.

FIGURE 6-4 Ram Up Button

EMERGENCY STOP BUTTON

When the red Emergency Stop button is pressed, power is removed from the main drive and backgage motors. The ram will stop on either the down or up stroke. See Figure 1-3.

NEXT RAM MOVEMENT LIGHTS

The Next Ram Movement lights indicate the direction the ram is moving, or will move, when the active operator station (palmbutton or footswitch) is pressed. Red indicates down movement and green indicates up movement, except in the case of the RAM UP button, which overrides these lights. See Figure 1-3.

OPERATOR STATION LIGHTS

When a palmbutton operator station is made active from the HMI control, the ON light is illuminated. The ram can then be cycled with the palmbuttons. When the palmbutton operator station is turned off on the HMI Control, the OFF light is illuminated and the ram cannot be cycled with the palmbuttons. When a footswitch is made active on the HMI control the ON light on the top of the footswitch is illuminated. The ram can then be cycled with the footswitch. When the footswitch operator station is turned OFF on the HMI control, the OFF light is illuminated and the ram cannot be cycled with the footswitch. See Figures 1-3 and 6-5.

Note: One light should always be on when the machine is powered on. If not, the machine should be checked by a qualified electrician.

FIGURE 6-5 Footswitch (handle removed for clarity)

ELECTRICAL ENCLOSURE

MAIN DISCONNECT SWITCH

The Main Disconnect switch, located on the main electrical enclosure, controls the incoming electrical supply to the machine. See Figure 6-6. When turning the Main Disconnect switch OFF and back ON, wait 15 seconds before switching back to ON.

IMPORTANT: This 15 second delay is required to allow machine functions to reset properly.

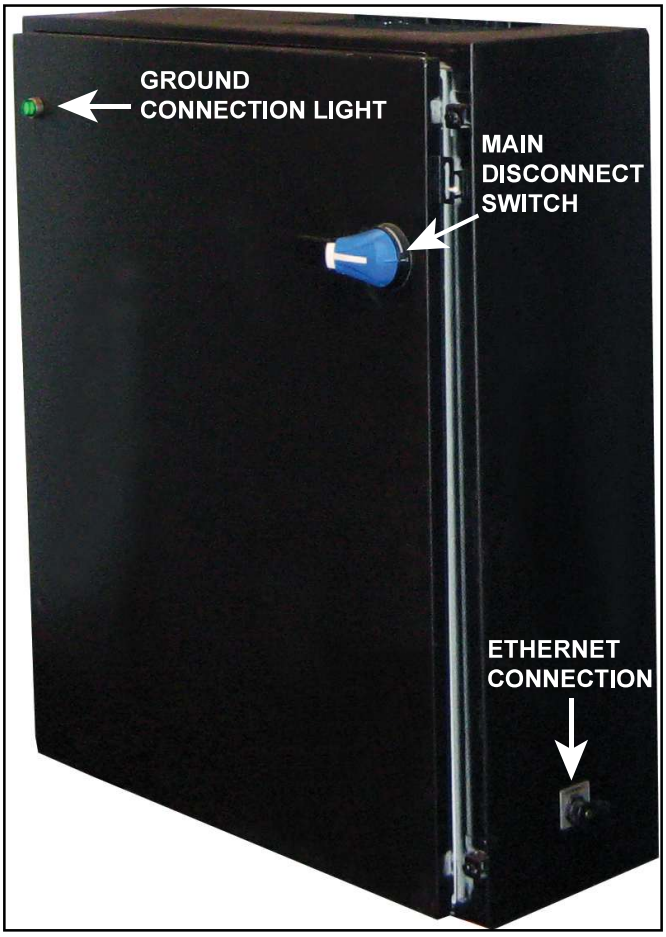


FIGURE 6-6 Main Electrical Enclosure

⚠WARNING

The control contains an uninterruptible power supply (UPS). Voltage may be present in some circuits even though the main disconnect is off.

GROUND CONNECTED LIGHT

The low voltage circuit is a grounded circuit. The ground connected light indicates that the internal chassis ground is connected. It does not indicate that the machine is grounded. See Figure 6-7.

FIGURE 6-7 Ground Connected Light

24 VOLT POWER LIGHT

The 24 volt Power On light indicates that the 24 volt power supply is operating correctly. See Figure 6-8.

FIGURE 6-8 24-Volt Power Light

ETHERNET CONNECTION

An Ethernet communications cable can be connected to the control via a plug on the bottom of the main electrical enclosure. See Figures 6-6 and 6-9.

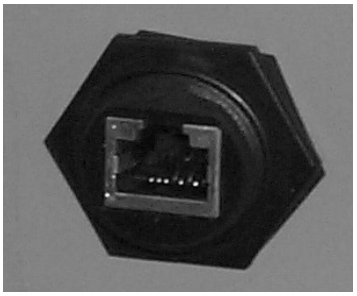


FIGURE 6-9 Ethernet Connection

SECTION 7 OPERATION

SEE SUPPLEMENT MANUAL EM-508 OR ONLINE HELP

FOR ADDITIONAL SETUP AND OPERATIONAL INFORMATION FOR THIS MACHINE, REFER TO EITHER THE ONLINE HELP INFORMATION THAT CAME WITH THE MACHINE SOFTWARE OR TO **EM-508**, **SECTION 7**, **OPERATION** – A SUPPLEMENT TO THE OPERATION MANUAL FOR THE CINCINNATI HMI CONTROL.

SECTION 8 OPTIONS

PRESENCE SENSING DEVICE INTERFACE

The Presence Sensing Device Interface is a hardware/ software package that interfaces with the machine, the HMI control and a presence sensing device (light curtain). The interface allows the presence sensing device to interrupt a down stroke in STROKE mode when a person or an object is detected in the protected area, until the Guard Mute Position is reached. See EM-559, SECTION 7, SOFTWARE - RAM PAGE, GUARD MUTE POSITION and SOFTWARE - TOOLBAR BUTTONS DESCRIPTION, QUICK BEND.

The Guard Mute Position is the position in the ram down stroke at which the presence sensing device is muted. At that point, the presence sensing device is no longer providing point-of-operation guarding.

When the Presence Sensing Guard OFF light is illuminated, the presence sensing device is muted (disabled). See Figure 8-1. When the device is muted, the operator can enter the guarded area to position or hold the workpiece.

Some presence sensing devices are programmable and allow a blanking window of variable size to be programmed per step. The XF has an output available that can be configured as a step advance output to a programmable presence sensing device to take advantage of this feature.

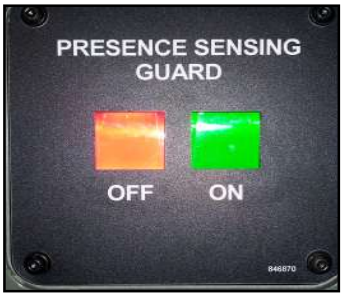


FIGURE 8-1 Presence Sensing Guard ON - OFF Light

LASER SAFEGUARD

A laser safeguard includes a transmitter and receiver mounted on opposite ends of the ram. Mounting brackets provide vertical adjustment for tool installation and proper alignment of the transmitter and receiver to the upper die for operation. A Hold-To-Run type footswitch is provided with a laser safeguard. Pressing the Hold-To-Run footswitch to the full down position will cause the ram to go UP regardless of the next movement of the ram.

FILLER BLOCKS AND CROWNING DEVICES

Filler blocks provide a means of aligning the dies and holding and clamping the lower die. Various types of filler blocks are available. Filler blocks are optional and should be selected to suit the tooling and avoid part interference. Lower clamps with manual or CNC adjustable crowning are available to provide a productive and repeatable method to reduce angular variation along the length of the bend without shimming.

6xLT BACKGAGE

An optional 6xLT backgage provides independent control of two front-to-back (X1 X2) axes, two left-to-right (Z1 Z2) axes and two up-down (R1 R2) axes. The 6xLT backgage is designed to process up to ¼" thick material that can be handled by one or two operators. Thicker materials weighing up to 150 lbs, but not requiring a crane assist, can be processed when reasonable care is exercised. The servo control will hold position against external forces applied during normal gaging operation, but gradually applied load of greater than 50 pounds per drive will overcome the servo and force the gage out of position without damage.

OIL HEATER

An oil heater is recommended for cold ambient room temperatures below 40°F and cold running conditions. They are immersion-type and are thermostatically controlled. The oil heater maintains the oil temperature in the hydraulic reservoir to permit machine startup. Oil heaters are not for heating up the oil. The thermostat is set to start the heater if the temperature falls below approximately 60°F.

HYDRAULIC CLAMPS

XF press brakes can be equipped with hydraulic clamping for the upper and lower dies. Control switches for the hydraulic clamps are located on the HMI Control. ***Caution: upon loss of power to the press brake, the upper clamping system could lose hydraulic pressure causing the upper die to fall out of the clamp. Do not use upper dies without a safety tongue.***

CI FIRESAFE ECO FLUID

CINCINNATI XF press brakes are shipped standard with petrolium-based hydraulic fluid. As an option, the XF can be provided with CI Firesafe ECO Fluid. This fluid is classified as FM Approved, Fire Resistant and Readily Biodegradeable.

SECTION 9 MAINTENANCE AND ADJUSTMENTS

To maintain accurate performance of the CINCINNATI press brake, regular maintenance practices should be followed. This section deals with the maintenance and adjustments of the press brake. The replacement of any safety related equipment might affect the safe performance of the press brake. If the user replaces any such items, they are responsible to have a qualified professional verify the safe operation of the machine and all safety functions. For instance, if a light curtain is replaced, the resolution and response time must meet or exceed that of the original light curtain. After the replacement of the light curtain, safety performance must be verified. The safety performance of the press brake should be checked periodically by a qualified professional to ensure continued safe operation.

LOCKOUT / TAGOUT PROCEDURE

Note: This procedure only covers the typical energies of CINCINNATI XF hydraulic press brakes. *Special options, tooling and add-ons may have energy states that this procedure does not cover. It is the responsibility of supervision to verify and establish the appropriate Lockout/ Tagout Procedure for the specific machine.*

Before maintaining the machine, read and understand this Operation, Safety, and Maintenance manual. Refer to ***SECTION 1 - IDENTIFICATION****, Figure 1-1 and 1-2, and this section,* ***MAINTENANCE AND ADJUSTMENTS****.*

1. In SETUP mode, use the palmbutton operator station to run the ram down until the dies are closed or until the ram is resting on support blocks. The ram supports must be able to withstand a minimum of 10% of full machine capacity without damaging the machine bed or ram.
2. Turn the main drive motor "OFF" by pressing the Main Drive STOP pushbutton on the HMI control (Figure 1-3).
3. Log off of the HMI control.
4. Turn the Main Disconnect switch "OFF" and padlock the switch (Figure 6-6).

UNLOCK / RESTART PROCEDURE

1. Remove the padlock and turn the Main Disconnect switch "ON".
2. Log on to the HMI control. Press and hold the Main Drive START button on the HMI Control until the motor starts (Figure 1-3).
3. Press the RAM UP button to run the ram UP until any ram supports can be removed from the machine.

ENTRAPMENT RELEASE

With No Electrical Power Available

If a person or object becomes trapped under the ram and no electrical power is available, use the following procedure for entrapment release.

1. Determine the estimated ram weight using the table below. Select components of sufficient strength to safely raise and support the ram assembly.

EST. RAM ASSEMBLY WEIGHT				LBS
				(KG)
	NOMINAL MACHINE LENGTH (BETWEEN HOUSINGS)			
SERIES	6FT	8 FT	10FT	12FT
90XF	2650	3550	-	-
	(1200)	(1610)	-	-
135XF	-	4050	5150	-
	-	(1840)	(2340)	-
175XF	-	4600	6000	-
	-	(2090)	(2720)	-
230XF	-	-	6500	7900
	-	-	(2950)	(3580)
350XF	-	-	8300	10850
	-	-	(3760)	(4920)

2. Use one of the two following techniques to support the ram but do not raise the ram until step 5.
   a. Jacks or similar mechanisms placed between the ram and bed of machine.
   b. Chains, slings or similar lifting devices connected to the ram assembly at the two lifting holes near the top of the ram. Use these in conjunction with sufficiently sized overhead crane, lift truck, or similar device.
3. Open the hydraulic cylinder covers to access the cylinder manifold assemblies.

4. Using sufficient protection to avoid spray of high pressure hydraulic fluid and ejection of fittings. Remove TP1 from each cylinder manifold assembly.

5. Using the selected method in step 2, slowly raise the ram.

6. Continuously support ram as it is raised using die blocks or similar items placed between ram and bed.

7. Hydraulic fluid may escape from TP1. Use care on slippery surfaces. Use approved methods to clean up and dispose of spilled fluid.

With Electrical Power Available

If a person or object becomes trapped under the ram and electrical power is available, use the following procedure for entrapment release.

1. If the press brake is not already powered on, turn the Main Disconnect Switch "ON". Then log on to the HMI control.

2. Press the Main Drive START button on the HMI control. Hold the button until the motor starts.

3. Turn the Control ON-OFF keyswitch "ON".

4. Press the RAM UP button on the Palmbutton Operator Station to raise the ram.

LUBRICATION

Refer to Figures 9-1 for machine lubrication point locations.

1. Cylinder Head Clevis Pins (2): Lubricate grease fittings (see Figure 9-1) while cycling the ram under light load, such as obtained with a bumping die. Lubricate once a month wtih #2 Lithium base grease with "moly" additive (C.I. grease H-2M).

FIGURE 9-1 Lubrication Points

2. Ram Guides and Slide Liners (2): Wipe clean and flush with light hydraulic oil once a month.

5-AXIS BACKGAGE LUBRICATION

Note: The references to "spray lubricant" means to use "LPS #1" aerosol spray (C. I. #420924) or to spray a SAE #10 oil. All grease applications use No. 1 EP grease (C. I. Grease H-1EP).

Clean and lubricate all exposed guide rails and the X-Axis, and R-Axis ball screws with a light coat of spray lubricant. These are accessed by removing the protective covers. Do not use grease on the ball screws. The 5-Axis Backgage is equipped with bearings that are lubricated with grease, viscosity of 32-150cSt. The X-Axis bearings (six total-three each arm) should be lubricated every 100 hours of operation. See Figure 9-2. The R-Axis (six total-three each arm) should be lubricated every 200 hours of operation. See Figure 9-3. The Z-Axis should be lubricated every 100 hours of operation. The grease must be distributed throughout the entire bearing housing by pumping grease into the fitting until excess comes out of the bearing housing. The bearings should then be moved along their rails to distribute the grease. Repeat the process two or three times to ensure lubrication has reached all the bearings. In addition there are two spherical bearings and two guide rail bearings located at the Z-Axis mounting interface. See Figure 9-4. These should be lubricated each time the X-Axis bearings are lubricated.

FIGURE 9-2 5-Axis Backgage Lubrication

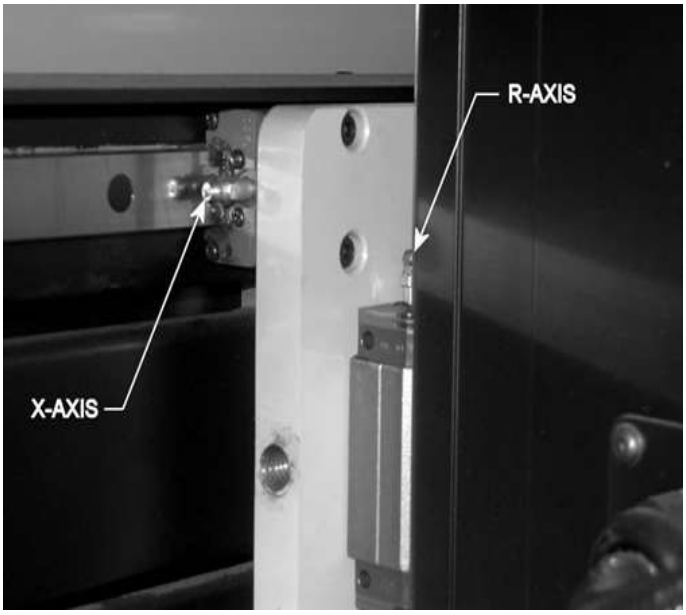


FIGURE 9-3 5-Axis Backgage Lubrication

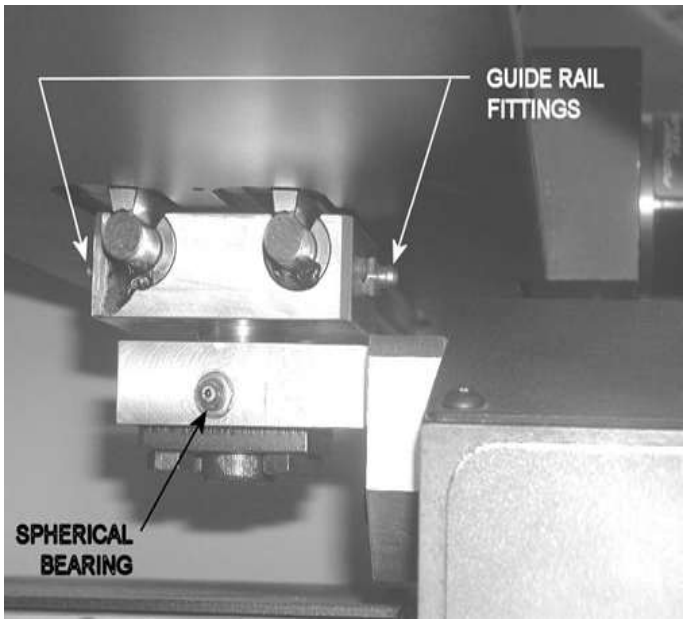


FIGURE 9-4 5-Axis Backgage Lubrication

HYDRAULIC RESERVOIR OIL

Check the oil level daily. The ram should be in the full UP position. The reservoir should be filled to the center of the sight gauge located on the back of the oil reservoir. To add oil, remove the breather filter and fill through the hole. Use a light hydraulic oil, viscosity 150 seconds at 100°F (37.8°C) with anti-rust, anti-oxidation and anti-wear additives (C. I. Oil B-150).

⚠WARNING

XF press brakes are designed for and shipped with a petroleum-based hydraulic fluid. This is flammable. Check applicable fire codes for special precautions. As an option CI can provide CI Firesafe ECO fluid. Contact CI Technical Service at (513) 367-7100 for more information.

The Lubrication Recommendation Chart furnished with this manual lists brand names and numbers which meet CINCINNATI specifications. Extreme temperatures may require lighter or heavier oil than shipped with the machine and normally recommended. The allowable range of oil temperatures for different viscosity oils are shown below.

VISCOSITY GRADE AT 100°F (38°C)	STARTUP 4000 SUS (860 cST)	RUNNING 250 SUS (54 cST) MAX.	RUNNING 70 SUS (13 cST) MIN.
150 SUS (32 cST)	11°F (-12°C)	80°F (27°C)	143°F (62°C)
215 SUS (46 cST)	22°F (-6°C)	94°F (34°C)	159°F (71°C)
315 SUS (68 cST)	32°F (0°C)	108°F (42°C)	177°F (81°C)

The hydraulic oil reservoir capacity for the CINCINNATI XF is shown in the adjacent table. Precautions must be taken to keep the oil clean, free of chips, grit, water, sludge, etc. The drain valve should be cracked open monthly to remove any accumulated moisture. The oil should be drained and replaced after one year of service. Replace the oil sooner if sludge or other contamination is present. New oil stored in drums is usually not as clean as the filtered oil shipped with the machine. Oil should be pumped through a 3 micron filter. After the oil is changed check the display periodically to see if a dirty oil filter error message appears. Change the filter if required. When the ambient room temperature is below 40°F (4.4°C), we recommend installing an optional oil heater in the reservoir to enable the oil pump to startup in cold weather. Extremely cold environments below 32°F (0°C) requires additional measures to protect the hydraulic system. Contact CINCINNATI Technical Service at (513) 367-7100.

NOMINAL MACHINE LENGTH (BETWEEN HOUSINGS)	HYDRAULIC OIL RESERVOIR CAPACITY GALLONS (LITERS)
6 ft.	125 gal.
	(473)
8 ft.	170 gal.
	(643)
10 ft.	215 gal.
	(814)
12 ft.	260 gal.
	(984)

OIL LEVEL / TEMPERATURE SWITCH

If the hydraulic oil drops to the minimum allowable level, an error message appears on the display and causes the main drive motor to shut off. The cause for low level should be found and corrected. Fill the oil reservoir to the proper level.

If the oil operating temperature reaches the maximum level, an error message appears on the display and causes the main drive motor to shut off. Determine the cause of the excessive heat before restarting the machine.

OIL FILTER

The high pressure oil filter is located on the top of the hydraulic oil reservoir. When the motor is running, hydraulic oil flows from the gear pump through the high pressure filter. When the filter has reached its dirt holding capacity an error message will appear on the display. The message will remain until the dirty element is replaced. The filter has a 10 micron (absolute) disposable element (CI #431139). To replace the filter, press the Main Drive STOP button and turn the Main Disconnect Switch “OFF”, and install a safety lockout. Remove the cap on the filter element, install a new element and replace the cap.

HYDRAULIC CLAMPS (OPTION)

Optional hydraulic upper and lower clamping units are powered by a small auxiliary hydraulic power unit (HPU) mounted on the back of the hydraulic reservoir. The oil capacity is approximately one gallon. The fluid should be replaced after one year of service with the same type of fluid used in the hydraulic reservoir.

BREATHER

The disposable, canister-type air breather/filter should be replaced about every 2000 hours of operation. See Figure 9-9.

MOTOR AND HYDRAULIC PUMP

The main drive motor and hydraulic pump are located on top of the hydraulic oil reservoir (Figure 9-5). There is a suction line going from the reservoir to the pump, and a pressure line going from the pump to the manifold.

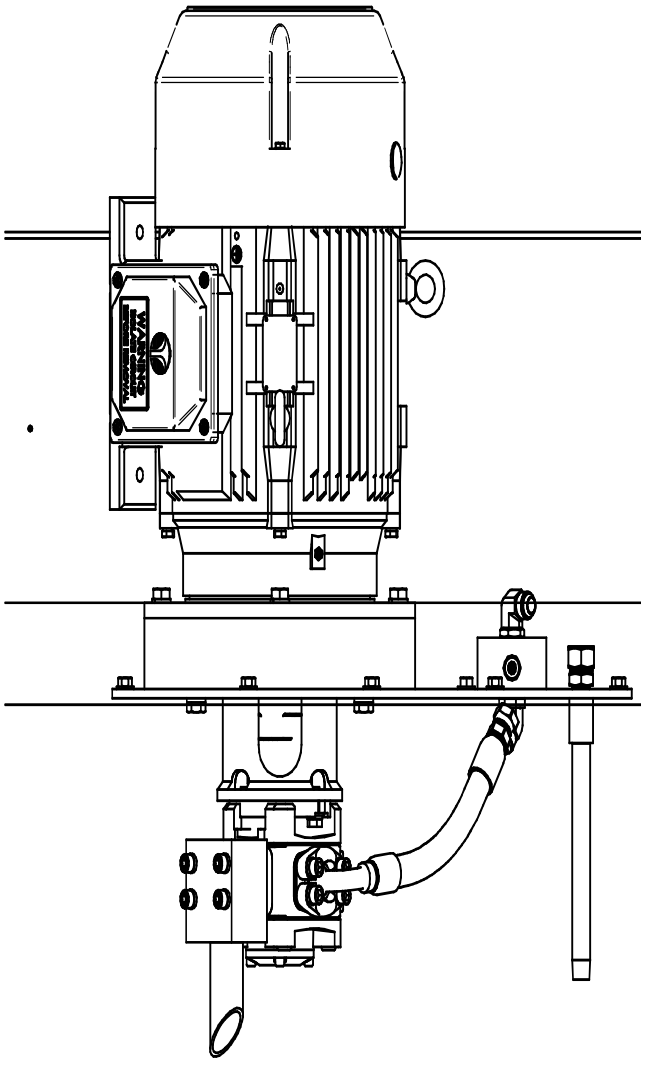


FIGURE 9-5 Motor and Hydraulic Pump

HYDRAULIC CYLINDERS

Each hydraulic cylinder on the press brake has a piston attached to the ram. The ram moves in relation to hydraulic pressure applied to the upper cylinder head or lower cylinder head. The XF cylinders have a simple design with the return line integral to the cylinder body. See Figure 9-6. For information regarding piston rod seal replacement, contact CINCINNATI Technical Service at (513) 367-7100.

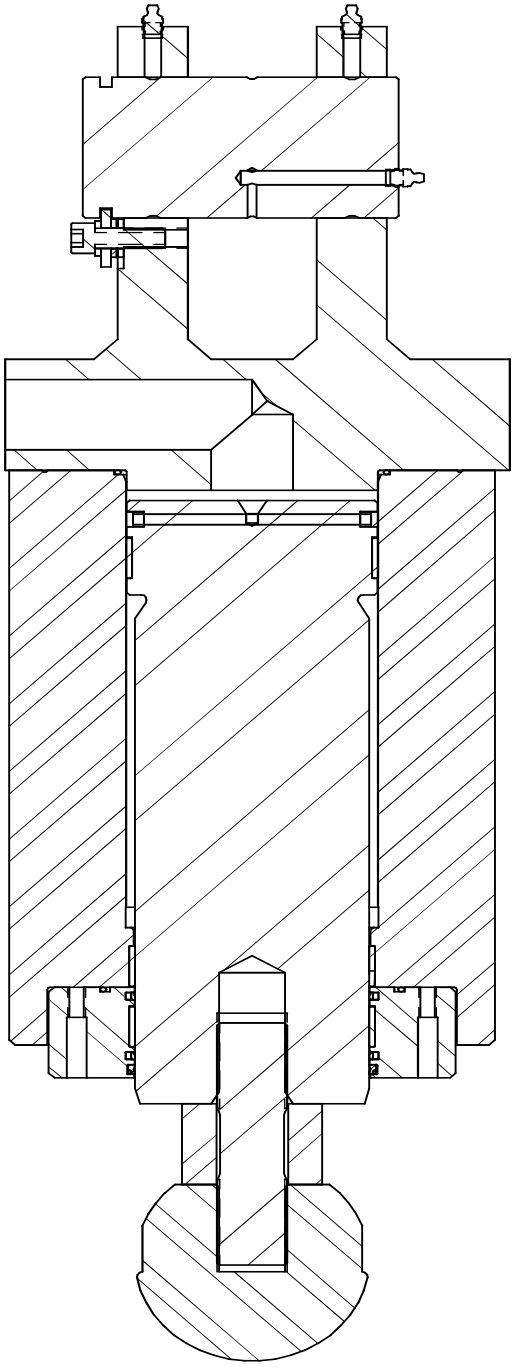


FIGURE 9-6 Hydraulic Cylinder (Internal View)

CHECKING & SETTING HYDRAULIC PRESSURES

The hydraulic system is equipped with male quick-disconnect fittings at the most frequently checked pressure test ports. Identification of the hydraulic system components is shown in Figures 9-7, 9-8 and 9-9.

COUNTERBALANCE PRESSURE

⚠CAUTION

All dies must be removed from the press brake.

Two test ports are provided in the circuit for checking counterbalance pressure. Dies should not be installed in the machine during this check.

1. Install 0-1500 PSI range pressure gage with a female quick-disconnect into either left or right test port. The pressure must be check in both ports.

2. Set the machine controls to:

Palm button OPERATOR STATION 1	ON
Palm button OPERATOR STATION 2	OFF
FOOTSWITCH STATION 1	OFF
FOOTSWITCH STATION 2	OFF
MODE SELECT Selector	STROKE
OPERATOR CONTROL Selector	ON

3. Start machine by turning main disconnect “ON” and pressing Main Drive START button.

4. Select QUICK BEND by selecting the “Quick Bend” button.

5. Enter a program in QUICK BEND as follows:

TOP STOP	max. value
SPEED CHANGE	max. value
REVERSAL POS.	min. value
FORMING MODE	POSITION
REVERSAL TONS	5.0
FORMING SPEED	15
TILT	0.0000
DWELL	0.0
UP STOP	OFF
DOWN STOP	OFF

6. To cycle the machine, press the “Cycle Start” button. “CYCLE ACTIVE” will be displayed on the display.

⚠CAUTION

Do not leave the pressure gage permanently attached to the test port.

⚠CAUTION

Do not run the ram up with the pressure gage attached

SERIES	COUNTERBALANCE PRESSURE
90XF6	700 PSI (4827 kPa)
90XF8	850 PSI (5861 kPa)
135XF8	875 PSI (6033 kPa)
135XF10	1000 PSI (6895 kPa)
175XF8	775 PSI (5344 kPa)
175XF10	850 PSI (5860 kPa)
230XF10	925 PSI (6378 kPa)
230XF12	1075 PSI (7412 kPa)
350XF10	850 PSI (5861 kPa)
350XF12	1000 PSI (6895 kPa)

7. The counterbalance pressure is checked while running the ram down. The proper pressure can be found in the table above. Note: If very heavy upper dies are installed, contact CINCINNATI Technical Service at (513) 367-7100 for information on how to set the counterbalance pressure. To adjust the pressure, loosen the locknut and turn the adjusting the screw on the counterbalance valve. Figure 9-8. Turn the screw clockwise to increase the pressure and counterclockwise to decrease the pressure. Tighten the locknut and remove the pressure gage.

8. Cycle the ram a number of strokes and recheck both counterbalance pressures.

9. Press the Main Drive STOP button and remove the pressure gage.

MAIN RELIEF PRESSURE

This pressure is controlled by a preset valve and cannot be adjusted. If this pressure must be checked contact CINCINNATI Technical Service at (513) 367-7100.

HYDRAULIC VALVES AND COMPONENTS

The hydraulic valves and main compnents are mounted on top of the hydraulic oil reservoir and on a manifold on each cylinder. See Figures 9-7, 9-8 and 9-9. These can be easily removed for service or replacement.

IMPORTANT: When servicing these components, the ram should be blocked, the Main Disconnect Switch turned "OFF" and locked.

PREFILL VALVE
Permits free hydraulic fluid flow in one direction and blocks return flow.

BLEED VALVE
Bleed valves are used to relieve pressure from the bottom of the hydraulic cylinders. This is necessary when releveling the ram mechanically.

PRESSURE TRANSDUCER
Pressure transducers are used to measure tonnage. They convert an input hydraulic pressure to an electrical output.

SERVO VALVE
Servo valves are used to control ram motion.

COUNTERBALANCE VALVE
Control the pressure at the bottom of the cylinder. Proper adjustment is required for smooth ram motion and to prevent the ram from drifting.

PROPORTIONAL PRESSURE PILOT VALVE
Adjusts the system pressure through the pilot.

PREFILL PILOT VALVE
These are 4-way valves that apply pilot pressure to the prefill valve.

RAPID VALVE
Allows rapid ram motion by bypassing the counterbalance valves.

PREFILL PIPE
Tranfers the hydraulic fluid from the hydraulic reservoir back to the top of the cylinder.

BREATHER
Filters air in two directions and prevents vacuum within the reservoir.

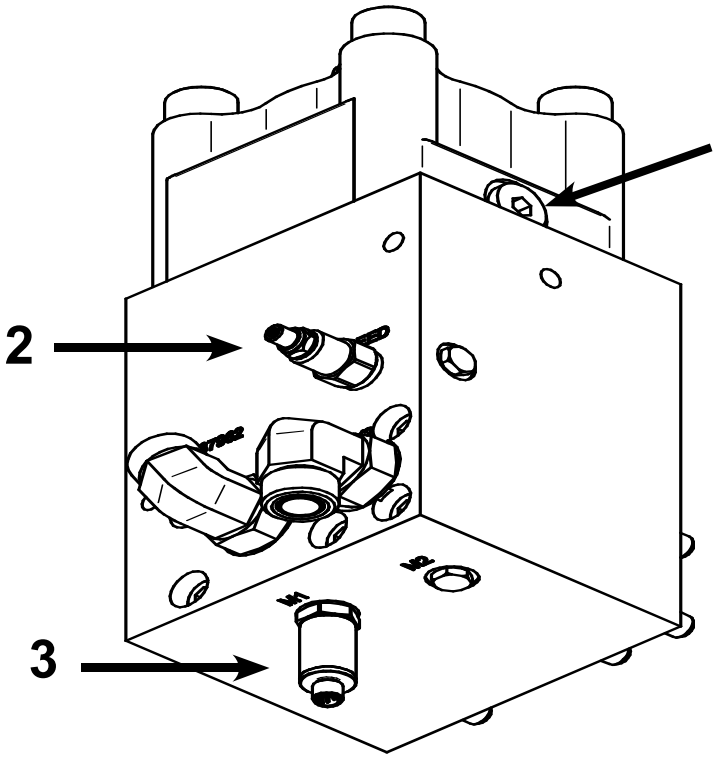


FIGURE 9-7 Cylinder Manifold (located on each hydraulic cylinder)

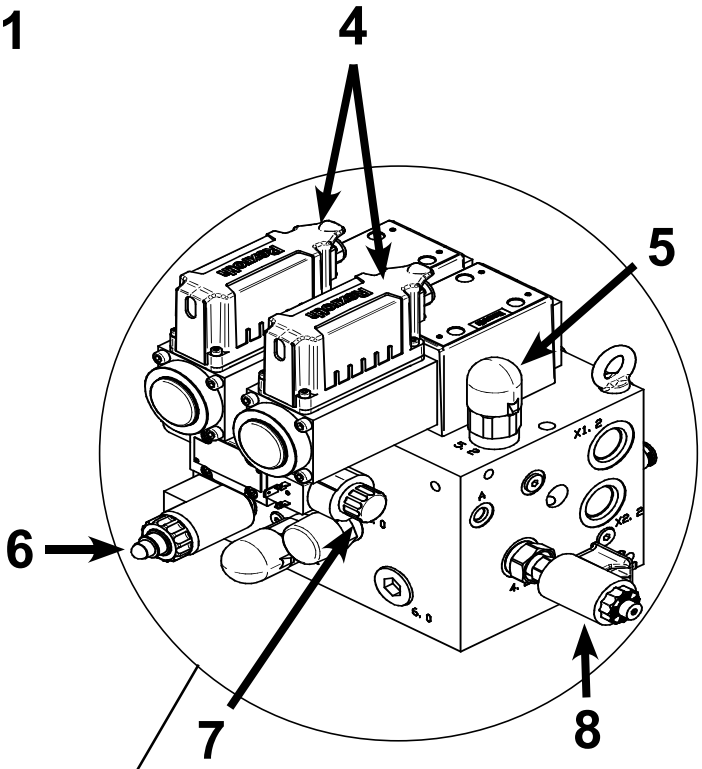


FIGURE 9-8 Hydraulic Control Manifold (located on top of the hydraulic oil reservoir)

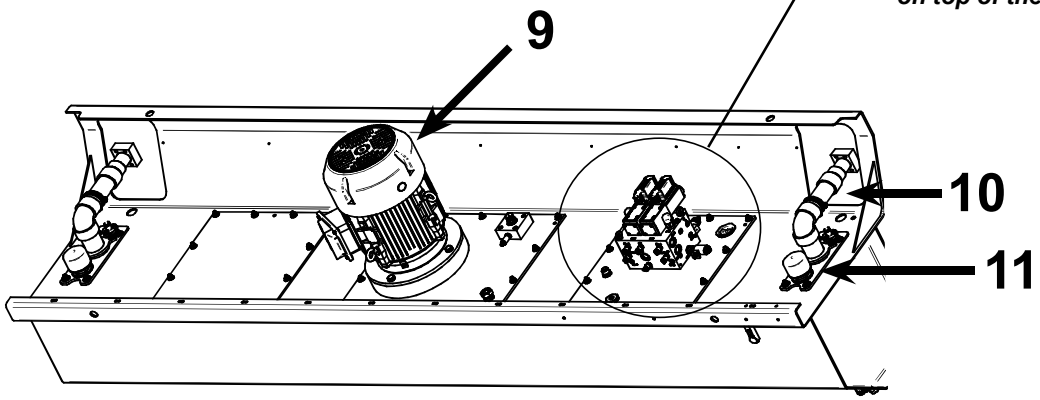


FIGURE 9-9 Hydraulic Oil Reservoir Components

1. PREFILL VALVE
2. BLEED VALVE
3. PRESSURE TRANSDUCER
4. SERVO VALVES
5. COUNTERBALANCE VALVE
6. PROPORTIONAL PRESSURE PILOT VALVE
7. PREFILL PILOT VALVE
8. RAPID VALVE
9. MOTOR AND HYDRAULIC PUMP ASSEMBLY
10. PREFIlL PIPE
11. BREATHER

RELEVELING THE RAM

If the ram goes out-of-level enough to actuate the tilt limit switches, the main drive motor will turn OFF and an error message will appear on the display.

IMPORTANT: ***The tilt limit switches must not be bypassed or readjusted to restore electrical circuits. If the machine is operated with excessive tilt, the slides and guides could be damaged.***

There are two methods to relevel the ram. First, attempt to relevel the ram by pressing the RAM UP button. If this is unsuccessful the ram must be releveled mechanically.

RELEVELING THE RAM WITH THE RAM UP BUTTON

Clear the faults displayed on the HMI control. Turn the main drive motor "ON". Attempt to level the ram by pressing the RAM UP button.

IMPORTANT: ***Do not try to raise the low end of the ram with a jack or hoist. Damage could result to the bed, ram or hydraulic system.***

RELEVELING THE RAM MECHANICALLY

1. Log off the HMI Control. Turn the Main Disconnect Switch "OFF" and padlock the Main Disconnect Switch on the main electrical enclosure.

2. Place a jack between the bed and ram at each housing. Do not place the jack directly on the ram die clamps. Protect the bed and ram nose with wood or soft metal. Apply enough pressure to support the weight of ram, ram slides and pistons.

3. Lower the high side of the ram by gradually lowering the respective jack and opening the bleed valve on the cylinder manifold. See Figure 9-7 for valve location. When the ram is level, close the bleed valve. The ram tilt limit switches will no longer deactivate the electrical circuits. Remove the padlock and turn the Main Switch "ON". Log on to the HMI Control. Press the Main Drive START button on the HMI control. DO NOT remove the jacks. The cause for the ram out-of-level condition may allow the ram to continue to drop.

Note: ***Make sure the bleed valve is completely closed before the jam locknut is tightened.***

4. Find the cause for the ram out-of-level condition. Possible causes are incorrect counterbalance pressure, damaged or broken linear encoder(s). Make the necessary repairs or adjustments. When troubleshooting, it may be necessary to relevel the ram several times.

MACHINE LEVEL

The machine level should be checked every three months and adjusted if necessary. See SECTION 2 for details.

ELECTRICAL

The components inside the main electrical cabinet do not require regular maintenance. Contact CINCINNATI Technical Service at (513) 367-7100 for information.

SWIVEL END-GUIDE BEARING

To adjust for wear in the swivel end-guide bearings, loosen the locking screws. Adjust the ram shoe clamp by tightening the adjusting screws evenly until they are snug. Back off to obtain a .003" (.076mm) clearance between the bearing and the ram guide. Then tighten the locknuts and the locking screws. See Figure 9-10.

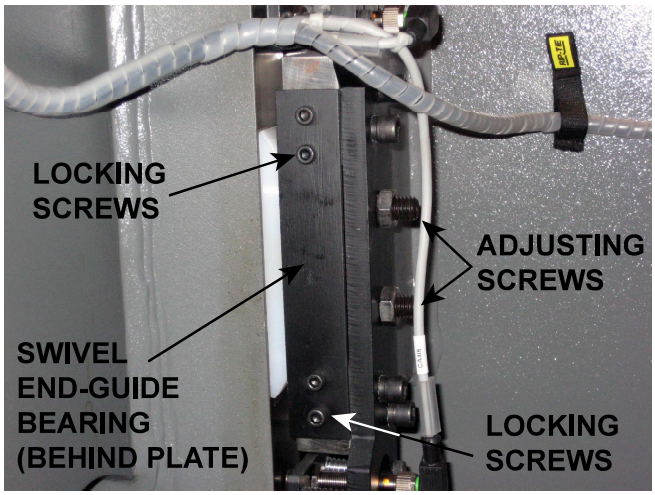


FIGURE 9-10 Swivel End-Guide Bearing

5-AXIS BACKGAGE ALIGNMENT

X-Axis (In-Out)

When the backgage is mounted to the press brake:

The X-Axis reference positions are the positions where the gage finger dowel pin is touching the back of a 0.5" (12.7 mm) thick calibration plate clamped in the upper die clamp. By turning the Operator Control Keyswitch "OFF" or the Main Drive Motor "OFF", the gage arms can be physically pushed against the calibration plate. When aligning the X-Axis, the associated R-Axis should be at mid-range, and the Z-Axis should be at the centerline of the ram. The reference position used is 0.250" (6.35 mm) which is half the thickness of the 0.5"calibration plate. See Figure 9-11.

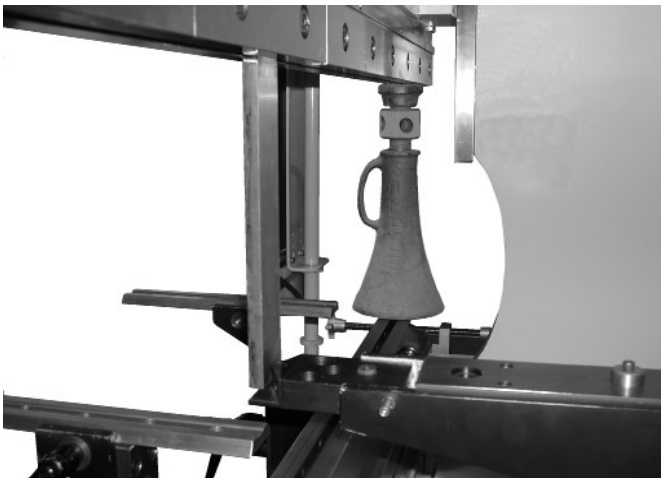


FIGURE 9-11 X-Axis Reference Position

After pushing the gage finger dowel pin against the back of the calibration plate, open the maintenance/diagnostics/align gages window, select the correct X-Axis and enter the .250" reference position. Then press "ALIGN". After alignment is complete, open the maintenance/diagnostics/calibrate gage. The backgage encoder alignment will not take effect until the gage calibration is complete. Repeat this process with both X-axes. Trying to move the gage with the optional hand-held pendant, or other means, before the gage calibration is complete can cause amplifier faults.

R-Axis (Up-Down)

The R-Axis reference position is measured from the top of the bed to the bottom surface of the backgage finger. Make sure the backgage finger is level before aligning. The Z-Axis should be at the center of the bed, and the X-Axis should be at zero. Place a 2.000" (50.8 mm) tall calibration block on the bed, and move the R-Axis until the bottom surface of the backgage finger touches the top of the calibration block. See Figure 9-12.

The R-Axis reference position is 2.000" (50.80 mm) or the height of the calibration block if a different size is used. If a filler block is installed on the bed, put the calibration block on top of the filler block and add the filler block height to the calibration block height for the reference position. Open the maintenance/diagnostics/align gages window, Select the R-Axis and enter the reference position. Then press "ALIGN". After alignment is complete, open the maintenance/diagnostics/calibrate gage. The backgage encoder alignment will not take effect until the gage calibration is complete.

FIGURE 9-12 R-Axis Reference Position

Z-Axis (Left-Right)

The Z-Axis reference positions are measured from the left/right centerline of the machine. Positive values to the right. Negative values to the left. The center of the gage fingers should be within .010" (.25mm) of the centerline when the control displays 0.000". Make a mark on the centerline of the bed. See Figure 9-13. Also, mark the centerline of the gage fingers. After moving the gage finger to the bed centerline, open the maintenance/diagnostics/align gages window, Select the correct Z-Axis and enter the .000" reference position. Then press "ALIGN". After alignment is complete, open the maintenance/diagnostics/calibrate gage. The backgage encoder alignment will not take effect until the gage calibration is complete. Move one of the gage fingers to zero on the control. Confirm that the centerline mark on the bed and gage finger line up. Repeat this process with both Z-Axes.

FIGURE 9-13 Z-Axis Reference Position

TROUBLESHOOTING

Effective troubleshooting skills are usually acquired with experience and a thorough knowledge of the machine and its operation. The assembly drawings, including hydraulic and electrical schematics (included with this manual), should be used as troubleshooting aids. Most problems can be efficiently diagnosed by contacting CINCINNATI Technical Service at (513) 367-7100. Before contacting CINCINNATI Technical Service **please have the following information available.**

- Company Name
- Machine Model
- Machine Serial Number
- All Error Messages (exactly as displayed)
- Description of the problem
- Have this manual and prints available for reference

ERROR MESSAGES

Note: *Refer to either the online help information that came with the machine or the* ***SUPPLEMENT MANUAL FOR THE CINCINNATI HMI CONTROL*** *provided with this manual.*

MAINTENANCE CHECKLIST- XFORM (XF) PRESS BRAKE

	LUBRICATION SCHEDULE	DAILY	WEEKLY	MONTHLY	3 MONTHS	6 MONTHS	YEARLY	2 YEARS
1	Check hydraulic reservoir oil level	X						
2	Clean and flush ram guides with oil			X				
3	Check for water in hydraulic reservoir			X				
4	Lubricate backgage guide rails, bearings and drive screws			X				
5	Drain, clean and refill hydraulic oil reservoir (standard hydraulic fluid)						X	
6	Drain, clean and refill hydraulic oil reservoir (optional CI FireSafe hydraulic fluid)							X
7	Drain, clean and refill hydraulic clamp oil reservoir (if equipped)						X	
8	Lubricate gage bar leveling foot				X			
	CHECK OR ADJUSTMENT							
1	Check entire machine for loose fasteners – tighten if necessary	X						
2	Wipe entire machine clean			X				
3	Check machine level				X			
4	Check ram guide clearance – re-level if necessary				X			
5	Adjust swivel end-guide bearings				X			
6	Replace oil pressure line filter element	WHEN INDICATED						
7	Replace reservoir air filter – breather						X	

ABOVE INTERVALS ARE BASED ON ONE SHIFT AND NORMAL PRESS BRAKE OPERATION.
DETAILED INSTRUCTIONS FOR SERVICING THE MACHINE CAN BE FOUND IN THIS MANUAL.

ORDERING REPAIR PARTS

Parts can be ordered from CINCINNATI Parts Department at (513) 367-7100. **When ordering parts please have the following information available.**

1. Serial number of the press brake. This is located on the machine's capacity plate and also stamped on the upper right-hand corner of the bed.
2. The part number and part name, obtained from the assembly drawings provided with the machine.
3. As complete a description of the part as possible.
4. Delivery required.

It is sometimes necessary to furnish subassemblies 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. Contact the CINCINNATI Parts Department at (513) 367-7100 for instructions and to receive a returned goods authorization number.
2. The returned goods authorization number must be shown on the **outside** of the package being returned. Unauthorized shipments will be returned to the sender freight collect.

SERVICE

CINCINNATI Service includes:

1. Established field-based service for prompt service assistance. Factory trained service representatives are available to assist with any service problems. This includes service ranging from minor repairs and adjustments to major reconditioning jobs.
2. Planned Maintenance Service (PMS). This is a program designed to give comprehensive inspections and recommendations concerning the condition of the equipment. PMS is specifically tailored to the machine's specific needs for timely inspections, qualified recommendations, and expert field assistance with repairs to the equipment.

TECHNICAL TRAINING

CINCINNATI offers a variety of Operator and Maintenance training programs to assist our customers in obtaining maximum value from their investment. With today's sophisticated controls, operator knowledge and proficiency have a significant effect on overall productivity. These training programs also review many of the basics of metal forming to enhance the abilities of newer employees. Contact the CINCINNATI Technical Training department at (513) 367-7100 for further information.