



OPERATOR'S MANUAL

Metal Working



HYDRAULIC PRESS BRAKE MODEL: BP-3305CNC

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Book 1 of 2

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THANK YOU & WARRANTY

Thank you for your purchase of a machine from Baileigh Industrial Holdings LLC. We hope that you find it productive and useful to you for a long time to come.

Inspection & Acceptance. Buyer shall inspect all Goods within ten (10) days after receipt thereof. Buyer's payment shall constitute final acceptance of the Goods and shall act as a waiver of the Buyer's rights to inspect or reject the goods unless otherwise agreed. If Buyer rejects any merchandise, Buyer must first obtain a Returned Goods Authorization ("RGA") number before returning any goods to Seller. Goods returned without a RGA will be refused. Seller will not be responsible for any freight costs, damages to goods, or any other costs or liabilities pertaining to goods returned without a RGA. Seller shall have the right to substitute a conforming tender. Buyer will be responsible for all freight costs to and from Buyer and repackaging costs, if any, if Buyer refuses to accept shipment. If Goods are returned in unsalable condition, Buyer shall be responsible for full value of the Goods. Buyer may not return any special-order Goods. Any Goods returned hereunder shall be subject to a restocking fee equal to 30% of the invoice price.

Specifications. Seller may, at its option, make changes in the designs, specifications or components of the Goods to improve the safety of such Goods, or if in Seller's judgment, such changes will be beneficial to their operation or use. Buyer may not make any changes in the specifications for the Goods unless Seller approves of such changes in writing, in which event Seller may impose additional charges to implement such changes.

Limited Warranty. Seller warrants to the original end-user that the Goods manufactured or provided by Seller under this Agreement shall be free of defects in material or workmanship for a period of twelve (12) months from the date of purchase, provided that the Goods are installed, used, and maintained in accordance with any instruction manual or technical guidelines provided by the Seller or supplied with the Goods, if applicable. The original end-user must give written notice to Seller of any suspected defect in the Goods prior to the expiration of the warranty period. The original end-user must also obtain a RGA from Seller prior to returning any Goods to Seller for warranty service under this paragraph. Seller will not accept any responsibility for Goods returned without a RGA. The original end-user shall be responsible for all costs and expenses associated with returning the Goods to Seller for warranty service. In the event of a defect, Seller, at its sole option, shall repair or replace the defective Goods or refund to the original end-user the purchase price for such defective Goods. Goods are not eligible for replacement or return after a period of 10 days from date of receipt. The foregoing warranty is Seller's sole obligation, and the original end-user's exclusive remedy, with regard to any defective Goods. This limited warranty does not apply to: (a) die sets, tooling, and saw blades; (b) periodic or routine maintenance and setup, (c) repair or replacement of the Goods due to normal wear and tear, (d) defects or damage to the Goods resulting from misuse, abuse, neglect, or accidents, (e) defects or damage to the Goods resulting from improper or unauthorized alterations, modifications, or changes; and (f) any Goods that has not been installed and/or maintained in accordance with the instruction manual or technical guidelines provided by Seller.

EXCLUSION OF OTHER WARRANTIES. THE FOREGOING LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. ANY AND ALL OTHER EXPRESS, STATUTORY OR IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE ARE EXPRESSLY DISCLAIMED. NO WARRANTY IS MADE WHICH EXTENDS BEYOND THAT WHICH IS EXPRESSLY CONTAINED HEREIN.

Limitation of Liability. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER OR ANY OTHER PARTY FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES (INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR DOWN TIME) ARISING FROM OR IN MANNER CONNECTED WITH THE GOODS, ANY BREACH BY SELLER OR ITS AGENTS OF THIS AGREEMENT, OR ANY OTHER CAUSE WHATSOEVER, WHETHER BASED ON CONTRACT, TORT OR ANY OTHER THEORY OF LIABILITY. BUYER'S REMEDY WITH RESPECT TO ANY CLAIM ARISING UNDER THIS AGREEMENT IS STRICTLY LIMITED TO NO MORE THAN THE AMOUNT PAID BY THE BUYER FOR THE GOODS.



Force Majeure. Seller shall not be responsible for any delay in the delivery of, or failure to deliver, Goods due to causes beyond Seller's reasonable control including, without limitation, acts of God, acts of war or terrorism, enemy actions, hostilities, strikes, labor difficulties, embargoes, non-delivery or late delivery of materials, parts and equipment or transportation delays not caused by the fault of Seller, delays caused by civil authorities, governmental regulations or orders, fire, lightening, natural disasters or any other cause beyond Seller's reasonable control. In the event of any such delay, performance will be postponed by such length of time as may be reasonably necessary to compensate for the delay.

Installation. If Buyer purchases any Goods that require installation, Buyer shall, at its expense, make all arrangements and connections necessary to install and operate the Goods. Buyer shall install the Goods in accordance with any Seller instructions and shall indemnify Seller against any and all damages, demands, suits, causes of action, claims and expenses (including actual attorneys' fees and costs) arising directly or indirectly out of Buyer's failure to properly install the Goods.

Work By Others; Safety Devices. Unless agreed to in writing by Seller, Seller has no responsibility for labor or work performed by Buyer or others, of any nature, relating to design, manufacture, fabrication, use, installation or provision of Goods. Buyer is solely responsible for furnishing, and requiring its employees and customers to use all safety devices, guards and safe operating procedures required by law and/or as set forth in manuals and instruction sheets furnished by Seller. Buyer is responsible for consulting all operator manuals, ANSI or comparable safety standards, OSHA regulations and other sources of safety standards and regulations applicable to the use and operation of the Goods.

Remedies. Each of the rights and remedies of Seller under this Agreement is cumulative and in addition to any other or further remedies provided under this Agreement or at law or equity.

Attorney's Fees. In the event legal action is necessary to recover monies due from Buyer or to enforce any provision of this Agreement, Buyer shall be liable to Seller for all costs and expenses associated therewith, including Seller's actual attorney fees and costs.

Governing Law/Venue. This Agreement shall be construed and governed under the laws of the State of Wisconsin, without application of conflict of law principles. Each party agrees that all actions or proceedings arising out of or in connection with this Agreement shall be commenced, tried, and litigated only in the state courts sitting in Manitowoc County, Wisconsin or the U.S. Federal Court for the Eastern District of Wisconsin. Each party waives any right it may have to assert the doctrine of "forum non conveniens" or to object to venue to the extent that any proceeding is brought in accordance with this section. Each party consents to and waives any objection to the exercise of personal jurisdiction over it by courts described in this section. Each party waives to the fullest extent permitted by applicable law the right to a trial by jury.

Summary of Return Policy.

- 10 Day acceptance period from date of delivery. Damage claims and order discrepancies will not be accepted after this time.
- You must obtain a Baileigh issued RGA number PRIOR to returning any materials.
- Returned materials must be received at Baileigh in new condition and in original packaging.
- Altered items are not eligible for return.
- Buyer is responsible for all shipping charges.
- A 30% re-stocking fee applies to all returns.

Baileigh Industrial Holdings LLC makes every effort to ensure that our posted specifications, images, pricing and product availability are as correct and timely as possible. We apologize for any discrepancies that may occur. Baileigh Industrial Holdings LLC reserves the right to make any and all changes deemed necessary in the course of business including but not limited to pricing, product specifications, quantities, and product availability.

For Customer Service & Technical Support:

Please contact one of our knowledgeable Sales and Service team members at:
(920) 684-4990 or e-mail us at sales@baileigh.com



INTRODUCTION

The quality and reliability of the components assembled on a Baileigh Industrial Holdings LLC machine guarantee near perfect functioning, free from problems, even under the most demanding working conditions. However, if a situation arises, refer to the manual first. If a solution cannot be found, contact the distributor where you purchased our product. Make sure you have the serial number and production year of the machine (stamped on the nameplate). For replacement parts refer to the assembly numbers on the parts list drawings.

Our technical staff will do their best to help you get your machine back in working order.

In this manual you will find: (when applicable)

- Safety procedures
- Correct installation guidelines
- Description of the functional parts of the machine
- Capacity charts
- Setup and start-up instructions
- Machine operation
- Scheduled maintenance
- Parts lists

GENERAL NOTES

After receiving your equipment remove the protective container. Do a complete visual inspection, and if damage is noted, **photograph it for insurance claims** and contact your carrier at once, requesting inspection. Also contact Baileigh Industrial Holdings LLC and inform them of the unexpected occurrence. Temporarily suspend installation.

Take necessary precautions while loading / unloading or moving the machine to avoid any injuries.

Your machine is designed and manufactured to work smoothly and efficiently. Following proper maintenance instructions will help ensure this. Try and use original spare parts, whenever possible, and most importantly; **DO NOT** overload the machine or make any modifications.



Note: This symbol refers to useful information throughout the manual.



IMPORTANT

PLEASE READ THIS OPERATORS MANUAL CAREFULLY

It contains important safety information, instructions, and necessary operating procedures. The continual observance of these procedures will help increase your production and extend the life of the equipment.



SAFETY INSTRUCTIONS

LEARN TO RECOGNIZE SAFETY INFORMATION

This is the safety alert symbol. When you see this symbol on your machine or in this manual, **BE ALERT TO THE POTENTIAL FOR PERSONAL INJURY!**



Follow recommended precautions and safe operating practices.

UNDERSTAND SIGNAL WORDS

A signal word – **DANGER**, **WARNING**, or **CAUTION** – is used with the safety alert symbol. **NOTICE**, which is not related to personal injury, is used without a symbol.

DANGER: Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING: Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION: Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE: Indicates a situation which, if not avoided, could result in property damage.



DANGER



WARNING



CAUTION



NOTICE

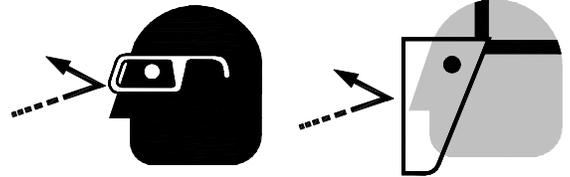


SAVE THESE INSTRUCTIONS.
Refer to them often and use them to instruct others.



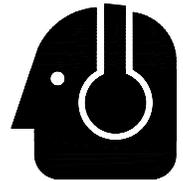
PROTECT EYES

Wear safety glasses or suitable eye protection when working on or around machinery.



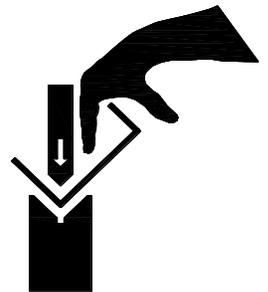
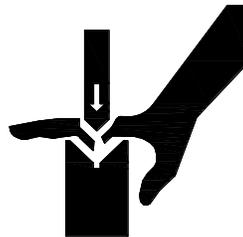
PROTECT AGAINST NOISE

Prolonged exposure to loud noise can cause impairment or loss of hearing. Wear suitable hearing protective devices such as ear muffs or earplugs to protect against objectionable or uncomfortable loud noises.



BEWARE OF CRUSH HAZARD

NEVER place your hands, fingers, or any part of your body in the die area of this machine.



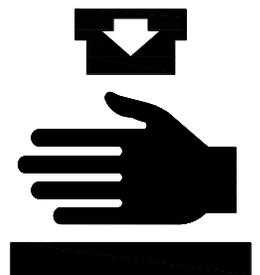
KEEP CLEAR OF MOVING OBJECTS

Always be aware of the position of the material as it is being formed. The material can be heavy and can swing back suddenly causing serious body or head injuries.



BEWARE OF CRUSH HAZARD

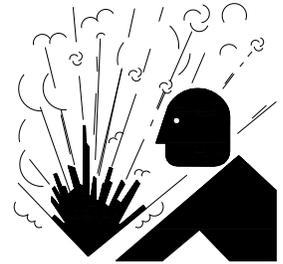
NEVER place your hands, fingers, or any part of your body in the die area of this machine.





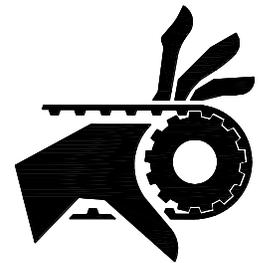
HYDRAULIC HOSE FAILURE

Exercise **CAUTION** around hydraulic hoses in case of a hose or fitting failure.



BEWARE OF PINCH POINTS

Keep hands and fingers away from the servo motors drive belt and pulleys when performing maintenance. Keep motor guards in place at all times while the machine is running.



HIGH VOLTAGE

USE CAUTION IN HIGH VOLTAGE AREAS. DO NOT assume the power to be off.
FOLLOW PROPER LOCKOUT PROCEDURES.



EMERGENCY STOP BUTTON

In the event of incorrect operation or dangerous conditions, the machine can be stopped immediately by pressing the **E-STOP** button. Twist the emergency stop button clockwise (cw) to reset. Note: Resetting the E-Stop will not start the machine.





SAFETY PRECAUTIONS



Metal working can be dangerous if safe and proper operating procedures are not followed. As with all machinery, there are certain hazards involved with the operation of the product. Using the machine with respect and caution will considerably lessen the possibility of personal injury. However, if normal safety precautions are overlooked or ignored, personal injury to the operator may result.

Safety equipment such as guards, hold-downs, safety glasses, dust masks and hearing protection can reduce your potential for injury. But even the best guard will not make up for poor judgment, carelessness or inattention. **Always use common sense** and exercise **caution** in the workshop. If a procedure feels dangerous, don't try it.

REMEMBER: Your personal safety is your responsibility.



WARNING: FAILURE TO FOLLOW THESE RULES MAY RESULT IN SERIOUS PERSONAL INJURY

Dear Valued Customer:

- All Baileigh machines should be used only for their intended use.
- Baileigh does not recommend or endorse making any modifications or alterations to a Baileigh machine. Modifications or alterations to a machine may pose a substantial risk of injury to the operator or others and may do substantial damage to the machine.
- Any modifications or alterations to a Baileigh machine will invalidate the machine's warranty.

PLEASE ENJOY YOUR BAILEIGH MACHINE!PLEASE ENJOY IT SAFELY!

1. **FOR YOUR OWN SAFETY, READ INSTRUCTION MANUAL BEFORE OPERATING THE MACHINE.** Learn the machine's application and limitations as well as the specific hazards.
2. **Only trained and qualified personnel can operate this machine.**
3. **Make sure guards are in place and in proper working order before operating machinery.**
4. **Remove any adjusting tools.** Before operating the machine, make sure any adjusting tools have been removed.
5. **Keep work area clean.** Cluttered areas invite injuries.
6. **Overloading machine.** By overloading the machine, you may cause injury from flying parts. **DO NOT** exceed the specified machine capacities.
7. **Dressing material edges.** Always chamfer and deburr all sharp edges.



8. **Do not force tool.** Your machine will do a better and safer job if used as intended. **DO NOT** use inappropriate attachments in an attempt to exceed the machine's rated capacity.
9. **Use the right tool for the job.** **DO NOT** attempt to force a small tool or attachment to do the work of a large industrial tool. **DO NOT** use a tool for a purpose for which it was not intended.
10. **Dress appropriately.** **DO NOT** wear loose fitting clothing or jewelry as they can be caught in moving machine parts. Protective clothing and steel toe shoes are recommended when using machinery. Wear a restrictive hair covering to contain long hair.
11. **Use eye and ear protection.** Always wear ISO approved impact safety goggles. Wear a full-face shield if you are producing metal filings.
12. **Do not overreach.** Maintain proper footing and balance at all times. **DO NOT** reach over or across a running machine.
13. **Stay alert.** Watch what you are doing and use common sense. **DO NOT** operate any tool or machine when you are tired.
14. **Check for damaged parts.** Before using any tool or machine, carefully check any part that appears damaged. Check for alignment and binding of moving parts that may affect proper machine operation.
15. **Observe work area conditions.** **DO NOT** use machines or power tools in damp or wet locations. Do not expose to rain. Keep work area well lighted. **DO NOT** use electrically powered tools in the presence of flammable gases or liquids.
16. **Keep children away.** Children must never be allowed in the work area. **DO NOT** let them handle machines, tools, or extension cords.
17. Keep visitors a safe distance from the work area.
18. **Store idle equipment.** When not in use, tools must be stored in a dry location to inhibit rust. Always lock up tools and keep them out of reach of children.
19. **DO NOT operate machine if under the influence of alcohol or drugs.** Read warning labels on prescriptions. If there is any doubt, **DO NOT** operate the machine.
20. **Turn off** power before checking, cleaning, or replacing any parts.
21. **DO NOT** touch live electrical components or parts.
22. Be sure **all** equipment is properly installed and grounded according to national, state, and local codes.
23. Inspect power and control cables periodically. Replace if damaged or bare wires are exposed. **Bare wiring can kill!** **DO NOT** touch live electrical components or parts.
24. **DO NOT** bypass or defeat any safety interlock systems.
25. Learn the function and controls of the controller. Know the location of the **ON - OFF** switch and the "**E**"- **STOP** button.



TECHNICAL SPECIFICATIONS

Table Length x Width	63" x 7" (1600 x 176mm)
Back Gauge Length	21.5" (546mm)
Maximum Pressure	33 tons (29.9metric tons)
Throat Depth	7.87" (200mm)
Distance Between Housings	51.3" (1304mm)
Distance From Table To Ram	11.8" (300mm)
Stroke Distance	3.9" (100mm)
Adjustment of Ram Travel	3.1" (80mm)
Approach Speed	3.5"/sec. (90mm/sec.)
Working Speed	.394"/sec. (10mm/sec.)
Return Speed	3.3"/sec. (85mm/sec.)
Power	220V, 3-phase, 60hz, 30A
Main Motor	7.5hp (5.5kw) 220V, 3ph, 60hz, 20A
Back Gauge Motor (X Axis)	3/4hp (550w) 220V, 3ph, 60hz, 3.2A
Bend Depth Motor (Y Axis)	1/8hp (120w) 220V, 3ph, 60hz, 1A
Hydraulic Reservoir Capacity	28gal. (106L)
Hydraulic Pump	Axial Piston, 4568psi x 0.61ci/r (31.5MPa x 10mL/r)
Maximum Hydraulic Pressure	3190psi (22MPa)
Shipping Weight	4000lbs. (1800kg)
Shipping Dimensions	83" x 47" x 82" (2108 x 1194 x 2083mm)
Footprint Dimensions	97" x 91" x 82" (2464 x 2312 x 2083mm)
Based on a material tensile strength of 60000 PSI – mild steel	

TECHNICAL SUPPORT

Our technical support department can be reached at 920.684.4990 and asking for the support desk for purchased machines. Tech Support handles questions on machine setup, schematics, warranty issues, and individual parts needs: (other than die sets and blades).

For specific application needs or future machine purchases contact the Sales Department at: sales@baileigh.com, Phone: 920.684.4990, or Fax: 920.684.3944.



Note: *The photos and illustrations used in this manual are representative only and may not depict the actual color, labeling or accessories and may be intended to illustrate technique only.*



Note: *The specifications and dimensions presented here are subject to change without prior notice due to improvements of our products.*



UNPACKING AND CHECKING CONTENTS

Your Baileigh machine is shipped complete. Separate all parts from the packing material and check each item carefully. Make certain all items are accounted for before discarding any packing material.

⚠ WARNING: SUFFOCATION HAZARD! Immediately discard any plastic bags and packing materials to eliminate choking and suffocation hazards to children and animals.
If any parts are missing, **DO NOT** place the machine into service until the missing parts are obtained and installed correctly.

Cleaning

⚠ WARNING: DO NOT USE gasoline or other petroleum products to clean the machine. They have low flash points and can explode or cause fire.

⚠ CAUTION: When using cleaning solvents work in a well-ventilated area. Many cleaning solvents are toxic if inhaled.

Your machine may be shipped with a rustproof waxy coating and/or grease on the exposed unpainted metal surfaces. Fully and completely remove this protective coating using a degreaser or solvent cleaner. Moving items will need to be moved along their travel path to allow for cleaning the entire surface. For a more thorough cleaning, some parts will occasionally have to be removed. **DO NOT USE** acetone or brake cleaner as they may damage painted surfaces.

Follow manufacturer's label instructions when using any type of cleaning product. After cleaning, wipe unpainted metal surfaces with a light coating of quality oil or grease for protection.



Important: This waxy coating is **NOT** a lubricant and will cause the machine to stick and lose performance as the coating continues to dry.



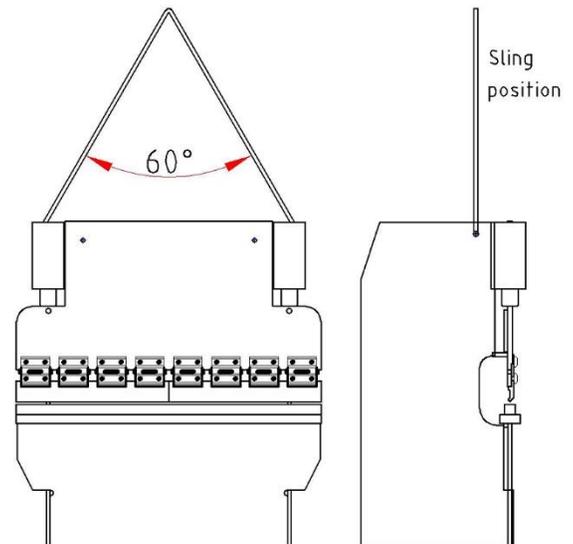


TRANSPORTING AND LIFTING

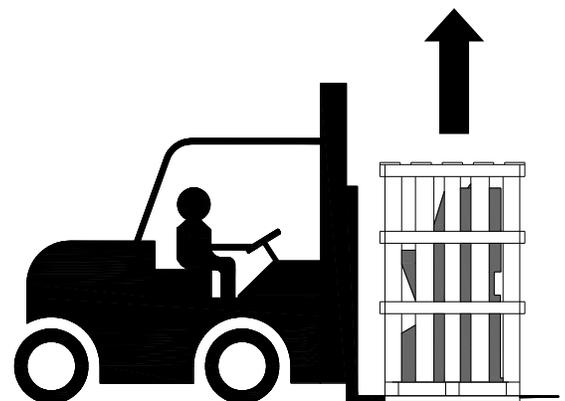
⚠ CAUTION: Lifting and carrying operations should be carried out by skilled workers, such as a truck operator, crane operator, etc. If a crane is used to lift the machine, attach the lifting chain carefully, making sure the machine is well balanced. Choose a location that will keep the machine free from vibration and dust from other machinery. Keep in mind that having a large clearance area around the machine is important for safe and efficient working conditions.

Follow these guidelines when lifting:

- Always lift and carry the machine with the lifting holes provided at the top of the machine.
- Use lift equipment such as straps, chains, capable of lifting 1.5 to 2 times the weight of the machine.
- Take proper precautions for handling and lifting.
- Check if the load is properly balanced by lifting it an inch or two.
- Lift the machine, avoiding sudden accelerations or quick changes of direction.
- Locate the machine where it is to be installed, then lower slowly until it touches the floor.



- The lift truck must be able to lift at least 1.5 – 2 times the machines gross weight.
- Make sure the machine is balanced. While transporting, avoid rough or jerky motion, and maintain a safe clearance zone around the transport area.
- Use a forklift with sufficient lifting capacity and forks that are long enough to reach the complete width of the machine.
- Remove the securing bolts that attach the machine to the pallet.
- Approaching the machine from the side, lift the machine on the frame taking care that there are no cables or pipes in the area of the forks.
- Move the machine to the required position and lower gently to the floor.





- Level the machine so that all the supporting feet are taking the weight of the machine and no rocking is taking place.

INSTALLATION

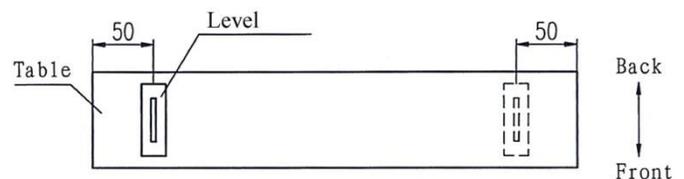
IMPORTANT:

Consider the following when looking for a suitable location to place the machine:

- Overall weight of the machine.
- Weight of material being processed.
- Sizes of material to be processed through the machine.
- Space needed for auxiliary stands, worktables, or other machinery.
- Clearance from walls and other obstacles.
- Maintain an adequate working area around the machine for safety.
- Have the work area well illuminated with proper lighting.
- Keep the floor free of oil and make sure it is not slippery.
- Remove scrap and waste materials regularly, and make sure the work area is free from obstructing objects.
- If long lengths of material are to be fed into the machine, make sure that they will not extend into any aisles.
- **LEVELING:** The machine should be sited on a level, concrete floor. Provisions for securing it should be in position prior to placing the machine. The accuracy of any machine depends on the precise placement of it to the mounting surface.

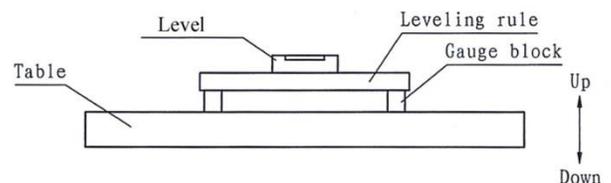
Horizontal Adjusting:

Placing the level at each point (the distance between ends and points is 50mm. Adjust the anchor bolt until the horizontal leveling accuracy is within 0.2/1000mm.



Vertical Adjusting:

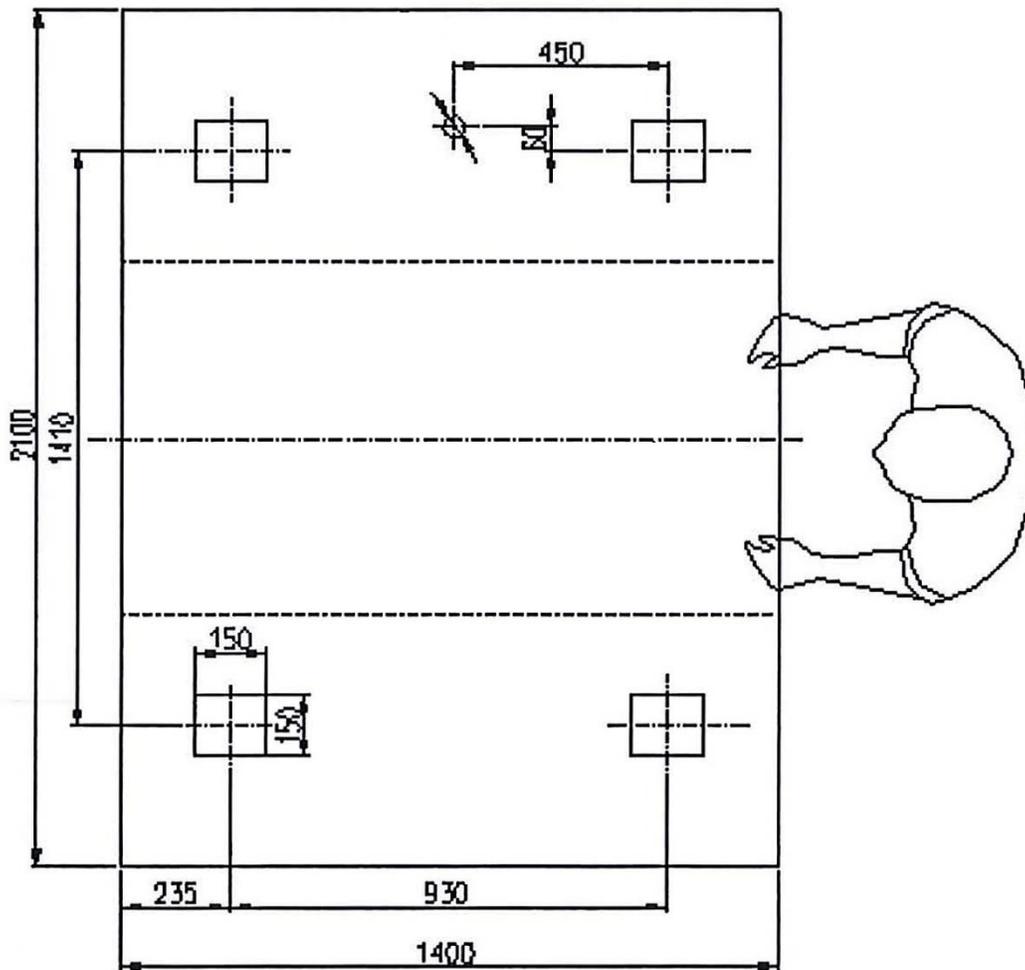
For the vertical direction of table has crowning (a curve which treats the middle part as axis), you must place gauge block on the table. Then put the leveling rule on the gauge block; put the level on the leveling rule. Adjusting the anchor bolt until the vertical leveling accuracy is within 0.2/1000mm.



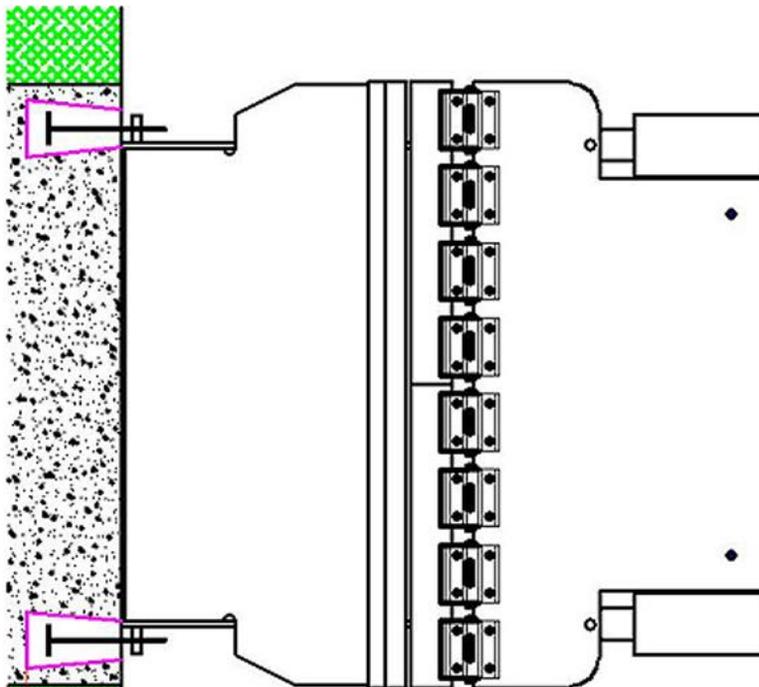
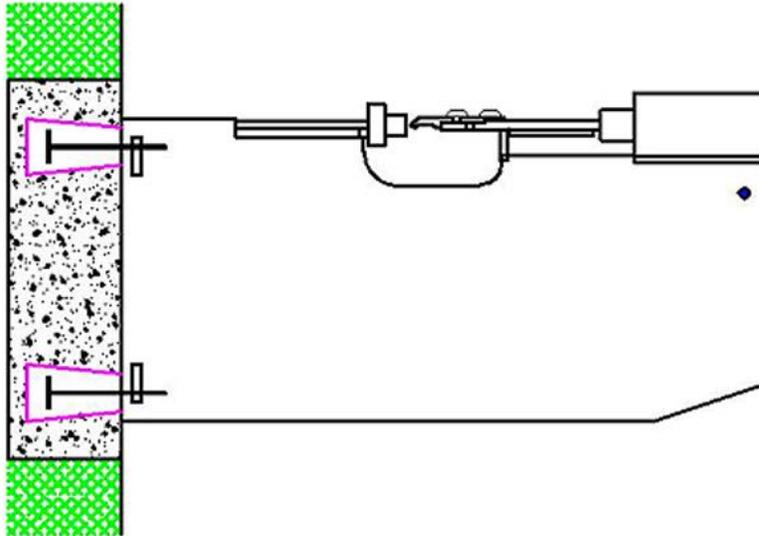


- **FLOOR:** This machine distributes a large amount of weight over a small area. Make certain that the floor is capable of supporting the weight of the machine, work stock, and the operator. The floor should also be a level surface. If the unit wobbles or rocks once in place, be sure to eliminate by using shims.
- **WORKING CLEARANCES:** Take into consideration the size of the material to be processed. Make sure that you allow enough space for you to operate the machine freely.
- **POWER SUPPLY PLACEMENT:** The power supply should be located close enough to the machine so that the power cord is not in an area where it would cause a tripping hazard. Be sure to observe all electrical codes if installing new circuits and/or outlets.

Anchoring the Machine



- Once positioned, anchor the machine to the floor. Use bolts and expansion plugs or sunken tie rods that connect through and are sized for the holes in the base of the stand.
- This machine requires a solid floor such as concrete at a minimum of 5.9" (150mm) thick. 7.8" (200mm) minimum is preferred.



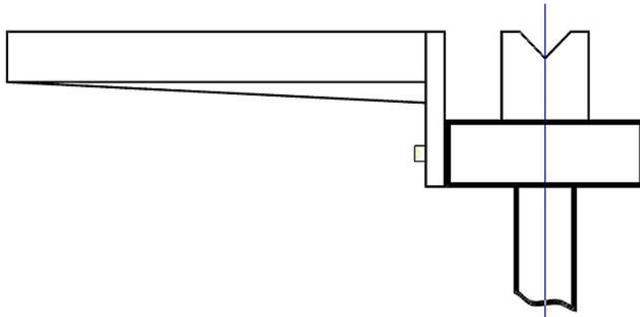
100 Minimum. 150 Preferred.
150 Minimum. 200 Preferred.



Assembly

Front Support

The front support arms install on the front face of the worktable. The support can mount in any position along the front T-slot. The support can be raised or lowered to align with the lower die as needed.



Foot Pedal Connection

Position the foot pedal and route the cable to the electrical enclosure in a manner that will allow easy access during operation but will minimize exposure of the foot pedal and cable to damage from being stepped on. Locate the connector on the underside of the electrical enclosure and align and secure the connector.



Tank Filling

The hydraulic oil is the primary medium for transmitting pressure and also must lubricate the running parts of the pump.

After installation of the machine and before machine startup, bring the oil level up to 90% of capacity. Verify that any cylinder rams are in the retracted position to prevent overfilling of the tank. Recheck the oil level after the first few hours of operation and again after the first full week of operation. Check hydraulic hoses and fittings for leakage.

A shortage of hydraulic oil can cause hydraulic system breakdown and damage to major mechanical parts due to overheating.



ELECTRICAL

⚠ WARNING: Baileigh Industrial Holdings LLC is not responsible for any damage caused by wiring up to an alternative 3-phase power source other than direct 3-phase. If you are using an alternate power source, consult a certified electrician or contact Baileigh Industrial Holdings LLC prior to energizing the machine.

⚠ CAUTION: HAVE ELECTRICAL UTILITIES CONNECTED TO MACHINE BY A CERTIFIED ELECTRICIAN!
Check if the available power supply is the same as listed on the machine nameplate.

⚠ WARNING: Make sure the grounding wire (green) is properly connected to avoid electric shock. DO NOT switch the position of the green grounding wire if any electrical plug wires are switched during hookup.

Power Specifications

Your machine is wired for 220 volts, 60hz alternating current. Before connecting the machine to the power source, make sure the power source is OFF.

Before switching on the power, you must check the voltage and frequency of the power to see if they meet with the requirement, the allowed range for the voltage is $\pm 5\%$, and for the frequency is $\pm 1\%$.

Considerations

- Observe local electrical codes when connecting the machine.
- The circuit should be protected with a time delay fuse or circuit breaker with an amperage rating slightly higher than the full load current of machine.
- A separate electrical circuit should be used for your machines. Before connecting the motor to the power line, make sure the switch is in the "OFF" position and be sure that the electric current is of the same characteristics as indicated on the machine.
- All line connections should make good contact. Running on low voltage will damage the motor.
- In the event of a malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. This machine is equipped with an electric cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into a matching outlet that is properly installed and grounded in accordance with all local codes and ordinances.



⚠ WARNING: In all cases, make certain the receptacle in question is properly grounded. If you are not sure, have a qualified electrician check the receptacle.

- Improper connection of the equipment-grounding conductor can result in risk of electric shock. The conductor with insulation having an outer surface that is green with or without yellow stripes is the equipment-grounding conductor. If repair or replacement of the electric cord or plug is necessary, do not connect the equipment-grounding conductor to a live terminal.
- Check with a qualified electrician or service personnel if the grounding instructions are not completely understood, or if in doubt as to whether the machine is properly grounded.
- Repair or replace damaged or worn cord immediately.

Power cord connection:

1. Unlock and open the electrical enclosure door.
2. Insert a fitting into the open hole at the bottom left of the electrical cabinet to grip the power cord (supplied by customer).
3. Route a power cord (customer supplied) from the power supply to the electrical cabinet at the bottom left of the cabinet.
 - a. Route the power cord so that it will NOT become entangled in the machine in any way.
 - b. Route the cord to the power supply in a way that does NOT create a trip hazard.
4. Connect the three power wires to the terminals **L1, L2, & L3**. Connect the ground wire (typically green) to the **E** terminal.
5. Check that the power cord has not been damaged during installation.

Check for correct rotation of the motor

6. Close the electrical enclosure door.
7. With power connected and the main disconnect turned ON, the power light on the control panel will be lit.
8. Start and stop the pump motor watching the fan end of the motor to verify the direction of rotation matches that directional arrow on the fan cover.
9. If motor rotation is not correct, disconnect power to the machine, and switch the L1 and L3 wires. DO NOT move the ground wire.



GETTING TO KNOW YOUR MACHINE







Item	Description
A	Bending Cylinders. Moves the ram, (Y Axis) down and up. Internal stops are used to set the depth of bend.
B	Upper Ram Plate. Holds the bending punch and moves down to press the punch into the material and then the die to create the form of the punch and die set.
C	Control Pendant Swing Arm. Supports the control pendant and allows for some movement to position the pendant.
D	Electrical Enclosure. Housed the electrical operating components and connections.
E	Control Pendant. Using the controller along with the buttons and switches, operator sets the parameters and operating conditions to be used during the bending process.
F	Light Curtain Emitter. Send out 8 light beams to the receiver to create the safety curtain in front of the bending opening.
G	Lower Die Clamp. Holds the die in position under the punch.
H	Foot Controls. Used to operate the actual bending cycle once the parameters and operating conditions have been set.
I	Front Material Supports. Holds the material before and after the bend. May be adjusted wider apart or closer together as needed. Operator should make efforts to center the bend at or near the center of the press for all bends.
J	Lower Die. The standard die is four sided with 7 bending V's.
K	Light Curtain Receiver. Receives the 8 light beams from the emitter to create the safety curtain in front of the bending opening.
L	Bending Punch. Presses the material into the lower die to create the specific bend shape in the material.
M	Bending Punch Clamps. Secures the upper die to the ram. The quick release style allows for fast tooling changes.
N	Main Motor. Powers the hydraulic pump and in turn the hydraulic system.
O	Hydraulic Pump. Provides the hydraulic fluid flow to the hydraulic system.
P	Hydraulic Manifold and Valve Assembly
Q	Main Pressure Gauge.
R	Depth of Bend Motor (Y Axis). This motor is used to change the depth stops located inside of the ram cylinders. This changes how far down the ram will travel during the bending cycle.
S	Hydraulic Tank Level / Temperature Gauge. Holds the hydraulic fluid. The gauge indicates the fluid level and temperature. Just above the gauge on the top of the tank is the fill cap.
T	Hydraulic Tank Drain Valve. The ball valve used to drain the hydraulic fluid each year during normal service.
U	Back Gauge Support Arm. Holds the material stops used to set the depth to which the material is inserted into the press before bending. The support arm travels forward and aft to set the gauge distance. Fine adjustment is done on each of the material stops separately.



V	Back Gauge Motor (X Axis). This motor is used to change the position of the back-gauge support arm. This changes how far in the material is positioned before the bend. The back gauge and the material stops may be manually adjusted as needed by the operator for the specific bend desired. This includes being lowered to not be used at all.
W	Door Closed Limit Switch. This limit switch is used to interlock the door with the system. When the door is open, the main motor will not run. ALWAYS keep the door closed during operation. Use proper Lock out Tag out procedures when opening the door for service or adjustments.
X	Main Power Disconnect Switch. Controls the main power supply On/Off function. Turn power off when the machine is not being used or attended. Has the ability to be locked out (customer supplies the lock) to prevent unauthorized use. Use proper Lock out Tag out procedures for service or adjustments.

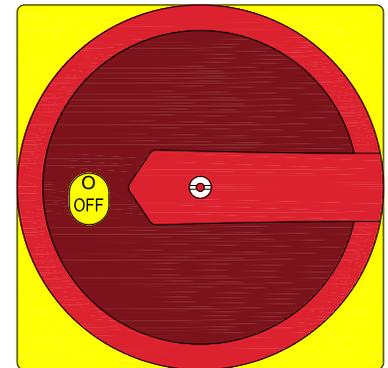
Switch and Button Functions

⚠ WARNING: Before making adjustment to or servicing this machine, turn the main disconnect switch “OFF”. Also turn off and Lock Out the electrical supply source to this machine. **FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN FATAL OR SERIOUS INJURY.**

MAIN DISCONNECT SWITCH – The safety disconnect switch turns power on to the machine when in the “ON” position. The power indicator lamp (A) will be illuminated.

POWER INDICATOR LIGHT – The white indicator lamp (A) will be illuminated when the machine is properly powered ON.

POWER KEY SWITCH – The key switch (B) controls the power to the operating system of the machine. When turned to the ON position the controller will be powered On. The main disconnect must be turned ON.



PUMP START PUSHBUTTON – When the system is properly set, (doors and guards closed and latched) depressing the pump start button (C) will start and run the main motor. The green light on the pump start button will be lit. The main motor must be running before the controller will allow for programming and setting of the X and Y axis’s.

RESET PUSHBUTTON – When operation is interrupted due to a safety limit switch activation, the system will be locked out until the limit switch is satisfied (door or guard closed) and the Reset button (D) is pressed. This clears the system to return to normal operation.



CYCLE MODE SELECTOR SWITCH – The Cycle Mode Selector switch (E) is a 2-position switch which allows you to pick one of two bend modes.

- In the left “inch” mode, the die will move down or up when the foot pedal is pressed and stop when the foot pedal is released. Inch mode is typically used during setup and testing.
- In the right “semi-auto” mode, the ram will continue to cycle down and up based upon the program settings in the E21 controller. The ram will start automatically and pause based on time delay settings and stop when the total number of piece parts have been completed. Semi-Auto mode is typically used to bend parts after setup whether in Single or Programmed operation.

E-STOP BUTTON – When pressed, the red E-STOP button will stop all machine functions will stop. Turn button clockwise (**cw**) to reset.



E21 CONTROLLER

Keys



entered.

Clear/Delete key, clear current numbers



Enter: In programming interface, press this key to confirm the parameter entered and switch between parameters.

Stop, Stops operation and the LED in the corner will illuminate. Press the Stop key to access the controller programming to change settings.





running.

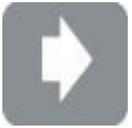
Start/Run, To let the controller operate. The LED in the corner will illuminate when



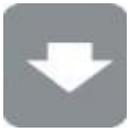
Interface switching, mainly used to switch among parameter interface, programming interface and diagnose interface and to modify in program sequence.



Left Direction key, moves the cursor to the left or page back.



Right Direction key, moves the cursor right or page forward.



Cursor down, press this key to show next parameter.



Symbol Key. Press this key to switch the symbol of value in the input area between + (positive) and - (negative).



0 – 9 Digit Keys. The 10 digit key pad.



Decimal key. This key allows you to input decimal symbol.



Low speed positive direction of travel key.



Low speed negative direction of travel key.



High/low speed selection, Press the corresponding double plus or double minus key along with the slow speed key to double the travel speed for the axis that is highlighted on the Single screen.

Safety Equipment



WARNING: This section describes the safety equipment installed on this machine so that the operator is aware of how it functions. Never remove, change, alter, disable, disconnect, etc. any of the safety equipment.

Light Curtain

Your press brake is equipped with an opto-electronic light curtain system mounted inside the side guard for point of operation safeguarding. This system is designed to safeguard the entire operating area from press bed to full opening, while maintaining user safety distance. Being designed to cover the entire working area, some applications may interrupt the light curtain causing the machine cycle to stop. These applications may include, but are not limited to, certain box shapes, small parts, etc... Accessories and tool sets may also interfere with light curtain operation. Accessories installed (including the optional supplied support arms) and mounted above bed level, extending toward the operator (past the light curtain) will stop the machine cycle. If your application interferes with light curtain operation, the end-user will need to re-mount or replace the safeguard system for their application per ANSI standard B11.3 Chapter 8, section 5.

Safety Guards

There are safety guards at side and back of machine. This is to prevent personal or objects from entering these areas while the machine is in operation. These safety guards are connected electrical to the system by safety switch. If any of the safety switches is activated, the machine will not operate.



Note: When the light of curtain is interrupted, or the safety guard switch is activated, you will need to push the reset button to enable the electrical system.

Emergency Stop

There are 2 emergency stop buttons on the machine located on the hanging control station and the foot pedal control station. In the event of incorrect operation or dangerous conditions, the machine can be stopped immediately by pressing the E-STOP button. Twist the emergency stop button clockwise (cw) to reset. Note: Resetting the E-Stop will not start the machine.



MACHINE OPERATION

⚠ CAUTION: Always wear proper eye protection with side shields, safety footwear, and leather gloves to protect from burrs and sharp edges. When handling large heavy materials make sure they are properly supported. Keep hands and fingers clear of the bending dies. Stand off to the side of the machine to avoid getting hit with the work material while the punch is pressing the material into the bending die.

Start Up

1. Turn the main disconnect to the ON position. The white power light (A) will be lit.
2. Turn the power key switch (B) to ON when ready to start.
3. Allow the controller display to complete the boot process.
4. Press the pump start button (C). The green power light will be lit.
5. Start completed.

Shutdown

1. Turn Selector Switch (E) to the INCH (left) position and press the down foot pedal to lower the ram to the bottom of the stroke or until it just makes contact with the lower die.
2. Turn the power key switch (B) to OFF and remove the key.
3. Turn the main disconnect to OFF to shutdown the controller.

Emergency Stop Button

1. In the event of incorrect operation or dangerous conditions, the machine can be stopped immediately by pressing the **E-STOP** button.
2. Twist the emergency stop button clockwise (cw) to reset.



Note: Resetting the E-Stop will not start the machine.



For the first time testing, select “INCH” mode to test the machine actions, and then test “Semi-Auto” mode and the ram stroke adjustment, the back-gauge control etc. Only when the machine actions are confirmed to be completely correctly, operation can be done as per the following procedures:

1. Define the opening size of the lower die as per the material thickness. Generally, the opening size is 8 ~ 12 times of the material thickness. For material thinner than 14ga. (2mm), the opening size can be 6 ~ 8 times the material thickness.
2. Determine the size of material you will be processing and setup the support arms accordingly. The arms can be adjusted for width or height.
3. Set up the dies for the type of bending you will be doing. See Changing Dies if necessary.
4. Align the centers of the upper die and the lower die.
5. Define the positions of the back-gauge. This is the XP value.



6. Define the lower limit position of the rams. This is the YP value.
7. Adjust the limit switch ramps for the travel limit switches so that the distance between the upper die and lower die is only slightly more than the thickness of the material being run. Doing so will reduce the chance of a foreign object getting between the dies and provide a faster cycle time when doing production work.
8. Ensure normal and standard "Inch" and "Semi-Auto" operation.

 **WARNING: IF A HAND OR OBJECT BREAKS THE SAFETY BEAM AFTER THE CYCLE HAS BEEN STARTED THE RAM WILL STOP UNTIL THE OBJECT IS CLEARED.**

9. Position the safety light curtain sensors in front of the die opening so that if any part of the body should enter the die area during a bend the bend will stop until the area is cleared. You should notice the red scanning code and green light near the bottom of the emitter and a red light on the receiver. If you wave an object through the beam the green light will turn red.
10. Safely start the machine. (The white power light will be lit)
11. Press the green pushbutton to start the hydraulic pump.
12. Place the cycle mode selector switch to the left INCH position and press the DOWN foot pedal. The ram should come down.
13. Press the UP foot pedal to raise the ram back to the top position.
14. Put the test material in the middle part of the worktable for trial bending.
15. Turn the cycle mode selector switch to "Semi-Auto" mode.
16. Press and hold the DOWN foot pedal until down travel block contacts the down travel limit switch or until the ram is at the bottom of the stroke. After the HT (hold time) has expired, the ram will raise and return to the top position and wait for the next command. If the operator continues to hold the down foot pedal, the ram will start the next cycle automatically. There will be approximately a 3 – 4 second delay before this next cycle begins.



PROGRAMMING

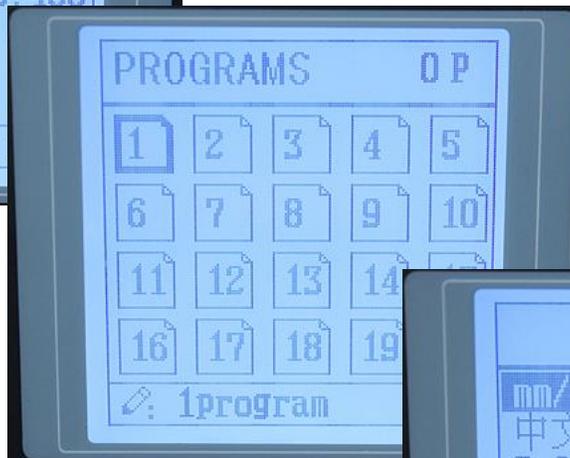
This device has two programming methods, which are single-step programming and multi-step programming. The user can set up programming according to actual demand.

At start up, the control screen will display the “Single” mode programming screen.

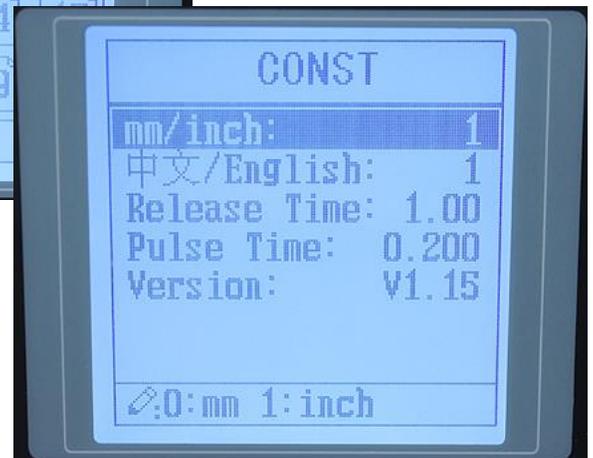
Pressing the  key will toggle between the three main programming screens.



The Single screen may be programmed directly to complete a single parameter bend. See the steps to follow.



The “Programs” screen is used to program multi-step bends. Each step is programmed similar to the single bend, however they are grouped together into one program that has many different bend settings. See the steps to follow.



The “CONST” screen is a reference screen. DO NOT make changes on this screen. This is also an access screen to deeper parameter settings.



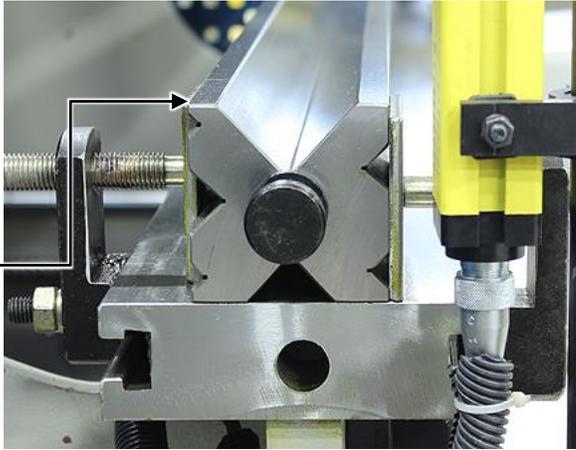
Bending Operation

NOTICE: This machine is designed for balanced operation. That means that the material should be evenly positioned between the dies from the center out. Loading material on one end of the machine will cause excessive loading on one ram and slide. This will shorten the life of the components and possibly damage the machine frame beyond repair. If biased loading is absolutely necessary on one end, place a similar material on the other end to prevent the biased loading problem. This is NOT covered by warranty.

Single Bend

Single bend operation is simplest most basic operation. The single refers to the dimension/settings to be used for the bend. A single set of dimensions will be used until changed by the operator. Whether the work piece has one bend or several, each bend is completed using the same single set of dimensions.

The following items may be programmed into the controller on this screen to be used for Single bending.

XP	Back Gauge dimension. 0.00 = is measured from the center line of the V groove being used, to the tip of the stop block. The smallest value that may be programmed in for this setting is 0.30	
YP	Depth the Ram will travel down. 0.000 = Is a relative number which in general is based upon the Punch (as included) being at the center of the Die (as included). The smallest value that may be programmed in for this setting is 0.119. The top of the die block is the 1.000 point. This does not matter which edge (V-groove) is in the up position. The dimension value programmed into the YP position is the distance the punch will travel into the die. Example; a YP of .75 would mean that the punch will travel about .25 into the V groove of the die.	
DX	The is a distance value that may be programmed to have the back gauge move away (retract) from the work piece at the moment the punch is about to touch the work piece.	
HT	This is a time value that starts when the down travel contact block activates the down travel limit switch. This value must be long enough for the ram to reach the full down stroke and cause the hydraulic system to reach pressure relief for at least 0.1 second.	
DLY	The is a time value that may be programmed to have the back gauge move away (retract) from the work piece at the moment the punch is about to touch the work piece.	



PP	This value is the programmed piece count desired for the job to be run.
CP	This value is a value that shows number of bends completed.
	The bottom line of the screen (pencil  symbol) will display the parameter limits when the parameter is highlighted. When a value is entered, that value will display until the Enter key or Cancel key is pressed.



Note: Parameter can only be set when Stop indicator is on.

Set up range of single step parameter

Parameter	Unit	Set Up Range	Remarks
X	inch	-	Current position of X axis, unable to be modified.
Y	inch	-	Current position of Y axis, unable to be modified.
XP	inch	0.310 – 20.000	Program position of X axis.
YP	inch	0.118 – 3.100	Target position of Y axis.
DX	inch	0.000 – 10.000	Retract distance of X axis.
HT	sec	0-9999s	The time between down travel limit switch being engaged and end hold time output.
DLY	sec	0-9999s	Delay Time for X axis retract and return movement.
PP	-	0-9999	Number of preset work piece.
CP	-	0-9999	Number of current work piece.

1. Start the press and allow the controller to boot up.
2. Start the hydraulic pump.
3. The “Single” screen will appear with the “XP” line highlighted. This line is the “PROGRAMMED” position of the back-gauge, (X axis).
4. Enter the value desired of the position of the back-gauge (XP). This value will be displayed in the bottom line of the screen. This is the line with the pencil  symbol.



5. Press the  Enter key. This will enter the value into the XP line and move the highlight to the next line. The YP line.
6. Enter the value desired of the position of the depth of bend (YP). This value will be displayed in the bottom line of the screen.



7. Press the  Enter key. This will enter the value into the YP line and move the highlight to the next line. The DX line.
8. Enter the value desired for the back-gauge to retract away from the work piece (DX). 0 (zero) will keep the back gauge in position for the entire bend. This value will be displayed in the bottom line of the screen.
9. Press the  Enter key. This will enter the value into the DX line and move the highlight to the next line. The HT line.
10. Enter the value needed for the Hold Time (HT). Generally, start with a value of 1.5 seconds and fine tune the number with experience for the specific bend and material. This value will be displayed in the bottom line of the screen. This is a time value that starts when the down travel contact block activates the down travel limit switch. This value must be long enough for the ram to reach the full down stroke and cause the hydraulic system to reach pressure relief for at least 0.1 second.
11. Press the  Enter key. This will enter the value into the HT line and move the highlight to the next line. The DLY line.
12. Enter the value, if needed, for a delay to occur before the back-gauge will retract away from the work piece. This will allow the punch to move deeper into the bend before the back-gauge move back away from the work piece. This value will be displayed in the bottom line of the screen.
13. Press the  Enter key. This will enter the value into the DLY line and move the highlight to the next line. The PP line.
14. Enter the value for the number of parts desired (PP). Enter 0 (zero) if no piece count is needed. This number could be the number of pieces for the complete job, or how many parts fit in a container, or some other value that creates a counting point. When this value is reached during operation, the controller will automatically switch from the Run to Stop. Press the green Start/Run key to reset the count and count the next set of parts. This value will be displayed in the bottom line of the screen.
15. Press the  Enter key. This will enter the value into the PP line and move the highlight to the next line. The CP line.
16. Enter 0 (zero) to clear the bend count if the PP line is 0 (zero). If the PP has a programmed value, do not change this line. This value will be displayed in the bottom line of the screen.
 - a. The CP line is a bend counter line. If 0 (zero) is entered for the PP value, the CP line will continue to count each bend cycle as one bend. If the PP line has a value, the CP number will count down from the programmed value to 0 (zero) to complete the counted parts.



17. Press the  Enter key. This will enter the value into the CP line and move the highlight to the next line. The XP line.

18. Place the Mode key switch in the semi-auto (right) position.

19. Press the  Start/Run key to enter the operational page. This activates the system to allow for operation.

- a. The system will activate the setting that have just been entered. This means that the Y and X axis's will move to the programmed locations. Y will move first and then X.
- b. When the Y and X axis's have finished moving to the programmed positions, the system is ready for a bend operation. If no change was programmed into either the Y and X axis's, the system is ready for a bend operation.



20. Place the work piece into the dies and up to the back-gauge.

21. Plan for the swing of the work piece during the bend.

- a. **DO NOT** hold the work piece in an area that may become a pinch point.
- b. **DO NOT** stand in an area that will strike the operator or bystanders during the bend cycle.

22. When the die area and work piece swing area are clear, press and hold the Down foot pedal to complete the bend.

- a. The foot pedal may be released when the ram is lowered enough to engage the down travel limit switch. If the foot pedal is released before the down travel limit switch is engaged, the ram movement will stop. Press the Up pedal to lift the ram and start again.

23. After a short pause based upon the HT time. The ram will raise back to the up position and wait until the next bend command from the foot pedal.

24. A Single bend has been completed.



Multi-Step Programming

Multi-step program is used for processing single work piece of different processing steps, realize consecutive implementation of multi-steps, and improve processing efficiency.

The following items may be programmed into the controller on this screen to be used for Multi Stage bending.

Multi-Step Parameter Setting Screen 1

Parameter	Unit	Setting Range	Remarks
ST	-	0 ~ 25	Stations. Set up total processing step number of this program
PP	-	0 ~ 99999	Number of preset work piece.
CP	-	0 ~ 99999	Number of current work piece. The CP line is a bend counter line. If 0 (zero) is entered for the PP value, the CP line will continue to count each bend cycle as one bend. If the PP line has a value, the CP number will count down from the programmed value to 0 (zero) to complete the counted parts.
DLY	ms	0 ~ 99999ms	Delay Time for X axis retract and return movement.
HT	ms	0 ~ 99999ms	The time between down travel limit switch being engaged and end hold time output.

Multi-Step Parameter Setting Screen 2

The Screen 2 information will be repeated for each ST (process step). Example; If 3 is entered into the ST parameter, this screen will be repeated 3 times. Each screen may have its own X and Y values.

Parameter	Unit	Set Up Range	Remarks
X	inch	-	Current position of X axis, unable to be modified.
Y	inch	-	Current position of Y axis, unable to be modified.
XP	inch	0.310 – 20.000	Program position of X axis.
YP	inch	0.118 – 3.100	Target position of Y axis.
DX	inch	0.000 – 10.000	Retract distance of X axis.
RP	-	1 ~ 99	Repeat Time. This is the number of times the system will repeat this exact same bend settings before moving on to the next station screen.



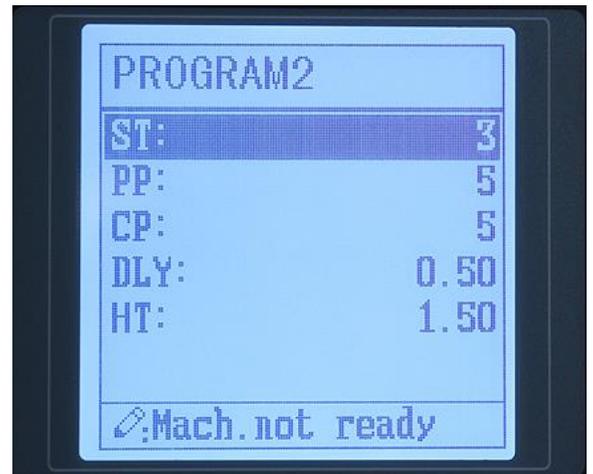
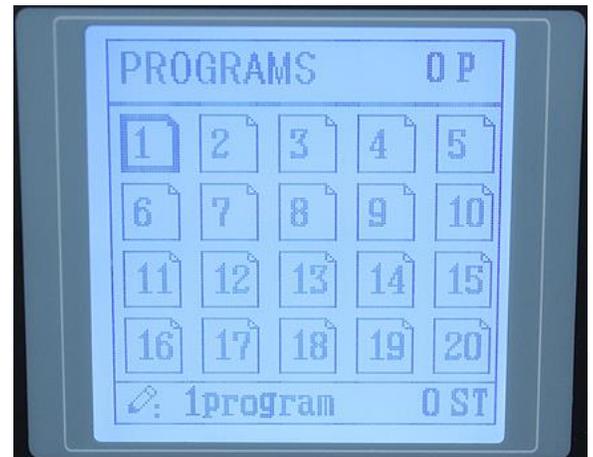
Multi-Bend Operation Steps

1. Start the press and allow the controller to boot up.
2. Start the hydraulic pump.
3. The "Single" screen will appear with the "XP" line highlighted.
4. Press the  button to switch to Program manage screen.

5. Press either the , , or  arrow keys to select the program number, or input program number directly, such as input "1", or "18".
6. Press the  enter button to enter the multi-step program setting screen.
7. The "Program2" screen will appear with the "ST" line highlighted.
8. Enter the value desired for the number of Stations (ST) needed to complete the operation. This value will be displayed in the bottom line of the screen.

This is the line with the pencil  symbol.

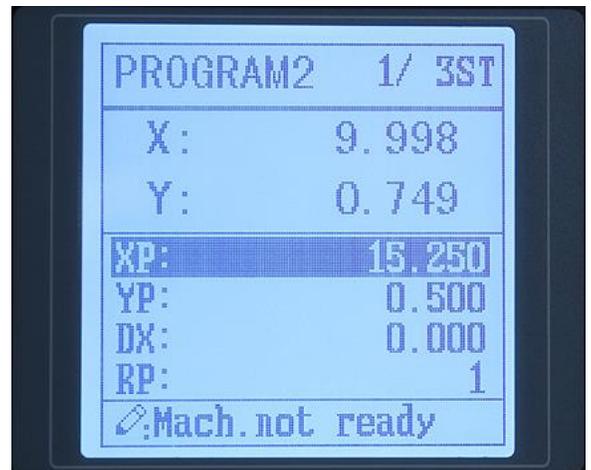
9. Press the  Enter key. This will enter the value into the ST line and move the highlight to the next line. The PP line.
10. Enter the value for the number of parts desired (PP). Enter 0 (zero) if no piece count is needed. This number could be the number of pieces for the complete job, or how many parts fit in a container, or some other value that creates a counting point. When this value is reached during operation, the controller will automatically switch from the Run to Stop. Press the green Start/Run key to reset the count and count the next set of parts. This value will be displayed in the bottom line of the screen.
11. Press the  Enter key. This will enter the value into the PP line and move the highlight to the next line. The CP line.
12. Enter 0 (zero) to clear the bend count if the PP line is 0 (zero). If the PP has a programmed value, do not change this line. This value will be displayed in the bottom line of the screen.





- a. The CP line is a bend counter line. If 0 (zero) is entered for the PP value, the CP line will continue to count each bend cycle as one bend. If the PP line has a value, the CP number will count down from the programmed value to 0 (zero) to complete the counted parts.

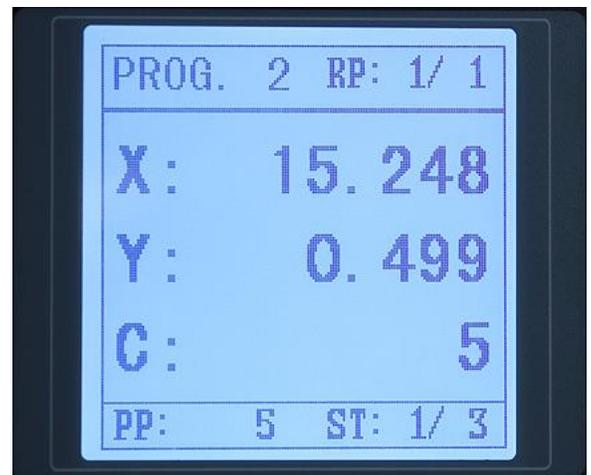
- 13. Press the Enter key. This will enter the value if any into the CP line and move the highlight to the next line. The DLY line.
- 14. Enter the value, if needed, for a delay to occur before the back-gauge will retract away from the work piece. This will allow the punch to move deeper into the bend before the back-gauge move back away from the work piece. This value will be displayed in the bottom line of the screen.
- 15. Press the Enter key. This will enter the value into the DLY line and move the highlight to the next line. The HT line.
- 16. Enter the value needed for the Hold Time (HT). Generally, start with a value of 1.5 seconds and fine tune the number with experience for the specific bend and material. This value will be displayed in the bottom line of the screen.
- 17. Press the Enter key. This will enter the value into the HT line and move the highlight to the next line. The ST line.
- 18. When the setup is complete, press the right arrow key to enter the step parameter setup screen. This will allow for setting the parameters for the first station.
- 19. The "Program2 1/xST" screen will appear with the "XP" line highlighted. This line is the "PROGRAMMED" position of the back-gauge, (X axis).
- 20. Enter the value desired of the position of the back-gauge (XP). This value will be displayed in the bottom line of the screen. This is the line with the pencil symbol.
- 21. Press the Enter key. This will enter the value into the XP line and move the highlight to the next line. The YP line.
- 22. Enter the value desired of the position of the depth of bend (YP). This value will be displayed in the bottom line of the screen.
- 23. Press the Enter key. This will enter the value into the YP line and move the highlight to the next line. The DX line.





24. Enter the value desired for the back-gauge to retract away from the work piece (DX). 0 (zero) will keep the back gauge in position for the entire bend. This value will be displayed in the bottom line of the screen.
25. Press the  Enter key. This will enter the value into the DX line and move the highlight to the next line. The RP line.
26. Enter the value needed for the Repeat Times (RP). This is how many times the system will perform the bend operation using the same setting on the same station screen before moving to the next station screen which will typically have at least one different setting. This value will be displayed in the bottom line of the screen.
27. Press the  Enter key. This will enter the value into the RP line and move the highlight to the next line. The XP line.
28. When the setup on the 1/xST screen is complete, press the  right arrow key to enter the next station setup screen. Repeat the parameter set up for this and each additional station screen.
29. When the last station screen has been programmed, pressing the  right arrow key will change back to the 1st station screen.
30. Place the Mode key switch in the semi-auto (right) position.

31. Press the  Start/Run key to enter the operational page. This activates the system to allow for operation.
- The system will activate the setting that have just been entered. This means that the Y and X axis's will move to the programmed locations. Y will move first and then X.
 - When the Y and X axis's have finished moving to the programmed positions, the system is ready for a bend operation. If no change was programmed into either the Y and X axis's, the system is ready for a bend operation.



32. Place the work piece into the dies and up to the back-gauge.
33. Plan for the swing of the work piece during the bend. DO NOT hold the work piece in an area that may become a pinch point. DO NOT stand in an area that will strike the operator or bystanders during the bend cycle.



34. When the die area and work piece swing area are clear, press and hold the Down foot pedal to complete the bend.
 - a. The foot pedal may be released when the ram is lowered enough to engage the down travel limit switch. If the foot pedal is released before the down travel limit switch is engaged, the ram movement will stop. Press the Up pedal to lift the ram and start again.
35. After a short pause based upon the HT time. The ram will raise back to the up position and wait until the next bend command from the foot pedal.
36. The RP value will determine if the system remains on this station screen or moves to the next station screen. If the RP: value in the top line of the display = 1/1, or 3/3, or 10/10 then the system will advance to the next station screen. If the first number of the RP line is < the second number, the system will repeat the same bend parameters from the same station screen.
37. When all of the programmed stations have been completed CP number will count down by 1 until it reaches zero. Then the system will automatically stop and wait for operator input.
38. A Multi-bend has been completed.

UNDERSTANDING SPRINGBACK

Springback, also known as elastic recovery, is the result of the metal wanting to return to its original shape after undergoing compression and stretch. After the bending leaf is removed from the metal and the load is released, the workpiece relaxes, forcing the bent portion of the metal to return slightly to its original shape. The key to obtaining the correct bend angle is to over bend the metal a little and allow it to spring back to the desired angle. All metals exhibit a certain amount of spring back.

MATERIAL SELECTION

⚠ CAUTION: It must be determined by the customer that materials being processed through the machine are NOT potentially hazardous to operator or personnel working nearby.

When selecting materials keep these instructions in mind:

- Material must be clean and dry. (without oil)
- Material should have a smooth surface so it processes easily.
- Dimensional properties of material must be consistent and not exceed the machine capacity values.



- Chemical structure of material must be consistent.
- Buy certificated steel from the same vendor when possible.

X AXIS FINE ADJUSTMENT

⚠ WARNING: Entanglement Hazard!

Always keep hands and fingers away from the adjustment handwheel when the press is adjusting the X axis automatically.

The handwheel spins at a high rate of speed and will injure hands and fingers if contact is made when the handwheel is in motion.

The handwheel located on the front of the lower bolster plate is intended to be used to fine tune the location of the back gauge (X axis) after the machine has completed movement to the set position.

The back-gauge movement has a tolerance of 0.019" built into the positioning of the back gauge. If for example, 5" was entered into the XP parameter, the final position of 4.81" to 5.19" will allow the press to continue on to complete the desired bend.

If the final distance is outside of this range, then the press will stop operation based on the back-gauge position being incorrect.

By turning the handwheel to bring the back-gauge to a dimension inside of the tolerance range, the press will resume operation.

Operational Indicators

- If the press does not activate the ram to lower, check that the X value is within 0.019" of the XP value after the back-gauge has completed its movement for positioning. Using the handwheel to move the back-gauge to within tolerance will allow the press to then lower the ram.
- If the out of tolerance dimension is consistently larger than the set value, lightly grease back-gauge leadscrews with one pump of any general-purpose grease.
- If the out of tolerance dimension is consistently smaller than the set value, clean the back-gauge leadscrews. Light grease may be added after the cleaning.

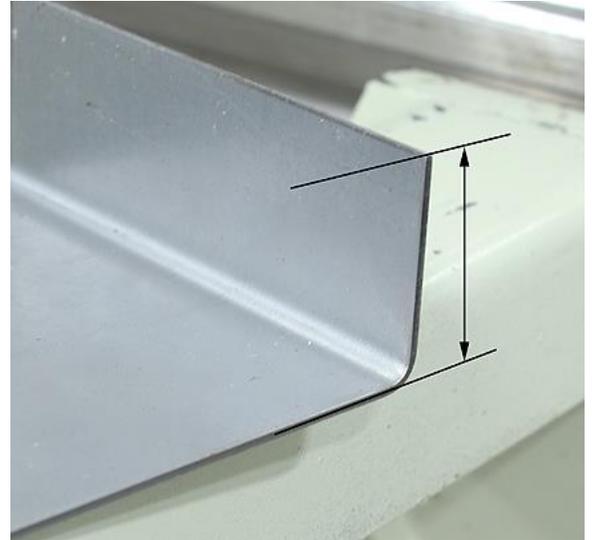




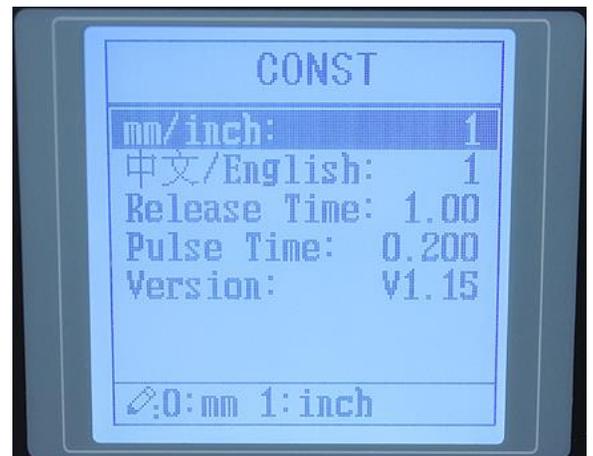
X AXIS TEACH IN

The X axis teach in is used to calibrate the exact position of the X axis (back gauge) at the specific time it is being measured. This calibration is done by bending a piece of material and then measuring the length of the material from the edge of the material that contacted the stop fingers to the bend radius. It is generally easier if the bend is between 85° and 95° , 24" wide, and the bend length at least 2".

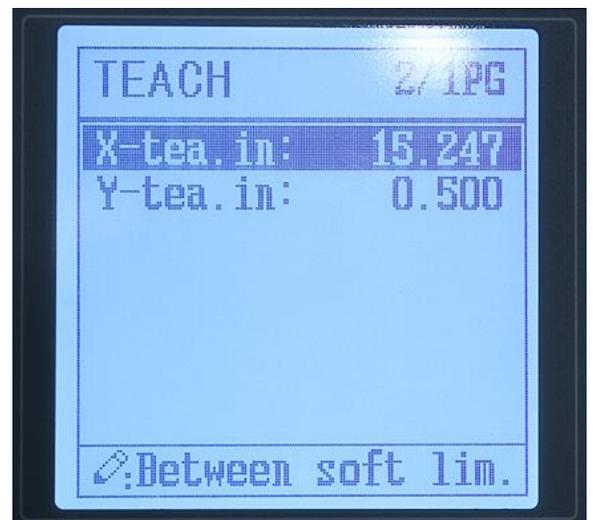
1. Adjust the width of the back gauge stop fingers so that the test material will contact both fingers evenly.
2. From the Single Parameter screen, set the XP number to be 2".
3. Bend the test piece of material.
4. Measure the length of the bend from the edge of the material that contacted the stop finger to the center of the material. This is the Actual X position.
5. Press the Red Stop key on the controller to return to the programming screen.



6. Pressing the  key to toggle the screen to the "CONST" programming screens. The "CONST" screen is a reference screen. DO NOT make changes on this screen. This is also an access screen to deeper parameter settings.
7. Key in the access code of 1212 to enter the "Teach In" screen.
8. Verify that the "X-tea. In:" line is highlighted.
9. Enter the measured Actual value into the controller and press enter to set the Teach In value for X. The smallest value that may be programmed in for this setting is 0.30.



10. Once entered, press the  key to return to the Single screen. The X axis is calibrated.





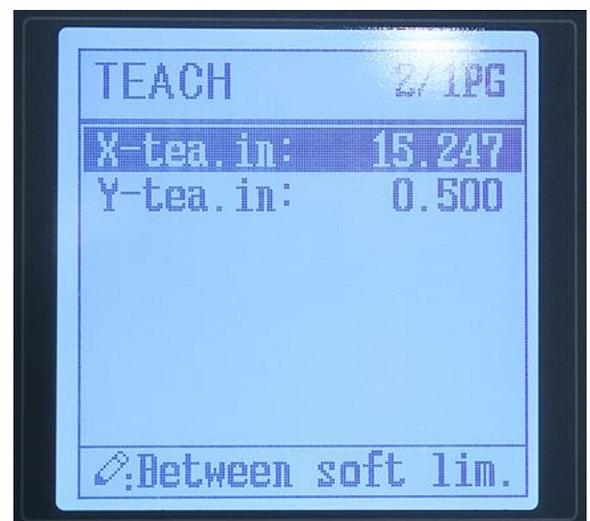
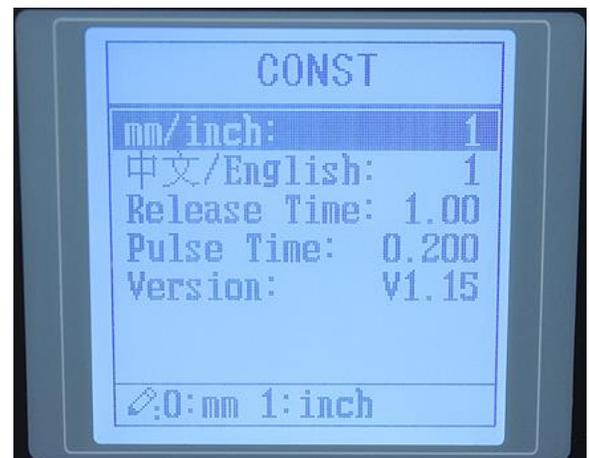
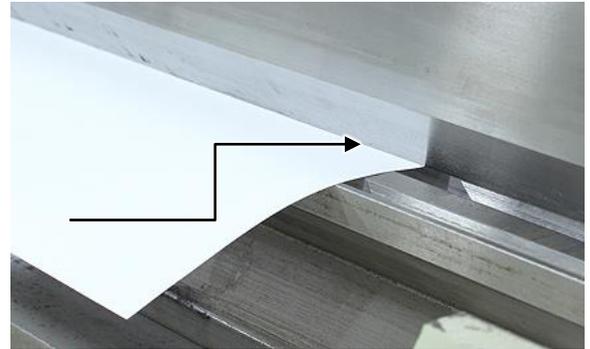
Y AXIS TEACH IN

The Y axis teach in is used to calibrate the relative position of the Y axis (bending ram) at the specific time it is being measured. This is not a common adjustment to be performed. This calibration is done by placing a piece of paper on the top of the die and then lowering the ram so that the bottom of the punch just touches the paper on the top of the die without bending the paper.

1. Place a piece of paper across the die.
2. Lower the punch in single stroke mode until the punch just touches the paper without bending it.
3. Press the Red Stop key on the controller to return to the programing screen.

4. Pressing the  key to toggle the screen to the "CONST" programming screens. The "CONST" screen is a reference screen. DO NOT make changes on this screen. This is also an access screen to deeper parameter settings.
5. Key in the access code of 1212 to enter the "Teach In" screen.
6. Use the down arrow key to move to and highlight the "Y-tea. In:" line.
7. Enter the value of 1.000 into the controller and press enter to set the Teach In value for Y. The smallest value that may be programmed in for this setting is 0.118.

8. Once entered, press the  key to return to the Single screen. The Y axis is calibrated.





CHANGING AND ADJUSTING DIES

Rotating Lower Die



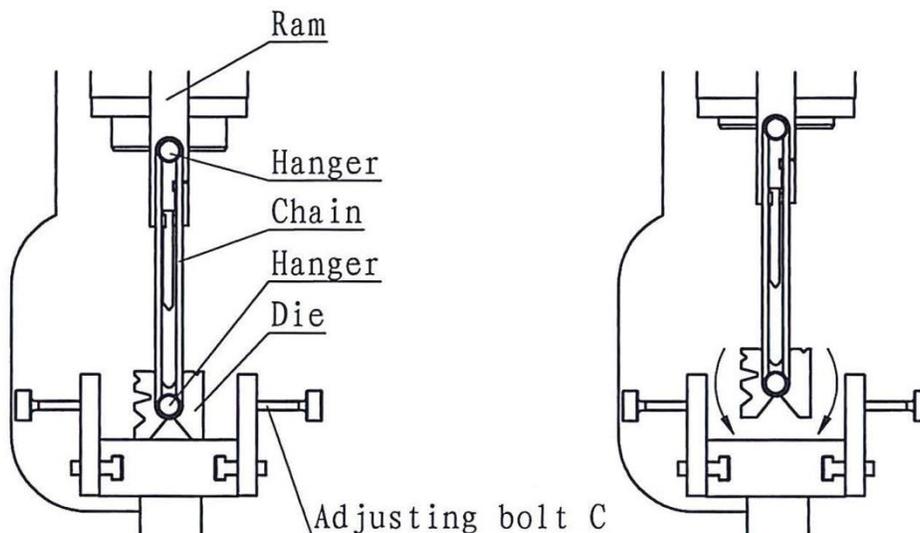
WARNING: Always keep hands and fingers from between the dies.

The dies supplied with the press are heavy. Have an assistant and a suitable lifting device available. **DO NOT** try and remove by yourself.

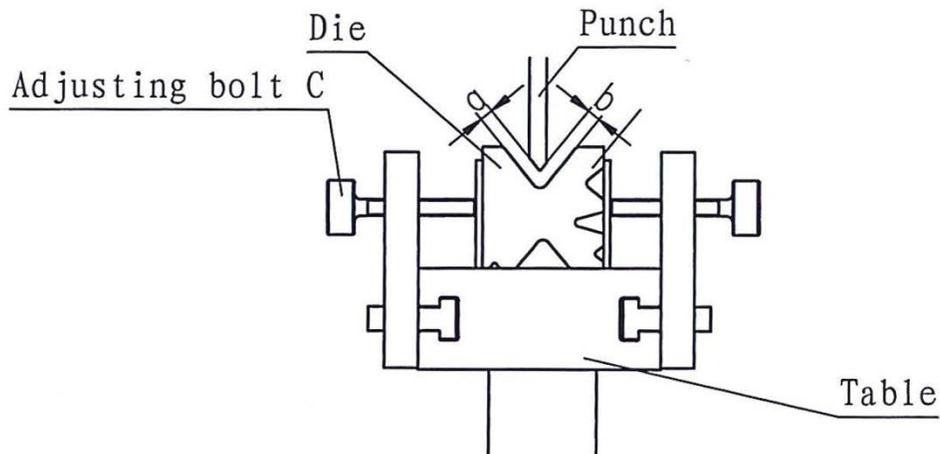


Note: *Never install or use dies that are cracked, chipped, or otherwise damaged. Make sure dies are the correct size and type to reduce the risk of overload.*

1. Start the machine and place in INCH mode.
2. Lower the ram to the bottom of the stroke.
3. Loosen the four adjusting bolts (C) which secure the die to the bolster.
4. Install the lift chains on both ends of the die and allow the ram to return to the full up position (TDP) to lift the lower die.
5. With the die elevated: Slowly rotate to the desired position and carefully lower the die down onto the bolster using INCH mode.
6. Lower the top die gently into the selected V-groove of the bottom die to position it.



7. When the ram is near the lower die, check if the clearance "a" and "b" between the punch and the die, is equal within the whole length. If not, use the adjusting bolt (C) to adjust the lower die. Make the clearance "a" and "b" is equal within the whole length.
8. When aligned, tighten the clamps (C) **EVENLY** and securely.



Replacing Lower Die



WARNING: Always keep hands and fingers from between the dies.

The dies supplied with the press are heavy. Have an assistant and a suitable lifting device available. **DO NOT** try and remove by yourself.



Note: *Never install or use dies that are cracked, chipped, or otherwise damaged. Make sure dies are the correct size and type to reduce the risk of overload.*

1. If the ram is not already in the full up position (TDP); start the machine and place in INCH mode and raise the ram.
2. Loosen the four adjusting bolts (C) which secure the die to the bolster.
3. Slide the die out. Make sure there is adequate clearance around the machine to safely remove and replace the die.
4. Carefully slide in the new die.
5. Start the machine in INCH mode and slowly lower the top die gently into the selected V-groove of the bottom die to position it.
6. When the ram is near the lower die, check if the clearance "a" and "b" is equal within the whole length. If not, use the adjusting bolt (C) to adjust the lower die. Make the clearance "a" and "b" is equal within the whole length.
7. When aligned, tighten the clamps (C) **EVENLY** and securely.
8. Check the adjusting bolts (C) regularly to ensure they are tight.



Replacing Upper Die

The upper die is a two piece design which allows each half to be slid out the side of the press table area. The quick change handles allow for fast tooling changes.



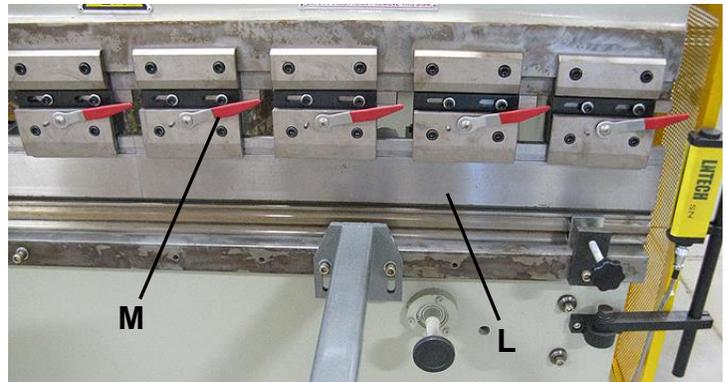
WARNING: Always keep hands and fingers from between the dies.

The dies supplied with the press are heavy. Have an assistant and a suitable lifting device available. **DO NOT** try and remove by yourself.



Note: *Never install or use dies that are cracked, chipped, or otherwise damaged. Make sure dies are the correct size and type to reduce the risk of overload.*

1. Safely start the machine and place the selector switch in INCH mode.
2. Lower the ram until the top die is approximately 1/16" (1.5mm) from bottoming in the lower die.
3. Stop the machine and turn the main disconnect to OFF and LOCK OUT power.
4. The top die is a two piece design; replace one segment at a time.
5. Rotate each of the die clamp handles (ccw) half a turn for the half of the die being replaced.
6. Open the side guard on the end of the press and slide the die out. Make sure there is adequate clearance around the machine to safely remove and replace the die.
7. Carefully slide in the new die (or die segment).
8. When positioned as needed, rotate the clamp handles (cw) to securely tighten and lock the die in position.
9. From the end of the die, check upper and lower die alignment. If the die alignment is not correct, follow the die rotation instructions to loosen the lower die and align the dies.





Adjusting Upper Die

The upper die is a two piece design with each section held in position by four mounting block. Each mounting block uses a wedge block to allow for alignment of the two die sections as well as making the upper die set parallel to the lower die.



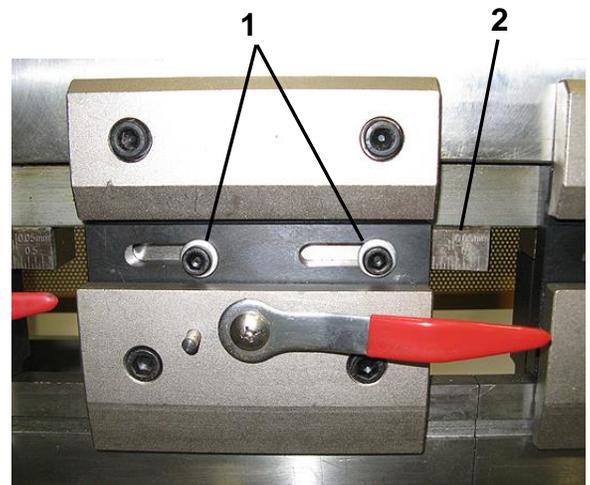
WARNING: Always keep hands and fingers from between the dies.

The dies supplied with the press are heavy. Have an assistant and a suitable lifting device available. **DO NOT** try and remove by yourself.



Note: *Never install or use dies that are cracked, chipped, or otherwise damaged. Make sure dies are the correct size and type to reduce the risk of overload.*

1. Use a straight edge to check that the lower edge of the upper die is on a straight line.
2. Measure from each end of the lower edge of the upper die to the top of the lower die. These measurements should be exactly the same to be parallel.
3. If either setting needs adjustment; safely start the machine and place the selector switch in **INCH** mode.
4. Lower the ram until the top die just contacts the lower die.
5. Loosen the socket head cap screws (1) just enough to allow the wedge blocks (2) to slide.
6. Slide the wedge blocks right or left as needed until evenly snug in the slots to align the upper die evenly into the lower die.
7. Tighten the socket head cap screws (1) to secure the wedge blocks (2) in position.





MACHINE ADJUSTMENT

Ram Stroke Limit Switch Adjustment

The ram travel is controlled by four different switch/control groups.

- The E21 Controller has depth of and mode of operation, travel settings, and time delays for travel.
- The Foot Pedals signal to start and stop up and down motion.
- The Light Curtain signal to stop or reverse travel if there is any interference with the dies that may cause damage or injury.
- The Stroke Limit Switches supply several signals.
 - The Cross Over Limit switch (sometimes call down stroke limit) signals the hydraulics to change from the Approach speed to the Work speed, Muting of the light curtains, and starting of the Hold Timer (HT, more details in the programming section.).
 - The Up Stroke Limit switch signals to stop the ram lifting travel, signal the counter to count a completed bend cycle, and start the next bend timer to create a pause before the ram may be lowered again. This is typically about 3 seconds.
- First; The two stroke limit switches are located on the right side of the machine and have rollers that contact adjustable stop blocks.
- Second; The Top limit switch controls the Cross Over function. The Bottom limit switch controls the Up stroke.
- Third, Always start the adjustment with the Up stroke limit and then the Cross Over limit.



Note: The contact blocks are shown in the maximum travel position. DO NOT allow the contact blocks to be adjusted so that both switches are activated at the same time.



NOTICE: DO NOT allow the contact blocks to be adjusted so that the switch roller is able to get positioned on the back (square) end of the block. Because there is no ramp, the roller and the switch will be damaged. This is NOT covered by warranty.

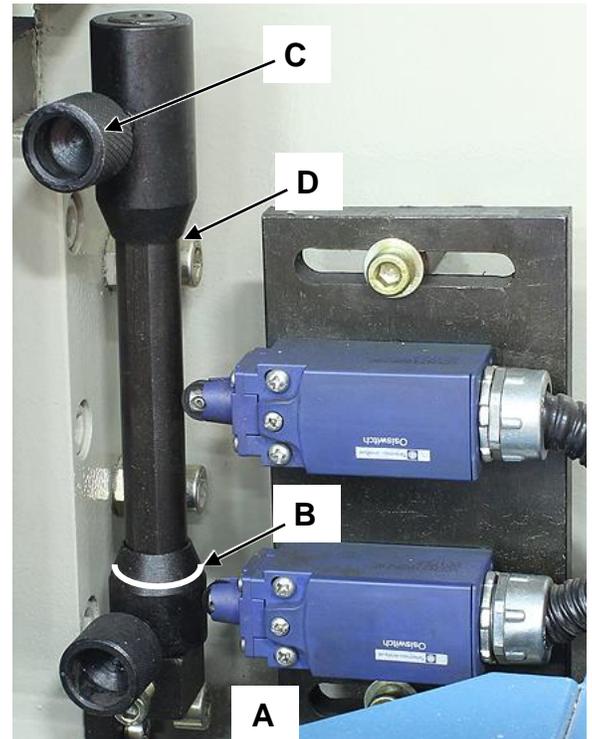
Up Stroke

When the ram raises, the ram will stop at the position in which the up contact block triggers the up stroke limit switch.

When the height of the contact block is properly adjusted the stroke of the rams will be shortened and improve production efficiency.

Lowering the contact block allows the ram to travel higher. Raising the contact block stops the ram **UP** travel at a lower position.

1. Safely start the machine and place the selector switch in INCH mode.
2. Lower the ram until the top die is lowered to the desired position. Verify that there will be enough clearance between the punch and die to load, position and unload the work material. Before and after the bend.
3. Loosen the thumb screw (A) and slide the contact block up so that the switch roller is approximately 2/3rds (B) up onto the ramp.
4. Firmly tighten the thumb screw.
5. Proceed to setting the down stroke.



Cross Over Stroke

When the cross over limit switch is actuated it signals the ram to switch to the slower bending **DOWN** stroke. The lower the contact block is positioned to the limit switch the sooner it actuates. The hold timer is also signaled to start the hold delay at the bottom of the stroke.



Note: The HT (Hold Time) setting of the controller needs to be long enough to allow for the ram to travel to the full stroke setting for the Y axis in the controller. If the ram is not traveling to the full depth as set, Check and increase the HT setting.

1. Loosen the thumb screw (C) and slide the contact block down so that the switch roller is just contacting the ramp (D). DO NOT allow the roller to start to be depressed.



2. Firmly tighten the thumb screw.

Back Gauge Adjustment

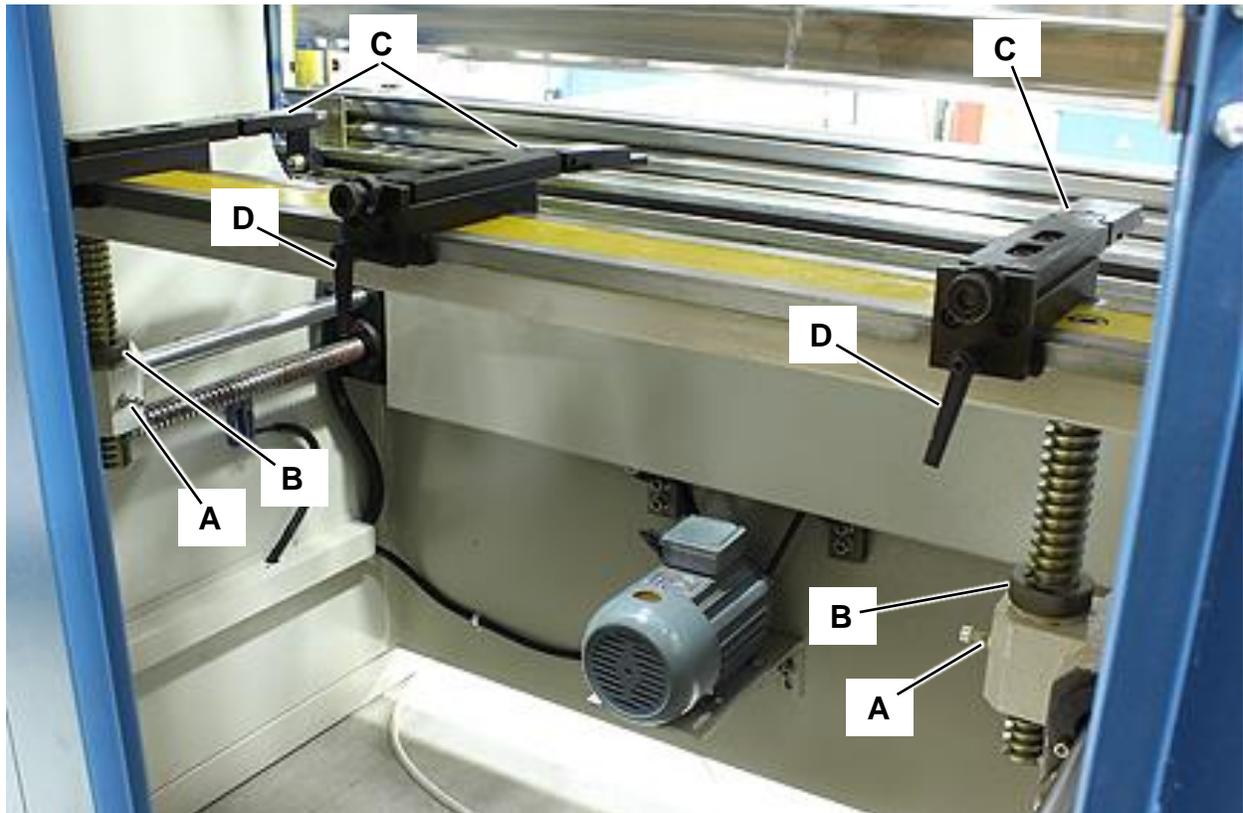
Along with the adjustment of the back gauge via the CNC controller the back gauge can be adjusted manually for height, and width. This is used to fine tune the back gauge setting and/or adapt the stops to the specific application. While it is commonly thought to adjust the stops to be specifically inline with the work material, it may also be adjusted to be completely out of the way of the work material.

Height Adjustment

1. Loosen the set screws (A).
2. Turn the adjustment wheels (B) as needed to raise or lower the beam to align the stop blocks (C) with the material to be processed. Use a level on the back-gauge beam if needed.
3. When the back-gauge beam is at the desired height, tighten the set screws (A).

Width Adjustment

1. Loosen the lock (D) and slide each of the three stop blocks to the desired position and tighten the lock. It is recommended that at least two stops are used to contact the work material to hold the material square to the bending line.





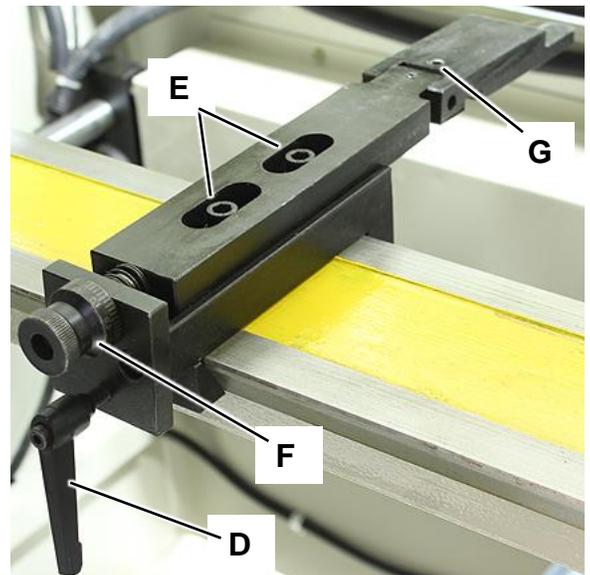
Stop Block Adjustment

Typically, this adjustment is to fine tune the stop block for squaring and accuracy, however, within the limits of the adjustment slots, this may also be used to create small angles between the stop blocks and the bending center line. This may be useful in creating a slight coning effect to the work material.

The stop blocks have three adjustments:

- Lateral position (width adjustment) on the back-gauge beam.
- Depth position to fine tune the back stop setting
- Contact block fine height adjustment.

1. Measure from the bend line center point to the front tip of the stop block to determine if the stop block must move forward or backward.
2. Loosen the adjustment cap screws (E).
3. Adjust the stop adjuster (F) as needed to move the stop block forward, or backward.
4. When the stop block is in the desired position, tighten the adjustment knob (E).
5. Repeat the process for the other two stop blocks.
6. Use the set screw (G) to raise or lower the stop plate to contact the material squarely.



NOTICE: If the back-gauge depth will be 1" (25.4mm) or less during operation, be very careful to adjust the stop plates up enough to prevent contact with the bending die. If back-gauge is moved fully forward and the stop plates contact the die, the die and or the stop plates may be damaged. This is NOT covered by warranty.



BEND TONNAGE CHART

Select the V-Die opening that matches the needed bend type and remains within the press operating tonnage. The opening choices are .31, .39, .47, 5/8, .94, 1-1/4, 2" (8, 10, 12, 16, 24, 32, 50mm)

Metal Thickness		Mild Steel Press Brake Bend Tonnage Chart - Tons per linear foot of bend at specific die opening and radius (Based on 60,000PSI Tensile strength)																						
Gauge	Dec.	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1	1-1/8	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4	5	6	7	8	10	
20	0.036	3.1	2.3	1.8	1.4	1.2	1																	
18	0.048	5.4	4	3.1	2.5	2.2	1.7	1.3																
16	0.060	9.6	7.1	5.6	4.5	3.8	2.8	2.2	1.8	1.5														
14	0.075		11.9	9.3	7.6	6.4	4.7	3.8	3	2.5	2.1	1.9												
13	0.090						6.8	5.5	4.3	3.7	3.3	2.9												
12	0.105			20.5	16.7	13.5	10.4	7.7	6.5	5.6	4.4	4.1	3.2	2.2										
11	0.120					18.5	13.9	10.9	8.8	7.5	6.2	5.6	4.3	3.2	2.2									
10	0.135					25.2	17.2	14.5	11.3	9.9	8.5	7.3	5.7	4	2.9	2.3								
9	0.150									13.1	11.9	9	7	5.2	3.7									
3/16	0.188							27.4	23.1	19.3	16.4	14.3	11.2	7.6	5.8	4.5								
1/4	0.250									39.4	33.3	29.5	22.7	15.4	11.5	9.1	7.5	6.2						
5/16	0.313											50.4	39.8	27	19.7	16	12.7	10.6	7.7					
3/8	0.375												61.1	42.3	30.9	24	19.6	16.3	12.3	9.5				
7/16	0.437													61.7	45.8	35.4	28.6	24.4	17.3	14.8	11.2			
1/2	0.500														85.2	63.6	48.8	39.7	33.3	24.6	19.4	15.9		
5/8	0.625															110	86.2	70	58.3	43.1	33.3	27.4	23.3	16.9
3/4	0.750																110	93	69	53.5	43.6	36.5	27.1	
7/8	0.875																	137	104	80.7	64.6	52.9	39.7	
1	1.000																		143	113	91.2	76.2	56.3	
Formed Radius		1/32	3/64	1/16	5/64	5/64	3/32	1/8	9/64	5/32	11/64	3/16	15/64	5/16	25/64	15/32	25/64	5/8	25/32	15/16	1-3/32	1-1/4	1-9/16	
Minimum Flange		3/16	7/32	1/4	9/32	5/16	7/16	1/2	9/16	5/8	11/16	3/4	15/16	1-3/16	1-7/16	1-3/4	2	2-1/4	2-3/4	3-3/8	4	4-1/2	5-1/2	



Tonnage adjustment for other materials:
 Stainless steel: 50% More
 Aluminum & brass (soft): 50% Less
 Aluminum (hard or alloys): Same as mild steel

*All tonnage and radii values are approximate, real world results may vary



NOTES



NOTES



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