

# LASER

Sentry



## Instruction Manual

February 01, 2003



### Hydraulic Press Brake Guarding

# METAL TECH

1-800.516.5516 Fax 1-888.761.8725  
P.O. Box 512113 ~ Punta Gorda FL 33982



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## Warning!

**The *Laser Sentry* can only be installed and used on hydraulic press brakes that have the ability to stop and reverse direction in less than 1/4 of an inch of travel.**

**Most hydraulic press brakes can reverse well within 1/4 inch if they are properly maintained, especially up-acting machines.**

**If you install the *Laser Sentry* on machines not capable of this performance you are in violation of national safety standards. Doing so could result in serious injury to personnel. You assume all responsibility for the safety of the machine in question if it is not capable of this performance and or not maintained to continuously reverse within 1/4 inch.**

**If you do not have the means of determining the reverse time, consult the machines manual or consult the machine manufacturer. (Also see below).**

**The *Laser Sentry* performs reverse time safety checks. When you install the *Laser Sentry* perform a reverse time check by selecting this function from the setup menu. If the reverse time is inadequate the *Laser Sentry* will reject the machine and will not run.**

# CONTROL RELIABILITY

The *Laser Sentry* is designed and built to the highest safety standards defined for machinery safety, EN954-1 Category 4 and meets the control reliability requirements of ANSI B11.19 and OSHA 1910.217. The *Laser Sentry* is also designed to meet CSA and EC (European Community) standards.

The laser Sentry is designed and manufactured in the USA. All components are at least UL and CSA approved some carry a CE mark. All components except some board level parts are manufactured in the USA.

## **Laser transmitter:**

Class II modulated visible laser diode emitter.

Beam width of 2.5 mm. at 5' 4 mm, 10' 5.5 mm, 20' 8.5 mm, and 50' 18 mm.

Environmental Rating - NEMA 6P; IEC IP67

Laser Classification - US Safety Standards 21 CFR 1040.10 and 1040.11; European Standards EN 60825 and IEC 60825.

## **Laser Receiver:**

Contains a .024 aperture, which provides detection of objects as small as .030.

The controller has two microprocessors, each programmed by different individuals. The processors jointly control and monitor the *Laser Sentry* functions, cross check each other and monitor the linear position transducer and laser transmitter and receiver for failure.

Two safety relays control the machines' ram closing hydraulic valve. These relays have force-guided contacts and are checked for welded or stuck contacts before being energized.

A separate relay is provided for reversing the ram.

An additional relay is provided for parallel connection to the machines' slow speed circuit. If the machine does not put the machine in to slow speed before 1/2 inch of the surface of the material, the *Laser Sentry* will force the machine into slow speed.

The *Laser Sentry* obtains the rams' position from a magnetostrictive transducer, which produces an absolute digital position to within .0025 of an inch. The transducer is monitored for position change when the Laser Sentry receives a ram movement signal. Should there be no change within a predetermined time the machine is immediately disabled. Should the connecting cables be disengaged the machine will be disabled within 1.5 mS.

The stop/reverse time of the machine is monitored each time the machine is reversed. The time is checked against a predetermined time and should it exceed the preset time the machine is disabled.

The control is password protected to three levels, Operator, Setup Person and Supervisor. The passwords can be changed at the Supervisors discretion. Attempts to guess passwords are prevented by allowing only 3 attempts before locking out.

Indicator lights and the screen clearly display the controls status. All user messages are in plain language. Error messages are displayed as well as suggestions for a solution.

# HOW *LASER SENTRY* PROVIDES SAFETY

The *Laser Sentry* provides press brake safety by eliminating the hazard in a similar manner as do elevator and subway doors eliminate the hazard of the doors closing and crushing someone. In the event the doors are blocked, the doors retract automatically thus eliminating the hazard! They use pressure sensitive switches to detect the presence of an object. When the sensor is activated the doors retract.

The *Laser Sentry* uses the interruption of a laser beam to sense objects, if any object breaks the beam, human or otherwise the ram is instantly retracted.

To permit the bending process the *Laser Sentry* determines when it is safe for the laser beam to be broken. That is, when the hazard is less than 1/4 inch.

To determine just exactly where that “safe” point is, a precision digital absolute position transducer is used. The transducer provides the rams position within .0025 inches of repeatability.

The operator “teaches” the *Laser Sentry* the exact position of the surface part to be formed when it is resting on the lower die. This position is used by the *Laser Sentry* to determine the safe area of ram travel.

However the laser is **not** “muted” at 1/4 inch above the material as with the use of light curtains, it is muted .100 above the surface of the part being formed!

The beam is scanned between 3/16 and 1/4 of an inch under the die. This distance is determined by the reversing capabilities of the machine. The *Laser Sentry* tests the reversing time and this time or ram travel distance is used to determine just how far below the die the beam can be placed.

As the ram travels down or up in the case of an up-acting press and the beam is broken before the die reaches to within .100 of the part to be formed, the ram will retract immediately.

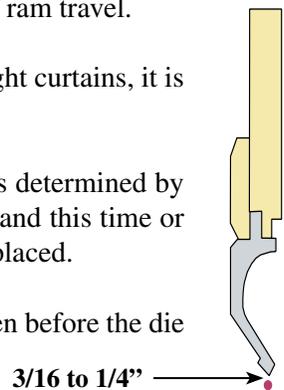
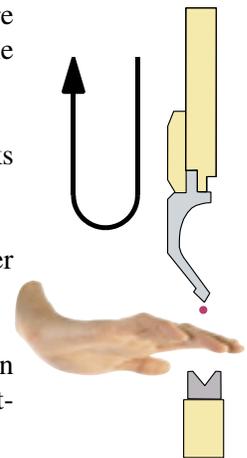
The machine’s slow speed function is used to reduce the risk of pinching even further. As the ram approaches to within a minimum of 1/2 inch above the part, the *Laser Sentry* forces the machine into slow speed. In slow speed the reaction time of reversing the machine is reduced drastically, thus allowing a greater margin of safety as the die closes.

To provide as near fail-safe operation as possible, the laser beam is pulsed at very high speed, a separate micro-processor monitors the laser pulse and will detect any malfunction in the laser transmitter or receiver and shut down the machine.

Two safety relays that are crosschecked by both processors are provided to control the ram motion valves.

An input from the machines’ control circuit that signals the ram to move is monitored so that when activated the *Laser Sentry* knows that ram motion is to begin and be maintained until the signal is de-activated. The *Laser Sentry* uses this information to monitor the output of the position transducer. Should it fail, the system will be shut down immediately.

Control reliability is provided by two microprocessors to maintain the transducer and the control the *Laser Sentry*’s operation while crosses checking each other for proper operation.





# SAFETY NOTICE

## Please read this message first!

The *Laser Sentry* is a control that reverses the machines' ram motion in the event the laser beam is interrupted during the hazardous portion of the stroke. Whenever the operator's safety is dependent on the machine's ability to stop and reverse quickly enough to prevent an injury, it is absolutely imperative that the safe stopping/reversing time of the machine be known and that the laser beam be set to the proper distance from the leading edge of the upper tool.

The *Laser Sentry* provides the reversing time of the machine in milliseconds when the machine is emergency reversed in any position and checks the time against a predetermined time that has been deemed safe. The reverse time is also displayed on the screen.

The *Laser Sentry* can and should be used to monitor the reversing time. Proper setting of the reverse time set point in the *Laser Sentry* is the sole responsibility of the employer, purchaser and final owner of the equipment.

**If the machine is incapable of reversing within 1/4 inch, the machine is unsafe and the hydraulic valve system should be repaired or replaced. DO NOT ATTEMPT TO OPERATE THE MACHINE IN THIS CONDITION! This requirement is the sole responsibility of the employer and or machine owner.**

The proper application, installation, maintenance and operation of the *Laser Sentry*, and the machine itself are the sole responsibility of the purchaser and or employer.

It is the purchaser and or employer's responsibility to inspect the *Laser Sentry*, the laser transmitter and receiver, and any other pertinent equipment daily for proper operation. It is also the purchaser and or employer's responsibility to know that the stop/reverse time monitoring set points and the mute set points are proper and safe for the operator.

The purchaser and or employer are also responsible for the selection and training of the personnel necessary to properly install, operate and maintain the machine and its safeguarding systems. For example, the *Laser Sentry* should only be installed, checked out and maintained by a *qualified* person, as "*a person or persons who, by possession of a recognized degree or certificate of professional training, or who, by extensive knowledge, training and experience, has successfully demonstrated the ability to solve problems relating to the subject matter and work.*" (ANSI B30.2-1983)

The user is the person(s) identified and designated by the employer as being appropriately trained and qualified to perform a specific procedure. Often the user is the installer, die setter, electrician, maintenance personnel, supervisor, foreman, etc. who is involved with the setup, daily test and checkout of the machine and the safety devices.

The *Laser Sentry* should never be accessed by anyone other than properly trained personnel so designated by the purchaser and or employer. If the machine operator is not properly trained to set up the machine or the *Laser Sentry* then a setup person so designated should perform the setup.

The machine operator must receive specific proper training on exactly which machinery is protected by the *Laser Sentry*, the machine's operating controls, warning signs and safety instructions. The machine operator must thoroughly understand and follow the company's safety rules and always use the safeguards and proper hand tools provided by the employer. The machine operator must immediately notify management if the machine, tooling or safety devices are not operating properly.

Never use the machine if it or the safety equipment is not in proper working order.

The *Laser Sentry* is provided with password protection. The purpose is to prevent untrained and unauthorized personnel from entering or modifying programs or from changing set points programmed for machine stop/reverse time monitoring and lost motion detection. It is the purchaser and or employer's responsibility to ensure that only trained and authorized personnel have access to these passwords and functions. The passwords can be changed at will by a supervisor.

**The following are additional requirements the purchaser and or employer must meet before using the *Laser Sentry*.**

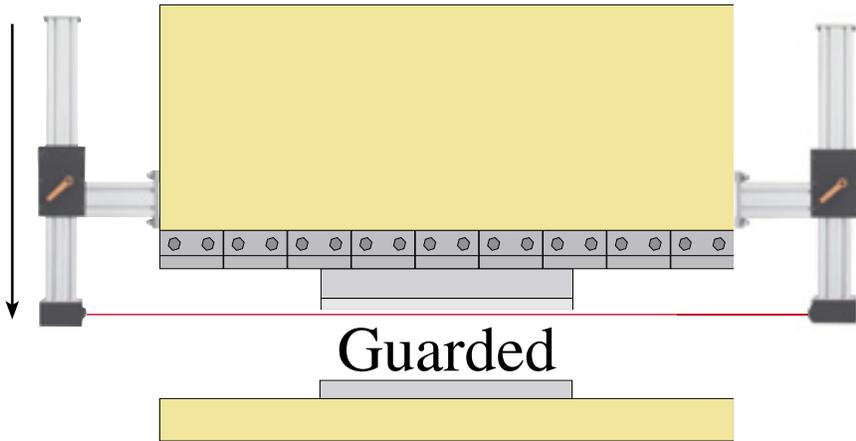
The machine on which the *Laser Sentry* is to be installed **MUST** be capable of stopping and reversing motion anywhere in the stroke or cycle in a safe time and within 1/4 inch of ram travel.

Do not use the *Laser Sentry* on any hydraulic press brake with inconsistent reversing time or inadequate control devices or mechanisms.

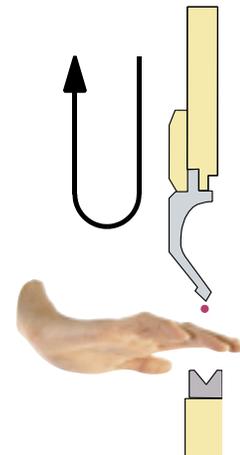
When the *Laser Sentry* is used to protect a machine operator from a hazard, the purchaser and or employer has the responsibility to ensure that all applicable federal, state and local Occupational Safety and Health Act (OSHA) requirements and any such rules, codes and regulations which may apply are satisfied.

All Safety related machine control circuit elements; including pneumatic, electric or hydraulic and their respective controls must be control reliable.

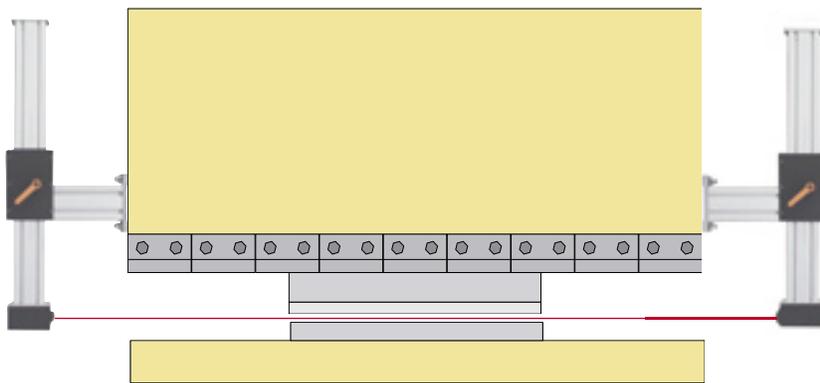
# PRINCIPLE OF OPERATION



The laser beam is active when the ram is descending, should the beam be broken before it reaches within .030 of the part being formed the machine will be immediately reversed.



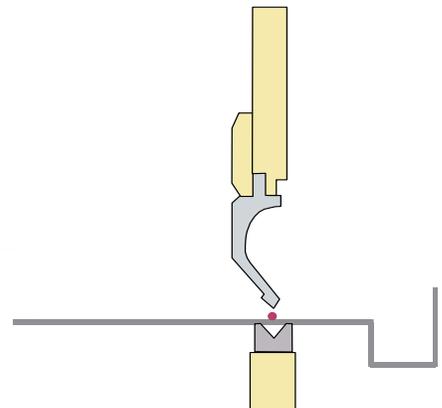
Reverses Ram



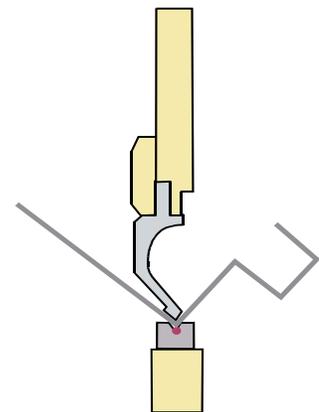
When the ram is descending, the machine is guarded by the **Laser Sentry**. At 1/2 inch or greater above the part being formed, the **Laser Sentry** shifts the machine's ram into slow speed. (down acting machines).

If the laser beam is not be interrupted by the part resting on the lower die, the ram will immediately reverse.

When the laser beam reaches the surface of the part being formed the **Laser Sentry** allows the ram to continue through the forming portion of the machine cycle allowing the part to be formed in the same manner as thought there where no guarding laser beam.



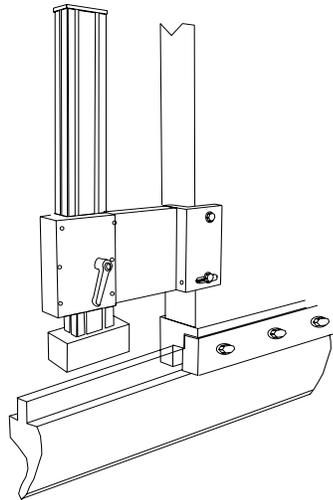
Laser beam detects part and allows the machine to continue forming.



Part is formed and the ram returns home.

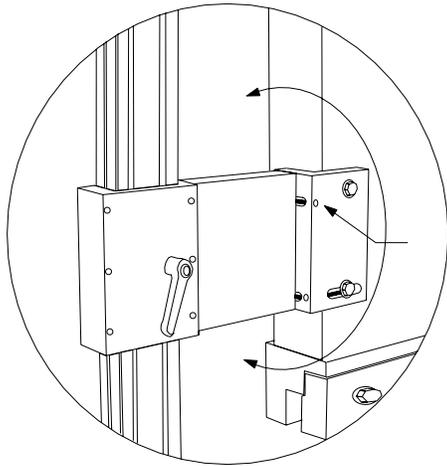


## INSTALLING THE *LASER SENTRY*

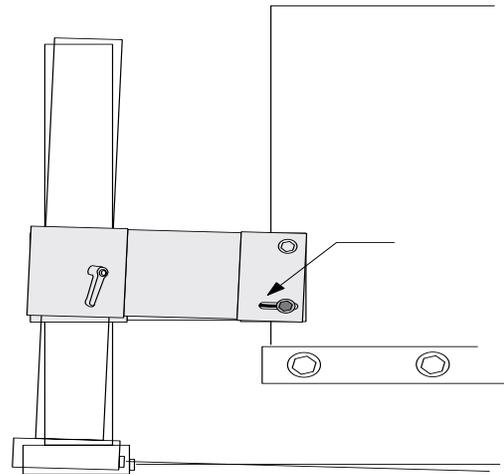


Mount the brackets so that when it is raised, the die can be safely removed.

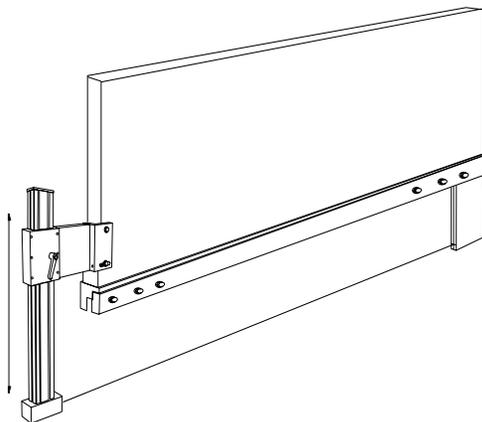
The mounting brackets have four points of alignment.



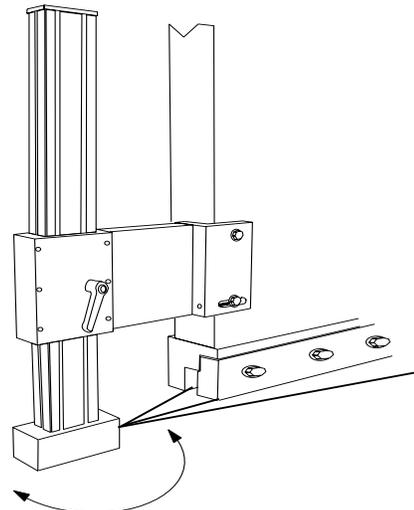
This one adjusts for vertical center and perpendicularity to the ram's die holder.



Adjustment for parallelism. See next view for details.

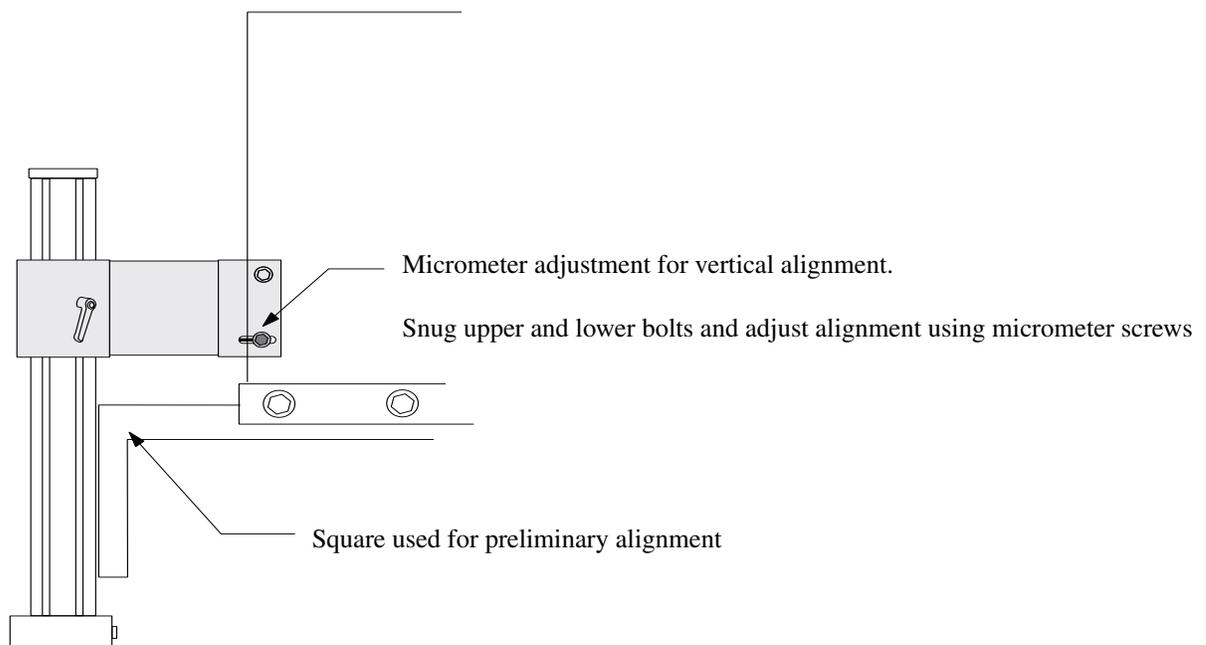
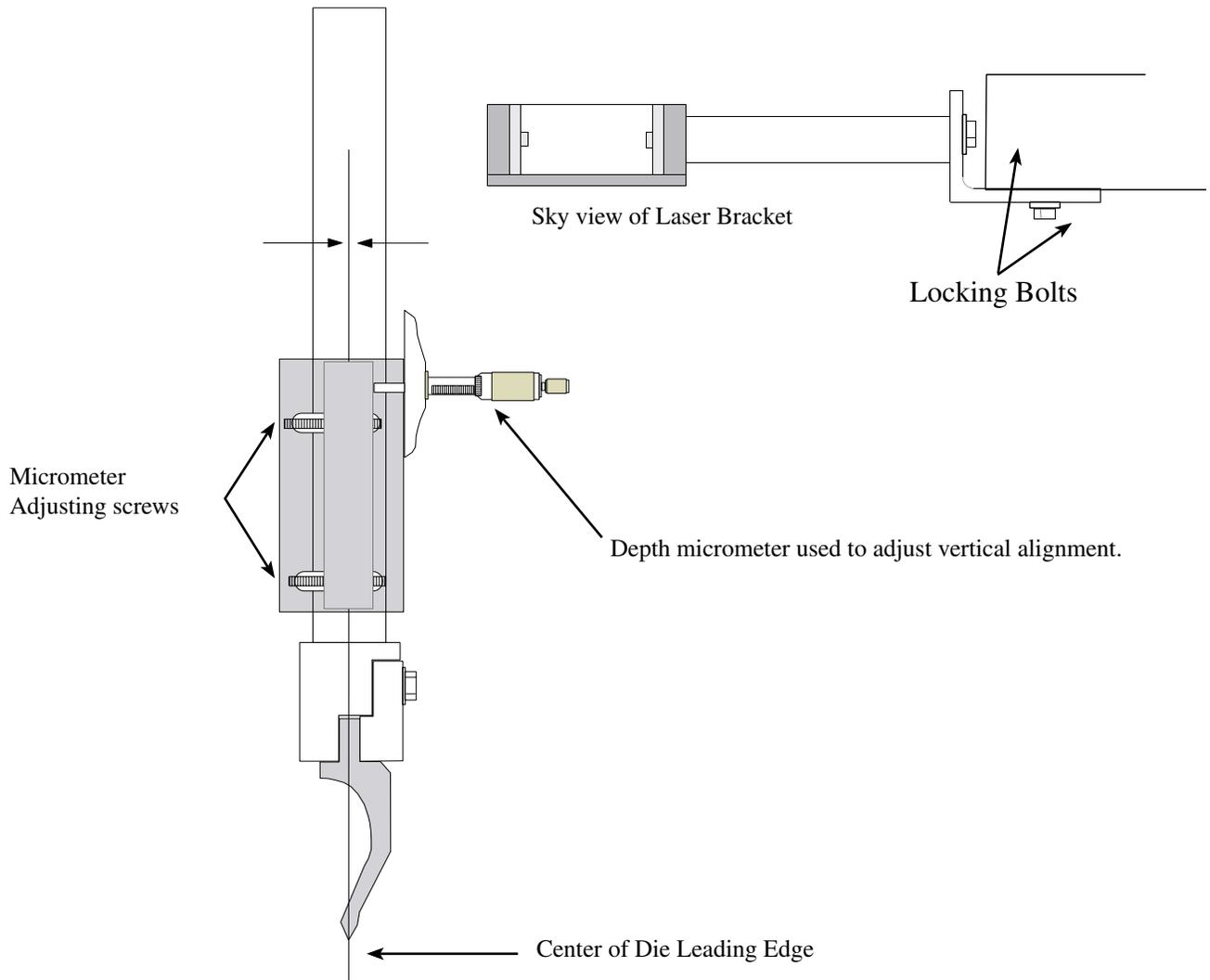


Adjustment for parallelism with the tool holder.

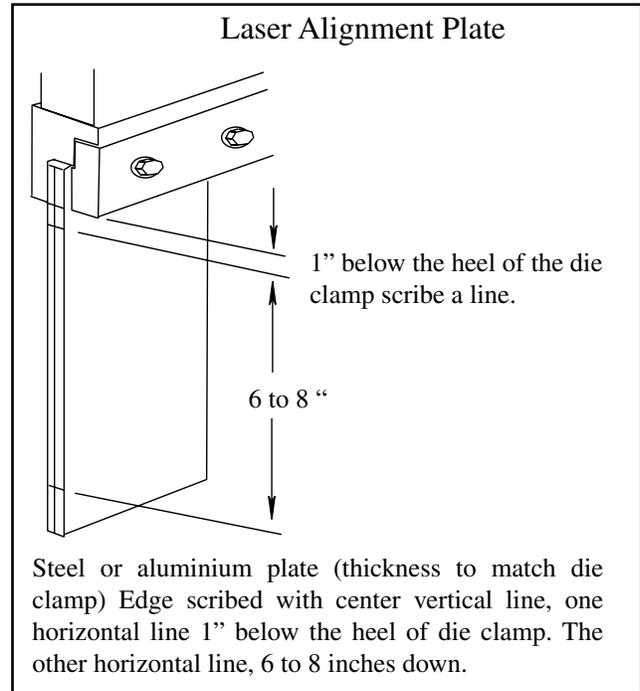
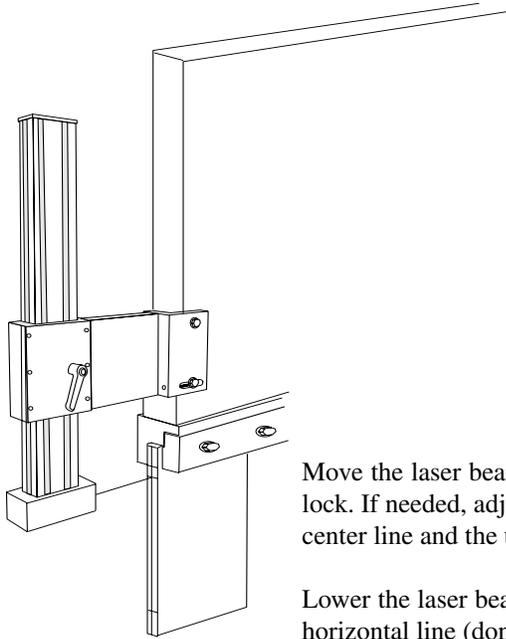


Beam angle adjustment. This is set at the factory and should only be adjusted as a last resort.

# MOUNTING AND ADJUSTING THE BRACKETS

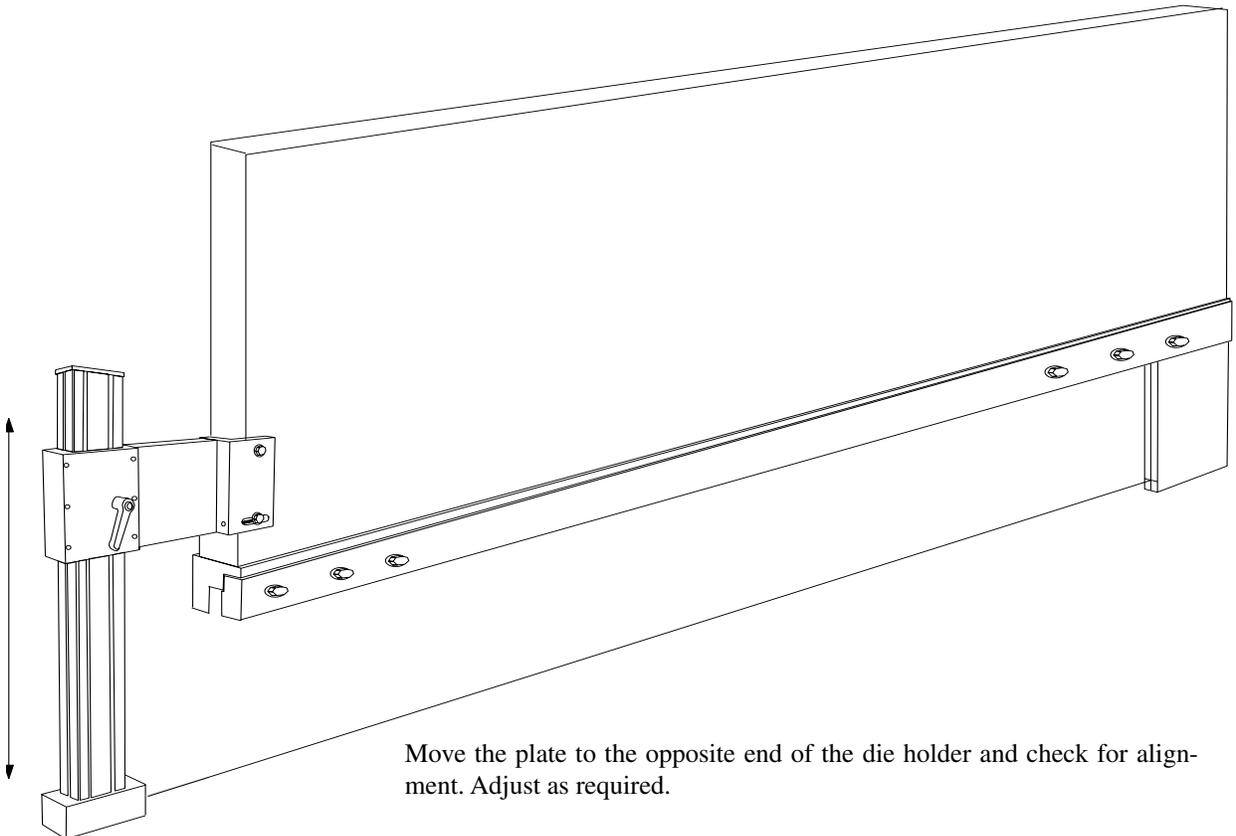


# PRECISION ALIGNMENT OF THE LASER TRANSMITTER



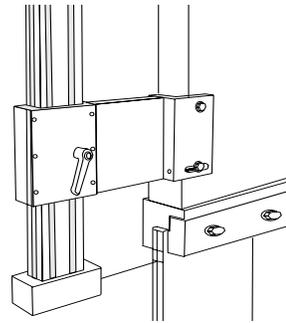
Move the laser beam up to the upper horizontal line and tighten the slide lock. If needed, adjust the bracket so that the beam is dead center with the center line and the upper horizontal line.

Lower the laser beam until it is aligned with the center line and the lower horizontal line (don't forget to tighten the slide lock). Adjust as required.



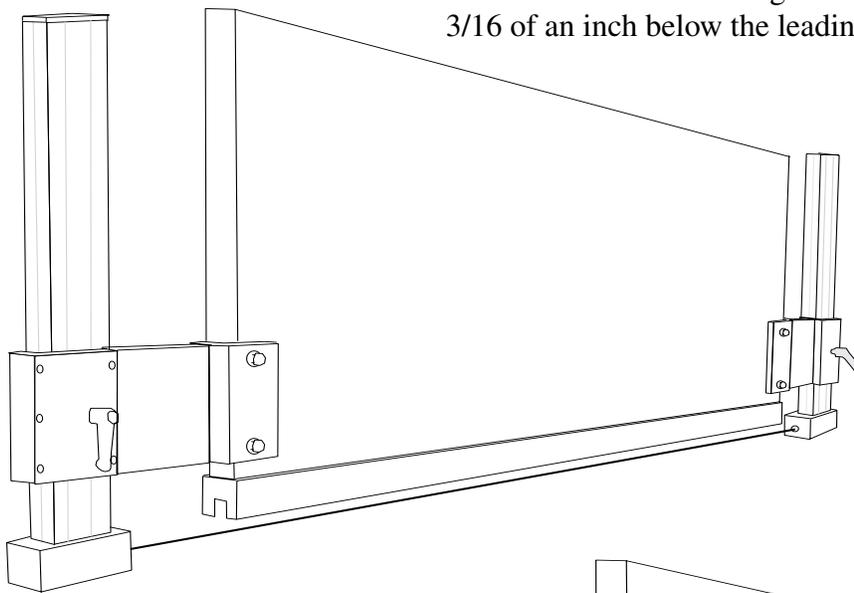
Move the plate to the opposite end of the die holder and check for alignment. Adjust as required.

## ALIGNING THE LASER RECEIVER



Once the laser transmitter has been aligned, move it so that the beam is aligned with the heel of the die clamp (top Scribed line on the alignment plate).

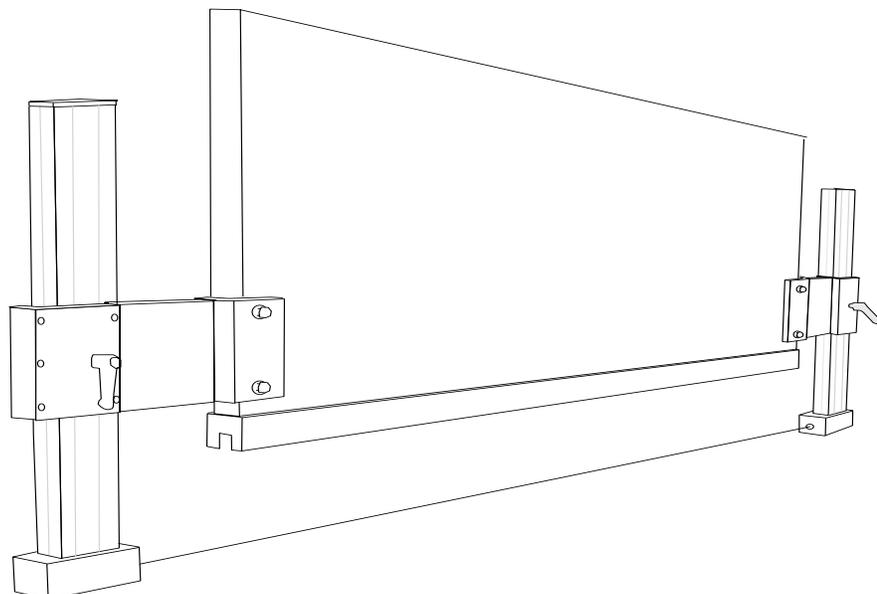
Loosen the scale's locking bolt and move the scale to read  $0 + 3/16''$ . Align the receiver up with the laser beam and lock its' scale to match. By setting the scale like this, whenever you adjust the laser beam to the length of the die, the beam will always be  $3/16$  of an inch below the leading die edge.



Align the receiver bracket using the same method as shown in (MOUNTING AND ADJUSTING THE BRACKETS).

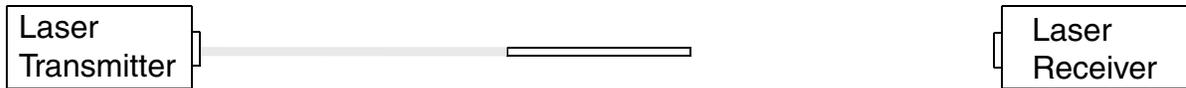
Once the laser receiver is adjusted for vertical and horizontal alignment move the laser transmitter up as shown. Make adjustments as required to align the laser beam exactly center in the lens of the receiver.

Lower the laser transmitter bracket 6 to 8 inches on the scale, then lower the receiver bracket the same distance. Check for alignment. The laser beam should be dead center in the receiver lens. Adjust the brackets as required and set the scale to match the one on the transmitter.



## ABOUT DETECTING OBJECTS

The Laser Sentry is capable of detecting objects as small as 1 MM. (.029), at a transmitter/receiver distance of 4 feet. As the distance increases the detecting size increases. At 10 feet an object as small as 2 MM. (.058) will be detected. The size detection sensitivity is not important for protecting personnel because body part size is much larger than 2 MM., but for part detection, size could be important.



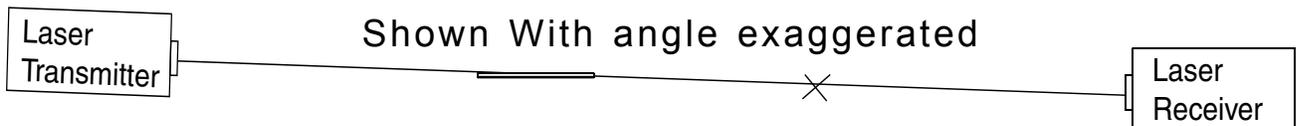
Part detection: Part blocks enough of the beam to prevent the laser beam from reaching the receiver.



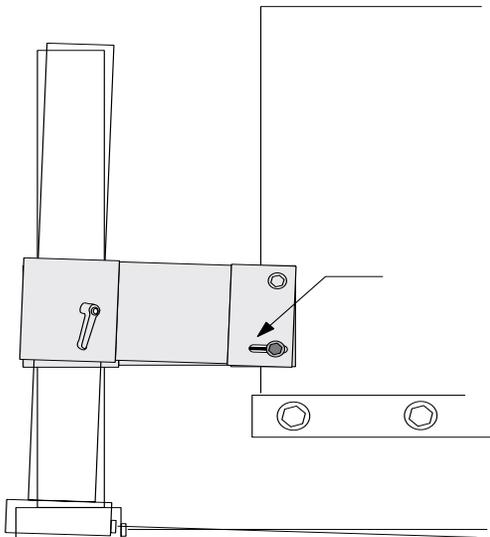
Increase the distance between the transmitter/receiver and the part will not be detected. This will cause a PART NOT DETECTED Fault.

If you are forming small thin parts, always teach the Laser Sentry the part surface with the part in the same place where you are going to form the part. Example: If you teach the control where the surface of the part is close to the transmitter, the beam will be smaller there, then if you try to form the part in the center of the machine, the beam is wider there and the part will not be detected.

If you are often forming thin small parts and you are getting PART NOT DETECTED errors it may be necessary to tilt the transmitter down so the beam is aimed at a cross section of the part, making the target thick enough for the laser to be blocked. (see below)



Transmitter angled about 1 degree. The laser beam is aimed through the part at an angle, effectively increasing the size of the target. The degree the transmitter is tilted is determined by the length of the machine. Use the smallest possible angle.

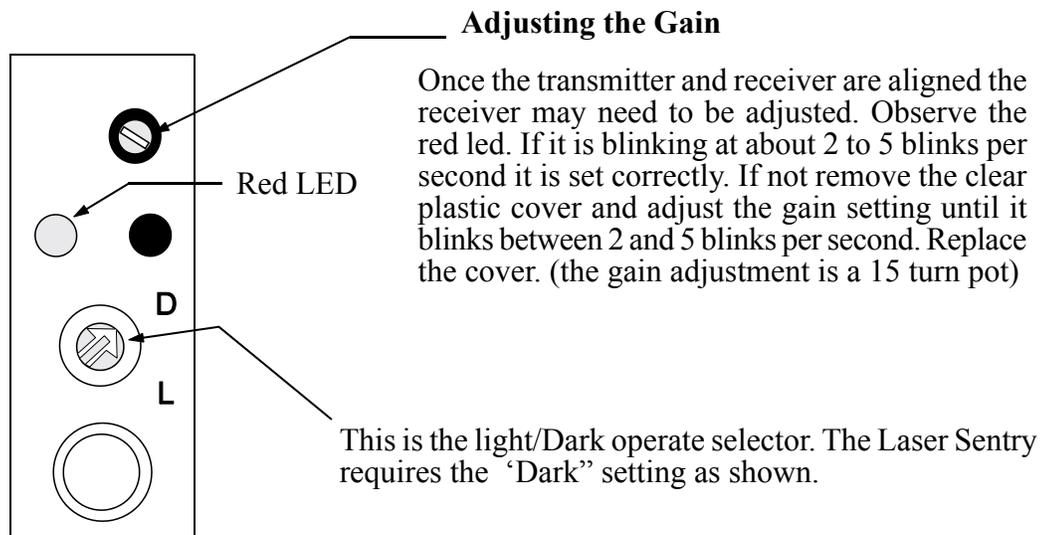
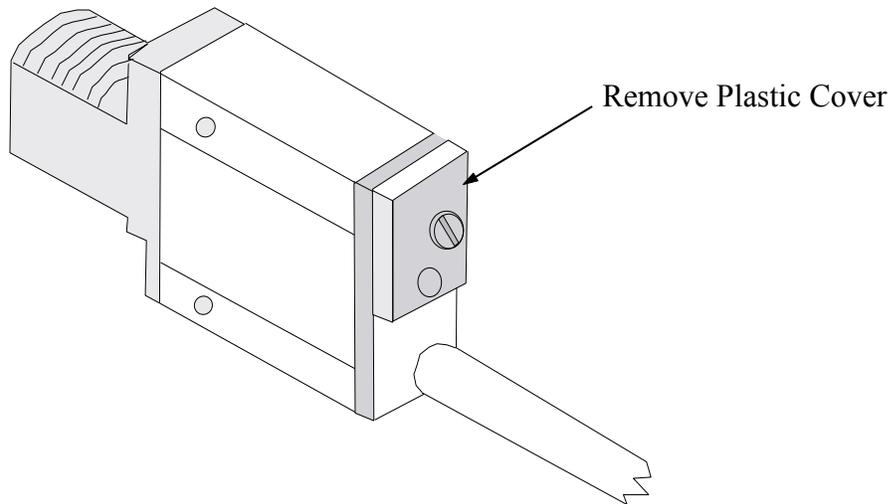


Tilt the transmitter by loosening the holding bolts slightly. Place a target at the very end of the press bed. Adjust the transmitter angle.

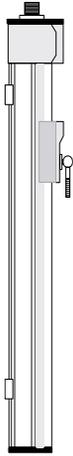
Align the receiver with the beam and adjust the receiver scale so that it reads the same as the transmitter's scale.

## ADJUSTING THE LASER RECEIVER

The laser receiver is adjusted at the factory for a 10' span. If you experience laser beam faults it may be because of the receiver adjustment. Remove the housing covers and observe the red LED as instructed below.

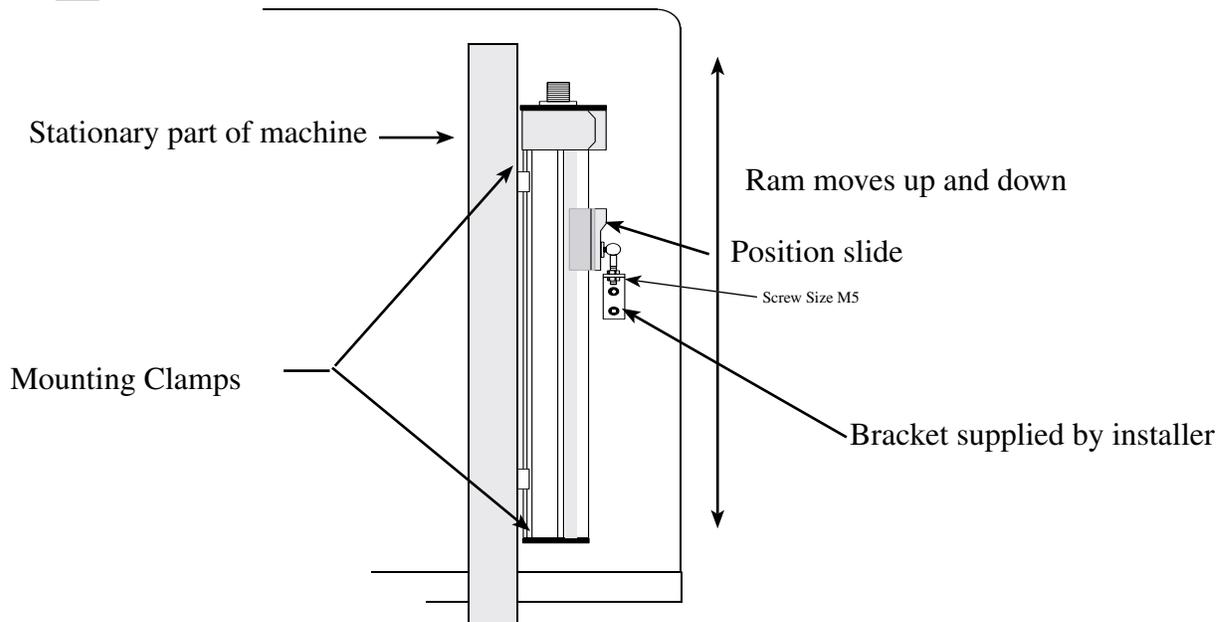


# MOUNTING THE RAM POSITION TRANSDUCER



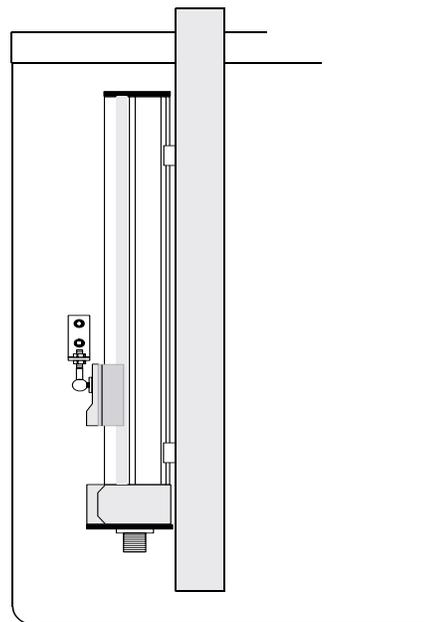
The *Laser Sentry* uses a linear transducer to monitor the ram's movement and position. Position is accurate to .0025 inches. The housing is mounted to the stationary part of the machine and the slide is connected to the moving ram.

The slide is provided with a ball socket screw to allow for slight mis-alignment. When installing, alignment should be accurate enough as to not cause binding of the slid.

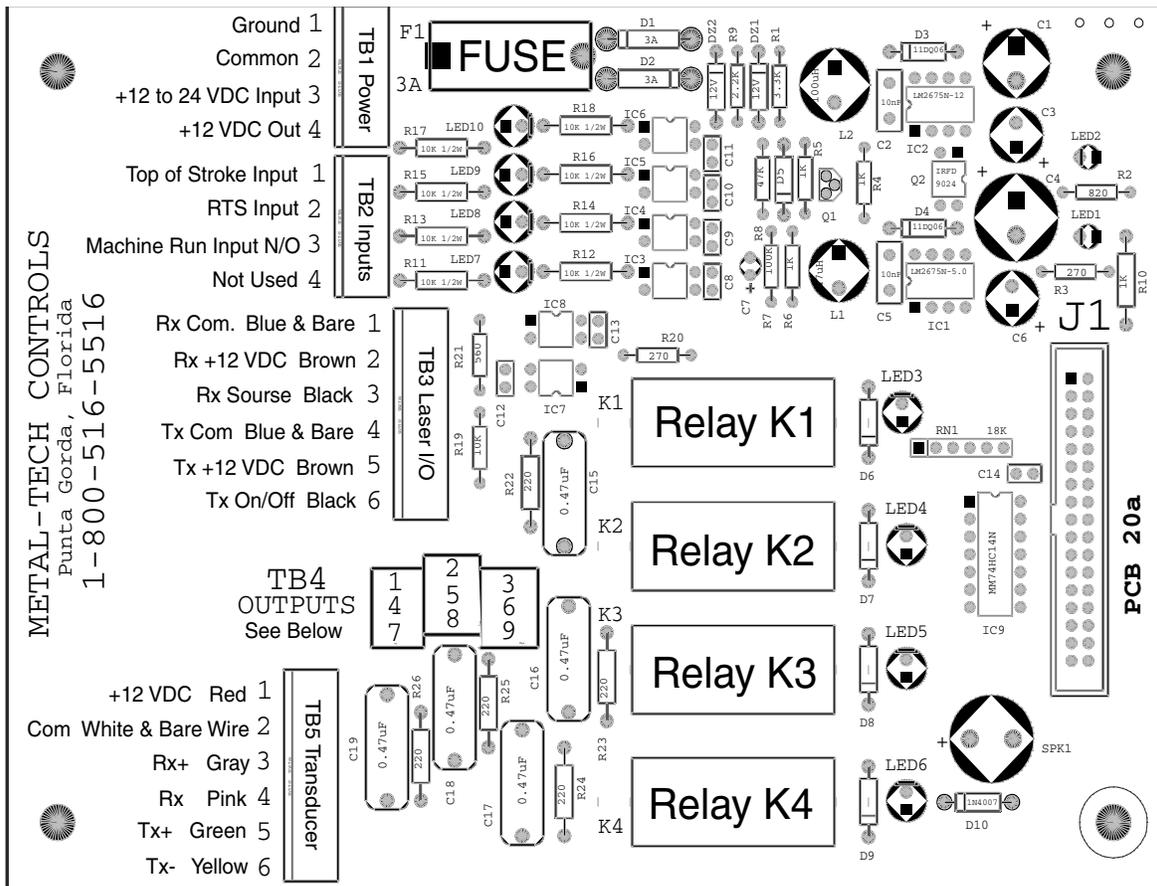


## UP-ACTING MACHINES

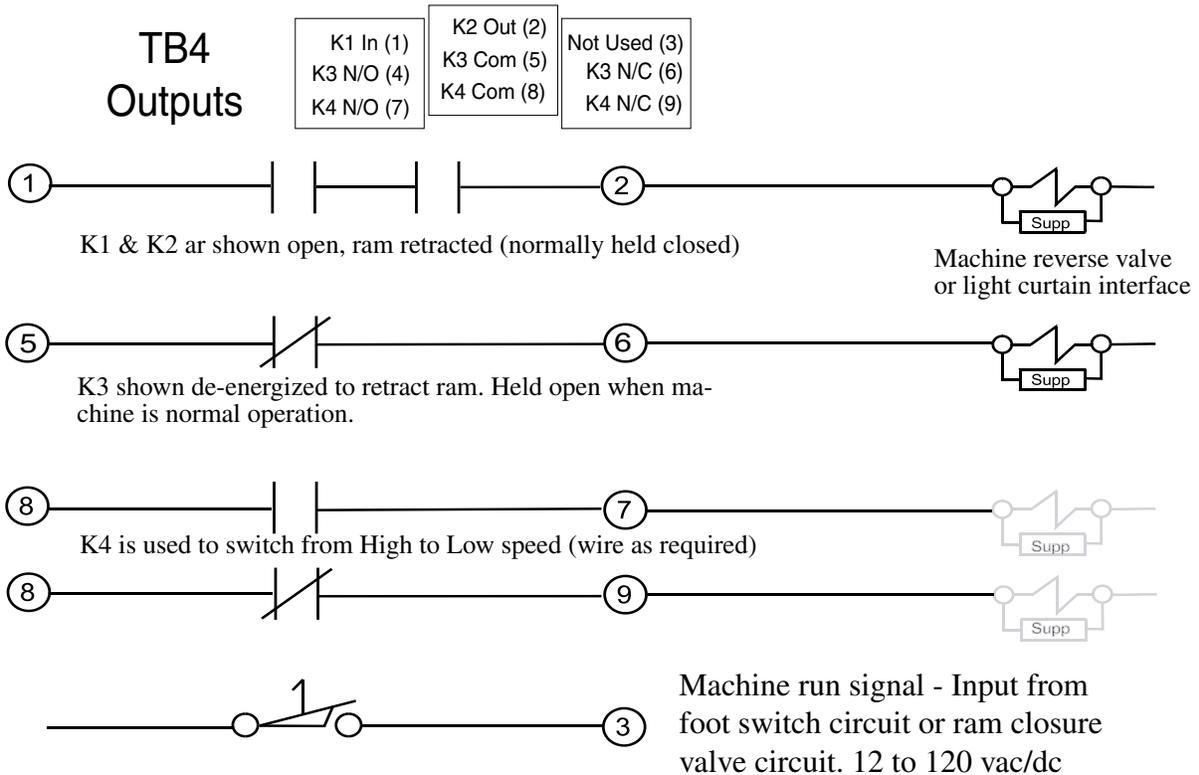
Mount the transducer in this direction in the same manner as shown above.



# ELECTRICAL INSTALLATION AND REQUIREMENTS



Cable Connector to Bottom Board



## TB1 POWER SUPPLY

TB1 is the DC power supply terminal. The *Laser Sentry* can accept a DC power supply between 12 and 24 VDC. If you do not have DC power available the a power supply can be purchased for most electrical supplier or from us. Part No. 400-MKS4012. Terminal 1 is a spare terminal that is +12 VDC for external use. Do NOT connect you power supply to it. Both common and a machine ground must be connected to TB1 as shown.

## TB2 INPUTS

The *Laser Sentry* requires a N/O machine (run) input from the circuit that closes the ram i.e. the foot switch circuit or down valve closure circuit. This input may be 12 to 120 volts DC or AC. Terminal 1, 2 and 3 are reserved for OEM applications.

When using the Wavy Material Function, the ram is retracted when the laser beam is interrupted by the wavy material (or anything else). The ram retracts until the laser beam is no longer broken and the ram is stopped. The *Laser Sentry* requires that the machine (run) input goes low, (foot switch is released), before allowing the ram to try to close again. It may be necessary to use a foot switch with two micro-switches in it. One switch controls the machine the other provides the ‘go’ signal to the *Laser Sentry*. By adjusting the switch sequence you can set the foot switch up so that by releasing it halfway the ‘go’ signal to the *Laser Sentry* signal goes off but the switch serving the machine remains on causing the ram to remain stopped. See the Relay sequence table below.

## TB3 LASER I/O

These are inputs and outputs for the laser transmitter and receiver. Wire them as shown in previous page drawings.

## TB4 - OUTPUTS

The *Laser Sentry* provides a pair of force guided contact safety relays, K1 and K2. These relays have normally open contacts which are held closed by the *Laser Sentry*. The relay contacts are monitored for contact weld and failure to open or close. Should one fail the *Laser Sentry* will immediately shut down the press and issue the message, “RELAY FAILURE”.

K1 and K2 are used to control the ram closure valve. When K1 and K2 de-energizes the machine’s ram should reverse or stop. (stop is required for use of the Wavy Material Function).

K3 relay is switched at the same time as K1 and K2. K3 has Common, N/O and N/C contacts to be used as required. K3 should be wired so that when it is de-energized the ram retracts. (If K1 and K2 stops the machine then K3 should be used to reverse the ram).

		OP=F/S Released	CL=F/S Pressed	X=Relay Energized	O=Relay De-Energized
		Foot Switch	K1	K2	K3
A	RAM CLOSING AT HIGH SPEED	CL	X	X	X
B	RAM CLOSING AT SLOW SPEED	CL	X	X	X
C	RAM RETRACTING NORMAL	CL	X	X	X
D	RAM RETRACT BEAM BROKEN	CL	O	O	O
<b>WAVY MATERIAL</b>					
1	RAM CLOSING BEFORE SLOW SPEED	CL	X	X	X
2	RAM CLOSING AT SLOW SPEED	CL	X	X	X
3	BEAM BROKEN (Ram Retracting)	CL	O	O	O
4	RAM STOPPED (Beam Cleared)	CL	O	O	X
5	RAM STOPPED (Now In Low Speed)	OP	O	O	X
6	RAM CLOSING (Repeat of 3 - 6 for 2 times)	CL	X	X	X
<b>REPEATS 3 thru 6</b>					

**NOTE:** See additional information on next page.

K4 relay is the high/low speed control relay. It is to be connected into the machine’s high/low speed change valve. Many up-acting machines do not have this type valve because the operator controls the speed by how much he/she presses the treadle down. On these machines K4 is not used. Even if the machine has its’ own high/low circuit K4 should be installed into that circuit. It is designed to force the machine into slow speed even if the machine’s slow speed is set lower than 1/2 inch or turned off.

## TB5 LASER I/O

The wiring of the transducer is crucial. Wire exactly as shown. The bare shield **MUST** be connected to terminal #2 along with the white wire!

## WAVY MATERIAL ELECTRICAL CONCEPTS

The requirements for using the Wavy Material Function need further clarification. In normal operation the **Laser Sentry** simply reverses the ram direction at high speed. This means (depending on the machines control circuit) de-energizing the down valve and energizing or de-energizing the up valve again, (depending on the machines control circuit).

When using the Wavy Material Function the following occurs; beam is broken before reaching the programmed material mute point; ram retracts until the beam is no longer broken and stops, the **Laser Sentry** waits for the ‘Go Signal’ or foot switch input to go away (input TB2 #3), it then waits for the ‘Go Signal’ to come back ‘ON’ before allowing the ram to close. It will do this 3 times if the obstruction remains. After the third time the ram will be allowed to close.

This requirement may cause the machine’s circuit to do strange things. If it does, a means must be found to overcome this. One way to do it is to isolate the **Laser Sentry’s** input TB2 #3 from the machine’s control inputs. This can be done by using a foot switch with two micro switches. The switches can be adjusted so that when fully pressed both micro switches “switch” and if the foot switch is only half released only one micro switch will “switch”. Use this switch to supply the “Go Signal” to input TB2 #3.

## DIAGNOSTICS

From the MACHINE SETUP menu select (6) for diagnostics. The machine will be placed in diagnostic mode. You can move the ram up and down but the laser beam will always be in the guarded mode. Interrupt the beam and the machine will reverse.

The display will show.

Trans=04536	Dir=1
INPUTS	S=05630=0
1234567890	M=06130=0
1001111011	

Numbers shown are representative

Trans= is the transducer position reading. This number should increase as the ram closes.

Dir= is the direction the machine is moving. 1 for closing, 0 for opening.

INPUTS, the 1234567890 represents inputs 1 through 10 as follows.

1-Laser Status 1	6-PosReady
2-Laser Status 2	7-K1_Test
3-Machine Go Input (foot Switch)	8-K2_Test
4-PIC Run Status	9-RTS
5-PIC Dog Status	0-TOS

S=05630=0 is the transducer position where slow speed is started, the =0 will change to =1 when the ram has reached the slow speed position programmed into the **Laser Sentry**.

M=06130=0 is the transducer position (where the laser beam is broken by material during QUICK TOOL setup) and the laser beam is muted (ignored) so that the part can be formed.

In most cases you will be instructed by Metal-Tech technical support as to what the status of the inputs are.

# MACHINE SETUP

## Run Menu

LASER---\* BRAKE GUARD  
WAVY PART is OFF  
Ram Reverse Time 065

When in this Menu press the MENU key to access the Main Menu.

Enter Your Password

PASSWORD

Entry into the Machine Setup Menu requires a password. Enter 1234. (Once you have entered the Machine Setup Menu, change you password following the directions (4).

## Main Menu

1=QUICK MENU  
2=WAVY PART OFF  
3=DISABLE  
4=MACHINE SETUP

Press '2' to gain access to the Machine Setup Menu.

\*\*\* SETUP MENU \*\*\*

1=SET SLOW POSITION  
2=LOST MOTION  
Press Down Fo More

Use the UP/DOWN arrow keys to move through the menus. Select the item to edit and follow the instructions given bellow.

## MACHINE SETUP MENU

1=SET SLOW POSITION  
2=SET LOST MOTION  
3=SET REVERSE TIME  
4=PASSWORD MENU  
5=DIRECTION HYSTERESIS  
6=DIAGNOSTICS

These are you menu choices. As you scroll through the menu you will have access to each function.

### (1) Slow Speed:

Ram slow down speed control is provide by the K3 relay. This is a safety related requirement. The default speed change is .500 above the programmed material setting. You cannot set it lower than this. You can set it higher if desired. Select (1) from the menu and enter the new setting.

### (2) Lost Motion:

This is a time in milliseconds. It is used to detect if the position transducer is working properly. We ram motion is called for by press the foot switch a timer begins ticking. As the ram positions change and the transducer is sending the proper position this timer is reset to zero. If there is a transducer fault

the timer will not be set to zero and a MOTION FAULT will be generated, stopping and reversing the machine. Each machine is different, set this time as low as possible. Start at 50 mS and work your way up until no errors occur. DO NOT SET HIGHER THAN ABSOLUTELY NECESSARY! Serious injury could occur if this setting is set to high!

### (3) Reverse Time:

Each time the ram is reversed the time it takes to retract is timed. If the reverse time exceeds the programmed reverse time check number a fault occurs preventing the machine from further operation until the problem is corrected. To determine the best reverse time setting, install the heaviest die you have in the ram tool holder. Select a stroke of about 4 inches. Place a block of wood so that the laser beam will be interrupted about one inch from the bottom. Cycle the machine and each time it reverses record the displayed reverse time. Do this about ten times and take an average by dividing the total times by the number of times. Enter this number plus 10 percent.

### (4) Password Menu:

There are three levels of password protection provided. Setup person, Supervisor and 10 Users. The setup person is anyone authorized to make changes to everything but the Supervisor's password, this includes changing the 10 Users passwords. The Supervisor can make changes to anything, including changing everyone else's password. All passwords must be greater than 1000 and less than 65535. 65535 is the limit of a integer word in machine memory.

Factory Preset Codes:

User	1234
Setup	4321
Supervisor	5678

All passwords should be kept secure.

PASSWORD MENU	
1=USER	2=USER = ON
3=SETUP	4=SUPERVISOR

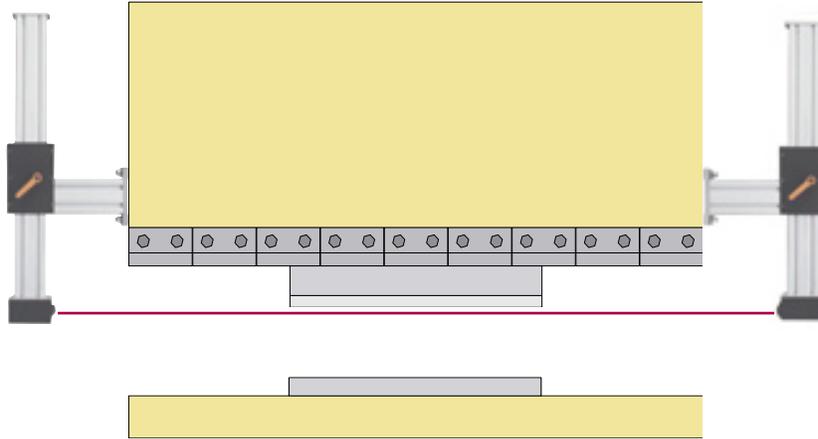
Selection (2) allows you to require a USER's password to be entered anytime the machine is powered up. As many as 10 Users can have individual passwords. You can change and or view these passwords by selecting (1) and using the Up and Down arrow keys to scroll through the 10 passwords.

The machine can be disabled by selecting disable from the Main Menu. You must enter a password to re-enable the machine.

### (5) Direction Hysteresis:

This should never be changed unless instructed to do so by Metal-Tech Controls' technical support staff. The factory setting is 20.

# GUARD SETUP INSTRUCTIONS



## QUICK TOOL SETUP:

Determine the depth of the die and move the Laser Transmitter so that the scale matches the die depth. Check to be sure the beam is centered under the die leading edge and the proper distance below the leading edge of the die. Align the Laser Receiver scale to the same setting. The green indicator lamp will be on when they are aligned.

LASER---\* BRAKE GUARD

WAVY PART is OFF  
Ram Reverse Time 065

This is the screen seen when in normal running mode. Press the MENU key.

1=QUICK MENU  
2=WAVY PART OFF  
3=DISABLE  
4=MACHINE SETUP

This screen will appear.  
Press [1] for QUICK MENU.

SET GUARDED RANGE

Move Ram to Material  
To Set Guarded Range

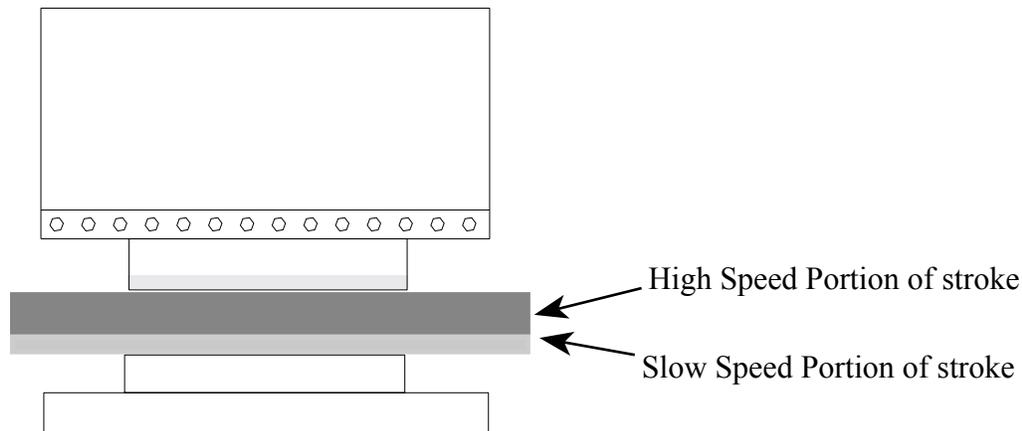
The machine is placed in slow speed. Place the part to be formed or a scrap piece on the surface of the lower die and press the foot pedal and lower the ram down until the laser beam is broken by the part.

GUARDED RANGE IS SET  
Press ENTER to Save  
Press CYCLE to Redo  
Press SKIP to Quit

If the setting is satisfactory, press the ENTER key. If you inadvertently interrupted the beam by accident press CYCLE and you will be instructed to lower the ram again. If you wish to quit the programming, press SKIP and you will return to the run screen.

**CAUTION!** This is a dangerous machine. Use extreme care when operating this machine. It is YOUR responsibility to insure that the machine safety devices are working properly. If they are not working properly IMMEDIATELY shut the machine down and advise a supervisor of the situation.

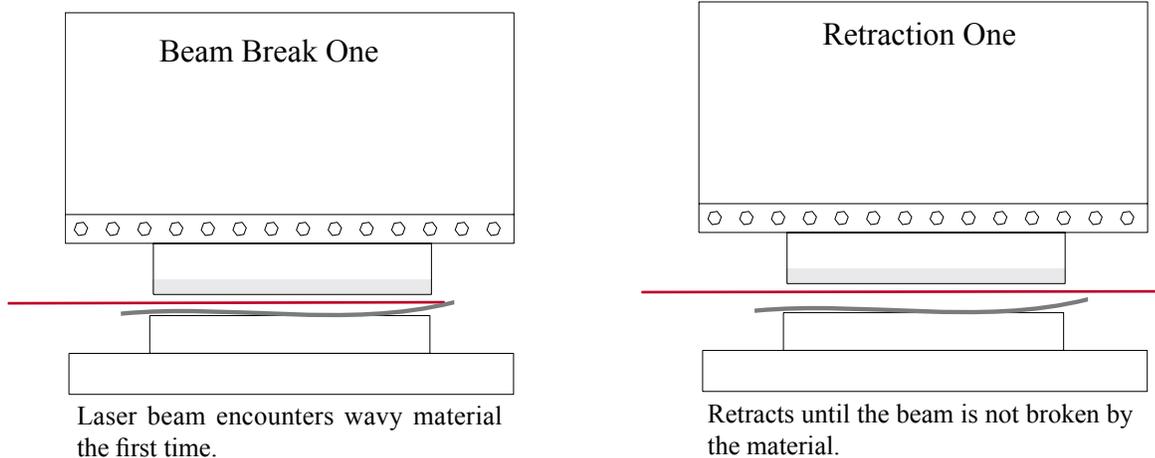
# WAVY MATERIAL FORMING

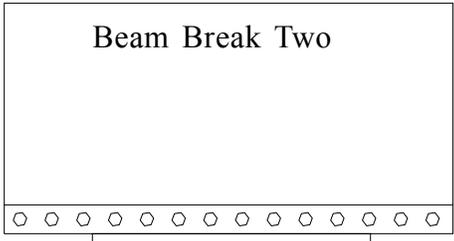


Safety First! It is the overall objective to provide a safe press brake for the operator and any other personnel around the machine. There are times when this is just impossible to do. Wavy or kinked material is one prime example. While the procedure explained below may seem awkward, we have found that once a person gets used to it, it is quite easy to use. Usually when a part is wavy, the first bend will straighten it out so that subsequent bends can be made in the regular manner. So be patient, and make parts safely.

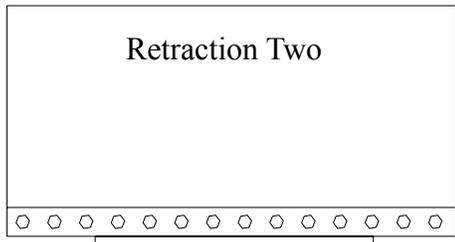
Wavy material will break the laser beam causing the ram to retract. To overcome this problem the **Laser Sentry** has a function called "Wavy Part", selection [2] on the main menu. This function can be turned ON and OFF as required.

When "Wavy Part" is turned ON, the ram will descend at high speed then shift to slow speed as usual. Once the machine has reached the slow speed ram position and a wavy part or anything else interrupts the laser beam the ram will retract up until the laser beam is cleared, and then stop. By releasing the foot switch and re-pressing it the ram will attempt downward movement in slow speed, if the laser beam is broken a second time the ram will retract and stop. Release and press the foot switch again, if the beam is broken again the ram retracts and stops. Press the foot switch again and the ram will descend, the laser beam will be ignored and the wavy part can be formed in slow speed.

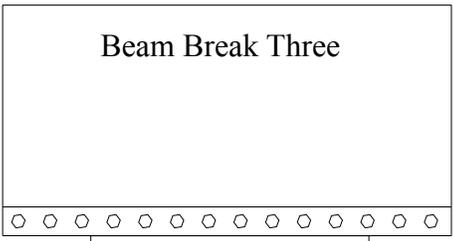




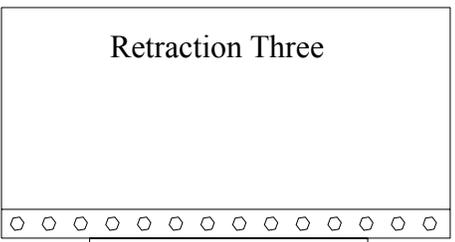
Laser beam encounters wavy material the second time.



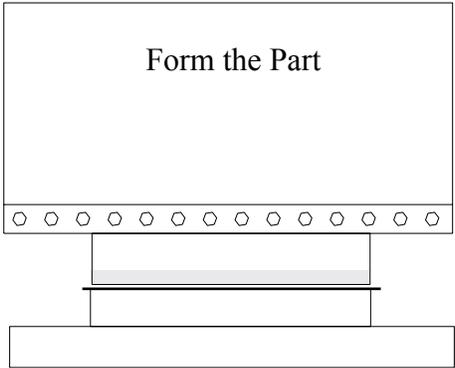
Retracts until the beam is not broken by the material.



Laser beam encounters wavy material the third time.



Retracts until the beam is not broken by the material.



Press the foot switch a 4th time and the ram will descend in slow speed, the laser beam will be ignored and the part can be formed without interference.

## OTHER LASER SENTRY FUNCTIONS

### **FREE STROKE (No Part Detection):**

There may be times when you need to re-press a part, possibly because the part was not pressed deep enough. You may do this for one cycle only by pressing the CYCLE key while in normal run mode. The screen will display 'No Part Free Stroke'. You may make one free stroke without have the laser detect the part.

## WARRANTY

**Metal-Tech Controls Corp.** - herein after referred to as **MTCC** warrants its products to be free from defects of material and workmanship and will, without charge, replace or repair the MAIN CONTROLLER BOARD found to be defective upon inspection at its factory, provided the equipment has been returned, transportation prepaid, within TWO years from date of shipment. At MTCC's option: Upon receipt of a purchase order from the owner for the price of the part needing replacement or repair MTCC may opt to send a replacement part. Upon receipt of the defective part from the owner and inspection by MTCC and where the part is found to be defective by no cause of the owner a credit will be issued. For the RELAY INTERFACE piggyback Board there is a ONE year warranty with the same conditions as above.

**Ten Year Main Controller Board exchange warranty and policy:** After the initial 2 year warranty period MTCC will replace the defective MAIN CONTROLLER BOARD for the exchange fee of \$600.00 provided the defective board is repairable. A purchase order for the full price of an exchange board must be provided to MTCC. Upon receipt of the defective board from the owner and inspection by MTCC and where the part is found to be defective by no cause of the owner a credit will be issued less the \$600.00 exchange fee. The fee for an exchange RELAY INTERFACE piggyback board is \$250.00. These prices are effective from the date imprinted on the front cover of this manual and are subject to change one year after said date. If the date is more than one year old, call the factor of current prices.

**800-516-5516**

Warranty is specifically at the MTCC's factory. Any on site service will be provided at the sole expense of the purchaser at MTCC's standard field service rates.

**THE FOREGOING WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES NOT EXPRESSLY SET FORTH HEREIN, WHETHER EXPRESSED OR IMPLIED BY OPERATION OF LAW OR OTHERWISE INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

No representation or warranty, expressed or implied, made by any sales representative, distributor, or other agent or representative of MTCC which is not specifically set forth herein shall be binding upon MTCC. MTCC shall not be liable for any incidental or consequential damages or loss arising from reduced or lost production, or expenses directly or indirectly arising from the sale, handling, improper application or use of goods or from any other cause relating thereto and MTCC's liability thereunder, in any case is expressly limited to the repair or replacement (at MTCC's option) of goods supplied by MTCC.

All associated equipment must be protected by properly rated electronic/electrical protection devices. MTCC shall not be liable for any damage due to improper engineering or installation by the purchaser or third parties. Proper installation, operation and maintenance of the product becomes the responsibility of the user upon receipt of the product.

