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# IRONWORKER

**For IW66D/DX, IW88D/DX, IW110D/DX, IW135DX  
and IW180 DX**

- Safety
- Installation
- Operation
- Maintenance
- Parts Catalog

Part No. PL/OMIW-2CYL\_V2 06/14

**Record your machine's serial number here:**

---



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# A MESSAGE OF SAFETY

# SPARTAN IRONWORKER

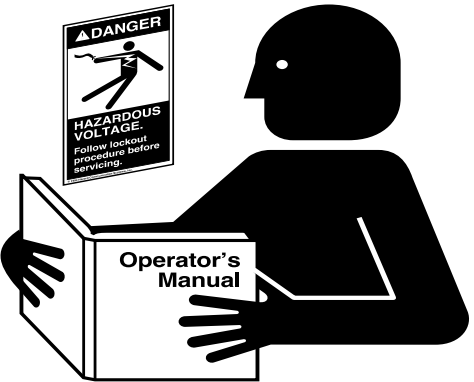
## IMPORTANT MESSAGE

While Marvel Manufacturing Co. Inc. machinery and equipment is engineered for safety and efficiency, a high degree of responsibility must be placed upon the machine operator to follow safe practices, based primarily on common sense, upon which true safety depends. Any machine with a potential safety hazard must be operated according to the instructions in the instruction manual, within the equipment's capacity, and in a careful and deliberate manner. All guards must be in place, and safety glasses and other applicable safety clothing must always be used. The machine must be inspected and maintained regularly.

Any questions regarding the safety, condition, or operation of this equipment must be immediately referred to supervisory or engineering personnel.

The warning sign reproduced below is attached to the machine in plain view of the operator to constantly remind the operator that only s/he can make this machine safe by following safe operating procedures. This sign must not be removed or disfigured. The sign must be replaced if it becomes unreadable. Replacement signs can be obtained from Marvel Manufacturing Co. Inc.

**⚠ WARNING**



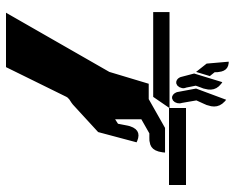
Misuse of this machine can cause serious injury.

Follow the operator's manual and safety decal instructions for installing, operating, and servicing this machine.

This machine must only be installed, operated, and serviced by people familiar with industrial machines, the hazards of industrial machines and the environment in which they are used, and the industry accepted methods of safeguarding against those hazards.

81-NP68

**⚠ WARNING**




This machine can cut off fingers and hands.

To avoid serious injury:

- Keep fingers and hands away from tooling.
- Keep the safety guards in place.
- Always use the holddowns to clamp the material.
- Turn off the machine before changing tooling.

IW45-NP3

**⚠ WARNING**




Material punched or sheared with this machine will have sharp edges.

To avoid serious injury always wear gloves when handling the material.

IW45-NP4

**⚠ WARNING**



Avoid serious injury from electric shock or unwanted machine operation.

Lock the Main Electrical Disconnect switch in the "Off" position before adjusting or servicing this machine.

15-NP17

A MESSAGE ON SAFETY .....	ii
CONTENTS.....	iii
<b>SAFETY.....</b>	<b>S-1</b>
WHO MAY USE THIS MACHINE?.....	S-2
FOLLOW THE INSTRUCTIONS .....	S-2
RECOGNIZE SAFETY INFORMATION.....	S-2
SAFETY SIGNAL WORDS .....	S-3
WEAR PROTECTIVE EQUIPMENT .....	S-3
STAY CLEAR OF MOVING PARTS.....	S-3
HANDLE CHEMICALS SAFELY .....	S-4
REMOVING DEBRIS.....	S-4
SAFE MATERIAL HANDLING.....	S-5
ELECTRICAL HAZARDS .....	S-5
HAZARDOUS METALS.....	S-6
HIGH PRESSURE FLUIDS.....	S-6
PUNCHING & SHEARING EQUIPMENT .....	S-6
KEEP THE MACHINE SAFE .....	S-7
KEEP THE WORK AREA SAFE.....	S-7
OPERATE THE MACHINE SAFELY .....	S-7
SERVICE THE MACHINE SAFELY .....	S-8
<b>INSTALLATION.....</b>	<b>A-1</b>
<b>GENERAL SPECIFICATIONS.....</b>	<b>B-1</b>
<b>MACHINE DESCRIPTION.....</b>	<b>C-1</b>
<b>PUNCHING STATION.....</b>	<b>D-1</b>
<b>NOTCHING STATION .....</b>	<b>E-1</b>
<b>ANGLE SHEARING STATION.....</b>	<b>F-1</b>
<b>BAR SHEARING STATION.....</b>	<b>G-1</b>
<b>FLAT BAR SHEARING STATION.....</b>	<b>H-1</b>
<b>MAINTENANCE.....</b>	<b>J-1</b>
<b>REPAIR PARTS.....</b>	<b>P-1</b>

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**Industrial Machinery can be Dangerous.**

**Read the safety messages on the following pages as well as the instructions in the operator's manual and those posted on the machine before attempting to install, operate, or maintain this machine.**

While Marvel Manufacturing Co., Inc. has made every effort to eliminate the potential dangers in its equipment through careful design and guarding, this equipment, if not operated and maintained properly, has the potential to cause serious injury or death.

A thorough knowledge of the operation of this machine and the hazards it presents is your best protection against injury.

**Attention Users of Older Marvel Equipment:**

Marvel equipment is ruggedly built and many machines are still operating well beyond their anticipated useful life. Older equipment may not meet current standards and may have been modified outside the control of Marvel Manufacturing Co., Inc. While we are happy to support your use of this equipment, we ask that you take whatever means necessary to safeguard your operators. Please contact Marvel Manufacturing Co., Inc. for the availability of safety retrofit kits for your particular machine.



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## WHO MAY USE THIS MACHINE?

Machinery sold by Marvel Manufacturing Co., Inc. is to be installed, operated, and maintained by people familiar with industrial machinery, the hazards associated with industrial machinery and the environment in which it is used, and the accepted methods of safeguarding against those hazards.



## FOLLOW THE INSTRUCTIONS

Read and follow all of the safety and operating instructions supplied with your machine. This includes the operator's manual, any safety signs on the machine, all Material Safety Data Sheets (MSDS), vendor literature, etc.

- Keep safety and operating instructions in good condition and located where the machine operator can refer to it. Replacement signs and literature are available from Marvel Manufacturing Co., Inc.
- Do not allow anyone to operate or repair the machine without proper instructions.
- If you need information not supplied in the operator's manual or accompanying literature, contact Marvel Manufacturing Co. Inc.



## RECOGNIZE SAFETY INFORMATION

- This safety-alert symbol signals important safety information to prevent personal injury or death.
- Safety messages are highlighted with **bold** words.
- Always obey safety messages which accompany the safety-alert symbol.

*Note: The safety-alert symbol is a relatively new device which does not appear in older Operator's Manuals. Please review manuals which do not contain safety-alert symbols carefully to identify safety information.*



## SAFETY SIGNAL WORDS

A safety signal word always accompanies the safety-alert symbol. The safety signal words - **DANGER**, **WARNING**, and **CAUTION** - identify the severity of a hazard.

- **DANGER** indicates a situation which, if not avoided, *will* result in serious injury or death.
- **WARNING** indicates a situation which, if not avoided, *could* result in serious injury or death.
- **CAUTION** indicates a situation which, if not avoided, *can* result in damage to the machine.



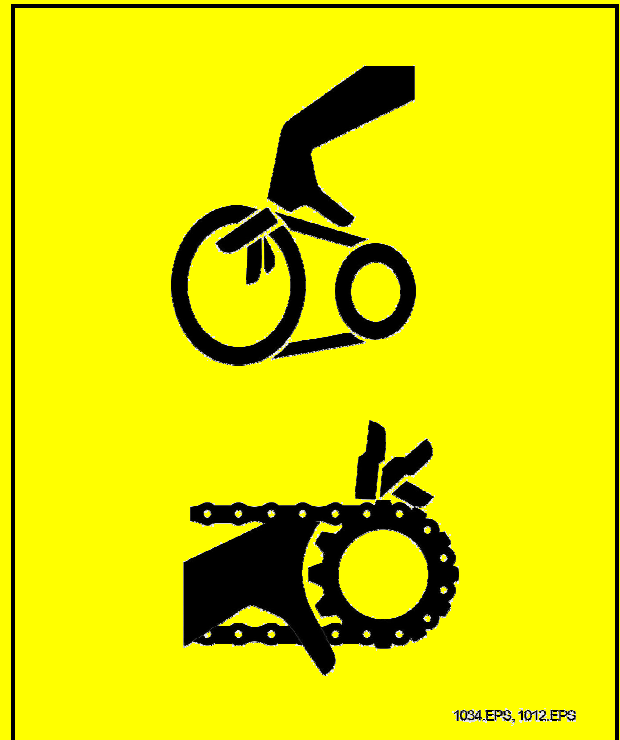
## WEAR PROTECTIVE EQUIPMENT

- Wear safety glasses, safety shoes and hearing protection.
- Do not wear gloves except when handling work stock. Gloves can get caught in the machine's moving parts and cause serious injury or death.



## STAY CLEAR OF MOVING PARTS

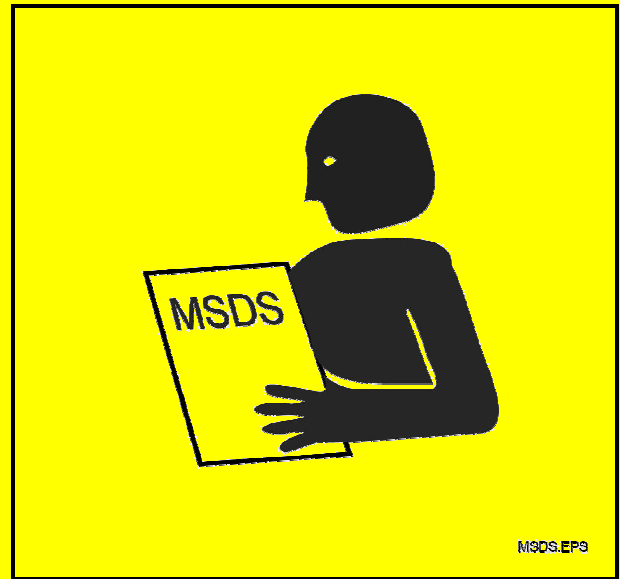
- Contact with moving and rotating parts can cause serious injury or death.
- Wear close fitting clothing, secure apron and garment strings, and tie back long hair so they can not get caught in moving parts.
- The machine may have automated movements. Be familiar with the machine's operation before operating the controls.
- Turn off the machine's power at its main electrical disconnect switch and lock it in the "Off" position before adjusting, servicing, or cleaning the saw.



## HANDLE CHEMICALS SAFELY

---

- Direct exposure to hazardous chemicals can cause serious injury. Potentially hazardous chemicals used with this machinery includes lubricants and hydraulic fluid.
- The Material Safety Data Sheets (MSDS) provide specific details on these chemical products including the specific hazards, safety procedures, and emergency responses.
- Consult the MSDS before operating the machine to become familiar with the specific hazards and how to avoid them.
- MSDS sheets for chemical products *supplied* with your machine are available from Marvel Manufacturing Co., Inc. These may be different from the actual chemicals present in your machine. Contact the chemical manufacturer for the MSDS of the products you are using.
- Protect the environment. Dispose of used and unwanted chemicals properly.



## REMOVING DEBRIS

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- Never use compressed air to remove debris from the machine. The flying debris can cause serious personal injury. Remove debris with a brush.



## SAFE MATERIAL HANDLING

Loading and unloading material from the machine presents safety hazards of its own.

- Wear appropriate safety equipment including safety shoes, hard hat, safety glasses, etc.
- Do not allow any part of your body to come between the material and any other surface. Serious or fatal crushing injuries can result.
- Never stand underneath the material while it is being handled.
- Always use equipment, in good, serviceable condition, capable of safely handling the material. This includes cranes, hoists, chains, and straps with a lifting capacity greater than the weight of the material being lifted.
- Never lift the material higher than necessary.



## ELECTRICAL HAZARDS

Contact with high voltage will cause death.

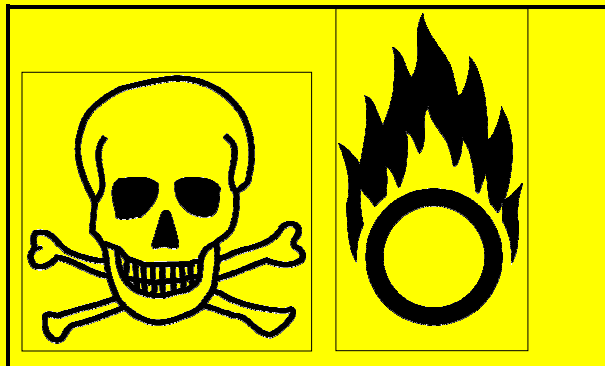
- Never perform any maintenance on or near electrical components until the machine's power source has been disconnected. **Lock out power before servicing.**
- The **only** way to be sure the machine's electrical circuits are safe is to turn off the machine's power supply at your facility's circuit panel and lock it out.
- The "All Stop" pushbutton **does not** disconnect the machine's power supply. Hazardous electricity is still present in the machine's electrical circuits.
- The machine's main electrical disconnect switch will remove electricity from the machine's circuits, however, deadly voltage is still present inside the main electrical panel at the infeed (line) side of the main fuses. **Keep hands and tools away from the top of the electrical panel's main fuses.**



## HAZARDOUS METALS

Your machine was designed specifically for metal working. However, some metals, such as beryllium, magnesium and lead, have characteristics which, if not handled properly, will cause serious injury or death.

- Know the material you are working with and the hazards it presents.
- Do not work materials which require specialized equipment or a controlled atmosphere unless your machine has been specifically designed and installed for that purpose. **Standard machines sold by Marvel Manufacturing Co. Inc. do not meet those special requirements.**



## HIGH PRESSURE FLUIDS

- Fluid escaping under pressure can penetrate skin and cause serious injury and death.
- Avoid the hazard by relieving pressure before disconnecting hydraulic lines.
- Look for leaks with a piece of cardboard. Protect your hands and body from exposure to the fluid.
- If an accident occurs, see a doctor immediately and inform them of the nature of the accident. Injected fluids must be surgically removed within a few hours or gangrene will result.



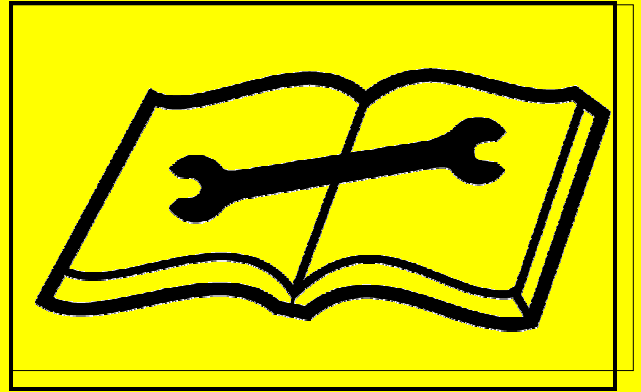
## PUNCHING AND SHEARING EQUIPMENT

- Always wear gloves when handling stock which has been punched or sheared. The edges can be extremely sharp.
- Never place your hands inside the safety guards.
- Keep fingers and hands away from the tooling.
- Always use the holddowns supplied with the machine to clamp the material.
- Turn off the machine before changing the tooling.



## KEEP THE MACHINE SAFE

- Do not alter the machine in any way.
- Do not remove protective guards, covers or safety signs.
- Perform regular maintenance to keep the machine operating safely and efficiently.
- Immediately replace worn, missing or damaged parts, including safety signs attached to the machine.



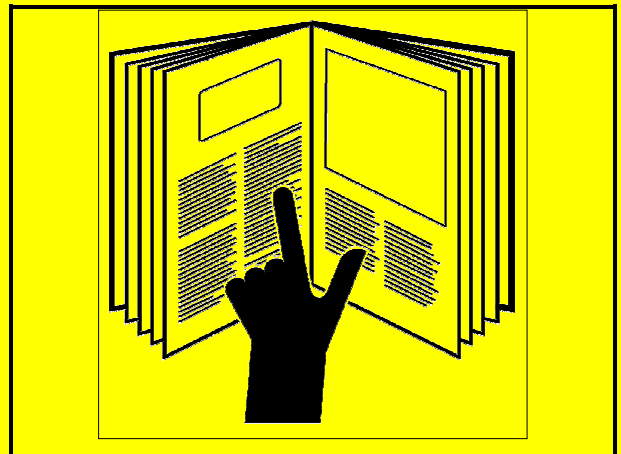
## KEEP THE WORK AREA SAFE

- Keep the machine and the area around the machine clean, well lighted, and free of debris and spills.
- Immediately clean up lubricants and hydraulic fluid from the floor. These create serious slipping hazards.
- Keep air hoses, power cords, etc., off the floor. These create serious tripping hazards.



## OPERATE THE MACHINE SAFELY

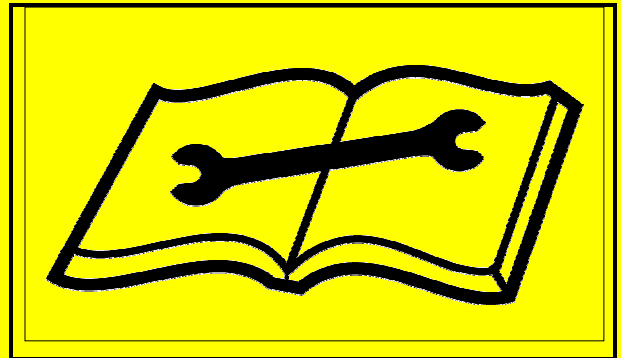
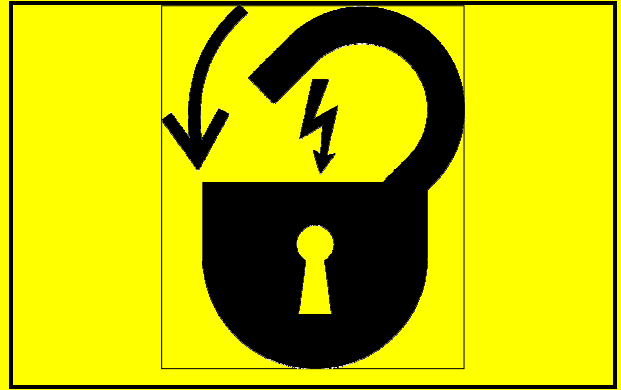
- Use the machine only for its intended use and within its specified capacity.
- Do not operate the machine if it has been altered in any way, is defective, or has worn, missing or broken parts.
- Operate the machine in a careful and deliberate manner.
- Remove rings, watches, bracelets, necklaces and other jewelry. These can get caught in the machine and cause serious injury or death.
- Refer to the machine's data charts and operating instructions for the proper punch and die combinations.
- Stop the machine before reaching into the cutting area or any area with moving parts.
- Always use the tooling guards.
- Report unsafe conditions to your employer.



## SERVICE THE MACHINE SAFELY

Review all safety information provided with your machine before servicing the machine. Additionally, important safety information which the service technician should be aware of is located throughout this safety section.

- Turn off the machine's power and lock it out before adjusting, servicing, or cleaning the machine.
- Read and understand a service procedure before performing the service.
- Never lubricate or service the machine while it is running. Keep your body, clothing, and tools away from power-driven parts.
- The machine may have automated movements. Become familiar with the machine's operation before operating the controls.
- Turning off the machine's main electrical disconnect switch *does not* remove electrical power from the input side of the machine's main fuses. To eliminate *all* electrical power at the machine, turn off the machine's electrical supply circuit at your facility's circuit breaker and lock it out.
- Some parts, particularly malfunctioning hydraulic parts and parts subject to high friction, can become hot. Allow the machine to cool before servicing.
- Whenever possible, avoid climbing on any of the machine's components. If it is necessary to climb on the machine's components, use extreme care! **Always turn the machine's power off and lock it out before climbing on the machine.** Cutting lubricants and debris can make the machine's surfaces slippery. Always maintain a safe footing, a firm hand hold, and never jump off the machine.





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# INSTALLATION

# SPARTAN IRONWORKER


## IMPORTANT


Before completing any steps in this section, read the entire safety section (the yellow pages numbered S-1 through S-8). The safety section contains important information which will safeguard both yourself, and the machine, during installation.


It is extremely important to read through the entire installation section to familiarize yourself with the installation procedure before performing any steps in this section.

## HANDLING

**IMPORTANT: Equipment capable of safely handling the weight of the machine is required.** Always use cranes, hoists, chains, straps, etc., with a lifting capacity greater than the weight of the object being lifted.

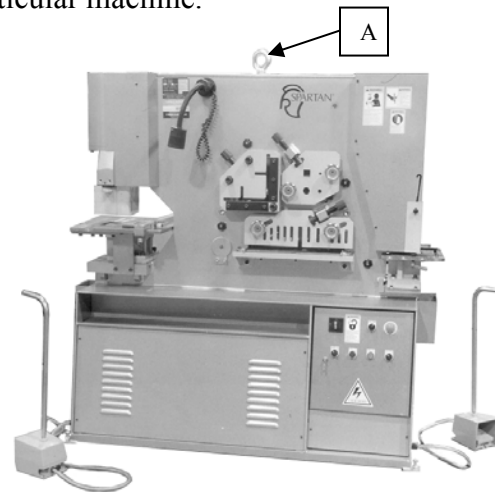
**WARNING**  **Avoid personal injury. Never push, pull, or lift the shipping crate to move the machine. Move the machine only by pushing or lifting the skid with a forklift, or by lifting with the eyebolt provided in the top of the machine.**

**WARNING**  **Avoid serious personal injury. Never place any part of your body under the machine while it is suspended.**

**WARNING**  **Avoid serious personal injury. The machine is top heavy and will tip if tilted too far.**

When transporting the machine with a crane, hook the crane to the eye bolt on top of the machine (A).

Refer to the following chart for the weight of your particular machine.



*An eyebolt (A) is provided at the top of the machine for lifting the machine with an overhead crane.*

### MACHINE NET WEIGHTS

Machine	lbs	kg
IW66D	3,969	1,804
IW66DX	4,851	2,205
IW88D	4,807	2,185
IW88DX	5,844	2,656
IW110D/2	6,505	2,956
IW110DX/2	7,608	3,458
IW135D	7,365	3,347
IW135DX	8,710	3,959
IW180DX	10,915	4,961

## POSITIONING

Consider these items when selecting a position for the machine:

**Foundation** - The foundation must be a dry, level, concrete floor in good condition.

**Lighting** - The entire machine must be well lighted for operator safety and maintenance.

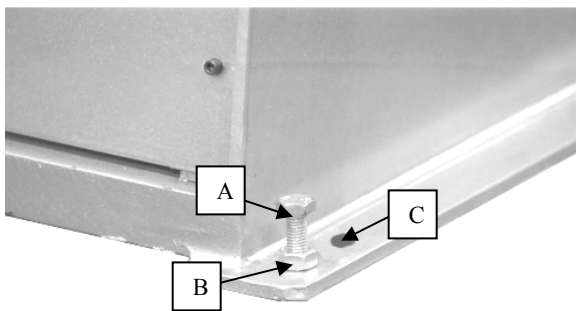
**Stock Movement** - Leave space around the machine for loading and unloading stock.

**Maintenance** - The machine must be placed to allow easy access to all areas for maintenance and repairs. Make sure all doors and panels can be opened easily.

## LEVELING AND ANCHORING

Four leveling screws (A) are provided to level the machine. After the machine has been leveled the position of each leveling screw can be locked in place with the lock screw (B) provided on each leveling screw.

Anchoring bolts can be installed if needed. Anchor the machine to the floor by drilling holes in the floor through the four holes in the machine's base (C) and installing anchor bolts, washers, and nuts.

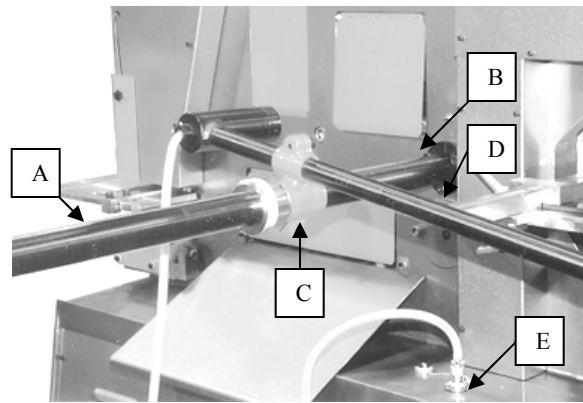


Leveling screw (A), locking screw (B), and anchor bolt hole (C).

## ASSEMBLY

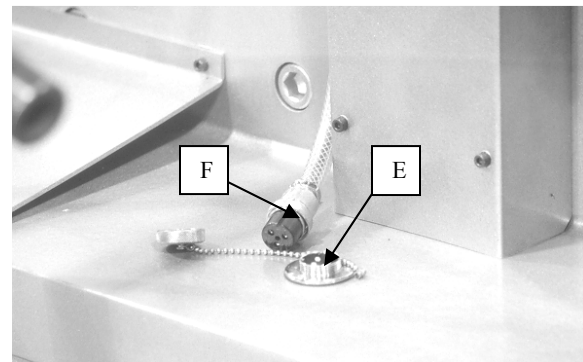
The Ironworker is shipped fully assembled with the exception of the electric back gauge. To assemble the back gauge:

1. Attach the length rod (A) to the discharge side of the machine with the three screws provided (B).



Assembling the electric back gauge.

2. Slide the collar (C) onto the length rod.
3. Install the cross-arm (D).
4. Unscrew the cap from the back gauge's electrical socket (E, above and below) and insert the gauge's electrical connector (F). Secure the connector by turning the knurled ring on the end of the connector clockwise until it stops.



Connecting the back gauge's electrical connector.

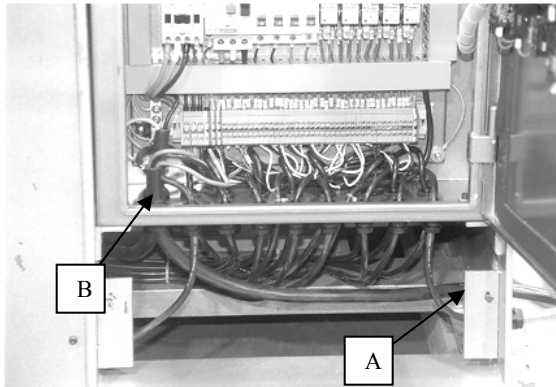
## CONNECTING POWER

**IMPORTANT:** Electrical wiring must be done by a qualified electrician in conformance with the prevailing electrical standards of your area.

**DANGER** Hazardous voltage. Will cause serious injury or death. Turn off supply electricity at your facility's circuit breaker before making electrical connections to the machine.



1. Open the electrical panel door and remove the panel directly below the door.

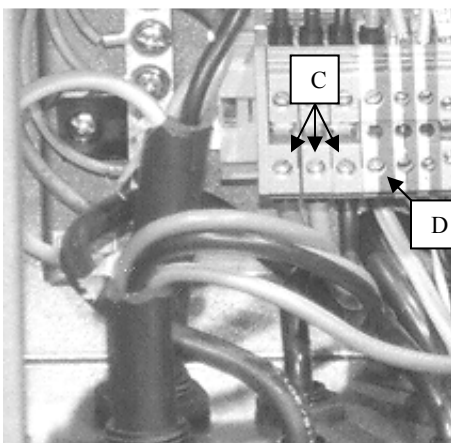


The electrical panel door and access panel must be removed to connect a power cord. The cord is then passed through the hole in the end of the machine (A) and up into the electrical enclosure (B). See step 2, below.

**CAUTION** Avoid damaging the machine. Make sure the supply voltage and phase matches the voltage the machine has been wired for. Refer to the data plate on the electrical enclosure.



2. Bring a three-phase power cord into the electrical enclosure through the entrance hole on the end of the machine (A) and then up through the hole in the floor of the electrical enclosure (B).
3. Connect the power cord's three power leads to terminals L1, L2, and L3 at the bottom of the terminal strip (See photo).



The main power leads L1, L2, and L3 (C) connect to the terminals at the bottom of the terminal strip. The ground

wire connects to the yellow and green terminal next to the power lead connections (D).

4. Attach the power cord's grounding wire to the grounding terminal (D, see photo).

**The importance of a properly grounded machine cannot be over emphasized - both for the safety of the operator and the dependable operation of the machine.**

The machine must be grounded, by a **qualified electrician**, in conformance with:

- a. National Fire Protection Association (NFPA) No. 79, "Electrical Standard for Metal Working Machine Tools".
- b. National Fire Protection Association (NFPA) No. 70, "National Electrical Code".
- c. The prevailing national, state, and local electrical codes.

## LUBRICATION

The lubrication points and intervals must be checked before operating the saw. Refer to "Lubrication", page J-2.

## ELECTRICAL CHECK

**IMPORTANT: Read steps 1 through 6 before performing this electrical check.**

This electrical check ensures the leads of the power cord are properly connected.

**CAUTION** Avoid damaging the machine. Make sure the hydraulic fluid level is correct before operating the machine. Refer to "Checking the Hydraulic Fluid Level", page J-2.



1. Set the following switches as indicated:
  - Auto / Manual switch - Manual
  - Turn the Emergency Stop pushbuttons clockwise to reset them.

- Normal / Jog switch - Normal
  - Shear /Notch switch - Notch
2. Turn the Main Electrical Disconnect switch on.
  3. Open the notching station's guard and make sure all other guards and covers are in place.

**CAUTION** The hydraulic pump can be damaged if the main power leads are not connected properly. Do not operate the pump more than 3 seconds during this check.



4. While stepping firmly on the notching station's foot switch, press the "Pump On" pushbutton, briefly observe the notching station for movement, and then press the "Pump Off" pushbutton.
5. If the notching station moved, continue with step 6.

If the notching station did not move, the wires to the main electrical disconnect switch are improperly connected. To change the connections:

- a. Turn off the Main Electrical Disconnect switch.

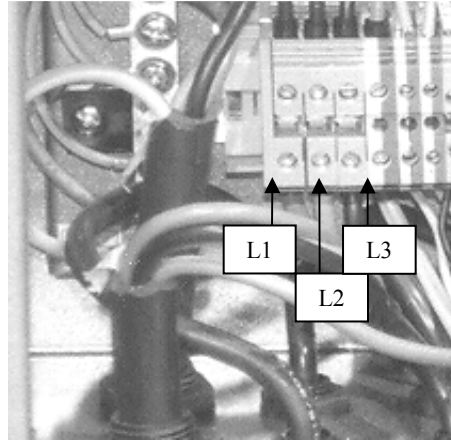
**DANGER** Hazardous voltage.



**Will cause serious injury or death. Turn off supply electricity at your facility's circuit breaker before making electrical connections to the machine.**

- b. Turn off the machine's supply voltage at your facility's circuit breaker.

- c. Open the machine's electrical panel door.
- d. Reverse power leads L1 and L2, or L2 and L3, not both.
- e. Repeat steps 1 through 5 above.



*Reverse L1 and L2 or L2 and L3 if the punching does not move during the electrical check.*

6. Turn the Main Electrical Disconnect switch off.

## FINAL INSPECTION

After the machine has been installed, a final, thorough inspection should be performed. The following checklist will help locate any items that may need further attention:

- Loose components, guards or panels
- Loose fasteners and fittings
- Loose hoses and conduit
- Missing or damaged items
- Hydraulic leaks
- Tools and other material left on the machine
- Overall condition and readiness for use

# GENERAL SPECIFICATIONS

# SPARTAN IRONWORKER

*Note: Specifications given are for standard machines. Available options may alter these specifications.*

*All specifications are subject to change without notice.*

*Specifications specific to each work station are given in the sections which describe each work station.*

	<b>Hydraulic Motor</b>	<b>AMP Load 230V/460v</b>	<b>Net Weight</b>	<b>Airborne Noise</b>
IW66D	7-1/2 HP	20.5A/10.25A	3,969 lbs	75Db +/- 5dB
IW66DX	7-1/2 HP	26.5A/13/25A	4,851 lbs	75Db +/- 5dB
IW88D	10HP	26.5A/13.25A	4,807 lbs	75Db +/- 5dB
IW88DX	10HP	26.5A/13.25A	5,844 lbs	75Db +/- 5dB
IW110D/2	10HP	26.5A /13.25A	6,505 lbs	75Db +/- 5dB
IW110DX/2	10HP	26.5A/13.25A	7,608 lbs	75Db +/- 5dB
IW135D	15HP	37.5A/18.75A	7,365 lbs	75Db +/- 5dB
IW135DX	15HP	37.5A/18.75A	8,710 lbs	75Db +/- 5dB
IW180DX	20HP	50.5A/25.25A	10,915 lbs	75Db +/- 5dB

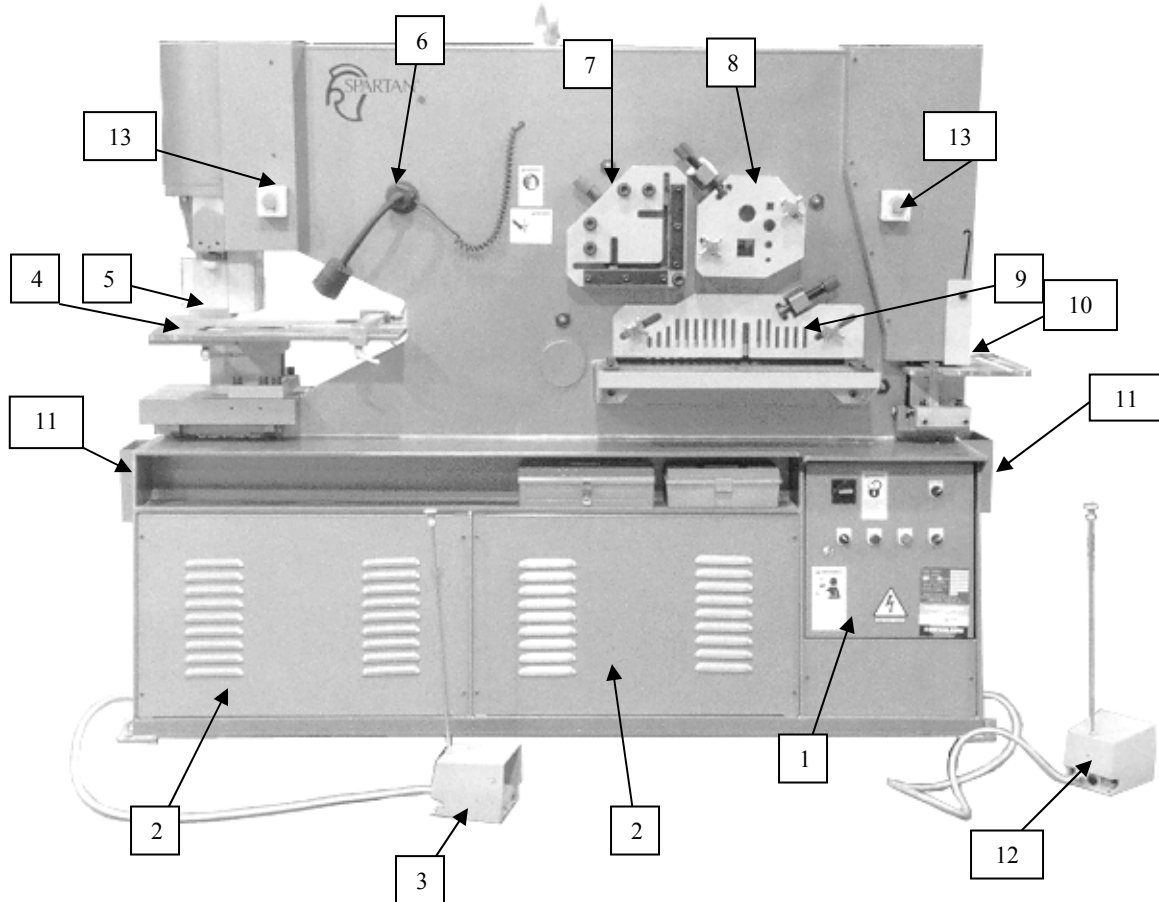
**SECTION CONTENTS**

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Machine Overview - Operator's Side	C-2
Machine Overview - Discharge Side	C-3
Machine Overview - Operator's Panel	C-4
Important	C-5
Main Electrical Disconnect Switch	C-5
Auto / Manual Switch	C-5
Shear / Notch Switch	C-5
Pump On Pushbutton	C-6
Pump Off Pushbutton	C-6
Normal Jog Switch	C-6
Door Lock	C-6
Emergency Stop Pushbutton	C-6
Punching Station Foot Switch	C-6
Notching / Shearing Foot Switch	C-7
Electric Back Gauge	C-7

## Machine Overview - Operator Side

Model IW110DX/2 shown

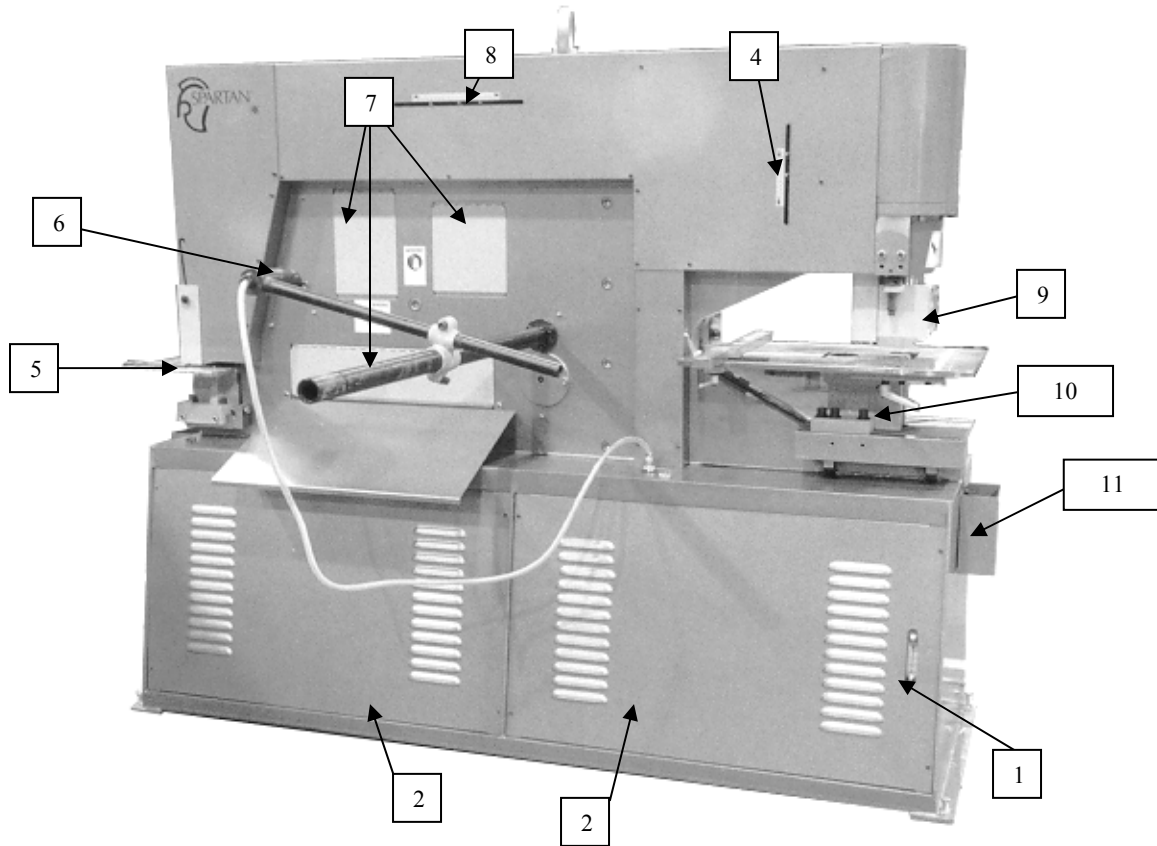


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|--|--|
| 1. Operator's Pushbutton Panel and Electrical Panel Door, see page C-4 | 7. Angle Shearing Station (see page F-1)           |
| 2. Access Panel  | 8. Bar Shearing Station (see page G-1)             |
| 3. Punching Station Foot Switch (see page C-6)                         | 9. Flat Bar Shearing Station (see page H-1)        |
| 4. Punching Station (see page D-1)                                     | 10. Notching Station (see page E-1)                |
| 5. Stripper (see page D-3)   | 11. Slug Bin                                       |
| 6. Moveable Worklight  | 12. Notching / Shearing Foot Switch (see page C-7) |
|  | 13. Emergency Stop Pushbutton (see page C-6)       |



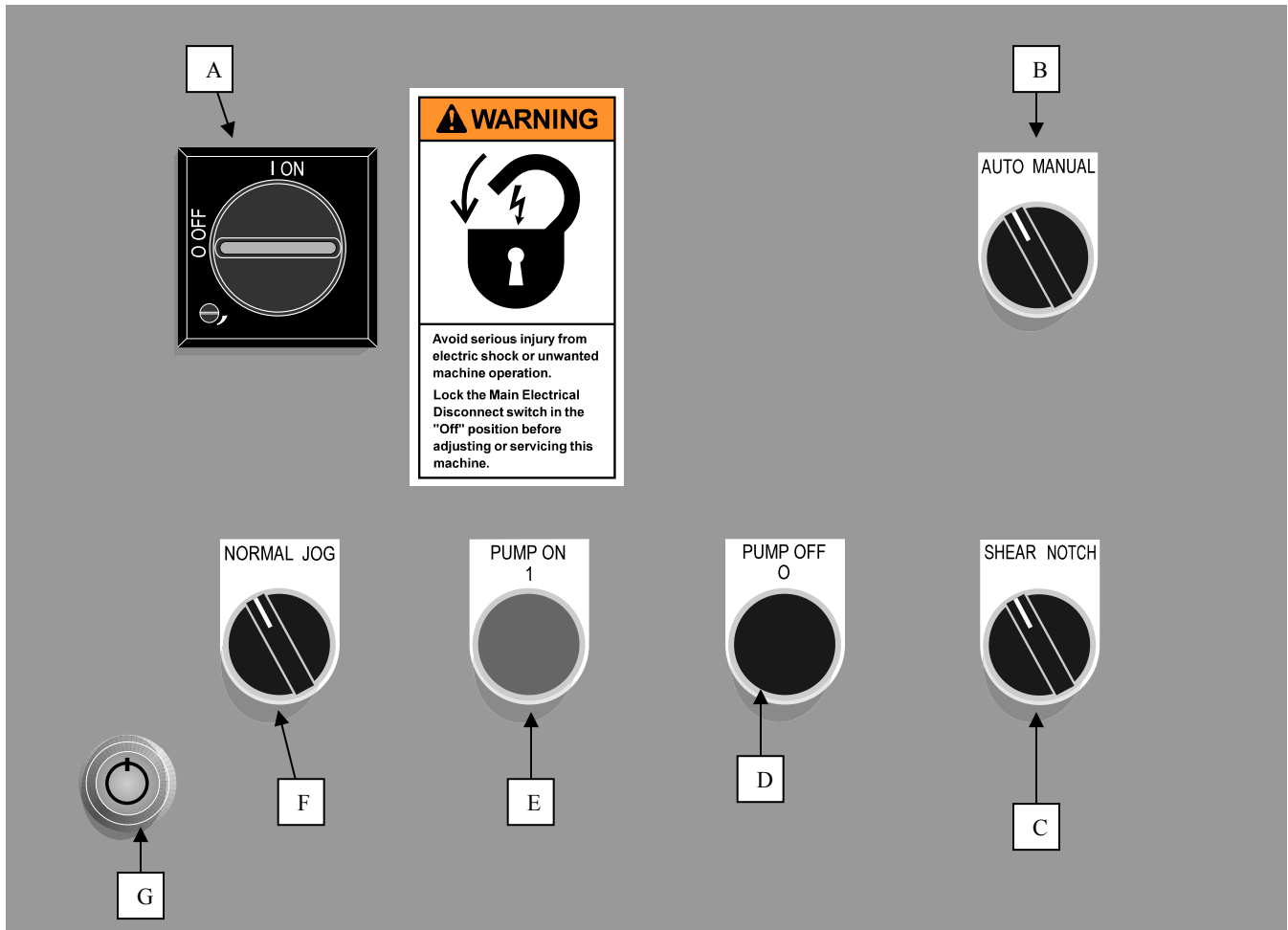
## Machine Overview - Discharge Side

Model IW110DX/2 shown



- |    |   |     |   |
|----|---|-----|---|
| 1. | Hydraulic Fluid Level Gauge (see page J-2)        | 7.  | Tooling Guards/Material Discharge   |
| 2. | Access Panel                                      | 8.  | Notching / Shearing Stations Stroke Adjustment (see pages E-6, F-9, G-5, H-7) |
| 3. | Access Panel                                      | 9.  | Punching Station / Stripper (see page D-1)                                    |
| 4. | Punching Station Stroke Adjustment (see page D-9) | 10. | Die Holder (see page D-6)   |
| 5. | Notching Station (see page E-1)                   | 11. | Slug Bin  |
| 6. | Electric Back Gauge (see page C-7)                |     |   |

## Machine Overview - Operator's Pushbutton Panel



- A. Main Electrical Disconnect switch (see page C-5)
- B. Auto / Manual switch (see page C-5)
- C. Shear / Notch switch (see page C-5)
- D. Pump Off pushbutton (see page C-6)
- E. Pump On pushbutton (see page C-5)
- F. Normal / Jog switch (see page C-6)
- G. Door Lock (see page C-6)

## IMPORTANT

---

This section describes the function, location, and operation of the individual machine components. It does not describe how to operate the machine.

### WARNING



**Do not operate the machine until you are familiar with the location and function of its individual components.**

**Failure to familiarize yourself with the individual components before operating the machine may result in serious personal injury or death.**

## MAIN ELECTRICAL DISCONNECT SWITCH

---

### DANGER



**Hazardous voltage is present on the input side of the saw's main electrical disconnect switch even when the switch is turned off. Contact with this voltage will cause serious injury or death.**

The main electrical disconnect switch (A, page C-4) is located on the door of the electrical enclosure. The switch has two positions:

**Position:            Function:**

**OFF - "O"**    The machine's electrical circuits are disconnected from the power source and the machine will not operate. See "Danger" above. The switch can be locked in the "Off" position by pivoting the red part of the switch out and inserting a lock through one of the holes in the switch.

**ON - "I"**     The machine's electrical circuits are connected to the power source and the machine can be operated.

*Note: The door of the electrical enclosure can only be opened when the electrical disconnect switch is turned to the "Off" position.*

## AUTO / MANUAL SWITCH

---

The Auto / Manual switch (B, page C-4) turns the electric back gauge on or off, allowing material to be sheared automatically when the material touches the electric back gauge, or manually with the foot switch.

**Auto** - Use the "Auto" position when you want the machine to shear automatically when the material touches the electric back gauge. When operating in the Auto position it is not necessary for the operator to step on the foot switch to activate a cut.

The Auto position is particularly useful when shearing many pieces to the same length.

**Manual** - In the "Manual" position the machine operator must step on the foot switch before the material will be sheared.

## SHEAR / NOTCH SWITCH

---

The "Shear / Notch " switch (C, page C-4) selects between full stroke and short stroke operation of the shearing and notching stations.

**Notch** - This position is recommended when using the notching station. It reduces the amount of travel in the notching station which makes the notching station safer for the operator and reduces cycle time.

**Shear** - This position is recommended when using the shearing station as it provides maximum shearing capacity.

*Note: The machine will not operate when "Shear" stroke is selected and the notching station's safety guard is open.*


## PUMP ON PUSHBUTTON

The "Pump On" pushbutton (item "E", page C-4) starts the hydraulic pump motor. The motor must be running before any of the machine's functions will operate. The pushbutton illuminates when the pump motor is running.

*Note: The pump motor can not be started unless the machine's Emergency Stop pushbutton(s) are reset.*

## PUMP OFF PUSHBUTTON

The "Pump Off" (D, page C-4) pushbutton stops the hydraulic pump motor and turns off the machine.

**WARNING**  **The Pump Off pushbutton does not disconnect any components from the power supply. Avoid serious injury or death by turning the machine's power off at the Main Electrical Disconnect switch before servicing the machine.**

## NORMAL / JOG SWITCH

The "Normal / Jog" switch (F, page C-4) selects between the "Normal" mode of operation in which the tooling retracts automatically when the foot switch is released, and the "Jog" mode in which the tooling moves downward when the foot switch is pressed, but maintains its position when the foot switch is released.

**Normal** - Use the "Normal" position for normal operation of the machine. In this position the tooling descends while the foot switch is pressed all the way down, stops moving when the foot switch is released to its halfway point, and retracts when the foot switch is released.

**Jog** - Use the "Jog" position during machine set-up. In this position the tooling descends while the foot switch is

fully pressed and maintains its position when the foot switch is released.

*Note: Turn the Normal / Jog switch to "Normal" to retract the tooling after machine set-up.*


## DOOR LOCK

The door lock (item G, page C-4) permits the electrical compartment's door to be locked.

*Note: To open the electrical compartment's door the lock must be unlocked and the Main Electric Disconnect switch must be turned off.*

## EMERGENCY STOP PUSHBUTTON

The red Emergency Stop pushbuttons (Items 13, page C-2) causes all of the machine's functions to stop. After a button is pressed it remains in the off position preventing the machine from being restarted until the button is reset by turning it clockwise. After the button is reset the machine can be restarted.

**WARNING**  **The Emergency Stop pushbuttons do not disconnect any components from the power supply. Avoid serious injury or death by turning the machine's power off at the Main Electrical Disconnect switch before servicing the machine.**

## PUNCHING STATION FOOT SWITCH

This foot switch is used to activate the punching station of the machine. The foot switch has three positions: up, halfway down, and down. The position of the foot switch and the setting of the "Normal / Jog" switch together affect the operation of the punching station.

**WARNING** Avoid serious injury. Make sure your hands are clear of the work area before stepping on the foot switch. When the foot switch is pressed, the punch will descend.



**Foot Switch Operation in "Jog" mode** - When the Normal / Jog switch is in the "Jog" position, pressing the foot switch all the way down causes the punch to move down into the work area. When the foot switch is released the punch maintains its position.

*Note: To retract the punch, turn the Normal / Jog switch to the "Normal" position.*

**Foot Switch Operation in "Normal" mode** - When the Normal / Jog switch is in the "Normal" position, pressing the foot switch all the way down causes the punch to move down into the work area. Releasing the foot switch to the halfway position causes the punch to maintain its current position. When the foot switch is released the punch retracts.

## NOTCHING / SHEARING STATION FOOT SWITCH

This foot switch is used to activate the notching and shearing stations of the machine. The foot switch has three positions: up, halfway down, and down.

**WARNING** Avoid serious injury. Make sure your hands are clear of the work area before stepping on the foot switch. When the foot switch is pressed, the shear or notcher will descend.



**Foot Switch Operation in "Jog" mode** - When the Normal / Jog switch is in the "Jog" position, pressing the foot switch all the way down causes the tooling to move down into the work area. When the foot switch is released the tooling maintains its position.

*Note: To retract the tooling, turn the Normal / Jog switch to the "Normal" position.*

**Foot Switch Operation in "Normal" mode** - When the Normal / Jog switch is in the "Normal" position, pressing the foot switch all the way down causes the tooling to move down into the work area. Releasing the foot switch to the halfway position causes the tooling to maintain its current position. When the foot switch is released the tooling retracts.

## ELECTRIC BACK GAUGE

The electric back gauge is an automatic feature which activates the shear shortly after the work stock comes in contact with the back gauge's sensor - the machine operator does not need to press the foot switch. The electric back gauge is functional when the "Auto / Manual" switch is turned to "Auto".

The time delay between when the stock contacts the sensor and when the shear is activated can be adjusted from 0 seconds to 3 seconds with a timer in the electrical enclosure.

**To set up the electric back gauge:**

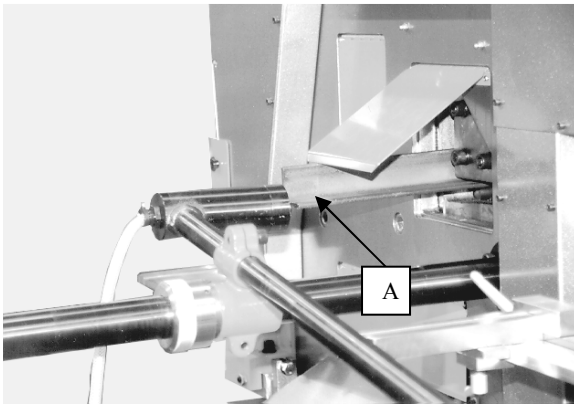
**Important: These instruction only describe the set-up procedure to prepare the back gauge for operation. Operation of the machine with the electricback gauge is described in the Operation section of this manual.**

1. Turn off the main electrical disconnect switch.

**WARNING** Avoid serious injury. Turn off the machine's power and lock it out before servicing the machine.

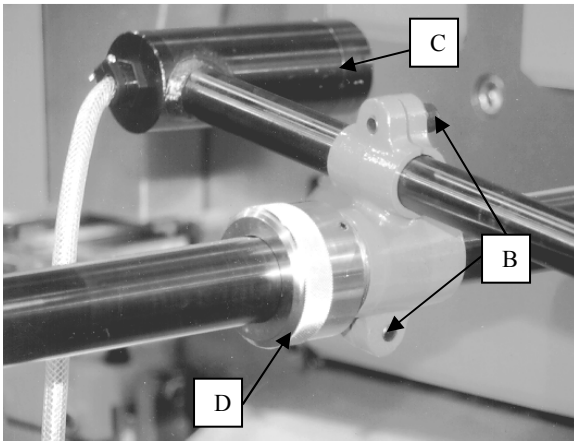


2. Insert the work material (A) through the shear.



*Angle stock (A) is shown here passing through the shearing station.*

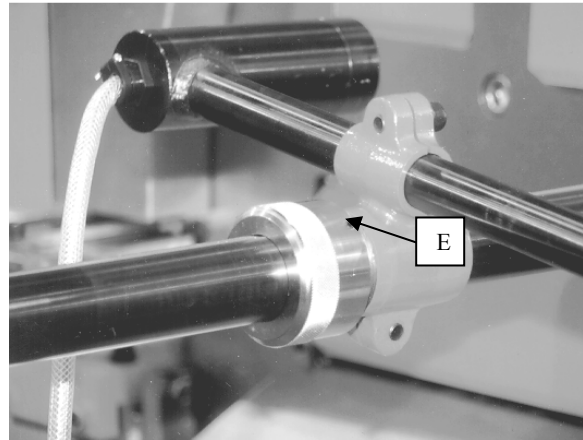
3. Loosen the locking screws (B) on the collar and adjust the position of the sensor (C) so it lines up with the material.



*Two lock screws (B) hold the sensor in the desired position. The rear of the collar (D) indicates the shear length setting.*

4. Slide the collar until its outer edge (D) is on the desired shear length and tighten the locking screws (B).

*Note: If you find the sheared length of the material does not match the shear length setting, the collar may need to be calibrated. Loosen the set screw in the side of the collar (E) and turn the collar until the measured shear length of the part is indicated by the rear of the collar and re-tighten the set screw.*



*The adjustable collar is locked in position by a set screw (E).*

## SECTION CONTENTS

This section contains procedures and specifications specific to the Ironworker's punching station.

Important	D-1
Punching Station Specifications	D-1
Punching Station Components	D-2
Punching Station Foot Switch	D-2
Emergency Stop Pushbutton	D-2
Work Table and Stock Guides	D-2
Stripper	D-3
Punch and Die Holders	D-4
Installing and Centering a Punch and Die	D-7
Punch Stroke Adjustment	D-9
Punch and Die Selection	D-10
Punch and Die Lubrication	D-10
Punching Station Capacity	D-10
Tonnage Chart	D-12
Punch Operation	D-13

## IMPORTANT

You *must* be familiar with the function and location of the components described in the Machine Description section of this manual before performing any steps in this section.

Safe operation of this machine depends on you, the operator.

### Do not operate this machine unless:

- a. **You are familiar with the function and location of the machine's components.**
- b. **You have inspected the machine and determined it is in safe, working condition (for example: no missing, altered or broken parts; all controls are functional; all safety devices are in place; etc.).**
- c. **You have read and understand all of the safety and instructional material supplied with the machine by Marvel Mfg. Co. Inc., including the Operator's manual and the safety and warning signs attached to the machine.**

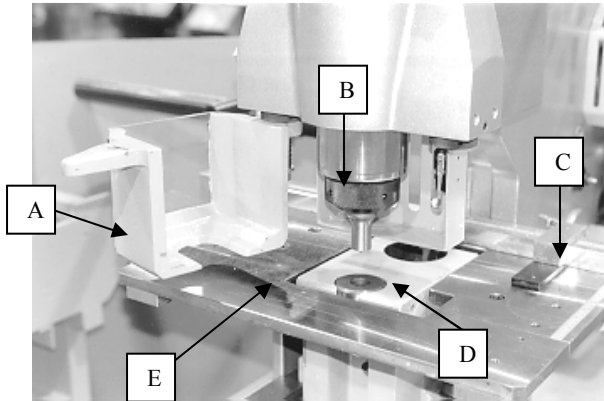
	IW66D/DX	IW88D/DX	IW110D/DX/2	IW135D/DX	IW180DX
Punching Pressure	66 tons	88 tons	110 tons	135 tons	180 tons
Throat Depth	12"(20" DX)	12" (20" DX)	12" (20" DX)	12" (20" DX)	20"
Max. Web (Channel)	7"	7"	7"	7"	7"
Stroke Length	4"	4"	4"	4"	4"
Cycles / Min (3/4")	30	29	24	28	29
Work Height	41-1/4"	41-1/4"	41-1/4"	41-1/4"	41-1/4"

# PUNCHING STATION

# SPARTAN IRONWORKER

## PUNCHING STATION COMPONENTS

The punching station includes the punch and die holders, stripper, work table, and stock guides. In addition, there is an Emergency Stop pushbutton which is located on the right side of the punching station, and a foot switch which controls the movement of the punch.



*The major components of the punching station include the stripper/guard (A), punch holder (B), stock guides (C), die holder (D), and work table (E).*

## PUNCHING STATION FOOT SWITCH

The operation of the punching station's foot switch is described in the Machine Description section, page C-6.

## EMERGENCY STOP PUSHBUTTON

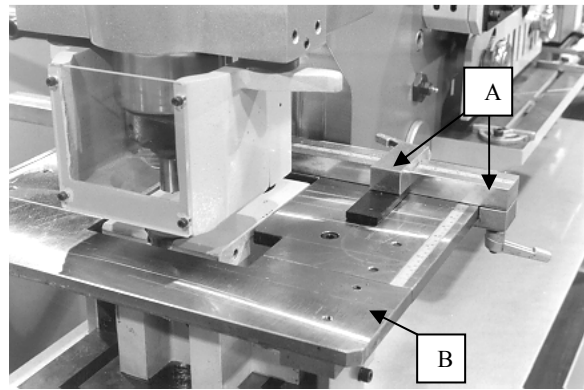
This red pushbutton, located on the right side of the punching station, causes all of the machine's functions to stop. After the button is pressed it remains in the off position, preventing the machine from being restarted, until the button is reset by turning it clockwise.

**WARNING** The Emergency Stop pushbutton does not disconnect any components from the power supply. Avoid serious injury or death by turning the machine's power off at the Main Electrical Disconnect switch before servicing the machine.



## WORK TABLE AND STOCK GUIDES

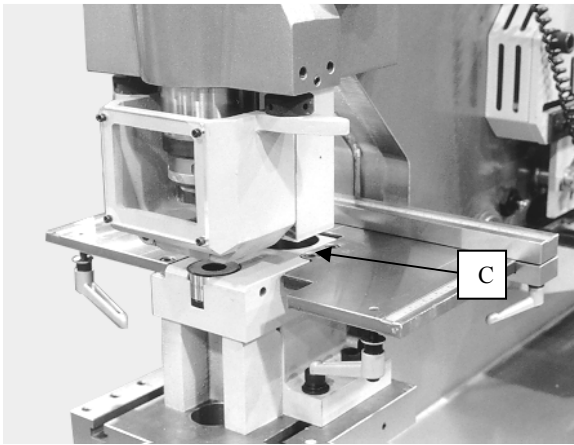
The work table supports the work stock, and the stock guides (A) provide positive alignment of the work stock for accurate, repeatable punching.



*The stock guides (A) are locked in place with hand levers. Both stock guides have a scale which indicate their position in relation to the center of the punch.*

The work table has a split top which allows the front of the table (B) to be removed. Removing the front of the table allows structural material, such as angle iron and channel stock, to be punched. It also permits the die holder to be removed and rotated as needed (see, "Reversing the Die Holder", page D-6).





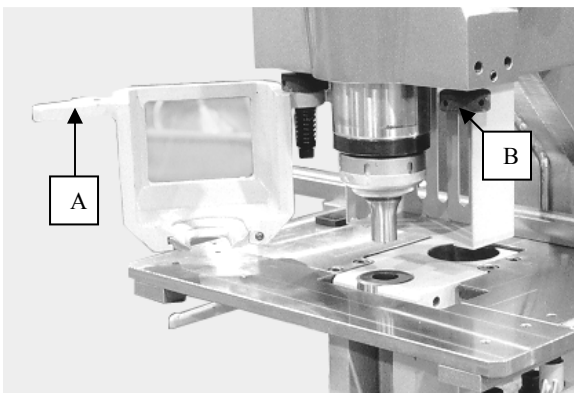
In this photo the front of the table has been removed. The whole table can be removed by removing the four screws (C) that mount the table to the die holder.

The entire work table can be removed for installation of optional tooling such as notchers and brakes. To remove the table, remove the four socket head cap screws (C) that mount it to the die holder.

## STRIPPER

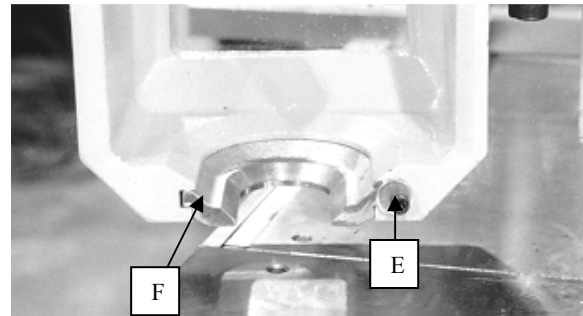
The stripper performs two important functions; it supports the work piece while the punch is being retracted and it guards the operator from the punch's point-of-operation.

To open the stripper, press down on the tab on the right side of the stripper (A) and swing the stripper open. When closing the stripper, make sure the hole in the top of the tab engages the pin on the bottom of the adjusting screw (B).



The stripper opens by pressing down on the tab (A). A hole in the tab engages a pin on the

adjusting screw (B) to keep the stripper closed. **Important:** In this photo the punch guard is in the open position. Never operate the machine unless all guards are closed.



The stripper holds an interchangeable insert (F, described below). The interchangeable insert is held in place by a cap screw and washer (E). **Important:** In this photo the punch guard is in the open position. Never operate the machine unless all guards are closed.

The stripper has three interchangeable inserts (F), each with a different width slot (3/4", 1-5/8", and 2"). Always use the most narrow insert possible as this provides maximum support for the work material while the punch is being retracted. If the work material is not properly supported during punch retraction, the punch can break.

### To Change the Stripper Insert:

#### WARNING Avoid serious injury.



**Turn off the machine's power and lock it out before servicing the machine.**

1. Turn off the main electrical disconnect switch and lock it in the "Off" position.
2. Loosen the cap screw (E) and swivel the washer out of the way.
3. Slide the insert (F) out of the stripper and install the smallest insert available for the punch that is being used.
4. Swivel the washer over the end of the insert and tighten the cap screw (E).

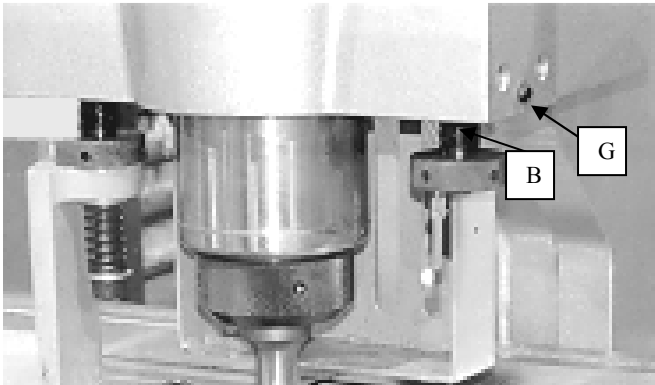
## Adjusting the stripper:

The stripper must be correctly adjusted to provide uniform contact with the work piece while the punch is being retracted from the workpiece.

**CAUTION** Avoid damaging the machine. If the work piece is not uniformly supported while the punch retracts, extremely high side loads will be applied to the punch and it will break.

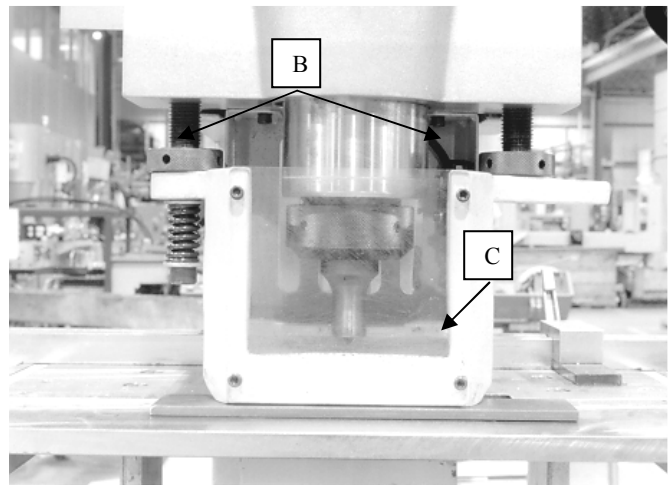


1. Press the punching station's Emergency Stop pushbutton.
2. Loosen the set screw (G) which locks the adjusting screw (B) in position.

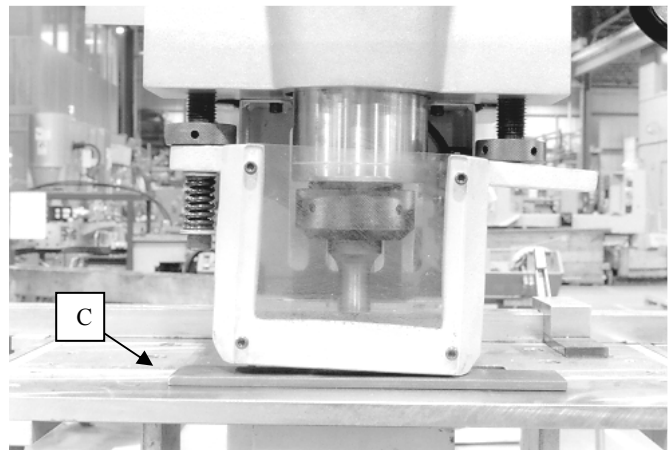


*The stripper adjusting screw (B) is locked in position by a set screw (G).*

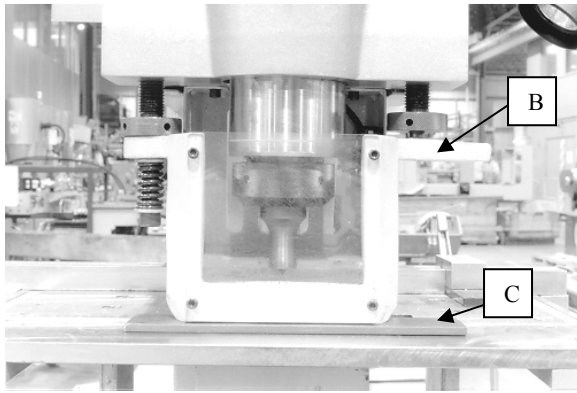
3. Place the work material (C) under the stripper and turn the adjusting screws (B) until the bottom of the stripper is parallel with the work material and the work material can be slid under the stripper with little or no resistance.



**Correct:** When properly adjusted, the bottom of the stripper is parallel with the work material (C), and the adjusting screws (B) are in contact with the top of the stripper. Compare this photo of a properly adjusted stripper with the following photos which depict an improperly adjusted stripper.



**Wrong:** The bottom of the stripper is not parallel with the work material (C). Though this is an exaggerated example, even a slight misalignment of the stripper with the work material can result in a damaged punch.



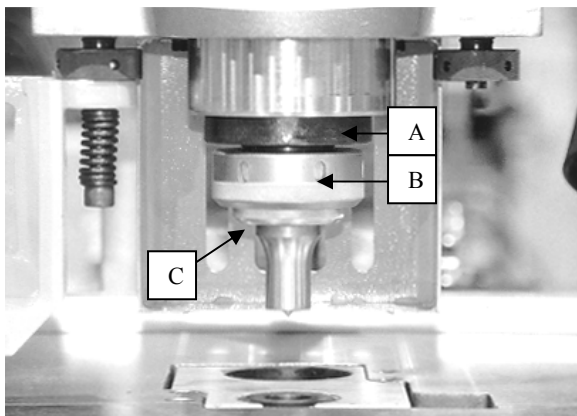
**Wrong:** The bottom of the stripper is parallel with the work material (C), however, the top of the stripper is not in contact with the bottom of the adjusting screw (B). When the punch retracts, the stripper will not be supported evenly and will twist, causing the punch to bind and break.

4. Tighten the set screw (G, upper left picture) to lock the adjusting screw in place.

## PUNCH AND DIE HOLDERS

### Punch Holder

The quick-change punch holder consists of a keyed retaining thread, a punch sleeve, and a coupling nut which threads onto the retaining thread. The coupling nut has slots in the side so the spanner wrench supplied with the machine can be used to tighten and loosen the nut.



The punch holder consists of the retaining thread (A), coupling nut (B), and punch sleeve (C).

The quick-change feature, as its name implies, allows broken and worn punches to be quickly

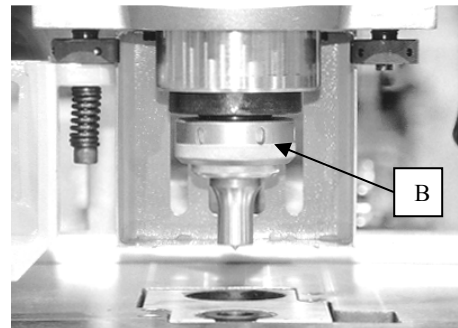
replaced with identical punches. To use the quick-change feature:

**Important:** The quick-change feature should **ONLY** be used when replacing a punch with an identical punch. When changing punch and die combinations, follow the procedure outlined on page D-7.

**WARNING** Avoid serious injury. Turn off the machine's power and lock it out before servicing the machine.

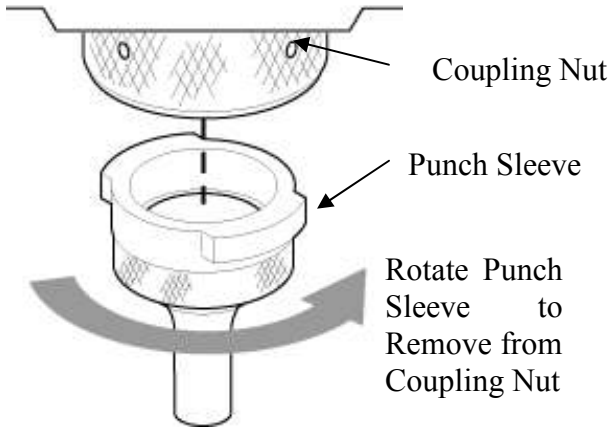


1. Turn off the main electrical disconnect switch and lock it in the "Off" position.
2. Loosen, do not remove, the coupling nut (B).



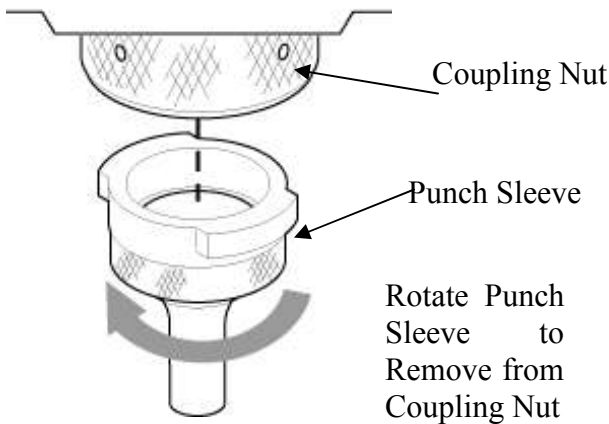
The coupling nut (B) only needs to be loosened to change the punch.

3. Rotate the punch sleeve, as shown in the illustration below, until it can be removed from the coupling nut.



*Rotate the punch sleeve until its tabs line up with the slots in the coupling nut and remove it from the nut.*

4. Remove the worn or broken punch from the punch sleeve and insert a new, identical punch.
5. Insert the punch sleeve into the coupling nut and rotate the sleeve, as shown in the illustration below, until it stops.

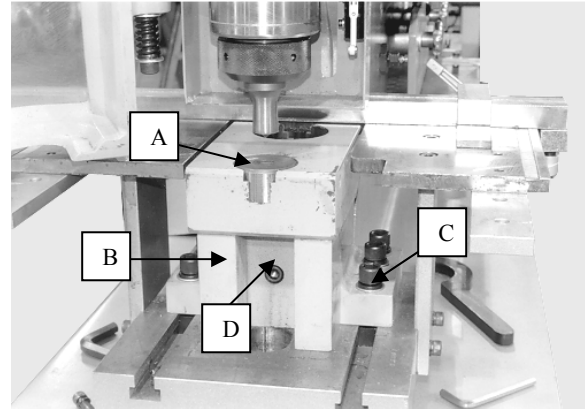


*Insert the punch sleeve in the coupling nut and rotate it in the direction shown by the arrow to lock it in place.*

6. Tighten the coupling nut with the spanner wrench provided.

## Die Holder

The die holder holds the die and supports the work material. The die holder has a removable overhang support (B) which, when removed, allows channel stock to be punched. When punching flat stock the overhang support must be installed.



*Features of the die holder include the die well (A), overhang support (B), and mounting screws (C). The overhang support is held in place with a single screw (D).*

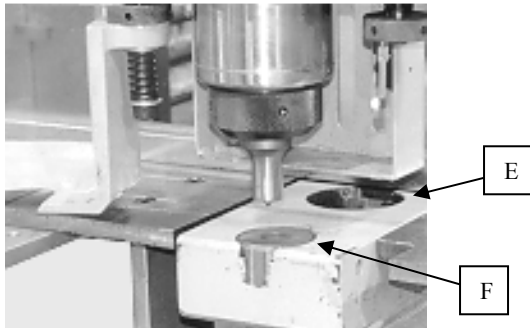


*In this photo the front of the work table as well as the overhang support have been removed to allow channel stock to be punched. The punching station's capacity is reduced when the overhang support is removed. For clarity, this photo was taken with the stripper open. Never punch material unless the stripper is closed and properly adjusted.*

## Reversing the Die Holder

The die holder has two die wells; one large (E) and one small (F). The punch and die

combination you are using determines which die well must be under the ram.



Reversible die holders have two die wells - one large (E) and one small (F).

### To Reverse the Die Holder:

**WARNING** Avoid serious injury.



Turn off the machine's power and lock it out before adjusting the machine.

1. Turn off the main electrical disconnect switch and lock it in the "Off" position.
2. Open the stripper.
3. Remove the front section of the work table by removing the four socket head cap screws which secure it in place.
4. Loosen the six socket head cap screws (C) which mount the die holder to the machine.



Six socket head cap screws (C) hold the die holder in place.

**CAUTION** Avoid serious injury. The die holder is heavy. Use proper lifting technique and a firm grip to avoid injury.



5. Slide the die holder off the end of its mounting surface, turn it around, and slide it back onto the mounting surface.
6. Continue with step 2 of "Installing and Centering a Punch and Die", page D-7.

### INSTALLING AND CENTERING A PUNCH AND DIE

**Important:** Refer to "Punch and Die Selection" on page D-9 for important information on the proper selection of punches and dies before proceeding with these steps.

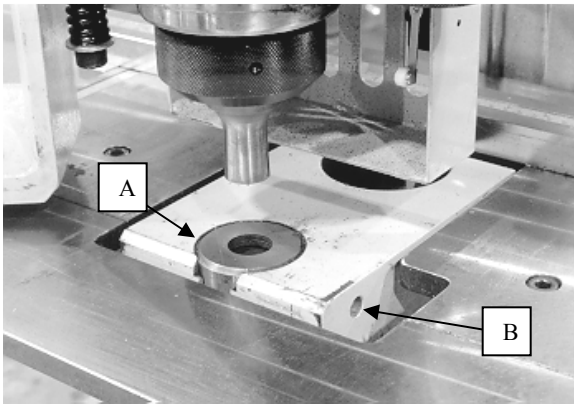
**Important:** Misalignment of the punch and die is the primary cause of failure for these components.

**WARNING** Avoid serious injury.



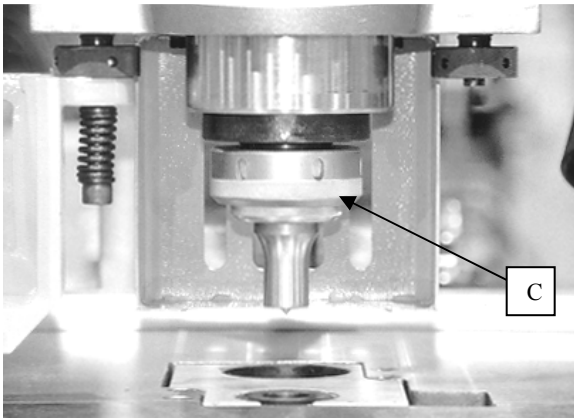
Turn off the machine's power and lock it out before servicing the machine.

1. Turn off the main electrical disconnect switch and lock it in the "Off" position.
2. Install a die (A) with the die's working hole facing up, and the larger, discharge hole facing down. The top of the die must be flush with, or slightly higher than, the top of the die holder.



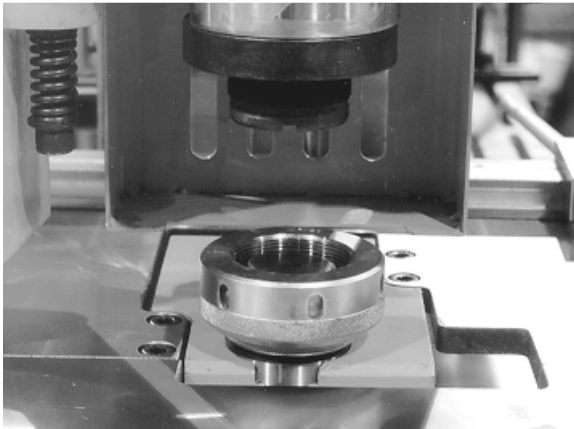
The die (A) is locked in place by a set screw (B) in the side of the die holder.

3. Remove the coupling nut (C) from the retaining thread.



Remove the coupling nut (C) from the retaining thread.

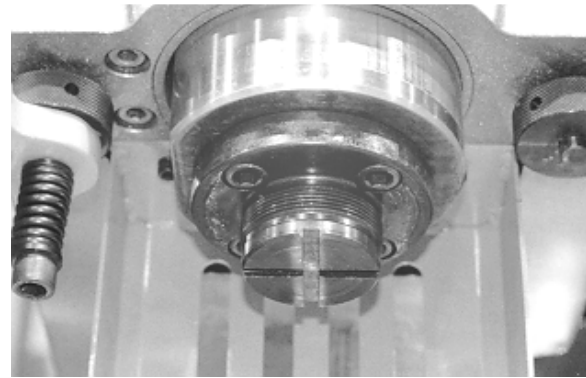
4. Insert the punch in the punch sleeve and insert the punch sleeve in the coupling nut. Finally, insert the punch in the die as shown below.



Assemble the punch, punch sleeve, and coupling nut and then insert the end of the punch in the die as shown here.

5. For square, oblong, or other shaped dies, rotate the punch, while inserted in the die, until the key in the punch is aligned with the key in the punch ram. Keyed punches require the use of 1/4" x 1/4" key stock, cut to the appropriate length.

*Note: If the die does not rotate, loosen the set screw (B, previous column) which locks the die in place. The set screw is located on the side of the die holder.*



When installing a keyed punch, the keyway in the punch must be aligned with the one of the keyways in the slotted retaining thread.

6. Tighten the set screw on the side of the die holder to secure the die.
7. Turn on the main electrical disconnect switch.
8. Place the Normal / Jog switch in the "Jog" position.
9. Close the punching station's guard.
10. Press the "Pump On" pushbutton.

*Note: Make sure the Emergency Stop pushbutton is reset.*

**WARNING** Avoid serious injury.



When the foot switch is pressed, the punch ram will descend. Keep hands and arms away from the punch and die.

11. Press the foot switch until the punch ram has fully descended, as shown in the following photo. Release the foot switch.



*The punch ram is lowered to the position shown here before the coupling nut and punch are threaded in place. This photo was taken with the guard open. **Never operate the machine with the guard open.***

12. Thread the coupling nut onto the retaining thread following these guidelines:
  - a. If a punch has a key, the key must line up with the keyway in the punch ram.
  - b. Never force the coupling nut onto the punch ram. If the coupling nut does not thread onto the punch ram easily, the die holder must be centered as described in steps 13 through 17.
  - c. The coupling nut should be threaded on by hand with final tightening done with the spanner wrench provided in the tool kit.
  - d. If the coupling nut threads onto the punch ram with no apparent interference, continue with step 15.

If the coupling nut **does not** thread onto the punch ram easily, continue with step 13.

13. Loosen the socket head cap screws (D) which lock the die holder in place.



*The die holder is secured by socket head cap screws (D).*

14. Adjust the position of the die holder until the coupling nut threads onto the punch ram easily, and there is equal clearance around the punch while it is still mated with the die. **Tighten the socket head cap screws (D) to lock the die holder in place.**

**CAUTION** Avoid damaging the machine.



**The punch must enter and exit the die smoothly, with no interference. Interference between the punch and die will cause the punch to break.**

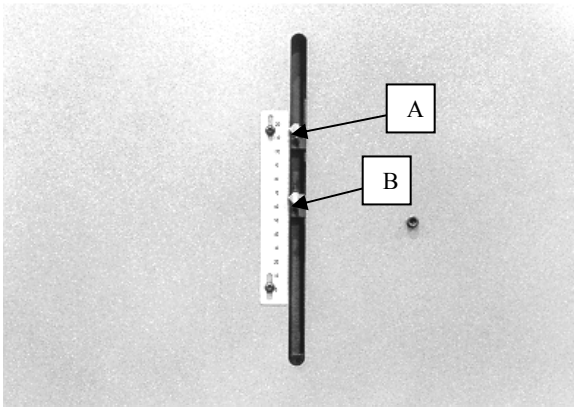
15. Retract the punch by turning the "Normal / Jog" switch to "Normal".
16. Turn the "Normal / Jog" switch back to "Jog".
17. Check the alignment of the punch and die by stepping on the foot switch while closely observing the punch as it nears, and enters, the die.
  - a. If the punch enters the die without interference, continue with step 18.
  - b. If the punch contacts the die in any way, repeat steps 13 through 17.
18. Turn off the main electrical disconnect switch and lock it in the "Off" position.
19. Make sure the coupling nut (C) and the socket head cap screws (D) are tight.

**Important: The forces exerted on the punch and die will cause them to become mis-aligned. It is important to visually check the alignment**

of the punch and die at regular intervals during the work session.

## PUNCH STROKE ADJUSTMENT

The travel limits of the punch can be adjusted by moving two collars (A and B) on the discharge side of the machine. When punching large quantities of the same material and hole size, limiting the travel of the punch will reduce production time.



Two collars (A and B) set the upward and downward travel limits of the punching station. Each collar is locked in place with a socket head set screw accessible through the slot in the cover.

### **To adjust the travel of the punch:**

1. Press the punching station's Emergency Stop pushbutton.
2. Adjust each collar to achieve the desired range of punch travel:

#### **Upper Collar (A):**

Move down to increase the punch's upward travel.

Move up to decrease the punch's upward travel.

#### **Lower Collar (B):**

Move up to increase the punch's downward travel.

Move down to decrease the punch's downward travel.

**Important:** When the punch cylinder is at its upper or lower limit of travel the stroke

adjusting collars must make contact with one of the limit switches so the hydraulic pump can "unload", preventing the motor from being overloaded and the hydraulic fluid from getting too hot.

## PUNCH AND DIE SELECTION

**Important:** This section provides information which must be followed for safe, satisfactory punching operations.

Proper punching requires careful attention to selecting the proper sized die, proper alignment of the punch and die, and staying within the machine's rated capacity.

**WARNING** Avoid serious injury.



Never exceed the machine's punching capacity.

### **Punch Size**

The punch size equals the desired hole size. For example, to punch a 1/2" diameter hole you would use a 1/2" diameter punch.

**Important:** Do not punch holes smaller than the thickness of the material. For example, when punching 1/4" thick material the smallest hole that can be punched is a 1/4" diameter hole.

### **Die Size**

The size of the die is determined by the thickness of the material being punched. The size of the die must provide clearance between the die and the punch.

### **Punching material 15/32" thick or less:**

When punching material 15/32" thick or less, add 1/32" to the size of the punch to determine the proper size die.

*Example #1 - Round holes: When punching a 1/2" diameter hole in 3/8" thick material, you would use a 17/32" diameter die.*



$$1/2" + 1/32" = 17/32"$$

*Example #2 - Oblong holes: When punching a 1/4" x 3/4" oblong hole in 3/8" thick material, you would use a 9/32" x 25/32" die.*

$$1/4" + 1/32" = 9/32"$$

$$3/4" + 1/32" = 25/32"$$

### Punching material 1/2" to 23/32" thick:

When punching material 1/2" to 23/32" thick, add 1/16" to the size of the punch to determine the proper size die.

*Example #3: When punching a 3/4" diameter hole in 1/2" thick material, you would use a 13/16" diameter die.*

$$3/4" + 1/16" = 13/16"$$

*Example #4 - Oblong holes: When punching a 1/2" x 3/4" oblong hole in 1/2" thick material, you would use a 9/16" x 13/16" die.*

$$1/2" + 1/16" = 9/16"$$

$$3/4" + 1/16" = 13/16"$$

### Punching material 3/4" to 1" thick:

When punching material 3/4" to 1" thick, add 3/32" to the size of the punch to determine the proper size die.

*Example #5: When punching a 3/4" diameter hole in 3/4" thick material, you would use a 27/32" diameter die.*

$$3/4" + 3/32" = 27/32"$$

*Example #6 - Oblong holes: When punching a 7/8" x 1" oblong hole in 3/4" thick material, you would use a 31/32" x 1-3/32" die.*

$$7/8" + 3/32" = 31/32"$$

$$1" + 3/32" = 1-3/32"$$

## PUNCH AND DIE LUBRICATION

Frequent lubrication of the punch is important to prolong the life of the punch. Every 5 to 10 punching cycles the punch should be brushed or sprayed with a light oil such as WD40® or CRC®. Do not use heavy oils such as motor oil or any type of grease.

## PUNCHING STATION CAPACITY

**WARNING** Avoid serious injury. Never exceed the machine's punching capacity.

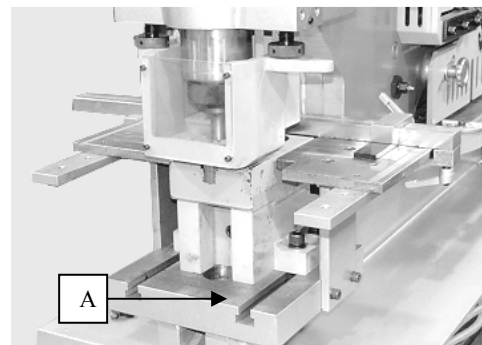


The punching capacity of each machine is provided in the chart included in this section. Note that all versions of a particular model share the same punching capacity, for example the IW66D, and IW66DX all have a 66 ton punching capacity.

	Maximum Punching Capacity - Tons		
Model No. (includes all variations)	Flat Stock <sup>1</sup>	Angle Stock <sup>1</sup>	Channel Stock <sup>2</sup>
IW66	66	66	42
IW88	88	88	42
IW110D/2	110	110	42
IW135	135	135	42
IW180	180	180	42

1. With the overhang support in place.
2. Channel stock must be punch with the overhang support removed.

**Important: The maximum punching capacity can only be utilized when the overhang support (A) is installed under the die holder.**



*The overhang support (A) must be installed to utilize the machine's full punching capacity.*

**WARNING** Avoid serious injury. Never punch a hole requiring more than 42 tons of pressure when the overhang support is removed.



When the overhang support is removed, as shown below, the punching capacity of the machine is reduced to 42 tons regardless of the rated maximum capacity of your Ironworker.



*The overhang support has been removed in this photo. When the overhang support is removed the punching capacity for all models of the Ironworker is limited to 42 tons. This photo shows the stripper in the open position. Never operate the machine unless all safety guards are in place and functioning.*

### **Calculating Punching Tonnage Requirements**

There are three primary variables in any punching operation: the material's thickness, the type of material (tensile strength), and the size of the hole being punched.

A quick-reference chart for punching round holes is provided on the following page.

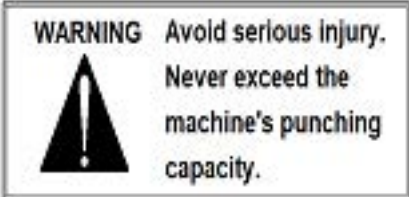
**WARNING** Avoid serious injury. Never exceed the machine's punching capacity.



**Tonnage required to punch round holes in mild steel\***

Hole Dia.	Material Thickness												
	1/8"	1/4"	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1-1/8"	1-1/4"	1-3/8"	1-1/2"	1-5/8"
1/8"	1.6												
1/4"	3.2	6.4											
3/8"	4.8	9.5	14										
1/2"	6.4	12.7	18.6	25.5									
5/8"	8	16	23.3	32	40								
3/4"	9.5	19	28	38.3	48	57							
7/8"	11	22.3	32.5	44.5	56	67	78						
1"	12.8	25.5	37.3	51	64	77	89	102					
1-1/8"	14.3	28.7	42	57	72	86	100	115	129				
1-1/4"	16	32	46.5	64	80	96	111	128	144	160			
1-3/8"	17.5	35	51.3	70	88	105	123	140	158	175	193		
1-1/2"	19	38.3	56	76.5	95.7	115	134	153	172	191	210	230	
1-5/8"	20.7	41.5	60	83	104	124	145	166	187	207	228	248	270
1-3/4"	22	44.7	65	89	112	134	156	179	201	223	245	268	290
2"	25.5	51	74.5	102	128	153	178	204	230	255	280	306	
2-1/4"	28.7	57.5	84	115	144	172	201	230	258	287	315		
2-1/2"	32	64	93	127	160	191	223	255	287	319			
2-3/4"	35	70	102	140	175	210	245	281	316				
3"	38	76.5	112	153	191	230	268	306					
3-1/4"	41.5	83	121	166	207	248	290						
3-1/2"	44.7	89.3	130	179	223	268							
3-3/4"	48	95.7	140	191	240								
4"	51	102	150	204									

Tonnage Conversion Factors*	
Material:	Conversion Factors:
Aluminum (2024-0) .....	.36
Brass (1/4 hard) .....	.7
Copper (1/2 hard) .....	.52
Steel (50% carbon) .....	1.6
Steel Cold Drawn (1018) .....	1.24
Stainless Steel (303) .....	1.5



**\*This Chart is based on punching mild steel with a 65,000 lb. shear strength. All information in this chart should be verified before applying it to your work particularly when using combinations that approach the machine's maximum tonnage capacity.**

## PUNCH OPERATION

You *must* be familiar with the function and location of the components described in the Machine Description chapter of this manual as well as the information in this Punching Station chapter before performing any steps in this section.

Safe operation of this machine depends on you, the operator.

### Do not operate the machine unless:

- a. You are familiar with the function and location of the machine's components.
- b. You have inspected the machine and determined it is in safe, working condition (for example: no missing, altered or broken parts; all controls are functional; all safety devices are in place; etc.).
- c. You have read and understand all of the safety and instructional material supplied with the machine by Marvel Mfg. Co., including the Operator's manual and the safety and warning signs attached to the machine.

### Pre-Operation Checklist

This checklist must be completed at the beginning of each shift and by each operator.

- Safety First! Obey all warnings.
- Review and comply with the instructional and safety information provided with this machine.
- Turn the machine's power off with the main electrical disconnect switch and lock it in the "Off" position.
- Make sure all guards and covers are in place and function properly.

**WARNING** Avoid serious injury. Do not operate this machine with missing, altered, or defective guards or covers.



- Remove unnecessary tools and equipment from the machine and surrounding area.
- Inspect the machine for damage, leaks, and alterations. Repair before operating.

**WARNING** Avoid serious injury.



Do not operate this machine if it is damaged, has worn or missing parts, or is altered in any way.

- Check the hydraulic fluid level. Fill if needed.

**CAUTION** Never operate the machine with a low hydraulic fluid level. Damage to the machine will occur.



### Punching Station Set-up

The following steps must be performed for each punching operation.

1. Perform the pre-operation checklist on page D-13.
2. Position the following switches as indicated:
  - Auto / Manual switch to "Manual".
  - Normal / Jog switch to "Jog".
  - Press the Emergency Stop pushbutton.

**WARNING** Avoid serious injury. Do not use a punch that has been reground.



3. Install a punch. Do not use a punch that has been reground. See page D-7.
4. Install the proper size die for the thickness of the material being punched. See page D-10.
5. Install the appropriate size stripper insert. See page D-3
6. Remove or install the front of the work table as required for the job. See page D-2.
7. Remove or install the overhang support as required for the job. The overhang support must be installed when punching flats and angles. See page D-6.
8. Press the "Pump On" pushbutton.

*Note: If the hydraulic pump does not come on make sure the Emergency Stop pushbuttons are reset.*

9. Center the die under the punch. See page D-7.

**CAUTION** Avoid damaging the machine. If the stripper is not properly adjusted extremely high side loads will be applied to the punch during punch retraction and the punch will break.



10. Adjust the stripper. See page D-3.
11. Adjust the stock guides, if necessary.
12. Adjust the punch stroke. See page D-9.

The machine is now set up and ready for operation. Continue with "Punch Operation" below for step-by-step punching instructions.

## Punch Operation

1. Complete steps 1 through 12 of "Punching Station Set-up", page D-13.
2. Position the Normal / Jog switch on "Normal".

**WARNING** Never load a work piece which exceeds the machine's design capacity. Serious injury can result. Refer to "Punching Station Capacity", page D-10.



3. Carefully position the work piece under the punch and stripper.

**CAUTION** Avoid damaging the machine. If the stripper is not properly adjusted extremely high side loads will be applied to the punch during punch retraction and the punch will break.



4. Press the foot switch all the way down and hold it until the punch has punched through the material.

**WARNING** Avoid serious injury. While the punch is retracting extremely high pressure is being exerted upward on the work piece and stripper. Keep your hands and body away from the work piece until the punch has stopped retracting.



5. Release the foot switch to retract the punch.

**WARNING** Avoid serious injury. Punched material will have sharp edges. Always wear gloves when handling the material.



6. To continue punching the same material using the same punch size, repeat steps 3 through 5. Remember to lubricate the punch every 5 to 10 punches

(see "Punch and Die Lubrication", page D-10) and to periodically check the alignment of the punch and die. See "Installing and Centering a Die", page D-7.

To punch material of a different thickness or tensile strength, or to punch material with a different sized punch, go to step 1 of "Punching Station Set-up", page D-13.

If you are done punching, continue with step 7.

7. Press the Emergency Stop pushbutton.
8. Turn the Main Electrical Disconnect Switch off.

## SECTION CONTENTS

This section contains procedures and specifications specific to the Ironworker's notching station.

Important	E-1
Notching Station Specifications	E-1
Notching Station Components	E-2
Emergency Stop Pushbutton	E-2
Notching Station Guard / Cover	E-2
Notching Station Foot Switch	E-2
Work Table and Stock Guides	E-3
Stripper	E-3
Slide and Upper Blade	E-3
Replacing the Upper Blade	E-3
Bolster and Lower Blades	E-4
Replacing the Lower Blades	E-4
Aligning the Bolster	E-4
Stroke Adjustment	E-6
Notching Station Capacity	E-7
Notching Station Operation	E-7

## NOTCHING STATION SPECIFICATIONS

*Note: Specifications given are for standard machines. Available options may alter these specifications.*

All specifications are subject to change without notice.

	IW66D / DX	IW88D / DX	IW110D/X/2	IW135D / DX	IW180DX
Max Mat <sup>1</sup> Thickness	3/8"	1/2"	1/2"	1/2"	5/8"
Rectangular Notcher	3-1/2" x 3-1/2"	2" x 3-1/2"	2-12" x 3-1/2"	2-1/2" x 3-1/2"	2-1/2" x 3-1/2"
V-Notcher (optional)	3-1/2" x 3/8"	3-1/2" x 1/2"	3" x 1/2"	4" x 1/2"	4" x 5/8"
Work Height	35-3/4"	36-1/2"	36"	36-1/4"	36-1/4"

## IMPORTANT

You must be familiar with the function and location of the components described in the Machine Description section of this manual before performing any steps in this section.

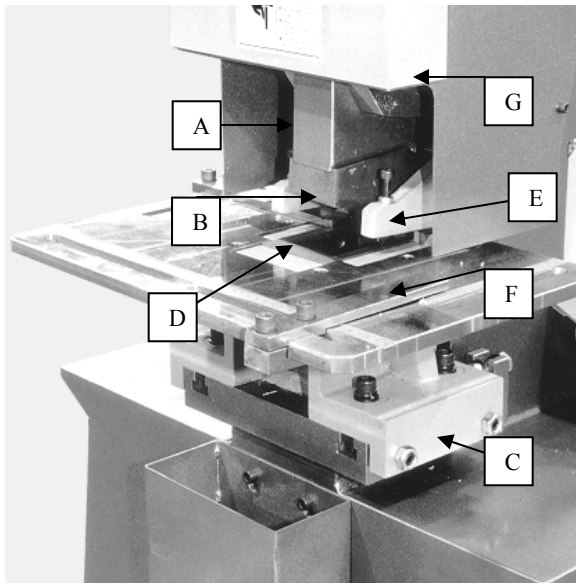
Safe operation of this machine depends on you, the operator.

Do not operate this machine unless:

- a. You are familiar with the function and location of the machine's components.
- b. You have inspected the machine and determined it is in safe, working condition (for example: no missing, altered or broken parts; all controls are functional; all safety devices are in place; etc.).
- c. You have read and understand all of the safety and instructional material supplied with the machine by Marvel Mfg. Co., including the Operator's manual and the safety and warning signs attached to the machine.

## NOTCHING STATION COMPONENTS

The notching station includes the slide to which the upper blade attaches, the bolster to which the lower blades attach, the stripper, the work table with stock guides, the guard, and the foot switch which controls the movement of the notcher.



The major components of the notching station include the slide (A), upper blade (B), bolster (C), lower blades (D), the stripper (E), the work table with stock guides (F), and the guard (G).

## EMERGENCY STOP PUSHBUTTON

Pressing the red emergency stop pushbutton causes all of the machine's functions to stop. After the button is pressed it remains in the off position, preventing the machine from being restarted, until the button is reset by turning it clockwise.

**WARNING** The Emergency Stop pushbutton does not disconnect any components from the power supply. Avoid serious injury or death by turning the machine's power off at the Main Electrical

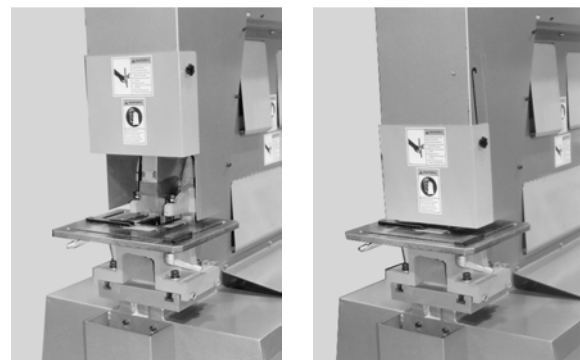


**Disconnect switch before servicing the machine.**

## NOTCHING STATION GUARD / COVER

The notching station's guard must be open to use the notching station. To open the guard, slide it upward until the hand knobs engage the end of the slot.

*Note: It is not necessary to loosen or tighten the hand knobs to operate the guard.*



*Left: The notching station's guard must be raised to use the notching station.*

*Right: When using the shearing station, the notching station's cover must be closed.*

When not using the notching station, the guard must be in the down position. The shearing station will not operate unless the notching station's guard is down.

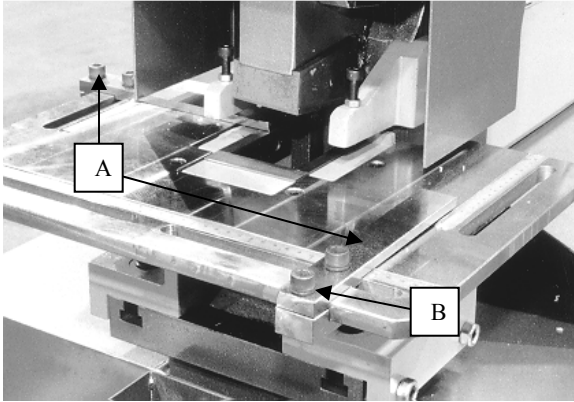
## NOTCHING STATION FOOT SWITCH

The operation of the notching station's foot switch is described in the Machine Description section, page C-7.



## WORK TABLE AND STOCK GUIDES

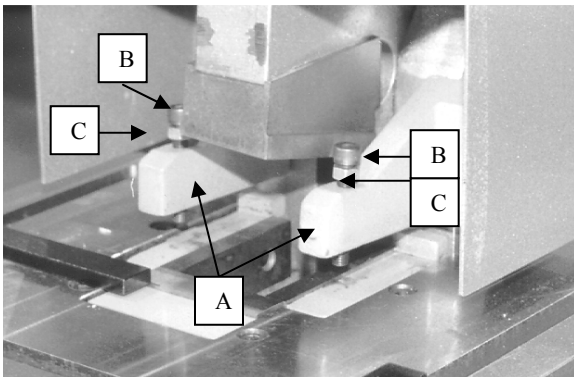
The work table supports the work stock and the stock guides (A) provide positive alignment of the work stock for accurate, repeatable notching.



The stock guides (A) are locked in place with cap screws (B). The guides can be placed in any of the slots in the work table.

## STRIPPER

The stripper performs two important jobs; it supports the work piece while the notcher is retracting, and partially guards the operator from the upper blade.



The stripper consists of two fixed guards (A) and two adjustable screws (B) locked in place by lock nuts (C).

### Adjusting the stripper:

The stripper must be correctly adjusted to provide uniform contact with the work piece while the upper blade is retracting from the workpiece.

**WARNING** Avoid serious injury.

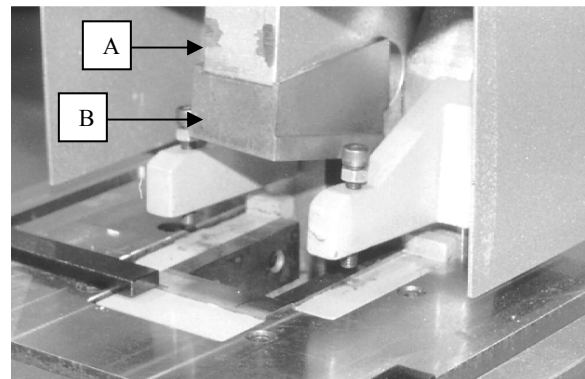


**Turn off the machine's power and lock it out before replacing the lower blades.**

1. Turn off the main electrical disconnect switch and lock it in the "Off" position.
2. Loosen the lock nut (C) on each stripper.
3. Place the work material under the stripper and turn the adjusting screws (B) until the end of each screw is no more than 1/32" above the work material.
4. Tighten the lock nuts (C).

## SLIDE AND UPPER BLADE

The slide (A) is the portion of the notching station that moves when the foot switch is pressed. The upper blade (B) is attached to the slide with a large socket head cap screw which is inserted up through the bottom of the blade and threaded into the slide.



The lower blade (B) is mounted to the slide (A) with a single socket head cap screw.

### Replacing the Upper Blade

The upper blade needs to be replaced when the work piece develops burrs as a result of the notching process, or when the blade shows visible signs of wear.

**WARNING** Avoid serious injury.



**Turn off the machine's power and lock it out before replacing the upper blade.**

1. Turn off the main electrical disconnect switch and lock it in the "Off" position.
2. Remove the socket head cap screw that holds the upper blade on the slide.
3. Install a new blade.

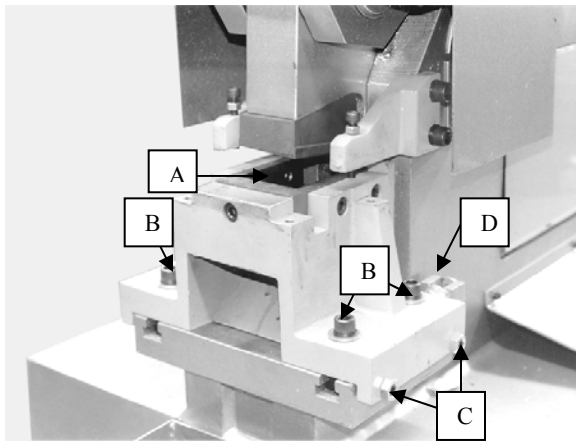
**CAUTION** Avoid damaging the machine.



**After replacing the upper blade make sure it will clear the lower blades before operating the machine. See "Aligning the Bolster", page E-4.**

## BOLSTER AND LOWER BLADES

The bolster holds the lower blades. The bolster is adjustable so the lower blades can be properly aligned with the upper blade.



*Features of the bolster include the lower blades (A), lock-down screws (B), bolster adjusting screws (C), and bolster hold-back screws (D). In this photo the work table has been removed for illustration purposes.*

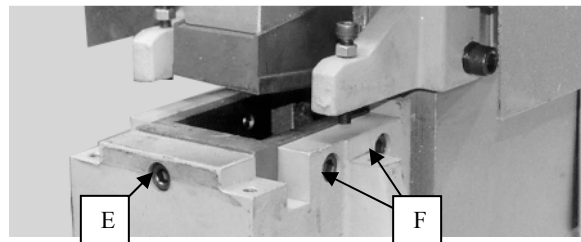
**Replacing the Lower Blades:**

The lower blades need to be replaced when the work piece develops burrs as a result of the notching process or when the blades show visible signs of wear.

**WARNING** Avoid serious injury. Turn off the machine's power and lock it out before replacing the lower blades.



1. Turn off the main electrical disconnect switch and lock it in the "Off" position.
2. Remove the socket head cap screws that hold the lower blades in the bolster and remove the old blades.



*The front blade is held in the bolster by a single socket head cap screw (E). The side blades are held in the bolster by two socket head cap screws each (F).*

3. Install the new blades.

**CAUTION** Avoid damaging the machine. After replacing the upper blade make sure it will clear the lower blades before operating the machine. See "Aligning the Bolster", next page.



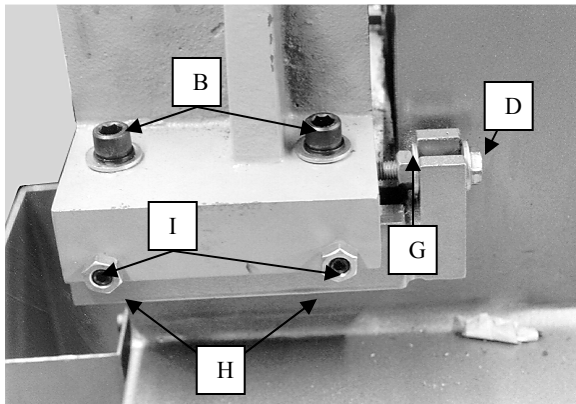
## Aligning the Bolster

**WARNING** Avoid serious injury.



**Turn off the machine's power and lock it out before replacing the lower blades.**

1. Turn off the main electrical disconnect switch and lock it in the "Off" position.
2. Open the notching station's guard.
3. Loosen the four socket head cap screws (B) which lock the bolster in place.



*The bolster is held in place by a variety of adjusting screws and lock nuts.*

4. Loosen the two hex nuts (G) that lock the bolster hold-back screws in position.
5. Turn the bolster hold-back screws (D) counterclockwise until they are removed from the bolster.
6. Loosen the four jam nuts (H) that lock the bolster adjusting screws in place.
7. Loosen the bolster adjusting screws (I).

**CAUTION** Avoid injury. The bolster is heavy. Use care when removing it from the machine.



8. Slide the bolster off the end of the machine.

9. Turn the main electrical disconnect switch on.
10. Turn the Shear / Notch switch to "Notch".
11. Press the "Pump On" pushbutton. Note: Make sure the Emergency Stop pushbuttons are reset.
12. Place the Normal/Jog switch in the "Jog" position.

**WARNING** Avoid serious injury.



**When the foot switch is pressed, the slide will descend. Keep away from the notcher.**

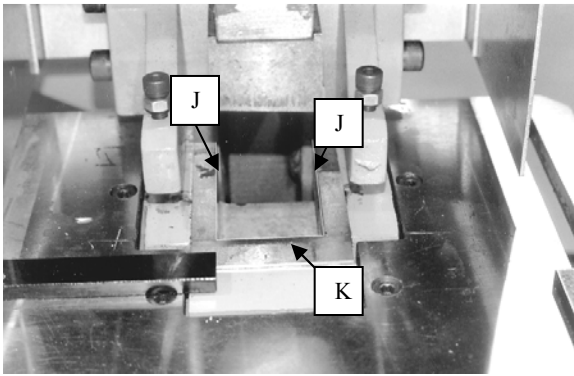
13. Press the foot switch until the notcher has fully descended and then release the foot switch.

**WARNING** Avoid serious injury.



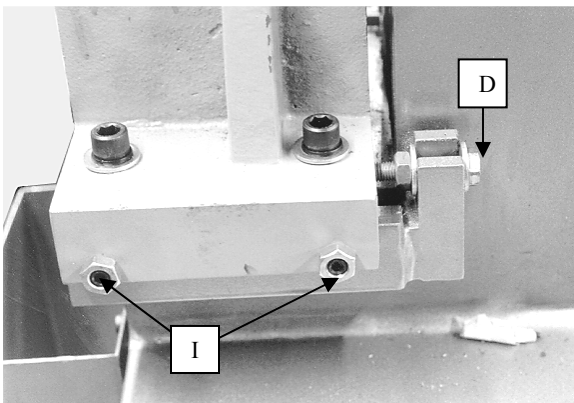
**Turn off the machine's power and lock it out before adjusting the bolster.**

14. Turn off the main electrical disconnect switch and lock it in the "Off" position.
15. Carefully slide the bolster back onto the machine.
16. Position the bolster so there is a .002" gap between the front blade of the bolster and the front of the upper blade, and an equal gap between the bolster's side blades and the sides of the upper blade.



*When properly installed, there will be a .002" gap between the front blade and the front of the upper blade (K), and the gap between the side blades will be equal on both sides (J).*

17. Adjust the bolster adjusting screws (I), and bolster hold-back screws (D), until the clearance between the upper blade and the lower blade is correct.



*Adjust all four bolster-adjusting screws (I) until the clearance between the upper blade and lower blades is the same on each side. Adjust the hold-back screws (D) until the clearance at the front blade is .002".*

18. Tighten the hex nuts (G) that lock the bolster hold-back screws in position.

**Important: The bolster hold-back screws must be properly adjusted and locked in place with the hex nuts or the bolster will move from the forces exerted during the notching operation.**

**CAUTION** Avoid damaging the machine. All of the bolster adjusting screws (I) must be firmly in contact with the bolster mounting pad after the blade clearance has been set. If any adjusting screws are not in contact with the bolster mounting pad, the bolster will move and the blades will strike each other.



19. Tighten the jam nuts (H) which lock the bolster adjusting screws in place. Check the blade clearance after the jam nuts have been tightened. If necessary, loosen the jam nuts to correct any clearance problems and then retighten them.
20. Tighten the four socket head cap screws (B) that help lock the bolster in position.

**CAUTION** Avoid damaging the machine.



**The upper blade must enter and exit the lower blades smoothly, with no interference.**

21. Recheck the clearance between the blades and make any adjustments that may be necessary.
22. Make sure all of the locking screws and nuts are tightened to prevent movement of the bolster.

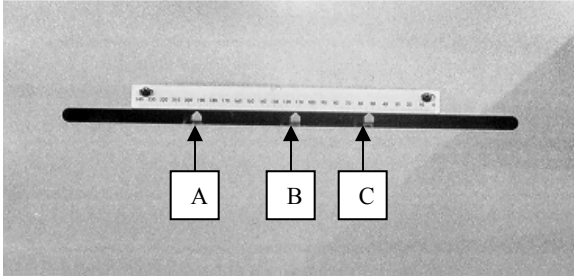
**Important: The forces exerted on the bolster during notching operations can cause the bolster to become mis-aligned. It is important to visually check the alignment of the upper and lower blades at regular intervals.**

## STROKE ADJUSTMENT

The upward travel limit of the notcher is automatically reduced when the Shear / Notch switch is placed in the "Notch" position. It is not necessary to adjust the notcher's stroke with the stroke adjusting collars.

However, if you find the notcher does not cut completely through the material, or retract high enough to allow material to be placed under it,

you will need to adjust the position of the stroke adjusting collars to restore the notcher's proper range of travel.



Three collars and limit switches control the travel limits of the shearing and notching stations. This photo shows the factory set positions for the three collars.

### To adjust the travel of the notcher:

1. Press the Emergency Stop pushbutton.
2. Adjust each collar to achieve the proper range of notch travel:

**Left Collar (A):** This collar controls the downward travel limit of the notching slide. This collar should always be positioned fully right, against its stop. Moving this collar away from its stop prevents the slide from descending completely and results in incomplete notches.

**Middle Collar (B):** This collar controls the upward travel limit of the notching slide. This collar is usually set halfway between the two outer collars (A and C). Moving this collar to the right decreases the slide's upward travel. Moving this collar to the left increases the slide's upward travel.

**Right Collar (C):** This collar is typically positioned fully left, against its stop. This collar has no effect on the notching station, however, if this collar is positioned far to the right of its stop it can limit the notching station's upward travel limit.



## NOTCHING STATION CAPACITY

**WARNING** Avoid serious injury.



Never exceed the machine's notching capacity.

The notching capacity of each machine is provided in the chart below. Notching capacity is expressed as the thickest material that can be notched with the notching blades available for each machine.

Maximum Material Thickness		
Model No.	 Rectangular Notch <sup>1</sup>	 V-Notch <sup>2</sup>
IW66D/DX	3/8"	3/8"
IW88D/DX	1 / 2"	1 / 2"
IW110D/X/2	1 / 2"	1 / 2"
IW135D/DX	1 / 2"	1 / 2"
IW180DX	5/8"	5/8"

1. Supplied as standard equipment

2. Optional equipment

## NOTCHING STATION OPERATION

You must be familiar with the function and location of the components described in the Machine Description chapter of this manual as well as the information in this Notching Station chapter before performing any steps in this section.

Safe operation of this machine depends on you, the operator.

**Do not operate the machine unless:**

- a. You are familiar with the function and location of the machine's components.
- b. You have inspected the machine and determined it is in safe, working condition (for example: no missing, altered or broken parts;

all controls are functional; all safety devices are in place; etc.).

c. You have read and understand all of the safety and instructional material supplied with the machine by Marvel Mfg. Co. Inc., including the Operator's manual and the safety and warning signs attached to the machine.

## Pre-Operation Checklist

This checklist must be completed at the beginning of each shift and by each operator.

- Safety First! Obey all warnings.
- Review and comply with the instructional and safety information provided with this machine.
- Turn the machine's power off with the main electrical disconnect switch and lock it in the "Off" position.
- Make sure all guards and covers are in place and function properly.

**WARNING** Avoid serious injury. Do not operate this machine with missing, altered, or defective guards or covers.



- Remove unnecessary tools and equipment from the machine and surrounding area.
- Inspect the machine for damage, leaks, and alterations. Repair before operating.

**WARNING** Avoid serious injury. Do not operate this machine if it is damaged, has worn or missing parts, or is altered in any way.



- Make sure all of the bolster's locking screws and locking nuts are tightened.
- Check the hydraulic fluid level. Fill if needed.

**CAUTION** Never operate the machine with a low hydraulic fluid level. Damage to the machine will occur.



## Notching Station Set-up

The following steps must be performed for each punching operation.

1. Perform the pre-operation checklist on page E-8.
2. Position the following switches as indicated:
  - Auto / Manual switch to "Manual".
  - Shear / Notch switch to "Notch".
  - Normal / Jog switch to "Jog".
  - Press the Emergency Stop pushbutton.
3. Open the notching station's guard.
4. Adjust the stock guides.

**WARNING** Avoid injury. Make sure the stripper is properly adjusted to support the stock as the upper blade retracts.



5. Adjust the stripper.
6. Turn on the Main Electrical Disconnect switch.
7. Reset the Emergency Stop pushbutton(s).
8. Press the "Pump On" pushbutton.

*Note: If the hydraulic pump does not come on make sure the Emergency Stop pushbutton(s) are reset.*

**CAUTION** Avoid damaging the machine. Make sure the upper blade will not strike the lower blades.



9. Step on the notching station's foot switch and check the clearance between the upper

blade and the lower blades. If necessary, align the bolster following the instructions on page E-5.

10. Adjust the stroke limits of the notching station if necessary. See page E-6.
11. Turn the Normal / Jog switch to the "Normal" position.

The machine is now set up and ready for operation. Continue with "Notching Operation" for step-by-step notching instructions.

## Notching Operation

1. Complete steps 1 through 11 of "Notching Station Set-up", page E-8.

**WARNING** Never load a work piece which exceeds the machine's design capacity. Serious injury can result. Refer to "Notching Station Capacity", page E-7.



2. Position the material to be notched on the work table.

**WARNING** The notching station can cause serious injury. Keep your hands and body away from the point-of-operation until the notcher has stopped retracting and you have removed your foot from the foot switch.



3. Press the foot switch all the way down and hold it until the upper blade has cut through the material. Release the foot switch to retract the notcher.

**WARNING** Avoid serious injury. Notched material will have sharp edges. Always wear gloves when handling the material.



4. To continue notching the same material, repeat steps 2 through 3. Remember to periodically check the alignment of the upper and lower blades.

To notch material of a different thickness or with a different stock-guide setup, go to step 1 of "Notching Station Set-up", page E-8.

If you are done notching, continue with step 5.

5. Press the Emergency Stop pushbutton.
6. Turn the Main Electrical Disconnect Switch off.
7. Close the notching station's guard.

## SECTION CONTENTS

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This section contains procedures and specifications specific to the Ironworker's angle shearing station.

Important	F-1
Angle Shear Components	F-2
Shearing Station Foot Switch	F-2
Electric Back Gauge	F-2
Guides / Guard	F-3
Holddown	F-4
Moveable Blade	F-4
Repositioning the Moveable Blade	F-4
Stationary Blades	F-7
Replacing the Stationary Blades	F-7
Adjusting the Stationary Blades	F-7
Stroke Adjustment	F-9
Angle Shear Capacity	F-10
Angle Shear Operation	F-10

## IMPORTANT

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You *must* be familiar with the function and location of the components described in the Machine Description section of this manual before performing any steps in this section.

Safe operation of this machine depends on you, the operator.

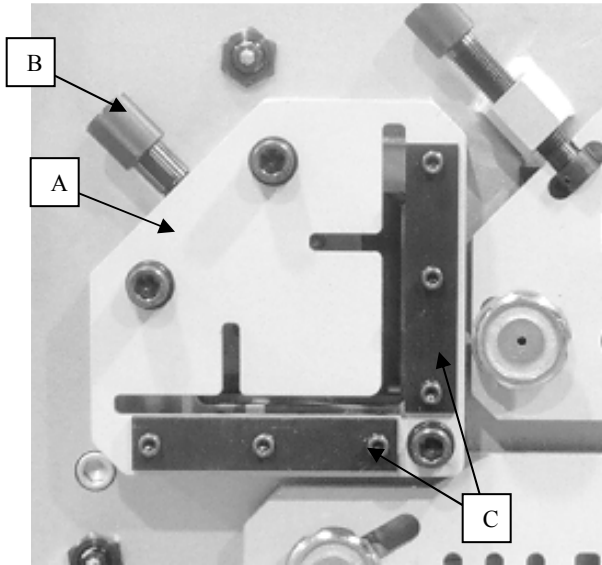
### **Do not operate this machine unless:**

- a. You are familiar with the function and location of the machine's components.**
- b. You have inspected the machine and determined it is in safe, working condition (for example: no missing, altered or broken parts; all controls are functional; all safety devices are in place; etc.).**
- c. You have read and understand all of the safety and instructional material supplied with the machine by Marvel Mfg. Co., including the Operator's manual and the safety and warning signs attached to the machine.**



## ANGLE SHEAR COMPONENTS

The angle shearing station consists of the guard, hold-down, squaring plates, stationary blade and moveable blade. Additionally, the angle shear is activated by a foot switch or by the electric back gauge.



*The angle shearing station consists of the guard (A), hold-down (B), squaring plates (C), and the stationary and moveable blades (not visible).*

## SHEARING STATION FOOT SWITCH

The operation of the punching station's foot switch is described in the Machine Description section, page C-7.

## ELECTRIC BACK GAUGE

The electric back gauge is an automatic feature which activates the shear shortly after the work stock comes in contact with the back gauge's sensor - the machine operator does not need to press the foot switch. The electric back gauge is functional when the "Auto / Manual" switch is turned to "Auto".

The time delay between when the stock contacts the sensor and when the shear is activated can be adjusted from 0 seconds to 3 seconds with a timer in the electrical enclosure.

## To Set Up the Electric Back Gauge:

**Important:** These instruction only describe the set-up procedure to prepare the back gauge for operation. Operation of the shear with the electric back gauge is described in the Angle Shear Operation section of this chapter.

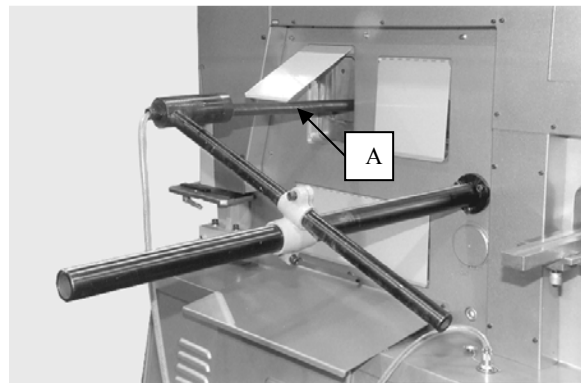
1. Turn off the main electrical disconnect switch.

**WARNING** Avoid serious injury.



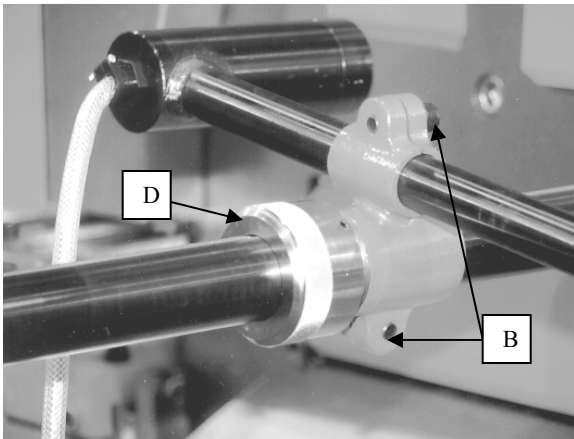
**Turn off the machine's power and lock it out before servicing the machine.**

2. Insert the work material (A) through the shear.



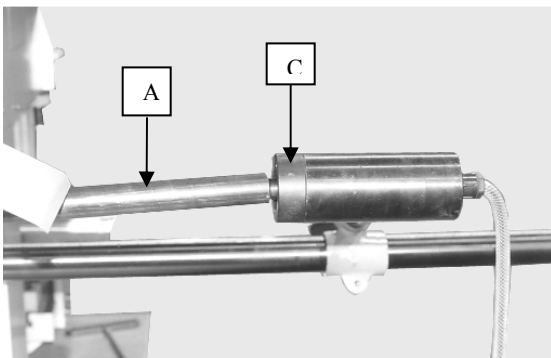
*Round bar stock (A) is shown here passing through the bar shearing station.*

3. Loosen the locking screws (B) on the collar and adjust the position of the sensor (C, next page) so it lines up with the material (A).



Two lock screws (B) hold the sensor in the desired position. The edge of the collar (D) indicates the shear length setting.

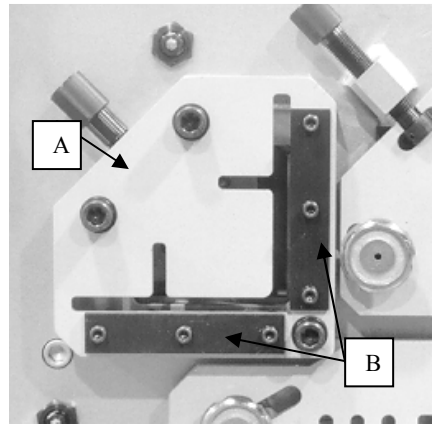
- Slide the collar until its outer edge (D) is on the desired shear length and tighten the locking screws (B).



The sensor (C) is positioned so the work material (A) will contact it at the desired cut-off length.

## GUIDES / GUARD

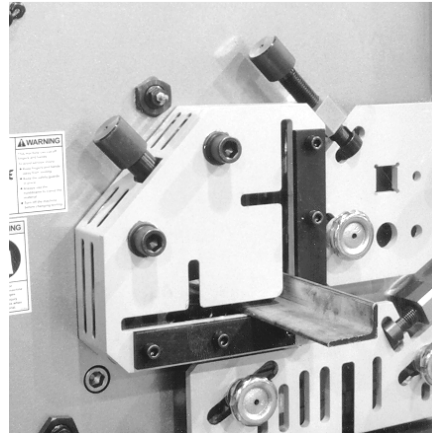
The guard (A) protects the operator from the shear blades and helps provides support for the work piece.



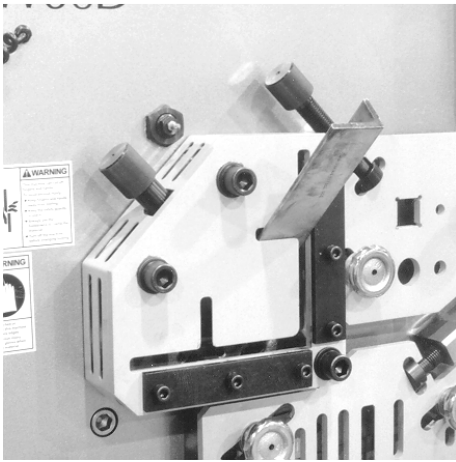
The guard (A) is slotted to allow angle stock to be sheared in any of three positions, as shown in the photos below.

Two squaring plates (B) are provided which can be adjusted to square the work material with the blades. To adjust the squaring plates, loosen the three screws which lock each plate in position and reposition the plates as needed.

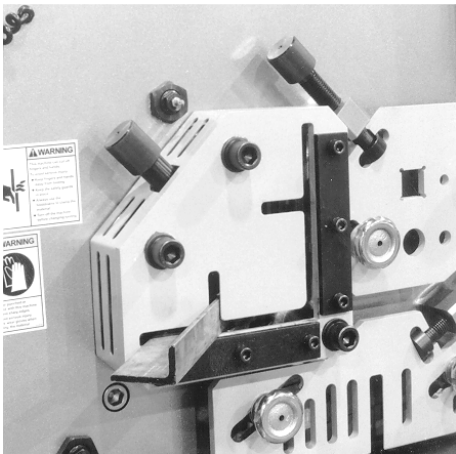
Angle stock can be inserted through the guard at any of three different positions, as shown below, allowing shear angles of  $90^\circ$  and  $45^\circ$ .



Angle stock is shown here positioned for a  $90^\circ$  shear.



Angle stock is shown here in one of the two 45° shear positions.



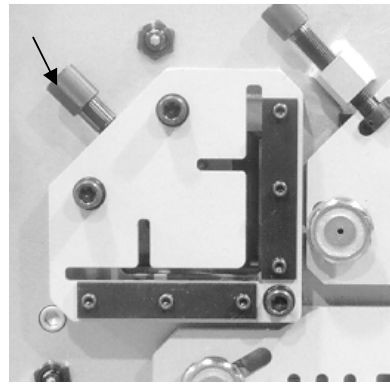
Angle stock is shown here in one of the two 45° shear positions.

## HOLDDOWN

The holddown (A) secures the work piece in the angle shear. After inserting the work piece, turn the holddown's knurled knob clockwise until it holds the work piece firmly in place.

*Note: When shearing stock in either of the angle shear's 45° positions the holddown cannot be*

**A** d.



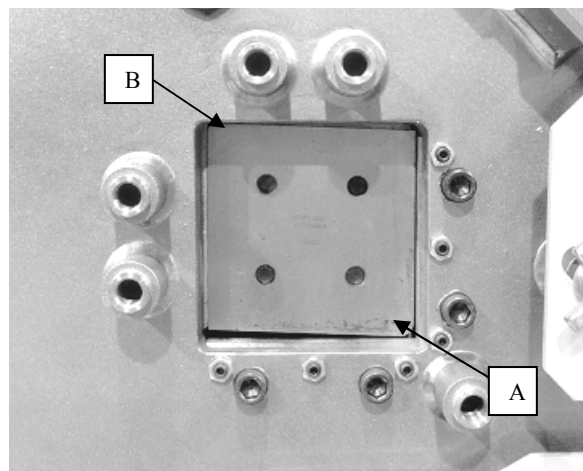
The holddown (A) secures the work piece in the angle shear.

## MOVEABLE BLADE

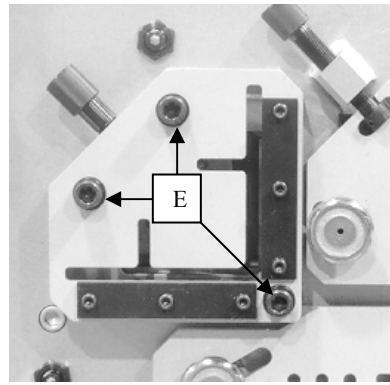
The moveable blade of the angle shearing station has two corners which are radiused (A and B, below). The blade can be quickly repositioned so that the corner radius that most closely matches the inside radius of the angle being sheared can be placed in the shearing position - resulting in the best cuts possible for a wide range of material sizes.

The chart below shows the radius at each corner of the blade.

*Note: Your Ironworker left the factory with the radius in column "A" installed in the shearing position.*



ANGLE SHEAR CORNER RADIUS		
MODEL	A	B
66D/DX	1 / 4"	1 / 2"
88D/DX	1 / 4"	1 / 2"
110D/DX/2	1 / 4"	1 / 2"
IW135D/DX	1 / 4"	1 / 2"
IW180DX	1 / 4"	1 / 2"



Socket head cap screws (E) hold the guard in place.

### Repositioning the Moveable Blade:

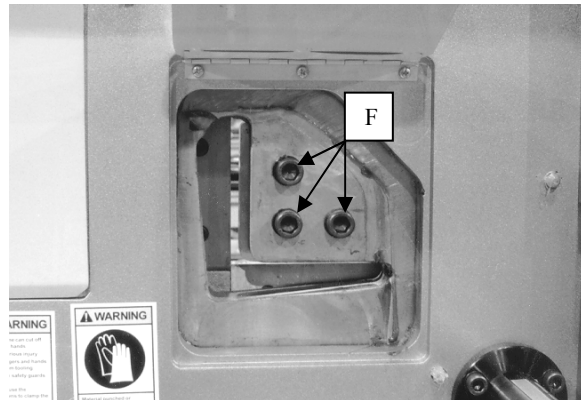
For the highest quality cuts, the blade's corner radius that most closely matches the inside radius of the material to be sheared should be in the cutting position.

- Open the guard on the discharge side of the angle shear and remove the three socket head cap screws (F) that hold the moveable blade to the slide.

**WARNING** Avoid serious injury.



Turn off the machine's power and lock it out before replacing the lower blades.



The moveable blade is held in place by three socket head cap screws (F).

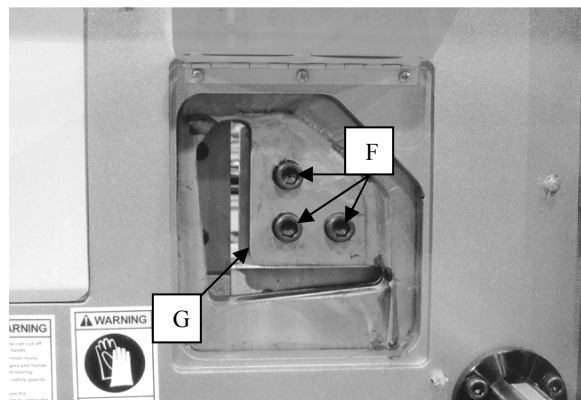
- Turn off the main electrical disconnect switch and lock it in the "Off" position.

**CAUTION** Avoid injury. The guard weighs 22 lbs. Use care when removing it from the machine.



- Remove the socket head cap screws that hold the guard in place and carefully remove the guard.

- Rotate the blade until the desired corner radius is in the cutting position (G) and secure it in place with the three socket head cap screws (F).



With the desired corner radius in the cutting position (G), secure the blade with the three socket head cap screws (F).

**CAUTION** Avoid injury. The guard weighs 22 lbs. Use care when lifting and installing the guard.



5. Re-install the guard removed in step 2.

### Aligning the Bolster

1. Turn on the main electrical disconnect switch.
2. Open the notching station's guard.
3. Turn the Shear (Full) / Notch (Short) switch to "Notch (Short)".
4. Press the "Pump On" pushbutton. *Note: Make sure the Emergency Stop pushbuttons are reset.*
5. Loosen the four socket head cap screws (B) which lock the bolster in place.
6. Loosen the two hex nuts (G) that lock the bolster hold-back screws in position.
7. Loosen the four jam nuts (H) that lock the bolster adjusting screws in place.
8. Place the Normal/Jog switch in the "Jog" position.

**WARNING** Avoid serious injury.



When the foot switch is pressed, the slide will descend. Keep away from the notcher.

9. Press the foot switch until the back of the upper blade is just above the lower blades and then release the foot switch.

**WARNING** Avoid serious injury.



Turn off the machine's power and lock it out before adjusting the bolster.

10. Turn off the main electrical disconnect switch and lock it in the "Off" position.
11. Adjust the side-to-side position of the bolster by turning the bolster adjusting screws (I) until the upper blade will clear the lower blades.
12. Turn the two bolster hold-back screws (D) until the clearance between the front of the upper blade and the lower blade is equal to the clearance between the side blades.
13. Tighten the hex nuts (G) that lock the bolster hold-back screws in position.

**Important: The bolster hold-back screws must be properly adjusted and locked in place with the hex nuts or the bolster will move from the forces exerted during the notching operation.**

**CAUTION** Avoid damaging the machine.



All of the bolster adjusting screws (I) must be firmly in contact with the bolster mounting pad after the blade clearance has been set. If any adjusting screws are not in contact with the bolster mounting pad, the bolster will move and the blades will strike each other.

14. Tighten the jam nuts which lock the bolster adjusting screws in place. Check the blade clearance after the jam nuts have been tightened. If necessary, loosen the jam nuts to correct any clearance problems and then retighten them.
15. Tighten the four socket head cap screws (B) that help lock the bolster in position.

**CAUTION** Avoid damaging the machine.



The upper blade must enter and exit the lower blades smoothly, with no interference.

16. Press the foot switch and observe the upper blade as it descends fully into the lower blade. The upper blade must not be allowed to contact the lower blades.

**WARNING** Avoid serious injury.



Turn off the machine's power and lock it out before adjusting the bolster.

17. Turn off the main electrical disconnect switch and lock it in the "Off" position.

18. Recheck the clearance between the blades and make any adjustments that may be necessary.

19. Make sure all of the locking screws and nuts are tightened to prevent movement of the bolster.

**Important:** The forces exerted on the bolster during notching operations can cause the bolster to become misaligned. It is important to visually check the alignment of the upper and lower blades at regular intervals.

## STATIONARY BLADES

The stationary blades of the angle shearing station have four cutting edges each. As the blades become worn they can be removed and re-installed with a different cutting edge in the cutting position.

### Replacing the Stationary Blades

The stationary blades need to be replaced when the work piece develops burrs as a result of the shearing process or when the blades show visible signs of wear.

1. Make sure the moveable blade is all the way up.

**WARNING** Avoid serious injury.



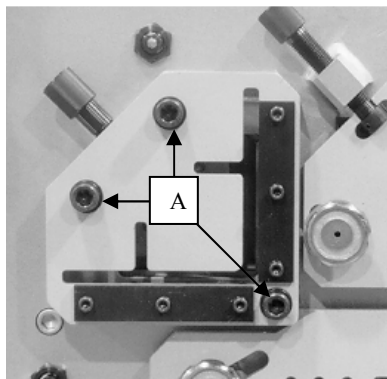
Turn off the machine's power and lock it out before adjusting or servicing the machine.

2. Turn off the main electrical disconnect switch and lock it in the "Off" position.

**CAUTION** Avoid injury. The guard weighs 22 lbs. Use care when removing it from the machine.

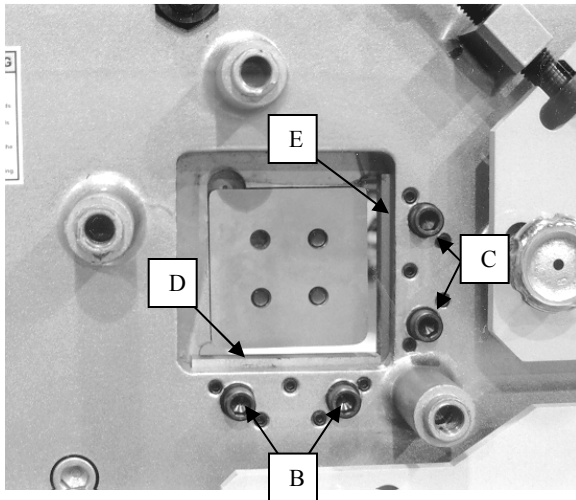


3. Remove the three socket head cap screws (A) that hold the guard in place and carefully remove the guard.



Three socket head cap screws (A) hold the guard in place.

4. Remove the four socket head cap screws (B and C) that hold the stationary blades in place and remove the blades.



Two socket head cap screws hold each of the stationary blades in place. Screws "B" hold the lower blade (D) in place, and screws "C" hold the side blade (E) in place.

5. Re-install the blades with a an unused edge in the cutting position. If all of the blade's cutting edges are worn, install a new blade.
6. Continue with step 3 of "Adjusting the Stationary Blades", below.

### Adjusting the Stationary Blades

The stationary blades are adjustable so the correct clearance between the stationary blades and the fixed blade can be achieved.

**WARNING** Avoid serious injury. Turn off the machine's power and lock it out before adjusting or servicing the machine.



1. Turn off the main electrical disconnect switch and lock it in the "Off" position.

**CAUTION** Avoid injury. The guard weighs 22 lbs. Use care when removing it from the machine.



2. Remove the three socket head cap screws (A, previous column) that hold the guard in place and carefully remove the guard.
3. Position the following switches as indicated:
  - Auto / Manual switch to "Manual".
  - Shear / Notch switch to "Shear".
  - Normal / Jog switch to "Jog".
4. Close the notching station's guard.
5. Turn the Main Electrical Disconnect switch on.
6. Reset the Emergency Stop pushbutton(s).
7. Press the "Pump On" pushbutton.

*Note: If the hydraulic pump does not come on make sure the Emergency Stop pushbutton(s) are reset.*

**WARNING** Avoid serious injury. When the foot switch is pressed, the moveable blade will descend. Keep away from the blades.



**CAUTION** Avoid damaging the machine. Make sure the moveable blade will not strike the stationary blades.



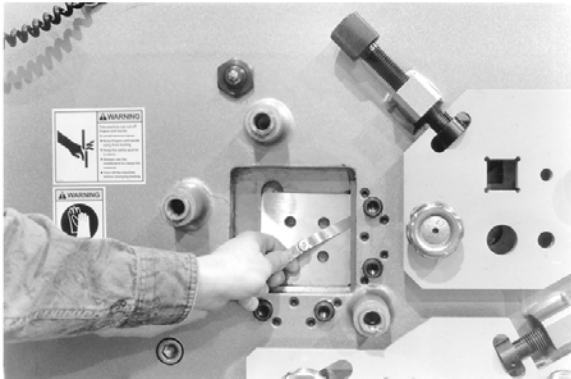
**Important:** If the moveable blade will strike the stationary blades continue with step 9, below.

8. Press the foot switch until the moveable blade descends behind the stationary blades and then release the foot switch.

**WARNING** Avoid serious injury. Turn off the machine's power and lock it out before adjusting the stationary blades.



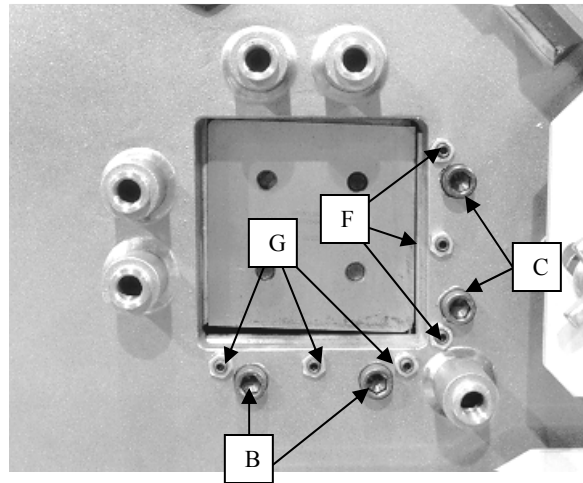
9. Turn off the main electrical disconnect switch and lock it in the "Off" position.
10. Measure the clearance between the shear's blades. The clearance must be within the range specified in the chart, below. If the clearance is correct, continue with step 14. If the clearance is incorrect, continue with step 11.



Measure the clearance between the blades with a feeler gauge. The blades should have a uniform clearance within the range defined in the chart, below.

SHEAR BLADE CLEARANCE	
Model:	Clearance:
IW66D, IW88D	.008" -.01"
IW110D/2, IW135D, IW180DX	.01" - .014"

11. Loosen the 4 socket head cap screws (B and C).



Two socket head cap screws (C and B) lock each of the stationary blades in place. Screws "G" and "F" are used to adjust the clearance between the moveable blade and the stationary blades. Each of these screws is locked in position by a hex nut.

12. Loosen the hex nuts which lock the screws (G and F) in position.
13. Adjust screws "G" and "F" as needed to obtain a uniform clearance within the range defined in the chart. To do this:
  - a. Turn screws "G" and "F" clockwise to decrease the clearance between the blades.
  - b. Turn screws "G" and "F" counter-clockwise to increase the clearance between the blades.
14. Tighten screws "C" and "B" and recheck the clearance between the blades. Repeat steps 11 through 13 as needed.

**CAUTION** Avoid injury. The guard weighs 22 lbs. Use care when lifting and installing the guard.



15. Re-install the guard removed in step 2.

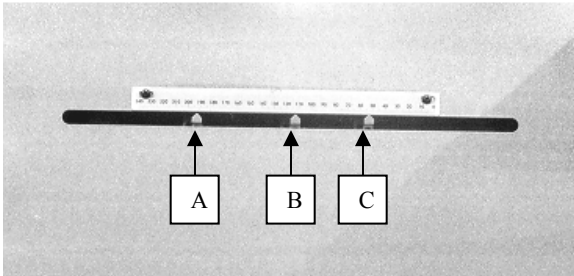


## STROKE ADJUSTMENT

The travel limits of the shear can be adjusted by moving the collars A, B, and C) on the drive bar. When shearing large quantities of the same material limiting the travel of the shear will increase productivity.

### To adjust the travel of the shear:

1. Press the Emergency Stop pushbutton.
2. Adjust each collar to achieve the proper range of shear travel:



Three collars and limit switches control the travel limits of the shearing and notching stations. This photo shows the factory set positions for the three collars.

### Left Collar (A):

This collar controls the downward travel limit of the shearing station's slide. This collar should always be positioned fully right, against its stop. Moving this collar away from its stop prevents the shear from descending completely and results in incomplete cuts.

### Middle Collar (B):

This collar controls the upward travel limit of the shear only when the Shear/Notch switch is in the "Notch" position. This collar is usually set in the middle of the collar bar. Moving this collar to the right reduces the shear's upward travel. Moving this collar to the left increases the shear's upward travel.

### Right Collar (C):

This collar controls the upward travel limit of the shear only when the Shear/

Notch switch is in the "Shear" position. This collar is typically positioned fully left, against its stop, where it provides full upward travel of the shear. As this collar is moved to the right, the shearing station's upward travel is reduced.

## ANGLE SHEAR CAPACITY

**WARNING** Avoid serious injury. Never exceed the machine's shearing capacity.



The angle shearing capacity of each machine is provided in the chart below.

Maximum Material Size (W x W x T)		
Model No.	Sheared @ 90°	Sheared @ 45°
IW66D/DX	5" X 5" X 1/2"	2-1/2" X 2-1/2" X 5/16"
IW88D/DX	6" X 6" X 1/2"	3-1/8" X 3-1/8" X 3/8"
IW110D/X/2	6" X 6" X 1/2"	3-1/8" X 3-1/8" X 3/8"
IW135D/DX	6" X 6" X 1/2"	3-1/8" X 3-1/8" X 3/8"
IW180DX	8" X 8" 3/4"	3-1/8" X 3-1/8" X 3/8"

## ANGLE SHEAR OPERATION

You *must* be familiar with the function and location of the components described in the Machine Description chapter of this manual as well as the information in this Angle Shearing Station chapter before performing any steps in this section.

Safe operation of this machine depends on you, the operator.

**Do not operate the machine unless:**

- a. You are familiar with the function and location of the machine's components.
- b. You have inspected the machine and determined it is in safe, working condition (for example: no missing, altered or broken parts; all controls are functional; all safety devices are in place; etc.).
- c. You have read and understand all of the safety and instructional material supplied with the machine by Marvel Mfg. Co., including the Operator's manual and the safety and warning signs attached to the machine.

## Pre-Operation Checklist

This checklist must be completed at the beginning of each shift and by each operator.

- Safety First! Obey all warnings.
- Review and comply with the instructional and safety information provided with this machine.
- Turn the machine's power off with the main electrical disconnect switch and lock it in the "Off" position.
- Make sure all guards and covers are in place and function properly.

**WARNING** Avoid serious injury. Do not operate this machine with missing, altered, or defective guards or covers.



- Remove unnecessary tools and equipment from the machine and surrounding area.
- Inspect the machine for damage, leaks, and alterations. Repair before operating.

**WARNING** Avoid serious injury.



Do not operate this machine if it is damaged, has worn or missing parts, or is altered in any way.

- Check the hydraulic fluid level. Fill if needed.

**CAUTION** Never operate the machine with a low hydraulic fluid level.



Damage to the machine will occur.

## Angle Shear Set-up

The following steps must be performed for each angle shearing operation.

1. Perform the pre-operation checklist on page F-9.
2. Position the following switches as indicated:
  - Auto / Manual switch to "Manual".
  - Shear / Notch switch to "Shear".
  - Normal / Jog switch to "Jog".
  - Press the Emergency Stop pushbutton.
3. Make sure the notching station's guard is closed.
4. Turn on the Main Electrical Disconnect switch.
5. Reset the Emergency Stop pushbutton(s).
6. Press the "Pump On" pushbutton.

*Note: If the hydraulic pump does not come on make sure the Emergency Stop pushbutton(s) are reset.*

**CAUTION** Avoid damaging the machine. Make sure the moveable blade will not strike the stationary blades.



7. Step on the shearing station's foot switch and make sure the moveable blade will not strike the stationary blades.
8. Adjust the stroke limits of the shearing station if necessary. See page F-8.
9. Turn the Normal / Jog switch to the "Normal" position.

The machine is now set up and ready for operation. Continue with "Angle Shearing Operation" for step-by-step shearing instructions.

### Angle Shearing - Manual Operation

Manual operation of the shearing station is performed without the use of the electric back gauge.

1. Complete steps 1 through 9 of "Angle Shear Set-up", page F-11

**CAUTION** Never load a work piece which exceeds the machine's design capacity. Refer to "Angle Shear Capacity", page F-8.



2. Place the work material in the angle shear.

**WARNING** The shearing station can cause serious injury. Never place any part of your body inside the guards.



3. Tighten the holddown against the material.

*Note: When using either of the angle shear's 45° shearing positions the holddown cannot be used.*

**WARNING** Avoid serious injury. Sheared material will have sharp edges. Always wear gloves when handling the material.



4. Press the foot switch all the way down and hold it until the blade has cut through the material. Release the foot switch to retract the blade.

5. To continue shearing, repeat steps 2 through 4.

When you are done shearing, continue with step 6.

6. Press the Emergency Stop pushbutton.
7. Turn the Main Electrical Disconnect Switch off.

### Angle Shearing - Automatic Operation

Automatic operation of the shearing station is performed with the use of the electric back gauge.

1. Complete steps 1 through 9 of "Angle Shear Set-up", page F-11
2. Set-up the Electric Back Gauge. See page F-2.

**CAUTION** Never load a work piece which exceeds the machine's design capacity. Refer to "Angle Shear Capacity", page F-10



**WARNING** The shearing station can cause serious injury. Never place any part of your body inside the guards.



**WARNING** Avoid serious injury. The shear will automatically cut when the work material is pushed through the angle shear and contacts the electric back gauge. Keep away from all moving parts when inserting the work material in the shear.



**WARNING** Avoid serious injury. Sheared material will have sharp edges. Always wear gloves when handling the material.



3. Place the work material through the angle shear until it contacts the electric back gauge. When the material contacts the electric back gauge the shear will automatically cut the material.
4. To continue shearing, repeat step 3.  
If you are done shearing, continue with step 5.
5. Press the Emergency Stop pushbutton.
6. Turn the Main Electrical Disconnect Switch off.

## SECTION CONTENTS

---

This section contains procedures and specifications specific to the Ironworker's bar shearing station.

Important	G-1
Bar Shear Components	G-2
Shearing Station Foot Switch	G-2
Electric Back Gauge	G-2
Guides / Guard	G-3
Stationary Blade	G-3
Replacing the Stationary Blade	G-3
Adjusting the Stationary Blade	G-4
Moveable Blade	G-4
Stroke Adjustment	G-5
Bar Shear Capacity	G-6
Bar Shear Operation	G-6

## IMPORTANT

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You *must* be familiar with the function and location of the components described in the Machine Description section of this manual before performing any steps in this section.

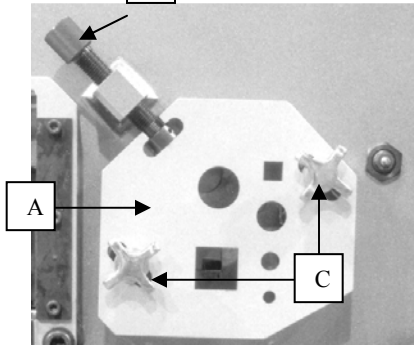
Safe operation of this machine depends on you, the operator.

### **Do not operate this machine unless:**

- a. You are familiar with the function and location of the machine's components.**
- b. You have inspected the machine and determined it is in safe, working condition (for example: no missing, altered or broken parts; all controls are functional; all safety devices are in place; etc.).**
- c. You have read and understand all of the safety and instructional material supplied with the machine by Marvel Mfg. Co., including the Operator's manual and the safety and warning signs attached to the machine.**

## BAR SHEAR COMPONENTS

The bar shearing station consists of the guard/guide, hold-down, stationary blade and moveable blade. Additionally, the bar shear is activated by a foot switch or by the electric back gauge. **B**



*The visible components of the bar shearing station include the guard/guide (A), hold-down (B), and two hand knobs which lock the guard/guide in place (C).*

## SHEARING STATION FOOT SWITCH

The operation of the punching station's foot switch is described in the Machine Description section, page C-7.

## ELECTRIC BACK GAUGE

The electric back gauge is an automatic feature which activates the shear shortly after the work stock comes in contact with the back gauge's sensor - the machine operator does not need to press the foot switch. The electric back gauge is functional when the "Auto / Manual" switch is turned to "Auto".

The time delay between when the stock contacts the sensor and when the shear is activated can be adjusted from 0 seconds to 3 seconds with a timer in the electrical enclosure.

### To Set Up the Electric Back Gauge:

**Important:** These instruction only describe the set-up procedure to prepare the back gauge for operation. Operation of the shear with the

electric back gauge is described in the Angle Shear Operation section of this chapter.

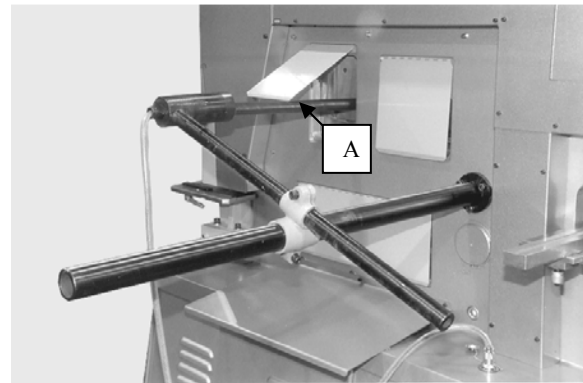
1. Turn off the main electrical disconnect switch.

**WARNING** Avoid serious injury.



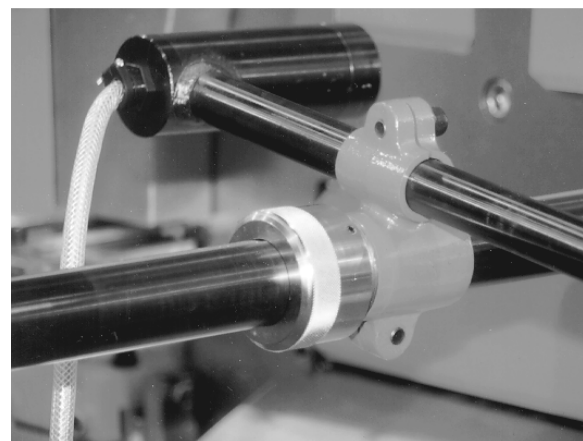
**Turn off the machine's power and lock it out before servicing the machine.**

2. Insert the work material (A) through the shear.



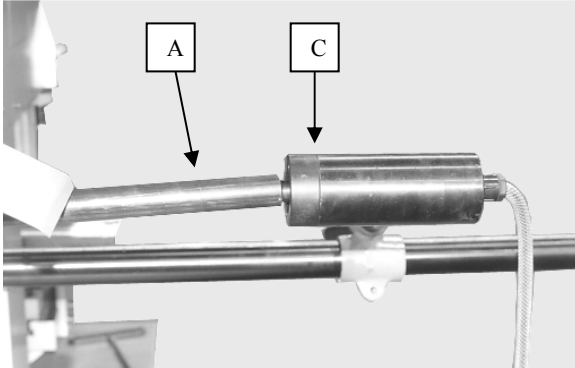
*Round bar stock (A) is shown here passing through the bar shearing station.*

3. Loosen the locking screws (B) on the collar and adjust the position of the sensor (C, next page) so it lines up with the material (A).



*Two lock screws (B) hold the sensor in the desired position. The edge of the collar (D) indicates the shear length setting.*

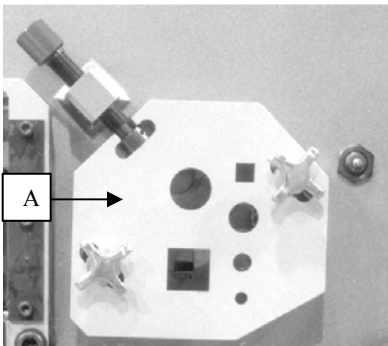
4. Slide the collar until its edge (D) is on the desired shear length and tighten the locking screws (B).



*The sensor (C) is positioned so the work material (A) will contact it at the desired cut-off length.*

## GUIDES / GUARD

The guide/guard (A) protects the operator from the shear blades and helps provide support for the work piece.



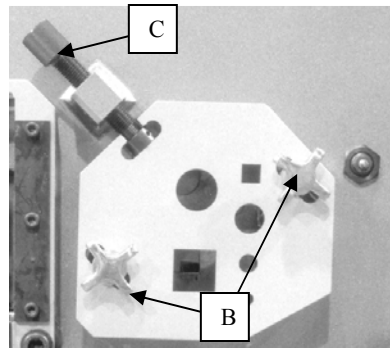
*The guard (A) has holes to accommodate different sized round and square bar stock.*

The guide/guard (A) steadies the work stock during the shearing process.

**Important: The hold-down should not be tightened firmly against the work stock. If it is the material will not be sheared squarely.**

### To Adjust the Guide / Guard:

1. Loosen the two hand knobs (B).



*The guide/guard must be properly adjusted for square cuts..*

2. Turn the adjusting screw (C) until the work stock passes easily through the bar shear.
3. Hold the work stock square to the blade and turn the adjusting screw (C) until the guide/guard just touches the work stock.
4. Tighten the two hand knobs (B) to lock the guide/guard in place.

## STATIONARY BLADE

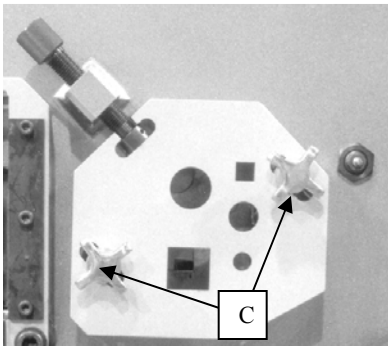
The stationary blade needs to be replaced when the work piece develops burrs as a result of the shearing process or when the blade shows visible signs of wear.

### Replacing the Stationary Blade

**WARNING** Avoid serious injury. Turn off the machine's power and lock it out before adjusting or servicing the machine.

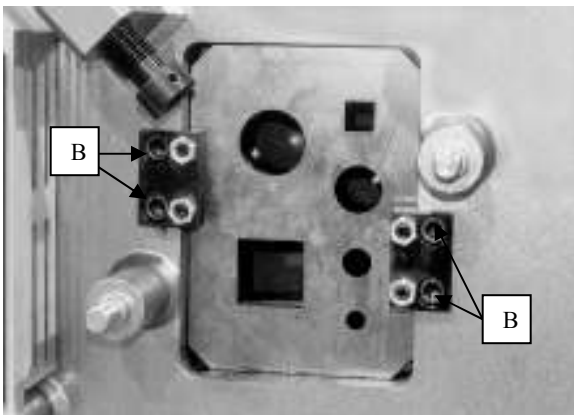


1. Turn off the main electrical disconnect switch and lock it in the "Off" position.
2. Remove the two hand knobs (C) that hold the guard in place and carefully remove the guard.



The guide/guard is held in place by the two hand knobs.

3. Remove the four socket head cap screws (B) that hold the blocks in place.



Four socket head cap screws (B) hold the blocks in place.

4. Remove the stationary blade.
5. Install a new stationary blade.
6. Re-install the blocks removed in step 3.
7. Continue with step 3 of "Adjusting the Stationary Blades", below.

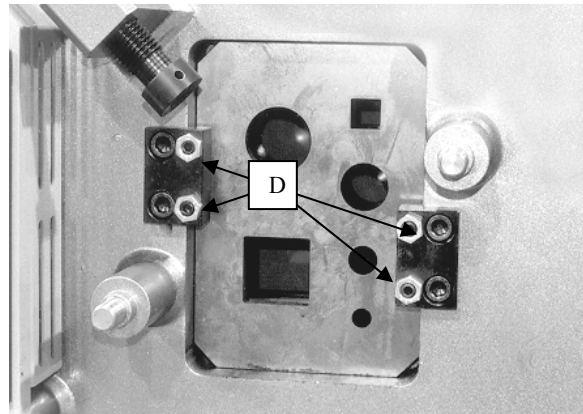
### Adjusting the Stationary Blade

The stationary blade is adjustable so the correct clearance between the stationary blade and the fixed blade can be achieved.

**WARNING** Avoid serious injury. Turn off the machine's power and lock it out before adjusting or servicing the machine.



1. Turn off the main electrical disconnect switch and lock it in the "Off" position.
2. Remove the two hand knobs (C, previous column) that hold the guard in place and carefully remove the guard.
3. Adjust screws "D" as needed to obtain zero clearance between the moveable blade and the stationary blade. Each screw is locked in position by a hex nut.



Each of the adjusting screws (D) is locked in position by a hex nut.

**Important:** When properly adjusted there should be no clearance between the moveable and stationary blades, however, they must not be tightly pressed against each other.

4. Re-install the guide / guard.

### MOVEABLE BLADE

The moveable blade needs to be replaced when the work piece develops burrs as a result of the shearing process, or when the blade shows visible signs of wear.

**WARNING** Avoid serious injury. Turn off the machine's power and lock it out before adjusting or servicing the machine.



1. Turn off the main electrical disconnect switch and lock it in the "Off" position.



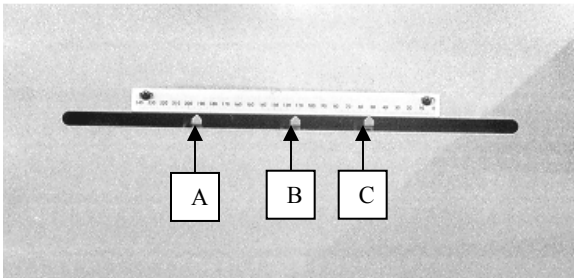
2. Perform steps 2 through 4 of "Replacing the Stationary Blades", page G-3.
3. Remove the moveable blade from the machine.
4. Install a new moveable blade.
5. Complete the installation by performing steps 5 through 7 of "Replacing the Stationary Blade", page G-3.

## STROKE ADJUSTMENT

The travel limits of the shear can be adjusted by moving the collars (A, B, and C) on the drive bar. When shearing large quantities of the same material, limiting the travel of the shear will increase productivity.

### To adjust the travel of the shear:

1. Press the Emergency Stop pushbutton.
2. Adjust each collar to achieve the proper range of shear travel:



*Three collars and limit switches control the travel limits of the shearing and notching stations. This photo shows the factory set positions for the three collars.*

### Left Collar (A):

This collar controls the downward travel limit of the shearing station's slide. This collar should always be positioned fully right, against its stop. Moving this collar away from its stop prevents the shear from descending completely and results in incomplete cuts.

### Middle Collar (B):

This collar controls the upward travel limit of the shear only when the Shear / Notch switch is in the "Notch" position. This collar is usually set in the middle of the collar bar. Moving this collar to the right reduces the shear's upward travel. Moving this collar to the left increases the shear's upward travel.

### Right Collar (C):

This collar controls the upward travel limit of the shear only when the Shear / Notch switch is in the "Shear" position. This collar is typically positioned fully left, against its stop, where it provides full upward travel of the shear. As this collar is moved to the right, the shearing station's upward travel is reduced.

## BAR SHEAR CAPACITY

**WARNING** Avoid serious injury.



Never exceed the machine's shearing capacity.

The bar shearing capacity of each machine is provided in the chart below.

**Important: Always shear bar stock in the hole which most closely matches the size of the bar stock. Shearing material in an overly large hole will result in poor quality cuts.**

BAR SHEAR CAPACITY		
Model:	Round Stock	Square Stock
	Max.	Max.
IW66	1-1/2"	1-1/2" X 1-1/2"
IW88	1-3/4"	1-3/4" X 1-3/4"
IW110/2	1-3/4"	1-3/4" X 1-3/4"
IW135	2"	2" X 2"
IW180	2-1/4"	2-1/4" X 2-1/4"

## BAR SHEAR OPERATION

You *must* be familiar with the function and location of the components described in the Machine Description chapter of this manual as well as the information in this Bar Shearing Station chapter before performing any steps in this section.

Safe operation of this machine depends on you, the operator.

### Do not operate the machine unless:

- a. You are familiar with the function and location of the machine's components.
- b. You have inspected the machine and determined it is in safe, working condition (for example: no missing, altered or broken parts; all controls are functional; all safety devices are in place; etc.).
- c. You have read and understand all of the safety and instructional material supplied with the machine by Marvel Mfg. Co., including the Operator's manual and the safety and warning signs attached to the saw.

### Pre-Operation Checklist

This checklist must be completed at the beginning of each shift and by each operator.

- Safety First! Obey all warnings.

- Review and comply with the instructional and safety information provided with this machine.
- Turn the machine's power off with the main electrical disconnect switch and lock it in the "Off" position.
- Make sure all guards and covers are in place and function properly.

### WARNING Avoid serious injury.



**Do not operate this machine with missing, altered, or defective guards or covers.**

- Remove unnecessary tools and equipment from the machine and surrounding area.
- Inspect the machine for damage, leaks, and alterations. Repair before operating.

### WARNING Avoid serious injury.



**Do not operate this machine if it is damaged, has worn or missing parts, or is altered in any way.**

- Check the hydraulic fluid level. Fill if needed.

### CAUTION Never operate the machine with a low hydraulic fluid level. Damage to the machine will occur.



### Bar Shear Set-up

The following steps must be performed for each bar shearing operation.

1. Perform the pre-operation checklist on page G-6.
2. Position the following switches as indicated:

- Auto / Manual switch to "Manual".
  - Shear / Notch switch to "Shear".
  - Normal / Jog switch to "Jog".
  - Press the Emergency Stop pushbutton.
3. Make sure the notching station's guard is closed.
  4. Turn on the Main Electrical Disconnect switch.
  5. Reset the Emergency Stop pushbutton(s).
  6. Press the "Pump On' pushbutton.
- Note: If the hydraulic pump does not come on make sure the Emergency Stop pushbutton(s) are reset.*
7. Adjust the stroke limits of the shearing station if necessary. See page G-5.
  8. Turn the Normal / Jog switch to the "Normal" position.

The machine is now set up and ready for operation. Continue with "Bar Shearing - Manual Operation" or "Bar Shearing - Automatic Operation" for step-by-step shearing instructions.

## Bar Shearing - Manual Operation

Manual operation of the shearing station is performed without the use of the electric back gauge.

1. Complete steps 1 through 8 of "Bar Shear Set-up", page G-7.
2. Place the work material in the bar shear.

**WARNING** The shearing station can cause serious injury. Never place any part of your body inside the guards.



3. Adjust the guide/guard as described on page G-3.

**WARNING** Avoid serious injury. Sheared material will have sharp edges. Always wear gloves when handling the material.



4. Press the foot switch all the way down and hold it until the blade has cut through the material. Release the foot switch to retract the blade.
5. To continue shearing, repeat steps 2 through 4.  
When you are done shearing, continue with step 6.
6. Press the Emergency Stop pushbutton.
7. Turn the Main Electrical Disconnect Switch off.

## Bar Shearing - Automatic Operation

Automatic operation of the shearing station is performed with the use of the electric back gauge.

1. Complete steps 1 through 8 of "Bar Shear Set-up", page G-7.
2. Set-up the Electric Back Gauge. See page G-2.

**WARNING** The shearing station can cause serious injury. Never place any part of your body inside the guards.



**WARNING** Avoid serious injury. The shear will automatically cut when the work material is pushed through the angle shear and contacts the electric back gauge. Keep away from all moving parts when inserting the work material in the shear.



**WARNING** Avoid serious injury. Sheared material will have sharp edges. Always wear gloves when handling the material.



3. Adjust the guide/guard as described on page G-3.
4. Place the work material through the bar shear until it contacts the electric back gauge. When the material contacts the electric back gauge the shear will automatically cut the material.
5. To continue shearing, repeat step 3.  
If you are done shearing, continue with step 6.
6. Press the Emergency Stop pushbutton.
7. Turn the Main Electrical Disconnect Switch off.

# SPARTAN IRONWORKER FLAT BAR SHEARING STATION

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## SECTION CONTENTS

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This section contains procedures and specifications specific to the Ironworker's flat bar shearing station.

Important	H-1
Flat Bar Shear Components	H-2
Shearing Station Foot Switch	H-2
Electric Back Gauge	H-2
Guard / Holddown	H-3
Moveable Blade	H-3
Replacing the Moveable Blade	H-3
Stationary Blade	H-4
Replacing the Stationary Blade	H-4
Adjusting the Stationary Blade	H-5
Stroke Adjustment	H-6
Flat Bar Shear Capacity	H-7
Flat Bar Shear Operation	H-7

## IMPORTANT

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You *must* be familiar with the function and location of the components described in the Machine Description section of this manual before performing any steps in this section.

Safe operation of this machine depends on you, the operator.

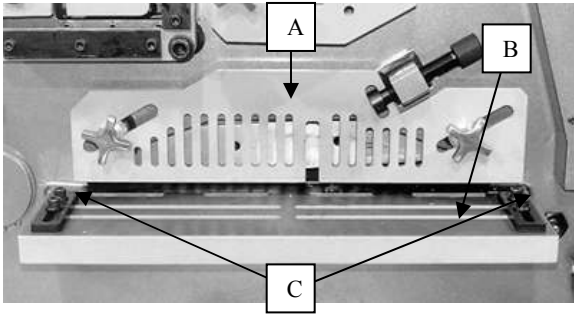
### **Do not operate this machine unless:**

- a. You are familiar with the function and location of the machine's components.**
- b. You have inspected the machine and determined it is in safe, working condition (for example: no missing, altered or broken parts; all controls are functional; all safety devices are in place; etc.).**
- c. You have read and understand all of the safety and instructional material supplied with the machine by Marvel Mfg. Co., including the Operator's manual and the safety and warning signs attached to the machine.**

# FLAT BAR SHEARING STATION SPARTAN IRONWORKER

## FLAT BAR SHEAR COMPONENTS

The flat bar shearing station consists of the guard/holddown, work table with miter gauges, stationary blade and moveable blade. Additionally, the shear is activated by a foot switch or by the electric back gauge.



The flat bar shearing station consists of the guard/holddown (A), work table (B), and miter gauges (C). Not visible are the stationary and moveable blades.

## SHEARING STATION FOOT SWITCH

The operation of the punching station's foot switch is described in the Machine Description section, page C-7.

## ELECTRIC BACK GAUGE

The electric back gauge is an automatic feature which activates the shear shortly after the work stock comes in contact with the back gauge's sensor - the machine operator does not need to press the foot switch. The electric back gauge is functional when the "Auto / Manual" switch is turned to "Auto".

The time delay between when the stock contacts the sensor and when the shear is activated can be adjusted from 0 seconds to 3 seconds with a timer in the electrical enclosure.

### To Set Up the Electric Back Gauge:

**Important:** These instruction only describe the set-up procedure to prepare the back gauge for operation. Operation of the shear with the

**H-2**

electric backgauge is described in the Flat Bar Shear Operation section of this chapter.

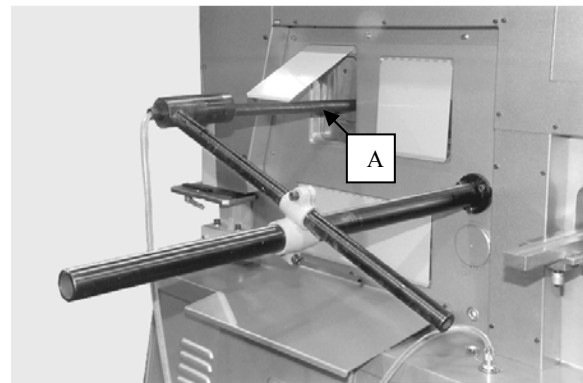
1. Turn off the main electrical disconnect switch.

**WARNING** Avoid serious injury.



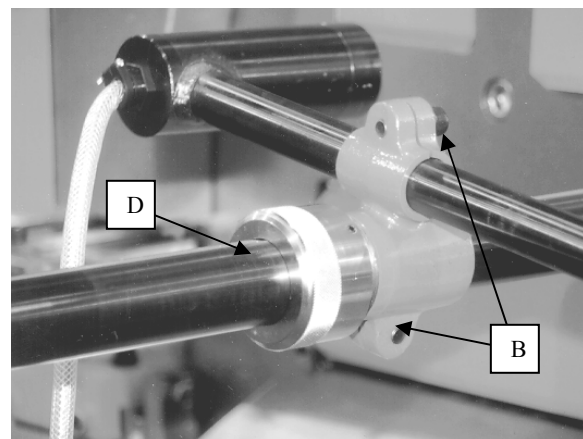
**Turn off the machine's power and lock it out before servicing the machine.**

2. Insert the work material (A) through the flat bar shear.



Round bar stock (A) is shown here passing through the round bar shearing station. The back gauge can also be positioned for use with the flat bar shearing station.

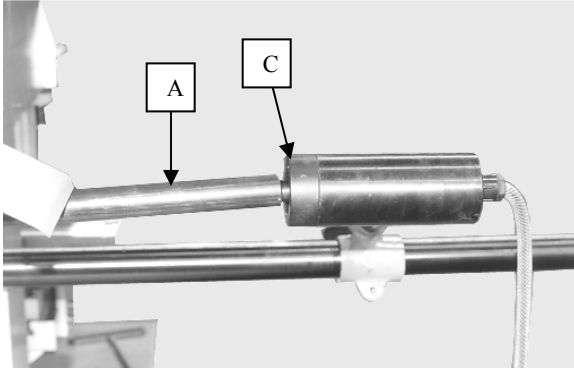
3. Loosen the locking screws (B) on the collar and adjust the position of the sensor (C, next page ) so it lines up with the material (A).



Two lock screws (B) hold the sensor in the desired position. The edge of the collar (D) indicates the shear length setting.

# SPARTAN IRONWORKER FLAT BAR SHEARING STATION

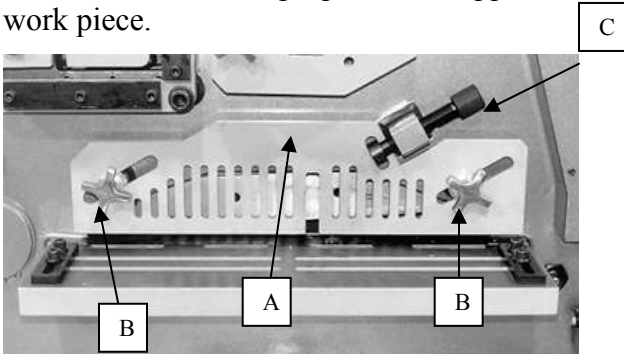
- Slide the collar until its outer edge (D) is on the desired shear length and tighten the locking screws (B).



*The sensor (C) is positioned so the work material (A) will contact it at the desired cut-off length.*

## GUARD / HOLDDOWN

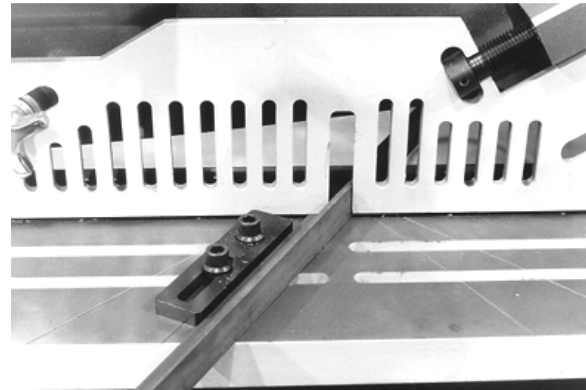
The guard (A) protects the operator from the shear blades and helps provides support for the work piece.



*The guard / hold-down (A) protects the operator from the blades and helps support the work material.*

The guard / holddown is adjusted by loosening the two hand knobs (B) and adjusting the knurled knob (C) until the bottom of the guard/holddown is resting on top of the work stock.

A slot in the center of the guard/holddown permits the flange of angle stock to be mitered at any angle, as shown in the photograph below.



*Angle stock is shown here positioned for a miter cut on one of its flanges.*

## MOVEABLE BLADE

Two edges of the moveable blade can be used as cutting surfaces. Therefore, the blade can be repositioned once before it needs to be replaced.

The moveable blade needs to be replaced when the work piece develops burrs as a result of the shearing process or when the blade shows visible signs of wear.

### Repositioning / Replacing the Moveable Blade:

- Press the foot switch until the shear has fully descended and then press the Emergency Stop pushbutton.

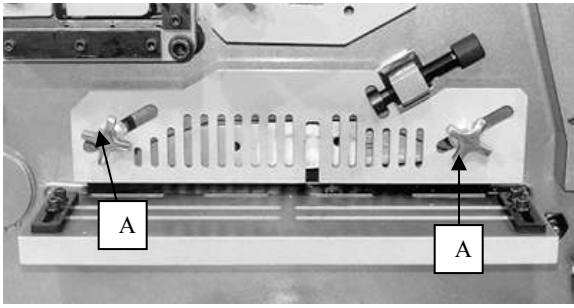
**WARNING** Avoid serious injury.



**Turn off the machine's power and lock it out before replacing the lower blades.**

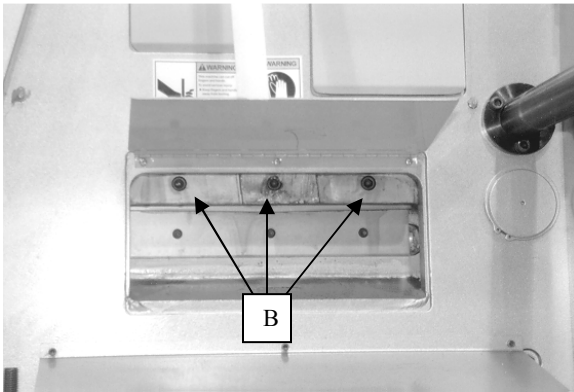
- Turn off the main electrical disconnect switch and lock it in the "Off" position.
- Remove the two hand knobs (A) that secure the guard / holddown and remove the guard.

# FLAT BAR SHEARING STATION SPARTAN IRONWORKER



Remove the two handknobs to remove the guard / hold-down.

4. Open the guard on the discharge side of the flat bar shear and remove the socket head cap screws (B) that hold the moveable blade to the slide.



Remove the socket head cap screws (B) to remove the moveable blade.

5. Rotate the blade until the unused cutting edge is in the cutting position, or, if all of the cutting edges are worn, replace the blade with a new one.
6. Re-install the blade with the socket head cap screws removed in step 4.
7. Re-install the guard removed in step 3.

## STATIONARY BLADE

The stationary blade of the flat bar shearing station has four cutting edges. As the blade becomes worn it can be removed and re-installed with a different edge in the cutting position.

The stationary blade needs to be repositioned or replaced when the work piece develops burrs as a result of the shearing process, or when the blade shows visible signs of wear.

## Replacing the Stationary Blade

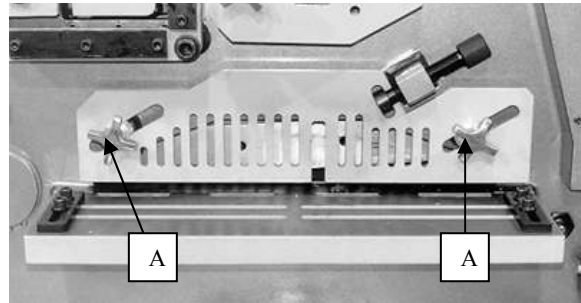
1. Make sure the moveable blade is all the way up.

**WARNING** Avoid serious injury.



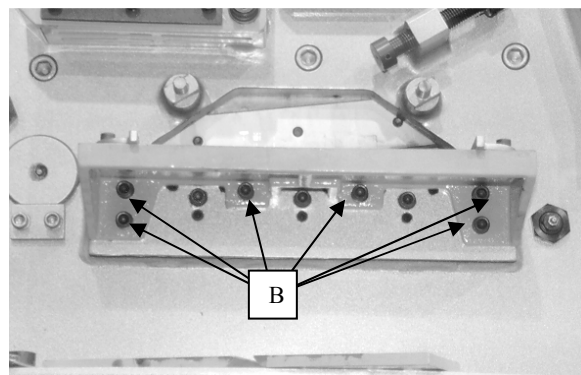
**Turn off the machine's power and lock it out before adjusting or servicing the machine.**

2. Turn off the main electrical disconnect switch and lock it in the "Off" position.
3. Remove the two hand knobs (A) that secure the guard / holddown and remove the guard.



Remove the two handknobs to remove the guard / hold-down.

4. Remove the socket head cap screws (B) that hold the work table in place.



Remove the socket head cap screws which hold the work table to the machine.

5. Remove the socket head cap screws that hold the stationary blade in place (item "C", page H-6) and remove the blade.



# SPARTAN IRONWORKER FLAT BAR SHEARING STATION

6. Re-install the blades with an unused edge in the cutting position. If all of the blade's cutting edges are worn, install a new blade.
7. Continue with step 4 of "Adjusting the Stationary Blades", below.

## Adjusting the Stationary Blades

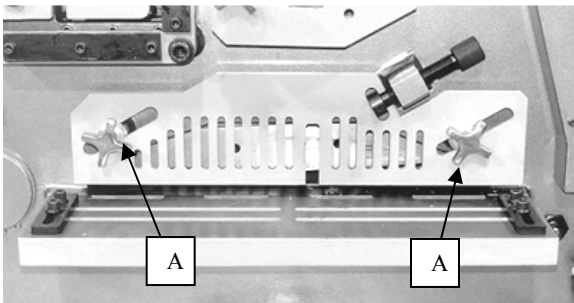
The stationary blades are adjustable so the correct clearance between the stationary blades and the moveable blade can be achieved.

**WARNING** Avoid serious injury.



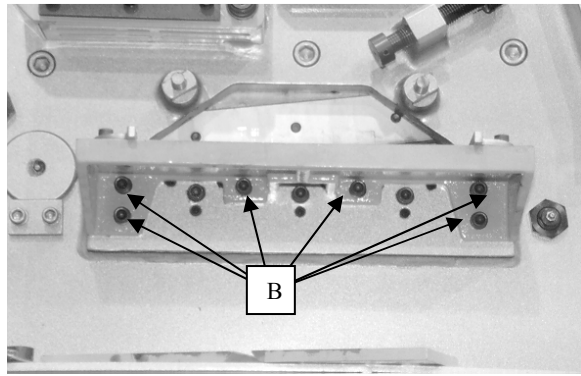
**Turn off the machine's power and lock it out before adjusting or servicing the machine.**

1. Turn off the main electrical disconnect switch and lock it in the "Off" position.
2. Remove the two hand knobs (A) that secure the guard / holddown and remove the guard.



*Remove the two handknobs to remove the guard / hold-down.*

3. Remove the socket head cap screws (B) that hold the work table in place.



*Remove the socket head cap screws which hold the work table to the machine.*

4. Position the following switches as indicated:
  - Auto / Manual switch to "Manual".
  - Shear / Notch switch to "Shear".
  - Normal / Jog switch to "Jog".
5. Close the notching station's guard.
6. Turn on the Main Electrical Disconnect switch.
7. Reset the Emergency Stop pushbutton(s).
8. Press the "Pump On" pushbutton.

*Note: If the hydraulic pump does not come on make sure the Emergency Stop pushbutton(s) are reset.*

**WARNING** Avoid serious injury.



**When the foot switch is pressed, the moveable blade will descend. Keep away from the blade.**

**CAUTION**



**Avoid damaging the machine. Make sure the moveable blade will not strike the stationary blade.**

**Important: If it appears the moveable blade will strike the stationary blade, continue with step 10.**

# FLAT BAR SHEARING STATION SPARTAN IRONWORKER

- Press the foot switch until the moveable blade descends behind the stationary blades and then release the foot switch.

**WARNING** Avoid serious injury.

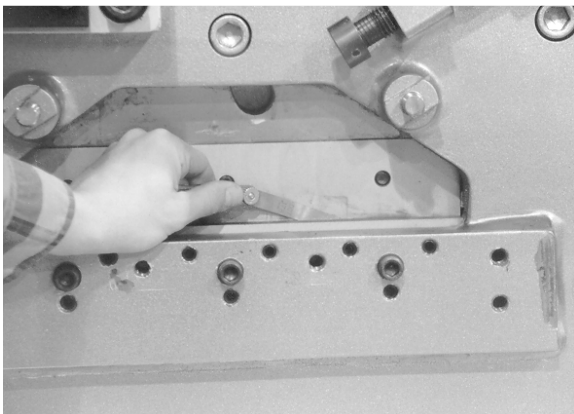


**Turn off the machine's power and lock it out before adjusting the stationary blades.**

- Turn off the main electrical disconnect switch and lock it in the "Off" position.
- Use a feeler gauge to measure the clearance between the moveable blade and the stationary blade (see photo on next page). The clearance between the blades must be within the range shown in the chart below. If the clearance is correct, continue with step 15. If the clearance is incorrect, continue with step 12.

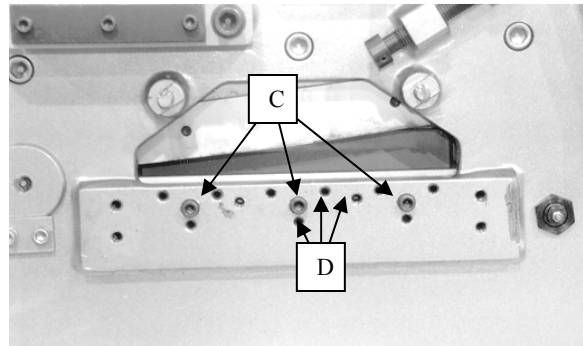
## FLAT BAR SHEAR BLADE CLEARANCE

Model:	Clearance:
IW66D,IW88D	.008"-.01"
IW110D/2,IW135D	.01" - .014"
IW180DX	.014" – .018"



*Measure the clearance between the blades with a feeler gauge. The blades should have a uniform clearance of .010".*

- Slightly loosen the socket head cap screws (C).



*Slightly loosen the socket head cap screws which hold the moveable blade in the machine and adjust the set screws (D) until the correct blade clearance is achieved.*

- Adjust screws "D" as needed to obtain a uniform blade clearance within the range specified for your machine in the chart on page H-5. To do this:
  - Turn screws "D" clockwise to decrease the clearance between the blades.
  - Turn screws "D" counter-clockwise to increase the clearance between the blades.
- Tighten screws "C" and recheck the clearance between the blades. Repeat steps 12 through 14 as needed.
- Re-install the work table removed in step 3.
- Re-install the guard removed in step 2.

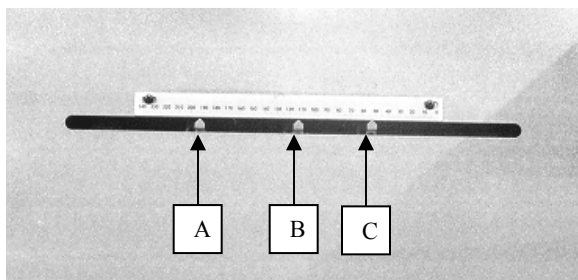
## STROKE ADJUSTMENT

The travel limits of the shear can be adjusted by moving the collars (A, B, and C) on the drive bar. When shearing large quantities of the same material, limiting the travel of the shear will increase productivity.

### To adjust the travel of the shear:

- Press the Emergency Stop pushbutton.
- Adjust each collar to achieve the proper range of shear travel:

# SPARTAN IRONWORKER FLAT BAR SHEARING STATION



Three collars and limit switches control the travel limits of the shearing and notching stations. This photo shows the factory set positions for the three collars.

## Left Collar (A):

This collar controls the downward travel limit of the shearing station's slide. This collar should always be positioned fully left, against its stop. Moving this collar away from its stop prevents the shear from descending completely and results in incomplete cuts.

## Middle Collar (B):

This collar controls the upward travel limit of the shear only when the Shear / Notch switch is in the "Notch" position. This collar is usually set in the middle of the collar bar. Moving this collar to the right reduces the shear's upward travel. Moving this collar to the left increases the shear's upward travel.

## Right Collar (C):

This collar controls the upward travel limit of the shear only when the Shear / Notch switch is in the "Shear" position. This collar is typically positioned fully right, against its stop, where it provides full upward travel of the shear. As this collar is moved to the right, the shearing station's upward travel is reduced.

## FLAT BAR SHEAR CAPACITY

**WARNING** Avoid serious injury.



Never exceed the machine's shearing capacity.

The flat bar shearing capacity of each machine is provided in the chart below.

Shear Capacity – Max. Material Thickness		
Model No.	Max. Mat'l. Thickness	Max. Shear Length @ Max. Material Thickness
IW66D/DX	3 / 4"	10" or less
IW88D/DX	3 / 4"	12" or less
IW110D/X/2	1"	14" or less
IW135D/DX	1"	16" or less
IW180DX	1-1/8"	16" or less

Shear Capacity- Max. Shear Length		
Model No.	Max. Shear Length	Max. Mat'l Thickness @ Max. Shear Length
IW66D/DX	14"	9/16" or less
IW88D/DX	17"	5/8" or less
IW110D/X/2	24"	5/8" or less
IW135D/DX	24"	11/16" or less
IW180DX	30"	3 / 4" or less

## FLAT BAR SHEAR OPERATION

You *must* be familiar with the function and location of the components described in the Machine Description chapter of this manual as well as the information in this Angle Shearing Station chapter before performing any steps in this section.

Safe operation of this machine depends on you, the operator.

# FLAT BAR SHEARING STATION SPARTAN IRONWORKER

Do not operate the machine unless:

- a. You are familiar with the function and location of the machine's components.
- b. You have inspected the machine and determined it is in safe, working condition (for example: no missing, altered or broken parts; all controls are functional; all safety devices are in place; etc.).
- c. You have read and understand all of the safety and instructional material supplied with the machine by Marvel Mfg. Co., including the Operator's manual and the safety and warning signs attached to the machine.

## Pre-Operation Checklist

This checklist must be completed at the beginning of each shift and by each operator.

- Safety First! Obey all warnings.
- Review and comply with the instructional and safety information provided with this machine.
- Turn the machine's power off with the main electrical disconnect switch and lock it in the "Off" position.
- Make sure all guards and covers are in place and function properly.

**WARNING** Avoid serious injury.



**Do not operate this machine with missing, altered, or defective guards or covers.**

- Remove unnecessary tools and equipment from the machine and surrounding area.
- Inspect the machine for damage, leaks, and alterations. Repair before operating.

**WARNING** Avoid serious injury.



**Do not operate this machine if it is damaged, has worn or missing parts, or is altered in any way.**

- Check the hydraulic fluid level. Fill if needed.

**CAUTION** Never operate the machine with a low hydraulic fluid level.



- Damage to the machine will occur.

## Flat Bar Shear Set-up

The following steps must be performed for each flat bar shearing operation.

1. Perform the pre-operation checklist on page H-7.
2. Position the following switches as indicated:
  - Auto / Manual switch to "Manual".
  - Shear / Notch switch to "Shear".
  - Normal / Jog switch to "Jog".
  - Press the Emergency Stop pushbutton.
3. Make sure the notching station's guard is closed.
4. Turn on the Main Electrical Disconnect switch.
5. Reset the Emergency Stop pushbutton(s).
6. Press the "Pump On" pushbutton.

*Note: If the hydraulic pump does not come on make sure the Emergency Stop pushbutton(s) are reset.*

# SPARTAN IRONWORKER FLAT BAR SHEARING STATION

**CAUTION** Avoid damaging the machine. Make sure the moveable blade will not strike the stationary blades.



7. Step on the shearing station's foot switch and make sure the moveable blade will not strike the stationary blade.
8. Adjust the stroke limits of the shearing station if necessary. See page H-6.
9. Set the miter gauge(s) on the work table for the desired shear angle.
10. Turn the Normal / Jog switch to the "Normal" position.

The machine is now set up and ready for operation. Continue with "Flat Bar Shearing Operation" for step-by-step shearing instructions.

## Flat Bar Shearing - Manual Operation

Manual operation of the shearing station is performed without the use of the electric back gauge.

1. Complete steps 1 through 10 of "Flat Bar Shear Set-up", page H-8.

**CAUTION** Never load a work piece which exceeds the machine's design capacity. Refer to "Flat Bar Shear Capacity", page H-7.



2. Position the work material in the flat bar shear.

**WARNING** The shearing station can cause serious injury. Never place any part of your body inside the guards.



3. Adjust the holddown.

**WARNING** Avoid serious injury. Sheared material will have sharp edges. Always wear gloves when handling the material.



4. Press the foot switch all the way down and hold it until the blade has cut through the material. Release the foot switch to retract the blade.
5. To continue shearing, repeat steps 2 through 4.  
If you are done shearing, continue with step 6.
6. Press the Emergency Stop pushbutton.
7. Turn the Main Electrical Disconnect Switch off.

## Flat Bar Shearing - Automatic Operation

Automatic operation of the shearing station is performed with the use of the electric back gauge.

1. Complete steps 1 through 10 of "Flat Bar Shear Set-up", page H-8
2. Set-up the Electric Back Gauge. See page H-2.

**CAUTION** Never load a work piece which exceeds the machine's design capacity. Refer to "Flat Bar Shear Capacity", page H-7.



**WARNING** The shearing station can cause serious injury. Never place any part of your body inside the guards.



**WARNING** Avoid serious injury. The shear will automatically cut when the work material is pushed through the flat bar shear and contacts the electric



# FLAT BAR SHEARING STATION SPARTAN IRONWORKER

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back gauge. Keep away from all moving parts when inserting the work material in the shear.

**WARNING** Avoid serious injury. Sheared material will have sharp edges. Always wear gloves when handling the material.



3. Place the work material through the flat bar shear until it contacts the electric back gauge. When the material contacts the electric back gauge the shear will automatically cut the material.
4. To continue shearing, repeat step 3.  
If you are done shearing, continue with step 5.
5. Press the Emergency Stop pushbutton.
6. Turn the Main Electrical Disconnect Switch off.

## SECTION CONTENTS

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Important	J-1
Spartan Service Technicians	J-1
Maintenance Schedule	J-1
Cleaning	J-1
Lubrication	J-2
Checking the Hydraulic Fluid	J-2
Changing the Hydraulic Fluid	J-3
Slide Adjustment	J-4
Punch Ram Adjustment	J-5

## IMPORTANT

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Read and follow all of the safety and operating instructions supplied with your machine.

Regular cleaning, maintenance, and lubrication of this machine will help it perform dependably and minimize the cost and inconvenience of repairs. Follow the Maintenance Schedule outlined in this chapter.

Read an entire procedure before performing the individual steps.

Repairs not described in this manual must be performed by a Spartan Service Technician.

Before performing any maintenance, become familiar with the function and location of the components described in the Machine Description section.

## SPARTAN SERVICE TECHNICIANS

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If you need the help of a Spartan service technician, contact your Spartan distributor or call Marvel Mfg. Co., Oshkosh, Wisconsin, at 1-800-472-9464.

## MAINTENANCE SCHEDULE

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This Maintenance Schedule is the *minimum* recommended maintenance interval. Your particular usage may require more frequent maintenance.

Reference page numbers are given after each item when additional instructions are provided in this manual.

### Daily:

- Clean scrap material from the machine.
- Check the level and condition of the hydraulic fluid. See page J-2.

### Every 8 Working Hours:

- Lubricate the slide. See "Lubrication", page J-2

### Once a Year:

- Change the hydraulic fluid and clean the hydraulic tank. See page J-3.

## CLEANING

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**WARNING** Avoid serious injury.



**Turn off the machine's power and lock it out before cleaning the machine.**

**WARNING** Do not use compressed air to clean the machine. Flying metal chips can cause serious injury and become embedded in the machine, causing premature wear.



**CAUTION** Failure to clean this machine will result in poor cuts, worn parts, and costly repairs.



Keep the machine and tooling clean to prevent premature wear to the tooling and moving parts. Clean the machine by wiping it with a brush or clean rags - never use compressed air to blow debris off the machine, serious injury can result.

## LUBRICATION

Regular lubrication is essential for accurate cuts and long machine life.

**Important: The minimum lubrication intervals are given below. Your use may require more frequent lubrication.**

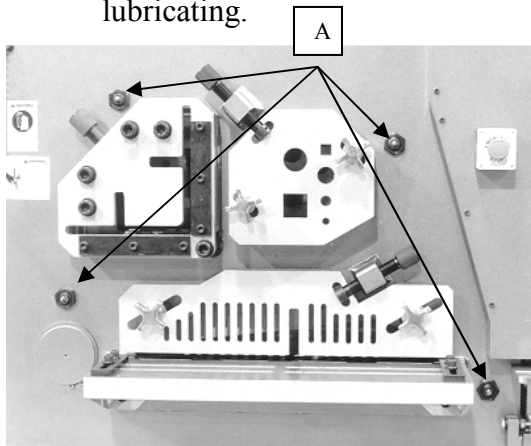
**WARNING** Avoid serious injury.



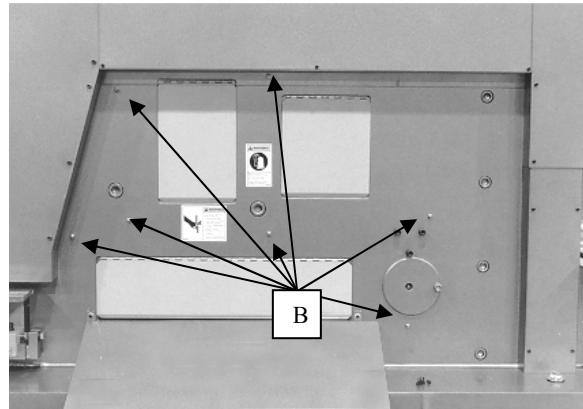
Turn off the machine's power and lock it out before lubricating the machine.

**Every Eight (8) Operating Hours:**

1. **Lubricate the Slide.** Use a Moly based grease and lubricate the slide at its grease fittings (A and B) every 8 operating hours. Clean the grease fittings before lubricating.



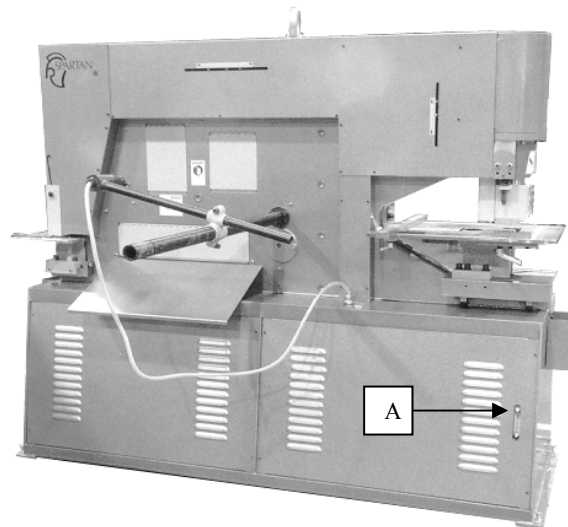
The operator's side of the machine has four grease fittings (A) which are provided to lubricate the slide.



The discharge side of the machine has a number of grease fittings (B) which are provided to lubricate the slide. The number and location of the grease fittings varies from model to model.

## CHECKING THE HYDRAULIC FLUID LEVEL

1. Check the level of the hydraulic fluid in the sight gauge (A). The fluid level must be near the top of the sight gauge. If the fluid level is low, continue with step 2.



The hydraulic fluid level sight gauge is visible through a cut-out in the enclosure panels (A).

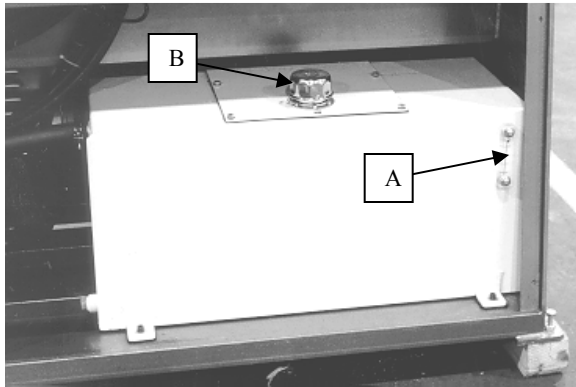


**WARNING** Avoid serious injury.



**Turn off the machine's power and lock it out before servicing the machine.**

2. Turn off the machine's main electrical disconnect switch and lock it in the "Off" position.
3. Remove the hydraulic compartment's access cover.



*The hydraulic fluid filler cap (B) is located on top of the hydraulic tank.*

4. Remove the filler cap (B, above) and add Mobil® DTE-25 anti-wear hydraulic oil, or equivalent, until the hydraulic fluid is near the top of the sight gauge (A).

**WARNING** Avoid serious injury.



**Hydraulic fluid creates a serious slipping hazard. Clean up all spilled hydraulic fluid from the floor.**

5. Reinstall the filler cap and the hydraulic compartment access cover.

## CHANGING THE HYDRAULIC FLUID

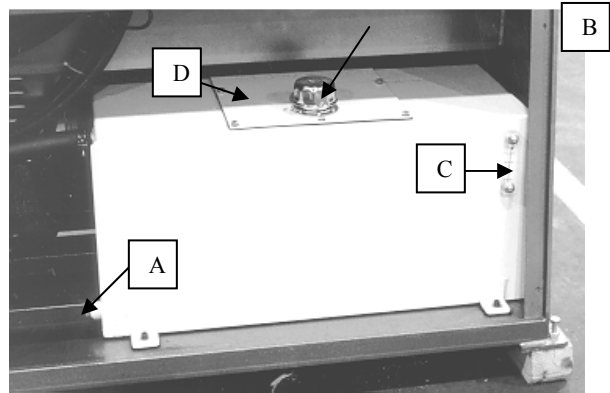
The hydraulic fluid must be changed at least once every year and any time it becomes dirty or contaminated.

**WARNING** Avoid serious injury.



**Turn off the machine's power and lock it out before servicing the machine.**

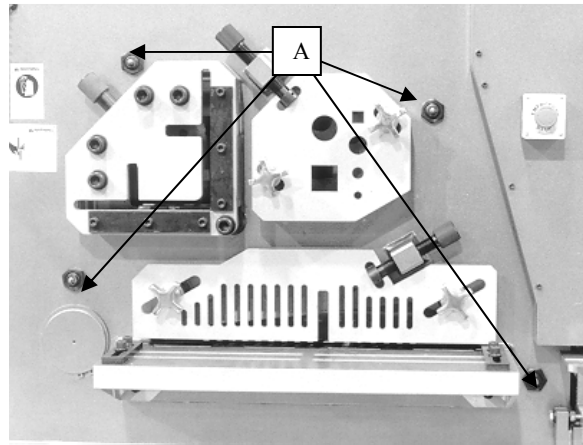
1. Turn off the machine's main electrical disconnect switch and lock it in the "Off" position.



*The hydraulic fluid drain plug (A), filler port (B), sight gauge (C), and tank access cover (D).*

2. Remove the hydraulic compartment's access cover.
3. Remove the hydraulic fluid drain plug (A) and drain the hydraulic fluid into a suitable container.
4. Replace the drain plug.
5. Remove the tank access cover (D) and wipe the inside of the hydraulic tank with a clean, lint-free rag.
6. Re-install the tank access cover with a new gasket.
7. Remove the filler cap (B) and add Mobil® DTE-25 anti-wear hydraulic oil, or equivalent, until the hydraulic fluid sight gauge (C) shows the fluid level is at 3/4 full.

HYDRAULIC CAPACITIES (Gallons)			
Machine		Capacity	Oil Required
IW66D	and	30	24
IW66DX			
IW88D	and	37	30
IW88DX			
IW110D/2	and	50	42
IW110DX/2			
IW135D	and	50	41
IW135DX			
IW180DX		50	41



The pressure pads (A) are adjusted by turning adjusting screws which are clearly visible on the operator's side of the machine.

- Operate the machine and inspect for leaks.

**WARNING** Avoid serious injury.



Hydraulic fluid creates a serious slipping hazard. Clean up all spilled hydraulic fluid from the floor.

- Wipe up any hydraulic fluid that has spilled.
- Reinstall the hydraulic compartment access cover.

## SLIDE ADJUSTMENT

The slide is the part of the machine to which the moveable blades of the shearing and notching stations are attached.

The slide is guided by pressure pads (A). The pressure pads are adjusted by turning adjusting screws which are clearly visible on the operator's side of the machine.

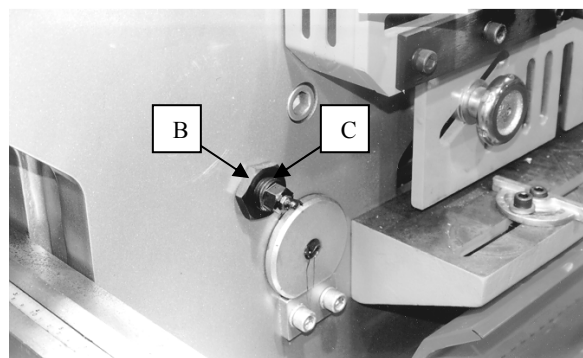
### To Adjust the Slide:

**WARNING** Avoid serious injury.



Turn off the machine's power and lock it out before servicing the machine.

- Turn off the machine's main electrical disconnect switch and lock it in the "Off" position.
- Loosen the hex nuts (B) which lock the adjusting screws (C) in place.



The adjusting screws (C) are locked in position by large locknuts (B).

- Tighten the adjusting screws (C) by turning them clockwise.
- Back each adjusting screw (C) out by turning them 1/3 of a turn counter-clockwise.

5. Lock the adjusting screws in position by tightening the hex nuts (B).
5. Press the Emergency Stop pushbutton.
6. Tighten the lock nuts (B).

## PUNCH RAM ADJUSTMENT

The punch ram moves on a guide inside the ram holder. When the punch ram wiggles or can be turned, the ram guide must be adjusted.

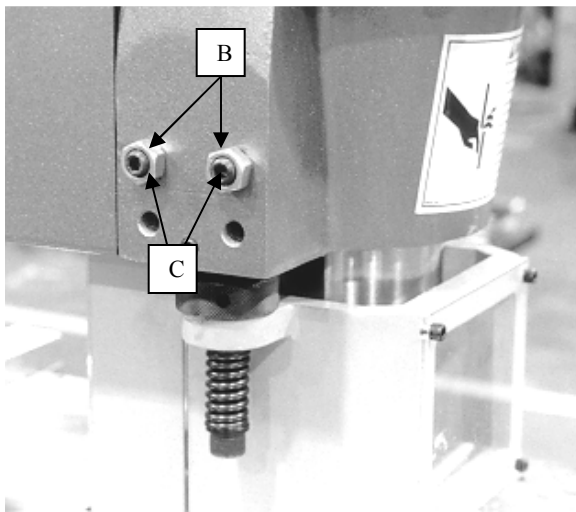
**To adjust the ram guide:**

**WARNING** Avoid serious injury.



**Press the Emergency Stop pushbutton before performing this procedure.**

1. Press the Emergency Stop pushbutton.
2. Loosen the lock nuts (B, below).



*The ram guide adjusting screws (C) protrude from the guide housing and are locked in position by lock nuts (B).*

3. Turn the adjusting set screws clockwise to tighten the punch ram. Do not over-tighten the adjusting screws.
4. Operate the punch. The punch should move smoothly.

## PARTS ORDERING

---

When ordering repair parts always provide the following information:

- Machine Model number (for example, IW88D)
- Machine Serial number (stamped on the machine's data plate)
- Machine voltage (stamped on the machine's data plate)
- Part number (not key number)
- Part Description
- Quantity required

This information is important to speed the processing of your order and to avoid the cost and inconvenience of shipping the wrong part.

### To order parts or request service, contact:

Marvel Manufacturing Co. Inc.  
 3501 Marvel Drive  
 Oshkosh, WI 54902  
 Phone: (800) 869-9800  
 Fax: (920) 236-4156

## IMPORTANT

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For the purpose of clearly illustrating repair parts, some photographs in this section depict the machine with guards, covers, and other parts necessary to operate the machine opened or removed. Never operate the machine unless all parts are installed and all guards and covers are closed and functioning properly.

**WARNING** Avoid serious injury. Never operate the machine unless all guards and covers supplied with the machine are installed and functioning as designed.



## HARDWARE AND FITTINGS

---

**Important: This machine has been assembled using primarily metric hardware.**

It is beyond the scope of this parts section to identify every common piece of hardware or hydraulic and electrical fitting. In most cases parts which are not identified will never need replacement. If you do require a part that is not identified in this manual, our parts and service department will gladly assist you in identifying and obtaining the part you need.

## ELECTRICAL AND HYDRAULIC COMPONENTS

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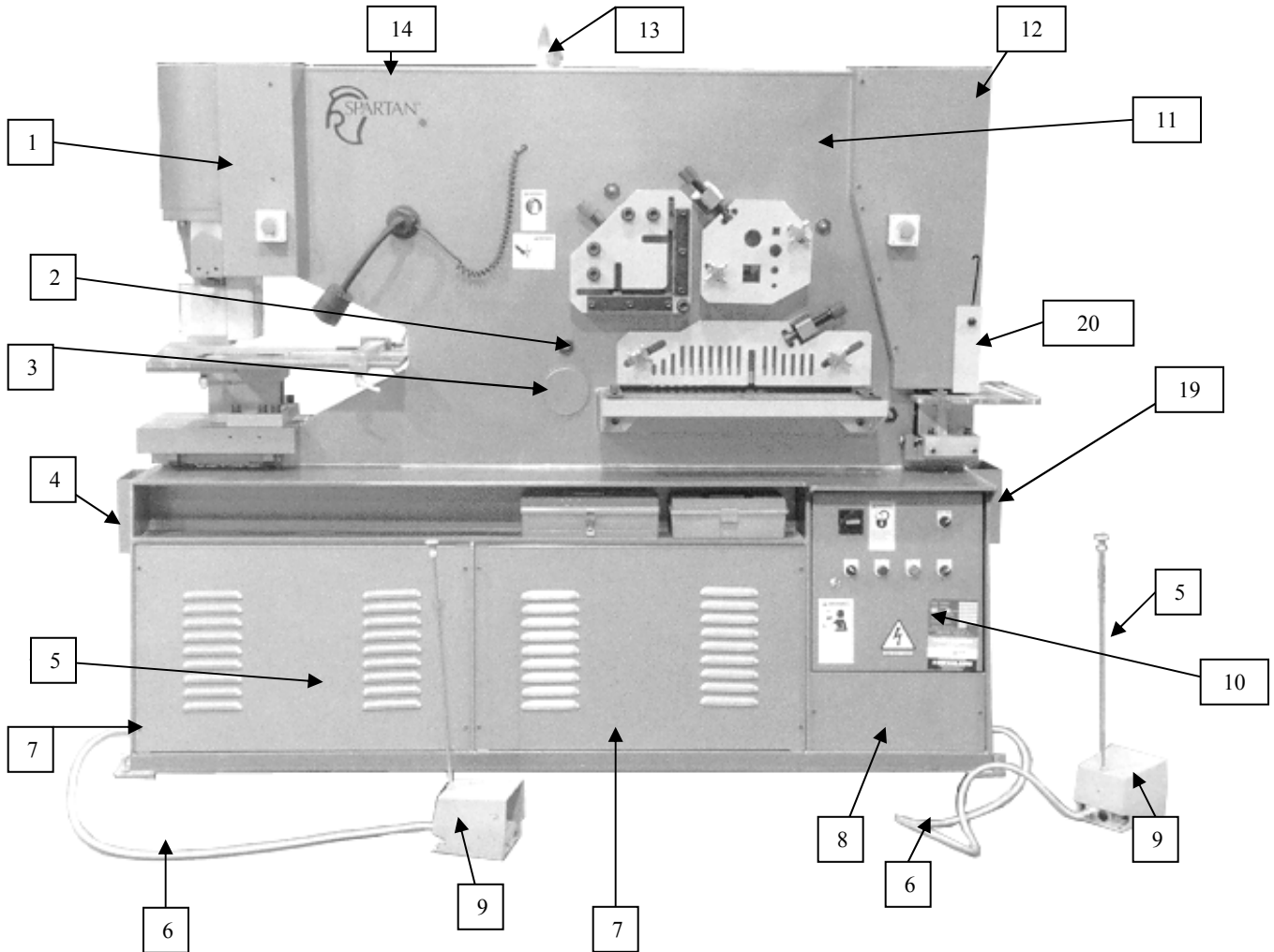
When your machine requires replacement electrical or hydraulic components, please refer to the electrical and hydraulic schematics supplied with your machine. These schematics will contain part numbers that may be specific to your particular machine.

## CONTENTS

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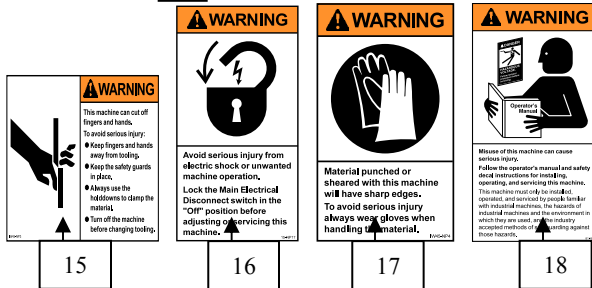
If you require a part which does not appear in this manual, our service department will gladly assist you in identifying and obtaining the part you need.

- Operator's Side .....P-2**
- Discharge Side .....P-4**
- Notching Station .....P-6**
- Angle and Bar Shear.....P-8**
- Flat Shear.....P-10**
- Punching Station .....P-12**
- Hydraulic Stripper .....P-15**
- Punching Cylinder .....P-16**
- Electric Back Gauge .....P-18**
- Shearing Cylinder .....P-19**
- Stroke Adjusters.....P-21**
- Electrical Components.....P-23**
- Hydraulic System .....P-24**



**WARNING** Avoid Serious Injury.

**Never operate the machine unless all guards and covers supplied with the machine are installed and functioning as designed.**



**Model IW66D and IW66DX**

Key	Part No.	Description [Qty if more than 1]	Key	Part No.	Description
1	IWM-3002006	Punch Cylinder Cover	10	IWM-3002023	Operators Panel
2	IWM-3010005	Adjustment Screw (4)	11	IWM-3002009	Cover
3	IWM-3010001	Pivot Pin	12	IWM-3002011	Cover
4	IWM-1302021	Scrap Box-Punch	13	IWM-RGBM36	Lifting Eye
5	IWM-3210008	Handle (2)	14	IWM-3002005	Top Cover IW66D
6	IWE-M611A	Cable (2)	15	IW45-NP3	Warning Decal-Shear
7	IWM-3002001	Cover (2) IW66D	16	15-NP17	Warning Decal-Lockout
	IWM-3102001	Cover (2) IW66DX	17	IW45-NP4	Warning Decal-Gloves
8	IWM-3202022	Cover	18	81-NP66	Warning Decal-Operator
9	IWE-M611	Foot Switch (2)	19	IWM-1302022	Scrap Box Notch
			20	IWM-3002020	Guard, Notcher

# OPERATOR'S SIDE

# SPARTAN IRONWORKER

## Model IW88D and IW88DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-3202002	Punch Cylinder Cover
2	IWM-3210006	Adjustment Screw (4)
3	IWM-3210001	Pivot Pin
4	IWM-1302021	Scrap Box-Punch
5	IWM-3210008	Handle (2)
6	IWE-M611A	Cable (2)
7	IWM-3202016	Cover (2) IW88D
	IWM-3202016	Cover (2) IW88DX
8	IWM-3202022	Cover
9	IWE-M611	Foot Switch (2)
10	IWM-3002023	Operators Panel
11	IWM-3202005	Cover
12	IWM-3202007	Cover
13	IWM-RGBM36	Lifting Eye
14	IWM-3202001	Top Cover IW88D
	IWM-3302001	Top Cover IW88DX
15	IW45-NP3	Warning Decal-Shear
16	15-NP17	Warning Decal-Lockout
17	IW45-NP4	Warning Decal-Gloves
18	81-NP66	Warning Decal-Operator
19	IWM-1302022	Scrap Box Notch
20	IWM-3202020	Guard, Notcher

## Model IW110D/2 and IW110DX/2

Key	Part No.	Description [Qty if more than 1]
1	IWM-3402005	Punch Cylinder Cover
2	IWM-3410005	Adjustment Screw (4)
3	IWM-3410001	Pivot Pin
4	IWM-1302021	Scrap Box-Punch
5	IWM-3210008	Handle (2)
6	IWE-M611A	Cable (2)
7	IWM-3402001	Cover (2) IW110D/2
	IWM-3502003	Cover (2) IW110DX/2
8	IWM-3402003	Cover
9	IWE-M611	Foot Switch (2)
10	IWM-3002023	Operators Panel
11	IWM-3402009	Cover
12	IWM-3402011	Cover
13	IWM-RGBM36	Lifting Eye
14	IWM-3402004	Top Cover IW110D/2
	IWM-3502007	Top Cover IW110DX/2
15	IW45-NP3	Warning Decal-Shear
16	15-NP17	Warning Decal-Lockout
17	IW45-NP4	Warning Decal-Gloves
18	81-NP66	Warning Decal-Operator
19	IWM-1302022	Scrap Box Notch

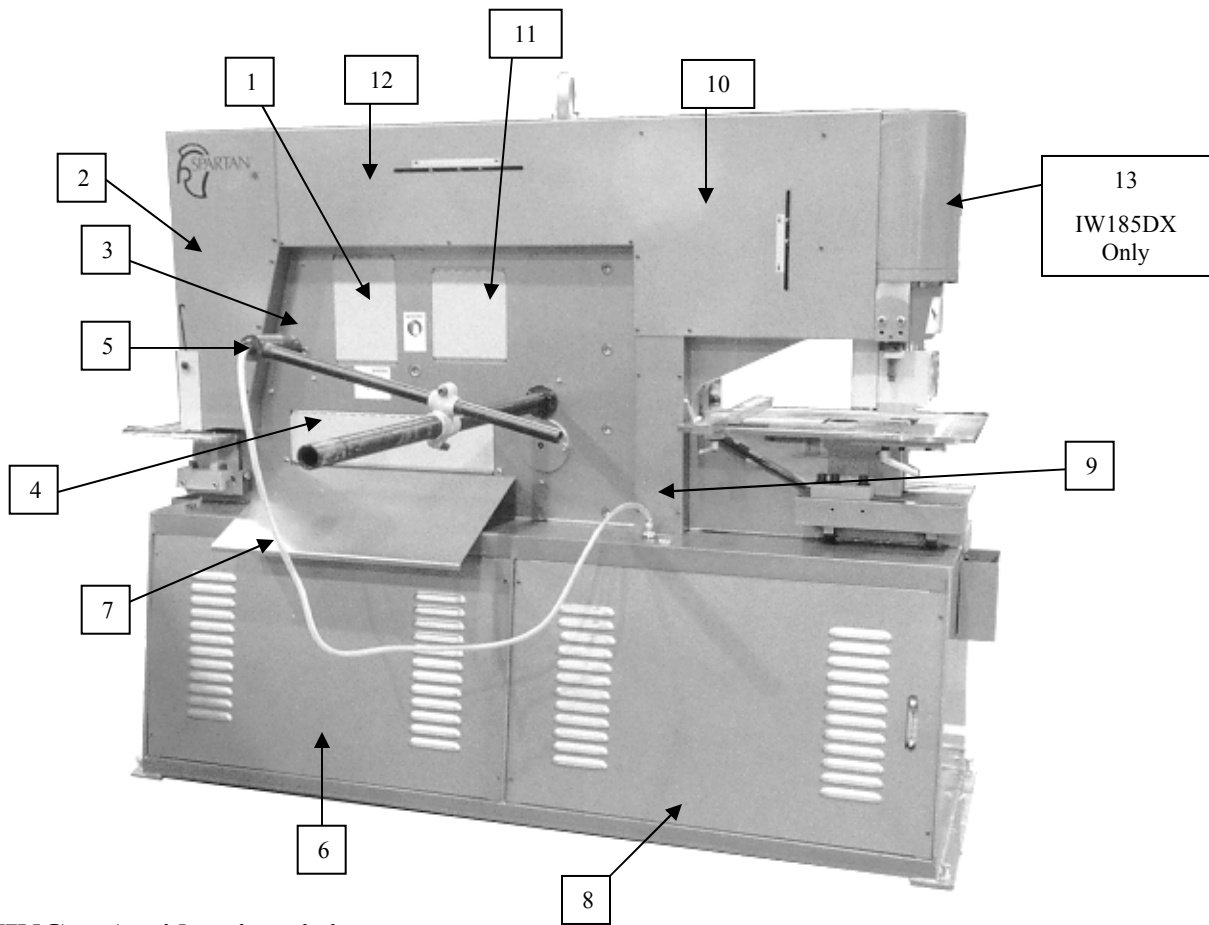
20	IWM-3402012	Guard, Notcher
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## Model IW135D and IW135DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-3602002	Punch Cylinder Cover
2	IWM-3610007	Adjustment Screw (4)
3	IWM-3610001	Pivot Pin
4	IWM-1302021	Scrap Box-Punch
5	IWM-3210008	Handle (2)
6	IWE-M611A	Cable (2)
7	IWM-3602020	Cover (2) IW135D/2
	IWM-3702004	Cover (2) IW135DX/2
8	IWM-3602019	Cover
9	IWE-M611	Foot Switch (2)
10	IWM-3602024	Operators Panel
11	IWM-3602006	Cover
12	IWM-3602008	Cover
13	IWM-RGBM36	Lifting Eye
14	IWM-3602001	Top Cover IW135D/2
	IWM-3702001	Top Cover IW135DX/2
15	IW45-NP3	Warning Decal-Shear
16	15-NP17	Warning Decal-Lockout
17	IW45-NP4	Warning Decal-Gloves
18	81-NP66	Warning Decal-Operator
19	IWM-1302022	Scrap Box Notch
20	IWM-3602009	Guard, Notcher

## Model IW180DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-3802006	Punch Cylinder Cover
2	IWM-3810007	Adjustment Screw (4)
3	IWM-3810001	Pivot Pin
4	IWM-1302021	Scrap Box-Punch
5	IWM-3210008	Handle (2)
6	IWE-M611A	Cable (2)
7	IWM-3802018	Cover (2)
8	IWM-3602019	Cover
9	IWE-M611	Foot Switch (2)
10	IWM-3602024	Operators Panel
11	IWM-3802003	Cover
12	IWM-3802005	Cover
13	IWM-RGBM36	Lifting Eye
14	IWM-3802001	Top Cover
15	IW45-NP3	Warning Decal-Shear
16	15-NP17	Warning Decal-Lockout
17	IW45-NP4	Warning Decal-Gloves
18	81-NP66	Warning Decal-Operator
19	IWM-1302022	Scrap Box Notch
20	IWM-2802013	Guard, Notcher



**WARNING** Avoid serious injury.



**Never operate the machine unless all guards and covers supplied with the machine are installed and functioning as designed.**

**Model IW66D & IW66DX**

IWM-3102006

Cover Limit Switch IW66DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-3002015	Guard Bar Shear
2	IWM-3002011	Cover
3	IWM-3002010	Cover
4	IWM-3002016	Guard Flat Shear
5	See Elect Gauge	
6	IWM-3002002	Cover, IW66D
	IWM-3102002	Cover, IW66DX
7	IWM-3002019	Chute
8	IWM-3002003	Cover IW66D
	IWM-3102003	Cover IW66DX
9	IWM-3002021	Hose Cover
10	IWM-3002007	Punch Cover LH IW66D
	IWM-3102005	Punch Cover LH IW66DX
11	IWM-3002014	Guard Angle Shear
12	IWM-3002008	Cover Limit Switch IW66D

# DISCHARGE SIDE

# SPARTAN IRONWORKER

## Model IW88D and IW88DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-3202011	Guard Bar Shear
2	IWM-3202007	Cover
3	IWM-3202006	Cover
4	IWM-3202013	Guard Flat Shear
5	See Elect Gauge	
6	IWM-3202017	Cover IW88D
	IWM-3302005	Cover IW88DX
7	IWM-3202019	Chute
8	IWM-3202018	Cover IW88D
	IWM-3302006	Cover IW88DX
9	IWM-3202012	Hose Cover
10	IWM-3202003	Punch Cover LH IW88D
	IWM-3302002	Punch Cover LH IW88DX
11	IWM-3202010	Guard Angle Shear
12	IWM-3202004	Cover Limit Switch IW88D
	IWM-3302003	Cover Limit Switch IW88DX

## Model IW110D/2 and IW110DX/2

Key	Part No.	Description [Qty if more than 1]
1	IWM-3402017	Guard Bar Shear
2	IWM-3402011	Cover
3	IWM-3402010	Cover
4	IWM-3402016	Guard Flat Shear
5	See Elect Gauge	
6	IWM-3402002	Cover IW110D/2
	IWM-3502002	Cover IW110DX/2
7	IWM-3402018	Chute
8	IWM-3402019	Cover IW110D/2
	IWM-3502004	Cover IW110DX/2
9	IWM-3402008	Hose Cover
10	IWM-3402006	Punch Cover LH IW110D/2
	IWM-3502005	Punch Cover LH IW110DX/2
11	IWM-3402015	Guard Angle Shear
12	IWM-3402007	Cover Limit Switch IW110D/2
	IWM-3502006	Cover Limit Switch IW110DX/2

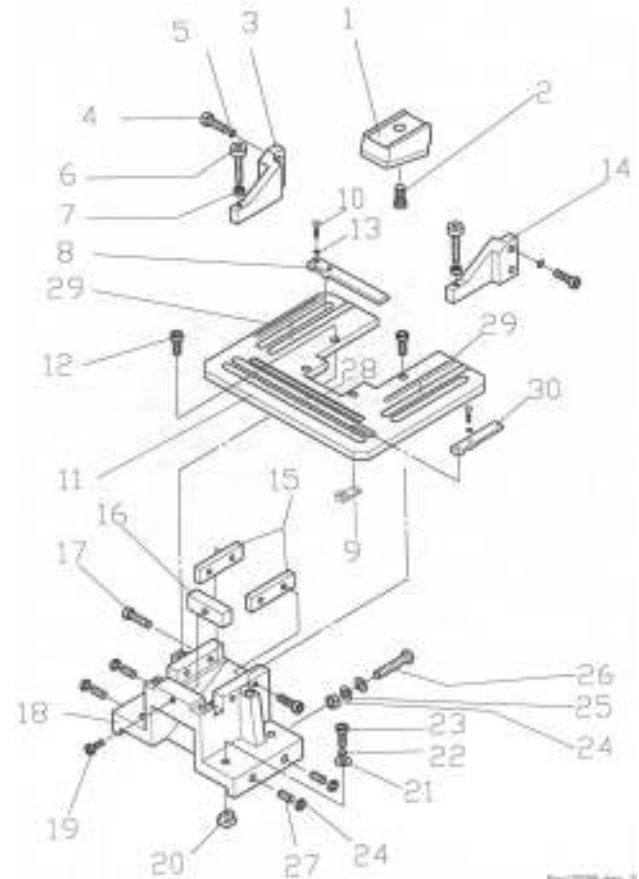
## Model IW135D and IW135DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-3602013	Guard Bar Shear
2	IWM-3602008	Cover
3	IWM-3602007	Cover
4	IWM-3602012	Guard Flat Shear
5	See Elect Gauge	
6	IWM-3602021	Cover IW135D
	IWM-3702005	Cover IW135DX
7	IWM-3602014	Chute
8	IWM-3602022	Cover IW135D
	IWM-3702006	Cover IW135DX

9	IWM-3602010	Hose Cover
10	IWM-3602003	Punch Cover LH IW135D
	IWM-3702002	Punch Cover LH IW135DX
11	IWM-3402015	Guard Angle Shear
12	IWM-3602005	Cover Limit Switch IW135D
	IWM-3702003	Cover Limit Switch IW135DX

## Model IW180DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-3802012	Guard Bar Shear
2	IWM-3802005	Cover
3	IWM-3802004	Cover
4	IWM-3802011	Guard Flat Shear
5	See Elect Gauge	
6	IWM-3802019	Cover
7	IWM-3802013	Chute
8	IWM-3802020	Cover
9	IWM-3802009	Hose Cover
10	IWM-3802007	Punch Cover LH
11	IWM-3802010	Guard Angle Shear
12	IWM-3802002	Cover Limit Switch
13	IWM-3802008	Cover Punch





**Model IW66D and IW66DX**

Key	Part No.	Description [Qty if more than 1]
1	IWA-1306001	Blade Top
	IWM-3206001	Blade Top
2		M18x35 Soc Hd cap Scr
3	IWM-1306004	Stripper Left
4		M12x30 Soc Hd cap Scr (4)
5		M12 Lock Washer (4)
6		M8x50 Soc Hd cap Scr (2)
7		M8 Hex Nut (2)
8	IWM-3206003	Stop
9	IWM-1605009	Clamp (2)
10		M10x40 Soc Hd Cap Scr (4)
11	IWM-3206002	Table
12		M8x16 Soc Hd Cap Scr (4)
13		M10 Lock Washer (4)
14	IWM-1306005	Stripper Right
15	IWA-1306002	Blade (2)
16	IWA-1306003	Blade
17		M10x20 Soc Hd Cap Scr (4)
18	IWM-1306008	Bolster
19		M10x35 Soc hd Cap Scr
20	IWM-1305012	T Nut (4)
21		M12 Flat Washer (4)
22		M12 Lock Washer (4)
23		M12x50 Soc Hd Cap Scr (4)
24		M12 Hex Nut (6)
25		M12 Flat Washer (4)
26		M12x55 Hex Hd Cap Scr (2)
27		M12x25 Soc Set Scr (4)
28	IWM-3204011	Ruler
29	IWM-3204012	Ruler (2)
30	IWM-3206003	Stop Short

**Model IW88D and IW88DX**

Key	Part No.	Description [Qty if more than 1]
1	IWA-1306001	Blade Top
	IWM-3206001	Blade Top
2		M18x35 Soc Hd cap Scr
3	IWM-1306004	Stripper Left
4		M12x30 Soc Hd cap Scr (4)
5		M12 Lock Washer (4)
6		M8x50 Soc Hd cap Scr (2)
7		M8 Hex Nut (2)
8	IWM-3206003	Stop
9	IWM-1605009	Clamp (2)
10		M10x40 Soc Hd Cap Scr (4)

11	IWM-3206002	Table
12		M8x16 Soc Hd Cap Scr (4)
13		M10 Lock Washer (4)
14	IWM-1306005	Stripper Right
15	IWA-1306002	Blade (2)
16	IWA-1306003	Blade
17		M10x20 Soc Hd Cap Scr (4)
18	IWM-1306008	Bolster
19		M10x35 Soc hd Cap Scr
20	IWM-1305012	T Nut (4)
21		M12 Flat Washer (4)
22		M12 Lock Washer (4)
23		M12x50 Soc Hd Cap Scr (4)
24		M12 Hex Nut (6)
25		M12 Flat Washer (4)
26		M12x55 Hex Hd Cap Scr (2)
27		M12x25 Soc Set Scr (4)
28	IWM-3204011	Ruler
29	IWM-3204012	Ruler (2)
30	IWM-3206003	Stop Short

**Model IW110D/2 and IW110DX/2**

Key	Part No.	Description [Qty if more than 1]
1	IWA-2406001	Blade Top
	IWM-3406001	Blade Top
2		M18x35 Soc Hd cap Scr
3	IWM-1306004	Stripper Left
4		M12x30 Soc Hd cap Scr (4)
5		M12 Lock Washer (4)
6		M8x50 Soc Hd cap Scr (2)
7		M8 Hex Nut (2)
8	IWM-3206003	Stop
9	IWM-1605009	Clamp (2)
10		M10x40 Soc Hd Cap Scr (4)
11	IWM-3406003	Table
12		M8x16 Soc Hd Cap Scr (4)
13		M10 Lock Washer (4)
14	IWM-1306005	Stripper Right
15	IWA-1306002	Blade (2)
16	IWA-2406002	Blade
17		M10x20 Soc Hd Cap Scr (4)
18	IWM-2406004	Bolster
19		M10x35 Soc hd Cap Scr
20	IWM-1305012	T Nut (4)
21		M12 Flat Washer (4)
22		M12 Lock Washer (4)
23		M12x50 Soc Hd Cap Scr (4)

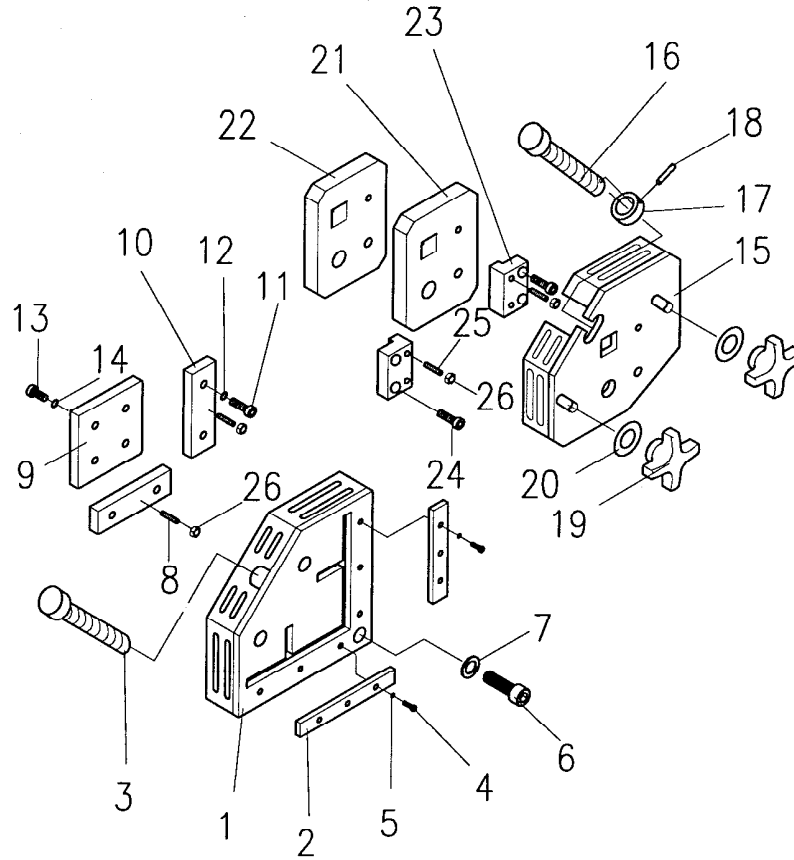
# NOTCHING STATION

# SPARTAN IRONWORKER

24		M12 Hex Nut (6)	6		M8x50 Soc Hd cap Scr (2)
25		M12 Flat Washer (4)	7		M8 Hex Nut (2)
26		M12x55 Hex Hd Cap Scr (2)	8	IWM-3206003	Stop
27		M12x25 Soc Set Scr (4)	9	IWM-1605009	Clamp (2)
28	IWM-3204011	Ruler	10		M10x40 Soc Hd Cap Scr (4)
29	IWM-3204012	Ruler (2)	11	IWM-3406003	Table
30	IWM-3206003	Stop Short	12		M8x16 Soc Hd Cap Scr (4)
<b>Model IW135D and IW135DX</b>			13		M10 Lock Washer (4)
Key	Part No.	Description [Qty if more than 1]	14	IWM-1306005	Stripper Right
1	IWA-2606001	Blade Top	15	IWA-1306002	Blade (2)
	IWM-3406001	Blade Top	16	IWA-2406002	Blade
2		M18x35 Soc Hd cap Scr	17		M10x20 Soc Hd Cap Scr (4)
3	IWM-1306004	Stripper Left	18	IWM-3806001	Bolster
4		M12x30 Soc Hd cap Scr (4)	19		M10x35 Soc hd Cap Scr
5		M12 Lock Washer (4)	20	IWM-1305012	T Nut (4)
6		M8x50 Soc Hd cap Scr (2)	21		M12 Flat Washer (4)
7		M8 Hex Nut (2)	22		M12 Lock Washer (4)
8	IWM-3206003	Stop	23		M12x50 Soc Hd Cap Scr (4)
9	IWM-1605009	Clamp (2)	24		M12 Hex Nut (6)
10		M10x40 Soc Hd Cap Scr (4)	25		M12 Flat Washer (2)
11	IWM-3406003	Table	26		M12x55 Hex Hd Cap Scr (2)
12		M8x16 Soc Hd Cap Scr (4)	27		M12x25 Soc Set Scr (4)
13		M10 Lock Washer (4)	28	IWM-3204011	Ruler
14	IWM-1306005	Stripper Right	29	IWM-3204012	Ruler (2)
15	IWA-1306002	Blade (2)	30	IWM-3206003	Stop Short
16	IWA-2406002	Blade			
17		M10x20 Soc Hd Cap Scr (4)	Not Shown: IWE-TZ7310		Limit Switch for Cover
18	IWM-2406004	Bolster			
19		M10x35 Soc hd Cap Scr			
20	IWM-1305012	T Nut (4)			
21		M12 Flat Washer (4)			
22		M12 Lock Washer (4)			
23		M12x50 Soc Hd Cap Scr (4)			
24		M12 Hex Nut (6)			
25		M12 Flat Washer (4)			
26		M12x55 Hex Hd Cap Scr (2)			
27		M12x25 Soc Set Scr (4)			
28	IWM-3204011	Ruler			
29	IWM-3204012	Ruler (2)			
30	IWM-3206003	Stop Short			

## Model IW180DX

Key	Part No.	Description [Qty if more than 1]
1	IWA-2606001	Blade Top
	IWM-3406001	Blade Top
2		M18x35 Soc Hd cap Scr
3	IWM-1306004	Stripper Left
4		M12x30 Soc Hd cap Scr (4)
5		M12 Lock Washer (4)



**Models IW66D, & IW66DX**

Key	Part No.	Description [Qty if more than 1]
1	IWM-3007901	Angle Shear Hold-down
2	IWM-1307005	Adjusting Plate (2)
3	IWM-1310009	Screw
4		M10x20 Soc Hd Cap Scr (6)
5		M10 Lock Washer (6)
6		M20x35 Soc Hd Cap Scr (3)
7		M20 Lock Washer (3)
8		M10x35 Soc Set Scr (6)
9	IWA-3007003	Angle Shear Blade Moving
10	IWA-3007002	Angle Shear Blade Stationary
11		M14x40 Soc Hd Cap Scr (4)
12		M14 Lock Washer (4)
13		M14x45 Soc Hd Cap Scr (3)
14		M14 Lock Washer (3)
15	IWM-3009900	Hold Down
16	IWM-3210900	Screw
17	Inc in Item 16	End Piece
18	Inc in Item 16	Spring Pin
19	IWM-3007019	Hand Knob (2)
20		M16 Flat Washer (2)
21	IWA-3009001	Rd/Sq Shear Blade Stationary

22	IWA-3009002	Rd/Sq Shear Blade Moving
23	IWM-1309004	Retainer (2)
24		M12x20 Soc Hd Cap Scr (4)
25		M10x35 Soc Set Scr (4)
26		M10 Hex Nut (10)

**Models IW88D, & IW88DX**

Key	Part No.	Description [Qty if more than 1]
1	IWM-3207901	Angle Shear Hold-down
2	IWM-2407004	Adjusting Plate (2)
3	IWM-2410008	Screw
4		M10x20 Soc Hd Cap Scr (6)
5		M10 Lock Washer (6)
6		M20x35 Soc Hd Cap Scr (3)
7		M20 Lock Washer (3)
8		M10x40 Soc Set Scr (6)
9	IWA-3207004	Angle Shear Blade Moving
10	IWA-3207001	Angle Shear Blade Stationary
11		M16x55 Soc Hd Cap Scr (4)
12		M16Lock Washer (4)
13		M16x50 Soc Hd Cap Scr (3)
14		M16 Lock Washer (3)
15	IWM-3209900	Hold Down
16	IWM-3210900	Screw

# ANGLE AND BAR SHEAR

# SPARTAN IRONWORKER

17	Inc in Item 16	End Piece
18	Inc in Item 16	Spring Pin
19	IWM-3007019	Hand Knob (2)
20		M16 Flat Washer (2)
21	IWA-3209001	Rd/Sq Shear Blade Stationary
22	IWA-3209002	Rd/Sq Shear Blade Moving
23	IWM-1309004	Retainer (2)
24		M12x20 Soc Hd Cap Scr (4)
25		M10x40 Soc Set Scr (4)
26		M10 Hex Nut (10)

## Models IW110D/2, & IW110DX/2

Key	Part No.	Description [Qty if more than 1]
1	IWM-3407901	Angle Shear Hold-down
2	IWM-2407004	Adjusting Plate (2)
3	IWM-2410008	Screw
4		M10x20 Soc Hd Cap Scr (6)
5		M10 Lock Washer (6)
6		M20x35 Soc Hd Cap Scr (3)
7		M20 Lock Washer (3)
8		M10x40 Soc Set Scr (6)
9	IWA-3207004	Angle Shear Blade Moving
10	IWA-3207001	Angle Shear Blade Stationary
11		M14x40 Soc Hd Cap Scr (4)
12		M14 Lock Washer (4)
13		M14x45 Soc Hd Cap Scr (3)
14		M14 Lock Washer (3)
15	IWM-3009900	Hold Down
16	IWM-3210900	Screw
17	Inc in Item 16	End Piece
18	Inc in Item 16	Spring Pin
19	IWM-3007019	Hand Knob (2)
20		M16 Flat Washer (2)
21	IWA-3009001	Rd/Sq Shear Blade Stationary
22	IWA-3009002	Rd/Sq Shear Blade Moving
23	IWM-1309004	Retainer (2)
24		M12x20 Soc Hd Cap Scr (4)
25		M10x35 Soc Set Scr (4)
26		M10 Hex Nut (10)

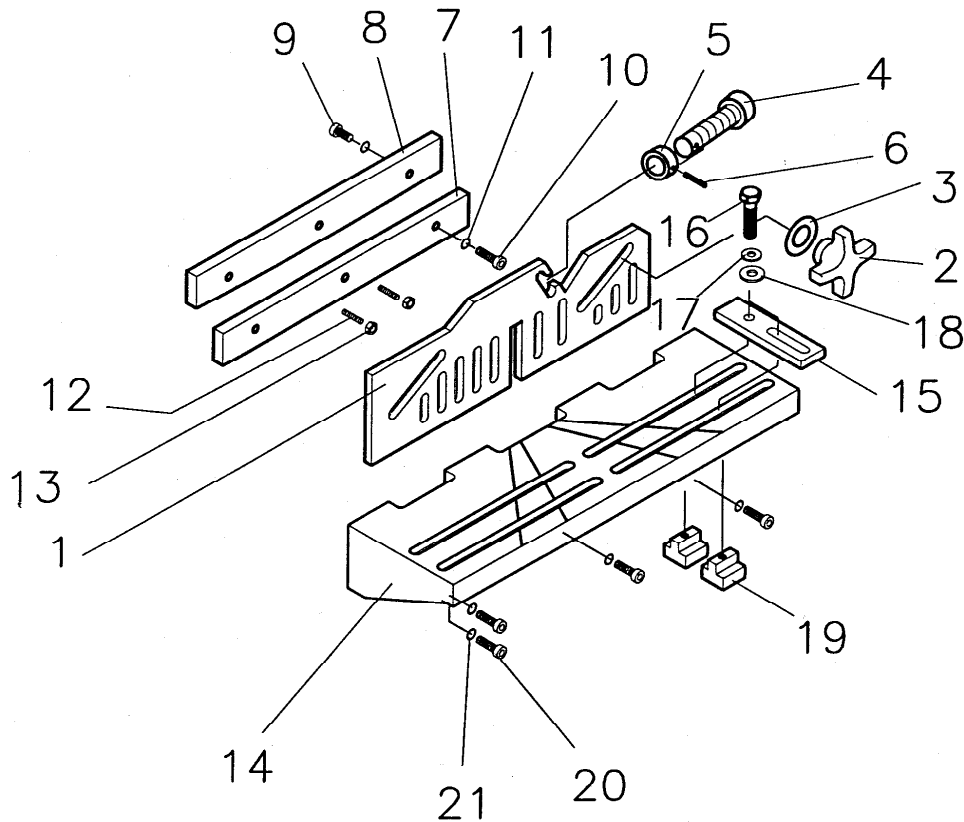
## Models IW135D, & IW135DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-3607901	Angle Shear Hold-down
2	IWM-2407004	Adjusting Plate (2)
3	IWM-2410008	Screw
4		M10x20 Soc Hd Cap Scr (6)
5		M10 Lock Washer (6)
6		M20x35 Soc Hd Cap Scr (3)
7		M20 Lock Washer (3)

8		M10x40 Soc Set Scr (6)
9	IWA-3207004	Angle Shear Blade Moving
10	IWA-3207001	Angle Shear Blade Stationary
11		M16x60 Soc Hd Cap Scr (4)
12		M16Lock Washer (4)
13		M16x50 Soc Hd Cap Scr (3)
14		M16 Lock Washer (3)
15	IWM-3609900	Hold Down
16	IWM-2210900	Screw
17	Inc in Item 16	End Piece
18	Inc in Item 16	Spring Pin
19	IWM-3007019	Hand Knob (2)
20		M16 Flat Washer (2)
21	IWA-3609001	Rd/Sq Shear Blade Stationary
22	IWA-3609002	Rd/Sq Shear Blade Moving
23	IWM-1309004	Retainer (2)
24		M12x20 Soc Hd Cap Scr (4)
25		M10x40 Soc Set Scr (4)
26		M10 Hex Nut (10)

## Models IW180DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-3807901	Angle Shear Hold-down
2	IWM-2407004	Adjusting Plate (2)
3	IWM-2810007	Screw
4		M10x20 Soc Hd Cap Scr (6)
5		M10 Lock Washer (6)
6		M20x35 Soc Hd Cap Scr (5)
7		M20 Lock Washer (5)
8		M10x40 Soc Set Scr (6)
9	IWA-3807001	Angle Shear Blade Moving
10	IWA-2807001	Angle Shear Blade Stationary
11		M16x60 Soc Hd Cap Scr (4)
12		M16 Lock Washer (4)
13		M16x50 Soc Hd Cap Scr (3)
14		M16 Lock Washer (3)
15	IWM-3809900	Hold Down
16	IWM-3810900	Screw
17	Inc in Item 16	End Piece
18	Inc in Item 16	Spring Pin
19	IWM-3007019	Hand Knob (2)
20		M16 Flat Washer (2)
21	IWA-3809001	Rd/Sq Shear Blade Stationary
22	IWA-3809002	Rd/Sq Shear Blade Moving
23	IWM-1309004	Retainer (2)
24		M12x20 Soc Hd Cap Scr (4)
25		M10x40 Soc Set Scr (4)
26		M10 Hex Nut (12)



**Models IW66D, & IW66DX**

Key	Part No.	Description [Qty if more than 1]	Key	Part No.	Description [Qty if more than 1]
1	IWM-3008002	Hold Down	1	IWM-3208004	Hold Down
2	IWM-3007019	Hand Knob (2)	2	IWM-3007019	Hand Knob (2)
3		M16 Flat Washer (2)	3		M16 Flat Washer (2)
4	IWM-3210900	Hold Down Screw	4	IWM-3210900	Hold Down Screw
5	Inc in Item 4End Cap		5	Inc in Item 4End Cap	
6	Inc in Item 4Spring Pin		6	Inc in Item 4Spring Pin	
7	IWA-1308001	Blade Lower	7	IWA-2208001	Blade Lower
8	IWA-1308002	Blade Upper	8	IWA-2208002	Blade Upper
9		M12x35 Soc Hd Cap Scr (3)	9		M12x35 Soc Hd Cap Scr (3)
10		M12x45 Soc Hd Cap Scr (3)	10		M12x45 Soc Hd Cap Scr (3)
11		M12 Flat Washer (6)	11		M12 Flat Washer (6)
12		M10x35 Soc Set Scr (4)	12		M12x40 Soc Set Scr (4)
13		M10 Hex Nut (4)	13		M12 Hex Nut (4)
14	IWM-3008001	Table	14	IWM-3208001	Table
15	IWM-3208002	Stop (2)	15	IWM-3208002	Stop (2)
16		M12x25 Soc Hd Cap Scr (4)	16		M12x25 Soc Hd Cap Scr (4)
17		M12 Lock Washer (2)	17		M12 Lock Washer (2)
18		M12 Flat Washer (2)	18		M12 Flat Washer (2)
19	IWM-1305012	T Nut (4)	19	IWM-1305012	T Nut (4)
20		M12x40 Soc Hd Cap Scr (6)	20		M12x40 Soc Hd Cap Scr (6)
21		M12 Lock Washer (6)	21		M12 Lock Washer (6)

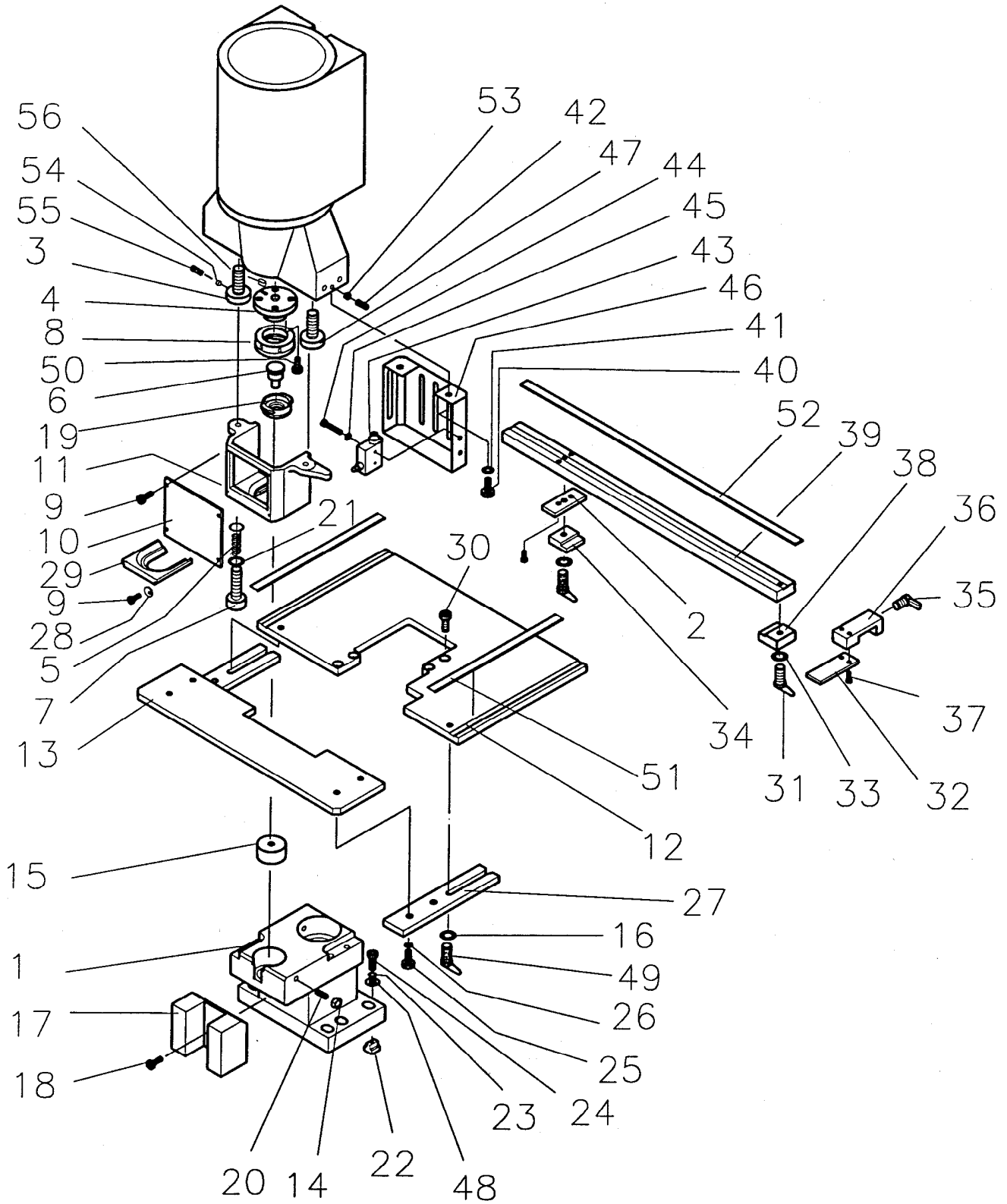
**Models IW110D/2 and IW110DX/2**

Key	Part No.	Description [Qty if more than 1]
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# FLAT SHEAR

# SPARTAN IRONWORKER

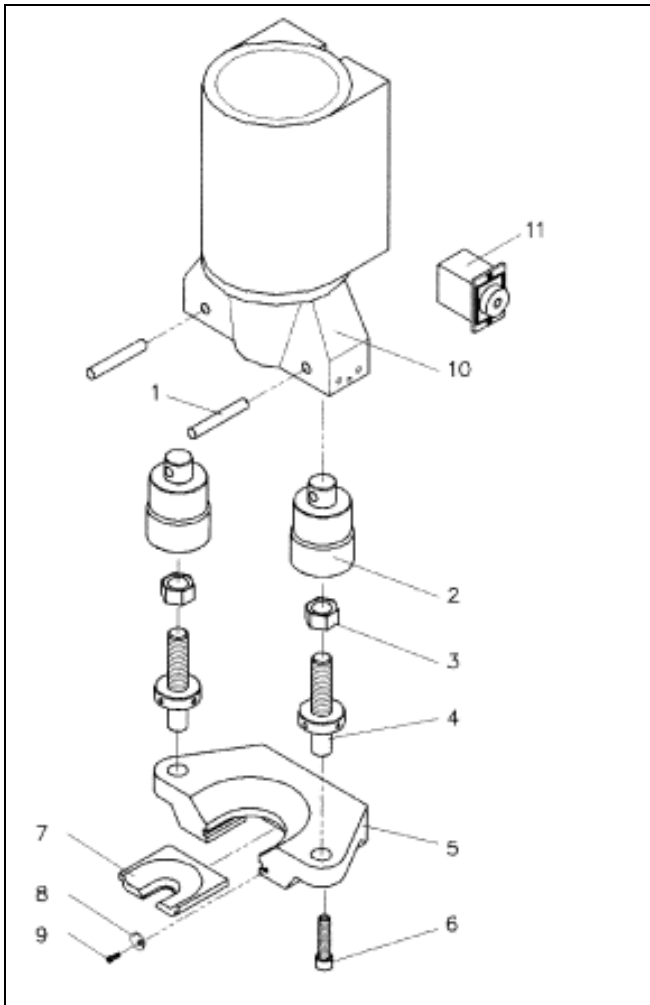
1	IWM-2408003	Hold Down	12		M12x45 Soc Set Scr (4)
2	IWM-3007019	Hand Knob (2)	13		M12 Hex Nut (4)
3		M16 Flat Washer (2)	14	IWM-3408001	Table
4	IWM-3210900	Hold Down Screw	15	IWM-3208002	Stop (2)
5		Inc in Item 4End Cap	16		M12x25 Soc Hd Cap Scr (4)
6		Inc in Item 4Spring Pin	17		M12 Lock Washer (2)
7	IWA-2408001	Blade Lower	18		M12 Flat Washer (2)
8	IWA-2408002	Blade Upper	19	IWM-1305012	T Nut (4)
9		M14x35 Soc Hd Cap Scr (3)	20		M12x40 Soc Hd Cap Scr (7)
10		M14x50 Soc Hd Cap Scr (3)	21		M12 Lock Washer (7)
11		M14 Lock Washer (6)	<b>Model IW180DX</b>		
12		M12x40 Soc Set Scr (4)	Key	Part No.	Description (Qty if more than 1)
13		M12 Hex Nut (4)	1	IWM-3808004	Hold Down
14	IWM-3408001	Table	2	IWM-3007019	Hand Knob (2)
15	IWM-3208002	Stop (2)	3		M16 Flat washer (2)
16		M12x25 Soc Hd Cap Scr (4)	4	IWM-3810900	Hold Down Screw
17		M12 Lock Washer (2)	5	Inc in Item 4	End Cap
18		M12 Flat Washer (2)	6	Inc in Item 4	Spring Pin
19	IWM-1305012	T Nut (4)	7	IWA-3808002	Blade Lower
20		M12x40 Soc Hd Cap Scr (6)	8	IWA-3808003	Blade Upper
21		M12 Lock Washer (6)	9		M16x45 Soc Hd Cap Scr (3)
<b>Models IW135D and IW135DX</b>			10		M16x60 Soc Hd Cap Scr (3)
Key	Part No.	Description [Qty if more than 1]	11		M16 Lock Washer (6)
1	IWM-2408003	Hold Down	12		M12x50 Soc Set Scr (4)
2	IWM-3007019	Hand Knob (2)	13		M12 Hex Nut (4)
3		M16 Flat Washer (2)	14	IWM-3808001	Table
4	IWM-2210900	Hold Down Screw	15	IWM-3208002	Stop (2)
5		Inc in Item 4End Cap	16		M12 x 25 Soc Hd Cap Scr (4)
6		Inc in Item 4Spring Pin	17		M12 Lock Washer (2)
7	IWA-2408001	Blade Lower	18		M12 Flat Washer (2)
8	IWA-2408002	Blade Upper	19	IWM-1305012	T Nut (4)
9		M14x40 Soc Hd Cap Scr (3)	20		M12 x 40 Soc Hd Cap Scr (6)
10		M14x55 Soc Hd Cap Scr (3)	21		M12 Lock Washer (6)
11		M14 Lock Washer (6)			



Models IW66D/DX, IW88D/DX		40			6x10 Soc Hd Cap Scr (2)
Key	Part No.	Description [Qty if more than 1]	41	M6 Lock Washer (2)	
1	IWM-B2DML1	Die Holder	42	M10x25 Soc Set Scr (2)	
2	IWM-3205006	Stop	43	IWE-TM7310	Limit Switch
3	IWM-1305005	Adjustment Screw (2)	44	M4x25 Soc Hd Cap Scr (2)	
4	IWA/RTBQML	Retaining Thread	45	M4 Flat Washer (2)	
5	IWM-1305006	Spring	46	IWM-3202021	Rear Guard
6	Ref Only	Punch	47	IWM-1305004	Screw
7		M12x85 Soc Hd Cap Scr	48	M16 Flat Washer (6)	
8	IWA/RNBQ	Retaining Nut	49	IWM-M10x32	Clamp Handle (2)
9		M5x12 Soc Hd Cap Scr (6)	50	M10x25 Soc Hd Cap Scr (4)	
10	IWM-STBC20	Cover	51	IWM-RULER305	Ruler "D" Model
11	IWM-STBC2	Stripper		IWM-RULER505	Ruler "DX" Model
12	IWM-3005001	Table- "D" Model	52	IWM-RULER02	Ruler X Axis
	IWM-3105001	Table - "DX" Model	53	IWM-3205010	Copper Slug (2)
13	IWM-3005002	Table - Front	54	IWM-2211009	Copper Slug
14		M10 Hex Nut	55	M6x10 Soc Set Scr	
15	Ref Only	Die	56	IWM-06x10KEY	Key
16		M10 Flat Washer (2)	Models IW110/2D/DX, 135D/DX & 180DX		
17	IWM-B2D005	Die Holder Support	Key	Part No.	Description [Qty if more than 1]
18		M12x20 Soc Hd Cap Scr	1	IWM-B2DWML1	Die Holder
19	IWA/RSBQ31	Punch Sleeve (221 Punch)	2	IWM-3205006	Stop
	IWA/RSBQ39	Punch Sleeve (228 Punch)	3	IWM-1305005	Adjustment Screw (2)
	IWA/RSBQ51	Punch Sleeve (P51 Punch)	4	IWA/RTBQML	Retaining Thread
20		M10x50 Soc Set Scr	5	IWM-1305006	Spring
21		M12 Flat Washer (2)	6	Ref Only	Punch
22	IWM-1305011	T Nut (6)	7		M12x85 Soc Hd Cap Scr
23		M16 Lock Washer (6)	8	IWA/RNBQ Retaining Nut	
24		M16x60 Soc Hd Cap Scr (6)	9	M5x12 Soc Hd Cap Scr (6)	
25		M10x30 Soc Hd Cap Scr (4)	10	IWM-STBC20	Cover
26		M10 Lock Washer (4)	11	IWM-STBC2	Stripper
27	IWM-2205005	Plate (2)	12	IWM-3005001	Table- "D" Model
28	IWM-STBC004	Washer		IWM-3105001	Table - "DX" Model
29	IWM-STBC21	Insert 3/4"	13	IWM-3405001	Table - Front
	IWM-STBC22	Insert 1-5/8"	14	M10 Hex Nut	
	IWM-STBC23	Insert 2"	15	Ref Only	Die
30		M10x20 Soc Hd Cap Scr (4)	16	M10 Flat Washer (2)	
31	IWM-M10x40	Clamp Handle (2)	17	IWM-B2D005	Die Holder Support
32	IWM-2205007	Stop	18	M12x20 Soc Hd Cap Scr	
33		M10 Flat Washer (2)	19	IWA/RSBQ31	Punch Sleeve (221 Punch)
34	IWM-3205007	Clamp		IWA/RSBQ39	Punch Sleeve (228 Punch)
35	IWM-M10x20	Clamp Handle		IWA/RSBQ51	Punch Sleeve (P51 Punch)
36	IWM-3205004	Bracket	20	M10x50 Soc Set Scr	
37		M6x16 Flat Hd Soc Scr (4)	21	M12 Flat Washer (2)	
38	IWM-3205008	Clamp	22	IWM-1305011	T Nut (6)
39	IWM-3205005	X Axis Guide Bar	23	M16 Lock Washer (6)	



24		M16x60 Soc Hd Cap Scr (6)
25		M10x30 Soc Hd Cap Scr (4)
26		M10 Lock Washer (4)
27	IWM-2205005	Plate (2)
28	IWM-STBC004	Washer
29	IWM-STBC21	Insert 3/4"
	IWM-STBC22	Insert 1-5/8"
	IWM-STBC23	Insert 2"
30		M10x20 Soc Hd Cap Scr (4)
31	IWM-M10x40	Clamp Handle (2)
32	IWM-2205007	Stop
33		M10 Flat Washer (2)
34	IWM-3205007	Clamp
35	IWM-M10x20	Clamp Handle
36	IWM-3205004	Bracket
37		M6x16 Flat Hd Soc Scr (4)
38	IWM-3205008	Clamp
39	IWM-3205005	X Axis Guide Bar
40		M6x10 Soc Hd Cap Scr (2)
41		M6 Lock Washer (2)
42		M10x25 Soc Set Scr (2)
43	IWE-TM7310	Limit Switch
44		M4x25 Soc Hd Cap Scr (2)
45		M4 Flat Washer (2)
46	IWM-3202021	Rear Guard
47	IWM-1305004	Screw
48		M16 Flat Washer (6)
49	IWM-M10x32	Clamp Handle (2)
50		M10x25 Soc Hd Cap Scr (4)
51	IWM-RULER305	Ruler "D" Model
	IWM-RULER505	Ruler "DX" Model
52	IWM-RULER02	Ruler X Axis
53	IWM-3205010	Copper Slug (2)
54	IWM-2211009	Copper Slug
55		M6x10 Soc Set Scr
56	IWM-06x10KEY	Key



### Model IW66D and IW66DX

Key	Part No.	Description [Qty if more than 1]
1		Spring Pin (2)
2	IWA-3205900	Hydraulic Stripper Cylinder (2)
3	IWA-3205017	M22 Nut (2)
4	IWA- 3205014	Stripper Adjusting Screw (2)
5	IWA-STBH005	Hydraulic Stripper
6		M12x25 Soc Hd Cap Scr (2)
7	IWA-STB009	Stripper Plate
8		M5x8 Button Hd Scr
9	IWA-STBC004	Washer
10	IWA-2005002	Punch Cylinder Guide Cover
11	IWE-ELTM Timer	
12	IWE-PEA-2 Enclosure (Not Shown)	

### Model IW88D and IW88DX

Key	Part No.	Description [Qty if more than 1]
1		Spring Pin (2)
2	IWA-3205900	Hydraulic Stripper Cylinder (2)
3	IWA-3205017	M22 Nut (2)

4	IWA- 3205014	Stripper Adjusting Screw (2)
5	IWA-STBH005	Hydraulic Stripper
6		M12x25 Soc Hd Cap Scr (2)
7	IWA-STB009	Stripper Plate
8		M5x8 Button Hd Scr
9	IWA-STBC004	Washer
10	IWA-2205015	Punch Cylinder Guide Cover
11	IWE-ELTM Timer	
12	IWE-PEA-2 Enclosure (Not Shown)	

### Model IW110/2D and IW110DX

Key	Part No.	Description [Qty if more than 1]
1		Spring Pin (2)
2	IWA-3205900	Hydraulic Stripper Cylinder (2)
3	IWA-3205017	M22 Nut (2)
4	IWA- 3205014	Stripper Adjusting Screw (2)
5	IWA-STBH005	Hydraulic Stripper
6		M12x25 Soc Hd Cap Scr (2)
7	IWA-STB009	Stripper Plate
8		M5x8 Button Hd Scr
9	IWA-STBC004	Washer
10	IWA-2405004	Punch Cylinder Guide Cover
11	IWE-ELTM Timer	
12	IWE-PEA-2 Enclosure (Not Shown)	

### Model IW135D and IW135DX

Key	Part No.	Description [Qty if more than 1]
1		Spring Pin (2)
2	IWA-3205900	Hydraulic Stripper Cylinder (2)
3	IWA-3205017	M22 Nut (2)
4	IWA- 3205014	Stripper Adjusting Screw (2)
5	IWA-STBH005	Hydraulic Stripper
6		M12x25 Soc Hd Cap Scr (2)
7	IWA-STB009	Stripper Plate
8		M5x8 Button Hd Scr
9	IWA-STBC004	Washer
10	IWA-2605002	Punch Cylinder Guide Cover
11	IWE-ELTM Timer	
12	IWE-PEA-2 Enclosure (Not Shown)	

### Model IW180D and IW180DX

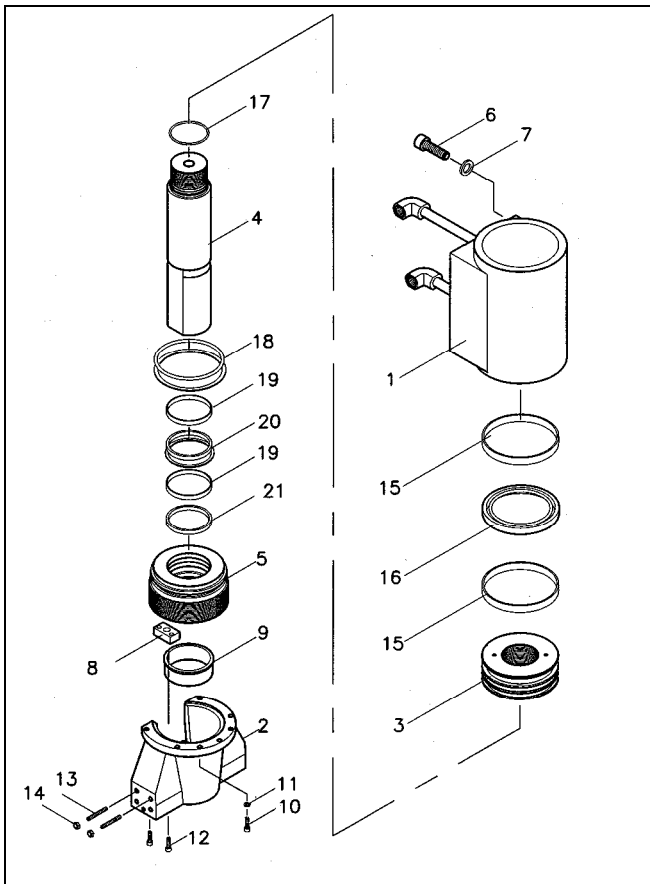
Key	Part No.	Description [Qty if more than 1]
1		Spring Pin (2)
2	IWA-3205900	Hydraulic Stripper Cylinder (2)
3	IWA-3205017	M22 Nut (2)
4	IWA- 3205014	Stripper Adjusting Screw (2)
5	IWA-STBH005	Hydraulic Stripper
6		M12x25 Soc Hd Cap Scr (2)

# SPARTAN IRONWORKER

# PUNCHING STATION

7	IWA-STB009	Stripper Plate
8		M5x8 Button Hd Scr
9	IWA-STBC004	Washer

10	IWA-2805008	Punch Cylinder Guide Cover
11	IWE-ELTM	Timer
12	IWE-PEA-2	Enclosure (Not Shown)



19		Included with Seal Kit, Key 15
20		Included with Seal Kit, Key 15
21		Included with Seal Kit, Key 15

### Model IW88D and IW88DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-3203911	Cylinder Tube
2	IWM-2205001	Guide End
3	IWM-3203010	Piston
4	IWM-3203008	Piston Rod
5	IWM-3203009	Rod Cover
6		M24x75 Soc Hd Cap Scr (10)
7		M24 Lock Washer (10)
8	IWM-3205002	Guide
9	IWM-3205003	Bushing
10		M10x35 Soc Hd Cap Scr (7)
11		M10 Lock Washer (7)
12		M10x45 Soc Hd Cap Scr (2)
13		M12x110 Soc Set Scr (2)
14		M12 Hex Nut (2)
15	IWH-OLSK80SP	Seal Kit
16		Included with Seal Kit, Key 15
17		Included with Seal Kit, Key 15
18		Included with Seal Kit, Key 15
19		Included with Seal Kit, Key 15
20		Included with Seal Kit, Key 15
21		Included with Seal Kit, Key 15

### Model IW66D and IW66DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-3003911	Cylinder Tube
2	IWM-2005001	Guide End
3	IWM-3003010	Piston
4	IWM-3003008	Piston Rod
5	IWM-3003009	Rod Cover
6		M24x75 Soc Hd Cap Scr (10)
7		M24 Lock Washer (10)
8	IWM-3205002	Guide
9	IWM-3205003	Bushing
10		M8x35 Soc Hd Cap Scr (7)
11		M8 Lock Washer (7)
12		M10x45 Soc Hd Cap Scr (2)
13		M12x110 Soc Set Scr (2)
14		M12 Hex Nut (2)
15	IWH-OLSK60SP	Seal Kit
16		Included with Seal Kit, Key 15
17		Included with Seal Kit, Key 15
18		Included with Seal Kit, Key 15

### Model IW110D/2 and IW110DX/2

Key	Part No.	Description [Qty if more than 1]
1	IWM-3403911	Cylinder Tube
2	IWM-2405001	Guide End
3	IWM-2403010	Piston
4	IWM-3403008	Piston Rod
5	IWM-3403009	Rod Cover
6		M27x90 Soc Hd Cap Scr (10)
7		M27 Lock Washer (10)
8	IWM-3205002	Guide
9	IWM-2605003	Bushing
10		M12x45 Soc Hd Cap Scr (7)
11		M12 Lock Washer (7)
12		M10x45 Soc Hd Cap Scr (2)
13		M12x110 Soc Set Scr (2)
14		M12 Hex Nut (2)
15	IWH-OLSK100SP	Seal Kit
16		Included with Seal Kit, Key 15

# PUNCHING CYLINDER

# SPARTAN IRONWORKER

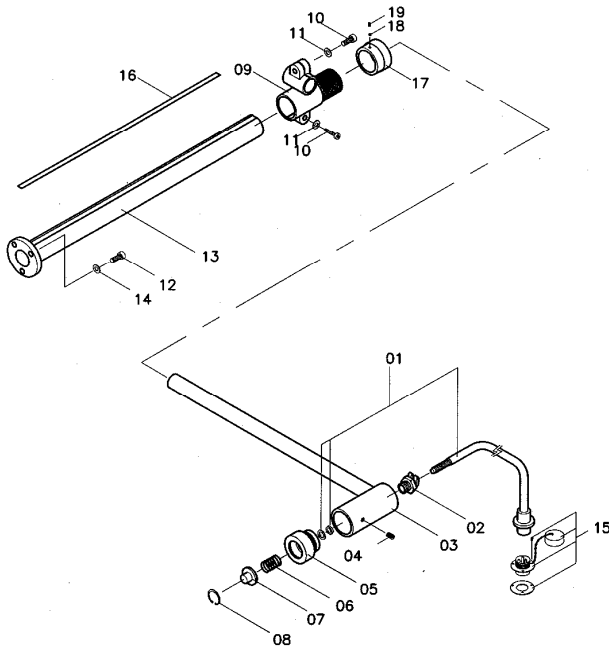
17	Included with Seal Kit, Key 15	18	Included with Seal Kit, Key 15
18	Included with Seal Kit, Key 15	19	Included with Seal Kit, Key 15
19	Included with Seal Kit, Key 15	20	Included with Seal Kit, Key 15
20	Included with Seal Kit, Key 15	21	Included with Seal Kit, Key 15
21	Included with Seal Kit, Key 15		

## Model IW135D and IW135DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-3603911	Cylinder Tube
2	IWM-2605001	Guide End
3	IWM-2603006	Piston
4	IWM-3603008	Piston Rod
5	IWM-3603009	Rod Cover
6		M30x90 Soc Hd Cap Scr (10)
7		M30 Lock Washer (10)
8	IWM-3205002	Guide
9	IWM-2605003	Bushing
10		M12x50 Soc Hd Cap Scr (7)
11		M12Lock Washer (7)
12		M10x45 Soc Hd Cap Scr (2)
13		M12x110 Soc Set Scr (2)
14		M12 Hex Nut (2)
15	IWH-OLSK125SP	Seal Kit
16		Included with Seal Kit, Key 15
17		Included with Seal Kit, Key 15
18		Included with Seal Kit, Key 15
19		Included with Seal Kit, Key 15
20		Included with Seal Kit, Key 15
21		Included with Seal Kit, Key 15

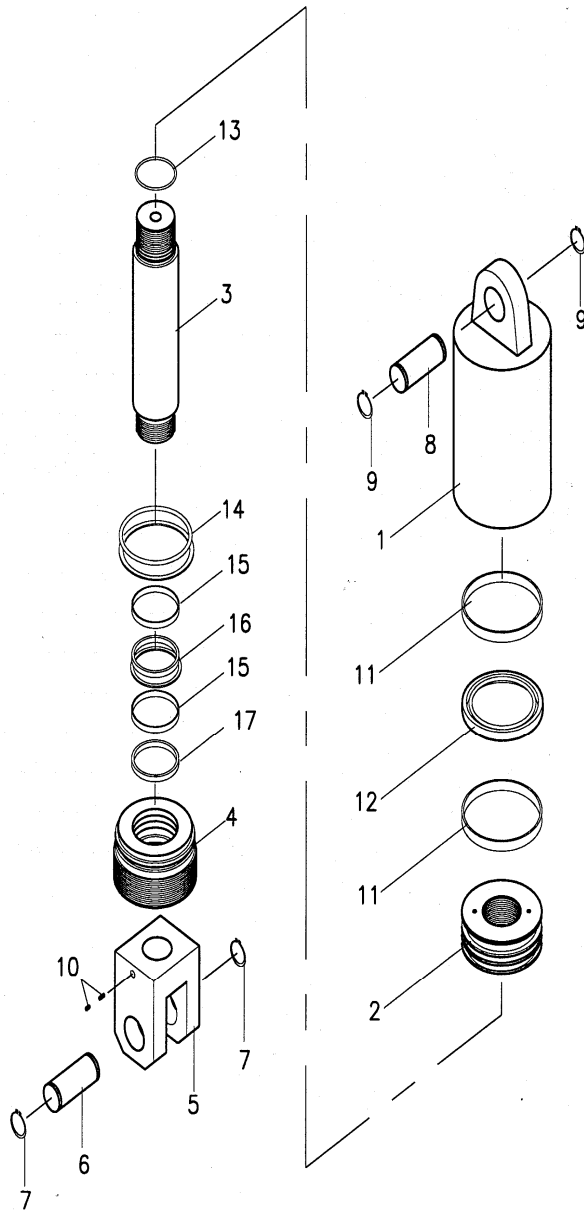
## Model IW180DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-3803911	Cylinder Tube
2	IWM-2805001	Guide End
3	IWM-3803010	Piston
4	IWM-3803008	Piston Rod
5	IWM-3803009	Rod Cover
6		M36x110 Soc Hd Cap Scr (10)
7		M36 Lock Washer (10)
8	IWM-3205002	Guide
9	IWM-2605003	Bushing
10		M14x50 Soc Hd Cap Scr (7)
11		M14Lock Washer (7)
12		M10x45 Soc Hd Cap Scr (2)
13		M12x90Soc Set Scr (2)
14		M12 Hex Nut (2)
15	IWH-OLSK165SP	Seal Kit
16		Included with Seal Kit, Key 15
17		Included with Seal Kit, Key 15



### All Models

Key	Part No.	Description [Qty if more than 1]
1	IWE-131210001	Proximity Switch Unit 1 Meter Female
	IWE-131210003	Proximity Switch Unit 2 Meter Female
	IWE-13121001	Proximity Switch Unit 1 Meter Male 4 Pin
	IWE-13121003	Proximity Switch Unit 2 Meter Male 4 Pin
2	IWE-KB2	Adaptor
3	IWM-1304901	Secondary Bar
4		M5x6 Soc Set Scr
5	IWM-1304009	Cover
6	IWM-1304008	Spring
7	IWM-1304010	Button
8	IWM-CPC40	Retaining Ring
9	IWM-2211010	Joint
10		M12x35 Soc Hd Cap Scr (2)
11		M12 Lock Washer (2)
12		M10x30 Soc Hd Cap Scr (3)
13	IWM-2211902	Main Rod, 1 Meter
	IWM-2211902L	Maain Rod, 2 Meter
14		M10 Lock Washer (3)
15	IWE-PLT2 5	Male Connector
16	IWM-3211001	Scale 1030 mm
17	Part of Item 9	
18	IWM-2211009	Copper Slug
19		M6x8 Soc Set Scr



### Model IW66D and IW66DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-3003901	Cylinder
2	IWM-3003003	Piston
3	IWM-3003001	Rod
4	IWM-3003002	Cover
5	IWM-3203007	Clevis
6	IWM-3210003	Pin
7	IWM-CPS65	Clip (2)
8	IWM-3010004	Pin
9	IWM-CPS65	Clip (2)
10		M8x10 Soc Set Scr (2)
11	IWH-OLSK60SS	Seal Kit

12	Included with Seal Kit, Key No. 11
13	Included with Seal Kit, Key No. 11
14	Included with Seal Kit, Key No. 11
15	Included with Seal Kit, Key No. 11
16	Included with Seal Kit, Key No. 11
17	Included with Seal Kit, Key No. 11

### Model IW88D and IW88DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-3203901	Cylinder
2	IWM-3203003	Piston
3	IWM-3203001	Rod
4	IWM-3203002	Cover
5	IWM-3203007	Clevis
6	IWM-3210003	Pin
7	IWM-CPS65	Clip (2)
8	IWM-3210005	Pin
9	IWM-CPS65	Clip (2)
10		M8x10 Soc Set Scr (2)
11	IWH-OLSK80SS	Seal Kit
12	Included with Seal Kit, Key No. 11	
13	Included with Seal Kit, Key No. 11	
14	Included with Seal Kit, Key No. 11	
15	Included with Seal Kit, Key No. 11	
16	Included with Seal Kit, Key No. 11	
17	Included with Seal Kit, Key No. 11	

### Model IW110D/2 and IW110DX/2

Key	Part No.	Description [Qty if more than 1]
1	IWM-3403901	Cylinder
2	IWM-2403003	Piston
3	IWM-3403001	Rod
4	IWM-2403002	Cover
5	IWM-3203007	Clevis
6	IWM-3210003	Pin
7	IWM-CPS65	Clip (2)
8	IWM-3410004	Pin
9	IWM-CPS65	Clip (2)
10		M8x10 Soc Set Scr (2)
11	IWH-OLSK100SS	Seal Kit
12	Included with Seal Kit, Key No. 11	
13	Included with Seal Kit, Key No. 11	
14	Included with Seal Kit, Key No. 11	
15	Included with Seal Kit, Key No. 11	
16	Included with Seal Kit, Key No. 11	
17	Included with Seal Kit, Key No. 11	

# SPARTAN IRONWORKER

# SHEARING CYLINDER

## Model IW135D and IW135DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-3603901	Cylinder
2	IWM-3603003	Piston
3	IWM-3603001	Rod
4	IWM-3603002	Cover
5	IWM-3603007	Clevis
6	IWM-3610003	Pin
7	IWM-CPS80	Clip (2)
8	IWM-3610005	Pin
9	IWM-CPS80	Clip (2)
10		M8x10 Soc Set Scr (2)
11	IWH-OLSK125SS	Seal Kit
12		Included with Seal Kit, Key No. 11
13		Included with Seal Kit, Key No. 11
14		Included with Seal Kit, Key No. 11
15		Included with Seal Kit, Key No. 11
16		Included with Seal Kit, Key No. 11

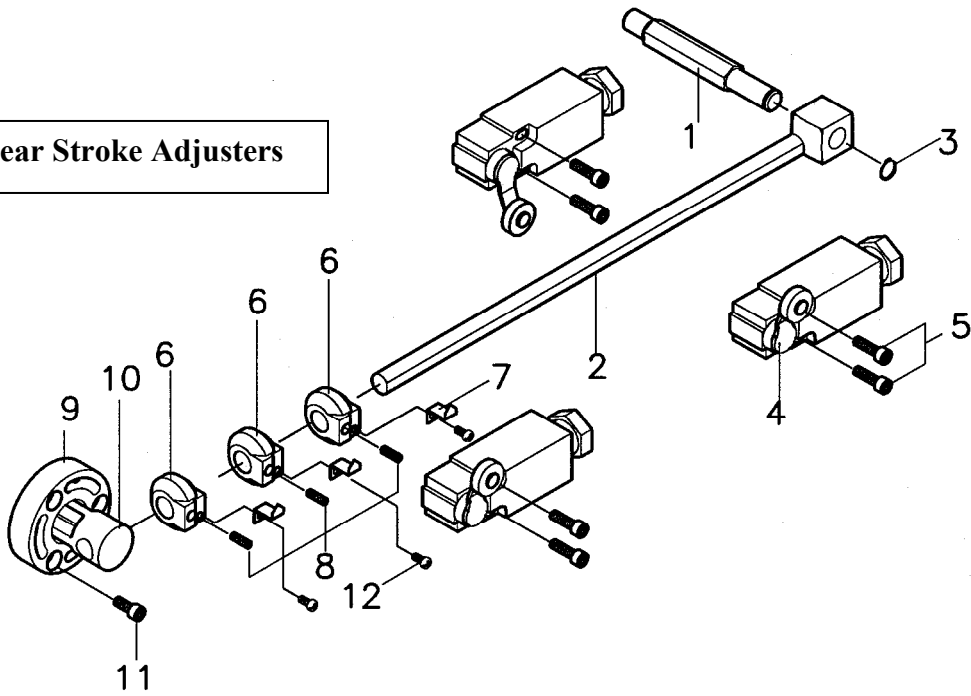
17

Included with Seal Kit, Key No. 11

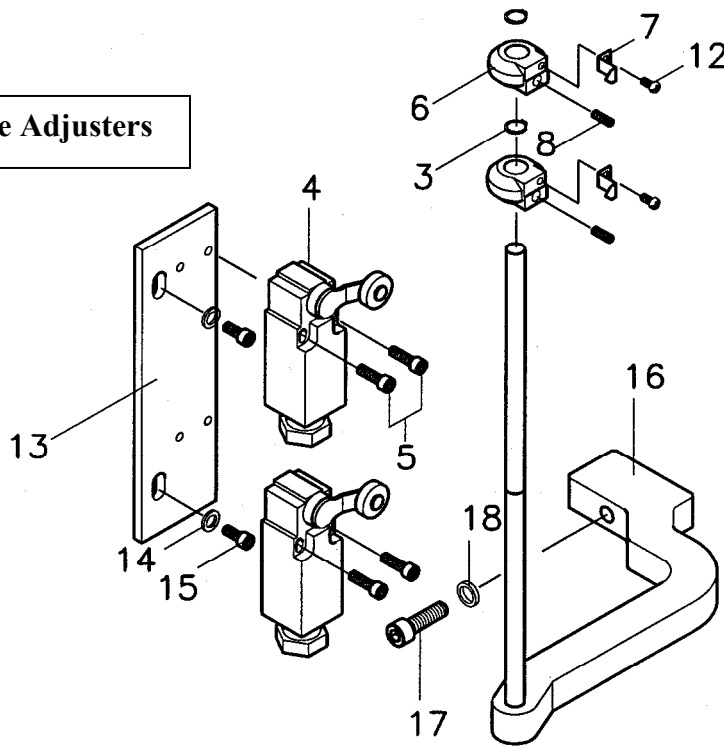
## Model IW180DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-3803901	Cylinder
2	IWM-2803003	Piston
3	IWM-3803001	Rod
4	IWM-2803002	Cover
5	IWM-3803007	Clevis
6	IWM-3810003	Pin
7	IWM-CPS100	Clip (2)
8	IWM-3810005	Pin
9	IWM-CPS100	Clip (2)
10		M8x10 Soc Set Scr (2)
11	IWH-OLSK165SS	Seal Kit
12		Included with Seal Kit, Key No. 11
13		Included with Seal Kit, Key No. 11
14		Included with Seal Kit, Key No. 11
15		Included with Seal Kit, Key No. 11
16		Included with Seal Kit, Key No. 11
17		Included with Seal Kit, Key No. 11

## Shear Stroke Adjusters



## Punch Stroke Adjusters





# SPARTAN IRONWORKER

# HYDRAULIC SYSTEM

## Model IW66D and IW66DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-2204009Screw	
2	IWM-3204903Rod	
3	IWM-CPS-12 Clip (3)	
4	IWE-XCKP118	Limit Switch (5)
5		M5x30 Soc Hd Cap Scr (10)
6	IWM-3204007Switch Dog (5)	
7	IWM-3204008Pointer (5)	
8		M6x10 Soc Set Scr (5)
9	IWM-1304004Base	
10	IWM-1304005Post	
11		M6x15 Soc Hd Cap Scr (3)
12		M4x5 Button Hd Cap Scr (5)
13	IWM-3204024Plate	
14		M8 Lock Washer (2)
15		M8x15 Soc Hd cap Scr (2)
16	IWM-3004900Bracket	
17		M8x50 Soc Hd Cap Scr
18		M8 Lock Washer

## Model IW88D and IW88DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-2204009Screw	
2	IWM-3204903Rod	
3	IWM-CPS-12 Clip (3)	
4	IWE-XCKP118	Limit Switch (5)
5		M5x30 Soc Hd Cap Scr (10)
6	IWM-3204007Switch Dog (5)	
7	IWM-3204008Pointer (5)	
8		M6x10 Soc Set Scr (5)
9	IWM-1304004Base	
10	IWM-1304005Post	
11		M6x15 Soc Hd Cap Scr (3)
12		M4x5 Button Hd Cap Scr (5)
13	IWM-3204024Plate	
14		M8 Lock Washer (2)
15		M8x15 Soc Hd cap Scr (2)
16	IWM-3204900Bracket	
17		M8x50 Soc Hd Cap Scr
18		M8 Lock Washer

## Model IW110D/2 and IW110DX/2

Key	Part No.	Description [Qty if more than 1]
1	IWM-2404020Screw	
2	IWM-2604900Rod	
3	IWM-CPS-12 Clip (3)	
4	IWE-XCKP118	Limit Switch (5)
5		M5x30 Soc Hd Cap Scr (10)
6	IWM-3204007Switch Dog (5)	
7	IWM-3204008Pointer (5)	
8		M6x10 Soc Set Scr (5)
9	IWM-1304004Base	
10	IWM-1304005Post	
11		M6x15 Soc Hd Cap Scr (3)

12		M4x5 Button Hd Cap Scr (5)
13	IWM-3202024Plate	
14		M8 Lock Washer (2)
15		M8x15 Soc Hd cap Scr (2)
16	IWM-3404900Bracket	
17		M8x50 Soc Hd Cap Scr
18		M8 Lock Washer

## Model IW135D and IW135DX

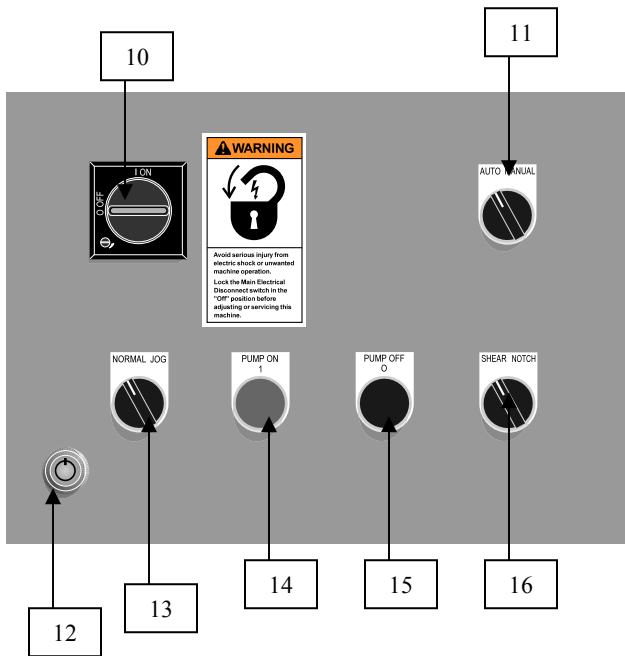
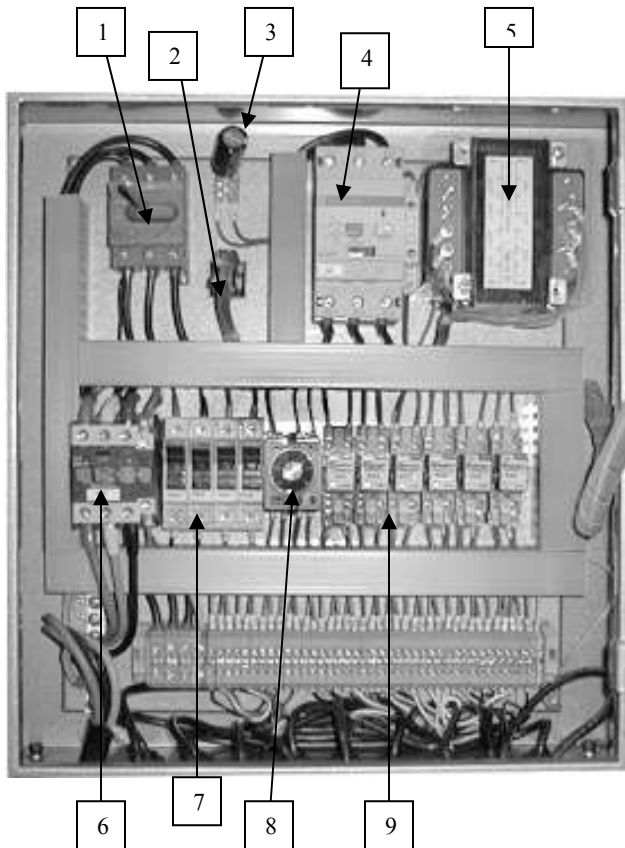
Key	Part No.	Description [Qty if more than 1]
1	IWM-2404020Screw	
2	IWM-2604900Rod	
3	IWM-CPS-12 Clip (3)	
4	IWE-XCKP118	Limit Switch (5)
5		M5x30 Soc Hd Cap Scr (10)
6	IWM-3204007Switch Dog (5)	
7	IWM-3204008Pointer (5)	
8		M6x10 Soc Set Scr (5)
9	IWM-1304004Base	
10	IWM-1304005Post	
11		M6x15 Soc Hd Cap Scr (3)
12		M4x5 Button Hd Cap Scr (5)
13	IWM-3202024Plate	
14		M8 Lock Washer (2)
15		M8x15 Soc Hd cap Scr (2)
16	IWM-3604900Bracket	
17		M8x50 Soc Hd Cap Scr
18		M8 Lock Washer

## Model IW180DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-2404020Screw	
2	IWM-53804901Rod	
3	IWM-CPS-12 Clip (3)	
4	IWE-XCKP118	Limit Switch (5)
5		M5x30 Soc Hd Cap Scr (10)
6	IWM-3204007Switch Dog (5)	
7	IWM-3204008Pointer (5)	
8		M6x10 Soc Set Scr (5)
9	IWM-1304004Base	
10	IWM-1304005Post	
11		M6x15 Soc Hd Cap Scr (3)
12		M4x5 Button Hd Cap Scr (5)
13	IWM-3202024Plate	
14		M8 Lock Washer (2)
15		M8x15 Soc Hd Cap Scr (2)
16	IWM-3804900Bracket	
17		M8x50 Soc Hd Cap Scr
18		M8 Lock Washer

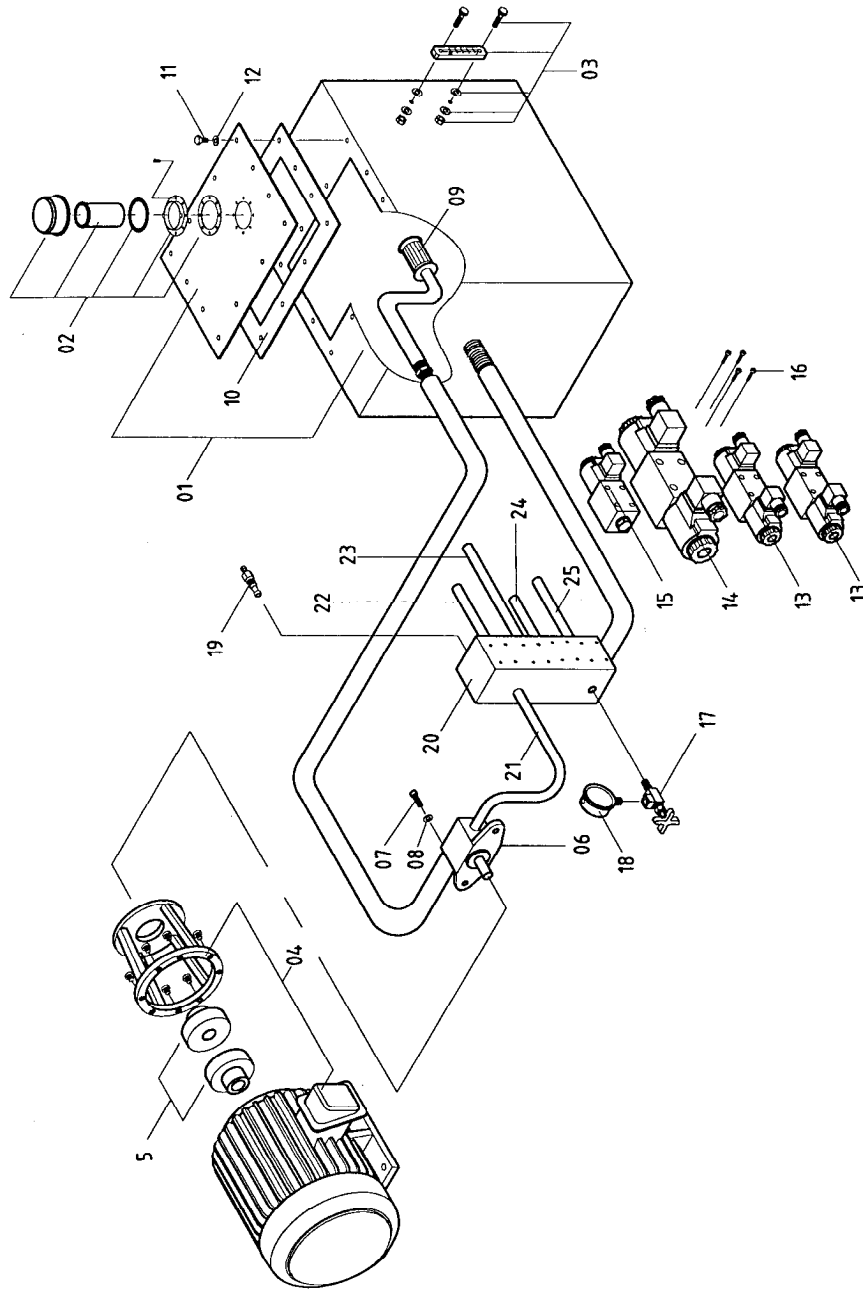
# ELECTRICAL COMPONENTS

# SPARTAN IRONWORKER



Key	Part No.	Description [Qty if more than 1]
1		Disconnect
2	IWE-C2506	Bridge Rectifier
3	IWE-UF50V	Capacitor
4		Motor Starter Protector
5	IWE-PET-0147	Transformer, 208/230/460V
	IWE-PET-0148	Transformer, 575V
6		Starter
7	IWE-PET-0134	Fuse Holder
8	IWE-H3CRA8	Timer
	IWE-P2CF08	Base For Timer
9	IWE-553290	Relay with Indicator
	IWE-94841	Relay Base
	IWE-09471	Relay Retaining Spring
10	IWE-O14B3HH1	On/Off Switch
11	IWE-PEB001	Auto/Manual Switch
	IWE-PEN-4	
12	IWE-EPE4	Door Lock
13	IWE-PEB-002	Normal/Jog Switch
	IWE-PEN-5	
14	IWE-PEB-003	Pump On Switch
	IWE-PEN-2	
15	IWE-PEB0-004	Pump Off Switch
	IWE-PEN-3	
16	IWE-PEB-005	Shear/Notch Switch
	IWE-PEN-6	
Not Shown	IWE-PEB-006	E- Stop Switch
	IWE-PEN-1	E Stop Nameplate
	IWE-PEA-1	Plastic Enclosure

All Models



**Model IW88D and IW88DX**

Key	Part No.	Description [Qty if more than 1]
1	IWM-3202023	Reservoir
2	PHE-0014	Breather-Filter
3	PHG-0013	Oil Level Gauge
4	PEM-0105	Electrical Motor IEC 10 HP
5	PHP-0038	Coupling
6	PHP-0037	Pump
7		M10x25 Soc Hd Cap Scr (2)
8		M10 Lock Washer (2)
9	PHE-0017	Strainer
10	IWM-1303008	Gasket
11		M8x25 Hex Hd Cap Scr (10)
12		M8 Lock Washer (10)
13	PHV-0145	Control Valve (2)
14	PHV-0147	Valve
15	PHV-0146	Control Valve
16		M5x40 Soc Hd Cap Scr (16)
17	PHG-0014	Gauge Shut Off Valve
18	PHG-0012	Pressure Gauge
19	PHV-0144	Relief Valve
20	IWM-2203016	Manifold
21	PHH-81000	1/2 x 1000 Hydraulic Hose
22	PHH-82320 (88D)	1/2 x 2320 Hydraulic Hose

# HYDRAULIC SYSTEM

# SPARTAN IRONWORKER

	PHH-82460 (88DX)	1/2 x 2460 Hydraulic Hose
23	PHH-82250 (88D)	1/2 x 2250 Hydraulic Hose
	PHH-82400 (88DX)	1/2 x 2400 Hydraulic Hose
24	PHH-811550 (88D)	1/2 x 1550 Hydraulic Hose
	PHH-81710 (88DX)	1/2 x 1710 Hydraulic Hose
25	PHH-81730 (88D)	1/2 x 1730 Hydraulic Hose
	PHH-81820 (88DX)	1/2 x 1820 Hydraulic Hose

## Model IW110D/2 and IW110DX/2

Key	Part No.	Description [Qty if more than 1]
1	IWM-3402020	Reservoir
2	PHE-0014	Breather-Filter
3	PHG-0013	Oil Level Gauge
4	PEM-0105	Electrical Motor IEC 10 HP
5	PHP-0038	Coupling
6	PHP-0037	Pump
7		M10x25 Soc Hd Cap Scr (2)
8		M10 Lock Washer (2)
9	PHE-0017	Strainer
10	IWM-1303008	Gasket
11		M8x25 Hex Hd Cap Scr (10)
12		M8 Lock Washer (10)
13	PHV-0145	Control Valve (2)
14	PHV-0147	Valve
15	PHV-0146	Control Valve
16		M5x40 Soc Hd Cap Scr (16)
17	PHG-0014	Gauge Shut Off Valve
18	PHG-0012	Pressure Gauge
19	PHV-0144	Relief Valve
20	IWM-2203016	Manifold
21	PHH-81000	1/2 x 1000 Hydraulic Hose
22	PHH-82600 (110D)	1/2 x 2600 Hydraulic Hose
	PHH-82900 (110DX)	1/2 x 2900 Hydraulic Hose
23	PHH-82560 (110D)	1/2 x 2560 Hydraulic Hose
	PHH-82900 (110DX)	1/2 x 2900 Hydraulic Hose
24	PHH-811680 (110D)	1/2 x 1680 Hydraulic Hose
	PHH-81900(110DX)	1/2 x 1900 Hydraulic Hose
25	PHH-81880 (110D)	1/2 x 1880 Hydraulic Hose
	PHH-82100 (110DX)	1/2 x 2100 Hydraulic Hose

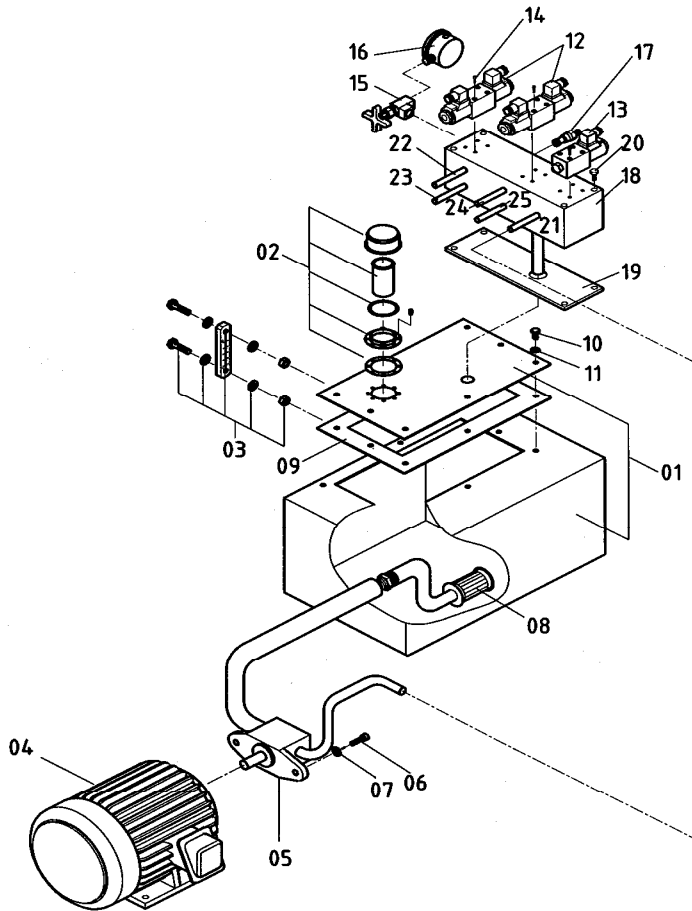
## Model IW135D and IW135DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-3602025	Reservoir
2	PHE-0014	Breather-Filter
3	PHG-0013	Oil Level Gauge
4	PEM-0106	Electrical Motor IEC 15 HP
5	PHP-0144	Coupling
6	PHP-0041	Pump
7		M10x25 Soc Hd Cap Scr (2)
8		M10 Lock Washer (2)

9	PHE-0021	Strainer
10	IWM-1303008	Gasket
11		M8x25 Hex Hd Cap Scr (10)
12		M8 Lock Washer (10)
13	PHV-0145	Control Valve (2)
14	PHV-0147	Valve
15	PHV-0146	Control Valve
16		M5x40 Soc Hd Cap Scr (16)
17	PHG-0014	Gauge Shut Off Valve
18	PHG-0012	Pressure Gauge
19	PHV-0144	Relief Valve
20	IWM-2203016	Manifold
21	PHH-81000	1/2 x 1000 Hydraulic Hose
22	PHH-82590 (135D)	1/2 x 2590 Hydraulic Hose
	PHH-82600 (135DX)	1/2 x 2600 Hydraulic Hose
23	PHH-82510 (135D)	1/2 x 2510 Hydraulic Hose
	PHH-82470 (135DX)	1/2 x 2470 Hydraulic Hose
24	PHH-121670 (135D)	3/4 x 1670 Hydraulic Hose
	PHH-121820(135DX)	3/4 x 1820 Hydraulic Hose
25	PHH-121880 (135D)	3/4 x 1880 Hydraulic Hose
	PHH-121640 (135DX)	3/4 x 1640 Hydraulic Hose

## Model IW180DX

Key	Part No.	Description [Qty if more than 1]
1	IWM-3602025	Reservoir
2	PHE-0014	Breather-Filter
3	PHG-0013	Oil Level Gauge
4	PEM-0108	Electrical Motor IEC 20 HP
5	PHP-0145	Coupling
6	PHP-0046	Pump
7		M10x25 Soc Hd Cap Scr (2)
8		M10 Lock Washer (2)
9	PHE-0023	Strainer
10	IWM-1303008	Gasket
11		M8x25 Hex Hd Cap Scr (10)
12		M8 Lock Washer (10)
13	PHV-0145	Control Valve (2)
14	PHV-0147	Valve
15	PHV-0146	Control Valve
16		M5x40 Soc Hd Cap Scr (16)
17	PHG-0014	Gauge Shut Off Valve
18	PHG-0012	Pressure Gauge
19	PHV-0144	Relief Valve
20	IWM-2203016	Manifold
21	PHH-81000	1/2 x 1000 Hydraulic Hose
22	PHH-83440	1/2 x 3440 Hydraulic Hose
23	PHH-83290	1/2 x 3290 Hydraulic Hose
24	PHH-121660	3/4 x 1660 Hydraulic Hose
25	PHH-121850	3/4 x 1850 Hydraulic Hose



**Model IW66D, IW66DX**

Key	Part No.	Description [Qty if more than 1]			
1	IWM-3002024	Reservoir	15	PHG-0014	Gauge Shut Off Valve
2	PHE-0014	Breather-Filter	16	PHG-0012	Pressure Gauge
3	PHG-0013	Oil Level Gauge	17	PHV-0144	Relief Valve
4	PEM-0104	Electrical Motor IEC 7-1/2 HP	18	IWM-3003014	Manifold
	IWE-MT051PH	Electrical Motor 5 HP 1 Phase	19	IWM-3003015	Seal
5	PHP-0143	Pump	20		M8x90 Soc Hd Cap Scr (4)
6		M10x25 Soc Hd Cap Scr (2)	21	PHH-8850 (66D)	1/2 x 850 Hydraulic Hose
7		M10 Lock Washer (2)	21	PHH-8890 (66DX)	1/2 x 890 Hydraulic Hose
8	PHE-0017	Strainer	22	PHH-81270 (66D)	1/2 x 1270 Hydraulic Hose
9	IWM-1303008	Gasket	22	PHH-81490 (66DX)	1/2 x 1490 Hydraulic Hose
10		M8x25 Hex Hd Cap Scr (10)	23	PHH-81180 (66D)	1/2 x 1180 Hydraulic Hose
11		M8 Lock Washer (10)	23	PHH-81300 (66DX)	1/2 x 1300 Hydraulic Hose
12	PHV-0145	Control Valve (2)	24	PHH-81820 (66D)	1/2 x 1820 Hydraulic Hose
14		M5x40 Soc Hd Cap Scr (12)	24	PHH-81920 (66DX)	1/2 x 1920 Hydraulic Hose
13	PHV-0146	Control Valve	25	PHH-81900 (66D)	1/2 x 1900 Hydraulic Hose
			25	PHH-82080 (66DX)	1/2 x 2080 Hydraulic Hose