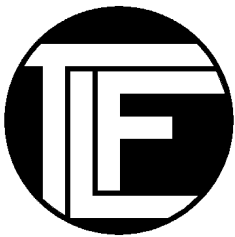


# **T. L. FAHRINGER CO.**

## **FW-200 HPA**

### **FLASH-BUTT WELDER**

### **OWNER'S MANUAL**



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**IMPORTANT:**

**PLEASE READ AND UNDERSTAND THIS ENTIRE MANUAL BEFORE OPERATING THIS MACHINE. PERFORMING IMPROPER PROCEDURES MAY VOID THE WARRANTY ON THIS MACHINE AND COULD CAUSE SERIOUS INJURY TO THE OPERATOR.**

# TABLE OF CONTENTS

## **Section 1: Installation**

Items Required for Installation .....	1-1
Items Required for Operation .....	1-1
Insallation Procedures .....	1-2

## **Section 2: Operating Instructions**

Diagram of Welder .....	2-1
Explanations of Controls .....	2-2
<b>General Setup</b> .....	2-5
Setup Mode .....	2-5
Jaw Gap Distance Indicator Calibration .....	2-5
Cam Positioning .....	2-5
Timing Calibration .....	2-6
Clamping Pressure Distribution Adjustment .....	2-6
Blade Guide Alignment, Back Edge .....	2-7
Blade Guide Alignment, Tooth Edge .....	2-7
Forge Pressure Switch Calibration .....	2-8
Weld Setup .....	2-9
Manual Welding Procedure .....	2-9
Anneal Setup .....	2-10
Manual Annealing Procedure .....	2-10
Obtaining New Anneal Settings .....	2-11
Automatic Welding and Annealing Procedure .....	2-11
Settings Chart .....	2-12

## **Section 3: Maintenance**

Care and Maintenance of Welding Jaws .....	3-1
Reconditioning Welding Jaws .....	3-1
Periodic Maintenance .....	3-1
Removing Clamps, Lower Jaws & Guide Rails .....	3-3
Installing Clamps, Lower Jaws & Guide Rails .....	3-4

## **Section 1**

# **INSTALLATION**

## **ITEMS REQUIRED FOR INSTALLATION**

- Screwgun with #2 phillips attachment or #2 phillips screwdriver
- #1 phillips screwdriver
- Flat blade screwdriver, medium
- Allen wrench set, 1/16" - 3/8"
- Crescent wrench
- Fork-lift or Pallet jack
- Main Power requirements (CHECK MACHINE LABELS FOR PROPER OPERATING VOLTAGE)
  - 220 VAC or 440 VAC, □1
  - Minimum 80-amps (recommend 100-amps) @ 220 VAC
  - Minimum 40-amps (recommend 50-amps) @ 440 VAC
  - Power must be supplied through a minimum 80-amp breaker and power cord of suitable size and length (See Installation Procedures)
- 115 VAC Power, supplied via a standard extension cord, for the auto-switching outlet
- 100-psi air supply and air hose with standard female quick disconnect fitting
- Oil (30 weight or heavier)
- Water-cooling pump to accept 1/4" I.D. water-cooling hose and tank to hold at least 15 U.S. gallons of water (i.e. LITTLE GIANT model: 2E-N pump)
- Dial or digital calipers, 4" - 6"

## **ITEMS REQUIRED FOR OPERATING THE FW-200 HSA**

- 3/16" T-handle allen wrench at least 3" long
- Ratchet wrench with 7/16" socket
- Flat blade screwdriver, medium
- #1 phillips screwdriver
- 5/16" box wrench
- 11/32" box wrench
- 24" steel straightedge 1/16"-1/8" thick
- Allen wrench set, 1/16" - 3/8"
- SILICONE FREE Welding anti-spatter spray (Recommend: WELD AID PRODUCTS Nozzle-Kleen #2)
- Cloth rags
- Fine Grit surfacing stone, 2" wide x 6" long (Recommend: NORTON #IB6 Sharpening Stone)
- Dial or digital calipers, 4" - 6"
- Compressed air hose with nozzle

## **CAUTION:**

**ALL ELECTRICAL HOOK-UPS SHOULD BE PERFORMED BY A QUALIFIED ELECTRICAL TECHNICIAN AND COMPLY WITH ALL OSHA REGULATIONS.**

## **INSTALLATION PROCEDURES**

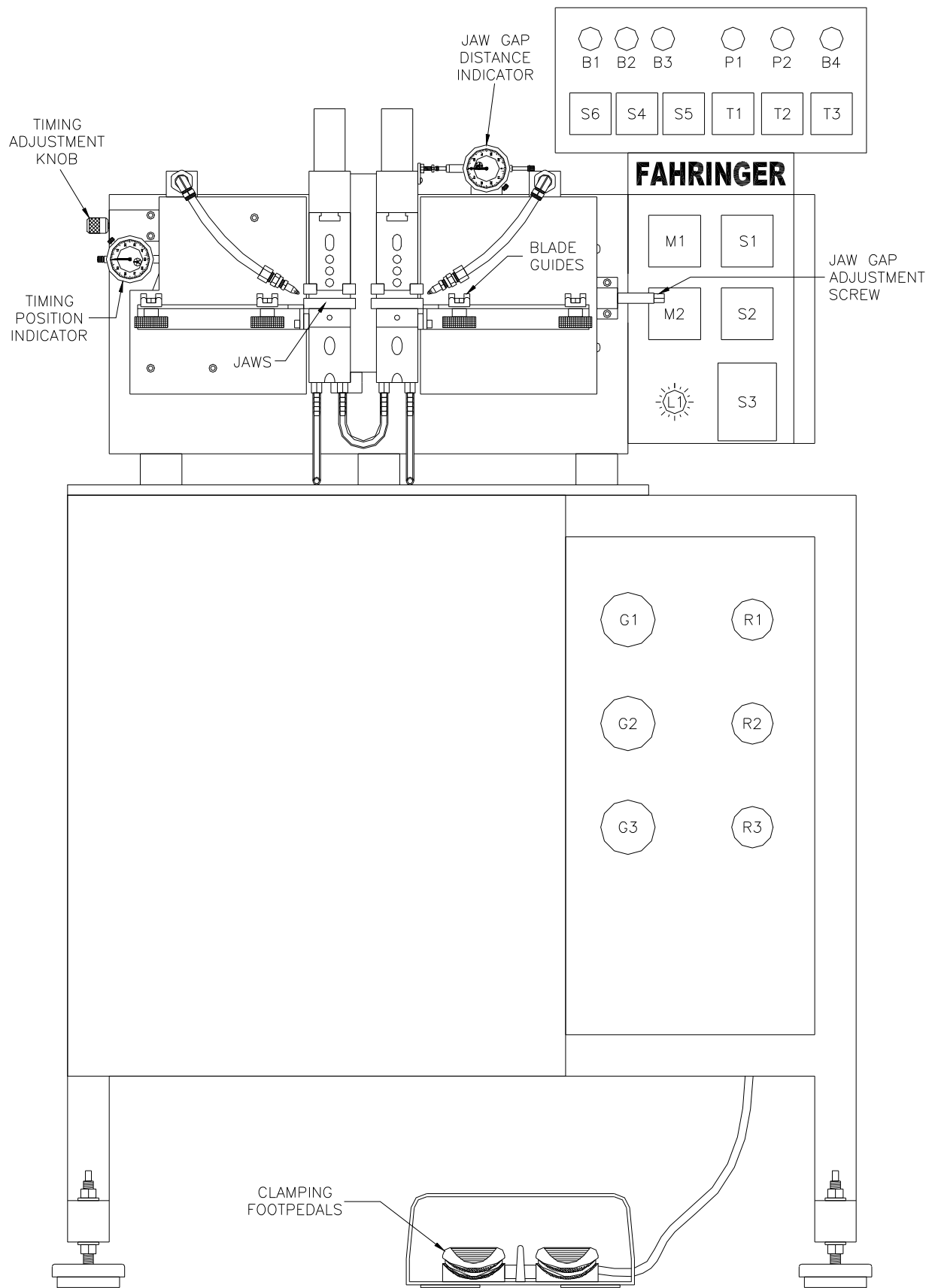
- 1) Open the welder crate.
  - a) Remove the screws around the bottom of the box.
  - b) Remove the front panel from the crate.
  - c) Carefully slide the crate off toward the rear of the welder.
- 2) Remove the clamping footpedals from their mounted position on the pallet and place them temporarily inside the welder stand.
- 3) Remove the four mount bolts holding the welder to the pallet.
- 4) Lift the welder off the pallet with a forklift or other suitable means.
- 5) If desired, mount the stand feet (located in a box inside the welder stand) into the holes from which the pallet mount bolts were removed.
- 6) Place the welder in the desired position on floor.
- 7) Power must be supplied through a minimum 80-amp breaker. Use the following guidelines to determine the size and length of the power cord.
  - At least 8 gauge at no more than 100 feet in length from breaker
  - At least 6 gauge at no more than 150 feet in length from breaker
  - At least 4 gauge at no more than 200 feet in length from breaker
  - At least 2 gauge at no more than 250 feet in length from breaker

**DANGER: ALWAYS TURN ALL POWER TO THE MACHINE OFF AT THE BREAKER BEFORE OPENING THE LOWER CONTROL BOX. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH!**

- 8) **Turn power to the machine off at the breaker.** Open the door to the lower control box, located on the right side of the welder, and install the main power cord through the hole in the back of the box. Attach the black & white L1 & L2 wires to the MAIN POWER block at the inputs where the black power wires are already attached (the order does not matter).
- 9) Attach the green Ground wire to MAIN POWER block at the input where the green ground wires are already attached.
- 10) If desired, plug the female end of an extension cord to the male receptacle attached to the auto-switching outlet on the back of the welder, and plug the other end of the extension cord into a standard 115 VAC powered outlet. The auto-switching outlet will then turn on and off in sync with the welder in order to power a water cooling pump, or other device, only when the welder is turned on.
- 11) Turn power to the machine on and check the voltage either with a voltmeter at the MAIN POWER block or by turning the machine on and reading the voltage on the LINE VOLTAGE METER located on the front of the lower control box.
- 12) Set the LINE VOLTAGE SWITCH to the position closest to your measured power voltage.
- 13) **Close and lock the door to the lower control box.**
- 14) Plug an air hose onto the air fitting located at the rear of the machine and set the main regulator for between 80 and 100-psi.
- 15) Remove the left front cover from the machine and fill the oil cup, located under the cam, with oil. (Any oil 30 weight or heavier)
- 16) Check the GENERAL SETUP of the machine for any maladjustment that may have occurred during shipment; timing calibration, blade guide alignment, jaw gap distance indicator calibration, etc. (See GENERAL SETUP)
- 17) Hook up one of the water-cooling hoses to a submersible water pump, the hoses are 1/4" I.D., and place the pump in a water tank (minimum 15 gallons). Run the other hose into the water tank to act as a return line.
- 18) Plug the water pump into the auto-switching outlet on the back of the welder, or other power source, and ensure the water cooling system is operating.
- 19) Before running the welder make sure to replace all covers. **NEVER WELD WITHOUT ALL COVERS IN PLACE.**

## Section 2

# OPERATING INSTRUCTIONS



## EXPLANATIONS OF CONTROLS

### B1 - WELD BUTTON

Weld Cycle Start

Button is enabled when its green light is on and both clamps are down.

In Manual or Weld Only mode the green light comes on when the welder is at weld start, and remains on during a weld cycle.

In Auto mode the green light comes on when the welder is calibrated and at weld start, and remains on during the auto cycle.

### B2 - ADVANCE BUTTON

Advances the welder to the next available position; Calibrates Machine in Auto mode

Button is enabled when its yellow light is on and both clamps are up.

### B3 - ANNEAL BUTTON

Anneal Cycle Start/Stop; Alarm Reset

Button is enabled when its red light is on and both clamps are down.

The red light comes on at the anneal position, and remains on during an anneal cycle.

### B4 - AIR BLOW-OFF BUTTON

Manually activates the air blow-off system.

### P1 - ANNEAL HEAT 1 KNOB

Adjusts the anneal heat for the Ramp Stage.

Heat Range = 100 - 999

100 = 0 volts

999 = Max. Weld Voltage as set by the WELD VOLTAGE SWITCH

### P2 - ANNEAL HEAT 2 KNOB

Adjusts the anneal heat for the Soak Stage.

Heat Range = 100 - 999

100 = 0 volts

999 = Max. Weld Voltage as set by the WELD VOLTAGE SWITCH

### T1 - ANNEAL TIMER 1

Sets the amount of time Anneal Heat 1 is applied for the Ramp Stage.

Set the time by pressing the button below the display that corresponds with the position of the number you want to change.

### T2 - ANNEAL TIMER 2

Sets the amount of time Anneal Heat 2 is applied for the Soak Stage.

Set the time by pressing the button below the display that corresponds with the position of the number you want to change.

### T3 - DELAY TIME

Sets the amount of time cool down time before the air blow off activates after a blade has been welded in the auto mode.

Set the time by pressing the button below the display that corresponds with the position of the number you want to change.

### S1 - WELD VOLTAGE SWITCH

Sets the maximum voltage for welding and/or annealing.

0 = Off

1 = 3.0 volts

2 = 3.6 volts

3 = 4.2 volts

4 = 4.8 volts

5 = 5.4 volts

6 = 6.0 volts

### S2 - LINE VOLTAGE SWITCH

Compensates for high or low power voltage.

Select the setting that is closest to, but not below, the incoming voltage level powering the machine.

### S3 - MAIN SWITCH

Turns the main power to the machine ON or OFF.

### S4 - MODE SWITCH

Sets the operating mode of the welder

AUTO - Welds, then automatically re-centers the blade and moves to the anneal position, anneals, and moves back to weld start.

Advancing is disabled unless the welder is not calibrated or is not at weld start.

When enabled, advancing moves to weld start, then becomes disabled.

MANUAL - Welding and annealing are done manually as separate cycles.

Advancing stops at all positions: 1) Weld Start, 2) Weld Stop, 3) Anneal

WELD ONLY - Only welding can be done in this mode.

Advancing bypasses the anneal position and stops only at weld start and weld stop.

### S5 - FLASHING SPEED SWITCH

Sets the rate at which the blade-ends are fed together during welding. **1** is Slowest; **6** is Fastest; **0** is Off

### S6 - CLAMPING MODE SWITCH

SINGLE - Each footpedal activates its corresponding clamp separately

DUAL - Either footpedal will activate both clamps simultaneously

### M1 - WELD VOLTAGE METER

Indicates the output voltage level at the jaws.

### M2 - LINE VOLTAGE METER

Indicates the voltage level powering the machine.

### L1 - POWER LIGHT

Indicates the main power is turned ON.

### R1 - FORGE PRESSURE REGULATOR

Adjusts the amount of pressure applied to the sliding carriage assembly during forging.

CW - Adjusts the pressure higher

CCW - Adjusts the pressure lower

### R2 - FOLLOWING PRESSURE REGULATOR

Adjusts the amount of pressure applied to the sliding carriage assembly while advancing or during flashing.

### R3 - CLAMPING PRESSURE REGULATOR

Adjusts the clamping pressure.

### G1 - FORGE PRESSURE GAUGE

Indicates the forging pressure set by the Forge Pressure Regulator.

### G2 - FOLLOWING PRESSURE GAUGE

Indicates the following pressure set by the Following Pressure Regulator.

### G3 - CLAMPING PRESSURE GAUGE

Indicates the clamping pressure set by the Clamping Pressure Regulator.

### CLAMPING FOOTPEDALS

Toggle clamps Up and DOWN.

### JAW GAP ADJUSTMENT SCREW

Adjusts the distance between the jaws.

CW - Adjusts the jaw gap larger

CCW - Adjusts the jaw gap smaller

### JAW GAP DISTANCE INDICATOR

Indicates the current distance between the jaws.

### TIMING ADJUSTMENT KNOB

Adjusts the moment of weld current cut-off.

CW - Adjusts weld current cut-off sooner

CCW - Adjusts weld current cut-off later

### TIMING POSITION INDICATOR

Indicates the current position of weld current cut-off.

### JAWS

Clamp the blade to be welded or annealed between the upper and lower jaws.

### BLADE GUIDES

Guides to align the blade horizontally.

Guides to align either the back edge or tooth edge of the blade are available.

Positions 1-4 on the tooth edge guides are for smaller to larger tooth sizes, respectively.

## GENERAL SETUP

This section describes how to perform the general setup of the welder. These procedures have already been performed at the factory prior to shipment. However, during shipment these settings are often knocked out of adjustment; therefore, it is recommended that, once installed, the machine be setup again prior to use.

### SETUP MODE

It is necessary to enter into a special "SETUP" mode for some operations. The following describes the procedure for entering setup, and how to operate the machine while in setup.

#### TO ENTER SETUP:

- 1) Select **MANUAL** on the mode switch.
- 2) With both clamps in the **UP** position, press the **ADVANCE BUTTON** until the machine arrives at the **ANNEAL** position, signified by the red light. (At this point the yellow and red lights should both be on.)
- 3) Press and hold the **WELD BUTTON**, then press the **ADVANCE BUTTON** while holding the weld button. All three lights, green, yellow and red, should come on. This indicates the machine is in setup mode.

#### TO EXIT SETUP:

Just press the **ANNEAL BUTTON** at any time.

#### WHILE IN SETUP:

- The **WELD BUTTON** acts as a toggle **ON/OFF** for the cam motor.
- The **ADVANCE BUTTON** acts as a jog for the cam motor.
- The cam motor speed is set at the rapid feed rate when the mode switch is set to **WELD ONLY**.
- The cam motor speed is set by the **FLASHING SPEED SWITCH** when the mode switch is set to **NORMAL**.
- Clamping is disabled.

### JAW GAP DISTANCE INDICATOR CALIBRATION

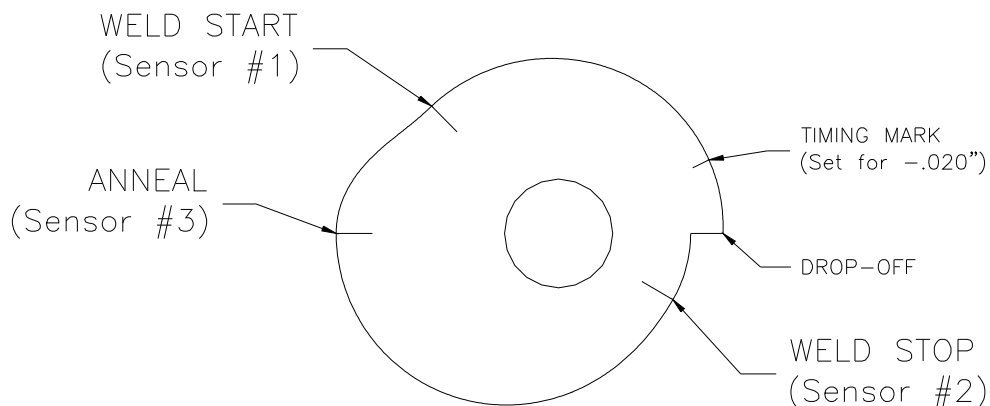
The jaw gap indicator should be checked periodically, every time the lower jaws are removed, or if weld quality seems to decline. An accurate jaw gap is essential to good weld quality.

- 1) Measure the gap between the lower jaws with a pair of calipers.
- 2) Adjust the jaw gap distance indicator adjustment screw until the indicator reads the same as the current jaw gap.

### CAM POSITIONING

Positioning of the cam relative to its four position points is adjusted via the four positioning discs attached to the camshaft behind the front plate of the welder. This procedure only needs to be performed if the cam does not stop at its correct positions.

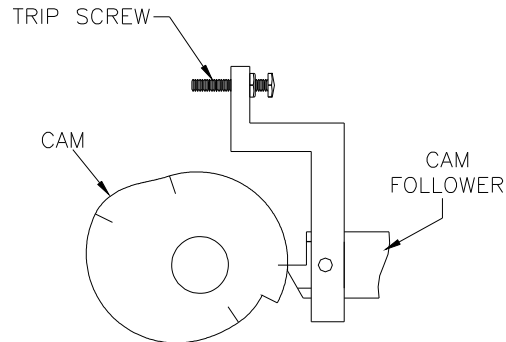
**THIS PROCEDURE SHOULD ONLY BE PERFORMED WITH THE ASSISTANCE OF AN AUTHORIZED  
T. L. FAHRINGER CO. SERVICE TECHNICIAN!**



## TIMING CALIBRATION

The timing calibration should be checked periodically to ensure accuracy.

- 1) Remove the left cover from the front of the machine.
- 2) Enter into the SETUP mode.
- 3) Set the timing for around 0.100".
- 4) JOG the motor until the cam follower is lined up with the cam's timing mark (See Diagram).
- 5) Turn the timing adjustment knob CW until a ½-second beep is heard. The beep should occur just when the timing position indicator needle passes -0.020".
- 6) Adjust the trip position, if necessary, by turning the trip screw. CW causes the timing to trip sooner; CCW causes the timing to trip later.
- 7) Recheck the calibration by turning the timing adjustment knob CCW at least 0.010", more if necessary, to reset the switch, then repeat from step 5.

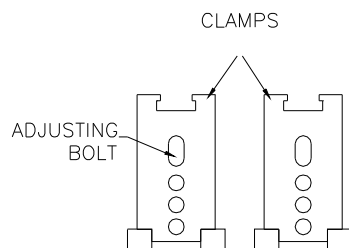


## CLAMPING PRESSURE DISTRIBUTION ADJUSTMENT

For reliable weld results the clamping pressure must be uniformly distributed across the blade. To check the clamping pressure a carbon paper impression can be utilized. Insert a length of blade of the desired size into the welder. Place a piece of white paper on top of the blade, then a piece of carbon paper on top of the white paper with the carbon side down, and clamp in place. Unclamp the clamps and look at the impressions of the jaws on the white paper. They should be an even color from front to back. This denotes even clamping pressure. If the impressions are not even, the points of darkest color and greatest width indicate the areas of heavier clamping pressure. Follow the procedure below to adjust how the clamping pressure is distributed.

**PLEASE NOTE:** It is normal for the upper jaw impressions of each clamp to fade toward the middle. This happens because the upper jaws sit at angle in the clamps to force the clamping pressure to the outside edges.

- 1) Unclamp both clamps.
- 2) Turn the Adjusting Bolt (see diagram) in the desired direction. CW adjusts the pressure toward the back. CCW adjusts the pressure toward the front. (Adjustments in 1/32-1/16 turn increments are recommended. Adjusting too far in or out could cause the clamp to stick or the slide to crack.)
- 3) Repeat step 2, if necessary, for the remaining clamp.
- 4) Recheck the clamping pressure with carbon paper.
- 5) Repeat the procedure if necessary.



Once the clamping pressure is set properly using carbon paper, the clamps can be adjusted for different blade sizes by looking at the anneal heat pattern produced during annealing. If the anneal pattern is uneven, adjust both clamps evenly to compensate. Be sure to adjust both clamps by the same amount. If the clamps get out of sync they will need to be reset with a carbon paper check.

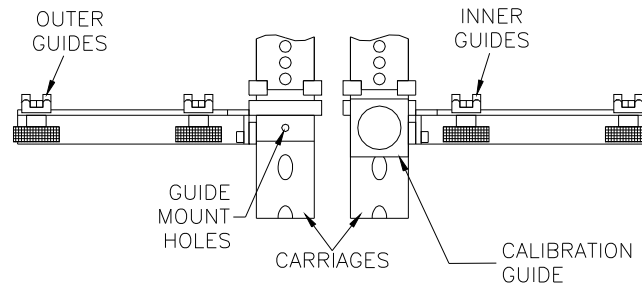
## BLADE GUIDE ALIGNMENT

There are two types of alignment systems available for the FW-200 welder, Back Edge and Tooth Edge. The Tooth Edge system can be obstructive when loading and unloading blades and is more difficult to calibrate than the Back Edge system, but once calibrated the guides are simply rotated from one setting to the next for different width blades. The Back Edge system does not obstruct loading and unloading and is much easier to re-calibrate, but requires re-calibrating whenever changing blade widths.

**NOTE:** All blade-stock has a curve in the back edge known as “camber”. If the camber is too severe, using Back Edge guides that are setup straight may cause blade misalignment. However, this is not a problem for most material.

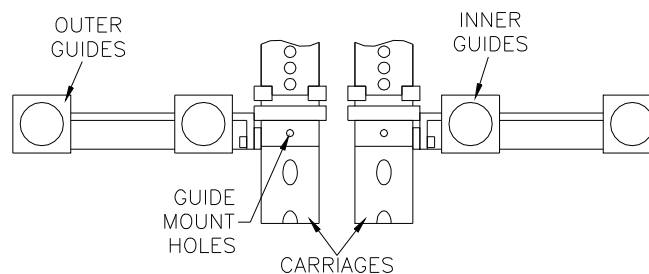
### BACK EDGE GUIDE CALIBRATION

- 1) Mount the calibration guides to the front of the carriages, making sure the mating surfaces are clean and smooth, and rotate them to a setting sufficient for the desired blade’s tooth size. (Note: Make sure the front of the lower jaws do not interfere with the calibration guides as this will cause them to not sit flush against the front of the carriage.)
- 2) Loosen all four guides and slide them all the way to the back.
- 3) Insert a blade of the desired size into the jaws, pull it against the calibration guides, and clamp it in place.
- 4) Slide the two inside guides against the back of the blade and tighten them in place.
- 5) Remove the calibration guides and the blade from the machine and set them aside.
- 6) Insert a 1/16”-1/8” thick x 24” long steel straightedge into the jaws, push it against the inside guides, and clamp it in place.
- 7) Pull the outside guides against the straightedge and tighten them in place.
- 8) Unclamp and remove the straightedge from the machine.



### TOOTH EDGE GUIDE CALIBRATION

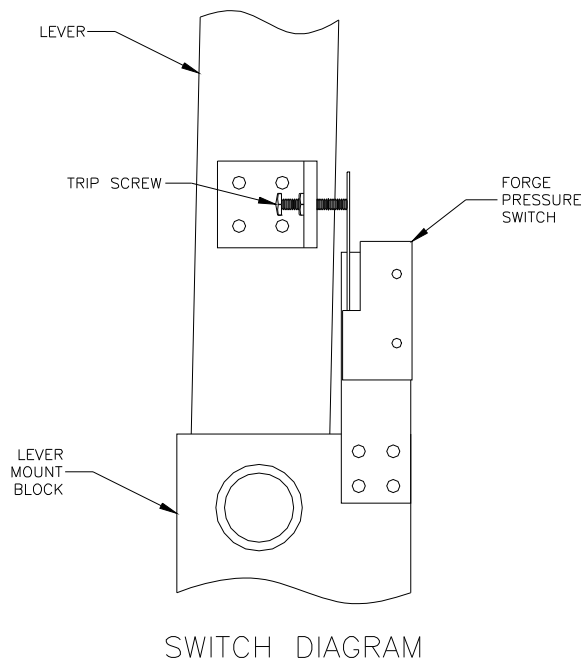
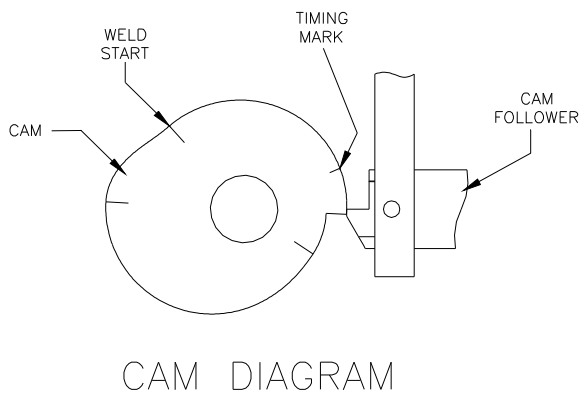
- 1) Mount the inner guides to the front of the carriages, making sure the mating surfaces are clean and smooth, and rotate them to setting #4. (Note: Make sure the front of the lower jaws do not interfere with the blade guides as this will cause them to not sit flush against the front of the carriage.)
- 2) Rotate the outer guides to setting #4.
- 3) Load a 1/16”-1/8” thick x 24” long steel straight-edge into the jaws, pull it against the INNER guides mounted to the front of the carriages, and clamp it in place.
- 4) The straightedge should be touching all four guides, and be able to be raised and lowered without hanging on the top of the outer guides. (Proceed to step 10 if the outer guides are aligned.)
- 5) Loosen the mount screw on the bottom of the guide mount to be adjusted.
- 6) Slide the guide mount so that the blade guide is touching the straightedge.
- 7) Tighten the mount screw and recheck the alignment of the blade guide as described in step 4.
- 8) Repeat steps 5-7, if necessary, until alignment is achieved.
- 9) Repeat steps 5-8, if necessary, for the remaining outer guide.
- 10) Unclamp the straightedge, remove the inner guides from the carriages and mount them to the inner guide mounts, then rotate them to setting #4.
- 11) Load the straightedge into the jaws, pull it against the OUTER guides, and clamp it in place.
- 12) The straightedge should be touching all four guides. (Proceed to step 15 if the inner guides are aligned.)
- 13) Perform steps 5-8.
- 14) Repeat step 13, if necessary, for the remaining inner guide.
- 15) Unclamp and remove the straightedge from the jaws.



## FORGE PRESSURE SWITCH CALIBRATION

The forge pressure switch calibration should be checked periodically to ensure accuracy. The forge pressure switch and trip screw are located on the lever mount block and lever respectively, and are accessed by removing machine's the top cover.

- 1) Remove the left cover from the front of the machine.
- 2) Enter into the SETUP mode.
- 3) Set the timing for around 0.150".
- 4) JOG the cam from weld start until the cam follower is lined up with the cam's timing mark.
  - a) If the machine beeps during step 4 then the forge pressure switch calibration is very early. Proceed to step 7.
  - b) Otherwise proceed to step 5.
- 5) JOG the cam SLOWLY, by quickly tapping the ADVANCE button, from the timing mark toward the drop-off until the machine beeps, then stop immediately.
- 6) The cam follower should be lined up with the cam about 1/16" above the drop-off right when the machine beeps.  
(See Cam Diagram)
  - a) If the forge pressure is calibrated, proceed to step 10.
  - b) Otherwise proceed to step 7.
- 7) Remove the top cover from the machine, if it is not already.
- 8) Adjust the trip position, if necessary, by turning the trip screw.
  - a) CW causes the forge pressure to trip sooner.
  - b) CCW causes the forge pressure to trip later.
- 9) Recheck the calibration from step 4.
- 10) Make sure the trip screw lock nut is tight. If it is not, tighten it, then recheck the calibration from step 4.
- 11) Replace the top cover on the machine.
- 12) Replace the left cover on the front of machine.
- 13) Exit out of SETUP mode.
- 14) The forge pressure switch is now calibrated.



## WELD SETUP

These procedures are performed whenever there is a change of the blade size and/or type being welded. Some suggested settings are listed in the settings chart of this manual (See "SETTINGS"). **NOTE:** The suggested settings are only baseline settings and may need to be changed to meet the user's specific requirements and/or shop conditions.

### SET JAW GAP

- 1) Advance to the WELD START position, indicated by the green light.
- 2) Turn the JAW GAP ADJUSTMENT SCREW in the desired direction.
- 3) If in Auto mode a 1/2-second beep will be heard to signify the machine needs to be recalibrated; Press the ADVANCE BUTTON to recalibrate the machine.

**CAUTION: NEVER TURN THE JAW GAP ADJUSTMENT SCREW WHILE THE CAM IS TURNING!**

### SET TIMING

Turn the TIMING ADJUSTMENT KNOB in the desired direction.

### SELECT WELD VOLTAGE

Set the WELD VOLTAGE SWITCH to a position 1-6.

### SET FORGE PRESSURE

Turn the FORGE PRESSURE REGULATOR to the desired setting.

### SET FOLLOWING PRESSURE

Turn the FOLLOWING PRESSURE REGULATOR to the desired setting.

### SELECT FLASHING SPEED

Set the FLASHING SPEED SWITCH to a position 1-6.

### SET BLADE GUIDES

Adjust the BLADE GUIDES to accommodate the blade's tooth size.

### ADJUST CLAMPING PRESSURE DISTRIBUTION

Check the clamping pressure distribution and adjust if necessary.

## MANUAL WELDING PROCEDURE

- 1) Select MANUAL or WELD ONLY mode.
- 2) Setup for the desired blade size.  
(See "WELD SETUP")
- 3) Select the desired clamping mode.
- 4) Advance to the weld start position.
  - a) Both clamps must be UP.
  - b) Press the ADVANCE BUTTON until the green weld light comes on.
- 5) Load the blade.
  - a) With both clamps UP, insert the blade-ends into the jaws with the teeth facing the operator.
  - b) The blade should be against all four blade guides.
  - c) Butt the blade-ends together leaving about a 0.010" - 0.020" gap between them and center the blade joint between the jaws.
  - d) Clamp the blade-ends in place making sure they are not overlapping, and the blade is against all four guides.
- 6) Press the WELD BUTTON to start the weld cycle.
  - a) Both clamps must be DOWN.
- 7) Unclamp & remove the blade when the weld cycle is finished.
  - a) The weld cycle is finished when the green weld light goes out and the yellow advance light comes on.

## ANNEAL SETUP

### SET JAW GAP

This is set at the Weld Start position and is the same setting used for welding the blade. (See WELD SETUP)

### SELECT WELD VOLTAGE SETTING

Use the same setting used for welding the blade. (See WELD SETUP)

### SET ANNEAL TIME 1

Type the desired Ramp Up time for the anneal cycle into ANNEAL TIMER 1.

### SET ANNEAL HEAT 1

Turn the ANNEAL HEAT 1 Knob to the desired Ramp Up setting.

### SET ANNEAL TIME 2

Type the desired Soak time for the anneal cycle into ANNEAL TIMER 2.

### SET ANNEAL HEAT 2

Turn the ANNEAL HEAT 2 Knob to the desired Soak setting.

### SET BLADE GUIDES

Adjust the BLADE GUIDES to accommodate the blade's tooth size.

### ADJUST CLAMPING PRESSURE DISTRIBUTION

Check the clamping pressure distribution and adjust if necessary.

## MANUAL ANNEALING PROCEDURE

- 1) Set the mode switch to MANUAL.
- 2) Setup for the desired blade size.  
(See “ANNEAL SETUP”)
- 3) Advance to the ANNEAL position.
  - a) Both clamps must be UP.
  - b) Press the ADVANCE BUTTON until the red anneal light comes on.
- 4) Load a welded blade.
  - a) With both clamps UP, insert the blade with the weld-burr between the jaws and the teeth facing the operator.
  - b) Position the blade against all four guides.
  - c) Center the weld-burr between the jaws and clamp the blade in place.
- 5) Press the ANNEAL BUTTON to start the anneal cycle.
  - a) Both clamps must be DOWN.
- 6) Unclamp & remove the blade when the anneal cycle is finished.
  - a) The anneal cycle is finished when ANNEAL TIMER 2 reaches zero and the yellow advance light comes on.  
**NOTE:** The anneal cycle can be stopped early by pressing the ANNEAL BUTTON while the anneal cycle is running.

## OBTAINING NEW ANNEAL SETTINGS

- 1) Set ANNEAL TIME 1 for 0.1 seconds
- 2) Set ANNEAL TIME 2 for 900.0 seconds
- 3) Set both ANNEAL HEAT 1 & 2 for 200 – 250
- 4) Load a blade of the desired size and initiate an anneal cycle
- 5) Adjust ANNEAL HEAT 2 until the desired temperature is reached and holds steady
- 6) Set ANNEAL TIME 2 for the desired soak time (probably around 3 – 5 seconds)
- 7) Set ANNEAL TIME 1 for the desired ramp time (usually around 5 seconds)
- 8) Set ANNEAL HEAT 1 around 50-100 points higher than ANNEAL HEAT 2
- 9) Load a fresh blade and initiate another anneal cycle
- 10) If needed, adjust the settings accordingly and repeat from Step 9 until the desired ramp and soak effect is achieved

## **AUTOMATIC WELDING & ANNEALING PROCEDURE**

- 1) Select AUTO mode.
- 2) Setup for welding and annealing the desired blade size.  
(See “WELD SETUP” & “ANNEAL SETUP”)
- 3) Set the ANNEAL DELAY time.  
Type the time for the duration of the auto anneal delay into the ANNEAL DELAY TIMER.
- 4) Calibrate the machine, if necessary.
  - a) The welder is out of calibration if the green light does not come on and a ½-second beep sounds at the weld start position.
  - b) With both clamps UP, press the ADVANCE BUTTON to re-calibrate.
- 5) Select the desired clamping mode.
- 6) Adjust air blow-off hoses  
Adjust the air blow-off hoses so they are aimed at the center of the blade where it meets the outer jaws.
- 7) Advance to the weld start position.
  - a) Both clamps must be UP.
  - b) Press the ADVANCE BUTTON until the green weld light comes on.
- 8) Load the blade.
  - a) With both clamps UP, insert the blade-ends into the jaws with the teeth facing the operator.
  - b) The blade should be against all four blade guides.
  - c) Butt the blade-ends together leaving about a 0.010” - 0.020” gap between them and center the blade joint between the jaws.
  - d) Clamp the blade-ends in place making sure they are not overlapping, and the blade is against all four guides.
- 9) Press the WELD BUTTON to start the automatic weld cycle.
  - a) Both clamps must be DOWN.
- 10) Unclamp and remove the blade when the cycle is finished.
  - a) Automatic cycle is finished when both clamps release and the machine moves back to the weld start position after annealing.





## **Section 3**

# **MAINTENANCE**

## **CARE AND MAINTENANCE OF WELDING JAWS**

Since your welder uses low AC Voltage to weld with, it is critical to keep resistance levels at a minimum in order to maintain consistent weld quality. The lower jaws on your welder are made from a copper tungsten alloy, which provides conductivity at 48% of pure copper, and has better wear characteristics than pure copper. If the jaws were made of steel they would wear better, but the conductivity would only be about 18% of pure copper. The lower conductivity would produce a lower quality weld.

Other forms of resistance include:

- Dirt or weld flash embedded in the surface of the jaws.
- Worn or uneven jaw surface.
- Dirt, oil, or shims between jaw and carriage surface.
- Pitting of jaw surfaces.
- Jaws that have been flipped over.

**CAUTION: NEVER FLIP THE LOWER JAWS OVER** as this could cause serious damage to the carriages **and will void your warranty.**

## **RECONDITIONING WELDING JAWS**

When your jaws become worn, pitted, or embedded with foreign material they may be reconditioned by surface grinding.

Surface grinding will remove the worn part of the jaws while maintaining flatness, parallelism and a smooth finish. Both lower jaws must be ground together in order to maintain the same thickness and keep the welded blade properly aligned. A surface profilometer finish of 32 or better is acceptable. New jaws are 1/2" thick and can have up to 1/8" of material removed. Typically it is necessary to remove .005" - .010" of material to restore the finish on the welding side of the jaws. The bottom (beveled side) of the jaws also need to be surface ground to clean in order to maintain parallelism and to remove warping.

The upper steel jaws also need to be reground periodically, though not as often due to the better wear qualities of steel. These jaws must also be ground together for the same reasons as the lower jaws, but only need to be ground on the welding side.

## **PERIODIC MAINTENANCE**

### **AT THE BEGINNING OF THE DAY & EVERY TIME THE BLADE SIZE IS CHANGED**

- Clean the entire weld area thoroughly with a rag and cleaning agent, such as welding anti-spatter spray.
- Check the clamping pressure distribution and adjust if necessary.
- Apply welding anti-spatter spray liberally to the weld area between the carriages and wipe the jaw surfaces dry before welding. Reapply anti-spatter as necessary throughout the day.

### **AFTER EVERY WELD**

- Blow off the jaws with compressed air to remove any loose weld flash and dirt before clamping a blade.

### **EVERY 10 WELDS**

- Wipe the jaw surfaces with a rag and clean the weld area to remove weld flash. Any weld flash adhering to the edges of the jaws can be removed with a scraper or a flat blade screwdriver.

**CAUTION:** Take care when scraping off weld flash not to nick, dent or scratch the surfaces of the lower jaws.

### **DAILY**

- Remove the clamp blocks and flash guard.
- Clean the entire weld area thoroughly with a rag and cleaning agent, such as welding anti-spatter spray.
- Clean and inspect all parts for wear and damage.
- Clean and inspect the flash guard for any cracks or holes and replace if necessary.
- Inspect lower jaws for uneven wear, pitting and cracking.

### DAILY (cont.)

- Lightly resurface both lower jaw surfaces together with a fine grit surfacing stone to remove any high spots and embedded debris.
- Lightly lubricate the clamp block slides with oil before reinstalling the clamp blocks. (Any oil 30 weight or heavier)

### WEEKLY

- Perform the DAILY maintenance procedures
- Remove the lower jaws and blade guide mount rails as described later in this section.
- Clean and inspect the jaws and carriages for wear and damage.
- Using a fine grit surfacing stone, lightly resurface the bottom (beveled side) of the lower jaws to remove any high spots or debris.
- Using a fine grit surfacing stone, lightly resurface the lower jaw mount surfaces on the carriages (together, not separately), the guide mount surfaces on the front of the carriages (together, not separately), and guide rail mount surfaces on the sides of the carriages.
- Clean your entire welder. This will make it easier to see potential problems and help keep dirt from building up in critical areas of the machine.
- Inspect the air and hydraulic system for leaks or worn hoses and repair or replace, if necessary.

**DANGER: Make sure all hydraulic pressure has been evacuated from the system before beginning any maintenance to the hydraulic system.** To relieve pressure, disconnect air from the welder. Turn the welder ON and press either of the clamping foot pedals. Turn the welder OFF and do not re-connect air to the welder until all maintenance has been completed.

- Check the oil level in the hydraulic pump reservoir and add oil, if necessary. A drop in the oil level would indicate a leak in the system, and should be corrected as soon as possible. (Hydraulic Oil Type AW68)
- Check the oil level in the air lubricator and add oil as needed. It is normal for the air lubricator to lose oil, and should need filling once every month or so. If it is not losing oil, it may be set too low and needs to be opened further to prevent damage to the hydraulic pump. (Any 10 weight oil such as Air Tool Oil)
- Check the air filter/accumulator for water accumulation and excessive dirt. There is an auto-drain located on the bottom of the filter bowl to drain water out. If there is a lot of dirt in the bowl, it will need to be removed and cleaned.
- Remove the left and right front covers from the welder. Check the oil level in the oil cup, located under the cam on the left side of the welder, and fill if necessary. (Any oil 30 weight or heavier)
- Blow out the timing cut-off switch slide with compressed air and lubricate with a lightweight oil. (i.e. 3-IN-1 Oil)
- Clean and lubricate the main shafts and bearings **WITHOUT REMOVING THEM.** (Any lightweight oil, i.e. 3-IN-1 Oil)
- Lubricate the drive rod at all friction points, including the threaded portion of the rod where it screws into the drive bushing. (Any oil 30 weight or heavier)
- Lubricate the lever pivot pin. (Any oil 30 weight or lighter)
- Check the timing calibration (see GENERAL SETUP).
- Check the jaw gap indicator calibration (see GENERAL SETUP).
- Check the water-cooling pump for proper operation. Check water lines and fittings for leaks. Fill the water tank as needed.

# **REMOVING CLAMP BLOCKS, LOWER JAWS & GUIDE MOUNT RAILS**

## **REMOVING THE CLAMP BLOCKS**

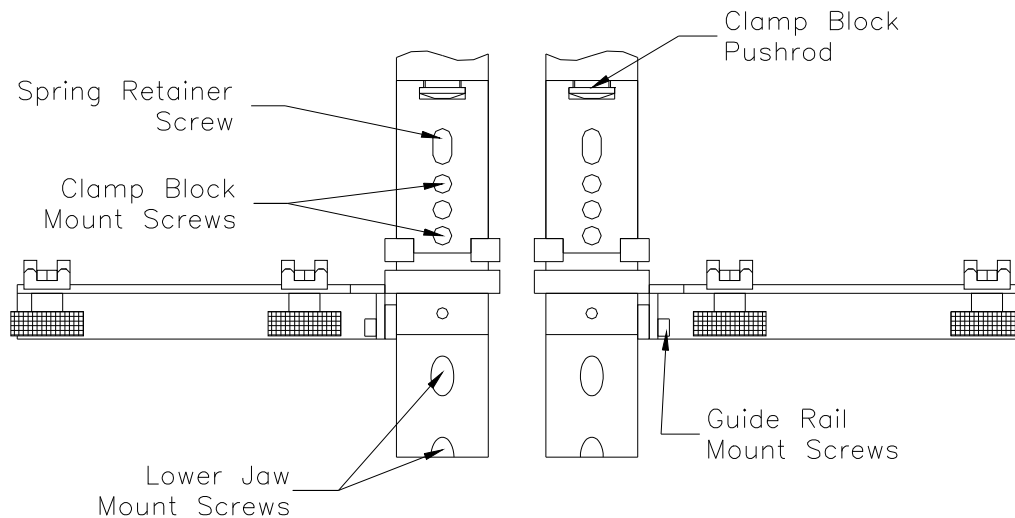
- 1) Retract the clamps all the way up in order to line up the holes in the clamps with their respective screws.
- 2) Remove the spring retainer screw (3/16 allen screw). (See Diagram)
- 3) Remove the upper & lower clamp block mount screws (3/16" allen screws). (See Diagram)
- 4) Leave the allen wrench inserted into one of the mount screws to keep the slide from falling out when removing the block.
- 5) Using a flat blade screwdriver, pry the clamp block pushrod down until there is about a 1/32" gap between the clamp block and the carriage.
- 6) Pull the clamp block straight out.

## **REMOVING THE LOWER JAWS**

- Remove the two lower jaw mount screws to remove the jaws. (See Diagram)

## **REMOVING THE GUIDE MOUNT RAILS**

- Remove the two guide rail mount screws. (See Diagram)
- The inner guide mount may need to be removed if it is in the way of the guide rail mount screws.



## **REINSTALLING GUIDE MOUNT RAILS, LOWER JAWS & CLAMP BLOCKS**

**IMPORTANT:** The guide mount rails, lower jaws and clamp blocks must be installed in the following order:

- 1) Ensure all mounting surfaces are smooth and clean.
- 2) Attach the guide mount rails to the sides of the carriages making sure to pull them all the way up.
- 3) Install the lower jaws (**beveled side down**) pushing them all the way against the guide rails to square them up and ensure they do not overhang the front of the carriages. Make sure there is no dirt or oil between the jaw and the carriage surface and both mating surfaces are smooth.

**CAUTION:** Extreme care must be taken to ensure the mating surfaces are totally smooth, dry, and free of all debris.

**CAUTION:** Do not overtighten the lower jaw mount screws as this could cause the jaws to warp.

- 4) Install the clamp block assemblies next.
  - 1) Insert the clamp block slide into the rear of the clamp block making sure the slide is right side up so the spring retainer pocket is at the top.
  - 2) Insert the clamp block mount screws into their respective holes.
  - 3) Insert a 3/16" allen wrench into one of the mount screws through its proper hole in the clamp block to hold the slide in place.
  - 4) Pry the clamp block pushrod down with a flat blade screwdriver and slide the clamp block onto it. (There should be a ledge facing the front to catch the screwdriver on. If you don't see it turn the pushrod around until it faces the front.)
  - 5) Push the clamp block back all the way until it stops and release it to the up position.
  - 6) Start the mount screws into their threads, but do not tighten them.
  - 7) Install the spring retainer assembly and tighten the screw down.
  - 8) Now tighten the clamp block mount screws down all the way.
  - 9) Make sure the spring retainer is not tightened down on the slide by turning the adjustment screw back and forth. The clamp block should move freely. If it does not, loosen the assembly and adjust to fix the problem.

**CAUTION:** It is very important that the clamp blocks adjust freely after they are tight before trying to activate the clamps hydraulically. If they do not, there could be interference that could damage components when the clamps are activated.

- 10) Pry the clamps down manually to check for interference before activating them hydraulically.

**CAUTION:** Serious damage can occur to the clamp blocks if they are not exercised by hand first. If the clamps are activated hydraulically the pressure could either damage faulty parts or jam the clamps so tightly that disassembly will be difficult or even impossible.

- 11) Clamp the clamps down to see if the upper and lower jaws line up on the inside edges properly. If they do not, unclamp the clamps, loosen the mount screws and spring retainer screw, and adjust the clamp blocks by pushing them left or right. (It sometimes helps to pry the clamp down a little to facilitate movement). Then retighten the mount screws and check the alignment again.
- 5) Adjust the height of the guide rails so the top of the guides are flush with the top of the lower jaws. This can be accomplished by clamping a blade or straight edge in the clamps, loosening the guide rails, and adjusting their height until they are flush with the bottom of the blade or straight edge.
- 6) Check the jaw gap indicator calibration and clamping pressure distribution as described in the GENERAL SETUP section.

## WARRANTY

Your FAHRINGER model FW-200 HPA welder is guaranteed against defects in material and workmanship for a period of one full year from the date of shipment. This warranty covers all parts and labor needed should repair become necessary due to such defects. However, this warranty does not cover damage that occurs during shipment, or damage caused by neglect, abuse, misuse, normal wear and tear, or any act of nature. Should the return of any equipment to T. L. Fahringer Co. become necessary, the owner is responsible for all shipping charges to T. L. Fahringer Company's plant. During the first 90 days from the date of original shipment T. L. Fahringer Co. will pay for ground freight charges within the continental United States to return the unit to the customer if the unit is determined by T. L. Fahringer Co. to be in need of warranty repair. After the first 90 days the customer is responsible for all freight charges to and from T. L. Fahringer Company's plant. All warranty returns must be authorized by T. L. Fahringer Co. in advance. Furthermore, any further damage that occurs to equipment during shipment back to T. L. Fahringer Co. will not be covered under warranty. It is the sender's responsibility to package the equipment properly so as to prevent damage from occurring during shipment. If replacement parts are needed to make a warranty repair in the customer's plant, there will be no charge for the warranted items, but the customer may be responsible for any shipping charges. Should the services of a T. L. Fahringer Co. technician be required at the customer's plant, there will be no charge for parts or labor covered under warranty, but the customer is responsible for all other expenses, including, but not limited to, airfare, lodging, meals, and any transportation needed.

All warranty repairs will be made at the discretion of T. L. Fahringer Co.; as such, some or all of the repairs may be the responsibility of the owner and not T. L. Fahringer Co.

