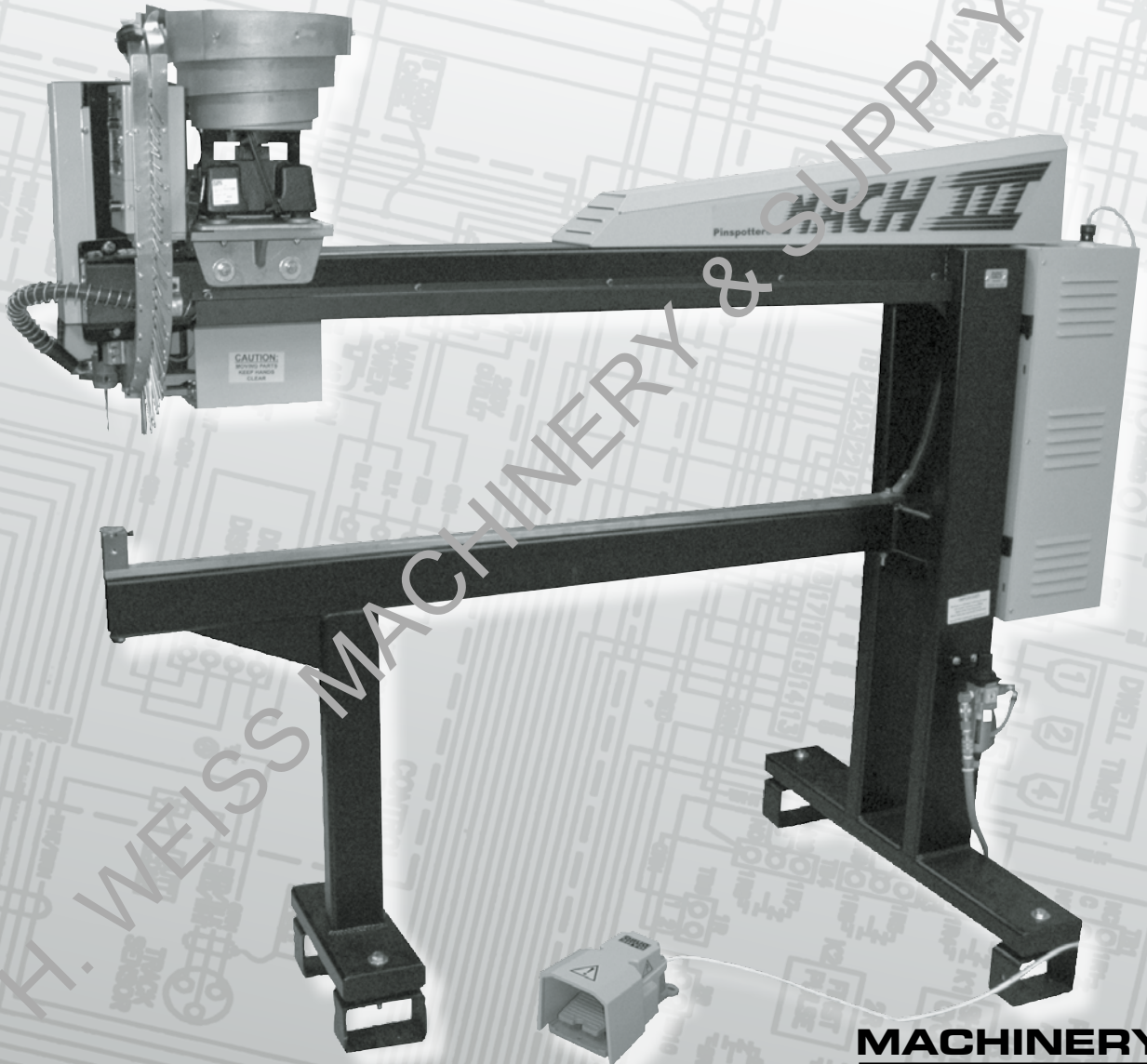


# FC NACH III

## **AUTOMATIC BULK FEED PINSPOTTER**



**MACHINERY  
DIVISION**

# **OWNER'S MANUAL**

## ***INTRODUCTION***

The FG Mach III Pinspotter was designed utilizing the best current technology to provide greater insulation fastening power and reliability. The inherent minimal material handling combined with the utilization of welded fasteners will insure your shop of a cost efficient, quality product.

Trouble free service is the foundation on which all Duro Dyne Pinspotters are built. Proven solid state components are located for easy access. Duro Dyne continues this concept and brings the FG Mach III to a new level of reliability, serviceability and efficiency.

This Guide is designed to help you set up and operate your FG Mach III at peak performance for years to come.

## ***IMPORTANT***

Always follow manufacturer's recommendations for proper safety and handling procedures for all materials used in conjunction with this machine as outlined in Manufacturer's Safety Data Sheet (MSDS) for each product.

## ***LIMITED WARRANTY***

Duro Dyne Machinery is manufactured by skilled mechanics, utilizing the latest production techniques. Each unit has been rigorously tested prior to packaging and shipment in order to ensure trouble-free operation.

Your Duro Dyne machine has a two year warranty against defects in material. Any component found to be defective will be repaired or replaced (at the manufacturer's discretion) at no cost if the failed component is returned freight prepaid to the nearest Duro Dyne Service Department. The warranty does not apply to expendable parts or repairs or service due to improper maintenance or operation procedures.

Duro Dyne products have been engineered to maximize operator safety. Unauthorized modification of this product will void the warranty.

All warranty claims must be accompanied by a serial number, date of purchase and the name and address of the distributor it was purchased from.

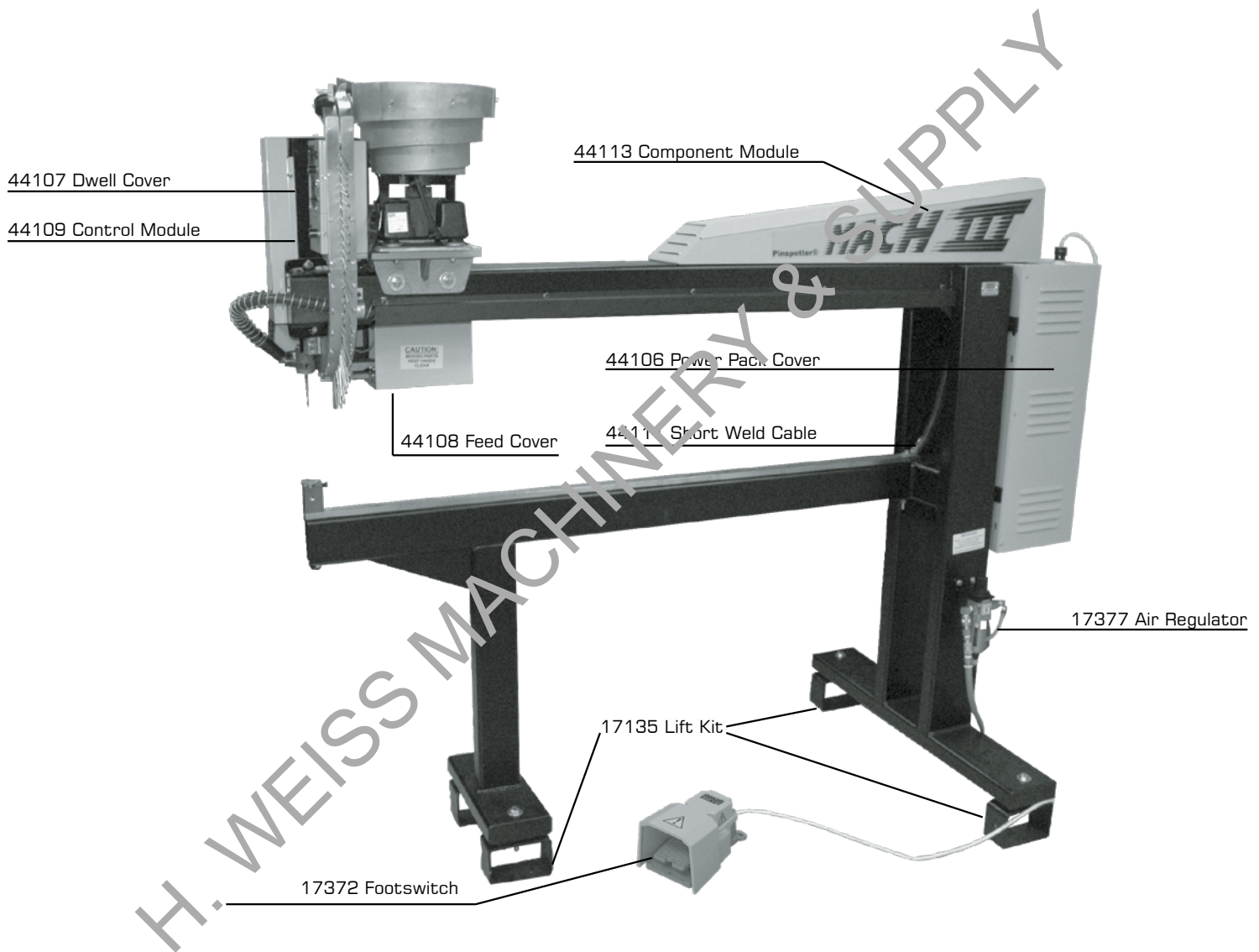
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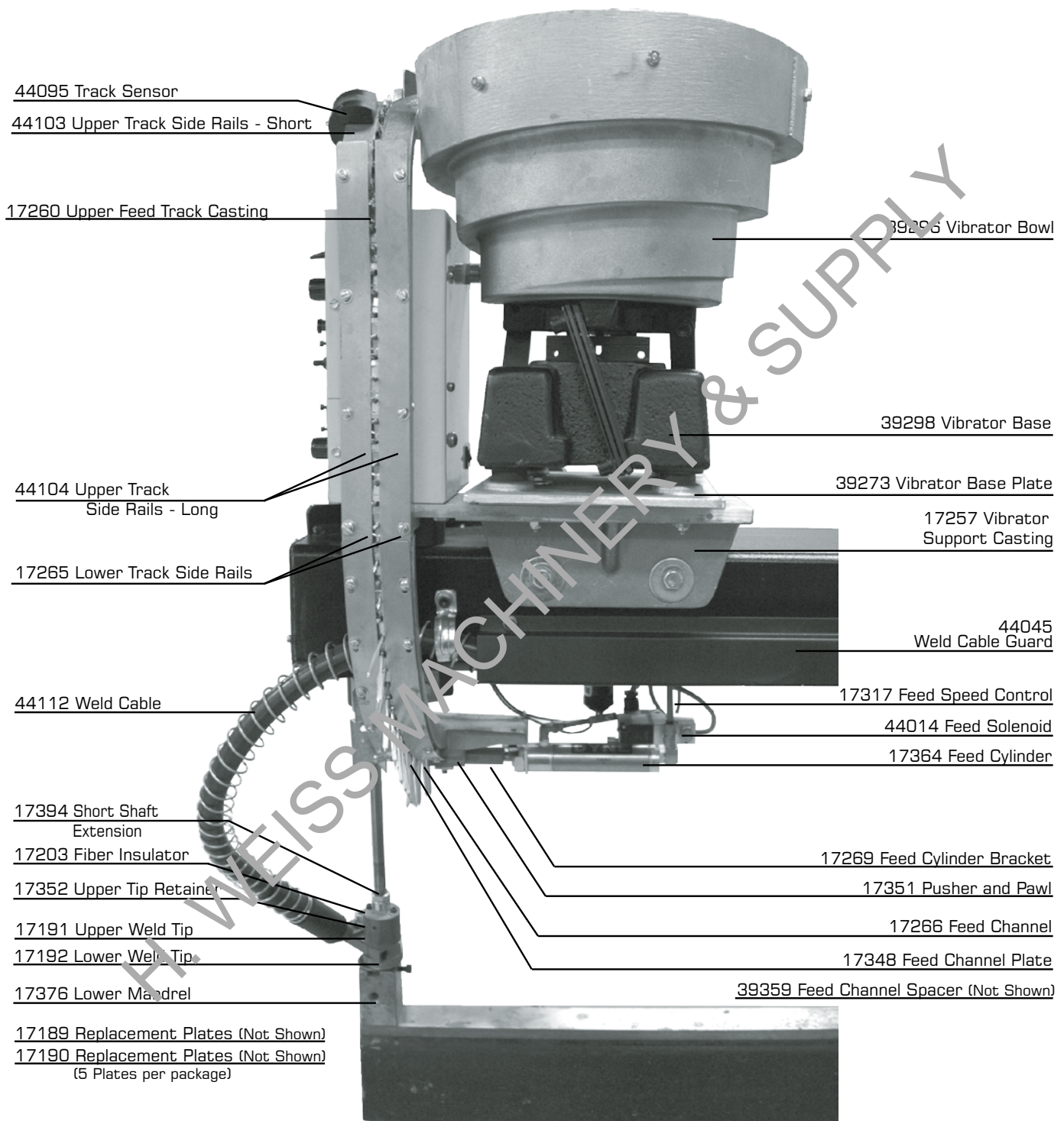


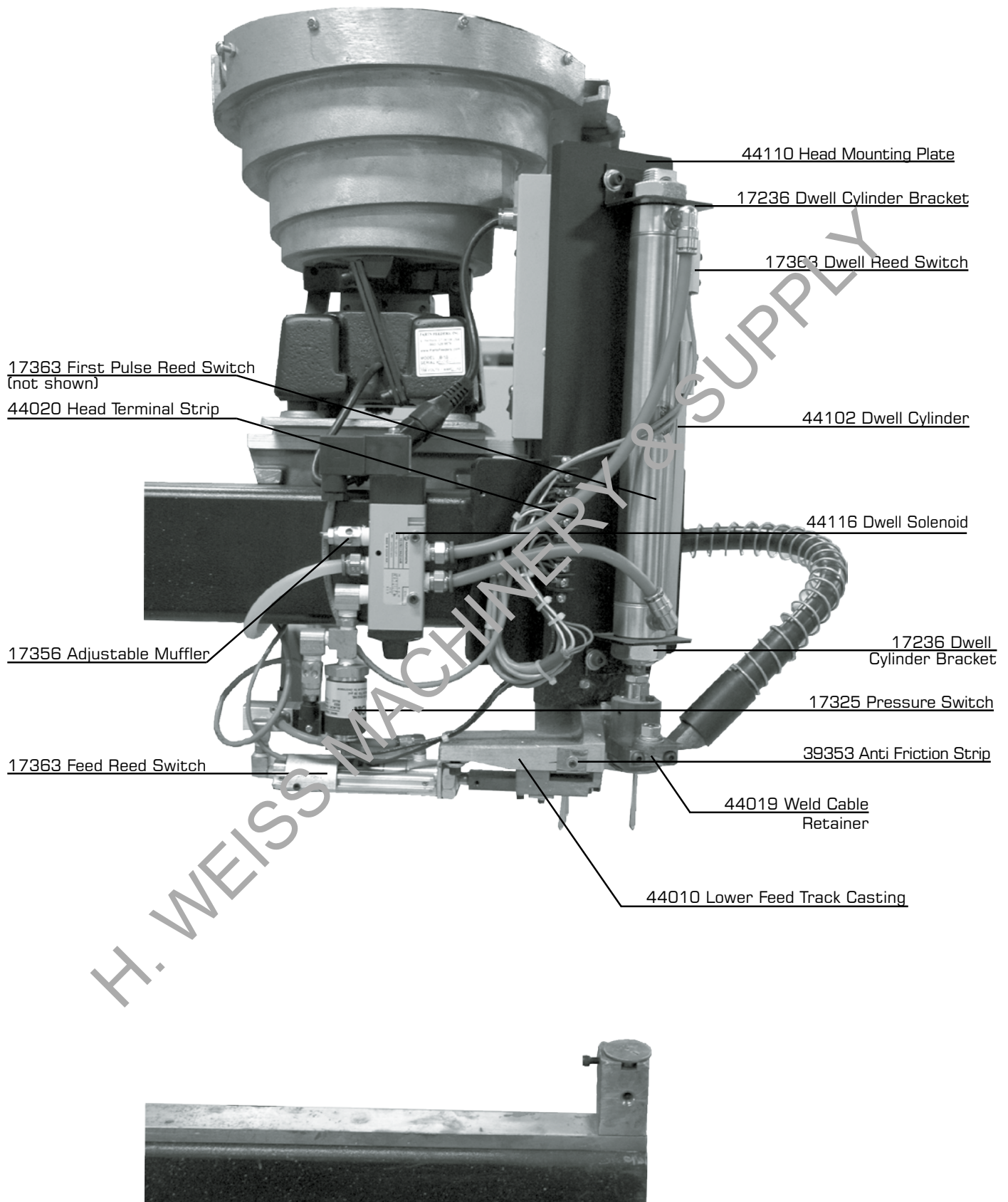
***PARTS LOCATION***

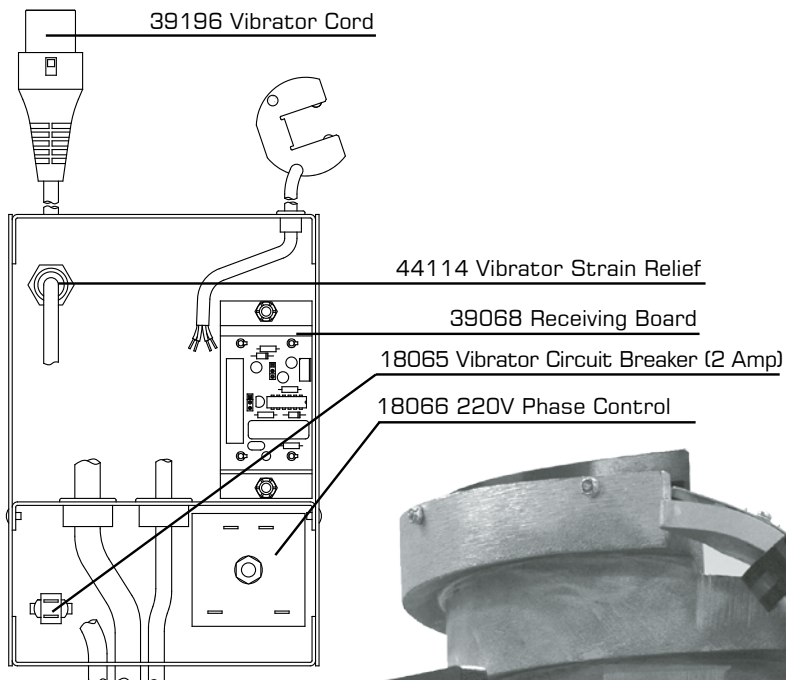
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***FRAME ASSEMBLY***

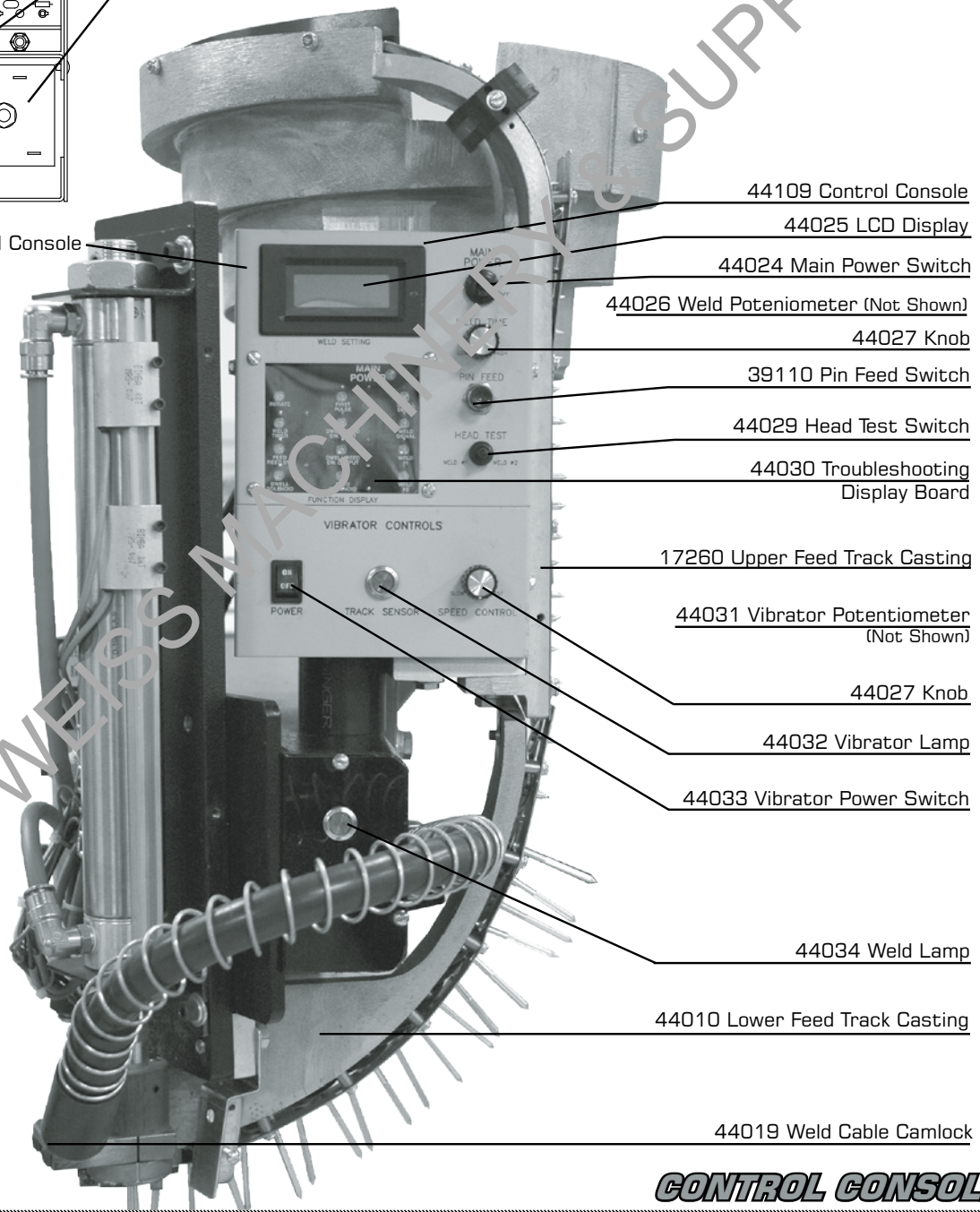
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***PARTS LOCATION******DWELL & FEED ASSEMBLY (1)***

***PARTS LOCATION***  
=====***DWELL & FEED ASSEMBLY (2)***  
=====

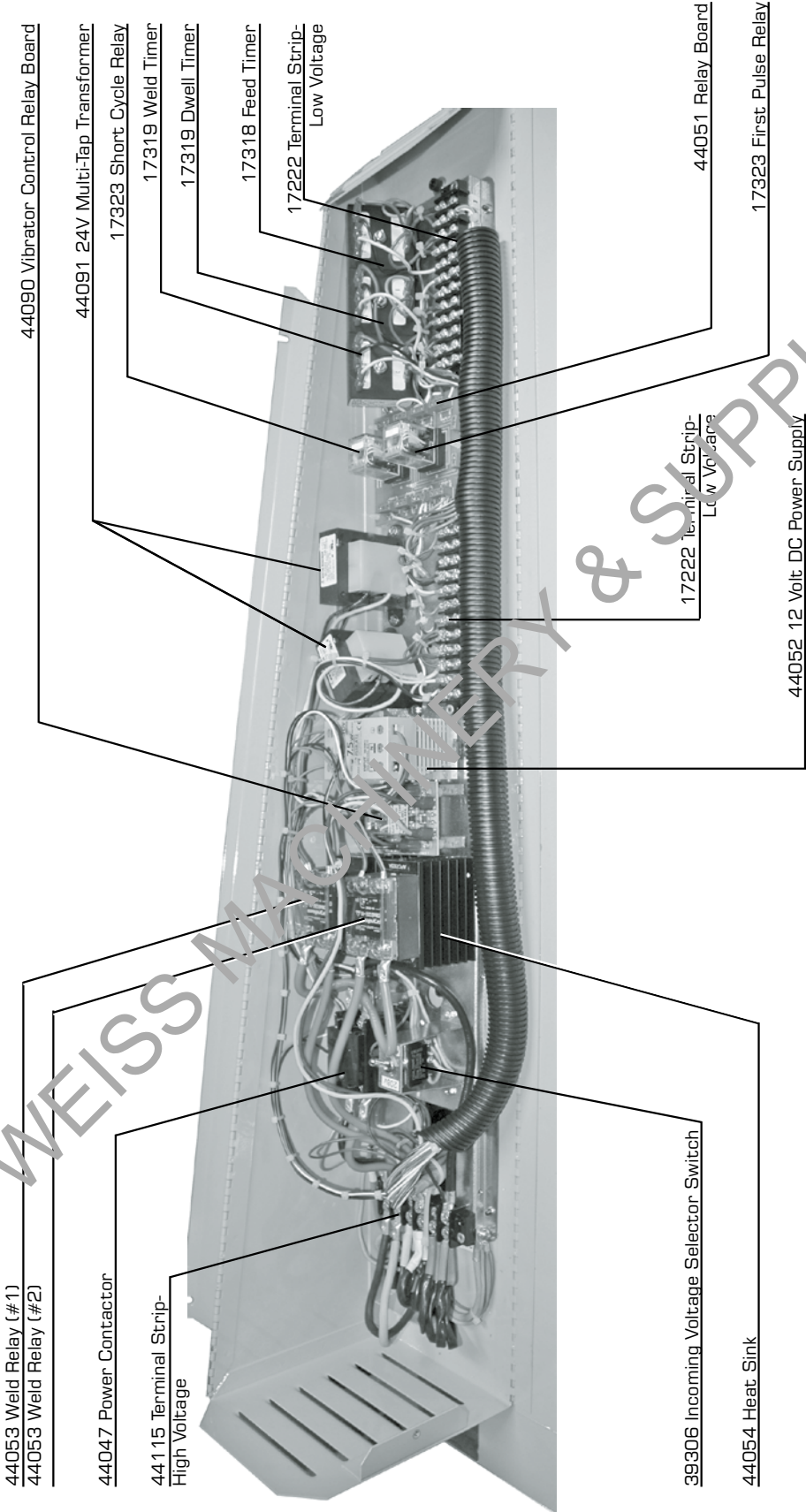
***PARTS LOCATION***

Located Inside Control Console

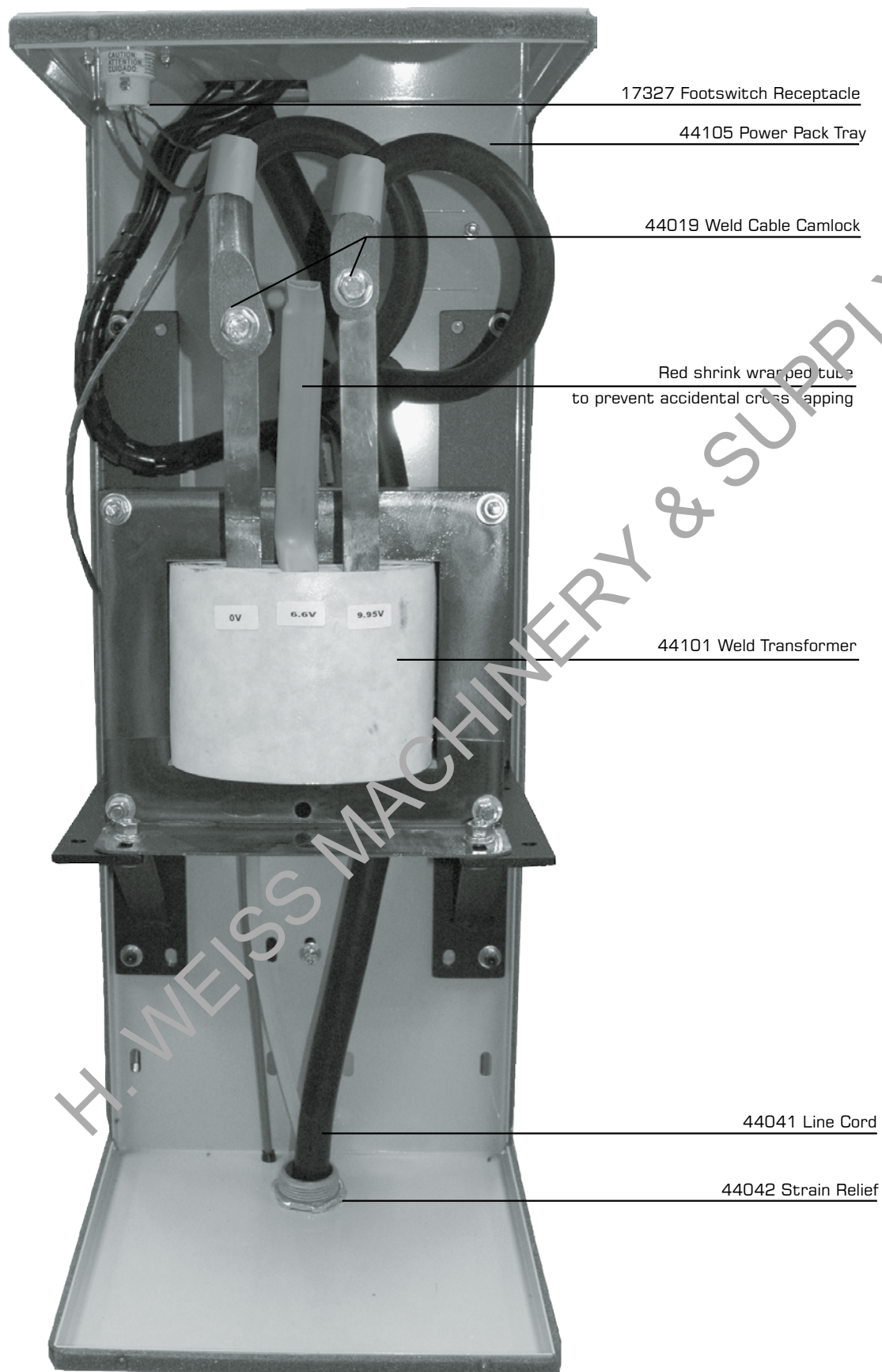
***CONTROL CONSOLE***



**PARTS LOCATION**



**COMPONENT MODULE**

***PARTS LOCATION******MACH III TRANSFORMER ENCLOSURE***



## ***INSTALLATION INSTRUCTIONS***

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### **1) For the Mach III-**

Connect the Power Pack to a source of 208-230 V 60 Amp. power. This service should be connected to a 60 amp disconnect box fitted with 60 amp slow blow fuses. The Power supply line to the Power Pack pigtail should be #6 (or heavier) wire to minimize voltage losses. The black and white wires are the power, the green is ground. Select the closest match to the Power Supply (either 208V or 240V) at the Incoming Voltage Selector Switch in the Component Module.

**2)** Attach the Footswitch to the Footswitch Receptacle on the rear of the Power Pack.

**3)** Connect the air line to the Regulator. Adjust the regulator pressure to 80-85 PSI.

**4)** Plug the Vibrator Line Cord into the socket on the rear of the Control Console.

### **TECHNICAL SPECIFICATIONS**

#### ***MACH III***

#### **AIR REQUIREMENTS:**

Input pressure 80 PSI.

#### **ELECTRICAL:**

Input voltage: 208-230 V 60 HZ  
single phase. 60 amp service  
Fuse for 60 amps. using slow blow fuses

## OPERATION

### Mach III INITIAL ADJUSTMENTS

- 1) Turn the power switch to "ON".
- 2) Turn the vibrator switch to "ON".
- 3) Add the weld pins to the hopper (Vibrator Bowl).
- 4) Adjust the vibrator speed so that the weld pins climb the spiral track inside the vibrator bowl without vibrating off.
- 5) When the weld pins fill the track up to the Vibrator Sensor, the vibrator automatically shuts off.
- 6) Flip the HEAD TEST switch to either the "WELD #1" or "WELD #2" position.

**NOTE:** The Mach III Pinspotter has two redundant weld circuits. In the event that the solid state relay controlling the weld fails you may simply flip the switch to the other circuit and continue production. A replacement Weld Relay should then be ordered through your local Duro Dyne wholesaler.

### STARTING OPERATION

- 1) Never actuate the unit without metal over the mandrel. For maximum weld quality, the metal should be in flat contact with the mandrel. An adjacent table or roller on which the sheet metal rests must be either exactly flush with, or slightly below, the top of the mandrel.
- 2) The WELD TIME knob controls the weld quality of the pinspotter. The display goes from 0 to 300. These numbers are for reference only and have no relationship with actual time. It is recommended that an initial setting of 150 be used and then adjust up or down accordingly in reference to the quality of welds.

Weld time is the length of time the welding transformers are on. A fraction of a second is generally all the time needed for a quality weld. Unnecessary weld time not only wastes energy but can also burn up the pins. (If the pins glow red up to the washer, the weld time is set too high.) Always set the weld timer to the minimum time required for a "good" weld.

- 3) Before beginning production, always "pre-test" with smaller pieces of the same gauge sheet metal thickness and liner density you intend to use in the final production. The different densities and the thicknesses of the liner may require adjustments of the weld timer setting. For example: heavier gauge steel, thicker liner, higher density liner and/or longer clip pins may require longer weld time. To make sure, always pre-test any adjustment before you begin "final production." However, only change the weld timer settings when a change in the materials results in inefficient welding or a poor quality weld.

## OPERATIONS DISPLAY

The FG Mach III Pinspotter is provided with an OPERATIONS DISPLAY to help identify the source of the problem should your pinspotter fail to perform properly. Watching these indicator lights will give you a clear understanding of the electrical flow of the various circuits and components during use. Should a problem arise, you simply press the footswitch and watch to see which indicator fails to illuminate. A call to our Technical Services Department at 1-800-899-3876 will quickly identify the component to order, repair or adjust.



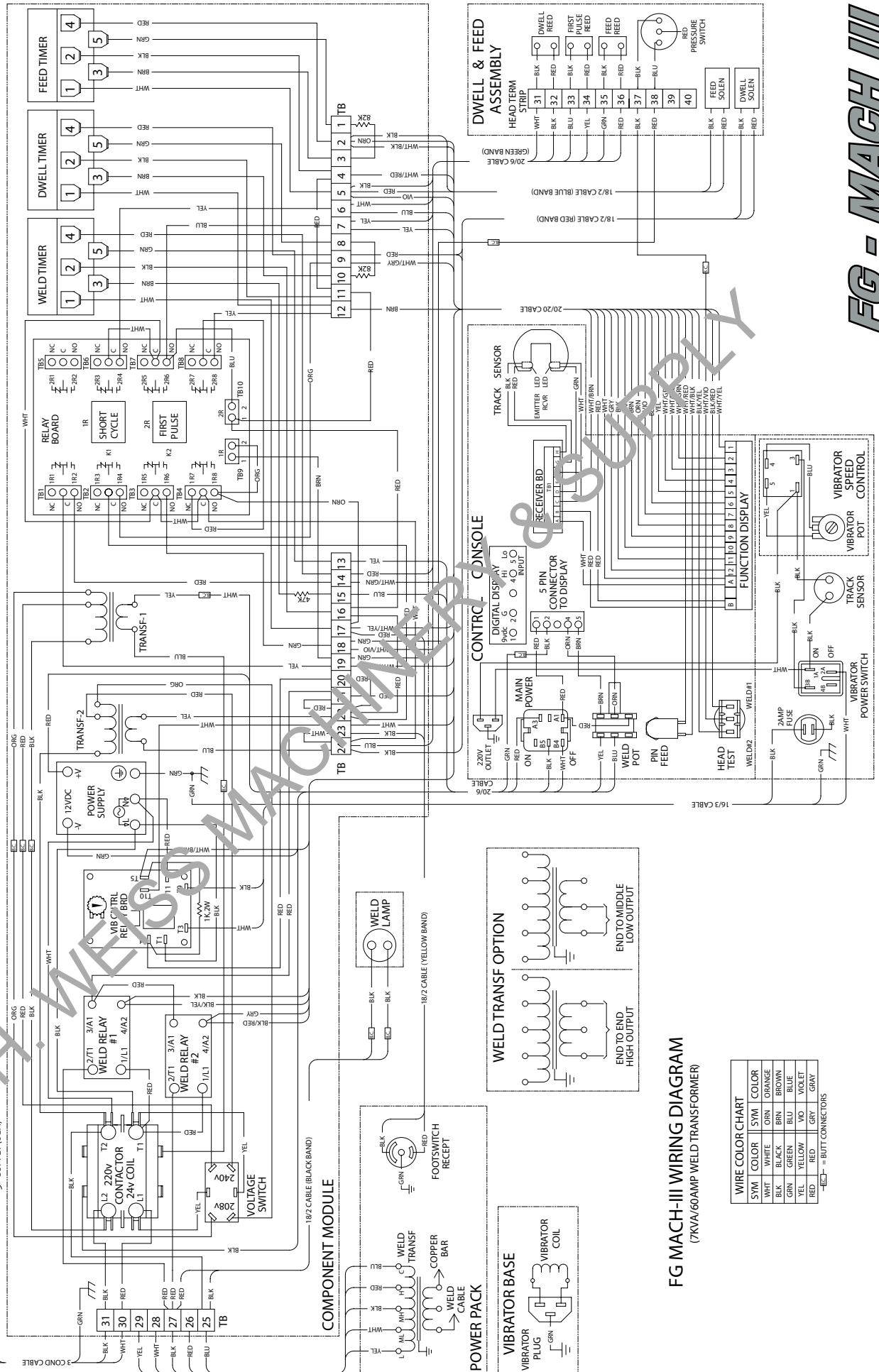
# WIRING DIAGRAM

B229-01-40/

LATEST: 2-24-16

220V SINGLE  
PHASE POWER  
SUPPLY (GGA)

GRN  
WHT  
BLK



FG MACH-III WIRING DIAGRAM  
(7KVA/60AMP WELD TRANSFORMER)

## FG - MACH III



## ***MAINTENANCE***

- 1)** To prolong the weld tip life and improve the weld quality, it is imperative that the weld tips always be kept clean. For best results, use a solvent to remove any built-up adhesive; a wire brush to remove any galvanizing deposits; and a fine emory cloth to smooth the tip surfaces.
- 2)** When the lower weld tip becomes worn in one area, loosen the locking cap screw and rotate the point of wear away from the point of contact. If this cannot be done because the lower weld tip is too badly pitted, replace the lower weld tip plate. Loosen set screw in weld tip shaft. remove 2 slotted screws. Assemble new weld plate in reverse order. Additional lower weld tip plates can be ordered from your local distributor.
- 3)** Depending on usage and maintenance, the upper welding tip plate will have to be periodically replaced. The replacement weld tip plates can be ordered from your local distributor. To replace the upper weld tip, loosen the locking cap screw and remove the weld tip. To replace the plate remove the three (3) brass screws. Discard the screws and attach the new plate to the tip using the three brass screws supplied. Be sure to align the angled section of the plate so it faces the feed mechanism. Then lock the tip in place. Cycle the machine to check the feeding.
- 4)** If the feeding is erratic, re-adjust the upper weld tip height by loosening the lock nut and then turning the dwell cylinder shaft clockwise to raise the tip; counter-clockwise to lower the tip. Lock the tip in position with the locking nut.

## ***SERVICING***

### **A SIMPLIFIED STEP-BY-STEP PROCEDURE**

Duro Dyne has called upon its many years of pinspotting experience in designing the FG Mach III. Your unit has been rigorously factory tested and inspected to provide many years of dependable service.

### **WHAT TO DO BEFORE YOU BEGIN TROUBLESHOOTING:**

#### **CONSULT THE MANUAL.**

Most of the functional problems that occur are due to an oversight in the set-up, operational or normal maintenance procedures. Therefore, you should re-check all "Set Up", "Initial Adjustment", "Operation" and "Maintenance" procedures.

#### **INSPECT THE UNIT**

If the problem still persists, the next step is careful visual inspection. Turn off the electricity - that is, disconnect your Pinspotter from its power supply and carefully check the control box for loose, broken or disconnected wires. Also check the air circuit for leaky air connections or cut hoses.

#### **HOW TO IDENTIFY WELD QUALITY PROBLEMS**

By weld we mean that the Power Pack is energized, sending a pulse of electricity through the weld pin, causing it to begin to fuse to the sheet metal. To properly troubleshoot the weld quality problems, you must first pinpoint the symptom by test welding the clip pins to bare sheet metal. The symptom will then show up in one of four categories:

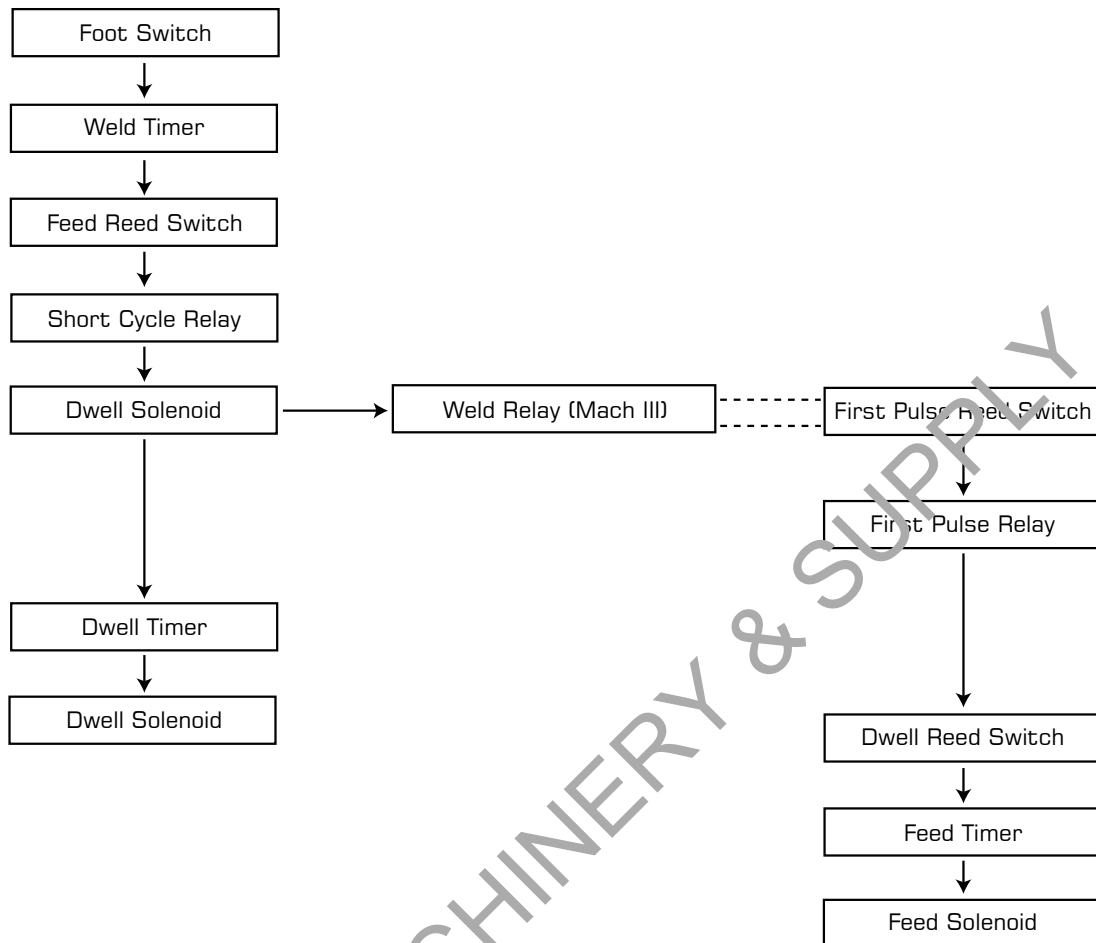
- 1)** The pins weld to bare metal but not on lined work.
- 2)** The pins weld to bare metal but can easily be removed.
- 3)** Pins weld to bare metal but remain on the weld tip as it retracts.
- 4)** The pins do not weld at all.

#### **Before troubleshooting, always check:**

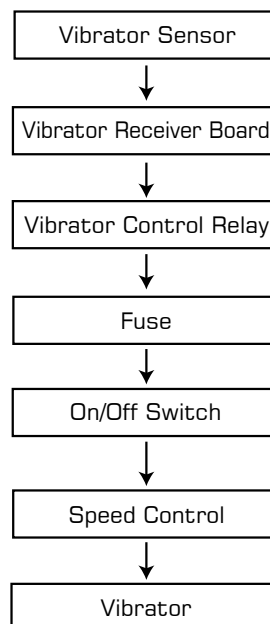
- 1)** Air pressure for a minimum of 80 PSI during usage of unit.
- 2)** The input Voltage for a minimum of 208V and a maximum of 230V.
- 3)** The Weld Timer is set properly.
- 4)** The Upper and the Lower Weld tips for extreme wear.

It may become necessary to use a voltmeter and/or ohmmeter to perform some servicing procedures. An Analog type is best. Our Technical Services Department will help you if necessary.

## ***OPERATION FLOW CHART FOR CONTROLS***



## ***OPERATION FLOW CHART FOR VIBRATOR***



## ***TROUBLESHOOTING SECTION***

Your FG Mach III Pinspotter is equipped with an Operations Display that will assist you in quickly locating the probable cause should your machine fail to operate. While the display can point you to a defective component, it is recommended that an analog type volt meter be used to verify the indication. In some cases a loose or broken wire could cause a false indication.

This troubleshooting section has been divided into separate sections depending on the type of malfunction.

### **MACHINE DOES NOT OPERATE**

#### **PIN FEED PROBLEMS**

#### **DWELL CYLINDER PROBLEMS**

#### **PINS DO NOT WELD**

#### **POOR WELD QUALITY**

#### **VIBRATOR PROBLEMS**

After determining the type of problem, go to that section, cycle the machine watching the Operations Display indicator lights and then follow the instructions in that part of the chart. If further assistance is needed you may call Duro Dyne Technical Services Department at 1-800-899-3876 between the hours of 7am - 6pm EST.



***MACHINE DOES NOT OPERATE***

<b>SYMPTOM</b>	<b>CORRECT FUNCTION INDICATOR</b>	<b>POSSIBLE PROBLEM</b>	<b>ACTION</b>
<b>No Power Indicator. No display.</b>	Power Indicator goes on and off with main power switch.	(A) Incoming power supply.	(A) Check the incoming power (208-230VAC) at terminals #29 and #30 or L1 and L2 on the Power Contactor in the Component Module.
		(B) Power Contactor.	(B) Check the voltage (24VAC+/-) at the coil of the contactor in the Component Module. If the voltage is present, check the voltage (208-230VAC) at terminals T1 and T2 on the contactor. If the voltage is present, the contactor is good. Proceed to step (E). If the voltage at the coil is present and T1 and T2 have no voltage replace the contactor. If the voltage at the coil is not present, proceed to the next two steps (C and D).
		(C) Main Power Switch.	(C) Check the Main Power Switch terminals B4 and B5 in the Controle Console. Terminals B4 and B5 should have 24VAC +/- when the switch is in the off position and 0 volts when the switch is in the on position. If the voltage stays at 24VAC +/- replace the switch. If the voltage stays at 0 volts proceed to step (D).
		(D) 24VAC Transformer: (XSFMR-1)	(D) In the Component Module, check the transformer primary input voltage (208-230VAC) at terminal L1 and L2 on the Power Contactor. Check the transformer secondary voltage (24VAC +/-) at the coil of contactor. If the voltage at the coil is not present and step (C) is correct replace the transformer. (This transformer is for the contactor only)
		(E) 24VAC Transformer: (XSFMR-2)	(E) In the Component Module, check the transformer primary input voltage (208-230VAC) at terminal T1 and T2 on the Power Contactor. Check the transformer secondary voltage (24VAC +/-) at terminals # 22 and # 24. If the voltage at terminals #22 and #24 is not present replace the transformer. (This transformer is for all the low voltage control circuits except for the coil of the contactor)
<b>Power Indicator on. Initiate Indicator is not functioning.</b>	Initiate Indicator goes on with footswitch and off after the machine cycles.	Footswitch.	Check the voltage (24VAC +/-) at terminals #17 and # 21 in the Component Module while depressing the footswitch. This voltage reading should go from 0 to 24VAC. If this voltage reading is not correct replace or repair Footswitch.
<b>Power Indicator on. Initiate indicator is functioning. Weld Timer Indicator is not functioning.</b>	Weld Timer Indicator goes on and off with every cycle.	Weld Timer.	Turn the weld time to the highest setting and check the voltage (24VAC +/-) at terminals #14 and #17 in the Component Module. This voltage should come on then go off every time the footswitch is depressed. If this voltage reading is not correct replace weld timer. (0 – 24VAC – 0)
<b>Power, Initiate, and Weld Timer Indicators are functioning. Feed Reed Switch Indicator is not functioning.</b>	Feed Reed Switch Indicator goes on and off with every cycle	Feed Reed Switch.	The Feed Reed Switch is a safety that will not allow the machine to operate if Feed Cylinder has not fully retracted. To test the Feed Reed Switch jump terminals #14 to #19 in the Component Module or #35 to #36 Dwell Feed Assembly. Now try to cycle the machine with this jumper in place. If machine operates this means that the Feed Reed Switch is not functioning. This reed switch is located on the Feed Cylinder and may be out of position. To check the position, turn power off (remove jumper from pervious test) and loosen the set screws on the reed switch. Now put an ohmmeter on terminals #14 and #19 in the Component Module or #35 and #36 Dwell Feed Assembly. Slide reed switch back and forth near the rear of the cylinder until the meter reads continuity. Now lock setscrews. If this procedure cannot be accomplished replace the Feed Reed Switch.
<b>Power, Initiate, Weld timer and Feed Reed Switch Indicators are functioning. Dwell Solenoid indicator is not functioning.</b>	Dwell Solenoid Indicator goes on and off with every cycle. (Stays on 150ms longer than Feed Reed Switch Indicator.)	Short Cycle Relay.	Turn the weld time to the highest setting and check the voltage (24VAC +/-) at the terminals #17 and #19 in the Component Module. This voltage reading should go from 0 to 24VAC and then back to 0 every time the footswitch is depressed. If this voltage reading is not correct recheck symptom. Now do the same procedure at terminals #9 and #24 in the Component Module. If this voltage reading is incorrect replace the Short Cycle Relay.
<b>Power, Initiate, Weld Timer, Feed Reed Switch and Dwell Solenoid Indicators are all functioning.</b>	All lights flash in sequence.	(A) Air pressure, Adjustable Exhaust Mufflers and Dwell Cylinder.	(A) Check Air Regulator for proper setting (80psi). Now press the test button located on the Dwell Solenoid Body. If the Dwell Cylinder does not operate check the Adjustable Exhaust Mufflers on the Dwell Solenoid for proper adjustment. If the mufflers are closed or restricted it will not allow the Dwell Cylinder to operate. Also check the cylinder by turning the air off and then move the shaft up and down. The shaft should move freely. If the mufflers (these mufflers control the speed of the up and down motion on the cylinder) are properly adjusted and have no restrictions and the Dwell Cylinder operates when the test bottom is pressed proceed to step (B).
		(B) Dwell Solenoid.	(B) Turn the weld time to the highest setting and check the voltage (24VAC +/-) at terminals #9 and #24 in the Component Module. The voltage reading should go from 0 to 24VAC and back to 0 every time the footswitch is depressed. If this voltage reading is correct replace the Dwell Solenoid.

***PIN FEED PROBLEMS***

<b>SYMPTOM</b>	<b>CORRECT FUNCTION INDICATOR</b>	<b>POSSIBLE PROBLEM</b>	<b>ACTION</b>
<b>First Pulse Indicator is not functioning.</b>	First Pulse Indicator turns on with the first machine cycle. It stays on until main power is turned off.	First Pulse Reed Switch.	The First Pulse Reed Switch sends power to the coil of the First Pulse Relay. To check the Reed Switch, remove the wire that goes to terminal #4 on the Dwell Delay Timer located in the Component Module and then jump terminals #7 and #24 in the Component Module or #33 and #34 on the dwell and feed assembly. With this jumper in place cycle the machine. If the machine feeds check the Reed Switch position (the First Pulse Reed Switch should be mounted to the middle off the dwell cylinder). If the Reed Switch position is correct replace the First Pulse Reed Switch.
First Pulse Indicator is functioning. <b>Dwell Reed Switch Input Indicator is not functioning</b>	Dwell Reed Switch Input Indicator turns on with the first machine cycle. Stays on until main power is turned off.	(A) First Pulse Relay. (Coil)	(A) The First Pulse Relay (K2 on the DRP panel) should engage on the first machine cycle and should stays engage until power is turned off. To check the first Pulse Relay jump terminals #7 to #24 or #33 to #34. With this jumper in place and the power on check the voltage (24VAC+/-) on the DRP panel at TB10 terminals #1 and #2. If voltage is present and the Relay is engaged (Indicator on Relay is on) proceed to step (B). If the voltage is present and the Relay is not engaged (No indicator on the Relay) replace the First Pulse Relay.
First Pulse Indicator is functioning. <b>Dwell Reed Switch Input Indicator is not functioning.</b>	Dwell Reed Switch Input Indicator turns on with the first machine cycle. Stays on until main power is turned off.	(B) First Pulse Relay.  (Contacts)	(B) If the Relay is engaged (the Indicator on the Relay is on) check the voltage (24VAC+/-) at the terminals #6 and #4 in the Component Module. If the voltage is not present replace the First Pulse Relay. If the voltage is present proceed to the next step.
First Pulse and Dwell Reed Switch Input Indicators are functioning. <b>Dwell Reed Switch Output Indicator is not functioning.</b>	Dwell Reed Switch Output Indicator turns on with the first machine cycle. Goes off and then back on with every cycle.	Dwell Reed Switch	The Dwell Reed Switch is the upper of the two reed switches located on the side of the Dwell Cylinder. The Dwell Reed Switch activates the Feed Timer. To check the Dwell Reed Switch, first cycle the machine once and then check the voltage (24VAC+/-) at terminals #4 and #6 in the Component Module. If the voltage is not present recheck the symptom. If this voltage is present now check the voltage (24VAC+/-) at the terminals #4 and #5. Terminals #4 and #5 should go from 24VAC to 0 and back to 24VAC with every cycle. If this is correct the Dwell Reed Switch is functioning properly. If the voltage reading is incorrect check the Dwell Reed Switch position. To check the Dwell Reed Switch position first loosen the reed switch set screws. Slide the Reed Switch down and check the voltage at terminal #4 and #5. The voltage should read 0. Now slide the reed switch up until terminals #4 and #5 have 24VAC and then lock the sets crews. If this procedure cannot be accomplished replace the Dwell Reed Switch.
First Pulse, Dwell Reed Switch Input and Output Indicators are functioning. <b>Feed Solenoid Indicator is not functioning</b>	Feed Solenoid Indicator goes on and then back off with every cycle.	Feed Timer	The Feed Timer activates the Feed Solenoid. Check the voltage (24VAC+/-) at terminal #2 and #5 in the Component Module. The voltage at terminal #2 and #5 should go from 0 to 24VAC and back to 0 on every cycle. If this voltage reading is incorrect replace the Feed Timer. If the voltage reading is correct proceed to the next section. (This voltage is only present for 150ms. Some voltmeters may not react fast enough to see this voltage)
All Indicators are Functioning.	All lights flash in sequence.	Feed Solenoid, Feed Cylinder, and Pusher With Pawl.	The Feed Solenoid controls the Feed Cylinder. To test the Feed Solenoid check the voltage (24VAC+/-) at terminals #2 and #5 in the Component Module. Terminals #2 and #5 should go to 24VAC and back to 0 on every cycle. If correct turn power and air off. Now try to move the Pusher With Pawl in and out. The Pusher With Pawl should move easily. If so, replace the Feed Solenoid. If not, check for jammed weld pins in the Feed Channel or for a damaged Feed Cylinder. Also check the Feed Speed Control, located on the air line going to the Feed Cylinder for proper adjustment.
<b>Feed Cylinder does not retract. Feed Solenoid Indicator on constantly.</b>	Feed Solenoid Indicator goes on and then back off with every cycle.	Feed Timer.	Remove the push-on connector from terminal #4 of the Feed Timer. If the Feed Cylinder retracts replace the Feed Timer.
<b>Feed Cylinder does not retract.</b> All Indicators are functioning correctly	All lights flash in sequence	(A) Feed Cylinder or Pusher With Pawl.	(A) Turn the power off and inspect the Feed Cylinder for air leaks. If there are no air leaks turn the air off and slide the Pusher With Pawl in and out. The Pusher With Pawl should go in and out with just a slight restriction.
		(B) Feed Solenoid.	(B) To check the Feed Solenoid turn the power off. If the Feed Cylinder does not retract and step (A) above is correct replace Feed Solenoid.

SYMPTOM	CORRECT FUNCTION INDICATOR	POSSIBLE PROBLEM	ACTION
<b>Feed collides with dwell.</b> All Indicators are functioning correctly except: <b>Dwell Reed Switch Output and Feed Solenoid Indicators are not coming on in the correct sequence.</b>	Dwell Reed Switch Output Indicator turns on with the first machine cycle. Goes off and then back on with every cycle. Feed Solenoid Indicator goes on and then back off with every cycle.	Dwell Reed switch	The Dwell Reed Switch activates the Feed Timer. If this switch is malfunctioning or out of position it will activate the feed at the wrong time. For instructions on how to check and adjust, refer to the action section on page 18 for "Possible Problem" Dwell Reed Switch. (Also Refer to to note #4 on page #22)
<b>Sluggish movement of the Feed.</b> All Indicators are functioning correctly	All lights flash in sequence	(A) Feed Speed Control.	(A) Readjust the Feed Speed Control located on the air line going to the Feed Cylinder.
		(B) Air Lines.	(B) Check the Air Lines for leaks and water. If there is water in the Air Lines, disconnect and blow out all Air Lines. Remove and clean the Exhaust Muffler. Reconnect the Air Lines and the muffler.
		(C) Feed Cylinder.	(C) Turn the power and air off. Check the Feed Cylinder and the Pusher With Pawl for binding. Move the Pusher With Pawl in and out. The Pusher With Pawl should move in and out with a slight resistance.
		(D) Feed Solenoid.	(D) If the above procedures check out and the feed still has sluggish movement, the problem may be the Feed Solenoid. Remove the air line from air inlet of the Solenoid and spray a light oil into the Solenoid. Reconnect the Air Line and cycle the machine. If the feed still has sluggish movement replace the Feed Solenoid.
<b>Feed does not place Weld pins on Upper Weld Tip.</b> All Indicators are functioning correctly	All lights flash in sequence	(A) Feed Speed Control.	(A) If the Feed Speed Control is open too much it may throw pins past the Upper Weld Tip. Adjust the Feed Speed Control so that it places the pin on the Upper Weld Tip.
		(B) Upper Weld Tip.	(B) Check the Upper Weld Tip for magnetism. Place a the weld pin under the Upper Weld Tip. If the tip does not retain the pin or magnets feel weak replace the Upper Weld Tip.
		(C) Pusher With pawl.	(C) The pawl (hinged part) on the pusher may be damaged or missing. If so replace Pusher With Pawl.



***DWELL CYLINDER PROBLEMS***

<b>SYMPTOM</b>	<b>CORRECT FUNCTION INDICATOR</b>	<b>POSSIBLE PROBLEM</b>	<b>ACTION</b>
<b>Dwell Cylinder does not retract and weld stays on. Initiate, Weld Timer, Feed Reed Switch, Dwell Solenoid and Weld Signal Indicators are all on constantly.</b>	All lights flash in sequence	Weld Timer.	Remove the push-on connector from terminal #4 of the Weld Timer. If the Dwell Cylinder retracts and the weld turns off replace the Weld Timer.
<b>Dwell Cylinder does not retract and weld stays on. Initiate, Dwell Solenoid and Weld Signal Indicators are all on constantly.</b>	All lights flash in sequence	Short Cycle Relay.	In the Component Module, test for voltage (24VAC+/-) at terminals #17 and #19. If the voltage is present return to the step up above. If the voltage is not present, now check the voltage (24VAC+/-) at the terminals #9 to #24, #18 to #22 and #17 to #22. If the voltage is present all the time on these terminals replace the Short Cycle Relay.
<b>Dwell Cylinder does not retract. Dwell Solenoid and Dwell Delay Indicators are on constantly.</b>	Dwell Solenoid Indicator goes on and off with every cycle. (Stays on 150ms longer than Feed Reed Indicator.)	Dwell Timer.	Remove the push-on connector from terminal #4 of the Dwell Timer. If the Dwell Cylinder retracts replace the Dwell Timer.
<b>Dwell Cylinder does not retract.</b> All Indicators are functioning correctly	All lights flash in sequence	(A) Dwell Solenoid.	(A) Turn the power off. (If the Dwell Cylinder shaft retracts, recheck the symptom). Now try and lift the Dwell Cylinder shaft up. If the cylinder shaft cannot be lifted replace the Dwell Solenoid.
		(B) Dwell Cylinder.	(B) If the cylinder shaft can be lifted easily check the Dwell Cylinder and the air lines for air leaks. Turn the air off and then move the cylinder shaft up and down. If the cylinder shaft moves up and down without any air resistance the seals in the cylinder are most likely worn. Replace the Dwell Cylinder. If a slight air resistance is present on the up and down motion replace the Dwell Solenoid.
<b>Sluggish movement of the Welding Tip.</b> All Indicators are functioning correctly	All lights flash in sequence	(A) Air Regulator.	A) Adjust the Air Regulator (80psi).
		(B) Air Lines and Adjustable Exhaust Mufflers.	(B) Check Air Lines for leaks or water. If there is water in the air lines, disconnect and blow out the Air Lines. Remove and clean out the adjustable exhaust mufflers. Reconnect the Air Lines and the Adjustable Exhaust Mufflers.
		(C) Dwell Cylinder.	(C) Turn the power and air off. Check the Dwell Cylinder shaft for binding by moving the shaft in and out of the cylinder. A slight air resistance should be present when the shaft is being moved in and out of the cylinder.
		(D) Dwell Solenoid	(D) If the above procedures check out and the Dwell Cylinder still has sluggish movement the problem maybe the Dwell Solenoid. Remove the Air Line from air inlet of the Solenoid and spray a light oil into the Solenoid. Reconnect the air line and cycle the machine. If the Dwell Cylinder still has sluggish movement replace the Dwell Solenoid.

***PINS DO NOT WELD***

SYMPTOM	CORRECT FUNCTION INDICATOR	POSSIBLE PROBLEM	ACTION
All Indicators are functioning except: <b>Weld Signal, Weld #1 and Weld #2 do not function</b>	Weld Signal Indicator goes on and off with every cycle	(A) Short Cycle Relay.	(A) The Short Cycle Relay controls the voltage that turns on the solid-state Weld Relays that turn on the Weld Transformer. To test the Short Cycle Relay circuit check the voltage (24VAC+/-) at terminals #18 and #24 in the Control Module. Terminals #18 and #24 should go from 0 to 24VAC and back to 0 on every cycle. If this voltage reading is incorrect replace the Short Cycle Relay.
		(B) Pressure Switch. (Mach Two models only)	(B) To test the Pressure Switch place a jumper between terminals #37 and #38 on the Dwell and Feed Assembly. If the machine welds with jumper in place replace Pressure Switch.
All Indicators are functioning except: <b>Weld #1 and Weld #2 do not function</b>	Weld Relay #1 or Weld Relay #2 Indicator should correspond with Weld Signal Indicator. Goes on and off with every cycle	Head Test Switch.	The Head Test Switch is single-pole, double-throw and center off switch. This switch selects which of the 2 solid state Weld Relay controls the Weld Transformer. To test this switch check for continuity at the switch in the Control Console.
All Indicators are functioning. <b>Welding Indicator on the frame is not functioning.</b> This Indicator shows when there is voltage (230VAC+/-) present at the primary of the Weld Transformer.	All lights flash in sequence	Weld Relay	The Weld Relay controls the voltage to the primary of the Weld Transformer. To check the Weld Relays, test for voltage (24VAC approx.) at terminals A1 and A2 on the selected relay in the Component Module. Terminals A1 and A2 should go from 0 to 24VAC and back to 0 on every cycle. If this voltage reading does not correspond, check the Head Test Switch is in Weld 1 or Weld 2 position and that the weld relay you are checking is the active one. If the voltage reading was correct, test the voltage (208-230 VAC approx.) at the terminals L1 and T1. Terminals L1 and T1 should go from (208-230 VAC approx.) to 0 and back to (208-230 VAC approx.) with every cycle. If this voltage is incorrect replace the Weld Relay.
All Indicators are functioning including the Weld Indicator on the frame	All lights flash in sequence	Weld Transformer.	To test the primary of the Weld Transformer check the voltage at the terminals L1 and T1 on the Relays. They should go from (208-230 VAC+/-) to 0 and back to (208-230 VAC+/-) every time the machine cycles. Now test the secondary output voltage. Place meter leads on copper bars coming out of the transformer(s) and test the voltage every time the machine is cycled. The Mach 1 Weld Transformers should read approximately 5VAC. (2.5 VAC x 2 = 5VAC) The Mach 2 Weld Transformer should read approximately 10VAC. (5VAC if on center tap) If the secondary voltage reading is incorrect replace the transformer. (Turn the weld time to the highest setting when performing this test.)

***POOR WELD QUALITY***

SYMPTOM	CORRECT FUNCTION INDICATOR	POSSIBLE PROBLEM	ACTION
<b>Dwell Delay Indicator is not functioning</b>	Dwell Delay Indicator comes on when the Weld Timer Indicator goes off and then goes off when the Dwell Solenoid Indicator goes on	(A) Short Cycle Relay or First Pulse Relay	(A) The Dwell Timer keeps the Dwell circuit on 150ms longer than the Weld Timer circuit. To check the Dwell Timer test for voltage (24VAC+/-) at terminal #11 and #12 in the Component Module. The voltage on terminals #11 and #12 should go from 24VAC to 0 and back to 24VAC with every machine cycle. If this voltage reading is correct proceed to step (B). If this voltage reading is incorrect check the Short Cycle Relay at the terminals TB4 (NC) and #11. This voltage reading should go from 24VAC to 0 and back to 24VAC on every machine cycle. If this voltage reading is incorrect replace the Short Cycle Relay. If this voltage reading is correct and the voltage reading at terminals #11 and #12 is still incorrect replace the First Pulse Relay.
		(B) Dwell Delay Timer	(B) If procedures in (A) test correctly now check the voltage (24VAC+/-) at the terminals #9 and #12 in the Component Module. The voltage at the terminals #9 and #12 should go from 0 to 24VAC and back to 0 on every machine cycle. If this voltage reading is incorrect replace the Dwell Timer.
All Indicators are functioning	All lights flash in sequence	(A) Weld Cable.	Any connection from the secondary of the Weld Transformer to the weld tips can contribute to a poor quality weld. All the connections should be <b>clean, bright and tight</b> . The Weld Cable can break down from use. Always inspect the Weld Cable, Weld Transformer secondary connections and weld tips for they are the most common causes for a poor weld quality.
		(B) Upper and Lower Welding Tips.	Clean and Retighten
		(C) Upper Tip Retainer.	Clean and Retighten
		(D) Female Camlock	Clean and Retighten
		(D) Flush Mount Camlock	Clean and Retighten
		(F) Power Supply Bar	Clean and Retighten

## ***VIBRATOR PROBLEMS***

<b>SYMPTOM</b>	<b>CORRECT FUNCTION INDICATOR</b>	<b>POSSIBLE PROBLEM</b>	<b>ACTION</b>
<b>Vibrator does not vibrate at all.</b>	N/A	(A) Vibrator Circuit Breaker.	(A) Check Vibrator Circuit Breaker (Located on the rear of the Control Console.) (208-230VAC+/-) If Circuit Breaker read 208-230V, Circuit Breaker is open. If so, push in Circuit Breaker to reset. If OV, go to step B.
		(B) Vibrator Power Switch.	(B) Check Vibrator Power Switch in the Control Console. (208-230VAC+/-) between switch term 4B-2A, than 3B-1A.
		(C) Vibrator Sensor and Receiver Board	(C) The Track Sensor controls the Receiver Board which controls the Vibrator Control Relay. Check the Track Sensor for the red LED. If the LED is not on, check the terminals G and H on the Receiver Board in the Control Console (top rear) for the 12 V dc. If the voltage is present, replace the Track Sensor. If the voltage is not present at G and H, check for 24 V ac at terminals A and B. If the voltage is present at A and B, replace Receiver Board. If the LED is on, jump C and D on the Receiver Board. This should make the vibrator run. If the vibrator runs, check the line of sight through Track Casting. If the line of sight is good, replace the Track Sensor. If the vibrator still does not run, jump A and F on the Receiver Board. If the vibrator now runs, replace Receiver Board. If the vibrator still does not run, proceed to next step.
		(D) Vibrator Control Relay Board	To check the Vibrator Control Relay, test the voltage (24VAC+/-) at terminals #T2 and #T5. There should be 24VAC at these terminals when there is no weld pin at the Track Sensor. If this reading is correct (Vibrator Sensor), now check the voltage (208-230VAC+/-) at terminals #T1 and #T11 on the relay board. When the main power is on, these terminals should always have voltage. Now check the voltage (208-230VAC+/-) at terminals #T3 and #T9. If there is no voltage at these terminals and the above is correct, replace the Vibrator Control Relay Board.
		(E) Vibrator Speed Control.	(E) In the Control Console, check for voltage (208-230VAC+/-) at terminals #1 and #3 on the Vibrator Speed Controls. If there is 208-230VAC at terminals #1 and #3 replace the Vibrator Speed Control.
		(F) Vibrator Coil.	(F) Measure the resistance at the plug (two outside pins) of the Vibrator. The resistance reading should be approximately 60 ohms. If this reading is not correct replace the Vibrator Coil.
<b>Vibrator vibrates but not enough to move weld pins.</b>	N/A	(A) Vibrator Speed Control.	(A) To test the Vibrator Speed Control place your hand on the Vibrator Bowl and watch the Vibrator Sensor Indicator. Now adjust the Vibrator Speed Control from slow to fast and back. If you feel no change in the intensity on the bowl or see any change in the intensity on the Vibrator Sensor Indicator, replace the Vibrator Speed Control. If a change in the intensity is present proceed to the next step.
		(B) Vibrator	(B) Turn the power off and remove Vibrator Bowl and inspect the springs and weldments for any damage. Contact Tech Service.

## ***NOTES:***

1. The Feed Reed Switch is a safety that will not allow the machine to operate if the feed cylinder is not fully retracted. The Feed Reed Switch is located on the Feed Cylinder. To check that the Feed Reed Switch is positioned properly, loosen the set screws and put an Ohm meter on terminals 35 and 36 exhaust. Slide the Feed Reed Switch back and forth until continuity is indicated, then tighten the set screws.
2. Check that the Air Regulator is set for 80 psi. Mounted on the Dwell Solenoid are two Adjustable Mufflers. The top one adjust the speed of the cylinder moving down and the bottom one adjust the speed up. These mufflers can become restricted or loose. If the machine is sluggish or starts slamming down, adjust these mufflers accordingly.
3. The First Pulse Reed Switch is located in the middle of the Dwell cylinder.
4. To check that the Dwell Reed Switch is positioned properly, loosen the set screws and put an Ohm meter on terminals 31 and 32. Slide the Dwell Reed Switch up and down until continuity is indicated, then tighten the set screws.
5. Mounted on the Feed Cylinder is a Feed Speed Control. The Feed Speed Control adjusts how fast the Pusher With Pawl assembly moves in and out. If adjusted too fast the pins may be tossed past the tip. If adjusted too slow the pins will not be placed on the tip.



***PARTS LIST***

17084	Air hose 3/8" natural	39359	Feed channel spacer
17135	Lift Kit	40102	Air hose 3/8" blue
17189	Upper weld tip plates - (5/pkg)	40105	Air hose 1/4" yellow
17190	Lower weld tip plates - (5/pkg)	40106	Air hose 1/4" blue
17191	Upper weld tip	44010	Lower track casting
17192	Lower weld tip	44014	Feed solenoid
17198	Track casting spacers and screws	44019	Weld cable camlock
17203	Fiber insulator	44020	Head terminal strip
17222	Terminal strip - low voltage	44022	Lower ground bar
17236	Dwell Cylinder Bracket	44024	Main power switch
17257	Vibrator support casting	44025	LCD display
17260	Upper feed track casting	44026	Weld potentiometer
17265	Lower track side rails	44027	Weld potentiometer knob
17266	Feed channel	44027	Vibrator potentiometer knob
17269	Feed cylinder bracket	44029	Head test switch
17288	Footswitch plug	44030	Troubleshooting LED display
17317	Feed speed control	44031	Vibrator potentiometer
17318	Feed timer	44032	Vibrator lamp
17319	Dwell timer	44033	Vibrator power switch
17319	Weld timer	44034	Weld lamp
17323	Short cycle relay	44041	Line cord
17323	First pulse relay	44042	Line cord strain relief
17325	Pressure switch	44045	Weld cable guard
17327	Footswitch receptacle	44047	Power contactor
17348	Feed channel plate	44051	Relay Board
17351	Pusher and pawl	44052	12 volt DC power supply
17352	Upper tip retainer	44053	Weld Relay
17356	Adjustable muffler	44054	Heat Sink
17363	Dwell reed switch	44090	Vibrator Control Relay Board
17363	First pulse reed switch	44091	24V Multi-Tap Transformer
17363	Feed reed switch	44095	Track Sensor
17364	Feed cylinder	44101	220V 7KVA MCI Transformer
17372	Footswitch	44102	Dwell Cylinder
17376	Lower mandrel	44103	Upper Track Side Rail - Short
17377	Air regulator	44104	Upper Track Side Rail - Long
17394	Short shaft extension	44105	Power Pack Tray
18066	200V Phase Control	44106	Power Pack Cover
18065	Vibrator Circuit Breaker (2 Amp)	44107	Dwell Cover
39068	Receiver Board	44108	Feed Cover
39110	Pin feed switch	44109	Control Module
39196	220V Vibrator Female Cord	44110	Head Mounting Plate
39273	Vibrator Base Plate	44111	Short Weld Cable
39296	Vibrator Bowl Assembly	44113	Component Module
39298	220V Vibrator with cord	44114	Vibrator Strain Relief
39306	Incoming Voltage Selector Switch	44115	Hi-Volt Terminator Strip
39353	Anti-friction strip	44116	Dwell Solenoid Assembly

***NOTES***

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**NOTES**

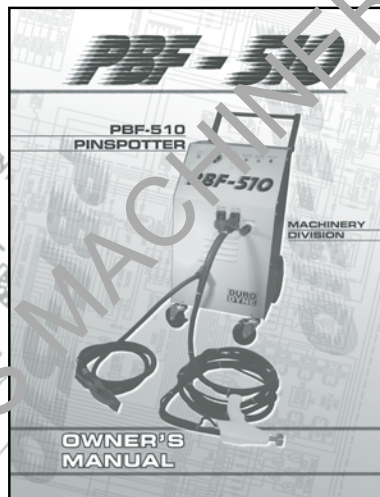
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