MICRO WELD

MODEL MD 4, 5 & 6

FLASH

BUTT WELDERS

MICRO PRODUCTS COMPANY

SERVICE MANUAL

TABLE OF CONTENTS

1.0 SPECIFICATIONS	**MODEL MD 4**	**MODEL MD5**
Type of Welding Process	Flash Weld	Flash Weld
Welding Range	.250 to .750	.500 to 1.125
Material Suitability	Steel Rod	Steel Rod
Standard Operating Voltages	460/230 Volts	460/230 Volts
Maximum Line Demand 460 Volt	115amps@100% duty cycle 362amps@10% duty cycle	137 amps@100% duty cycle 433 amps@10% duty cycle
Maximum Line Demand 230 Volt	230amps@100% duty cycle 724amps@10% duty cycle	274 amps@100% duty cycle 866 amps@10% duty cycle
Single Phase AC Transformer	75 KVA @ 50% duty cycle	90 KVA @ 50% duty cycle
Clamp Method Upset Method	Pneumatic, Foot Controlled Motor, Adjustable	Pneumatic, Foot Controlled Motor, Adjustable
Mounting	4-Caster Wheels	4-Caster Wheels

Dimensions and Weights

Height Overall	50 in.	50 in.
Floor space	60 in. x 37 in.	60 in. x 37 in.
Welding Die Height	43 in.	43 in.
Weight	2025 LBS	2325 LBS

2.0 SPECIFICATIONS	**MODEL MD 6**	
Type of Welding Process	Flash Weld	
Welding Range	.750 to 1.500	
Material Suitability	Steel Rod	
Standard Operating Voltages	460/230 Volts	
Maximum Line Demand 460 Volt	472amps@100% duty cycle 944amps@10% duty cycle	
Maximum Line Demand 230 Volt	944amps@100% duty cycle 1888amps@10% duty cycle	
Single Phase AC Transformer	308 KVA @ 50% duty cycle	
Clamp Method Upset Method	Pneumatic, Foot Controlled Motor, Adjustable	
Mounting	4-Caster Wheels	

Dimensions and Weights

Height Overall	50 in.	
Floor space	40 in. x 85 in.	
Welding Die Height	44 in.	
Weight	5400 LBS	

FEATURES

- Micro Weld quality and workmanship
- Heavy-duty construction & components
- East to operate controls
- Low maintenance costs
- Easy to set welding parameters
- Safety electrical switch circuits
- Heavy-duty weld heat selection switch
- Sensitive straight slide movable headpiece assembly

2.0 GENERAL OPERATING INSTRUCIONS

2.1 ELECTRICAL HOOK-UP INSTRUCTIONS

First determine that available electrical service in your plant corresponds to the nameplate rating located on welder housing. Electrical wiring to welder must be of sufficient size to deliver full ampere load with no appreciable loss during weld cycle. The welder will not operate properly if there is more than a 10% variation in the line voltage. In general, the welder should be fused with a slow blow fuse of the 100% duty cycle rating. The minimum power cable size to the welder can be obtained by using this same current rating.

Refer to National Electrical Code and local electrical regulations for adequate power sizes; disconnect methods and fusing guidelines.

Remember line voltages to the welding machine are potentially dangerous should the power cords be damaged or severed. The welding voltages at the welding dies will not harm an operator since they do not exceed 10 volts.

2.2 SAFETY PRECAUTIONS
(See section 11.0)

2.2.1 ELECTRICAL

Maintain electrical cable to welder in good repair. Welder must be grounded and connections securely tightened. Heat Switch must not be changed to new position while a weld cycle is in process. Disconnect electrical service before serving welder – high voltages are located within the base of the welder.

2.2.2 MECHANICAL

Operator while using welder must wear safety glasses. Keep all safety guards on welders and use properly. Operators must be instructed on basic operation of unit to prevent injury. Check nameplate rating and keep within material size range for each welder.

2.3 WATER-HOOK-UP (if so equipped)

It is important that if a welder is to be operated for an extended period of time and heads heat up, water lines must be connected to the welder. Connect hoses to inlet and outlet provided at the back of the welder. Shut-off valve should be installed in the inlet line and the hose from the outlet should run to an open sight drain. Water should be turned off when welder is not in use.

2.4 AIR HOOK-UP

Set air regulators for from 20 to 80 lbs. A safety pop-off valve will be activated when air gauge is set for over 100 lbs.

2.5 WELDING DIES

The dies and shoes supplied with the welder will handle most size and material types within the range of the welder. For new weld applications consult the factory for special die and shoe sets.

3.0 BASIC OPERATING PARTS

3.1 WELD HEAT SELECTION SWITCH

Weld heat is selected by means of a heavy-duty tap switch with 6 steps of voltage. The switch is conveniently located on the lower front of the welder. Number one indicates the high heat; number 6 indicates low welding heat. Other numbers are equally graduated from high to low to allow just the right amount of voltage for the weld operation. (Not illustrated)

3.2 HEAD OPEN SPACE STOP BOLT

The head open space stop bolt is located on the top plate in the right rear. This adjustment is used to set the starting space between the dies.

3.3 HEAD CLOSED SPACE BOLT

The head closed space bolt is located on the movable headpiece end plate. This adjustment is used to set the closed or finishing space between the weld dies.

3.4 WELD LIMIT SWITCH

The weld limit switch is located behind a small door on the lower right of the front panel.

3.5 MOTOR LIMIT SWITCH

The motor limit switch is located behind a small door on the lower right of the front panel.

3.6 WELDING DIES

The welding dies (lower) and die shoes (upper), serve three purposes:

1. To carry current for welding
2. To align two ends of stock
3. To prevent material slippage during a weld cycle. Small rod is placed in the smaller grooves and the larger rod is placed in the bigger grooves.

3.7 WELDER PUSHBUTTON OPERATING STATION

Four pushbutton switches make up the welder operating station.

3.7.1 WELD BUTTON

This button activates all electrical circuits and initiates the weld flash cycle after all safety devices have been closed.

3.7.2 MOTOR BUTTON

This button activates the motor drive circuits only and is used in adjusting welder spacing without activating the weld transformer.

3.7.3 ANNEAL BUTTON

This button activates the manually operated anneal circuit only.

3.7.4 STOP BUTTON

This button terminates all electrical cycles and can be used with the motor button to aid in making welder adjustments.

3.8 CLAMP ARMS

The clamp arms are air operated. The foot controlled air valves are used to initiate the air clamp cylinders. The foot valves are located at the bottom of the welder housing. The right foot pedal operated the right clamp arm, and the left pedal operates the left clamp arm. To clamp stock, place it in the proper welding die groove and press the top edges of the tilt pedal on foot valve. To release stock, press on bottom edge of foot valve tilt pedal. **CAUTION:** Care must be used when clamping stock, be sure hands are clear of clamp arms. An air regulator with gauge is located on the left end of the welder and should be adjusted from 80-90 (PSI). Flow control valves are factory installed to keep clamp arm movement slowed.

3.9 MOTOR SPEED CONTROL

The motor speed control is located on the right front panel. A potentiometer located on the control box will adjust the motor speed. A scale of 1-10 is found on the potentiometer, 1 is slow and 10 is fast.

4.0 BASIC OPERATING PARTS LOCATION

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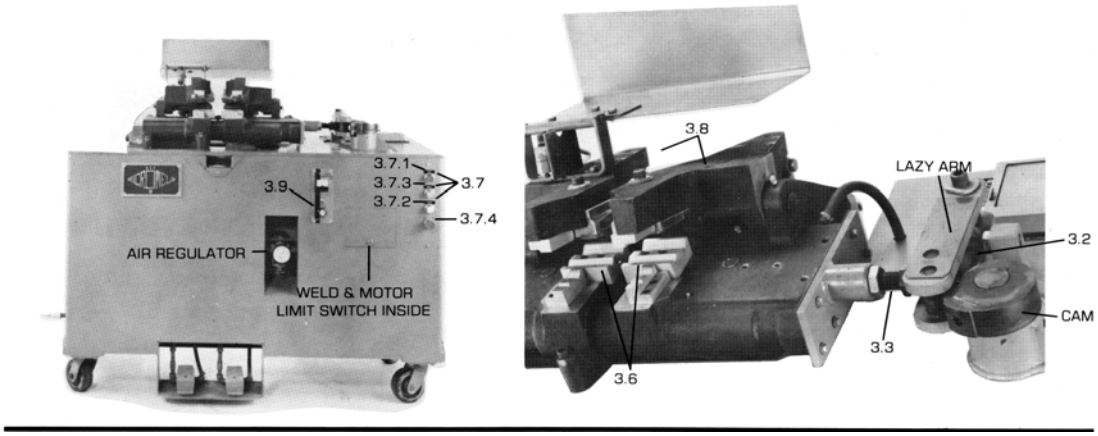


5.0 TYPICAL SEQUENCE OF OPERATION

Wire to be joined must be free of rust, corrosion or other insulating materials, clean wire where it makes contact with welding dies. (Refer to section 8.0 for approximate settings.)

5.1 Adjust head open space.

5.2 Adjust head closed space.

5.3 Adjust weld limit switch.

5.4 Adjust motor speed.

5.5 Pinch cut stock ends.

5.6 Place stock into welding dies so wire ends meet midway between each welding die. Clamp into position with foot valve pedals. After clamping the stock into position there should be approximately 1/16" between stock ends.

5.7 Lower the flashguard to close the safety switch.

5.8 Press weld button firmly in and release.

5.9 Because of the amount of flashing it is advisable to step back from machine.

5.10 Welder will finish the weld cycle without assistance.

5.11 Unclamp stock leaving weld burr intact.

5.12 Hard drawn stock, mild or high carbon steel will require an anneal operation. (See 5.15)

5.13 Trim off weld burr so welded area is equal to parent material diameter. Incomplete burr removal or undercutting of the weld area will result in subsequent weld breaks.

5.14 ANNEAL OPERATION

An anneal cycle may be incorporated to process material for improved bending qualities by placing welded stock into anneal dies located on welder. This may be a standard anneal device activated by a manual "Anneal Button" or an accessory device that will automatically process the anneal cycle, as explained below.

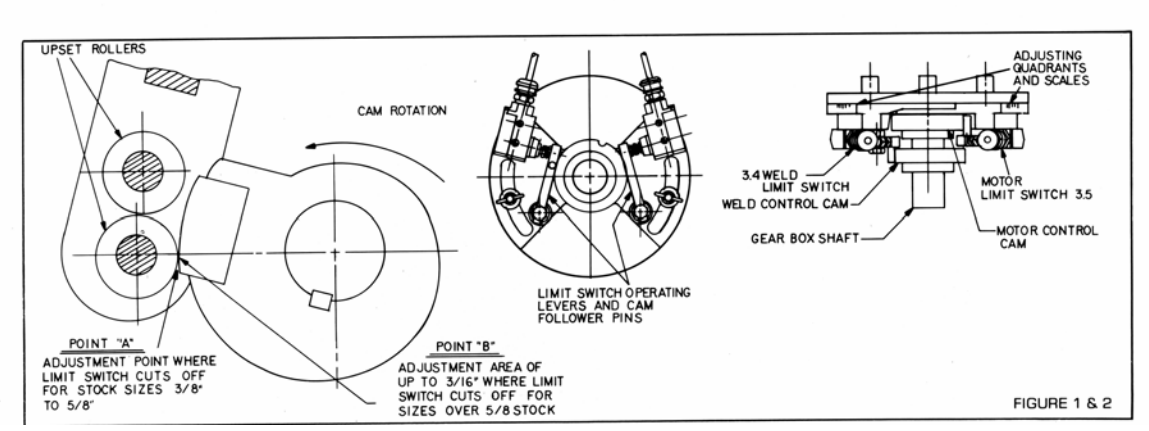
5.15 OPERATING INSTRUCTIONS – PULSATING ANNEAL TIMER UNIT

To operate the pulsating anneal timer incorporated in the Model MD-4, MD-5 and MD-6 welder, remove the weld from the welding jaws and Reclamp the wire in the anneal jaws located in front of welder. The weld burr should be placed midway between the anneal jaws. Activate automatic anneal operating switch located on front panel.

Before annealing a weld, it would be best to clamp a wire the same size as the wire to be welded in the anneal jaws as a test to determine the approximate timer settings. Set the anneal heat switch one heat higher than that used to weld the wire. Next, set top timer dial (total time) to around 30 seconds and the On-Timer to two seconds and the Off-Timer to two seconds. Depress and release anneal switch. Timers will complete the time cycle and turn off. If settings given above heat the wire too hot, any of these three settings may be lowered: (A) Anneal heat switch setting. (B) Overall time. (C) Time on.

If setting does not heat the rod up enough, increase any one or more of the settings mentioned above. The Off-Time is used to allow heat pulses to spread out into the wire being heated. The ideal settings are those that cause the temperature to rise gradually to the correct anneal temperature and then cut off.

Variations in the temperature from one time to another can be caused by not starting with approximately the same rod temperature or variations in electrical contact between the rod and anneal jaw. Once settings have been determined for a particular size and alloy, a chart can be made so they may be repeated.



6.0 SPECIAL ADJUSTMENTS

6.1 HEAT SWITCH SETTINGS

This setting determines the amount of heat available for welding. In general use higher heat settings for larger stock and lower heat settings for smaller stock. Number one heat is the highest setting and number six heat is the lowest heat.

6.2 HEADPIECE CLOSED SPACE

The closed space bolt should be adjusted to equal the diameter of the rod as measured between the dies at the groove being used to weld that particular stock size. The closed space should be set prior to setting the open space adjustment. Refer to Figure 4 for this setting.

6.3 HEADPIECE OPEN SPACE

The headpiece open space is adjusted by a bolt that pushes against the lazy arm. (See Figure 5.) This setting must be made after setting the closed space adjustment. Use the method described in Figure 5 to establish the proper open space.

6.3.1 On the MD-6 Model, please refer to figures 1-5 in conjunction with Section 10, Print #B-5809.

6.4 WELD LIMIT SWITCH

The weld limit switch adjustment will either increase or decrease the time of the heat cycle during the weld cycle. Determine which quadrant to change; a single winged nut maintains the quadrant position. Loosening this nut will enable the quadrant to be changed to a new position on a graduated scale etched on the quadrant. (Refer to Figures 1 & 2.) (Also refer to Section 8.0 for approximate setting.)

6.5 MOTOR LIMIT SETTING

The motor limit switch quadrant is factory preset and should not need field adjustment. But if this ever needs adjustment—Determine which quadrant to change; a single winged nut maintains the quadrant position. Loosening this nut will enable the quadrant to be changed to a new position on a graduated scale etched on the quadrant. (Refer to Figure 1.)

6.6 DRIVE MOTOR ADJUSTMENT
(DC Drive is Standard/AC Drive is Optional)

This adjustment is made by turning a potentiometer on the front of the welder. A graduated scale of 1-10 is located on the potentiometer. #1 is slowest speed and is used for larger stock. During a weld cycle, there should be flashing when the ends of stock begin to touch and until the cam insert engages the lazy arm roller. If this does not happen, refer to Section 9.0.

HEADPIECE AND WELDING DIE ADJUSTMENTS

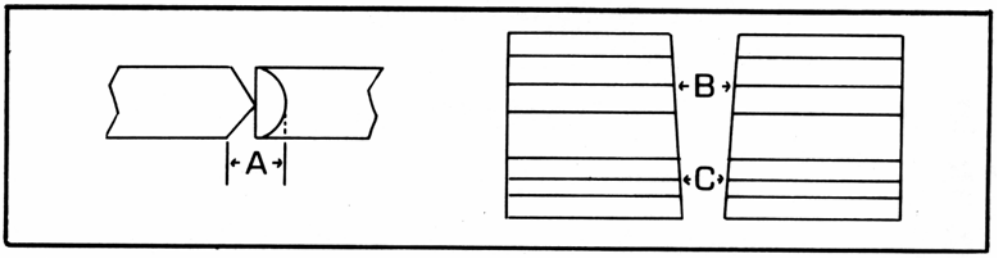


FIGURE 3 - STARTING POSITION OF WELDING DIES.
LENGTH OF PINCH CUT PLUS 1/4" EQUALS SPACE BETWEEN WELDING DIES.
EXAMPLE: A = 1/2"
A + 1/4" = B or C
1/2" + 1/4" = 3/4"

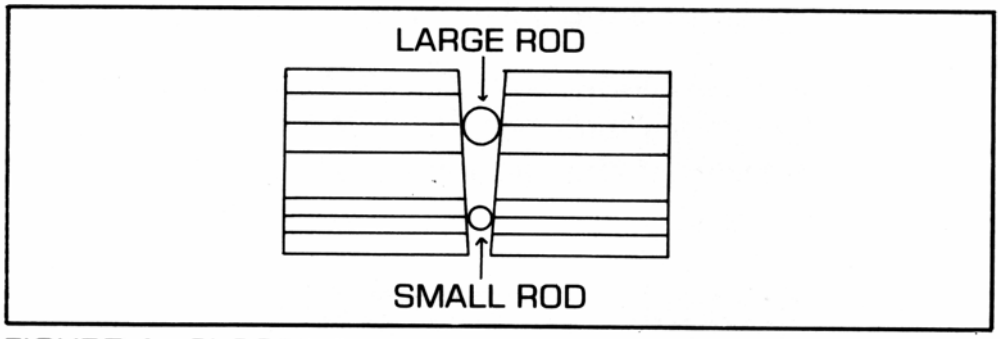


FIGURE 4 - CLOSED POSITION OF WELDING DIES.
SPACE BETWEEN WELDING DIES EQUAL TO DIAMETER OF ROD WELDED. (CHECK WITH MOVABLE HEADPIECE IN MAXIMUM UPSET POSITION.)

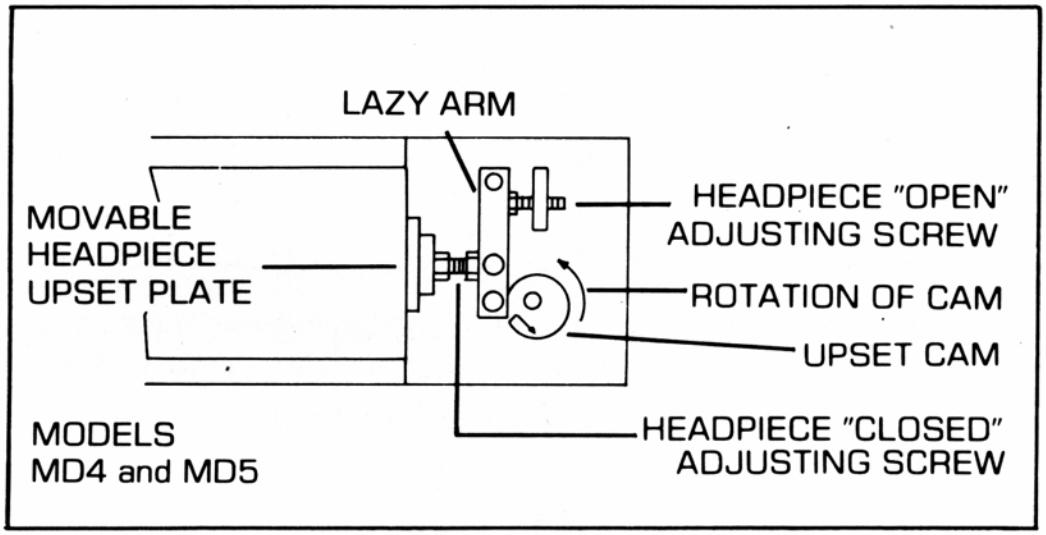


FIGURE 5 - ADJUSTING FOR STARTING POSITION AND ADJUSTING FOR CLOSED POSITION ON THE MD4 and MD5.

THE STARTING POSITION IS ADJUSTED BY THE LAZY ARM STOP SCREW, AND THE LARGE SCREW AND NUT ON UPSET PLATE ADJUST THE CLOSED POSITION.

7.0 PREVENTIVE MAINTENANCE TECHNIQUE MAINTENANCE PROCEDURES AS REQUIRED

Keep in mind that these welders are precision built to last many years, but will require good maintenance procedures. They are designed to be as automatic as possible with a minimum dependence on the ability of the operator. Adjustments must be made by those thoroughly familiar with the operating principles of the welders.

Brush loose flashings from dies, clamp shoes and flash tray to prevent excessive build-up.

Check welding die shoes and dies for excessive wear. Replace both sets if they become excessively worn. Welding dies in poor condition is primary cause of poor welds. Welding die notes: Remove dies and clean or replace as necessary. By placing welding dies on fine emery cloth located on a flat surface, dies may be brightly polished. Brighten die seats on headpieces by placing emery cloth on a flat file. Replace dies and pull down tightly.

7.1 DAILY

7.1.1 Check for water leaks.
7.1.2 Check for air leaks.
7.1.3 Drain airline filter bowl.
7.1.4 Tighten any loose parts.
7.1.5 Clean flash pan.

7.2 WEEKLY

7.2.1 Repeat above service items
7.2.2 Grease following places with hand grease gun:
A. Clamp arm pivot bearings.
B. Headpiece slide bearings
C. Upset lever arm bearing.

7.3 QUARTERLY-DISCONNECT POWER FROM WELDER

7.3.1 Repeat above service items.
7.3.2 Tighten transformer clamp retaining ring to prevent transformer laminations from vibrating out of place.
7.3.3 Blow all flashings from top of transformer to prevent shorting of secondary.
7.3.4 Check contacts on magnetic contactor, replace if worn badly burned.
7.3.5 Wash contacts on heat selection switch with carbon tetrachloride, dry with a clean cloth and place a thin coat of petroleum jelly on contacts.

7.4 ANNUALLY – DISCONNECT POWER FROM WELDER

7.4.1 Repeat above service items.
7.4.2 Check for wear in clamp arm bearings, replace when needed.
7.4.3 Check for excessive headpiece wear (die seats not lining up properly).
7.4.4 Check pop safety valve on air system to be sure they are operative.
7.4.5 Clean inside of welder housing.

7.5 WELDING DIES AND DIE SHOES INFORMATION

Description:

Welding dies – Lower conducting electrode and clamp jaw.

Welding die shoes – Upper clamping member.

Welding dies and die shoes in poor condition are the main causes of bad welds.

CARE OF DIE SETS:

7.5.1 Use a brass or fiber blade to remove particles of flashings that build-up on die sets. Excessive flash build-up causes die burns on material and shorting of die sets.

7.5.2 Do not attempt to clamp material that is not suited for welder into die sets. Undersize materials will slip and burn die grooves, oversize materials will overstress clamping parts.

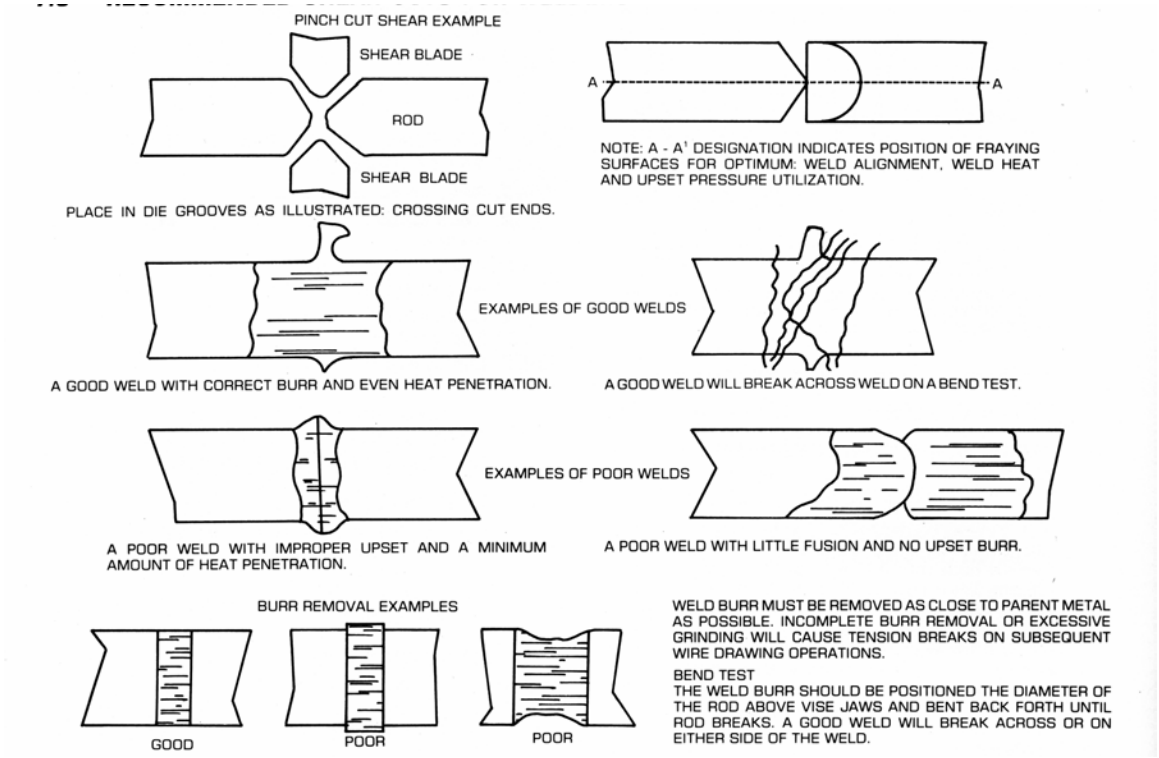
7.5.3 Do not use welding die sets for a vise. These parts will not withstand the mechanical abuse.

7.5.4 Whenever welding dies are replaced, clean bottoms of dies and corresponding die seats to a bright and clean condition before bolting them tightly into place. An oxidized surface will insulate the welding dies and reduce effective welding voltage.

7.5.5 Welding die shoes must swivel freely within clamp arm pivots to prevent cracking of die shoes. File down die shoe boss if necessary.

7.5.6 Welding die set will wear with use and must be changed occasionally for good welding results. Keep and adequate supply of replacement parts available. Wire and rod slippage is a problem caused by poor die sets and a major cause of wire breaks.

7.6 RECOMMENDED SHEAT CUTS FOR WELDERS



8.0 SUGGESTED SETTINGS

MATERIAL	SIZE	WELD HEAT	FLASHING SPEED	WELD LIMIT SWITCH SETTING	STARTING SPACE BETWEEN DIES	GROOVE	CLAMP PRESSURE
MD-4 .250-.750							
Steel	¼″ Dia	6	100%	1	1 ½″	Front	100 PSI
Steel	3/8″ Dia	5	90%	1	1 ½″	Middle	100 PSI
Steel	½″ Dia	5	80%	1	1 ½″	Middle	100 PSI
Steel	5/8″ Dia	4	70%	4	1 ¾″	Rear	100 PSI
Steel	¾″ Dia	2	70%	4	1 ¾″	Rear	100 PSI
MD-5 .500-1.125							
Steel	½″ Dia	6	100%	1 ½	1 3/8″	Front	100 PSI
Steel	¾″ Dia	5	100%	2	1 3/8″	Front	100 PSI
Steel	1″ Dia	2	60%	2 ¾	1 ¾″	Rear	100 PSI
Steel	1 1/8″ Dia	1	60%	2 ¾	1 ¾″	Rear	100 PSSSI
MD-6 .500-1.500							
Steel	9/16″ Dia	6	100%	4 ¼	2 1/8″	Front	100 PSI
Steel	5/8″ Dia	6	100%	4 ¼	2 1/8″	Front	100 PSI
Steel	¾″ Dia	6	90%	4 ¼	2 1/8″	Front	100 PSI
Steel	1″ Dia	4	70%	3	3″	Rear	100 PSI
Steel	1 1/8″ Dia	4	65%	3	3″	Rear	100 PSI
Steel	1 1/8″ Dia	4	60%	2	3″	Rear	65 PSI
Steel	1 ½″ Dia	2	50%	1	3 ¼″	Rear	90 PSI

9.0 DIAGNOSTIC CHART FOR TROUBLE-SHOOTING

WELDING ACTION	CAUSE	REMEDY
Starts flashing but cycle is broken and weld, if any, has large push-up or weld may pull apart.	Weld heat too low	Increase weld heat
	Upset speed too fast for welding heat	Slow down flash cycle
	Flashing cycle too long for stock size	Allow small space between ends of stock when placed in welding dies
Does not start flashing, makes big burr or hot metal drops out before weld cycle is complete	Ends of stock too blunt	Grind or cut stock to chisel point
	Weld heat too low	Increase weld heat or slow down upset speed
Weld cycle normal-yet voids found in weld	Weld limit switch set to hold on too long	Increase weld heat or slow down upset speed
	Lack of shims under upset cam	Add extra shims under upset cam (1/32” at a time)
	Pinch cut on rod too tapered or flashing cycle is too short	Change angle of rod cut or adjust for longer flash cycle
Weld action normal until upset occurs then welder stalls	Too much shim thickness under upset cam	Remove some of upset cam shims
	Flashing cycle too short	Decrease flashing speed or increase weld heat
	Dirty stock causing poor contact between die and material	Clean scale or rust from stock
Flashing and weld cycle seem normal but weld is pulled apart while hot	Weld limit switch set to hold on too long	Readjust limit switch to cut out sooner
	Too much heat stored in rod during flashing	Space ends apart to shorten flash cycle
	Flashing speed too slow or weld heat too hot	Increase flashing speed
Weld burns on stock	Dirty stock	Remove rod scale before welding
	Dirty dies	Wire brush die grooves
Variations in welding	Loose upset cam	Tighten cam-check locking key
	Input voltage variations	Check input voltage only 5% drop permissible
	Loose welding die or transformer secondary connection	Clean and tighten secondary connections
Misalignment of rods	Worn die grooves	Replace dies
	Starting gap between dies too great	Reduce starting space either with motor limit switch or space adjusting screw
	Loose headpiece slide shafts	Return to factory for re-cementing
	Ends or rod bent	Straighten 6” of material where rod meets dies

9.1 ELECTRICAL TROUBLE-SHOOTING OF WELDER

(Caution!! Extreme care should be exercised when making these tests. Dangerous voltages are present in the welder. Only persons familiar with electrical safety precautions should perform these tests.)

9.1.1 TROUBLE-SHOOTING TABLE (See section 9.1.3)

This electrical trouble-shooting table is furnished as a suggested method of trouble-shooting the welder. The individual steps of the table should be performed in the order given, to make the tests valid. The electrical schematic (section 10) furnished for these tests show the table test points. The table may be used for welders with a different but closely related wiring by using corresponding test points. During all tests, line voltage should be connected to L1 & L2 of the welder. The heat switch should be set to the #1 position.

9.1.2 FINAL ELECTRICAL CHECKS

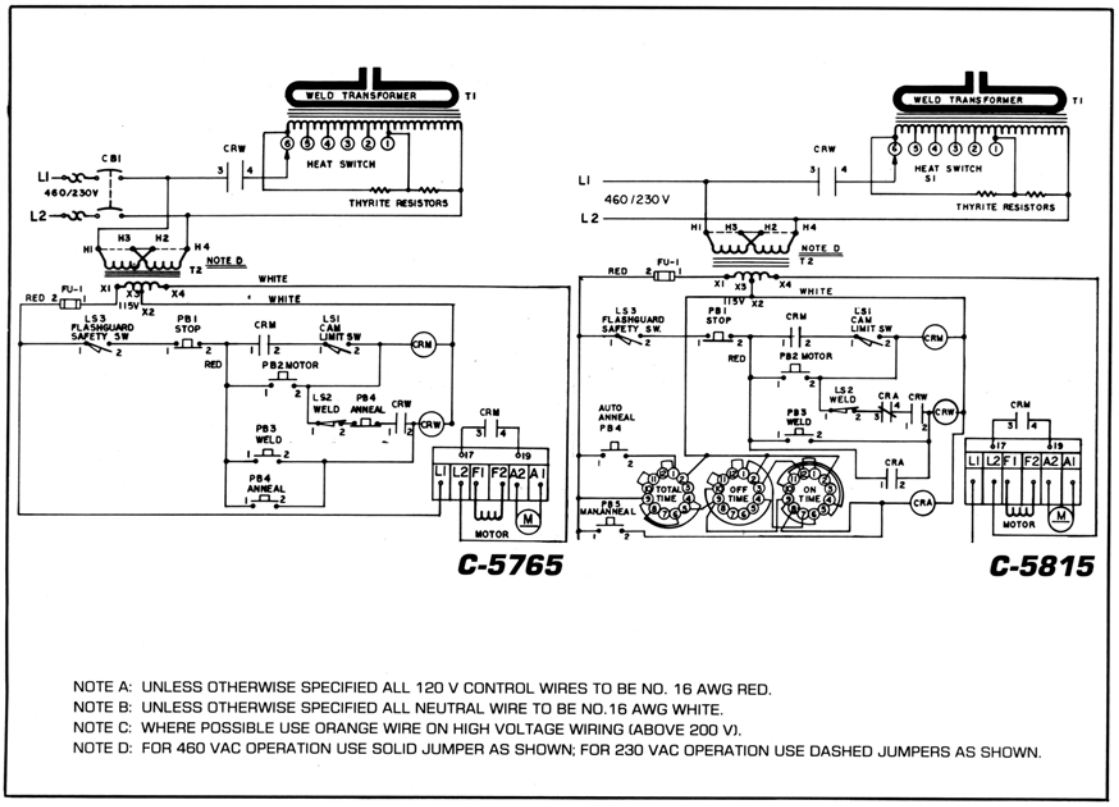
Set the heat switch to the number 1 position, connect the voltmeter across the welding dies. Press the operating switch. The meter reading will typically be less than 10 VAC. Consult the weld specification sheet for this value. Rotate the heat switch through all settings. If the voltage is not read at any setting, the heat switch may be defective. Actuate the weld limit switch; observe the reading goes to zero. Release the weld limit and operating switches, the reading should remain at zero.

9.1.3

TEST LEAD CONNECTION	METER READING	PROBLEM IF NO READING	PRESS OPERATING SWITCH	WELD LIMIT SWITCH ACTUATED	PRESS ANNEAL SWITCH
X1 X2	115 VAC	Bad control transformer			
X2 FU1-1	115 VAC	Bad fuse connection			
X2 FU1-2	115 VAC	Open fuse			
X2 LS3-2	115 VAC	Open flashguard switch			
X2 PB1-2	115 VAC	Open stop switch			
X2 LS1-2	115 VAC	LS1 open			X
X2 Ls1-2	115 VAC	CRM contacts open			
X2 PB3-2	115 VAC	Bad weld switch	X		
X2 LS2—1	115 VAC	Open connection to weld limit switch			
X2 LS2-2	115 VAC	Open weld limit switch			
X2 CRW-2	115 VAC	PB4 or CRW defective	X		
X2 PB4-1	115 VAC	Open wire to anneal switch			
X2 PB4-2	115 VAC	Bad anneal switch			X
L2 CRW-3	Line voltage	Open wiring to contactor			
L2 CRW-4	Line voltage	Bad contactor	X		
L2 T1-1	Line voltage	Open wire to heat switch	X		

NOTE: To perform repair consult section 13 for parts identification.

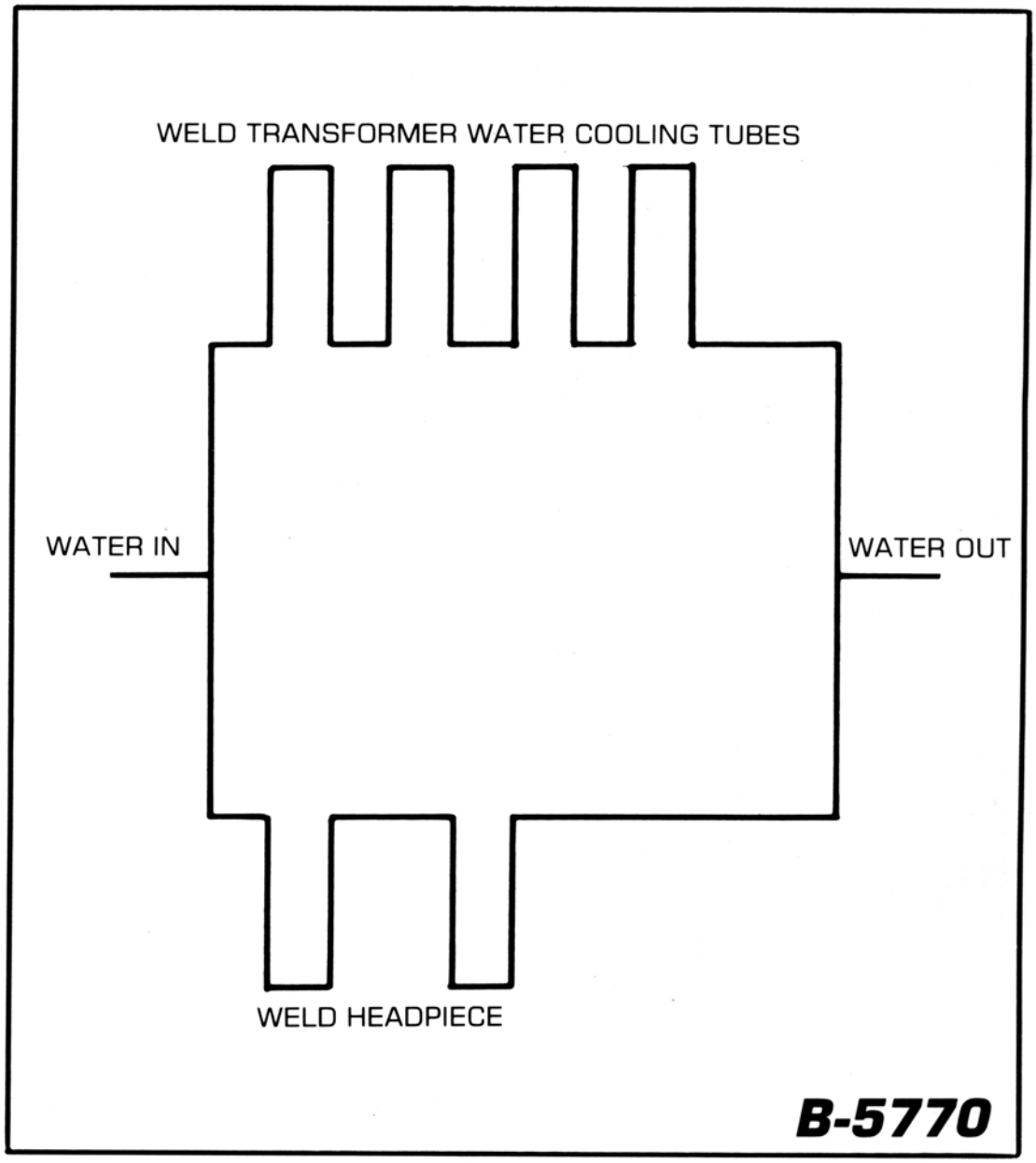
10.0 ELECTRICAL SCHEMATIC



NOTE A: UNLESS OTHERWISE SPECIFIED ALL 120 V CONTROL WIRES TO BE NO. 16 AWG RED.
NOTE B: UNLESS OTHERWISE SPECIFIED ALL NEUTRAL WIRE TO BE NO.16 AWG WHITE.
NOTE C: WHERE POSSIBLE USE ORANGE WIRE ON HIGH VOLTAGE WIRING (ABOVE 200 V).
NOTE D: FOR 460 VAC OPERATION USE SOLID JUMPER AS SHOWN; FOR 230 VAC OPERATION USE DASHED JUMPERS AS SHOWN.

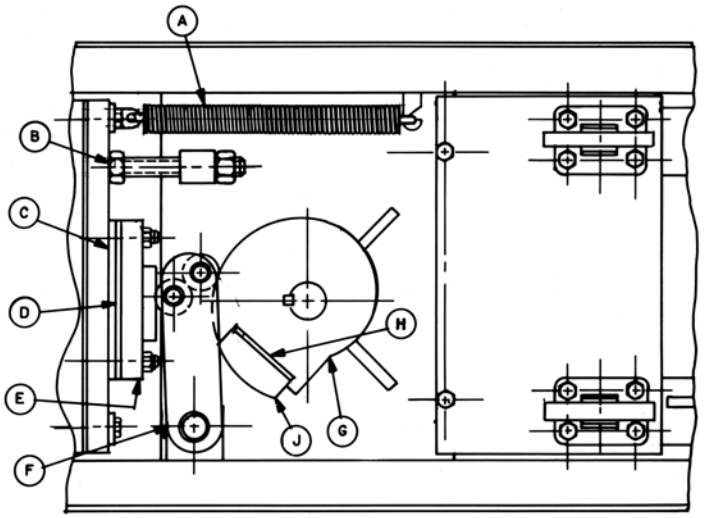
B

MODEL MD 6 WATER LINE DIAGRAM



MODEL MD 6 UPSET ADJUSTMENTS

A: HEAD RETURN SPRING
B: OPEN HEAD SPACE ADJ. STOP SCREW
C: SHIM
D: INSULATION SHIM
E: ANVIL
F: UPSET LAZY ARM
G: UPSET CAM
H: CAM INSERT SHIM
J: CAM INSERT



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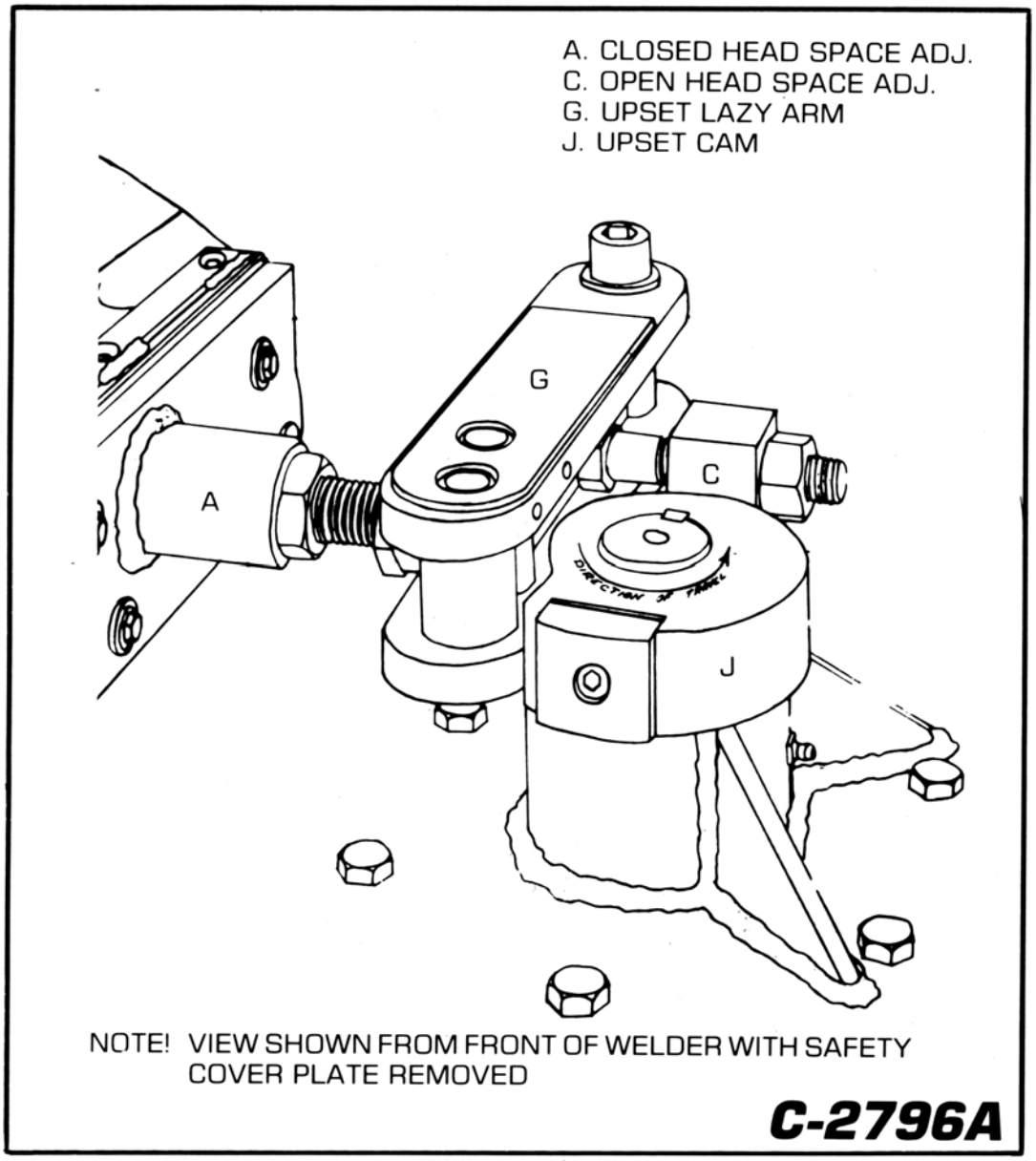
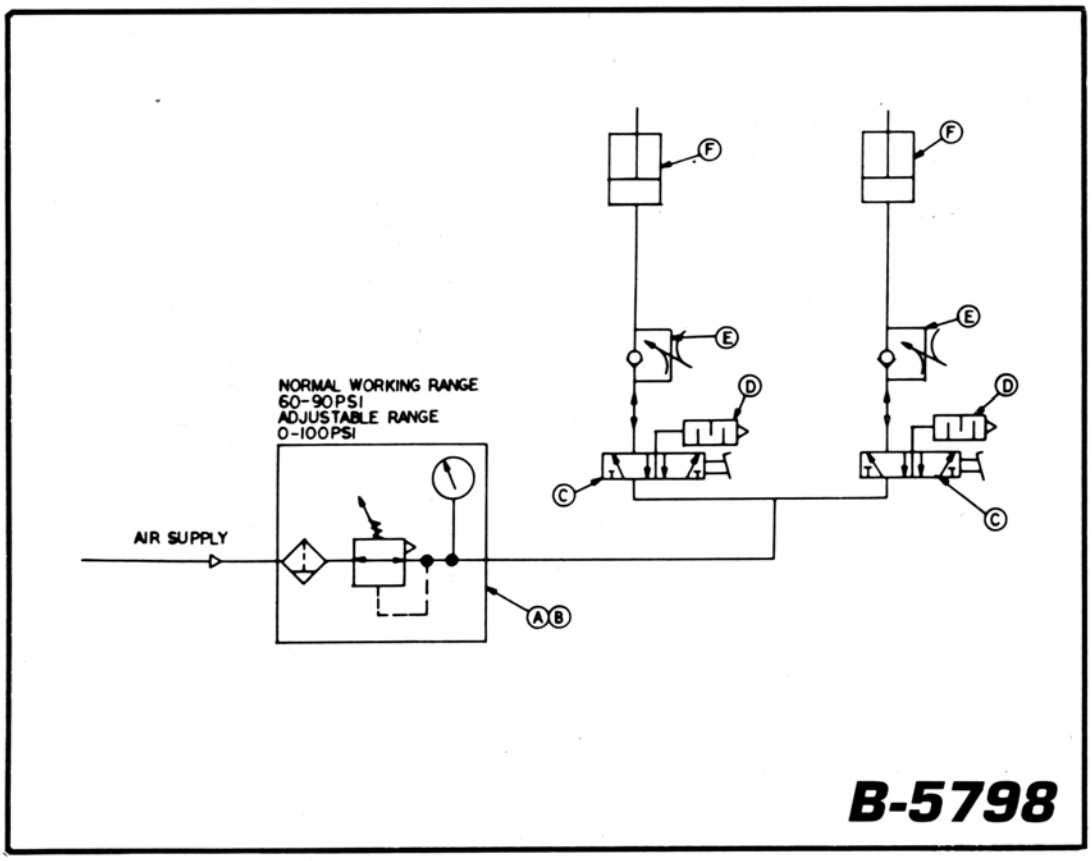
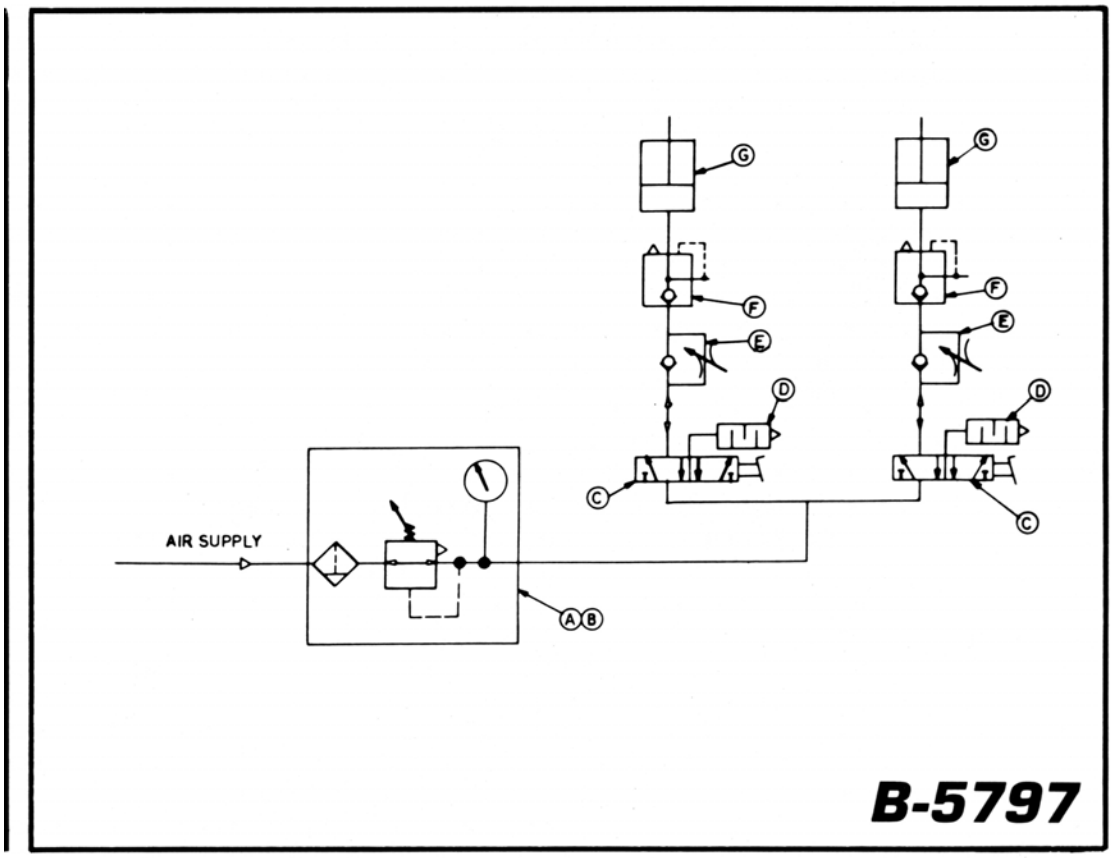
MODEL MD-3,4,& 5 UPSET ADJUSTMENTS



MODEL MD 4 & 5 PNEUMATIC SYSTEM



MODEL MD 6 PNEUMATIC SYSTEM



11.0 SAFETY REMINDERS

The following accident prevention information is presented to eliminate potential hazards while operating, inspecting or repairing Micro-Weld electric resistance welding equipment.

Important safety compliance information for Micro-Weld Welders.

GENERAL

1. Qualified personnel, prior to using equipment, must instruct an operator on basic operation and malfunction methods.
2. Safety eyeglasses must be worn by all personnel operating or servicing welders.
3. Use safety equipment properly and keep safety equipment on welders.
4. Determine that both operating voltages and hertz (cycles) of power supply correspond to ratings listed on welder nameplate located on welder housing.
5. Check nameplate ratings and keep within capacities and material categories stated therein.
6. Adjustments or repairs must be made by persons thoroughly familiar with operating principles of welder.
7. Welder must be disconnected from power supply prior to maintenance or repair procedures.

ELECTRICAL

1. Refer to National Electrical Code and local regulations for adequate electrical wiring to power welder. Do not operate welder with inadequate electrical power supply cords or cable.
2. All welders must be grounded through power supply and welder ground connection terminal securely tightened.
3. All welders must be able to be disconnected from power source either by a double breaking disconnect switch or unplugged by standard rated plugs.
4. All welders must be fused to prevent injury should an electrical malfunction occur. Welders must never be fused for an ampere load that exceeds the ratings stated on welder nameplate. Normally welders are fused using the nameplate rated load; time lag parameters functional to standard fuses allow this specification.
5. Electric power cords to welder must be kept in good condition. Report any damage or potential hazards to maintenance personnel.
6. The weld heat selection switch, potentiometer or range selection devices must not be changed to a new position while a weld operation is in process.

12.0 BUYERS GUIDE

HOW TO ORDER PARTS:

You must provide
1. Machine Model
2. Machine Serial Number
3. Voltage

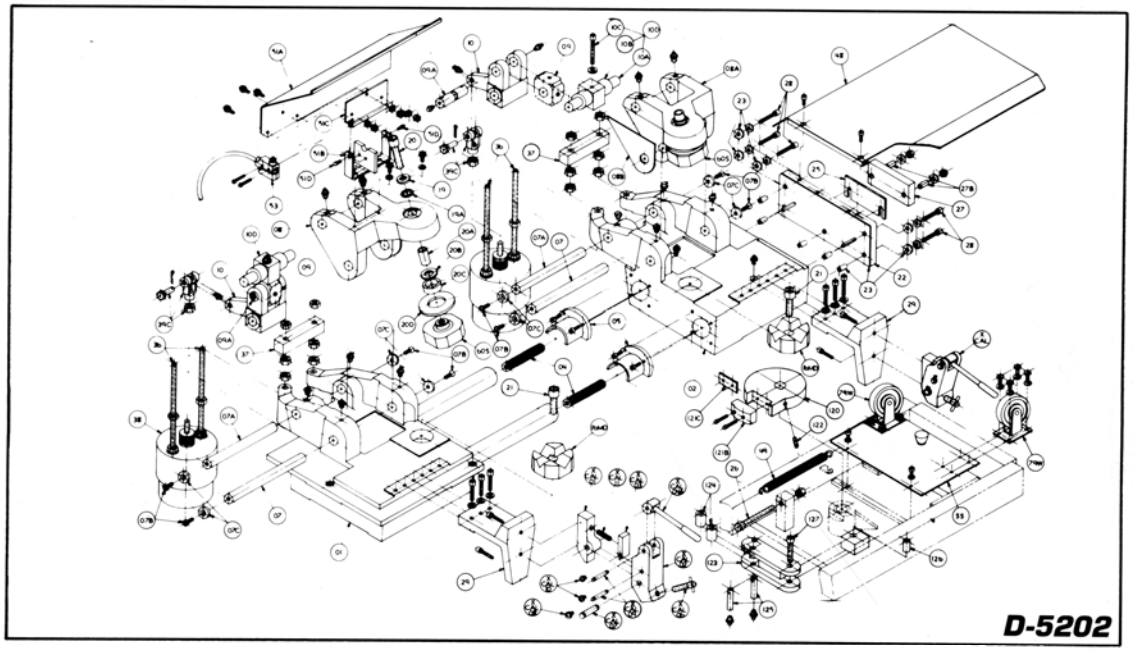
Then identify part(s) on part list (last page in book) and provide MICRO with the circled number.

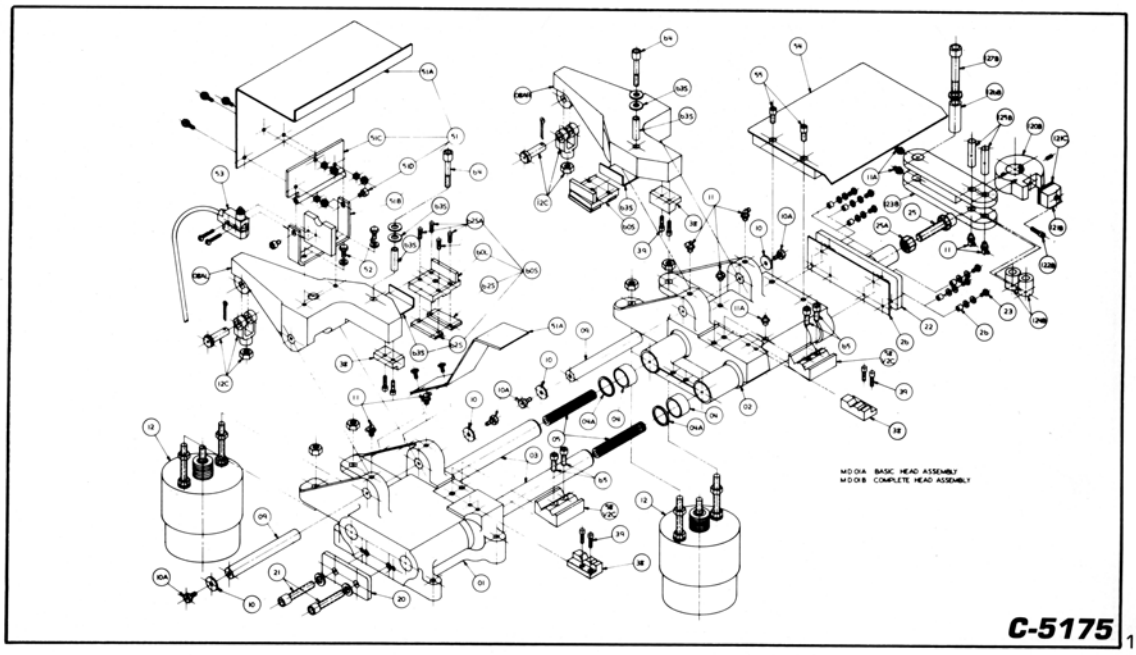
CALL MICRO at 800-872-1068
OR FAX MICRO at 630-787-9360

Provide MICRO with your company name and purchase order number.

13.0 PARTS LIST

13.0 PARTS LIST





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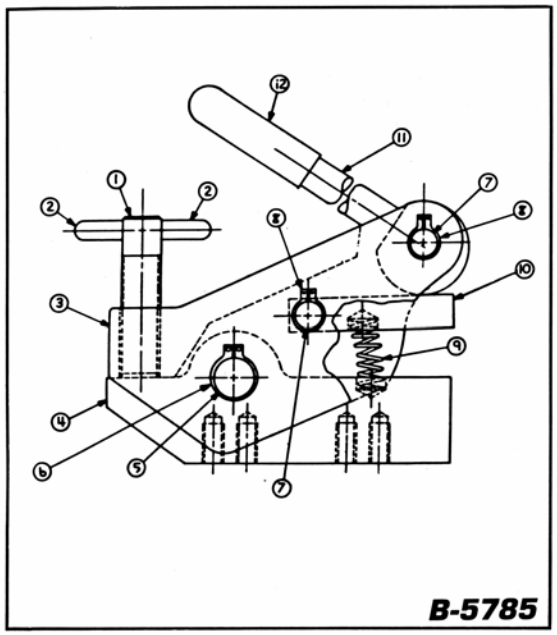
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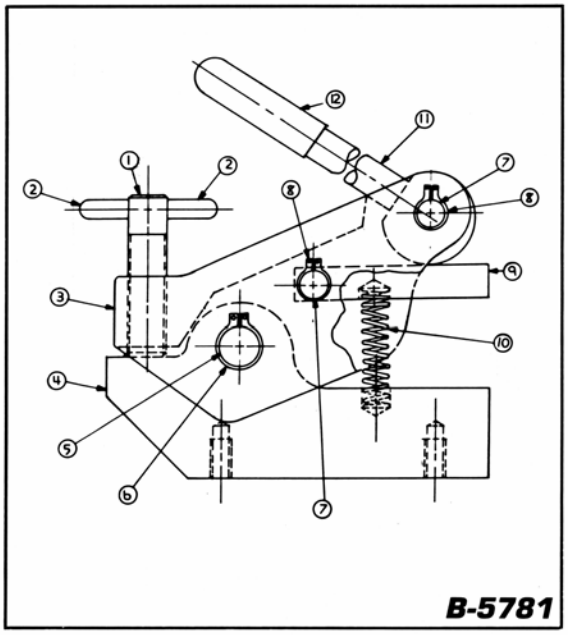
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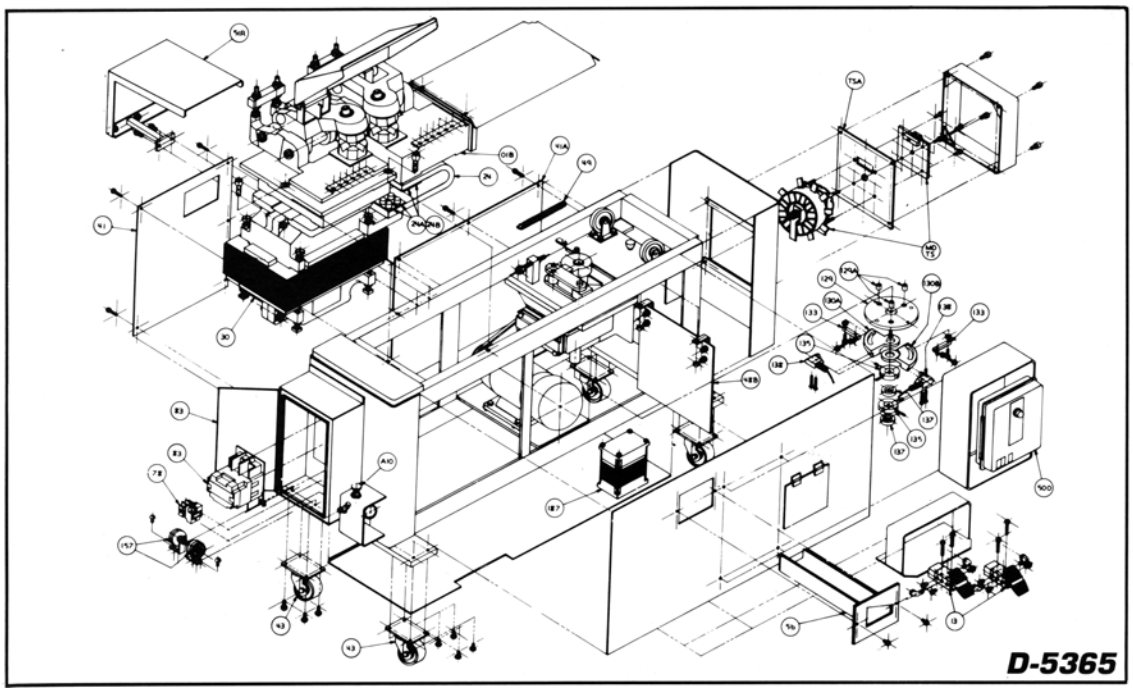
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PARTS LIST MD 4 & 5 WELDERS		
MODEL/ PART NO	**DESCRIPTION**	**ITEM NO.**
MD-01A	Basic head assembly	30654
MD-01B	Complete head assembly, no dies, no shoes	30661
MD-04	Shaft wipes, felt	30640
MD-04A	Shaft wipe retaining ring	48219
MD-05	Head return spring	80059
MD-08L	Clamp arm, left	30554
MD-08R	Clamp arm, right	30614
MD-08AL	Clamp arm for arm anneal, left	30643
MD-08AR	Clamp arm for arm anneal, right	30644
MD-09	Arm pivot pin, steel	30526
MD-10	Arm pin washer	30517
MD-11	Grease zerk 90 degrees	48422
MD-12	Clamp cylinder #50	77706
MD-12A	Cylinder replacement diaphragm	77713
MD-12B	Cylinder shaft boot	77718
MD-12C	Clamp cylinder clevis	77727
MD-13	Foot pedal, clamp	77859
MD-13A	Hand operated clamp valve	77864
MD-14	Pedal mount screw	90611
MD-20	End plate stationary head	30548
MD-21	End plate mount bolt	90687
MD-22	End plate movable head	40551
MD-23	End plate mount bolt, movable head	90203
MD-25	Closed head space adjusting screw	30523
MD-26	End plate insulation	30641
MD-27	Muffler	77892
MD-30	Stationary anneal extension bar	62079
MD-31	Front anneal bar	62080
MD-32	Anneal bar mount bolts	90260
MD-33	Movable anneal extension bar	62081
MD-35	CA anneal clamp, each (front)	62155
MD-36	CAL anneal, pair	62020
MD-37	Anneal clamp mount bolt	90260
MD-38	Arm anneal die set (4 pieces)	30524
MD-39	Anneal die mount screw	90617
MD-40	Complete truck	40571
MD-41	Truck door	40540
MD-43	Swivel caster	48108
MD-44	Stationary caster, special order	48117
MD-45	#4 shear	64009
MD-46	Shear mount bolt	90295
MD-47	Standard vise	78112
MD-47H	Heavy duty vise	78111
MD-48	Standard vise bracket	60022
MD-48H	Heavy duty vise bracket	60005
MD-49	Vise bracket mount bolt	90295

PARTS LIST MD 4 & 5 WELDERS		
MODEL/ PART NO	**DESCRIPTION**	**ITEM NO.**
MD-50	Vise mount bolt	90262
MD-51	Flashguard assembly	30656
MD-52	Flashguard mount bolt	30672
MD-53	Flash shield safety switch	57813
MD-54	Upset cover	30551
MD-55	Upset cover mount screw	90656
MD-56	Flash tray	40500
MF-57	Flash tray mount bolt	90202
MD-58R2	Contour dies, pair, 3 grooves	30662
MD-58V2C	Standard dies, copper	30594
MD-58V2A	Standard dies, alloy	30618
MD-60R	Contour shoes, pair	30673
MD-60S	Shoes complete w/inserts insulation, pair	30660
MD-60SL	Shoe, left	30542
MD-60SR	Shoe, right	30543
MD-62S	Set of inserts (4 pieces)	30659
MD-62SA	Insert screw	90703
MD-62SL	Left insert	30536
MD-62SR	Right insert	30537
MD-62SS	Straight insert	30535
MD-63S	Insulation for shoes (set)	30671
MD-64	Shoe attaching bolt	90664
MD-65	Die attaching bolt	90657
MD-70F	Complete transformer	50558
MD-70FP	Primary	50569
MD-70FS	Secondary	50515
MD-70S	Shunt	50527
MD-71U	Transformer ring, upper	50506
MD-71L	Transformer ring, lower	50535
MD-72	Transformer studs	50521
MD-78	Control step down transformer	59525
TS-06	6 point heat switch	56549
MD-82	Heat switch mount bolt	90294
MD-83A	Contactor, state voltage & Serial number	57611
MD-83C	Contactor repair kit, state voltage & serial number	APPL
MD-87	Terminal block	53000
MD-88	3 stage anneal timer	50572
MMD-89	Anneal timer operating switch	57810
MD-120B	Upset cam with insert	30667
MD-121B	Insert only, for cam	30529
MD-121C	Insert shim	30530
MD-122B	Insert attaching screw	90619
MD-123B	Upset leverage bar w/roller	30530
MD-124B	Roller	30521
MD-125B	Roller axle	30520

PARTS LIST MD 4 & 5 WELDERS		
MODEL/ PART NO	**DESCRIPTION**	**ITEM NO.**
MD-126B	Pivot bushing, leverage bar	30522
MD-127B	Pivot bushing bolt	90687
MD-128B	Open stop bolt	90040
MD-129	Quadrant mount plate	50529
MD-129A	Quadrant plate spacers	40608
MD-130B	Weld switch quadrant	50508
MD-131B	Motor switch quadrant	50510
MD-132B	Quadrant mount bolt	90021
MD-133B	Quadrant switch lever	30525
MD-134B	Lever mount bolt	90262
MD-135B	Cutoff cam switch	30532
MD-136B	Cutoff cam set screw	90015
MD-137B	Cutoff cam spacer	30534
MD-138	Limit & motor cutoff switch	57813
MD-157	Thyrite resistor	58132
MD-158	4 button operating station	57854
MD-159	Flow control valve	778/62
MD-500	DC motor control	57734
MD-501	Gear reducer w/motor n.s.	40616

PARTS LIST MD 6 WELDER		
MODEL/ PART NO	**DESCRIPTION**	**ITEM NO.**
MD-01B	Basic head assembly, with shafts & shields	30067
MD-01A	Stationary head attaching bolts	90683
MD-04	Head return spring	80059
MD-07	Clamp arm pivot pin	30014
MD-07A	Bell crank pivot pin	30015
MD-08	Left clamp arm	30080
MD-08A	Right clamp arm	30081
MD-09	Clamp eccentric leveling block	70005
MD-10	Bell crank	70007
MD-10A	Bell crank block pin	70010
MD-10B	Bell crank block	70004
MD-10C	Bell crank retaining screw	90665
MD-16MD2	Standard copper dies 2 V groove	30060
MD-16MD3	Standard copper dies 3 V groove	30059
MD-MD60S	Die shoes, standard	30065
MD-19	Shoe attaching screw washer	30068
MD-19A	Attaching screw insulating washer	30068
MD-20	Shoe attaching screw	90691
MD-20A	Shoe screw insulating tube	30069
MD-20B	Shoe boss insulating washer	30070
MD-20C	Shoe boss insulating ring	30071
MD-20D	Shoe insulating plate	30072
MD-08B	Arm insulating spacer	30073
MD-21	Die attaching screw	90689
MD-22	Movable head end plate	30074
MD-23	End plate insulation	30075
MD-24	Secondary shunt	50004
MD-24A	Shunt clamp plates	50000
MD-24B	Shunt attaching screws, long (14)	90330
MD-24C	Shunt attaching screws, short (4)	90329
MD-26	Open space adjustment screw	30000
MD-27	Upset pressure plate	30076
MD-27A	Upset plate mount screw	90661
MD-27B	Upset plate insulation (optional)	30077
MD-28	End plate mount screws	90660
MD-29	Anneal mount bracket	30058
MD-30	Weld transformer	50005
MD-31	Primary coil	50016
MD-32	Transformer secondary	50017
MD-36	Clamp cylinder stud	70001
MD-36A	Cylinder stud nuts	92066
MD-37	Clamp link stop block	70002
MD-38	Clamp cylinder	77707
MD-38A	Clamp cylinder clevis	77714
MD-38B	Clamp cylinder boot	77719
MD-39C	Clamp cylinder clevis	70009

PARTS LIST MD 6 WELDER		
MODEL/ PART NO	**DESCRIPTION**	**ITEM NO.**
MD-120	Upset cam only	30083
MD-120A	Upset cam complete	30085
MD-121	Upset cam insert	30084
MD-122	Upset cam shim	30086
MD-123	Upset lever bar	30087
MD-124	Lever bar rollers	30521
MD-125	Axle for roller	30510
MD-126	Lever bar pivot bushing	30522
MD-127	Lever bar pivot bolt	90687
MD-48	Upset cover	40618
MD-49	Head return assist spring	80045
MD-129	Quadrant plate	30679
MD-129A	Quadrant plate spacer	40608
MD-130A	Weld switch quadrant (limit)	50508
MD-130B	Motor switch quadrant	50510
MD-131	Quadrant mount bolt	90217
MD-133	Quadrant switch lever	30525
MD-134	Switch lever mount bolt	90262
MD-135	Switch operating cam	30532
MD-136	Cam set screw	90015
MD-137	Cam spacer	30534
MD-138	Limit & motor switch	57813
MD-139	Motor 3 H.P.	57743
MD-140	Speed reducer	57746
MD-141	Motor sprocket	APPL
MD-142	Speed reducer sprocket	APPL
MD-25	3/8” ship for closed stop	30676
MD-25A	5/16” shim for closed stop	30678
MD-25B	¼” shim for closed stop	30678
	D.C. motor control	57736
	4 push button control station	57854
	Thyrite resistor	57676
	8 point heat switch 300 amp	57857
	Speed reducer	57746
	Motor pulley	APPL
	Speed reducer pulley	APPL
	Chain	APPL
	Belt	APPL