

# INSTRUCTIONS AND PARTS MANUAL

## CWE-5 CIRCLE WELDER

Please record your equipment identification information below for future reference. This information can be found on your machine nameplate.

Model Number \_\_\_\_\_

Serial Number \_\_\_\_\_

Date of Purchase \_\_\_\_\_

Whenever you request replacement parts or information on this equipment, always supply the information you have recorded above.

LIT-CWE-5-IPM-0813

Bug-O Systems is guided by honesty, integrity and ethics in service to our customers and in all we do.



**B U G - O   S Y S T E M S**

A DIVISION OF WELD TOOLING CORPORATION

CE

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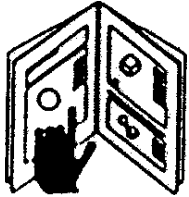
## SAFETY

**PROTECT YOURSELF AND OTHERS FROM SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS.**



### **ELECTRIC SHOCK can kill.**

- 1) The equipment is not waterproof. Using the unit in a wet environment may result in serious injury. Do not touch equipment when wet or standing in a wet location.
- 2) The unused connectors have power on them. Always keep the unused connectors covered with the supplied protective panels. Operation of the machine without the protective panels may result in injury.
- 3) Never open the equipment without first unplugging the power cord or serious injury may result.
- 4) Verify the customer-supplied power connections are made in accordance with all applicable local and national electrical safety codes. If none exist, use International Electric Code (IEC) 950.
- 5) Never remove or bypass the equipment power cord ground. Verify the equipment is grounded in accordance with all applicable local and national electrical safety codes. If none exist, use International Electric Code (IEC) 950.



### **READ INSTRUCTIONS.**

Read the instruction manual before installing and using the equipment.



### **EQUIPMENT DAMAGE POSSIBLE.**

- 1) Do not plug in the power cord without first verifying the equipment is OFF and the cord input voltage is the same as required by the machine or serious damage may result.
- 2) Always verify both the pinion and wheels are fully engaged before applying power or equipment damage may occur.
- 3) Do not leave the equipment unattended.
- 4) Remove from the worksite and store in a safe location when not in use.



### **FALLING EQUIPMENT can cause serious personal injury and equipment damage.**

Faulty or careless user installation is possible. As a result, never stand or walk underneath equipment.



### **MOVING PARTS can cause serious injury.**

- 1) Never try to stop the pinion from moving except by removing power or by using the STOP control.
- 2) Do not remove any protective panels, covers or guards and operate equipment.

## HIGH FREQUENCY WARNINGS

**SPECIAL PRECAUTIONS ARE REQUIRED WHEN USING PLASMA, TIG OR ANY WELDING PROCESS THAT USES HIGH FREQUENCY TO STRIKE AN ARC.**



**WARNING:** HIGH FREQUENCY CAN EFFECT MACHINE OPERATION AND THEREFORE, WELD QUALITY.

**Read the precautions below before installing and using the equipment.**

### PRECAUTIONS:

- 1) Some plasma or welding cables are strong sources of high frequency interference. NEVER lay a plasma or welding cable across the controls of the machine.
- 2) Always physically separate the plasma or welding cable leads from the machine cables. For example, the plasma or welding cable leads should NEVER be bundled with a pendant cable or the machine power cord. Maximize the separation between any machine cables and the plasma or welding cables.
- 3) Strictly follow the grounding procedures specified for the plasma or welding unit. NOTE: Some plasma and welding units produce exceptionally large amounts of high frequency noise. They may require a grounding rod be driven into the earth within six feet (2 meters) of the plasma or welding unit to become compatible with an automatic cutting or welding process.
- 4) If the high frequency is produced using a spark gap, adjust the points so the gap is as small as possible. The larger the gap, the higher the voltage and the higher the interference.
- 5) Some plasma or welding units will inject high frequency interference into the AC power line. Use separate power line branches whenever possible to power the plasma or welding source and the machine. Do not plug them into the same outlet box.
- 6) High frequency noise may enter the machine through the plasma or welding supply remote contactor leads. Some plasma and welding sources can produce noise spikes of up to several thousand volts. These sources are not compatible with automated cutting and welding equipment. It is recommended that the remote contactor leads on these plasma or welding sources not be connected to the machine. An alternate solution is to purchase a separate remote contactor isolation box.

# **CWE-5 CIRCLE WELDER**

## **INSTRUCTIONS AND PARTS MANUAL**

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## INTRODUCTION

The CWE-5 Circle Welder is designed for circular single pass welding of couplings on sprinkler pipe utilizing MIG or FLUX CORED process, with gas shielding. For one to twelve inch diameter welds.

## FEATURES

- Automatic Cycle Control
- Amperage & wire speed control
- Wire feeder with one set of drive rolls
- 1/12 HP P.M. motor and rotational speed control
- 300 AMP Gun & cable assembly
- Gas shielding kit with 120 VAC solenoid valve
- 5/8" (16 mm) gas cup
- Burn back control
- 50 ft. (15 m) power cable
- 50 ft. (15 m) gas shielding hose
- 50 ft. (15 m) weld cable
- Quick disconnects for all cables
- Weld contact switch
- Cold wire inch switch
- Wire direction switch
- Pre and post flow controls
- Wire reel adaptor for 30 lb. (14 kg) spools
- Adjustable vertical and horizontal torch positioning system
- Rise and fall cam assembly with 5" (125 mm) of travel
- Brushes and collector rings for welding current, rated at 300 AMPS 100% duty cycle
- Brushes and collector rings for all controls, eliminates cable and hose wrap

## SETUP AND OPERATION

### POWER SOURCE:

Use only constant voltage type power sources with this circle welder machine. If using a multiple process power source, be sure that it is set for constant voltage output as per the instructions in the manual for the power source. Set the power source polarity switch or properly connect the electrodes and work leads for the correct electrode polarity.

### FIXTURING:

All circle welders have to be fixtured in some manner from the top of the shaft. This may be achieved in one of the following: column & boom, manipulator or carriage & monorail.

### GUNS AND CABLES:

All circle welders come equipped with a gun and cable assembly. It is our recommendation that at least once a week the liner be taken out of the cable and soaked overnight in a solvent solution. To keep the wire moving it is also recommended that a felt clip be saturated with a product like Ferro Slick and feed through the incoming tube of the wire feeder at least once a day.

## SET-UP AND OPERATION, CONT'D.

### ADDITIONAL CABLES:

The circle welders are supplied with the following cables:

1. CWO-3139 50' (15 m) power cable that connects the power source to the cable connector on the top gear of the machine.
2. CWO-3019 50' (15 m) weld cable that connects the lead coming out of the top of the machine using the quick connect connector to your power supply.
3. CWO-9406 50' (15 m) gas shielding hose that connects the gas fitting on the top of the shaft to your shielding gas supply.

### WIRE SPEED AND VOLTAGE ADJUSTMENT:

The wire speed control on the front of the CWE-1000-B Control Box has a dial that is calibrated directly in inches per minute. Set the voltage using the control on the power source.

### RISE AND FALL OF THE CAM:

All circle welders are equipped with a rise and fall cam assembly. The cam assembly must be aligned before any other settings can be made. To align the cam rotate the machine so the horizontal rack is parallel to the pipe, then adjust the gun holder so it is perpendicular to the horizontal rack. Position torch tip to top dead center of joint. Loosen the set screws in the brass block on the cam, and rotate the cam to the vertical position as shown. Refasten set screws.

### CAM SETTING:

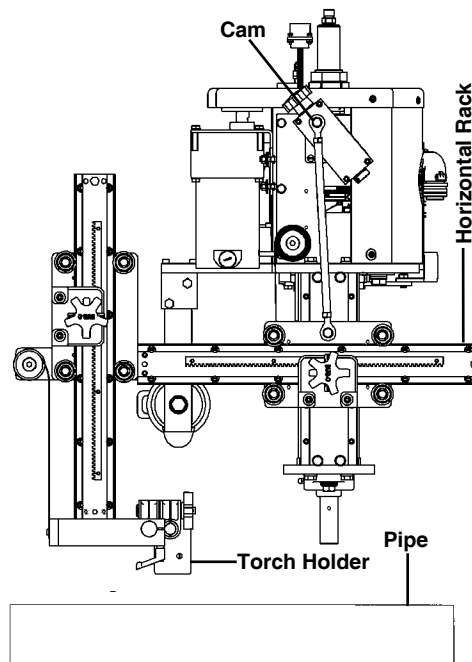
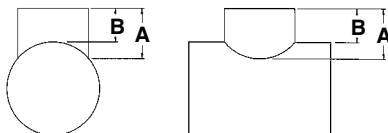
The cam setting is equal to distance "B" subtracted from distance "A".

#### Example:

Let A=3 and B=2

$3-2=1$

The cam setting is 1.



### WHEEL ADJUSTMENT:

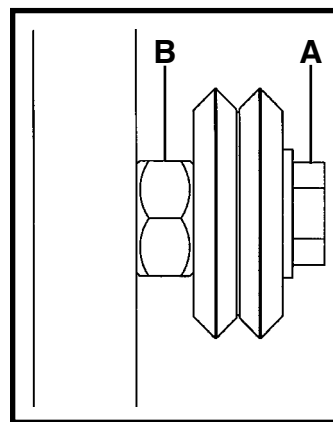
The CWE-5 Racking System CWO-1670 and the Small Vertical Racker CWO-1685 are equipped with adjustable wheels. Always check these components for proper wheel adjustment before using the machine. The wheels need adjustment if you can cock or wiggle the components out of alignment. The wheels should be snug but not prohibit movement along the path of travel. The wheels with the hex stand offs are adjustable. To adjust the wheels, loosen the hex bolt (A) until the adjustable bushing (B) can be rotated. Correct the wheel alignment by rotating the adjustable bushing (B). Once adjusted, hold the adjustable bushing (B) while tightening the hex bolt (A). Recheck alignment.

### MACHINE CONTROLS:

Operational parameters can be set using the CWE-1000-B Control Box. Please refer to the sections in this manual entitled CWE-1000-B Programmable Rotation Controls for descriptions of the various welding parameters that are available, as well as for descriptions of the various speed and directional capabilities.

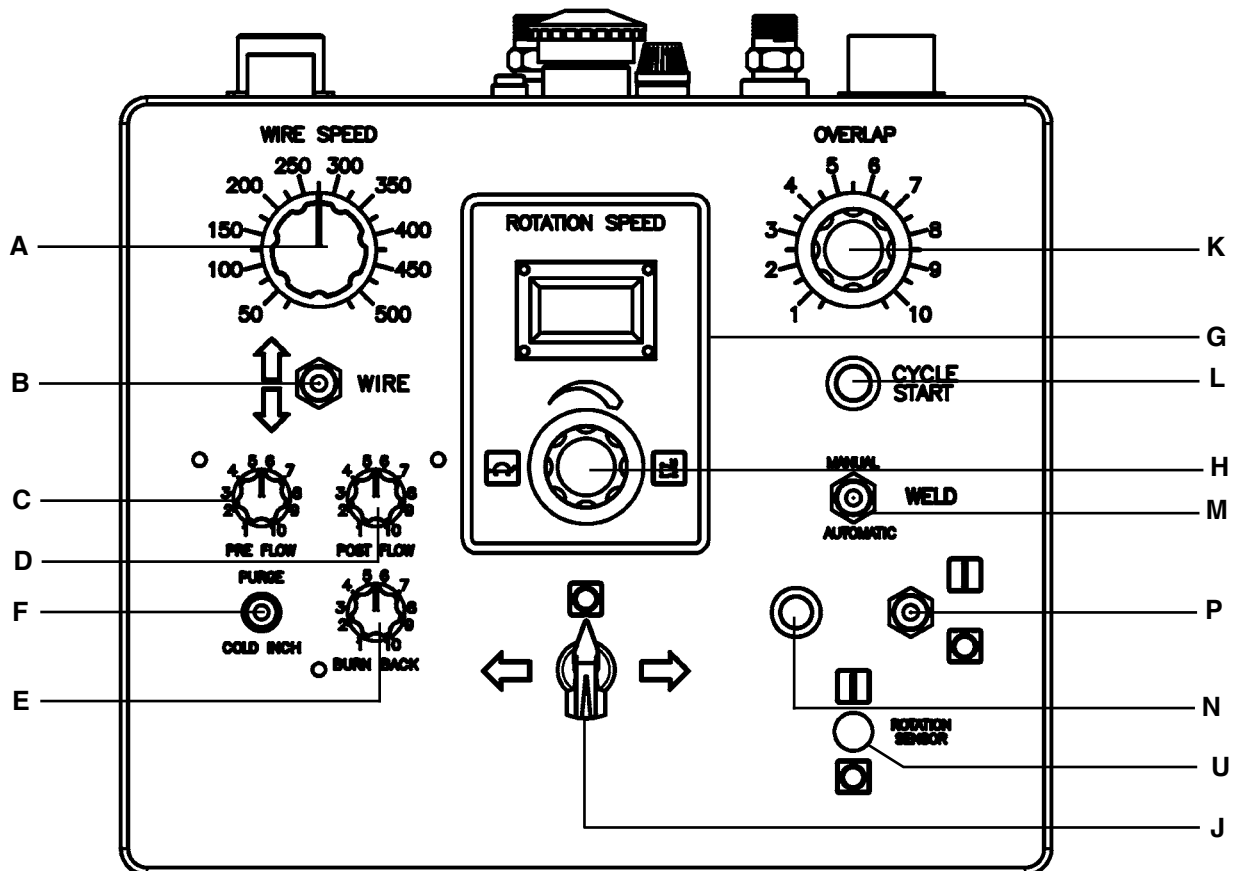
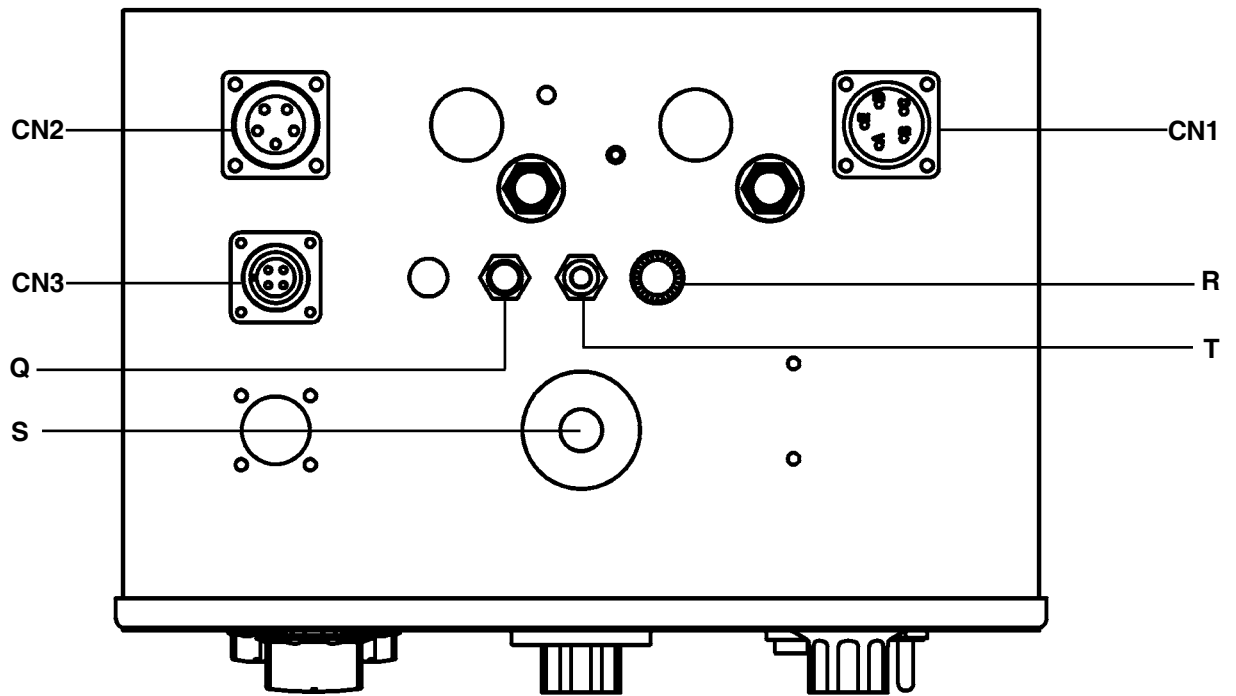
### MAKING A WELD:

1. Position the gun to start position using the CWO-1670 CWE-5 Racking System.
2. Connect the ground cable to the workpiece. The ground cable must make good electrical contact with the work.
3. Select Automatic Mode
4. Position wire
5. Cycle start
6. Machine stops and reverses to start position



**WARNING:** When using an open arc process, it is necessary to use correct eye, head and body protection.

# CWE-1000-B PROGRAMMABLE ROTATION CONTROLS



## **CWE-1000-B PROGRAMMABLE ROTATION CONTROLS, CONT'D.**

### **(A) WIRE SPEED CONTROL:**

This control sets the feed speed of the wire feeder. Turn the knob to the LEFT for slower speeds and to the RIGHT for higher speeds. This control is calibrated. The nameplate shows the wire speed for the given setting of the control.

### **(B) WIRE DIRECTION:**

Controls the direction the wire is being fed through the feeder. UP to return wire to the spool. DOWN to feed the wire to the gun.

### **(C) PRE-FLOW CONTROL:**

This control provides flow of shielding gas to the work before the arc is established. The gas solenoid valve is energized immediately when the gun trigger is closed, but the time delay before the wire feeder is energized is adjustable from 0 to 1.5 seconds. Turn the knob LEFT for shorter delays and to the RIGHT for longer delays.

### **(D) POST-FLOW CONTROL:**

This control provides flow of shielding gas to the work after welding has stopped. Delay for gas solenoid valve shutoff is adjustable from .5 to 4.5 seconds. Turn the knob to the LEFT for shorter delays and to the RIGHT for longer delays.

### **(E) BURN BACK CONTROL:**

This control provides a precise time delay that allows the wire to be burned off at the end of the weld. This is useful for those applications where higher speed, fine wire feeding is used and there is a tendency for the electrode to overrun at the end of the weld and causes "sticking" in the crater. The delay is adjustable for optimum burn back depending on the wire size, process, and procedure, etc.

### **(F) PURGE / COLD INCH CONTROL:**

This control provides control of some wire feeder functions without energizing the welding power source. The momentary up position energizes the gas solenoid but not the wire feeder or welding power source. The momentary down position energizes the wire feeder but not the gas solenoid or the power source.

### **(G) ROTATION SPEED DIGITAL DISPLAY:**

Visual display that supplies rotation speed information to the operator.

### **(H) ROTATION SPEED CONTROL:**

Controls the speed in which the machine travels. Turn the knob LEFT to decrease the rotation speed and to the RIGHT to increase the rotation speed. The digital read out displayed should NOT be construed as inches per minute of travel. They should be considered as reference only.

### **(J) TRAVEL DIRECTION CONTROL:**

Controls the direction in which the machine will travel in the MANUAL MODE. Turn the switch to the RIGHT for clockwise rotation, CENTER to stop and to the LEFT for counter-clockwise rotation. When in the AUTOMATIC MODE, set to the CENTER (Stop) position. The machine is stationary until the CYCLE START button (L) is pressed. Once activated, the machine is programmed to weld in the counter-clockwise rotation.

### **(K) OVERLAP CONTROL:**

Controls the overlap time at the end of each cycled weld. Overlap length is determined by a combination of time and speed.



## **CWE-1000-B PROGRAMMABLE ROTATION CONTROLS, CONT'D.**

### **(L) CYCLE START SWITCH:**

In the AUTOMATIC WELD mode the CYCLE START SWITCH initiates the automated weld cycle.

### **(M) MANUAL / AUTOMATIC WELD SWITCH:**

The manual position allows the operator to rotate the machine without welding to check the wire placement as well as the cam setting. The automatic position enables unit for complete automatic cycle. Press (L) to initiate automatic cycle.

### **(N) PILOT LIGHT:**

The pilot light indicates whether the machine is on/off as dictated by the on/off switch.

### **(P) ON / OFF SWITCH:**

The on/off switch enables/disables the power to the Rotation Control Box.

### **(Q) 2 AMP SLOW BLOW FUSE**

### **(R) RESET CIRCUIT BREAKER FOR WIRE FEEDER**

### **(S) EMERGENCY STOP BUTTON:**

In case of a emergency press button in the DOWN position to stop ALL functions of the machine. To deactivate the EMERGENCY STOP rotate clockwise.

### **(T) GLP RESET FOR WIRE FEEDER:**

Protects unit if weld current ground is lost.

### **(U) ROTATION SENSOR ON/OFF:**

Control sensor so the unit can be used for single pass if ON / multipass if OFF.

### **(CN1) CONNECTOR:**

Power input and contact cable from the welding power source.

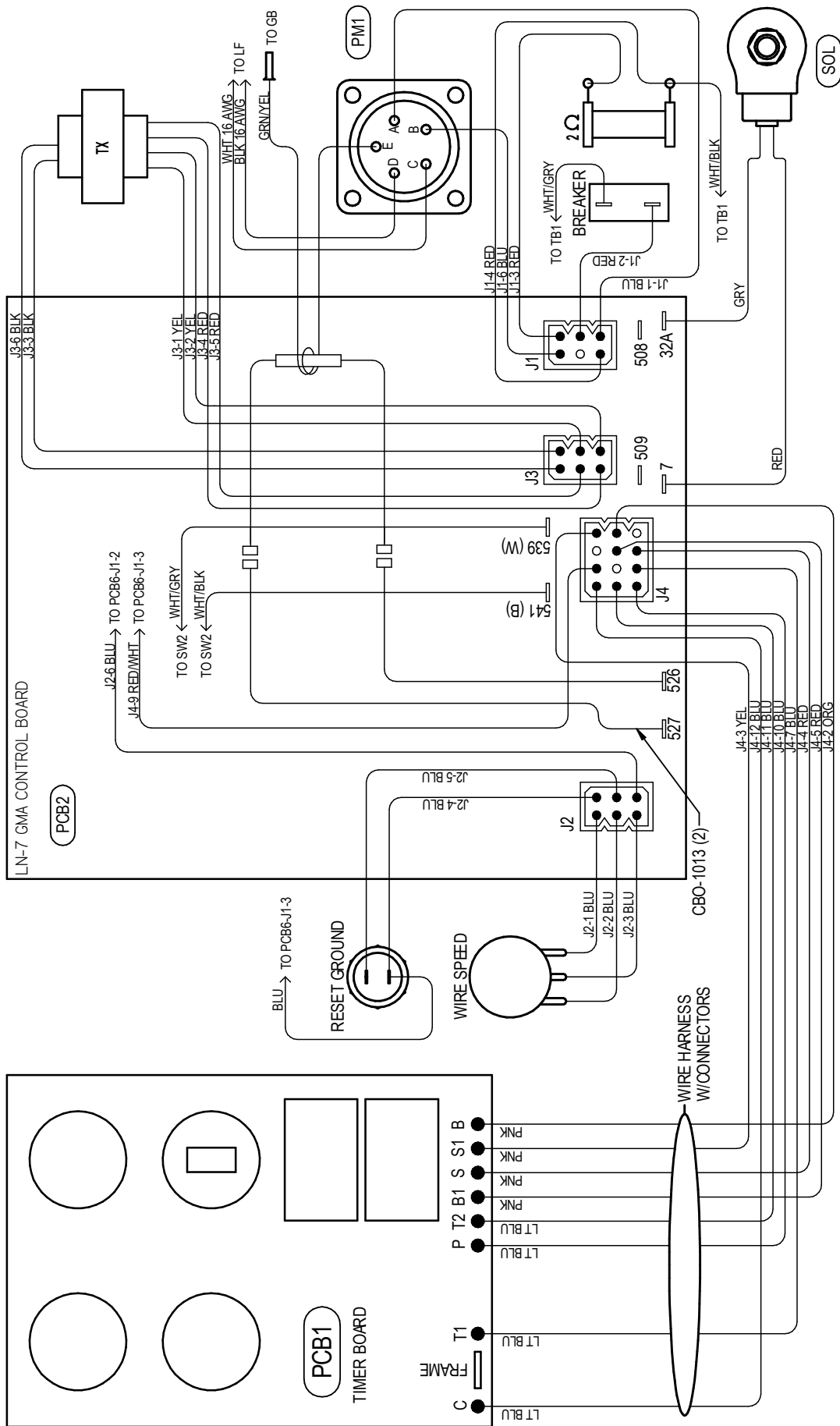
### **(CN2) CONNECTOR:**

Cable connection to the machine for wire feed and rotation motor.

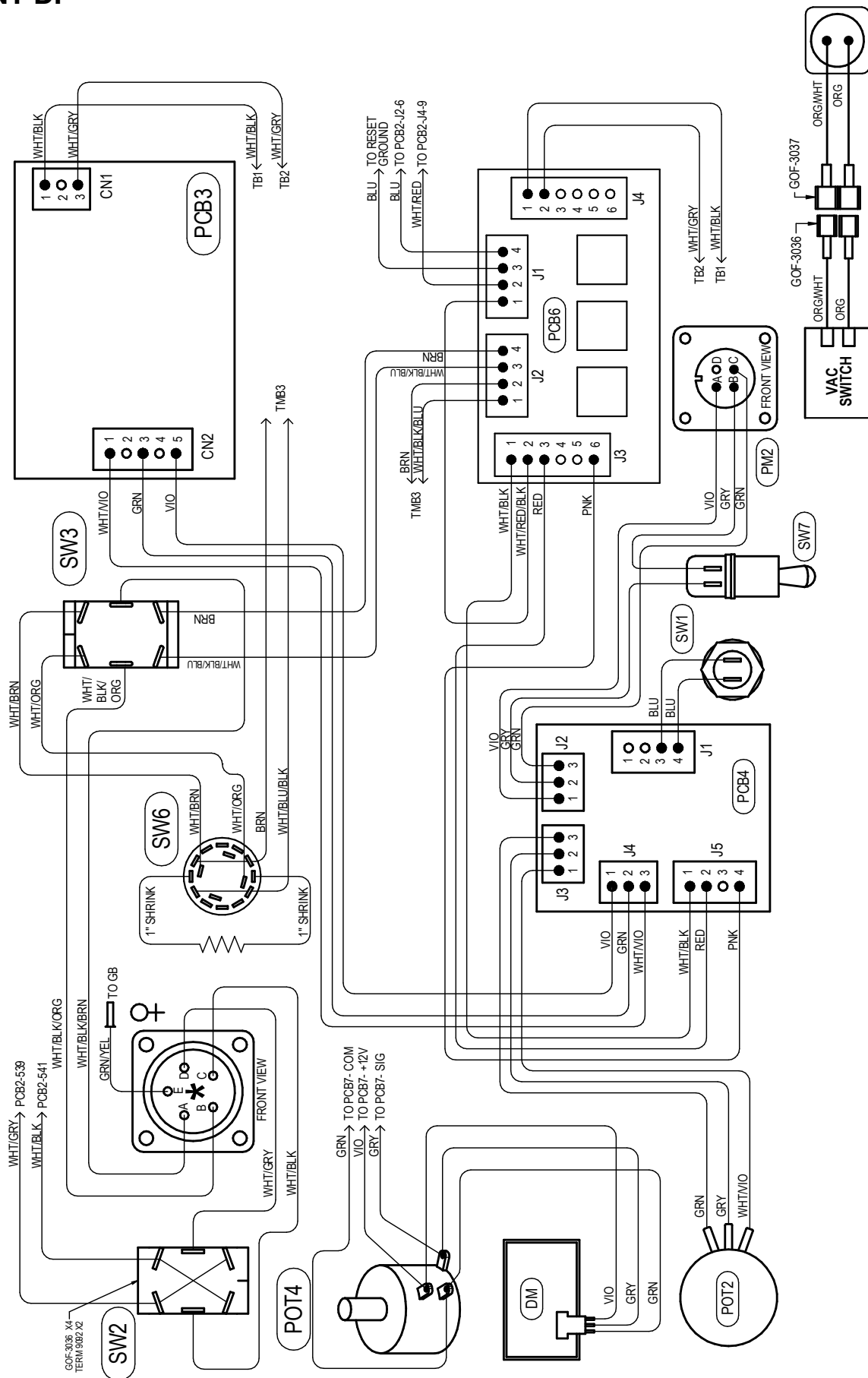
### **(CN3) CONNECTOR:**

Homing sensor cable from machine.

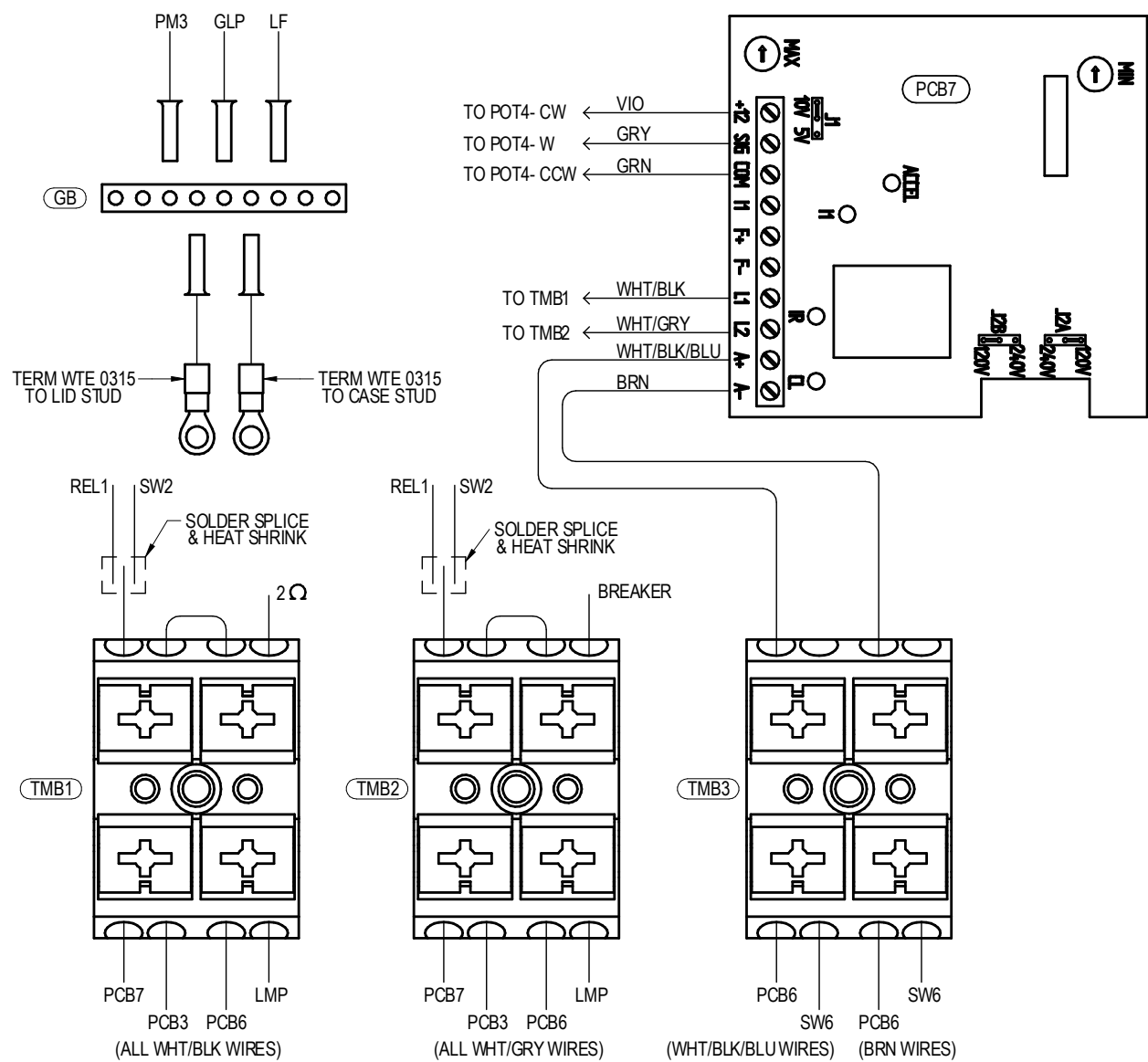
**10**



**CWE-1000-B-WD REMOTED CW-5 CONTROL BOX WIRING DIAGRAM,  
CONT'D.**



CWE-1000-B-WD REMOTED CW-5 CONTROL BOX WIRING DIAGRAM, CONT'D.



**\* LN-7 GMA WIRE FEEDER COMPONENTS**

CAUTION: ON PCB5 SET J1 TO 10V, SET J2A TO 120V, SET J2B TO 120V.

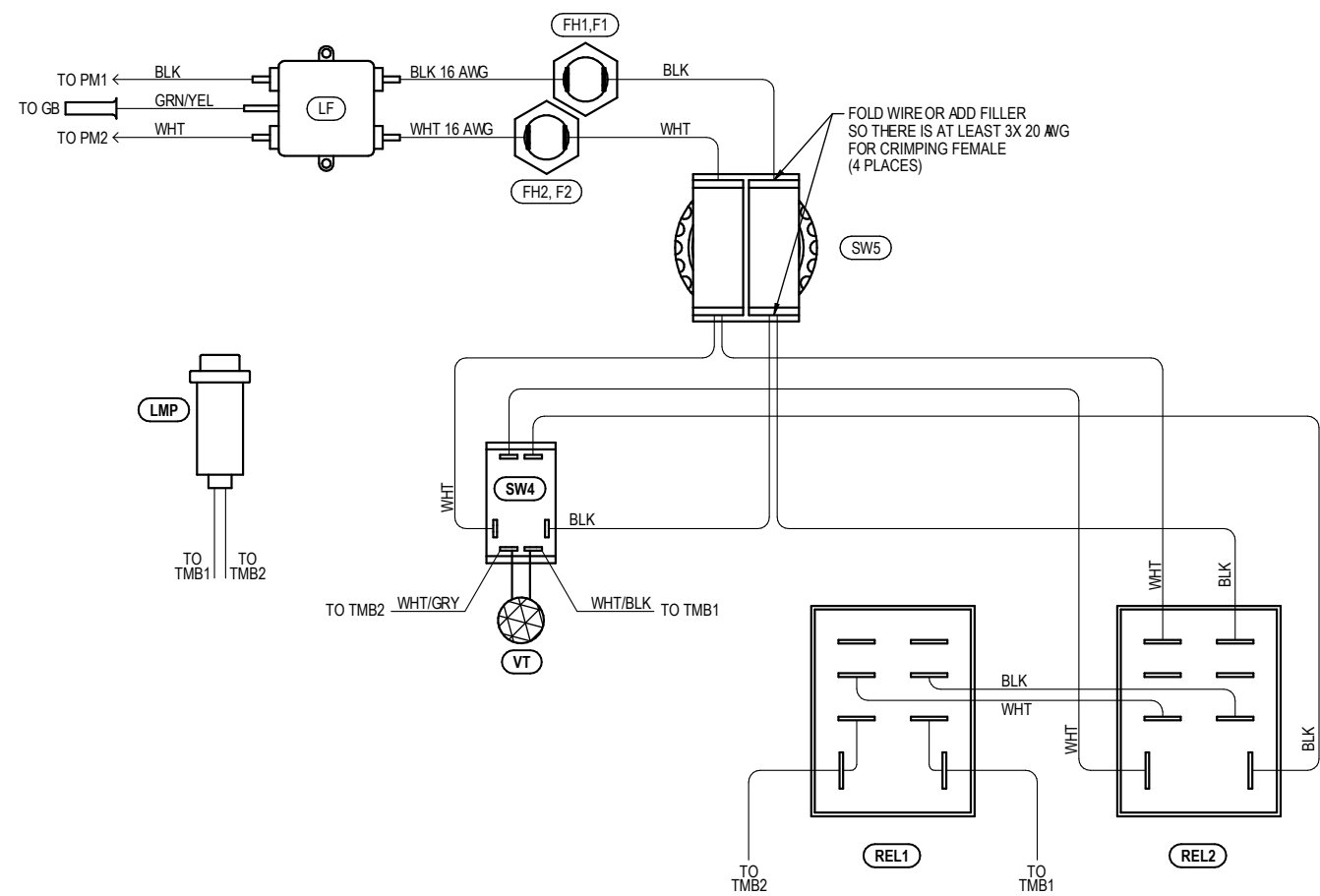
NOTE: PCB5, POT1, POT3 NUMBERS SKIPPED TO AVOID CONFUSION W/CWE-1000-A DRAWINGS.

**CWE-1000-B-WD REMOTED CW-5 CONTROL BOX WIRING DIAGRAM,  
CONT'D.**

**ELECTRICAL COMPONENT CHART**

<b>ITEM</b>	<b>DESCRIPTION</b>	<b>PART NUMBER</b>
PCB1	Timer Board PCB	PCB-1350
PCB2	Motor Control Board PCB	PCB-1351
PCB3	Power Supply PCB	PCB-5800
PCB4	Micro Control PCB	PCB-5801
PCB6	Relay Board PCB	PCB-2231
PCB7	0-90V Spd Ctrl W/Isolator	CWO-6527
SW1	Push Button Switch	SWT-1111
SW2	Toggle Switch	CWO-6335
SW3	Toggle Switch	BUG-2255
SW4	Toggle Switch	MUG-1199
SW5	Latch Switch	SWT-FNC2
SW6	Rotary Switch w/Knob	MUG-1258-1
POT2	Potentiometer	BUG-9677
POT4	Multi-turn Potentiometer	BUG-1562
DM	Digital Meter	BUG-1764
PM1	Panel Mount 5T-M	CON WTE 0383
PM2	Panel Mount 4T-F	MUG-1156
LMP	Pilot Light	LED-2111
FH1,2	Fuse Holder Panel Mount	FHO-0188
F1,2	Fuse Slow Blow 2.0A	FUS WTE 0373
SOL	Magnetic Valve	BUG-9102
SW7	Toggle Switch	ABP-1069
REL1,2	Relay DPDT 10A 110/120VAC	CBP-2006
VT	Volt Trap	BUG-1393
TMB 1,2,3	Terminal Block	PWS-0147
GB	Ground Bar	PWS-0259

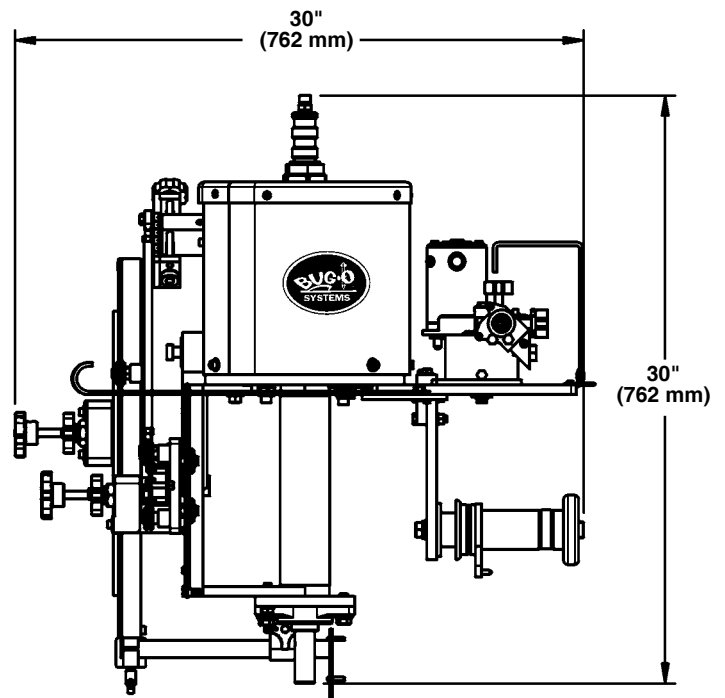
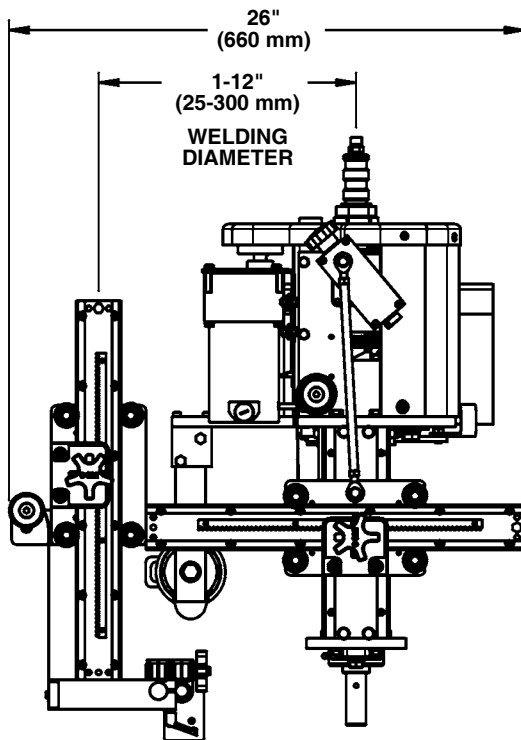
CWE-1000-B-WD REMOTED CW-5 CONTROL BOX WIRING DIAGRAM,  
CONT'D.



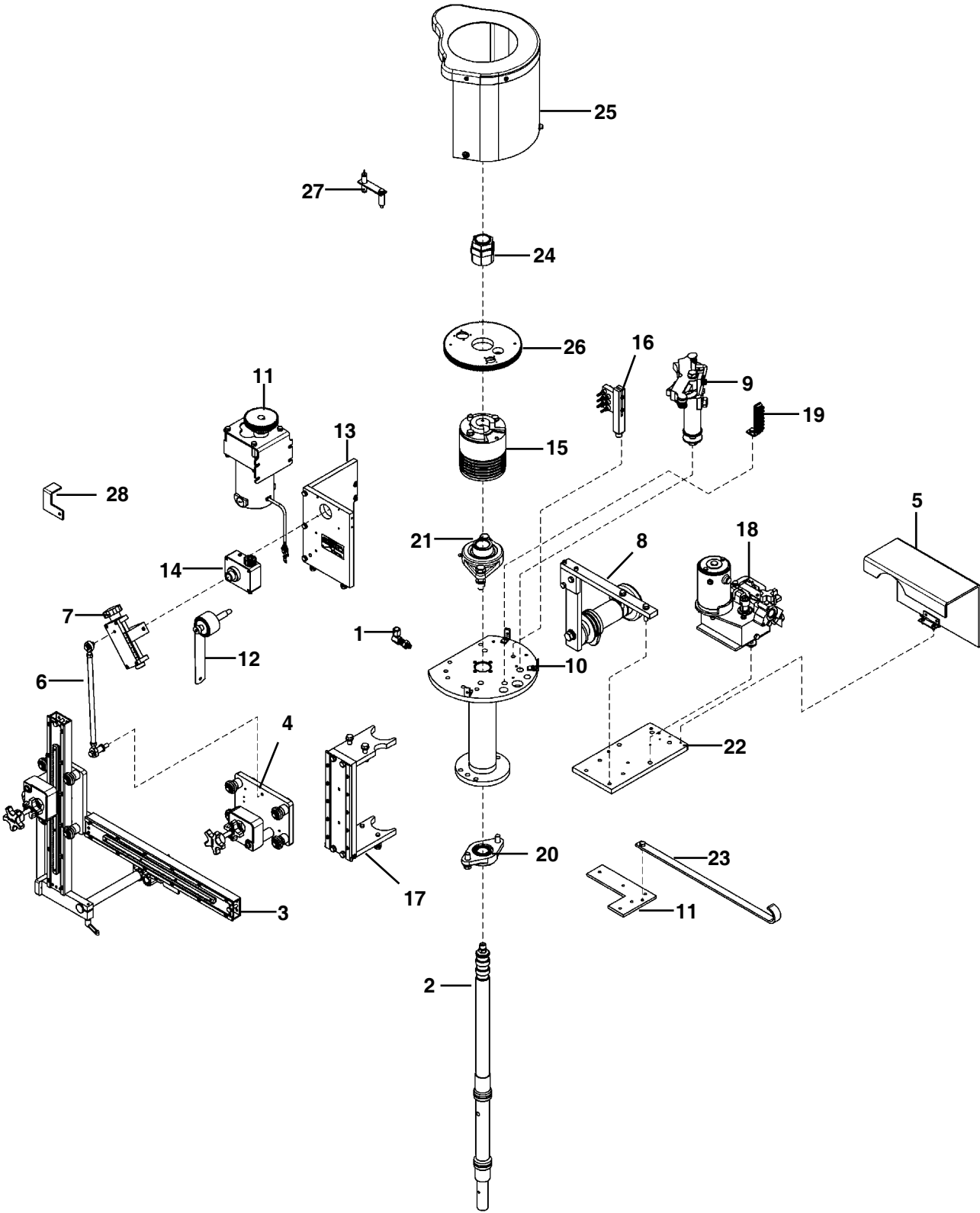
## TECHNICAL DATA:

<b>Amperage:</b>	0-300 amps
<b>Input Voltage:</b>	115 VAC
<b>Voltage:</b>	0-50 VAC
<b>Wire Sizes:</b>	.035" - .078" (.89 - 1.98 mm)
<b>Rotation Speed:</b>	.5-6.0 rpm
<b>Cam Range:</b>	5" (125 mm)
<b>Welding Diameter:</b>	1 - 12" (25 - 300 mm)
<b>Shielding Gas:</b>	Solenoid Control
<b>Height:</b>	30" (762 mm)
<b>Net Weight:</b>	155 lbs. (71 kg)
<b>Shipping Weight:</b>	200 lbs. (91 kg)

## DIMENSIONS:



CWE-5 CIRCLE WELDER / EXPLODED VIEW

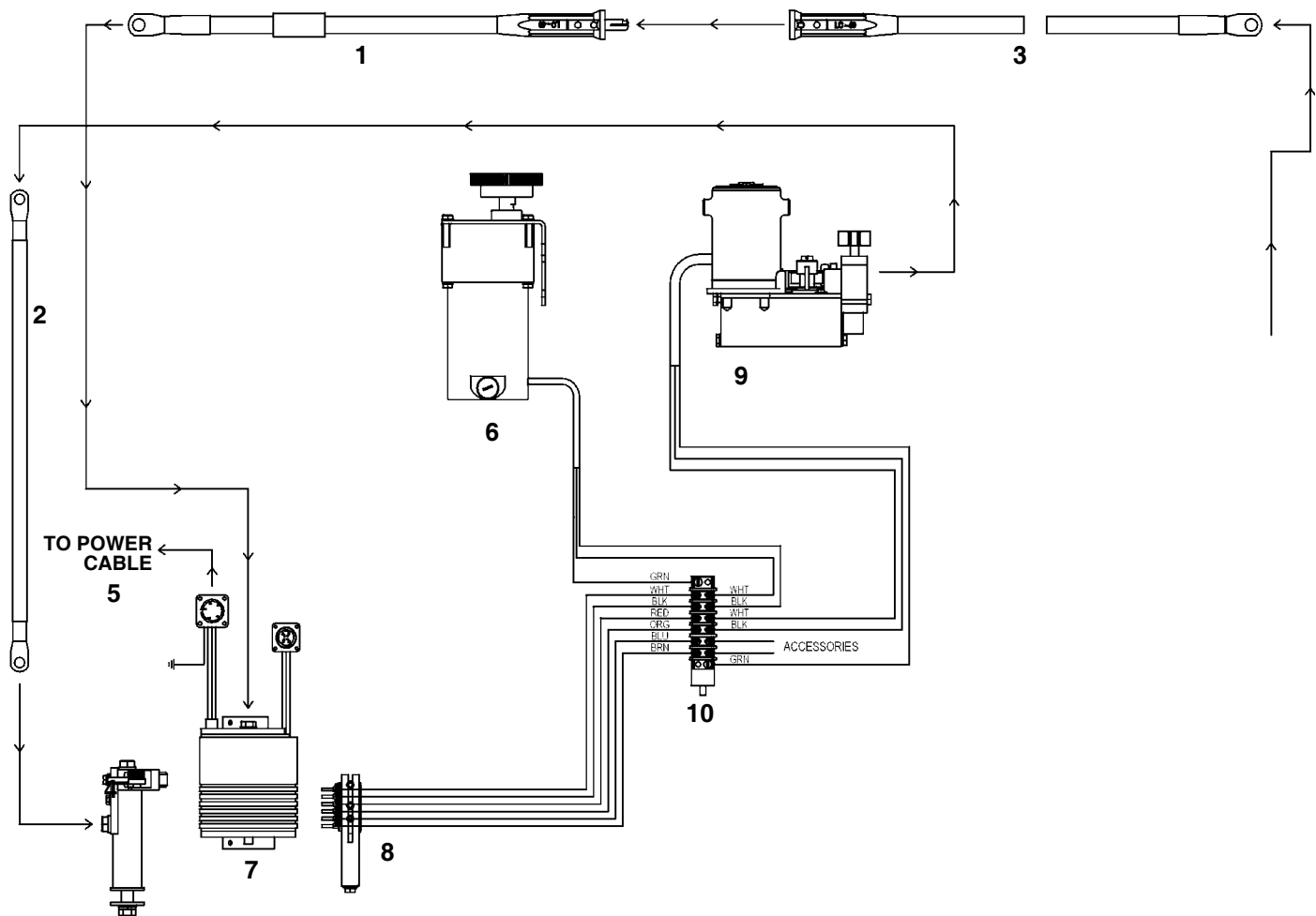




## CWE-5 CIRCLE WELDER / PARTS LIST

<u>ITEM</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	BUG-1296	90 Degree Hose Adaptor
2	1	CWO-3001	CW-5 Shaft Assembly
3	1	CWO-1670	CW-5 Racking System
4	1	CWO-1685	Small Horizontal Racker
5	1	CWO-2005	Wire Feeder Guard
6	1	CWO-3004	Cam Shaft & Spacer Assembly
7	1	CWO-3005	5" Cam Assembly
8	1	CWO-3008	Wire Reel Assembly
9	1	CWE-1535	Brush Holder & Support Assembly
10	1	CWO-3199	CW-5 Housing Assembly
11	1	CWO-3384	P.M. Motor Assembly
12	1	CWO-3399	Load Spring Assembly
13	1	CWO-3417	Motor & Transmission Plate Assembly
14	1	CWO-3418	Transmission 3.5:1 Assembly
15	1	CWE-1525	CW-5 Collector
16	1	CWE-1530	Small Brush Retainer Assembly
17	1	CWO-3466	Slide Bar Mounting Assembly
18	1	CWO-3468	LN-7 Wire Feeder Assembly
19	1	CWO-3935	Terminal Block Assembly CW-5
20	1	CWO-4050	1" Bearing With Fasteners
21	1	CWO-4060	1-1/4" Bearing With Fasteners
22	1	CWO-4088	Wire Feeder Mount Plate
23	1	CWO-4092	Cable Support
24	1	CWO-5075	1-1/4" Trantorque
25	1	CWO-5220	Guard Assembly
26	1	CWE-5734	Gear, Alum (0716112) 2" Bore
27	1	CWE-1026	Sensor Mount Bracket
28	1	CWE-1028	Sensor Target

## CWE-5 CIRCLE WELDER / WIRING DIAGRAM

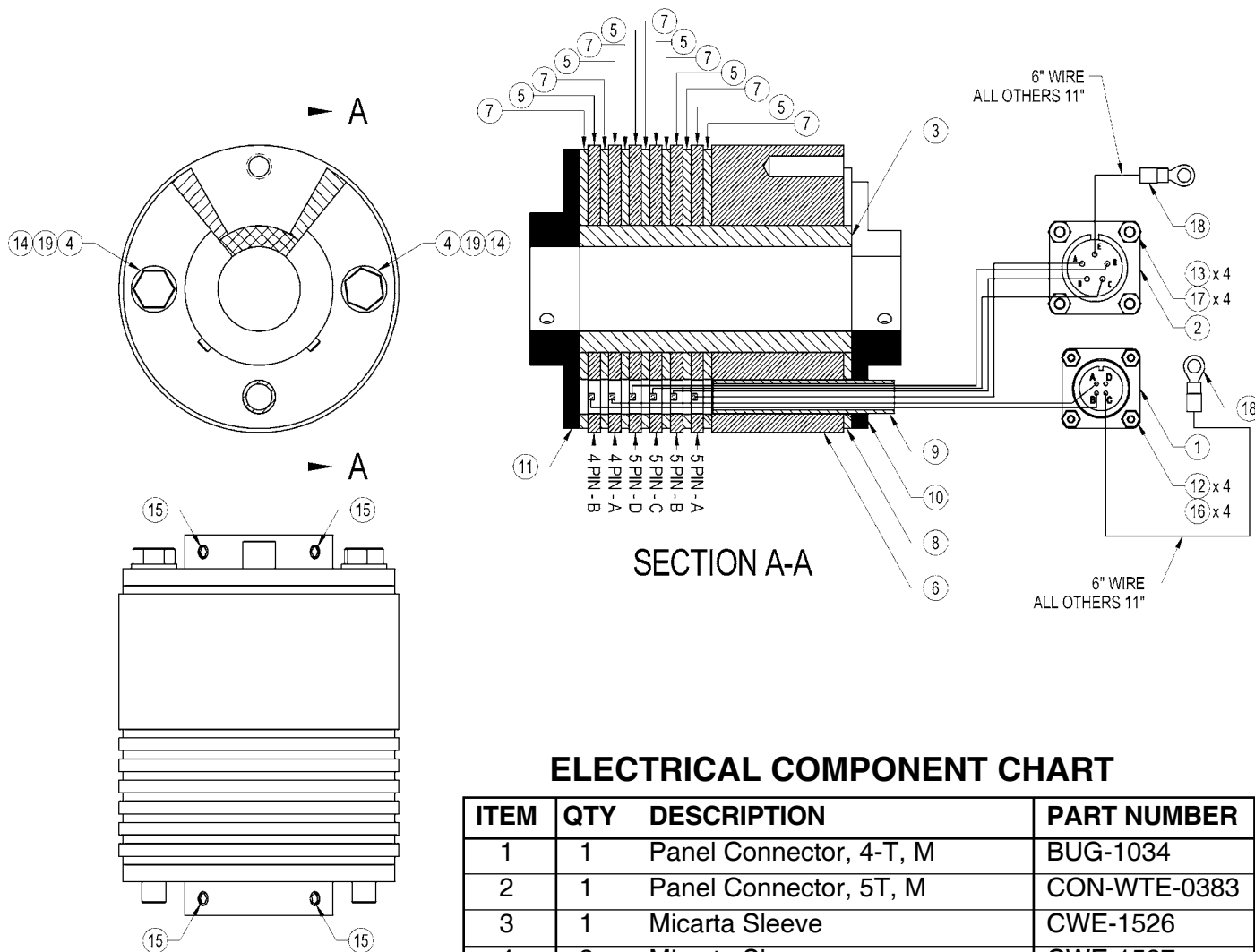


ELECTRICAL COMPONENT CHART		
ITEM	DESCRIPTION	PART NUMBER
1	Weld Cable Inlet 2/0	CWO-3012
2	Weld Cable	CWO-3013
3	Weld Cable 50'	CWO-3019
4	Large Brush Holder & Support	CWO-3059
5	Power Cable	CWO-3139*
6	P.M. Motor Assembly	CWO-3384
7	CW-5 Collector	CWE-1525
8	Small Brush Retainer Assembly	CWE-1530
9	LN-7 Wire Feeder Assembly	CWO-3468
10	Terminal Block	CWO-3935

\*CWO-3139 Universal

CWO-3139-M For Miller Welders

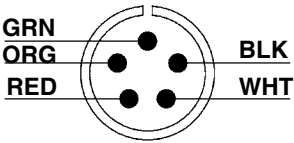
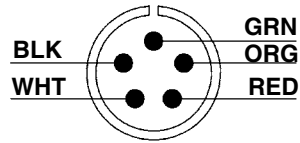
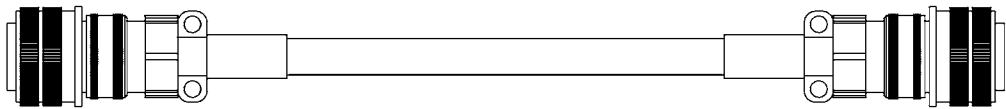
# CWE-1525 COLLECTOR FOR CWE-1500 / WIRING DIAGRAM



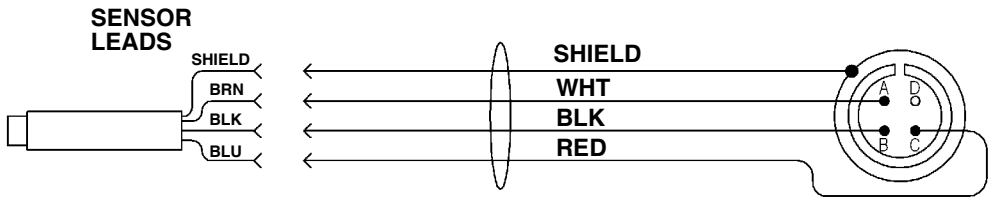
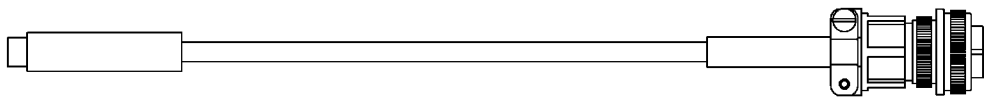
## ELECTRICAL COMPONENT CHART

ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	Panel Connector, 4-T, M	BUG-1034
2	1	Panel Connector, 5T, M	CON-WTE-0383
3	1	Micarta Sleeve	CWE-1526
4	2	Micarta Sleeve	CWE-1527
5	6	Brass Ring 4.25" x .188"	CWO-3127
6	1	Brass Ring 4.25" x 2"	CWO-5742
7	7	Micarta Spacer	CWO-5744
8	1	Micarta Spacer w/Notch	CWO-5747
9	1	.5" x2.75" Micarta Sleeve	CWO-5754
10	1	Top Plate CW-5 Collector	CWO-5763
11	1	Bottom Plate CW-5 Collector	CWO-5764
12	4	Rnd Hd. Slit. Scr 4-40 x 3/8 Zinc	FAS-0204
13	4	Rnd Hd. Scr/ 6-32 x 1/2 Zinc	FAS-0215
14	2	3/8-16 x 5" Hex. Hd. Cap, Zinc	FAS-0392
15	4	Set Scr 1/4-20 x 1/2 Cup Point	FAS-0455
16	4	Hex Nut 4-40	FAS-1305
17	4	Hex Nut 6-32	FAS-1310
18	2	#8 Ring, Red	TERM-5494
19	2	5/16 SAE Washer	WAS-0250

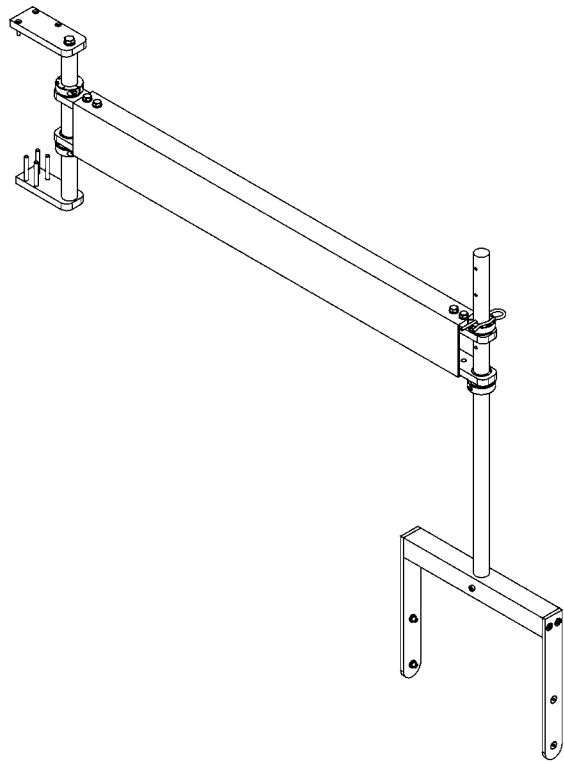
**CWE-1025 CONTROL TO UNIT CABLE**



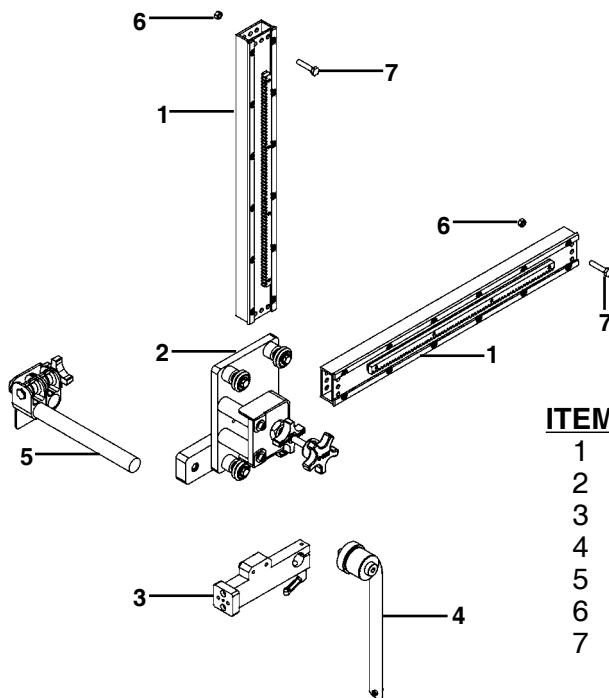
**CWE-1020 SENSOR CABLE**



**CWE-1010 CONTROL MOUNT ARM**

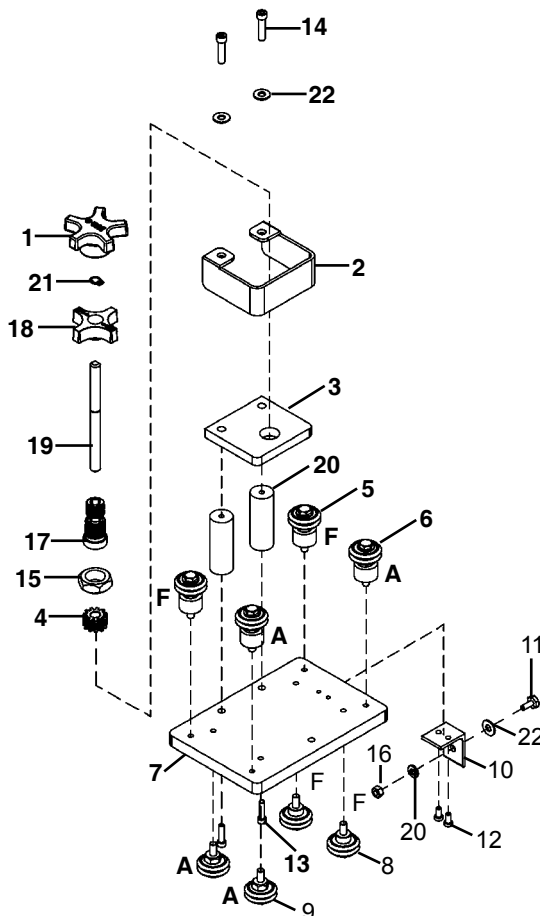


## CWO-1670 CWE-5 RACKING SYSTEM / EXPLODED VIEW / PARTS LIST



ITEM	QTY	PART NO.	DESCRIPTION
1	2	ABR-1070	V-Guide Ways 19"
2	1	CWO-1675	Vertical Racker
3	1	CWO-1695	Attachment Block
4	1	CWO-3450	10.6# Load Spring Assy.
5	1	CWO-5544	Gun Clamp Assy.
6	2	FAS-1351	Hex Nut 1/4-20
7	2	FAS-2351	Hex Hd Cap Scr 1/4-20 x 1-1/4"

## CWO-1685 HORIZONTAL RACKER / EXPLODED VIEW / PARTS LIST

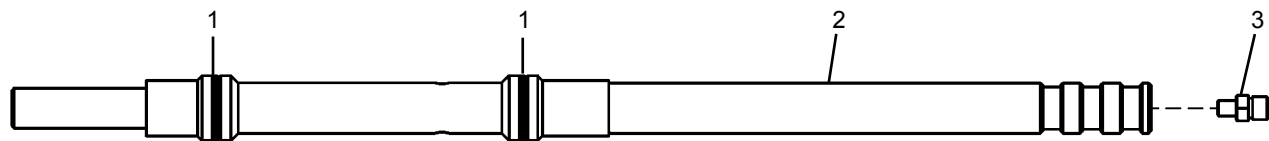


ITEM	QTY	PART NO.	DESCRIPTION
1	1	BUG-2032	Knob, Black
2	1	CWO-1671	Racker Shield
3	1	CWO-1678	Racker Plate
4	1	CWO-1679	Pinion 11T
5	2	CWO-1680	W2 Fixed Leg & Wheel Assy.
6	2	CWO-1681	W2 Adj. Leg & Wheel Assy.
7	1	CWO-1686	Mount Plate (Small Racker)
8	2	CWO-4020	Fixed Leg & Wheel Assy.
9	2	CWO-4021	Adj. Leg & Wheel Assy.
10	1	CWO-4112	Bracket
11	1	FAS-0355	Hex Hd Cap Scr 1/4-20 x 1/2"
12	2	FAS-0534	Soc Hd Cap Scr 10-24 x 3/8"
13	2	FAS-0557	Soc Hd Cap Scr 1/4-20 x 3/4"
14	2	FAS-0559	Soc Hd Cap Scr 1/4-20 x 1"
15	1	FAS-1307	Hex Jam Nut 3/4-16
16	1	FAS-1351	Hex Nut 1/4-20
17	1	MUG-1141	Bearing Collet
18	1	MUG-1142	Knob, Locking
19	1	MUG-1144	Shaft
20	2	MUG-1453	Stand-Off
21	1	MUG-1579	Retaining Ring
22	3	WAS-0240	1/4" SAE Washer
23	1	WAS-0243	1/4" Split Lock Washer

F = FIXED WHEEL PLACEMENT

A = ADJUSTABLE WHEEL PLACEMENT

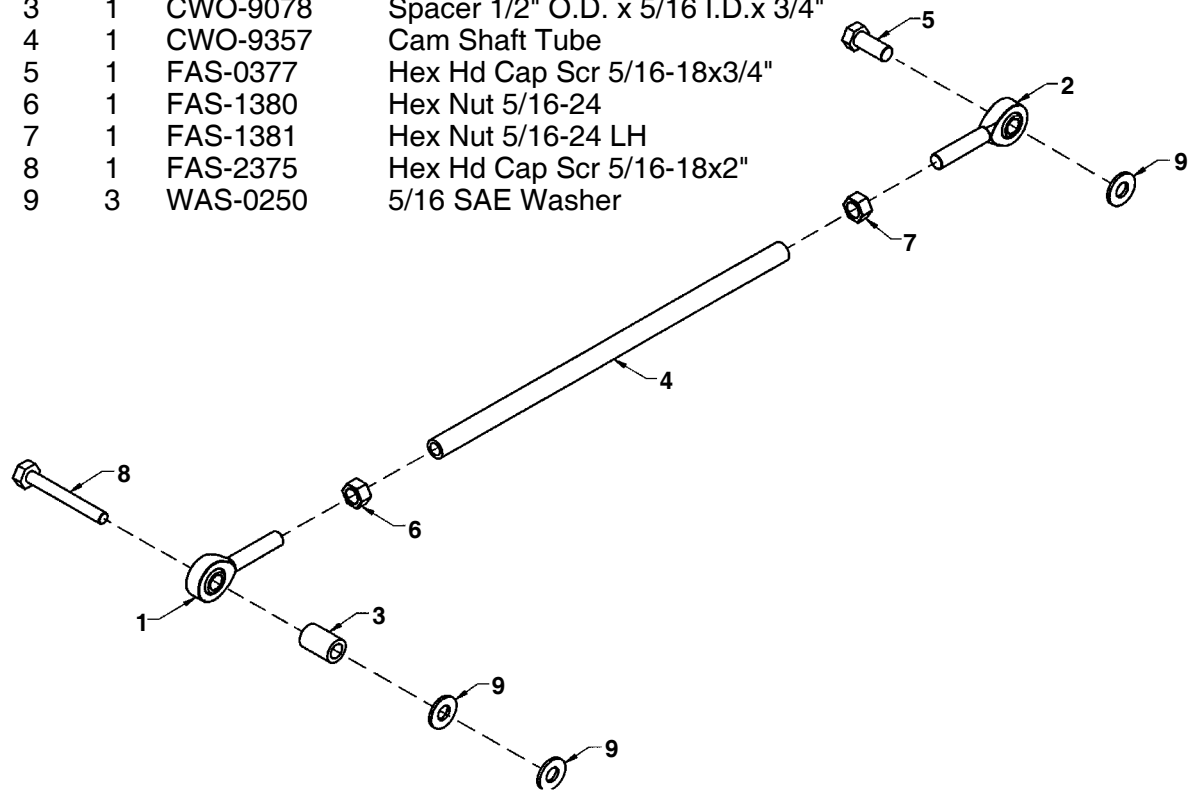
CWO-3001 SHAFT ASSEMBLY / EXPLODED VIEW / PARTS LIST



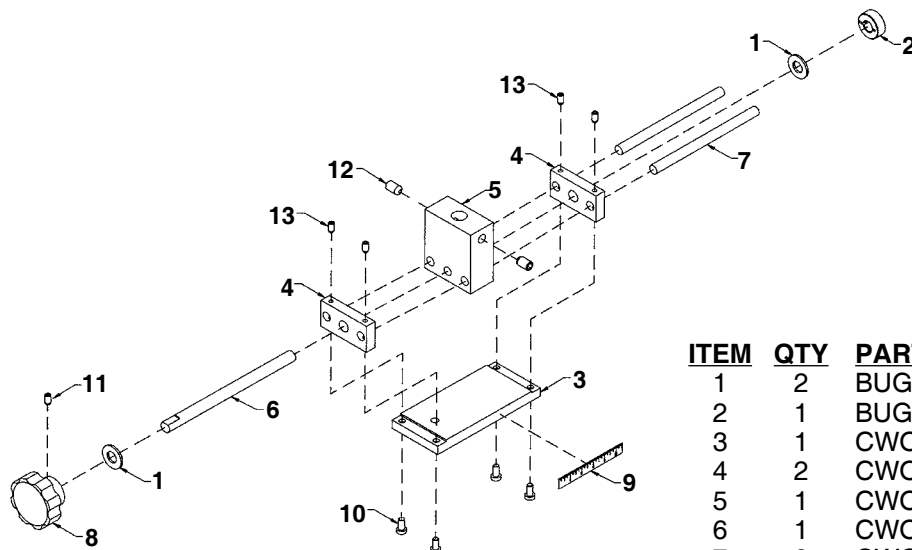
ITEM	QTY	PART NO.	DESCRIPTION
1	2	CWO-4003	O-Ring
2	1	CWO-5781	CWP-5 Shaft
3	1	BUG-9096	Outlet Bushing, Oxygen

CWO-3004 CAM SHAFT AND SPACER ASSEMBLY / EXPLODED VIEW / PARTS LIST

ITEM	QTY	PART NO.	DESCRIPTION
1	1	CWO-4073	Ball Joint Rod End 5/16-24 RH
2	1	CWO-5019	Ball Joint Rod End 5/16-24 LH
3	1	CWO-9078	Spacer 1/2" O.D. x 5/16 I.D.x 3/4"
4	1	CWO-9357	Cam Shaft Tube
5	1	FAS-0377	Hex Hd Cap Scr 5/16-18x3/4"
6	1	FAS-1380	Hex Nut 5/16-24
7	1	FAS-1381	Hex Nut 5/16-24 LH
8	1	FAS-2375	Hex Hd Cap Scr 5/16-18x2"
9	3	WAS-0250	5/16 SAE Washer

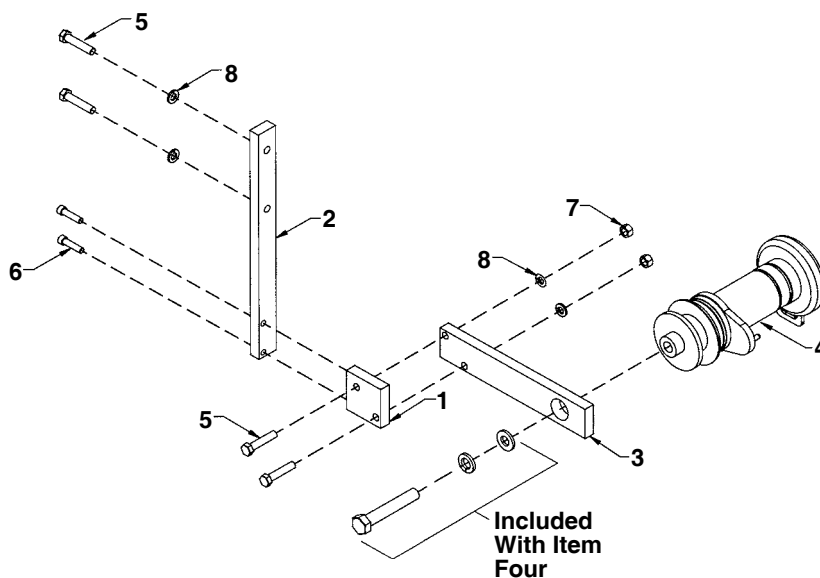


## CWO-3005 5" CAM ASSEMBLY / EXPLODED VIEW / PARTS LIST



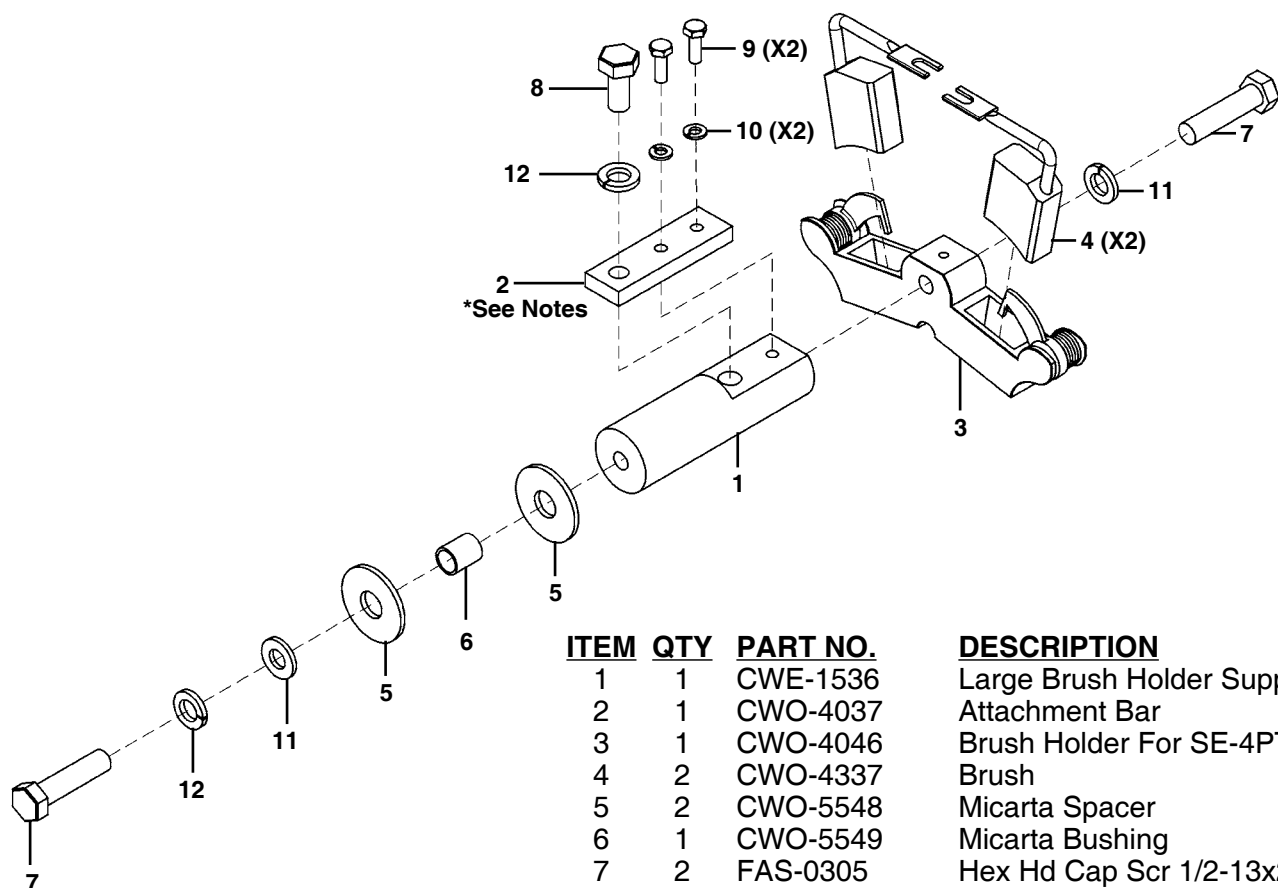
ITEM	QTY	PART NO.	DESCRIPTION
1	2	BUG-2098	Delrin Washer 3/8" I.D.
2	1	BUG-9012	Locking Collar
3	1	CWO-4026	Base Plate
4	2	CWO-4027	End Plate
5	1	CWO-4028	Center Block
6	1	CWO-4029	Screw
7	2	CWO-4031	Rod
8	1	CWO-4032	Knob
9	1	CWO-5199	Scale
10	4	FAS-0434	Set Scr 10-24x3/8"
11	1	FAS-0444	Set Scr 10-32x3/8"
12	2	FAS-0495	Set Scr 3/8-16x1/2"
13	4	FAS-0534	Soc Hd Cap 10-24x3/8"

## CWO-3008 WIRE REEL MOUNT ASSEMBLY / EXPLODED VIEW / PARTS LIST



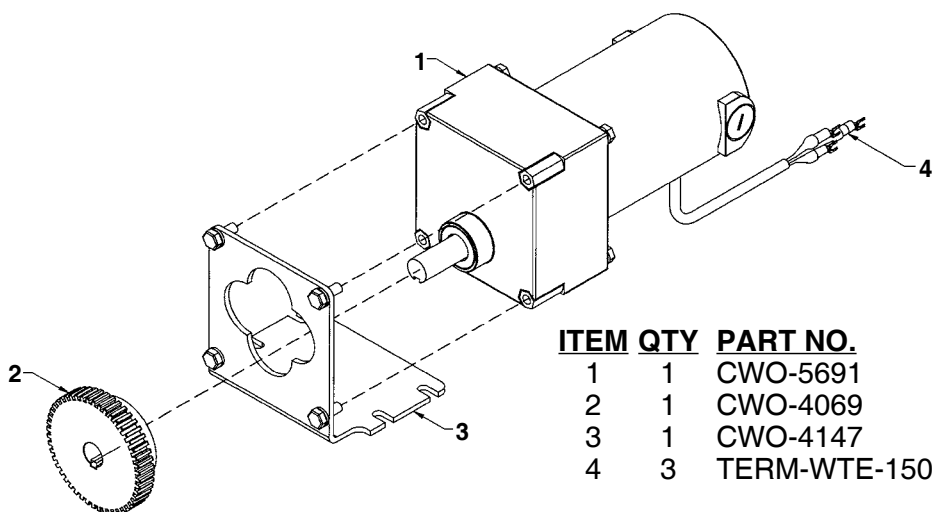
ITEM	QTY	PART NO.	DESCRIPTION
1	1	CWO-5977	Vertical Mount Plate
2	1	CWO-3743	Horizontal Mount Plate
3	1	CWO-4081	Wire Reel Mount Bar
4	1	WFU-1041	2" O.D. Spindle Kit
5	4	FAS-2373	Hex Hd Cap Scr 5/16-18x1-1/2"
6	2	FAS-0559	Soc Hd Cap Scr 1/4-20x1"
7	2	FAS-1370	Hex Nut 5/16-18
8	4	WAS-0251	5/16 Lock Washer

## CWE-1535 LARGE BRUSH HOLDER AND SUPPORT / EXPLODED VIEW / PARTS LIST



ITEM	QTY	PART NO.	DESCRIPTION
1	1	CWE-1536	Large Brush Holder Support
2	1	CWO-4037	Attachment Bar
3	1	CWO-4046	Brush Holder For SE-4PT
4	2	CWO-4337	Brush
5	2	CWO-5548	Micarta Spacer
6	1	CWO-5549	Micarta Bushing
7	2	FAS-0305	Hex Hd Cap Scr 1/2-13x2"
8	1	FAS-0309	Hex Hd Cap Scr 1/2-13x1"
9	2	FAS-0357	Hex Hd Cap Scr 1/4-20x3/4"
10	2	WAS-0243	1/4" Lock Washer
11	1	WAS-0280	1/2" Washer
12	3	WAS-0281	1/2" Lock Washer

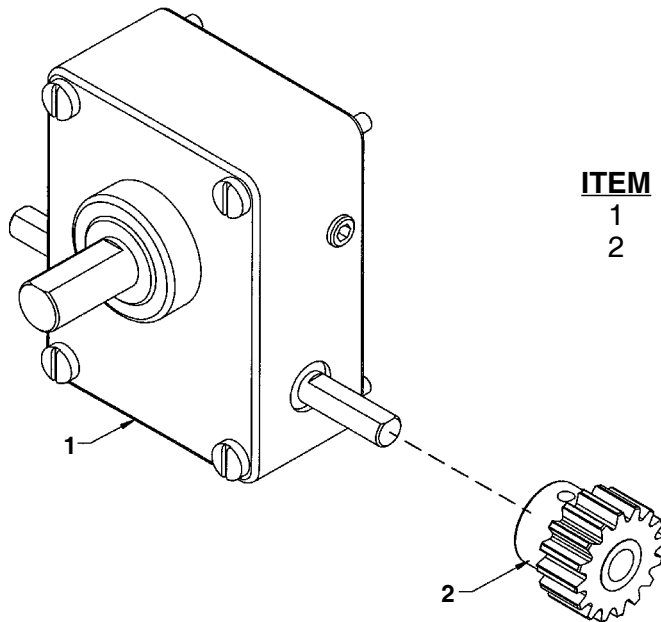
## CWO-3384 P.M. MOTOR ASSEMBLY / EXPLODED VIEW / PARTS LIST



ITEM	QTY	PART NO.	DESCRIPTION
1	1	CWO-5691	P.M. Motor 1070
2	1	CWO-4069	Gear, P.M. Motor 1070
3	1	CWO-4147	P.M. Motor Bracket #970
4	3	TERM-WTE-1508	#8 Fork Blue 14RB-8FL T&B

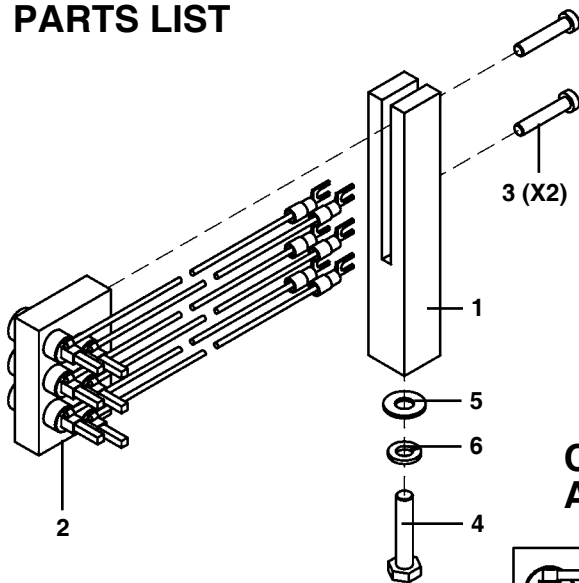


## CWO-3418 TRANSMISSION 3.5:1 ASSEMBLY / EXPLODED VIEW / PARTS LIST



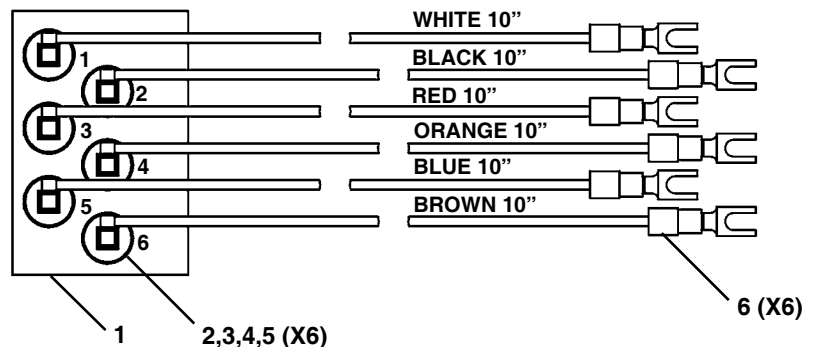
ITEM	QTY	PART NO.	DESCRIPTION
1	1	CWO-3276	Pinion Gear Assembly
2	1	CWO-4068	Transmission SW 3.5:1

## CWE-1530 SMALL BRUSH HOLDER ASSEMBLY / EXPLODED VIEW / PARTS LIST



ITEM	QTY	PART NO.	DESCRIPTION
1	1	CWE-1531	Retainer Support Small
2	1	CWE-1532	6 Pos Small Ret. Block Assy.
3 (X2)	2	FAS-2351	Soc Hd Cap Scr 10-24x1"
4	1	FAS-0539	Hex Hd Cap Scr 1/4-20x1 1/4"
5	1	WAS-0240	1/4" SAE Flat
6	1	WAS-0243	1/4" Split Lock Washer

## CWE-1532 SMALL RETAINER BLOCK ASSEMBLY / DETAIL VIEW / PARTS LIST

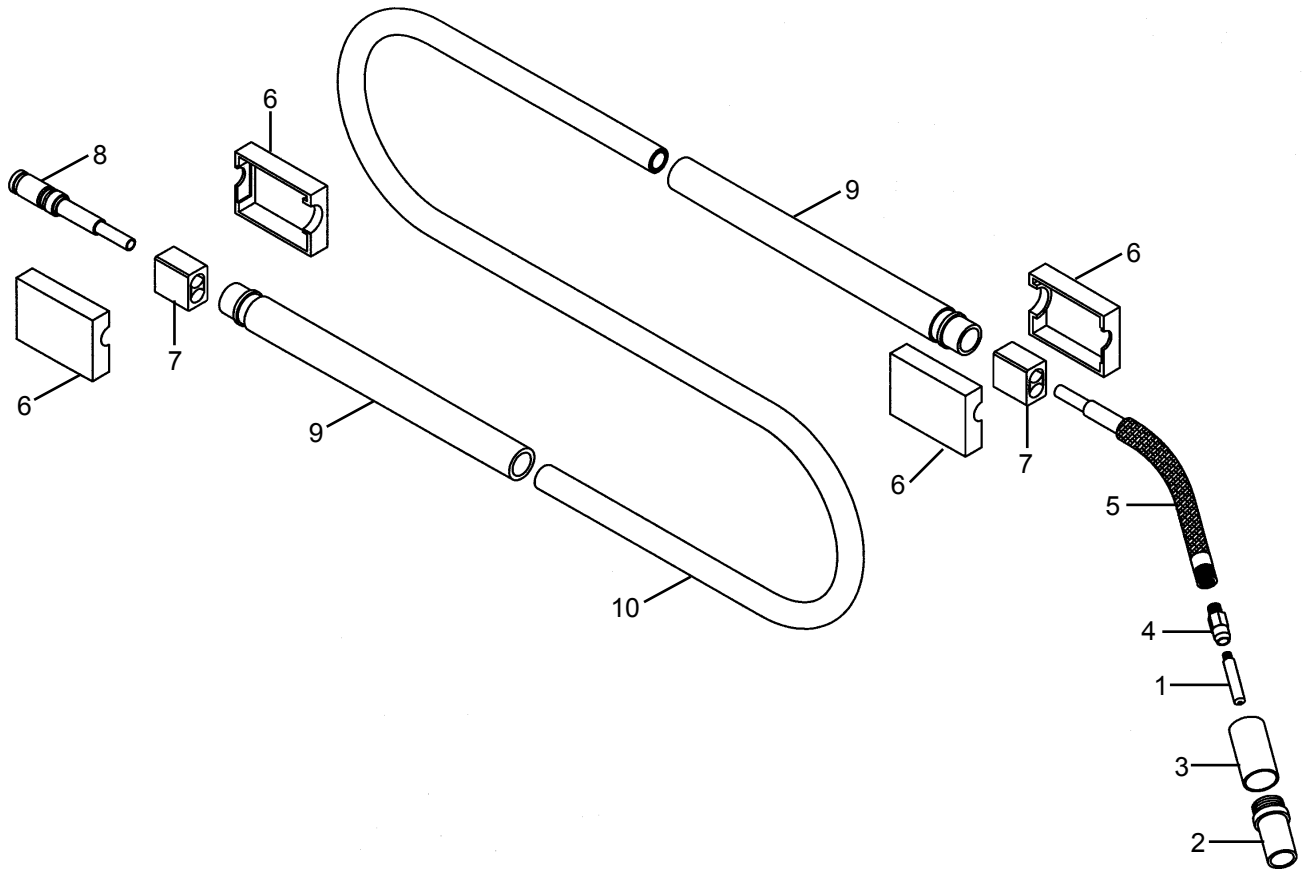


ITEM	QTY	PART NO.	DESCRIPTION
1	1	CWE-1533	6 Pos. Small Retainer Block
2	6	CWO-5831	1/8" x 1/8" x 7/8" Brush
3	6	CWO-5874	1/8" Brush Holder
4	6	CWO-5875	Cap
5	6	CWO-5876	Clip
6	6	TERM WTE 0602	#6 Fork Blue

## CWE-5 GUN ASSEMBLIES

CWO-1500-A	#4 1/16 GUN ASSEMBLY MIG/FLUX	1/16 WIRE SIZE	
	CWO-8002	14H-116 CONTACTOR TIP	10
	CWO-8006	24A-62-SS NOZZLE	1
	CWO-8007	34A NOZZLE INSULATOR	1
	CWO-8008	54A GAS DIFFUSER	1
	CWO-8011	44-116-15 CABLE LINER	1
	CWO-8523	40902 400 AMP CABLE	1
CWO-1500-B	#4 .035 GUN ASSEMBLY MIG/FLUX	.035 WIRE SIZE	
	CWO-8003	14H-35 CONTACTOR TIP	10
	CWO-8006	24A-62-SS NOZZLE	1
	CWO-8007	34A NOZZLE INSULATOR	1
	CWO-8008	54A GAS DIFFUSER	1
	CWO-8009	44-3545-15 CABLE LINER	1
	CWO-8523	40902 400 AMP CABLE	1
CWO-1500-C	#4 .045 GUN ASSEMBLY MIG/FLUX	.045 WIRE SIZE	
	CWO-8004	14H-45 CONTACTOR TIP	10
	CWO-8006	24A-62-SS NOZZLE	1
	CWO-8007	34A NOZZLE INSULATOR	1
	CWO-8008	54A GAS DIFFUSER	1
	CWO-8009	44-3545-15 CABLE LINER	1
	CWO-8523	40902 400 AMP CABLE	1
CWO-1500-D	#4 5/64 GUN ASSEMBLY MIG/FLUX	5/64 WIRE SIZE	
	CWO-8005	14H-564 CONTACTOR TIP	10
	CWO-8006	24A-62-SS NOZZLE	1
	CWO-8007	34A NOZZLE INSULATOR	1
	CWO-8008	54A GAS DIFFUSER	1
	CWO-8012	44-564-15 CABLE LINER	1
	CWO-8523	40902 400 AMP CABLE	1
CWO-1500-E	#4 .052 GUN ASSEMBLY MIG/FLUX	.052 WIRE SIZE	
	CWO-8001	14H-52 CONTACT TIP	10
	CWO-8006	24A-62-SS NOZZLE	1
	CWO-8007	34A NOZZLE INSULATOR	1
	CWO-8008	54A GAS DIFFUSER	1
	CWO-8011	44-116-15 CABLE LINER	1
	CWO-8523	40902 400 AMP CABLE	1

## #4 GUN AND CABLE ASSEMBLY / EXPLODED VIEW / PARTS LIST



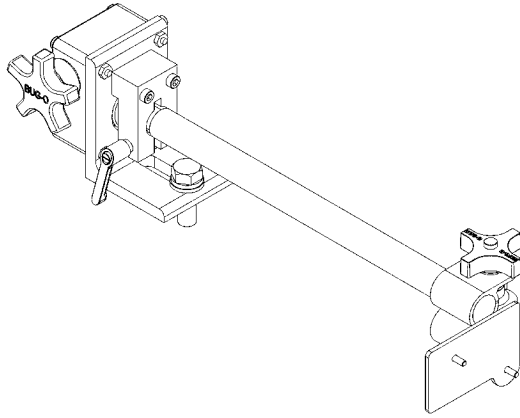
PARTS LIST				WIRE SIZE				
ITEM	QTY	PART #	DESCRIPTION	.035	.045	.052	1/16	5/64
1	1	CWO-8001	14H-52 Contact Tip			X		
1	1	CWO-8002	14H-116 Contact Tip				X	
1	1	CWO-8003	14H-35 Contact Tip	X				
1	1	CWO-8004	14H-45 Contact Tip		X			
1	1	CWO-8005	14H-564 Contact Tip					X
2	1	CWO-8006	24A-62-55 Nozzle	X	X	X	X	X
3	1	CWO-8007	34A Nozzle Insulator	X	X	X	X	X
4	1	CWO-8008	54A Gas Diffuser	X	X	X	X	X
5	1	CWO-8014	64A-60 Conductor Tube	X	X	X	X	X
6	2	CWO-8017	185 Case w/Binder Screws	X	X	X	X	X
7	2	CWO-8018	104 Cable Connector Block	X	X	X	X	X
8	1	CWO-8025	174 Connector Plug w/ O-Rings	X	X	X	X	X
9	1	CWO-8019	234-12 Cable Hose Support	X	X	X	X	X
10	1	CWO-8523	40902 400 AMP cable	X	X	X	X	X
*	1	CWO-8009	44-3545-15 Cable Liner	X	X			
*	1	CWO-8011	44-116-15 Cable Liner			X	X	
*	1	CWO-8012	44-564-15 Cable Liner					X

\* ITEM NOT SHOWN

## CWE-5 DRIVE ROLL KITS

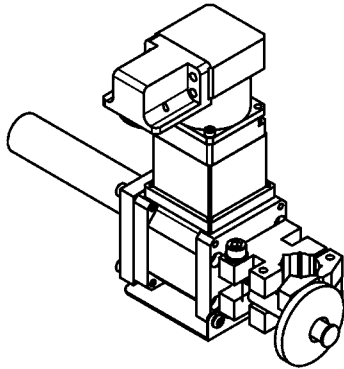
PART NUMBER	DESCRIPTION
CWO-7026-.035	DRIVE ROLL KIT .035 (0.9mm) SOLID WIRE
CWO-7026-.035C	DRIVE ROLL KIT .035 (0.9mm) CORED WIRE
CWO-7026-.052	DRIVE ROLL KIT .045-.052 (1.0-1.3mm) SOLID WIRE
CWO-7026-.052C	DRIVE ROLL KIT .045-.052 (1.0-1.3mm) CORED WIRE
CWO-7026-1/16	DRIVE ROLL KIT 1/16 (1.6mm) SOLID/CORED WIRE
CWO-7026-3/32	DRIVE ROLL KIT .068-3/32 (1.7-2.4mm) SOLID/CORED WIRE

## ACCESSORIES



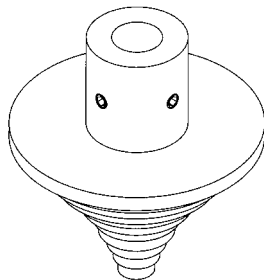
### **CWO-3023-1 Torch Angle Adjuster**

The Torch Angle Adjuster allows the operator to adjust the angle of the gun precisely, without unclamping the holding device.



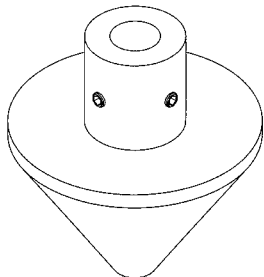
### **KBUG-5050 Stand Alone Weaver**

The compact oscillator provides a pendulum weaving motion to the gun. Speed, width and dwells are independently adjustable.



### **CWO-3670 Step Adaptor**

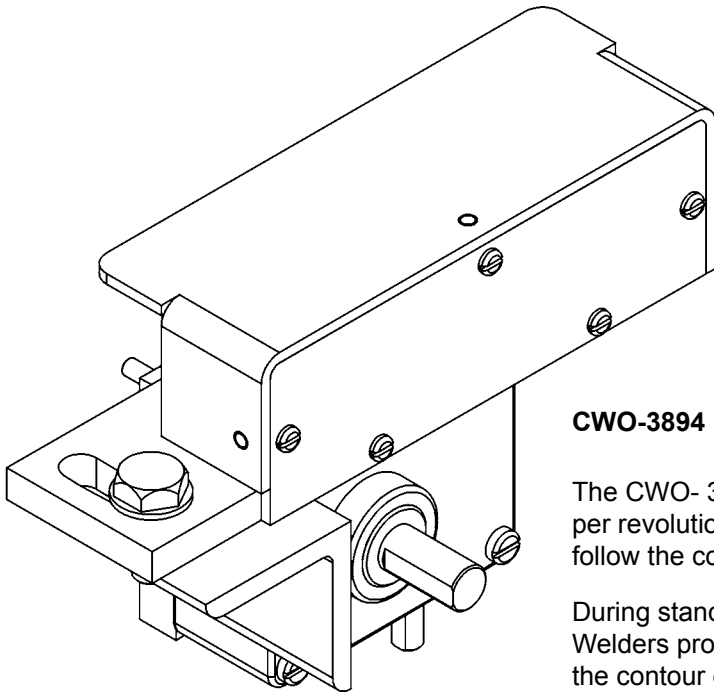
The Step Adaptor is a stepped centering device used to center the machine on threaded I.D. couplings. The range of the Step Adaptor is 1/2" to 4" (13-102 mm) diameter.



### **CWO-5790 Cone Adaptor**

The Cone Adaptor is a tapered centering device used to center the machine on pipe stubbies. The range of the Cone Adaptor is 1-1/4" to 4" (32-102 mm) diameter.

## ACCESSORIES, CONT'D.



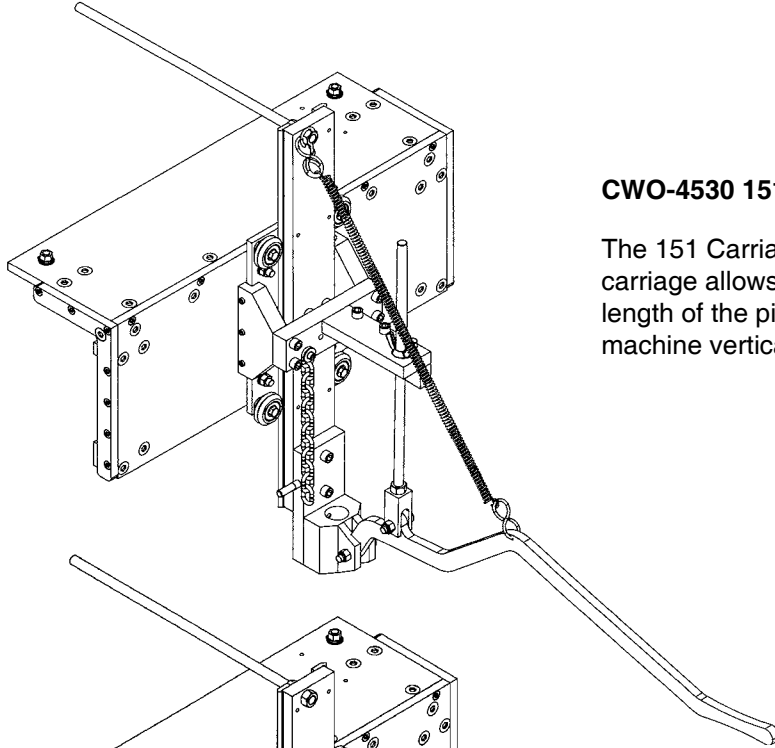
### CWO-3894 HILLSIDE KIT

The CWO- 3894 Hillside Kit provides a *single* rise and fall motion per revolution of the machine to provide the motion required to follow the contour of an *offset* pipe-to-pipe weld.

During standard operation, the cam mechanism of all Bug-O Circle Welders provides a *dual* rise and fall action per revolution to follow the contour of a pipe-to-pipe weld.

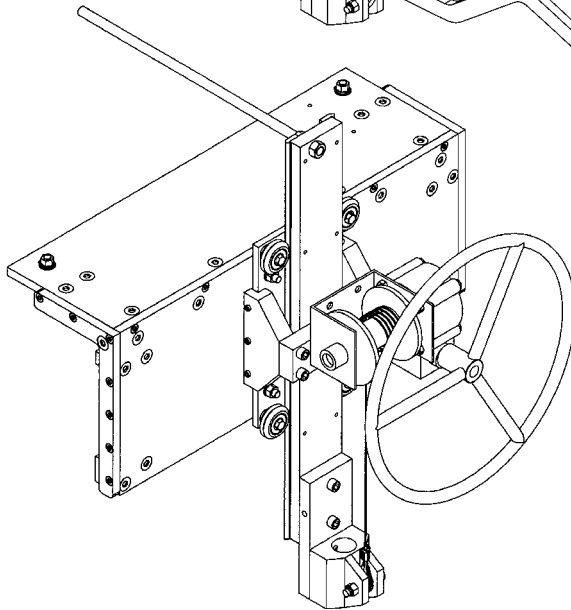
Once the Hillside kit is installed on a Bug-O Circle circle welder, the operator can easily engage or disengage it to switch between single or dual rise and fall operation.

## CARRIAGES



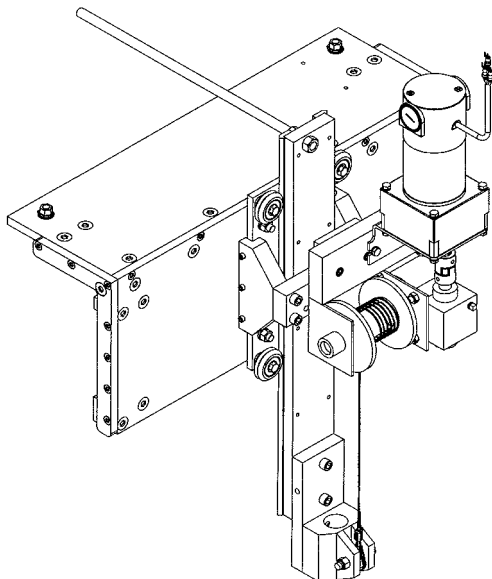
### **CWO-4530 151 Carriage**

The 151 Carriage mounts on a standard monorail. The carriage allows the operator to move the machine the length of the pipe, while utilizing a lever to position the machine vertically on the work piece.



### **CWO-4540 151P Carriage**

The 151P Carriage mounts on a standard monorail. The carriage allows the operator to move the machine the length of the pipe, while utilizing a winch to position the machine vertically on the work piece.



### **CWO-4550 151M Carriage**

The 151M Carriage mounts on a standard monorail, or “bridge crane” type setups. The carriage allows the operator to move the machine the length of the pipe, while utilizing an electric motor to mechanically position the machine vertically on the work piece.

# SETUP INSTRUCTIONS FOR CWE-5 / CB-1P USED IN SPRINKLER FABRICATION

## SUPPORTING FIXTURE AND PIPE STANDS:

The first priority should be given to where the fixture is to be placed. The burning of the holes and welding of the couplings should be the last part of the operation performed on the pipe. It is important that a flow pattern or line be looked at, so that when the pipe is taken out of the fixture, it is finished and ready for shipment.

The mono rail consists of a 4" x 8" x 1/4" (102 x 203 x 6 mm) wall rectangular tubing with a 3/8" x 3" (10 x 76 mm) flat bar welded to the tubing (See pg. 33). The flat bar has to project 1" (25 mm) above the top of the tubing. "C" clamps are to be used to hold the flat bar against the tubing with no gaps. The "C" clamp may be walked down the tubing as it is being tack welded. If the beam has a bow in it, take the following steps:

1. Determine exactly where the center of the bow is. This may be accomplished by putting a string along the front side of the monorail. Place 1/2" (13 mm) nuts between the string and the monorail and measure the gap between the string and the monorail. Always measure on the same side of the string.
2. After you have determined where center of the bow is, take a hand torch and heat the outside of the bow. The outside of the bow should be the side the flat bar is welded to. Take a piece of chalk and draw a triangle with a 2" (51 mm) base under the bottom of the flat bar with the top or point of the triangle pointing down. Do the same on the top of the monorail against the flat bar with the top or point pointing towards the face of the monorail. Heat these two areas so that they become cherry red in color. After the heat has been applied, take a large rag and a bucket of water and cool the heated area. After the area has been cooled, check the beam again. Repeat as necessary.

## PIPE STANDS:

The pipe stands consist of 3" (76 mm) pipe in floor flanges with a 2-1/2" (64 mm) or 3" (76 mm) angle welded to the top of the pipe, and they should be spaced and aligned as shown (See pg. 29). The two stands should have some sort of clamping device to hold the pipe in place. The clamping device can be anything from a pipe vise to a chain and boom. The clamping device must be staggered.

After the pipe stands and supporting columns are in place, the monorail is to be placed on the supporting columns. The pipe stands and the supporting columns must be level and plumb. These items may have to be shimmed. With these items level, the monorail may be put in place on the supporting columns and held in place by two "C" clamps. Put a level on the face of the beam in the vertical position and on the bottom in the horizontal position. The beam should be level both ways, and if not, the beam will have to be shimmed. If the monorail has a twist, which may occur, level one end so that the other end needs to be pulled back.

Next, put a piece of 8" (203 mm) pipe in the pipe stands and clamp down. Take a center head and find the center of the pipe on each end and in the middle. You can now use two methods to check to see if the monorail is aligned with the pipe below. They are as follows:

1. Use a plumb bob off the face of the monorail and measure from the center of the pipe to the plumb bob. The distance should be 5-11/16" (144 mm) in all three locations.
2. The second method is to put one carriage on the monorail and attach the CB-1P to it. With the center pin in the burning machine, check all three locations. The burning machine must be plumb on the carriage if this method is used.



# SETUP INSTRUCTIONS FOR CWE-5 / CB-1P USED IN SPRINKLER FABRICATION

## INSTALLING CARRIAGES AND MACHINES ON THE MONORAIL:

Assemble carriages and put them on the rail.

The CWE-5 welder is put on the carriage that is nearest to the welding power source and the CB-1P cutter nearest to the plasma power source.

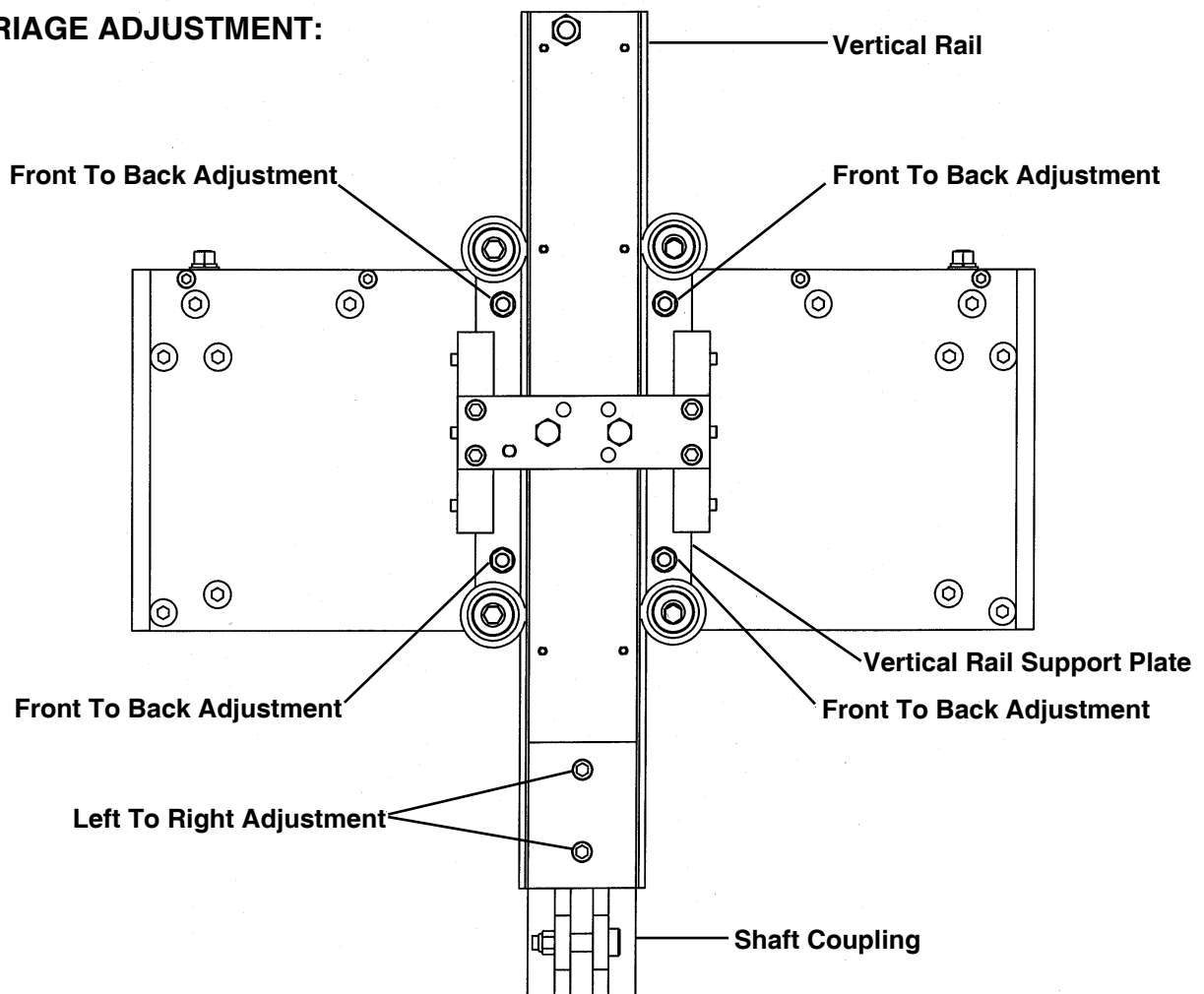
Put the CB-1P cutter machine on the 8" (203 mm) pipe in the stands and bring the carriage to the machine. Lower the shaft coupling over the main shaft on the cutter. Ensure that shaft is fully inserted into the shaft coupling. Rotate the machine so that the plasma leads are in front and parallel to the carriage and tighten the set screws in the shaft coupling to secure the main shaft to the vertical slide assembly.

Next put the CWE-5 welder on the 8" (203 mm) pipe and bring its carriage to it. Lower the shaft coupling down over the main shaft. Rotate the machine so that the welding lead on top of the machine will be on your left. This will put the electrical connector on the right. Tighten the set screws in the shaft coupling to secure the main shaft to the vertical slide assembly.

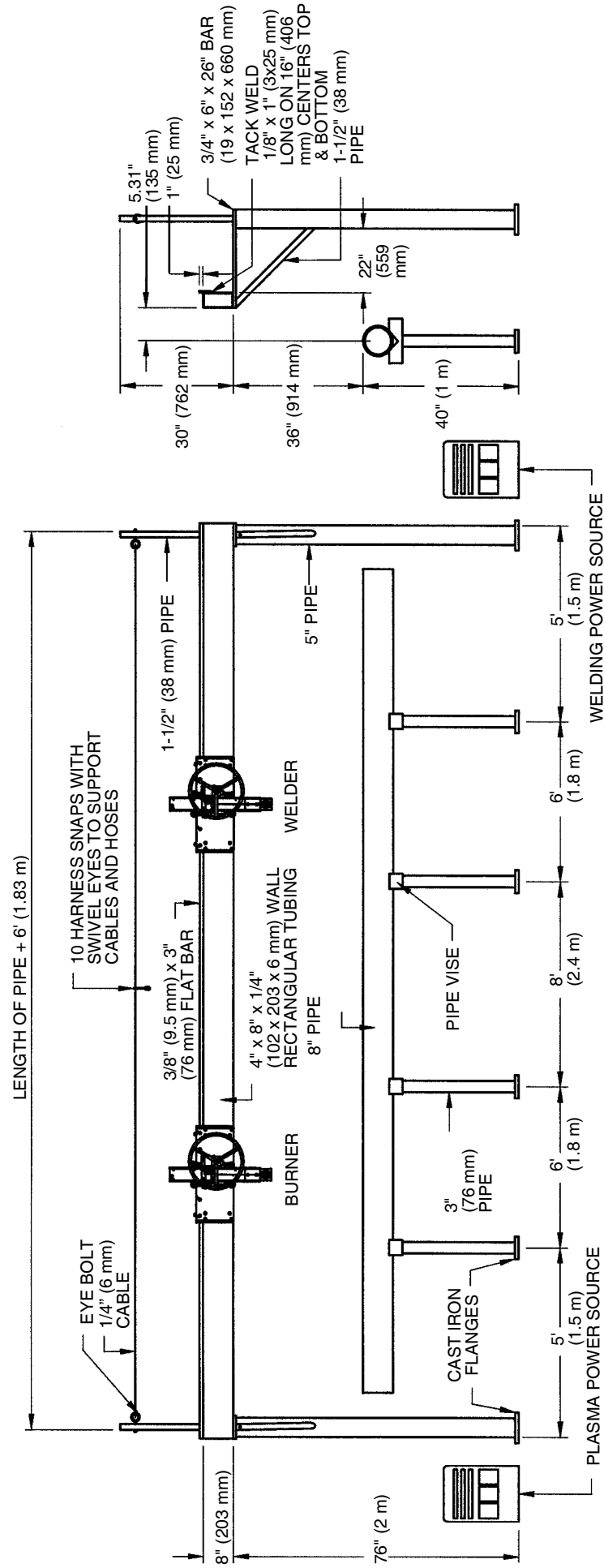
It is important for the machines to hang plumb. Left to right adjustments are made by loosening the two bolts that connect the shaft coupling to the vertical rail. Front to back adjustments are done by adjusting the position of the vertical rail support plate. Move the plate by adjusting the eight nuts on the four studs.

**Note:** Once machines are plumb verify that the machines are centered over the pipe stand.

## CARRIAGE ADJUSTMENT:



# SETUP DIAGRAM FOR CWE-5 / CB-1P USED IN SPRINKLER FABRICATION



## PREVENTIVE MAINTENANCE / CWE-5 CIRCLE WELDER

**IMPORTANT:** Make sure the input power at the power source is turned off and the 50' weld cable is disconnected from the circle welder prior to working inside the circle welder.

### AFTER DAILY USE:

#### Refer to CWE-5 Exploded View Parts List. (Pg. 16, 17)

##### Racking System item #3:

Inspect gear rack, hardened ways and wheels (remove all dirt, grease, weld spatter and rust). Check hardened ways for nicks and replace if necessary. Lubricate with a dry teflon or graphite spray lubricant. Adjust wheels for snug fit and smooth operation. Lubricate racker pinion with a dry teflon or graphite spray lubricant.

##### Small Vertical Racker item #4:

Inspect wheels (remove all dirt, grease, weld spatter and rust). Adjust wheels for snug fit and smooth operation. Lubricate racker pinion and wheels with a dry teflon or graphite spray lubricant.

##### Slide Bar Mounting Assembly item #18:

Inspect hardened ways (remove all dirt, grease and weld spatter). Check hardened ways for nicks and replace if necessary. Lubricate with a dry teflon or graphite spray lubricant.

#### Refer to CWE-5 Electrical Component Chart. (Pg. 18)

##### Power Cable item #5:

Inspect cable connector to make sure threads are not stripped and that the connector is not cracked. Check the cable for cuts, missing insulation and burn spots, replace if necessary.

##### CWE-5 Collector Ring item #9:

Inspect cable connector to make sure threads are not stripped and that the connector is not cracked. Ensure that the connector is fastened properly to the large aluminum gear item #27 on the CW-5 Exploded View Parts List.

### EVERY SIX MONTHS:

#### Refer to CWE-5 Exploded View Parts List. (Pg. 16, 17)

##### Aluminum Gear item #27

Do not grease this gear. Inspect gear teeth (remove all dirt, grease and weld spatter). Lubricate with a dry teflon or graphite spray lubricant. Replace gear if excessively worn.

##### P.M. Motor Assembly item #12:

Do not grease this pinion. Inspect the drive pinion (remove all dirt, grease and weld spatter). Lubricate with a dry teflon or graphite spray lubricant. Replace pinion if excessively worn. Check set screw and tighten if necessary. Adjust motor assembly using the four adjustable mounting fasteners so that proper gear mesh is achieved between the aluminum gear item #27 and the motor drive pinion.

##### 4" Cam Assembly item #6:

Inspect the slide rails and the cam pinion (remove all dirt, grease and weld spatter). Do not grease slide rails or cam pinion. Lubricate with a dry teflon or graphite spray lubricant. Replace cam pinion if excessively worn. Tighten all fasteners as needed.

##### Wire Wheel Assembly item #7:

Periodically coat the wire wheel shaft with a thin layer of grease as needed. Inspect the shoe assembly and replace if excessively worn.

# PREVENTIVE MAINTENANCE / CWE-5 CIRCLE WELDER

## Refer to CWE-5 Electrical Component Chart. (Pg. 18)

### GMA Wire Feed Control item #7:

Open control box, use an air hose to blow out dust and dirt. Check all wires for breaks and replace if necessary. Check all electrical connectors and plugs. If an electrical component fails refer to CWO-3332 Wire Feeder Control electrical component chart for replacement parts or return for service.

### M-14 Rotation Control item #13:

Open control box use an air hose to blow out dust and dirt. Check all wires for breaks and replace if necessary. Check all electrical connectors and plugs. If an electrical component fails refer to CWE-1000-B Rotation Control electrical component chart for replacement parts or return or service.

### LN-7 Wire Feeder Assembly item #11:

Check brushes for wear. Brushes should be replaced when their length is less than 1/4 inch. Replace strain relief on wire if pulled out of motor housing.

### Large Brush Holder & Support item #4:

Inspect brush holder. Make sure constant tension is being applied on the brushes. Brushes should move freely within the brush holder. Check brushes for arc build-up. If brushes are pitted they will need replaced. Remove the brushes and sand them to ensure a smooth contact surface. Make sure all fasteners are tight.

### Small Brush Retainer Assembly item #10:

Inspect black brush holders for cracks and replace if needed. Check and make sure all wires are soldered properly to the holders. Replace the brushes when their length is less than 1/2 inch long. Remove the brushes and sand them to ensure a smooth contact surface. Make sure all fasteners are tight.

### Terminal Block item #12:

Inspect the plastic terminal strip and make sure it is not cracked, replace if necessary. Make sure all terminal connections are tight. Make sure all ground wires are connected to the mounting screws of the terminal strip.

## EVERY TWELVE MONTHS:

## Refer to CWE-5 Exploded View Parts List. (Pg. 16, 17)

### 1" Bearing With Fasteners item #21:

Do not grease the bearing, it is greased for life by the manufacturer. If the grease fitting has not been removed and plugged we suggest that you do so now. Earlier models may not have been plugged at time of assembly.

### 1-1/4" Bearing With Fasteners item #22:

Do not grease the bearing, it is greased for life by the manufacturer. If the grease fitting has not been removed and plugged we suggest that you do so now. Earlier models may not have been plugged at time of assembly.

### P.M. Motor Assembly item #12:

Bodine gear motor lubrication. Fill gear motor to oil level indicator with worm gear oil conforming to AGMA#5EP compounded (SAE#90) oil or Bodine lubricant (#L-23). Do not overfill.

### LN-7 Wire Feeder Assembly item #19:

Apply graphite grease to the gear teeth. Inspect the drive roll portion of the assembly, clean as necessary. Do not use solvents on the idle roll because it may wash the lubricant out of the bearings. Do not apply grease to the drive rolls.

### Transmission 3.5:1 Assembly item #15:

Inspect for excessive wear and tear. Keep the transmission assembly clean and lubricate with Lubriplate #630-AA.

## **PREVENTIVE MAINTENANCE / CWE-5 CIRCLE WELDER**

### **Refer to CWE-5 Electrical Component Chart. (Pg. 18)**

#### **CWE-5 Collector item #9:**

The collector ring should be sanded once a year. If the collector ring is pitted too badly it should be replaced. Inspect all wires coming out of the collector ring for cut or missing insulation. All wires should be fastened to the center shaft with a nylon cable tie. Tighten four set screws if needed.

#### **Weld Cable Inlet 2/0 item #1:**

Ensure that the cable is fastened tightly to the collector ring. Inspect the cable for cut or missing insulation. Make sure the micarta insulation tube on the cable is in good condition. Replace the cable if necessary.

#### **Solenoid Adaptor Kit item #14:**

Inspect for damage. Replace if necessary.

#### **GMA Pigtail item #6:**

Inspect the cable for cuts or missing insulation. Ensure that the elbow connector is not damaged. Ensure that all terminal ends are snug. Replace cable if necessary.

# WARRANTY

## Limited 3-Year Warranty

Model \_\_\_\_\_  
Serial No. \_\_\_\_\_  
Date Purchased: \_\_\_\_\_  
Where Purchased: \_\_\_\_\_

For a period ending one (1) year from the date of invoice, Manufacturer warrants that any new machine or part is free from defects in materials and workmanship and Manufacturer agrees to repair or replace at its option, any defective part or machine. HOWEVER, if the invoiced customer registers the Product Warranty by returning the Warranty Registration Card supplied with the product within 90 days of the invoice date, or by registering on-line at [www.bugo.com](http://www.bugo.com), Manufacturer will extend the warranty period an additional two (2) years which will provide three (3) total years from the date of original invoice to customer. This warranty does not apply to machines which, after Manufacturer's inspection are determined by Manufacturer to have been damaged due to neglect, abuse, overloading, accident or improper usage. All shipping and handling charges will be paid by the customer.

The foregoing express warranty is exclusive and Manufacturer makes no representation or warranty (either express or implied) other than as set forth expressly in the preceding sentence. Specifically, Manufacturer makes no express or implied warranty of merchantability or fitness for any particular purpose with respect to any goods. Manufacturer shall not be subject to any other obligations or liabilities whatsoever with respect to machines or parts furnished by Manufacturer.

Manufacturer shall not in any event be liable to Distributor or any customer for any loss of profits, incidental or consequential damages or special damages of any kind. Distributor's or customer's sole and exclusive remedy against Manufacturer for any breach of warranty, negligence, strict liability or any other claim relating to goods delivered pursuant hereto shall be for repair or replacement (at Manufacturer's option) of the machines or parts affected by such breach.

### Distributor's Warranty:

In no event shall Manufacturer be liable to Distributor or to any customer thereof for any warranties, representations or promises, express or implied, extended by Distributor without the advance written consent of Manufacturer, including but not limited to any and all warranties of merchantability or fitness for a particular purpose and all warranties, representations or promises which exceed or are different from the express limited warranty set forth above. Distributor agrees to indemnify and hold Manufacturer harmless from any claim by a customer based upon any express or implied warranty by Distributor which exceeds or differs from Manufacturer's express limited warranty set forth above.

### HOW TO OBTAIN SERVICE:

***If you think this machine is not operating properly, re-read the instruction manual carefully, then call your Authorized BUG-O dealer/distributor. If they cannot give you the necessary service, write or phone us to tell us exactly what difficulty you have experienced. BE SURE to mention the MODEL and SERIAL numbers.***