

# INSTRUCTIONS AND PARTS MANUAL

## CWP-18 PROGRAMMABLE 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-CWP18-IPM-1224

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



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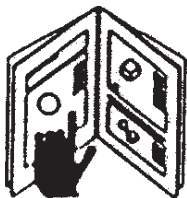
## SAFETY

**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 work site 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.**

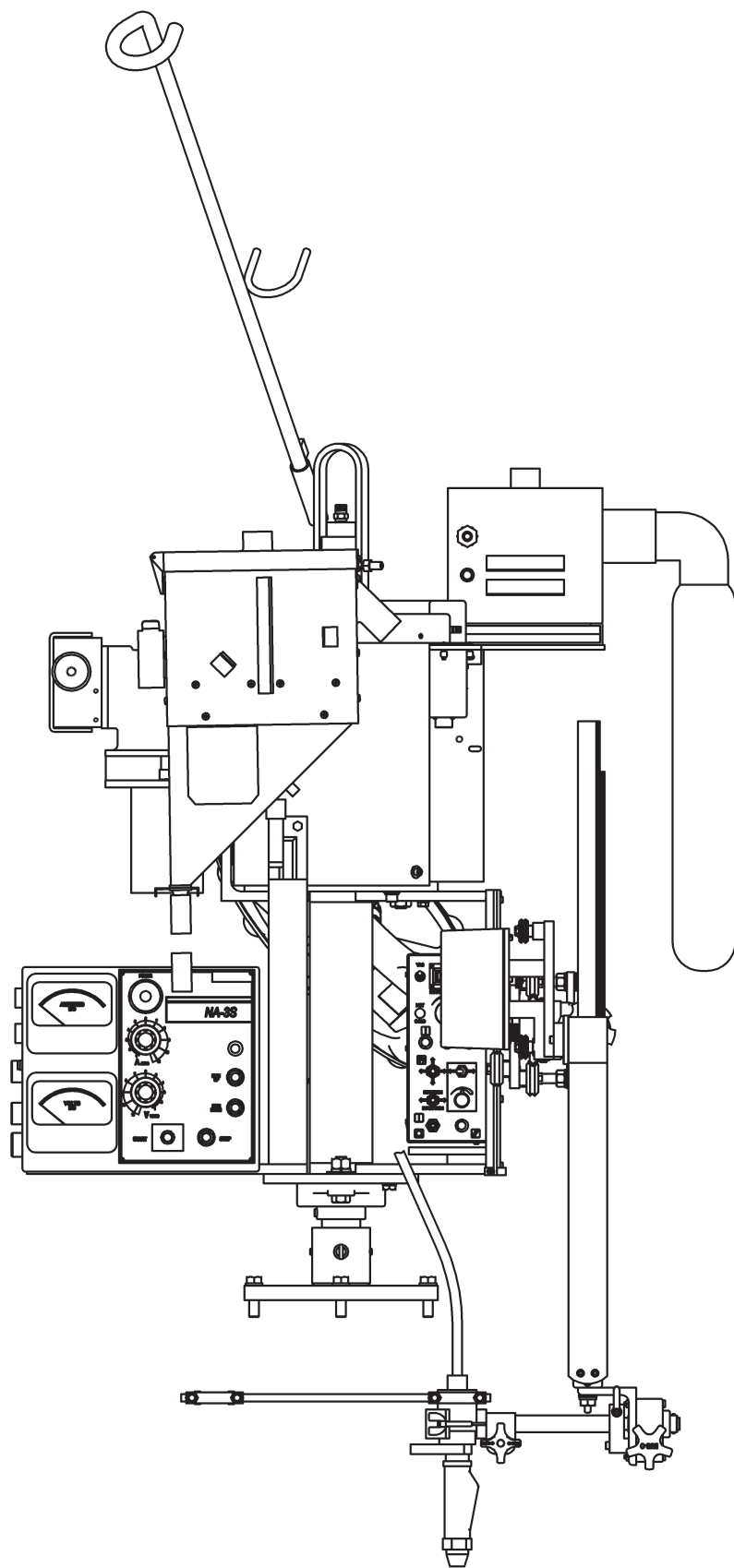


**WARNING:** HIGH FREQUENCY CAN EFFECT MACHINE OPERATION AND THEREFORE, WELD QUALITY.

**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.



# CWP-18 PROGRAMMABLE CIRCLE WELDER

## INSTRUCTIONS AND PARTS MANUAL

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## INTRODUCTION

The CWP-18 (CWP-1800) Programmable Circle Welder is designed for contour welding of nozzles into vessels or domed heads utilizing SUB-ARC, MIG or FLUX CORED PROCESS, with gas shielding. The CWP-18 mounts on a 3-Jaw Chuck welding diameter 6" to 50" O.D.

## FEATURES

- Wire feeder with one set of drive rolls
- 1/12 HP P.M. motor and rotational speed control
- 600 AMP gun & cable assembly
- 50 ft. (15 m) power cable
- 50 ft. (15 m) gas shielding hose
- 50 ft. (15 m) weld cable
- Quick disconnects for all cables
- Pre and post flow controls
- Wire reel adaptor for 60 lb. (27 kg) spools
- Motorized vertical and horizontal torch positioning system
- Microprocessor controlled rise and fall with 7" (175 mm) of travel
- Brushes and collector rings for welding current, rated at 600 AMPS 100% duty cycle
- Brushes and collector rings for all controls, eliminates cable and hose wrap

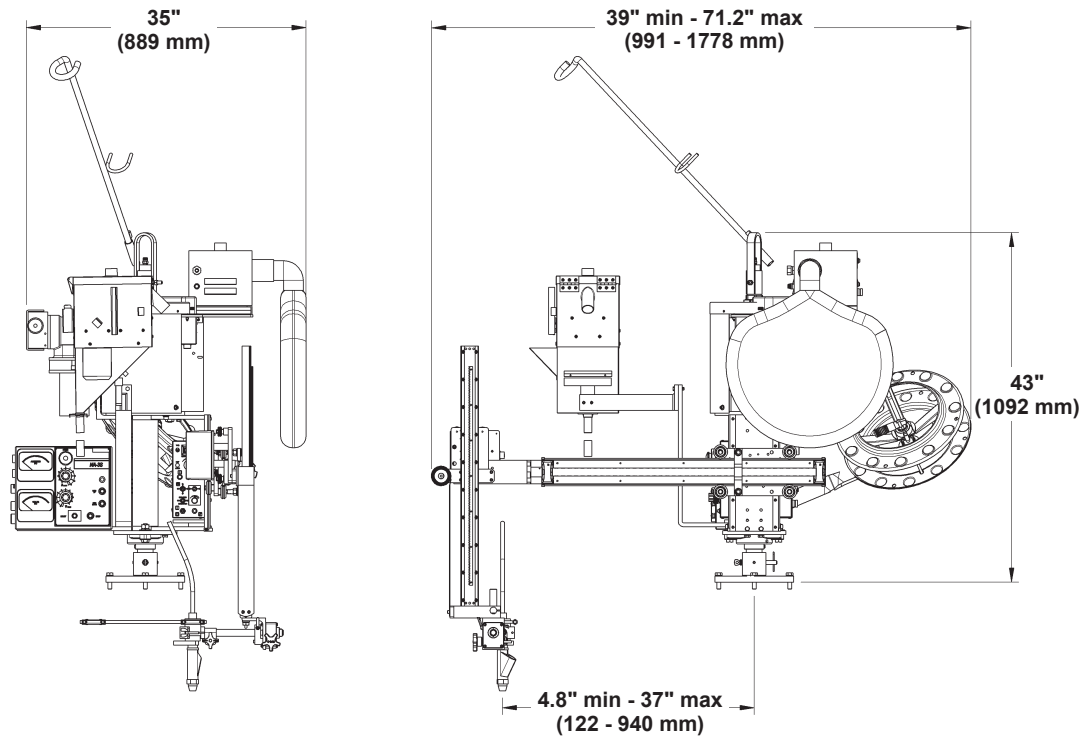
## NA 3 CONTROL PROVIDES

- Wire Speed (amperage) control
- Voltage Control
- Wire burn back
- Weld contact
- Cold wire inch switch
- Weld start parameter adjustment
- Weld Crater parameter adjustment

## TECHNICAL DATA

|                          |                          |
|--------------------------|--------------------------|
| <b>Control Voltage:</b>  | 115 VAC                  |
| <b>Amperage:</b>         | 0-600 amps               |
| <b>Voltage:</b>          | 0-50                     |
| <b>Wire Sizes:</b>       | 1/16"-7/32" (1.6-5.6 mm) |
| <b>Rotation Speed:</b>   | .06-0.72 rpm             |
| <b>Vertical Travel:</b>  | 0"-7" (0-175 mm)         |
| <b>Welding Diameter:</b> | 10"-50" (254-1270 mm)    |
| <b>Shielding Gas:</b>    | Solenoid Control         |
| <b>Height:</b>           | 43" (1092 mm)            |
| <b>Net Weight:</b>       | 360 lbs. (163.6 kg)      |
| <b>Shipping Weight:</b>  | 490 lbs. (222.3 kg)      |

## DIMENSIONS



## SETUP

### POWER SOURCE

Please refer to the included Lincoln NA3 User's Manual for welding power source requirements and system setup.

### 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 solvent solution. To keep the wire moving, it is also recommended that a felt clip be saturated with a product like Ferro Slick and fed through the incoming tube of the wire feeder at least once a day.

### ADDITIONAL CABLES

The circle welders are supplied with the following cables:

1. CWO-3971 50' (15 m) control cables that connects the power source to the cable connector on the top gear of the machine.
2. CWO-3040 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. (MIG models only)

## SETUP, CONT'D.

### WIRE SPEED AND VOLTAGE ADJUSTMENT

The wire speed control on the front of the CWP-1810 Wire Feed Control Box has a dial that is calibrated directly in inches per minute. Voltage can be controlled on the power source or with the NA-3 controller. To use the NA-3 controls, set the power source voltage control to REMOTE.

### MACHINE CONTROLS

Operational parameters can be set using the two control boxes. Please refer to the section in this manual entitled CBP-1550 Rotational Control (page 10) for descriptions of the various speed and directional capabilities. For the NA-3 Wire Feeder Control, refer to the supplied NA-3 Semiautomatic Wire Feeder Manual from Lincoln Electric.

### INSTALLATION

Use a 3-Jaw Chuck to mount and center the CWP-18 on nozzles with or without flanges, as seen in Figure 1. See page 34 for a listing of available 3-Jaw Chucks.

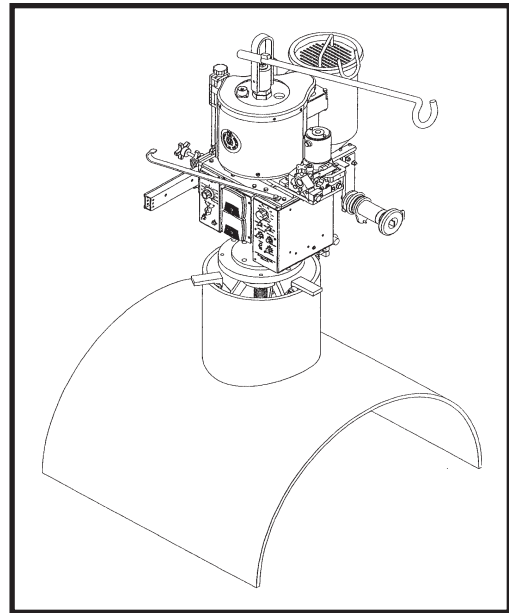


Figure 1: Installation with 3-Jaw Chuck

### WHEEL ADJUSTMENT

The CWP-18 Motorized Racking System CBP-1840 and the Horizontal Racker CWO-1690-MH 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.

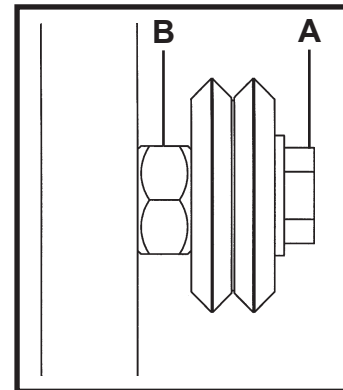


Figure 2: Adjustable Wheel

### WELD STARTING POSITION

Proper positioning of the electrode is crucial to a successful weld. The CWP-18 rotates in a clockwise direction. Depending on the job, whether on-center or hillside, or the process, the optimum starting point of the weld may vary. The desired starting position should be entered at setup as an angle to the pipe axis direction, as shown in Figure 3.

The default start position (start angle = 0.00°) is shown as A and B in Figure 3. For an on-center joint, this would be the topmost point. For a hillside joint, -90.00° is the topmost point (C in Figure 3) and 90.00° is the lowest point.

During setup, enter the Start Angle in hundredths of degrees: 4500 is 45.00°. The machine makes one revolution from the start point for each pass. Overlap is only added to the last pass.

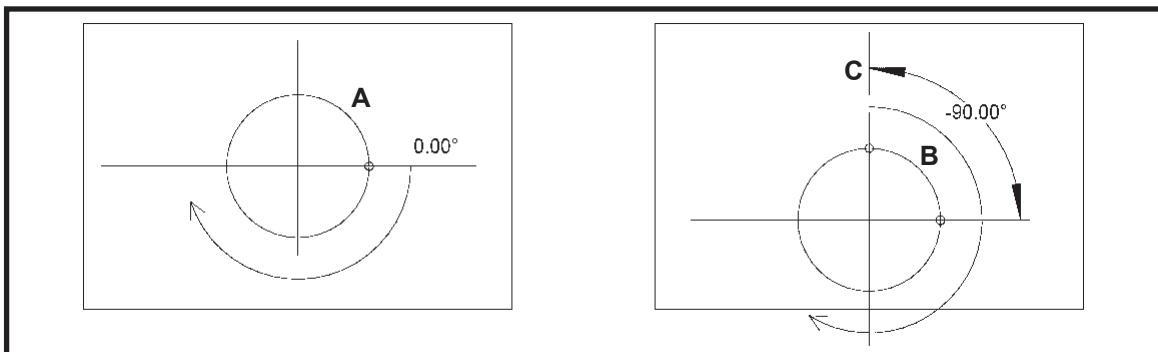


Figure 3: Weld Start Position for On-center (left) and Offset or Hillside (right) nozzles.



## CWP-1810 NA-3 WIRE FEEDER CONTROL PANEL

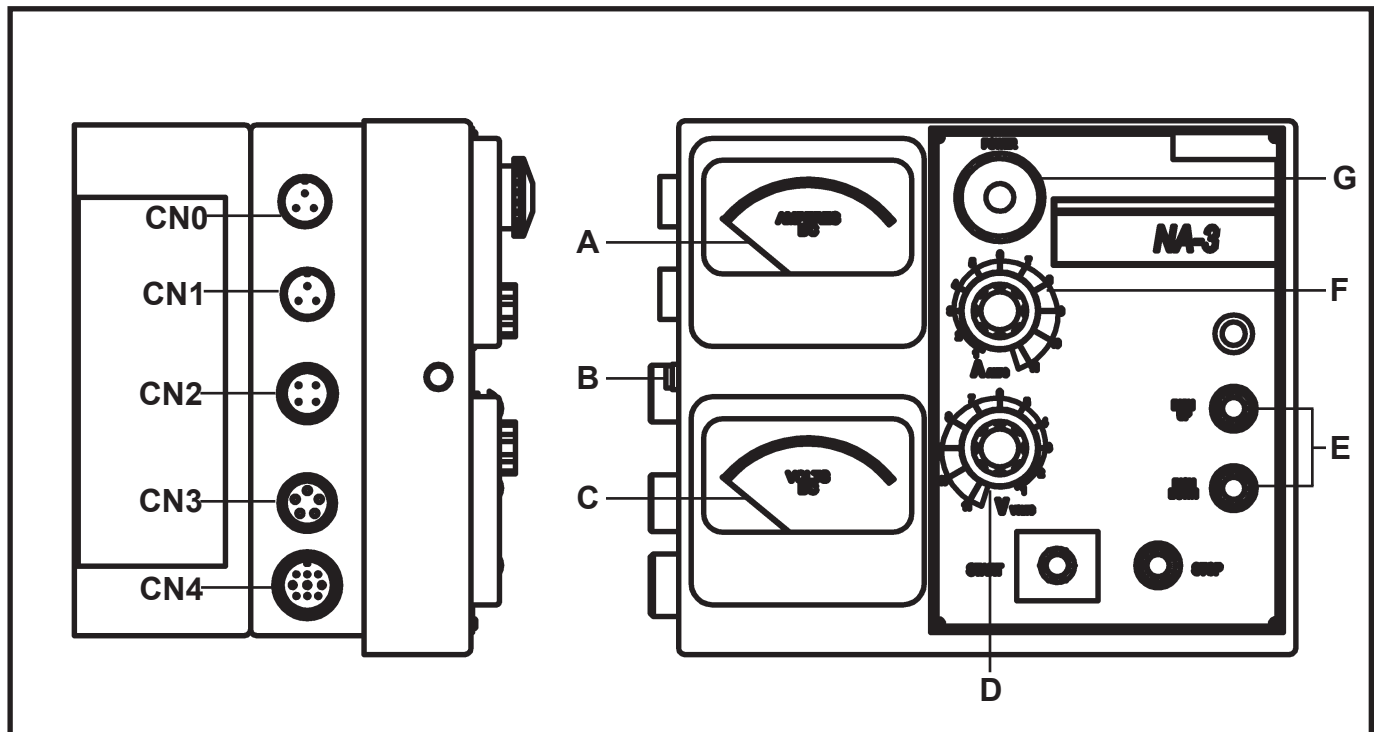


Figure 4: Side and Front views of Lincoln NA-3 Control Box. (Not to Scale.)

### CONTROLS (A-G)

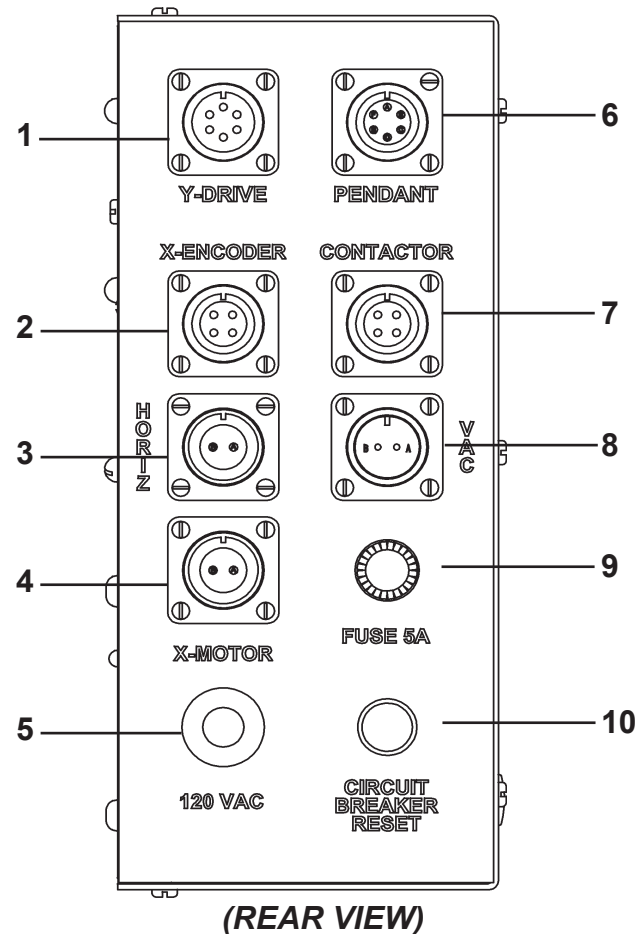
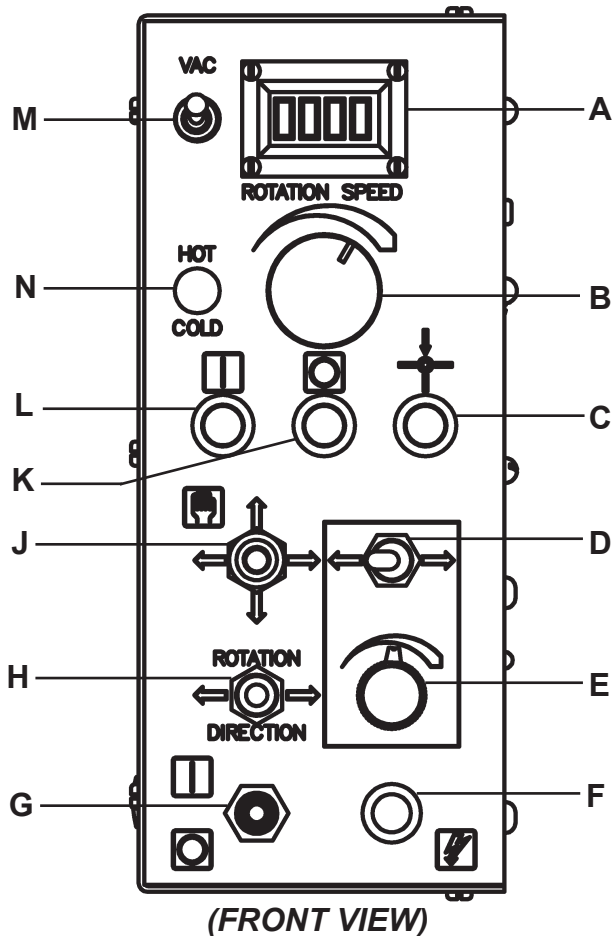
- A. Ammeter** - Indicates current only while welding.
- B. Circuit Breaker** - Protects the circuit from severe wire feed motor overload and short circuits. Press to reset. Locate and correct the cause for overload.
- C. Voltmeter (Standard)** - Indicated welding voltage only while welding. Also indicates OCV below 60 volts.
- D. Current Control** - Adjusts wire feed speed to control welding current.
- E. Inch Up & Inch Down** - Press to inch electrode at the speed set by "Inch Speed" control on inner panel.
- F. Voltage Control** - Adjust arc volts by controlling power source output voltage.
- G. Control Power Switch** - Turns input control power "On" and "Off". Also used as an emergency "Off" in case of malfunction.

### CABLE CONNECTIONS (CN0 - CN4)

- CN0** Connects to Contactor Box via CWP-1816
- CN1** (Unused)
- CN2** Connects to Rotation Control Box via Power Cable
- CN3** Connects to Wire Feeder Motor (Cable is integral to Wire Feeder Motor)
- CN4** Connects to Terminal Block Assembly (internal to machine) via CWO-2978

**NOTE:** For further information refer to Lincoln Electric NA-3 Operator's Manual.

## CBP-1550 ROTATION CONTROLS

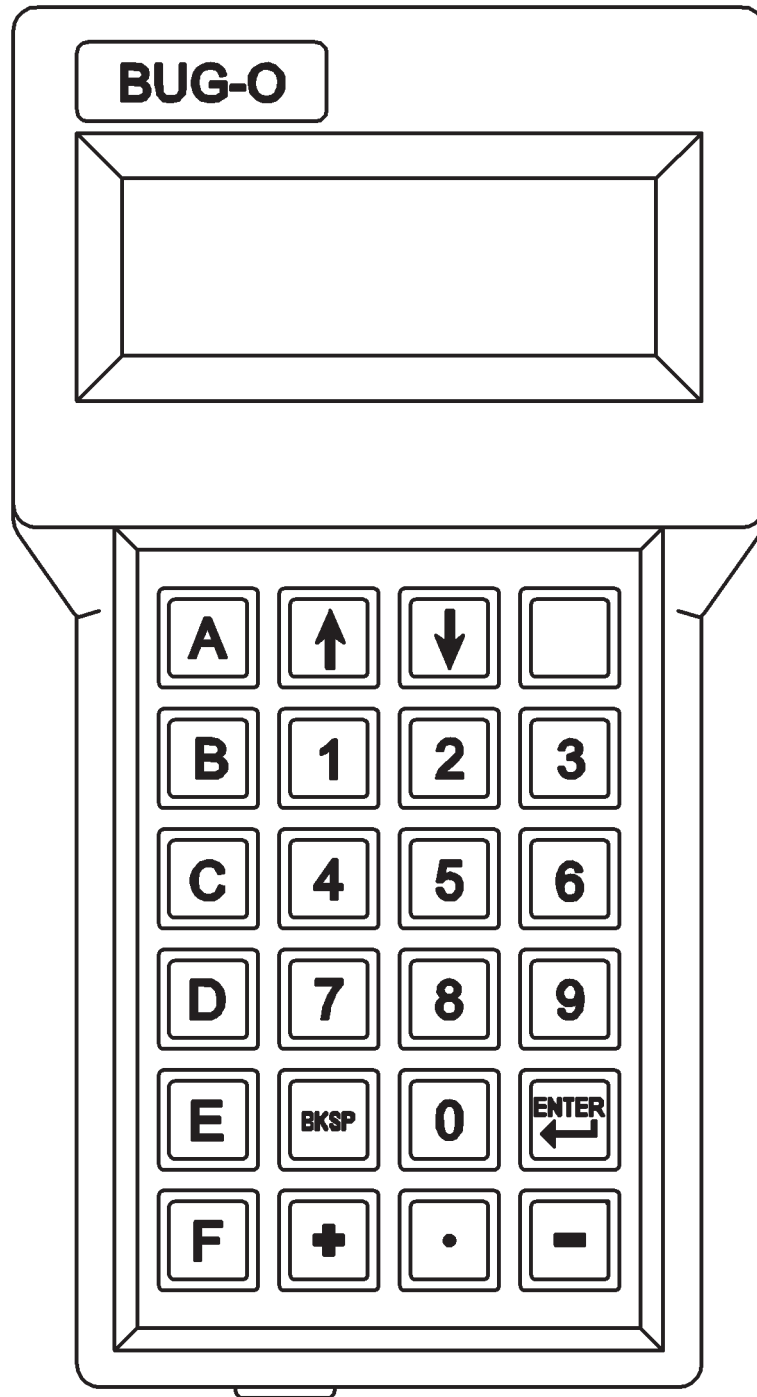


- A. **DIGITAL READOUT** - Displays rotation speed as a reference value.
- B. **SPEED CONTROL** - Increases or decreases the rotation speed.
- C. **RESET** - Resets Home or weld start position.
- D. **HORIZONTAL JOG** - Drives the horizontal racker left and right.
- E. **HORIZONTAL SPEED CONTROL** - Increases or decreases speed of horizontal racker.
- F. **PILOT LIGHT** - Illuminated when power is ON to rotation control box.
- G. **ON/OFF SWITCH** - Enables / disables power to the rotation control box.
- H. **ROTATION DIRECTION SWITCH** - Changes rotation direction.
- J. **MANUAL JOG** - Manually drives the welding tip while machine is stopped or paused.
- K. **STOP/PAUSE** - Stops weld program and rotation.
- L. **START/RESUME** - Starts weld program and rotation.
- M. **VAC** - On/Off switch for flux recovery vacuum.
- N. **HOT/COLD SWITCH** - Changes whether the rotation control uses the wire feeder.

- 1. **Y-DRIVE** - Connects to Vertical Racking Motor (CBP-1840).
- 2. **X-ENCODER** - Connects to Encoder (CBP-1535-18).
- 3. **HORIZ** - Connects to Horizontal Racker Motor (CWO-1690-MH).
- 4. **X-MOTOR** - Connects to Terminal Block Assembly (CWO-3969).
- 5. **120 VAC** - Input power, connects to CN2 on the LN3 wire feeder controller.
- 6. **PENDANT** - Connects to Pendant (BUG-6050).
- 7. **CONTACTOR** - Connects to welding power source.
- 8. **VAC** - Connects to vacuum pump for flux recovery.
- 9. **FUSE** - Access to 5 Amp fuse.
- 10. **CIRCUIT BREAKER RESET** - Press to reset circuit breaker after overload.

## BUG-6050 PENDANT CONTROL

The handheld terminal with keypad and text display or pendant control is used for entering the dimension and weld parameter data. It plugs into the Pendant connection on the CBP-1500 rotation control box.



**ALPHA KEYS:** Press keys A, B, C, D, E, or F for the desired program function.

**DIGIT KEYS:** Use the digit keys to enter pipe diameters or dimensions.

**ENTER:** Push the enter button to store the numeric value keyed.

**BACKSPACE:** The backspace key removes the last digit keyed in before pushing the enter button, if a correction is required.

**SHIFT:** The blank key at the top right corner of the keypad is the SHIFT key. Use this key to access additional programming options.

**ARROW KEYS:** Used to jog vertical axis during auto-run program to set new torch position.

# PROGRAMMING

## ALPHA KEYS

Dimensions and weld parameter data is entered on the handheld terminal with keypad and text display. The alpha keys used are listed below, with their functions:

- A:** To enter dimensions
- B:** To enter the time delay for puddle build-up
- C:** To change Program Number in memory (0 – 99)
- D:** To display all programmed parameters for the current program
- E:** To enter the number of passes (1 – 99)
- F:** To enter the start angle so weld can start at the preferred point around the joint (see pg. 8)

Three other useful key functions are:

- Shift 9:** Set units, English (inch) or metric (meters)
- Shift 8:** Test drives & encoders
- Shift E:** Version number (have this information ready when calling for service)

## DATA REQUIRED

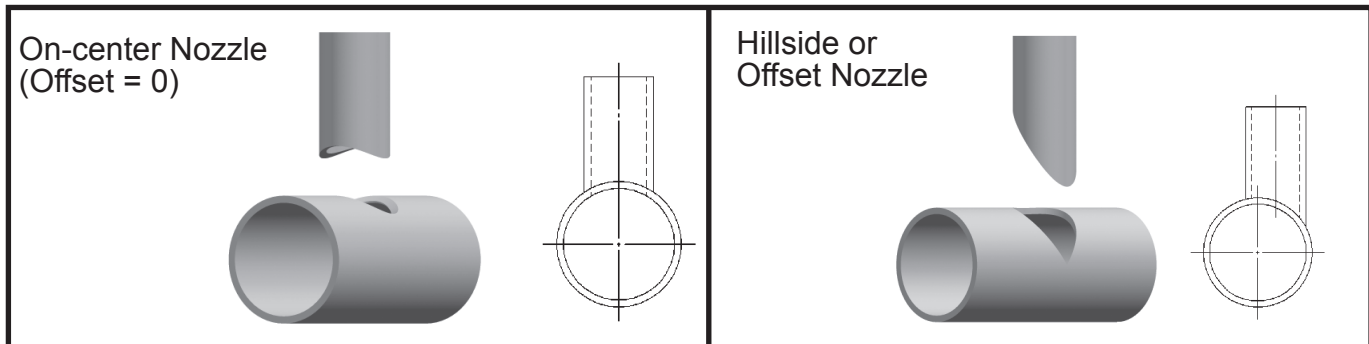
The following five (5) parameters are entered for each program:

1. Small diameter (diameter of weld) - inches x 100 or mm x 10
2. Large diameter (pipe OD) - inches x 100 or mm x 10
3. Offset - inches x 100 or mm x 10. Enter "0" if nozzle is on centerline of vessel
4. Overlap (additional rotation on final pass) - degrees X 100
5. Start Angle - degrees x 100. Enter "0" for top dead center

In addition, background parameters that are retained for all programs, and are individually set are:

1. Time Delay (from arc start to gun moving)
2. Number of Passes (when multiple passes required. Default setting is 1)

**NOTE:** If the STOP / RESUME button is pressed, the machine will be in pause mode, and cannot be programmed. Press the RESET button to get back to the ready mode for programming.



## DATA ENTRY

When entering data with the pendant keypad, multiply inches, degrees, or seconds by 100 and enter the number without a decimal point. For metric dimensions, multiply mm x 10 or cm x 100.

Example: 350 for 3.5 inches,  
800 for 80 mm, on metric machines

Press "ENTER" on the keypad after the number is entered.

## SAVING PROGRAMS

The machine has 100 storage areas or welds, numbered 0 to 99 in memory. Push the "C" button on the pendant keypad to change (or set) the program number and enter the desired number. Program data is retained until reprogrammed. At any time, one of these numbers is selected, it will stay selected even when power is shut off and turned back on, it will not change until the program number is changed by the operator. Settings for time delay and number of passes are not saved as part of a program.

# OPERATION

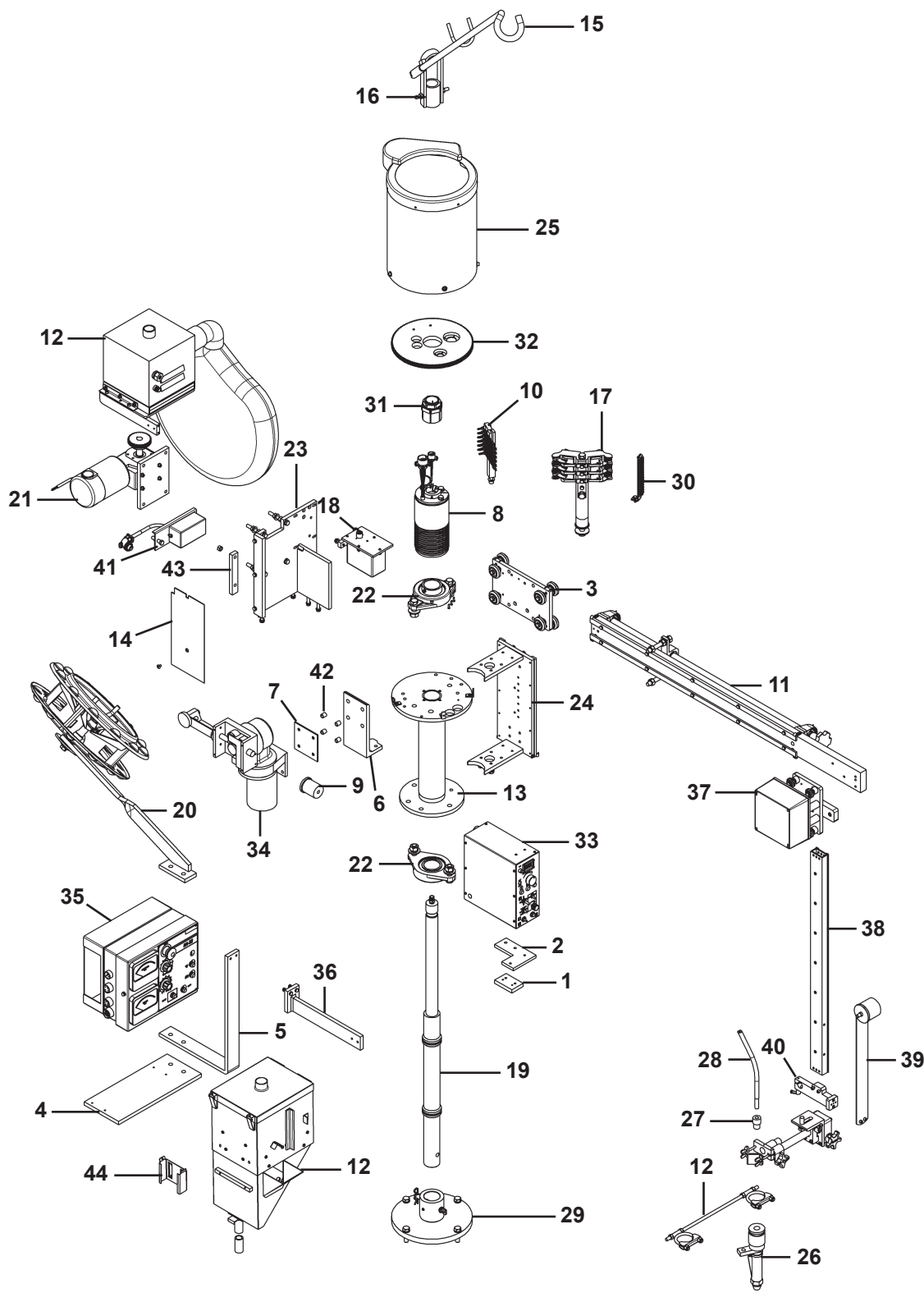
## MAKING A WELD

1. Turn on control power to NA-3 Wire Feeder Controls, to Rotation Controls and to the welding power source.
2. Connect the ground cable to the workpiece. The ground cable must make good electrical contact with the work.
3. Press the red “STOP” button on the Rotation Controls to allow for manual positioning. Use the four-way jog switch to manually position the torch at the desired weld start point.
4. With Hot/Cold Switch in the “COLD” position, set rotation speed.
5. Press the Wire Down button on the NA-3 control box until the wire touches the work piece and stops.
6. Using the keypad on the Pendant Control, press “A” and follow the prompts to input a new weld program or press “C” to select an existing weld program.
7. At the “READY” prompt, press “B” to change “ROTATION START DELAY or “E” to enter “NUMBER OF WELD PASSES.”
8. Open the flux hopper valve. (For Sub-Arc models only)
9. Throw Hot/Cold Switch to the “HOT” position.
10. Weld process and rotation are both started by pressing the green Start Button on the Rotation Controls.
11. Weld process and rotation are stopped by pressing the red Stop Button on the Rotation Controls.
12. For multi-pass welds, use the arrow keys on the Pendant Control to raise the torch for each pass.
13. To stop welding immediately, without burnback or purge, turn off control power to the NA-3 Wire Feeder Controls.

### **WARNING:**

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

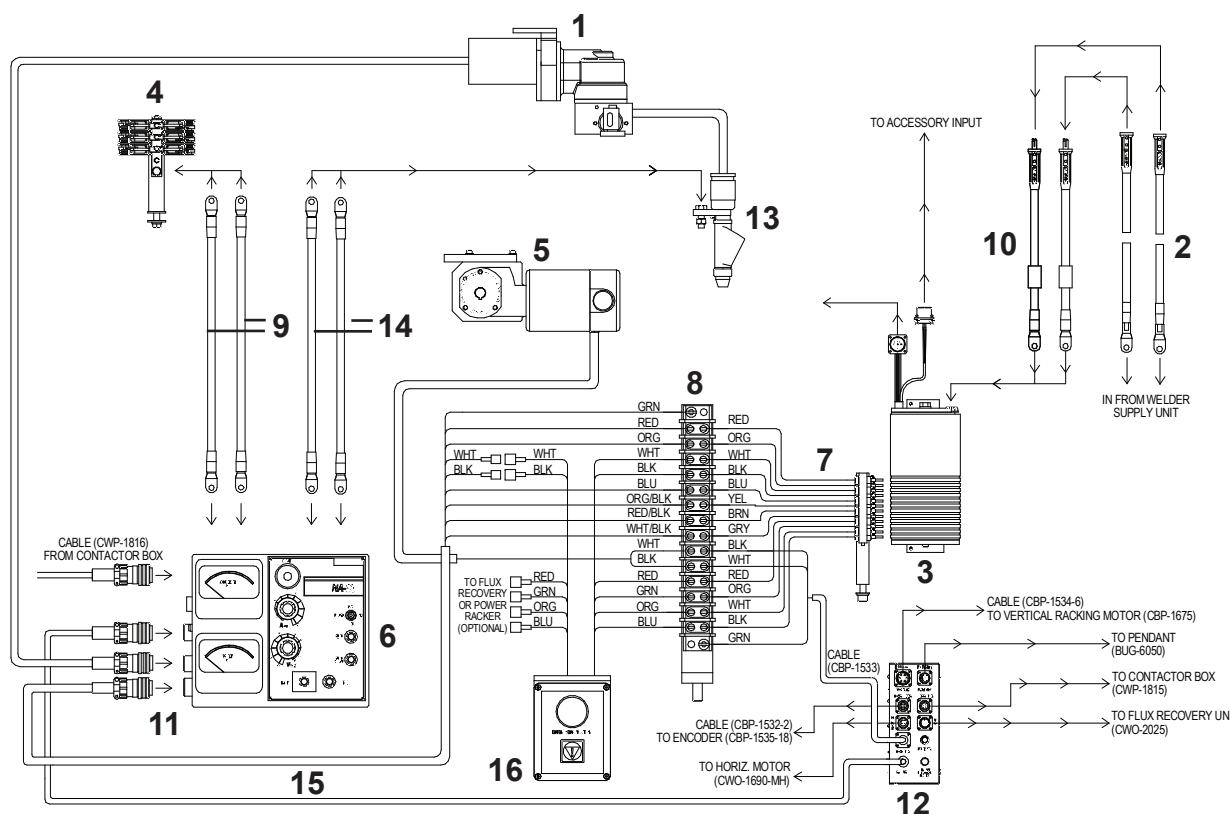
CWP-1800 CWP-18 CIRCLE WELDER / EXPLODED VIEW



## CWP-1800 CWP-18 CIRCLE WELDER / PARTS LIST

| <u>ITEM</u> | <u>QTY</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>                       |
|-------------|------------|-----------------|--|
| 1           | 1          | CWO-1123        | Control Mt. Spacer Block                 |
| 2           | 1          | CWO-1124        | CW-18 Control Mt. Plate                  |
| 3           | 1          | CWP-3363        | Horiz. Racker for Hvy Duty Screw Racking |
| 4           | 1          | CWO-1811        | NA-3S Mount Plate                        |
| 5           | 1          | CWO-1812        | Flux Hopper Support Bracket              |
| 6           | 1          | CWO-1813        | Wire Feeder Bracket                      |
| 7           | 1          | CWO-1814        | Insulator Plate                          |
| 8           | 1          | CWO-3133        | Collector                                |
| 9           | 1          | CWO-1816        | Wire Feeder Adaptor                      |
| 10          | 1          | CWO-3931-18     | Brush Retainer F/ Power Racking, CW-18   |
| 11          | 1          | CWP-3345        | Manual Horiz. Hvy Duty Rack Assembly     |
| 12          | 1          | CWO-2025        | Flux Recovery System                     |
| 13          | 1          | CWO-3165        | CW-18 Housing Assembly                   |
| 14          | 1          | CWP-1803        | Adaptor Plate                            |
| 15          | 1          | CWO-3218        | Cable Support Bar                        |
| 16          | 1          | CWO-3312        | Lifting Lug Weldment                     |
| 17          | 1          | CWO-3315        | Brush Holder & Support                   |
| 18          | 1          | CBP-1545-18     | Encoder Assembly                         |
| 19          | 1          | CWO-3432        | CW-18 Shaft Assembly                     |
| 20          | 1          | CWO-3498-11     | Wire Reel Assembly CW-18                 |
| 21          | 1          | CWO-3506        | 4066 Motor Assembly                      |
| 22          | 2          | CWO-3528        | 2" Flange Bearing W/ Fasteners           |
| 23          | 1          | CWO-3531        | Motor & Transmission Plt. Assembly       |
| 24          | 1          | CWO-3534        | Slide Bar Mounting Assembly              |
| 25          | 1          | CWO-3537        | Guard Assembly CW-18                     |
| 26          | 1          | CWO-3690-5/32   | SUB-ARC Nozzle                           |
| 27          | 1          | CWO-3695-1/2    | Adaptor K231 1/2"                        |
| 28          | 1          | CWO-3697        | QCC 72" Liner                            |
| 29          | 1          | CWO-3968        | CW-18 Base Plate                         |
| 30          | 1          | CWO-3969        | Terminal Block Assembly                  |
| 31          | 1          | CWO-5074        | 1-1/2" ID Trantorque                     |
| 32          | 1          | CWO-5793        | Gear Aluminum                            |
| 33          | 1          | CBP-1550        | Rotation Control, 120 VAC                |
| 34          | 1          | LDC-0010        | Automatic Head                           |
| 35          | 1          | LDC-NA3S        | NA-3S                                    |
| 36          | 1          | CWO-1820        | Flux Hopper Support Arm Assembly         |
| 37          | 1          | CBP-1675        | Motorized Vehicle Racker                 |
| 38          | 1          | ABR-1060        | V-Guide Ways 33"                         |
| 39          | 1          | CWO-3460        | 33# Load Spring Assembly                 |
| 40          | 1          | CWO-1695        | Attachment Block                         |
| 41          | 1          | CWP-1815        | CWP Contactor Box                        |
| 42          | 4          | CWO-3876        | Micarta Bushing 1/2OD x 3/8"ID x 9/16"   |
| 43          | 1          | CWP-1817        | Contactor Box Mounting Bar               |
| 44          | 1          | SEO-4165        | Terminal Holster Assembly                |

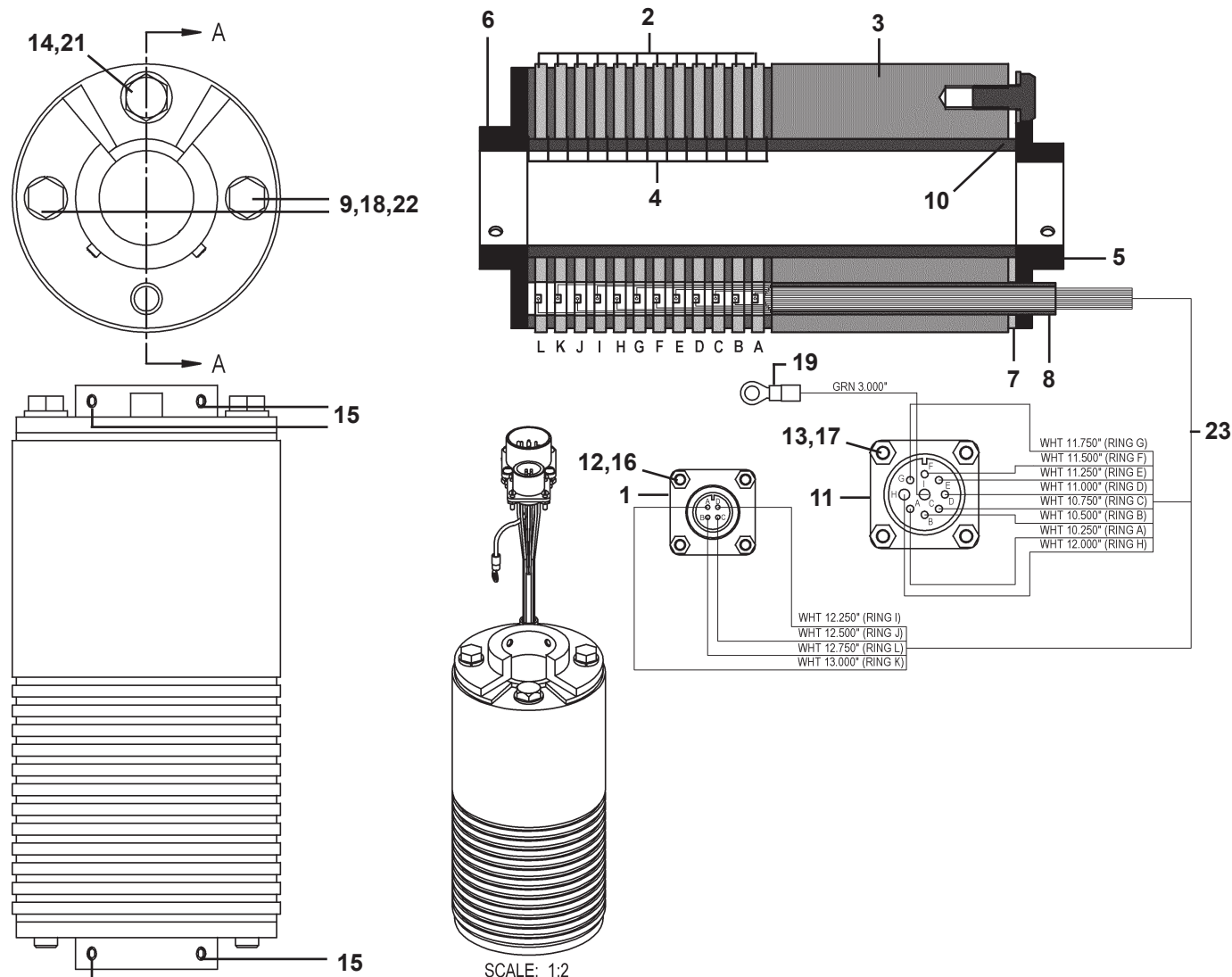
CWP-1800 CWP-18 CIRCLE WELDER / WIRING DIAGRAM / ELECTRICAL COMPONENT CHART



| ELECTRICAL COMPONENT CHART |  |              |
|----------------------------|--|--------------|
| ITEM                       | DESCRIPTION                            | PART NO.     |
| 1                          | NA-3 Wire Feeder                       | LDC-0040     |
| 2                          | Weld Cable 4/0 50'                     | CWO-3040     |
| 3                          | CW-18 Collector Ring                   | CWO-3133     |
| 4                          | Brush Holder Support                   | CWO-3313     |
| 5                          | 4066 Motor Assembly                    | CWO-3506     |
| 6                          | NA-3 Wire Feeder Control               | CWP-1805     |
| 7                          | Brush Retainer F/ Power Racking, CW-18 | CWO-3931-18  |
| 8                          | Terminal Block Assembly                | CWO-3969     |
| 9                          | Weld Cable 4/0                         | CWO-3970     |
| 10                         | Weld Cable Inlet                       | CWO-3972     |
| 11                         | Feeder Control Box Cable               | CWO-2978-ES  |
| 12                         | Rotational Control                     | CBP-1550     |
| 13                         | K231 Sub Arc Gun                       | CWO-3710-__  |
| 14                         | Weld Cable 4/0 6'                      | CWO-3970-72  |
| 15                         | Power Input to NA3                     | MUG-1621-1.5 |
| 16                         | E-STOP Assembly                        | CWO-1105     |

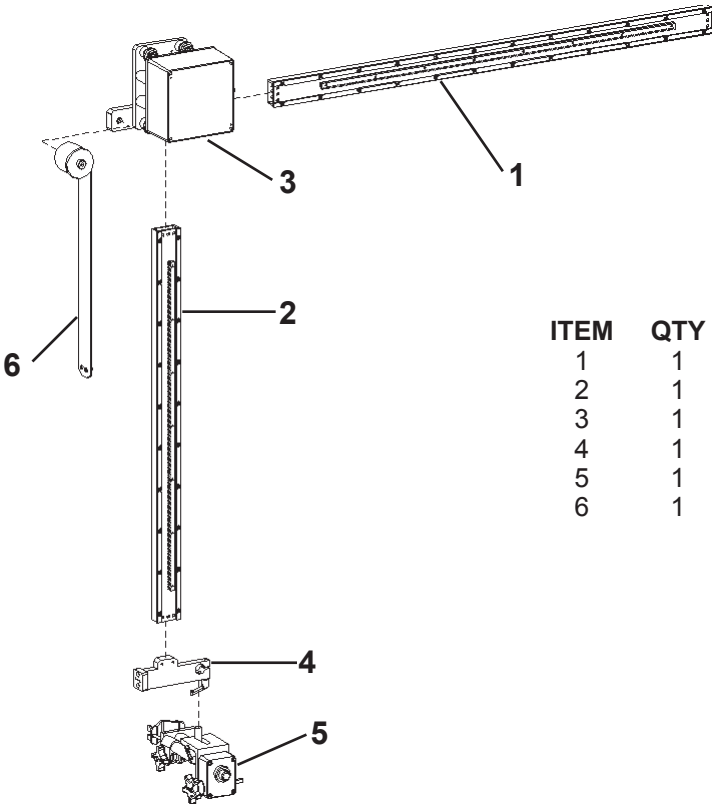


# CWO-3133 COLLECTOR WITH POWER RACKER



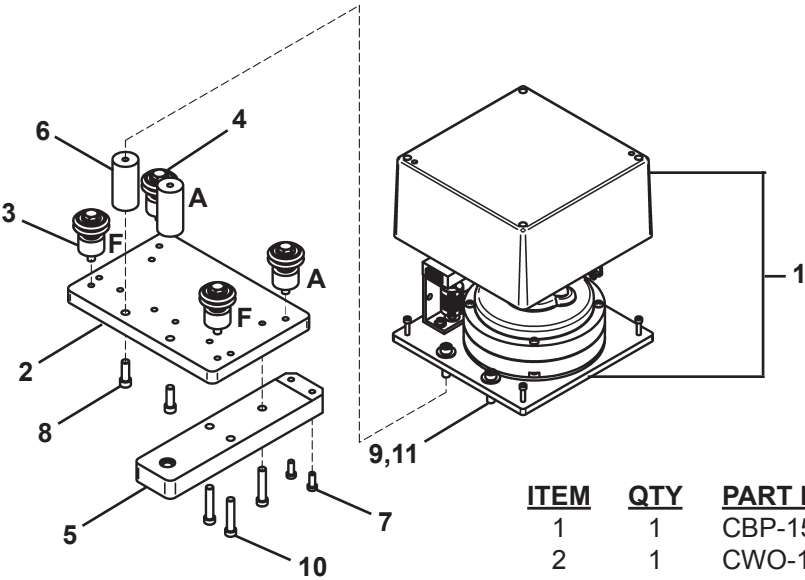
| ITEM | QTY  | PART NO.  | DESCRIPTION   |
|------|------|-----------|---|
| 1    | 1    | BUG-1034  | Panel Connector 4-T, M                                |
| 2    | 12   | CWO-3127  | Brass Ring 4.250" Dia x .188" Thk                     |
| 3    | 1    | CWO-5739  | Brass Ring 4.250" Dia x 3.750 Thk                     |
| 4    | 13   | CWO-5744  | Micarta Spacer  |
| 5    | 1    | CWO-5745  | Top Collector Plate CW-7, CW-11                       |
| 6    | 1    | CWO-5746  | Cb-2 Bottom Collector Plate                           |
| 7    | 1    | CWO-5747  | Micarta Spacer W/Notch                                |
| 8    | 1    | CWO-5758  | Micarta Sleeve .495" O.D. x .391" I.D. x 4.500" Lg    |
| 9    | 2    | CWO-5760  | Micarta Sleeve .495" O.D. x .391" I.D. x 8.000" Lg    |
| 10   | 1    | CWO-5770  | Micarta Sleeve 1.875" O.D. x 1.5000" I.D. x 7.750" Lg |
| 11   | 1    | CWO-6068  | Panel Connector 9-T, M                                |
| 12   | 4    | FAS-0205  | Rnd Hd Scr 4-40 x 1/2"                                |
| 13   | 4    | FAS-0215  | Rnd Hd Scr 6-32 x 1/2"                                |
| 14   | 1    | FAS-0397  | Hex Hd Cap Scr 3/8-16 x 3/4"                          |
| 15   | 4    | FAS-0455  | Set Scr 1/4-20 x 1/2" Cup Point                       |
| 16   | 4    | FAS-1305  | Hex Nut 4-40  |
| 17   | 4    | FAS-1310  | Hex Nut 6-32  |
| 18   | 2    | FAS-3397  | Hex Hd Cap Scr 3/8-16 x 8-1/2"                        |
| 19   | 1    | TERM-5494 | #8 Ring, Red  |
| 20   | 1    | W05-2025  | Green Wire 20 Ga 2-1/2"                               |
| 21   | 1    | WAS-0260  | 3/8" Washer   |
| 22   | 2    | WAS-0262  | 3/8" Split Lockwasher                                 |
| 23   | 140" | WRE-1601  | 16 Awg. White Teflon                                  |

CBP-1840 MOTORIZED RACKING SYSTEM / EXPLODED VIEW / PARTS LIST



| ITEM | QTY | PART NUMBER | DESCRIPTION              |
|------|-----|-------------|--------------------------|
| 1    | 1   | ABR-1050    | V-Guide Way, 40"         |
| 2    | 1   | ABR-1060    | V-Guide Way, 33"         |
| 3    | 1   | CBP-1675    | Motorized Racker         |
| 4    | 1   | CWO-1695    | Attachment Block         |
| 5    | 1   | CWO-3023-S  | Torch Angle Adjuster     |
| 6    | 1   | CWO-3460    | 33# Load Spring Assembly |

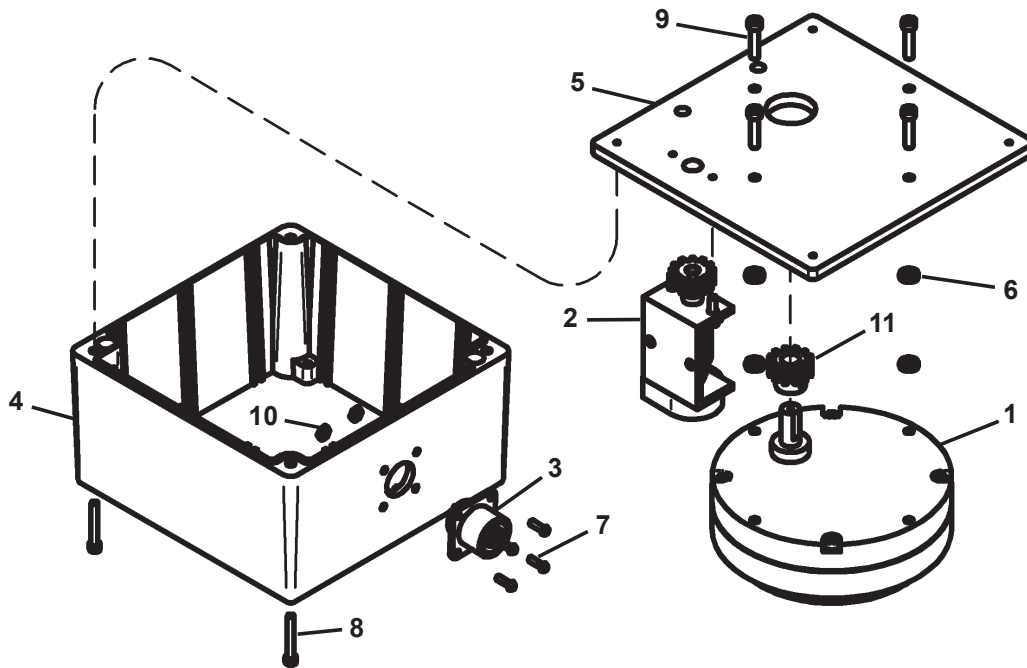
CBP-1675 MOTORIZED RACKER / EXPLODED VIEW / PARTS LIST



A = Adjustable Wheel Placement  
F = Fixed Wheel Placement

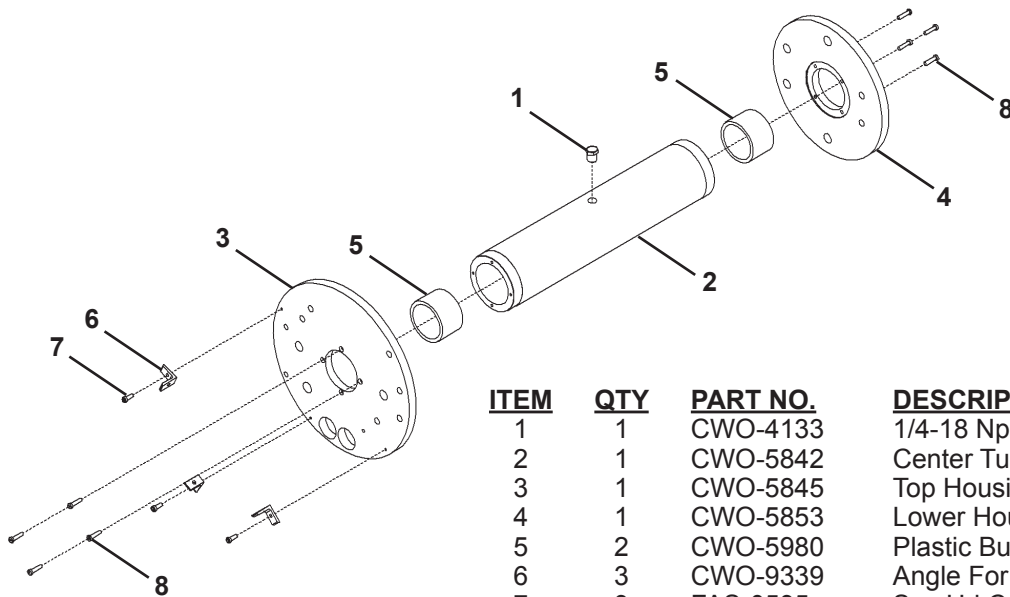
| ITEM | QTY | PART NO. | DESCRIPTION                   |
|------|-----|----------|-------------------------------|
| 1    | 1   | CBP-1590 | Drive Box                     |
| 2    | 1   | CWO-1677 | Mount Plate                   |
| 3    | 2   | CWO-1680 | W2 Fixed Leg & Wheel Assembly |
| 4    | 2   | CWO-1681 | W2 Adj Leg & Wheel Assembly   |
| 5    | 1   | CWO-1682 | Racker Mount Base             |
| 6    | 2   | CWO-1694 | Stand-Off                     |
| 7    | 2   | FAS-0555 | Soc Hd Cap Scr 1/4-20 x 1/2   |
| 8    | 2   | FAS-0557 | Soc Hd Cap Scr 1/4-20 x 3/4   |
| 9    | 2   | FAS-0559 | Soc Hd Cap Scr 1/4-20 x 1     |
| 10   | 3   | FAS-2551 | Soc Hd Cap Scr 1/4-20 x 1 1/4 |
| 11   | 2   | WAS-0240 | 1/4" SAE Washer               |

## CBP-1590 DRIVE BOX / EXPLODED VIEW / PARTS LIST



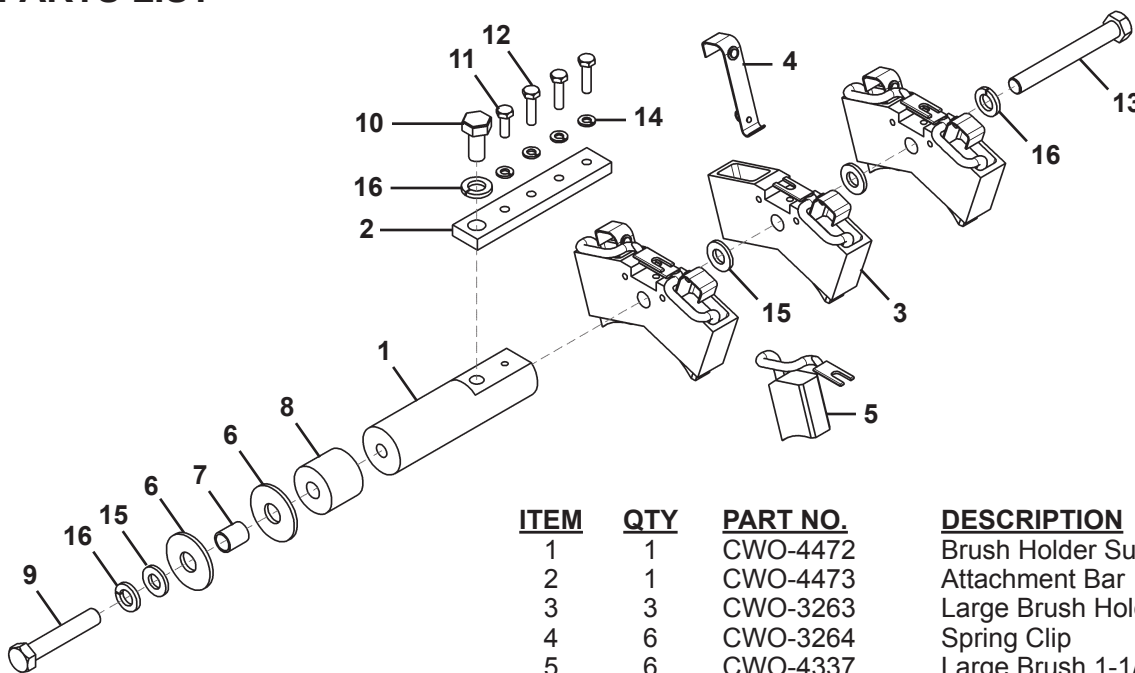
| <u>ITEM</u> | <u>QTY</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>            |
|-------------|------------|-----------------|-------------------------------|
| 1           | 1          | BUG-1550        | Gear Motor (150:1)            |
| 2           | 1          | BUG-6040        | Gear / Encoder Assembly       |
| 3           | 1          | BUG-9909        | Panel Connector, 6-T, M       |
| 4           | 1          | CBP-1585        | Drive Box Enclosure           |
| 5           | 1          | CBP-1586        | Drive Plate                   |
| 6           | 4          | AFR-1015        | Spacer Washer                 |
| 7           | 4          | FAS-0204        | Screw, Rnd Hd Slit 4-40 x 3/8 |
| 8           | 4          | FAS-0519        | Screw, Soc Hd Cap 6-32 x 1    |
| 9           | 4          | FAS-0527        | Screw, Soc Hd Cap 8-32 x 3/4  |
| 10          | 4          | FAS-1305        | Hex Nut 4-40                  |
| 11          | 1          | GOF-3014        | Drive Pinion                  |

## CWO-3165 HOUSING ASSEMBLY / EXPLODED VIEW / PARTS LIST



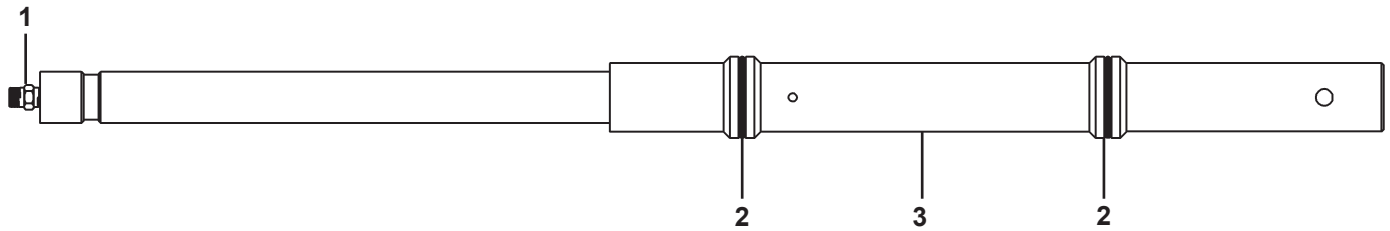
| ITEM | QTY | PART NO. | DESCRIPTION                          |
|------|-----|----------|--------------------------------------|
| 1    | 1   | CWO-4133 | 1/4-18 Npsm Hex Plug, Brass          |
| 2    | 1   | CWO-5842 | Center Tube Housing, CW-18           |
| 3    | 1   | CWO-5845 | Top Housing Plate, CW-18             |
| 4    | 1   | CWO-5853 | Lower Housing Plate, CW-18           |
| 5    | 2   | CWO-5980 | Plastic Bushing                      |
| 6    | 3   | CWO-9339 | Angle For Guard                      |
| 7    | 3   | FAS-0535 | Soc Hd Cap Scr 10-24 x 1/2"          |
| 8    | 8   | FAS-0548 | Soc Hd Cap Scr 10-32 x 3/4" Low Head |

## CWO-3315 BRUSH HOLDER & SUPPORT ASSEMBLY / EXPLODED VIEW / PARTS LIST



| ITEM | QTY | PART NO. | DESCRIPTION                    |
|------|-----|----------|--------------------------------|
| 1    | 1   | CWO-4472 | Brush Holder Support           |
| 2    | 1   | CWO-4473 | Attachment Bar                 |
| 3    | 3   | CWO-3263 | Large Brush Holder             |
| 4    | 6   | CWO-3264 | Spring Clip                    |
| 5    | 6   | CWO-4337 | Large Brush 1-1/2" x 3/4" x 2" |
| 6    | 2   | CWO-5548 | Micarta Spacer                 |
| 7    | 1   | CWO-5549 | Micarta Bushing                |
| 8    | 1   | CWO-4470 | Support Brush Holder Extension |
| 9    | 1   | FAS-3308 | Hex Hd Cap Scr 1/2-13 x 3"     |
| 10   | 1   | FAS-0309 | Hex Hd Cap Scr 1/2-13 x 1"     |
| 11   | 1   | FAS-0357 | Hex Hd Cap Scr 1/4-20 x 3/4"   |
| 12   | 3   | FAS-0359 | Hex Hd Cap Scr 1/4-20 x 1"     |
| 13   | 1   | FAS-3304 | Hex Hd Cap Scr 1/2-13 x 4"     |
| 14   | 4   | WAS-0243 | 1/4" Split Lock Washer         |
| 15   | 3   | WAS-0280 | 1/2" SAE Flat Washer           |
| 16   | 3   | WAS-0281 | 1/2" Split Lock Washer         |

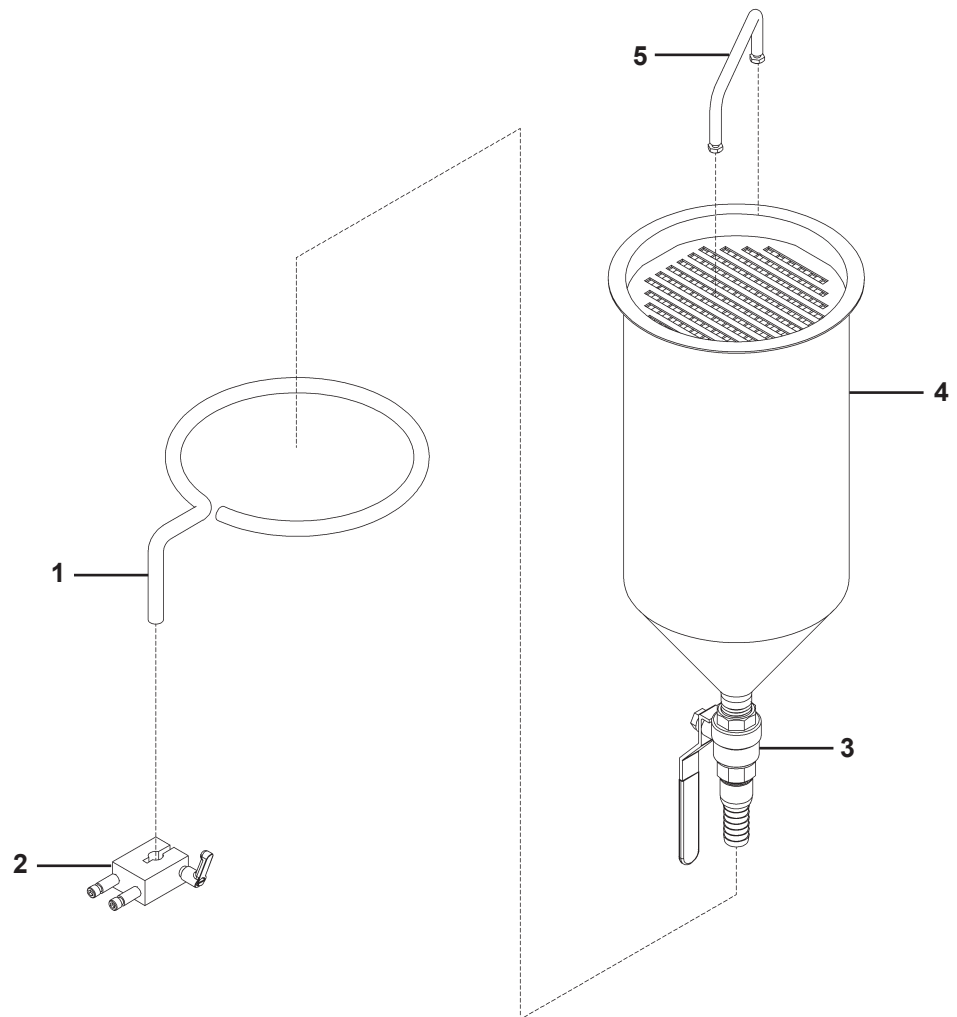
## CWO-3432 SHAFT ASSEMBLY / EXPLODED VIEW / PARTS LIST



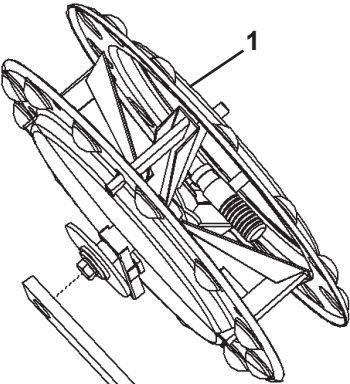
| <u>ITEM</u> | <u>QTY</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>     |
|-------------|------------|-----------------|------------------------|
| 1           | 1          | BUG-9096        | Outlet Bushing, Oxygen |
| 2           | 2          | CWO-4507        | O-Ring, Oxygen, Gas    |
| 3           | 1          | CWO-5779        | Shaft CW-18            |

## CWO-3490 FLUX HOPPER ASSEMBLY / EXPLODED VIEW / PARTS LIST

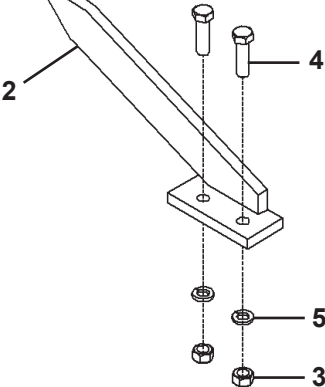
| <u>ITEM</u> | <u>QTY</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>                 |
|-------------|------------|-----------------|------------------------------------|
| 1           | 1          | CWO-3757        | Hopper Support Rod                 |
| 2           | 1          | CWO-3760        | Clamp Block 1/2"                   |
| 3           | 1          | CWO-3478        | 1-3/4" Hose Barb                   |
| 4           | 1          | CWO-3769        | Flux Hopper Steel 12"              |
| 5           | 1          | GOF-3019        | Handle W/ Bolts                    |
| N/S         | 1          | CWO-3491-48     | Flux Hose 3/4" ID x 1" OD x 48" Lg |



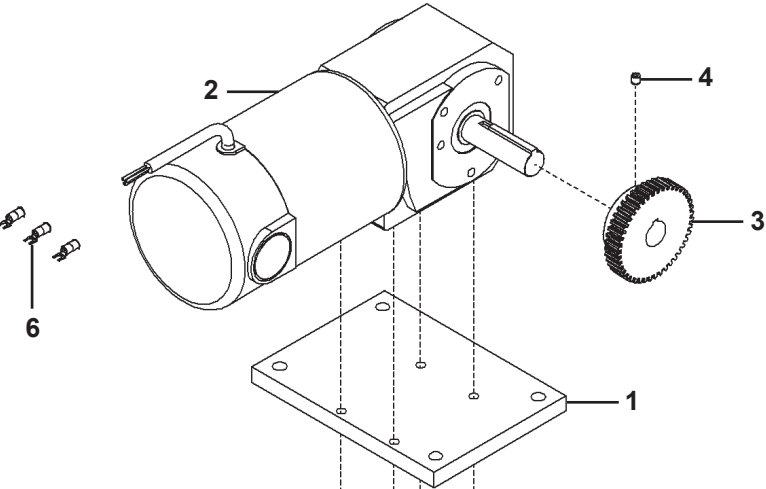
CWO-3498-11 WIRE REEL ASSEMBLY / EXPLODED VIEW / PARTS LIST



| ITEM | QTY | PART NO.    | DESCRIPTION                      |
|------|-----|-------------|----------------------------------|
| 1    | 1   | BUG-3293    | Reel, 60 Lbs.                    |
| 2    | 1   | CWO-3217-11 | Wire Reel Support Assembly CW-18 |
| 3    | 2   | FAS-1301    | Hex Nut 1/2-13                   |
| 4    | 2   | FAS-2305    | Hex Hd Cap Scr 1/2-13 x 1-3/4"   |
| 5    | 2   | WAS-0281    | 1/2" Lock Washer                 |

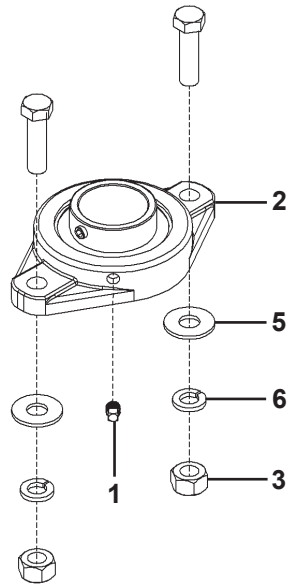


CWO-3506 4066 MOTOR ASSEMBLY / EXPLODED VIEW / PARTS LIST



| ITEM | QTY | PART NO.      | DESCRIPTION                |
|------|-----|---------------|----------------------------|
| 1    | 1   | CWO-3620      | Motor Mount Bracket        |
| 2    | 1   | CWO-4846      | Right Angle DC Motor 4066  |
| 3    | 1   | CWO-5767      | Gear Pm Motor 147          |
| 4    | 1   | FAS-0453      | Set Scr 1/4-20 x 1/4"      |
| 5    | 4   | FAS-0559      | Soc Hd Cap Scr 1/4-20 x 1" |
| 6    | 3   | TERM WTE 1508 | #8 Fork, Blue              |
| 7    | 4   | WAS-0243      | 1/4" Split Lock Washer     |

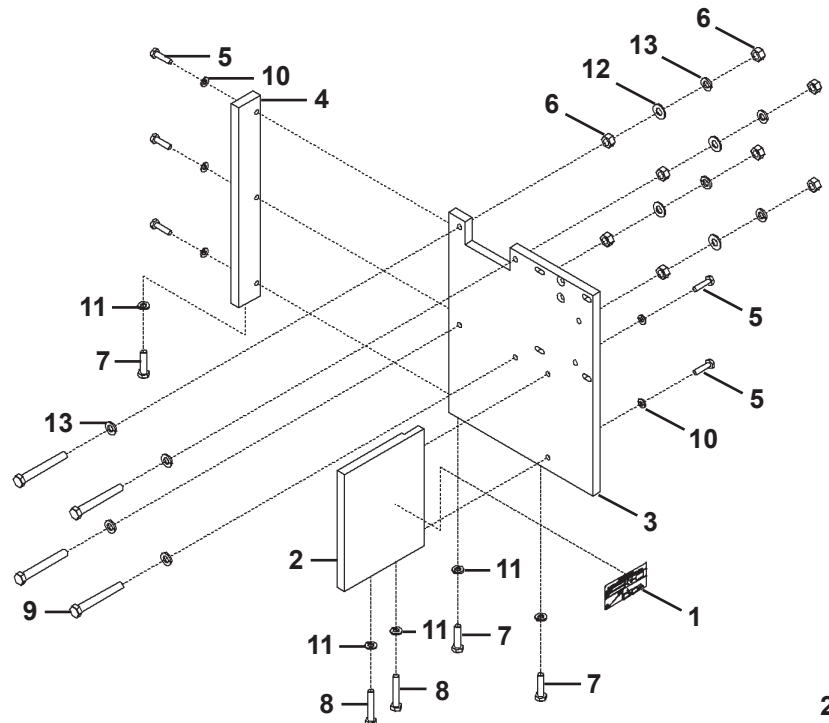
## CWO-3528 2" FLANGE BEARING w/FASTENERS / EXPLODED VIEW / PARTS LIST



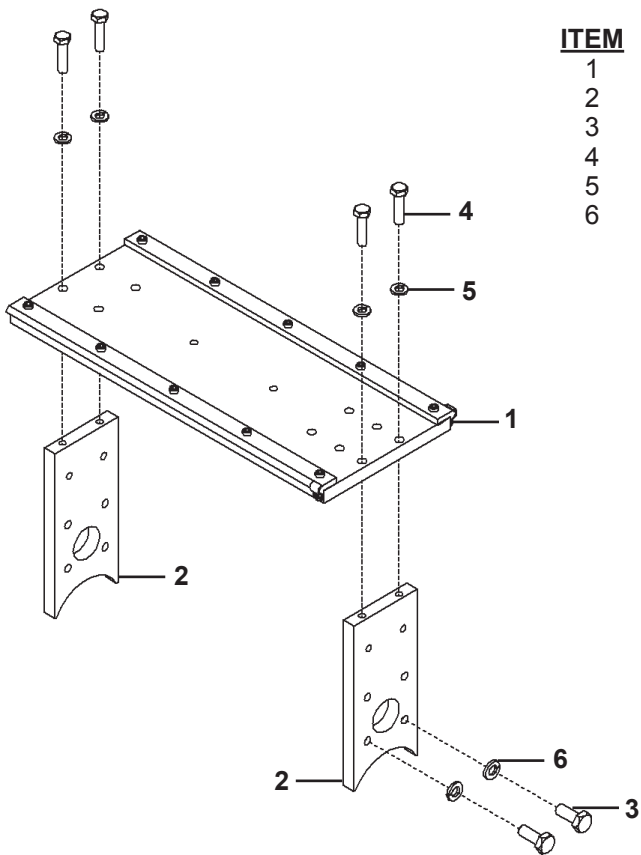
| <u>ITEM</u> | <u>QTY</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>          |
|-------------|------------|-----------------|-----------------------------|
| 1           | 1          | CWO-1511        | 1/8" Pipe Plug Black Iron   |
| 2           | 1          | CWO-4482        | Flange Bearing 2" Bore      |
| 3           | 2          | FAS-1398        | 9/16-12 Hex Nut             |
| 4           | 2          | FAS-3305        | Hex Hd Cap Scr 9/16-12 x 2" |
| 5           | 2          | WAS-0290        | 9/16" Sae Washer            |
| 6           | 2          | WAS-0291        | 9/16" Split Lock Washer     |

## CWO-3531 MOTOR & TRANSMISSION PLATE ASSEMBLY / EXPLODED VIEW / PARTS LIST

| <u>ITEM</u> | <u>QTY</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>              |
|-------------|------------|-----------------|---------------------------------|
| 1           | 1          | BUG-1338        | I.D. Plate                      |
| 2           | 1          | CWO-5788        | Cover Plate                     |
| 3           | 1          | CWO-5887        | Motor & Transmission Plate      |
| 4           | 1          | CWO-5888        | End Plate                       |
| 5           | 5          | FAS-0359        | Hex Hd Cap Scr 1/4-20 x 1"      |
| 6           | 8          | FAS-1390        | Hex Nut 3/8-16                  |
| 7           | 3          | FAS-2372        | Hex Hd Cap Scr 5/16-18 x 1-1/4" |
| 8           | 2          | FAS-2374        | Hex Hd Cap Scr 5/16-18 x 1-3/4" |
| 9           | 4          | FAS-2398        | Hex Hd Cap Scr 3/8-16 x 3"      |
| 10          | 5          | WAS-0243        | 1/4" Split Lock Washer          |
| 11          | 5          | WAS-0251        | 5/16" Split Lock Washer         |
| 12          | 4          | WAS-0260        | 3/8" Washer                     |
| 13          | 8          | WAS-0262        | 3/8" Split Lock Washer          |

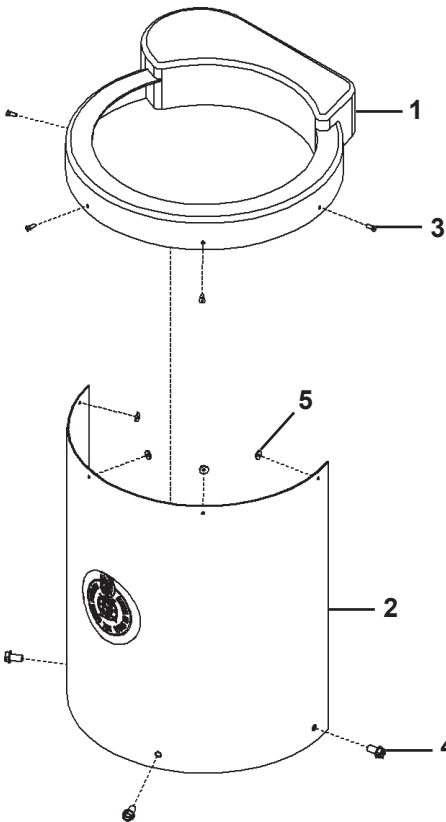


CWO-3534 SLIDE BAR ASSEMBLY / EXPLODED VIEW / PARTS LIST



| ITEM | QTY | PART NO. | DESCRIPTION                       |
|------|-----|----------|-----------------------------------|
| 1    | 1   | CWO-3912 | Slide Bar Assembly                |
| 2    | 2   | CWO-9033 | Top / Bottom Vertical Slide Plate |
| 3    | 2   | FAS-0399 | Hex Hd Cap Scr 3/8-16 x 1"        |
| 4    | 4   | FAS-2372 | Hex Hd Cap Scr 5/16-18 x 1-1/4"   |
| 5    | 4   | WAS-0251 | 5/16" Split Lockwasher            |
| 6    | 2   | WAS-0262 | 3/8" Split Lockwasher             |

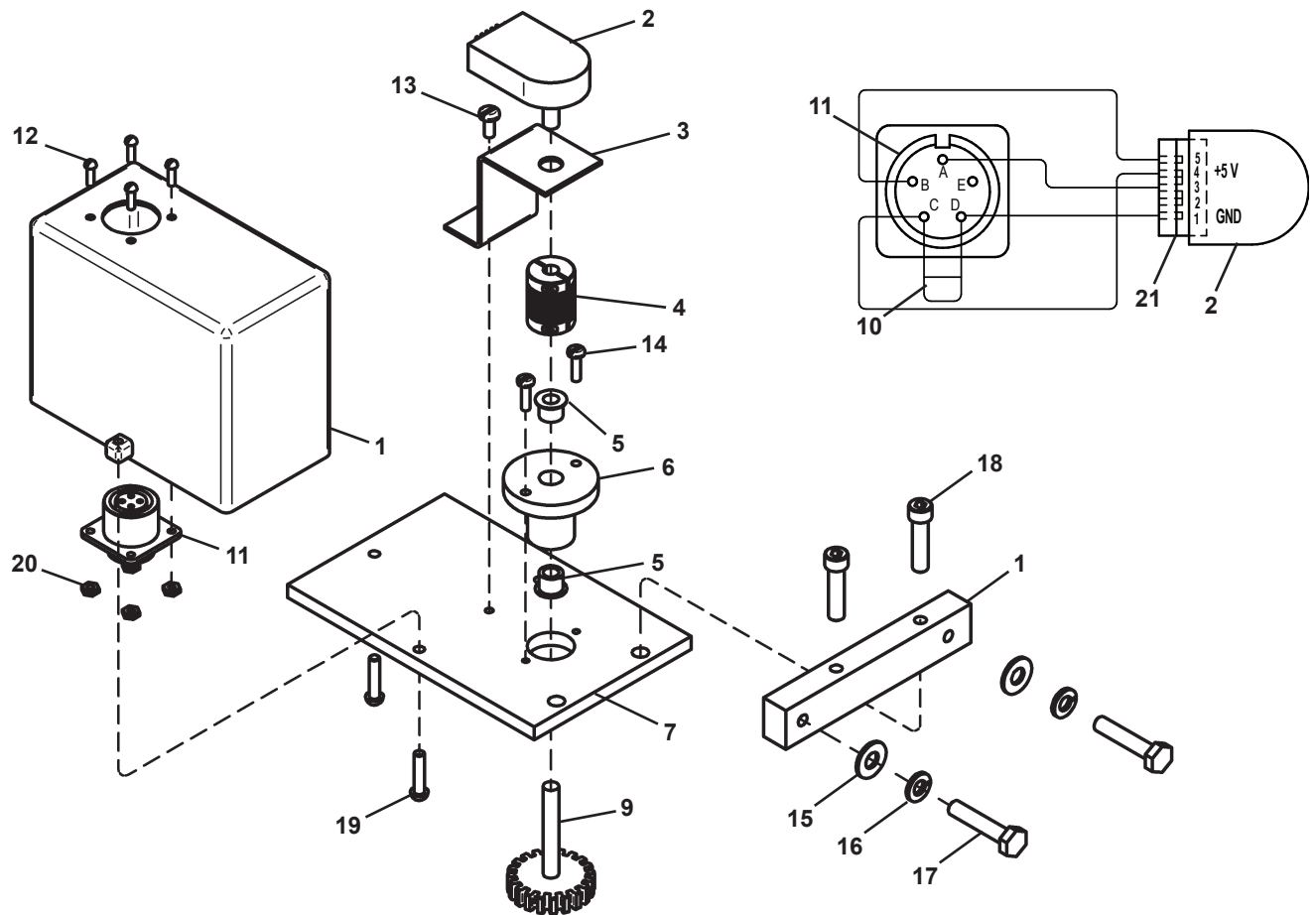
CWO-3537 GUARD ASSEMBLY / EXPLODED VIEW / PARTS LIST



| ITEM | QTY | PART NO. | DESCRIPTION                          |
|------|-----|----------|--------------------------------------|
| 1    | 1   | CWO-5094 | Upper Guard CB-2, CB-3, CW-7, CW-18  |
| 2    | 1   | CWO-9142 | Lower Guard CW-18                    |
| 3    | 4   | FAS-1376 | Rivet 1/8" Dia x 3/8"                |
| 4    | 3   | FAS-1455 | T.C. Slit Hex 1/4-20 x 1/4" W/Washer |
| 5    | 4   | FAS-0261 | 3/8" Washer, 0.056 Thk               |

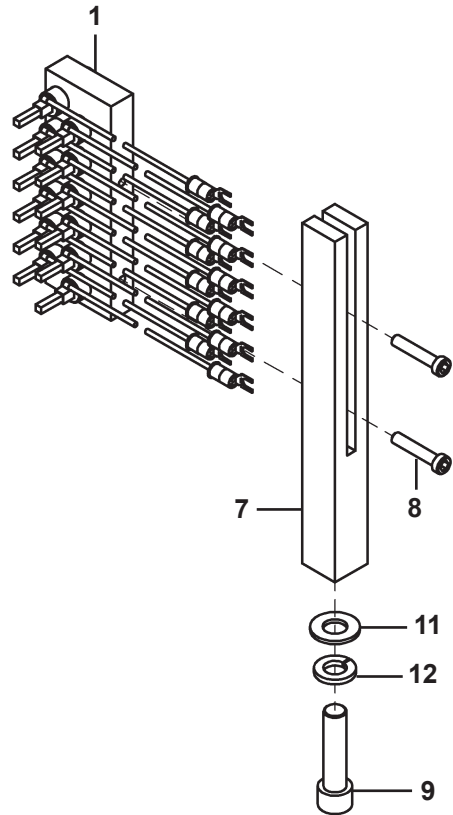


# CBP-1535-18 ENCODER ASSEMBLY / EXPLODED VIEW / PARTS LIST / WIRING DIAGRAM



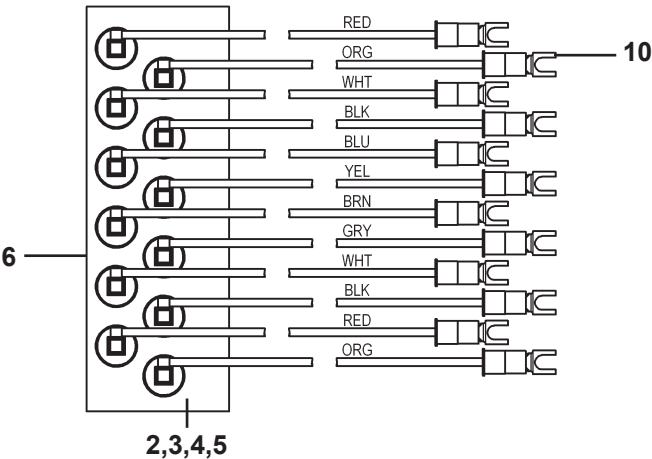
| <u>ITEM</u> | <u>QTY</u> | <u>PART NO.</u> | <u>DESCRIPTION</u>                    |
|-------------|------------|-----------------|---------------------------------------|
| 1           | 1          | CBP-1603        | Encoder Enclosure For CWP-18          |
| 2           | 1          | CBP-1549        | Encoder, 512 CPR                      |
| 3           | 1          | MUG-1592        | Bracket                               |
| 4           | 1          | BUG-6044        | Flexible Coupling                     |
| 5           | 2          | SFX-1218        | Bearing-Flg 1/4 ID x 3/8 OD x 5/16 Lg |
| 6           | 1          | MUG-1593        | Pod                                   |
| 7           | 1          | CBP-1601        | Encoder Mount Plate For CWP-18        |
| 8           | 1          | CBP-1602        | Encoder Mounting Bar For CWP-18       |
| 9           | 1          | CBP-1593        | Gear Shaft Assembly                   |
| 10          | 1          | CAP-1105M       | 1Uf 50V 10% Radial                    |
| 11          | 1          | CON-1305P       | Panel Connector, 5-T, M               |
| 12          | 4          | FAS-0204        | Rnd Hd Slit Scr 4-40 x 3/8 Zinc       |
| 13          | 1          | FAS-0124        | 8/32 x 3/8 Pan Hd, Di-Chrome          |
| 14          | 2          | FAS-0115        | 6-32 x 1/2 Pan Head, Zinc             |
| 15          | 2          | WAS-0240        | 1/4 SAE Flat Washer                   |
| 16          | 2          | WAS-0243        | 1/4" Split Lock Washer                |
| 17          | 2          | FAS-2351        | Hex Hd Cap Scr 1/4-20 x 1-1/4         |
| 18          | 2          | FAS-0559        | Soc Hd Cap 1/4-20 x 1                 |
| 19          | 3          | FAS-0227        | Rnd Hd Scr 8-32 x 3/4                 |
| 20          | 4          | FAS-1305        | Hex Nut 4-40                          |
| 21          | 1          | CBP-1598        | Connector Cable                       |

CWO-3931-18 BRUSH RETAINER F/ POWER RACKING, CW-18 / EXPLODED VIEW / PARTS LIST

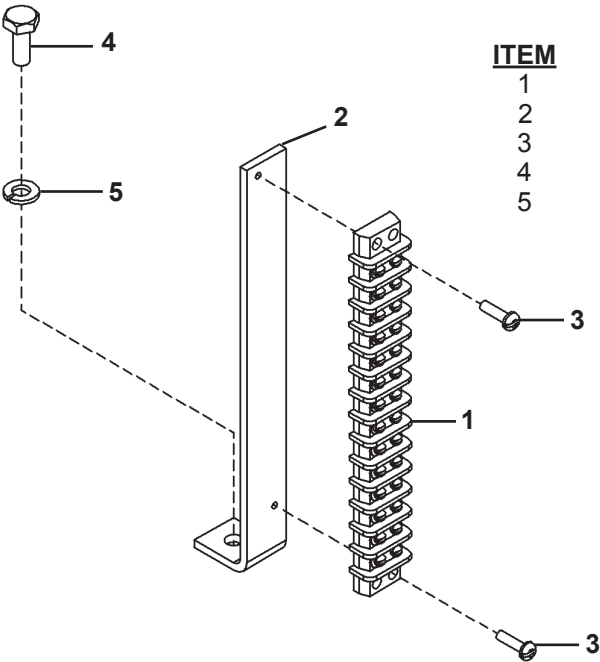


| ITEM | QTY | PART NO.      | DESCRIPTION                       |
|------|-----|---------------|-----------------------------------|
| 1    | 1   | CWO-3947      | 12 Position Small Brush Assembly  |
| 2    | 12  | CWO-5831      | 1/8" x 1/8" Z 1/8" Brush          |
| 3    | 12  | CWO-5874      | 1/8" Brush Holder                 |
| 4    | 12  | CWO-5875      | Cap                               |
| 5    | 12  | CWO-5876      | Clip                              |
| 6    | 1   | CWO-9067      | Small Brush Retainer Block, CW-18 |
| 7    | 1   | CWO-9082      | Retainer Support                  |
| 8    | 2   | FAS-0359      | Soc Hd Cap Scr 10-24 x 1"         |
| 9    | 1   | FAS-0593      | Soc Hd Cap Scr 3/8-16 x 1-1/2"    |
| 10   | 12  | TERM-WTE-1508 | #8 Fork, Blue                     |
| 11   | 1   | WAS-0260      | 3/8" SAE Washer                   |
| 12   | 1   | WAS-0262      | 3/8" Split Lockwasher             |

CWO-3931-18 BRUSH RETAINER F/ POWER RACKING, CW-18 / DETAIL VIEW

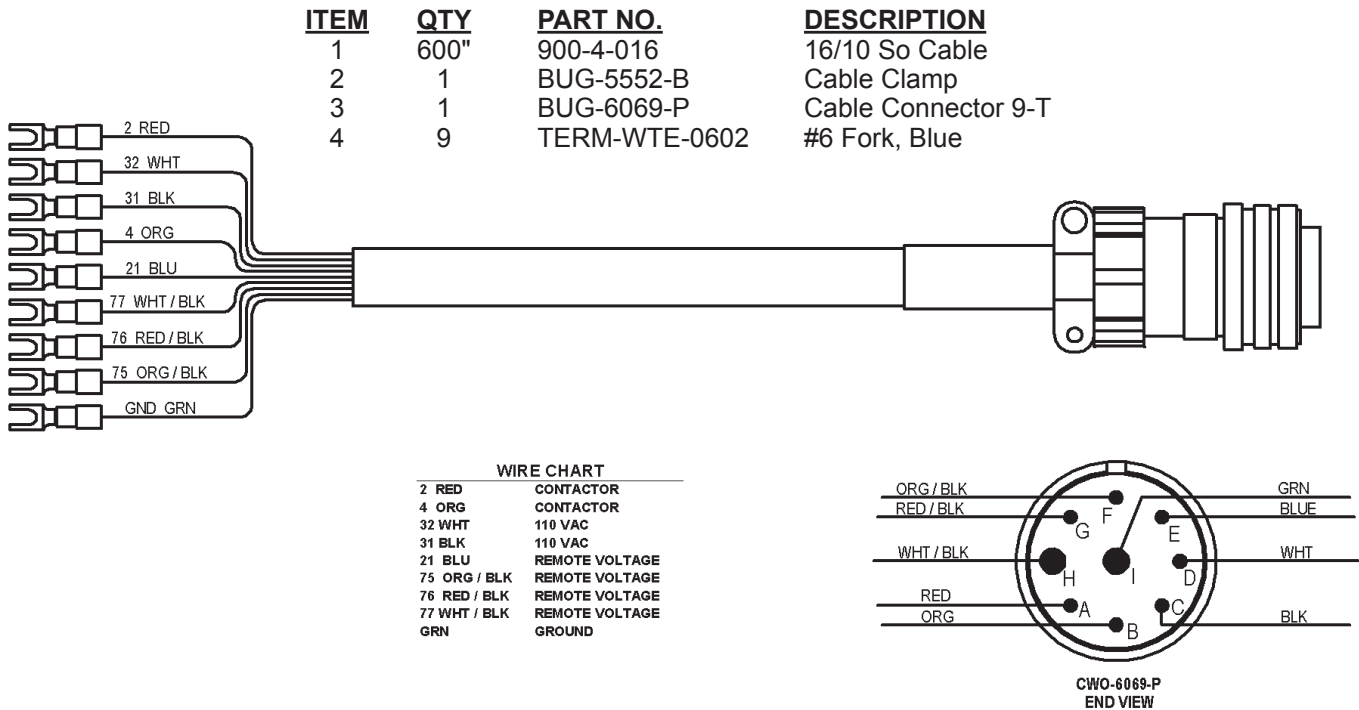


CWO-3969 TERMINAL BLOCK ASSEMBLY / EXPLODED VIEW / PARTS LIST

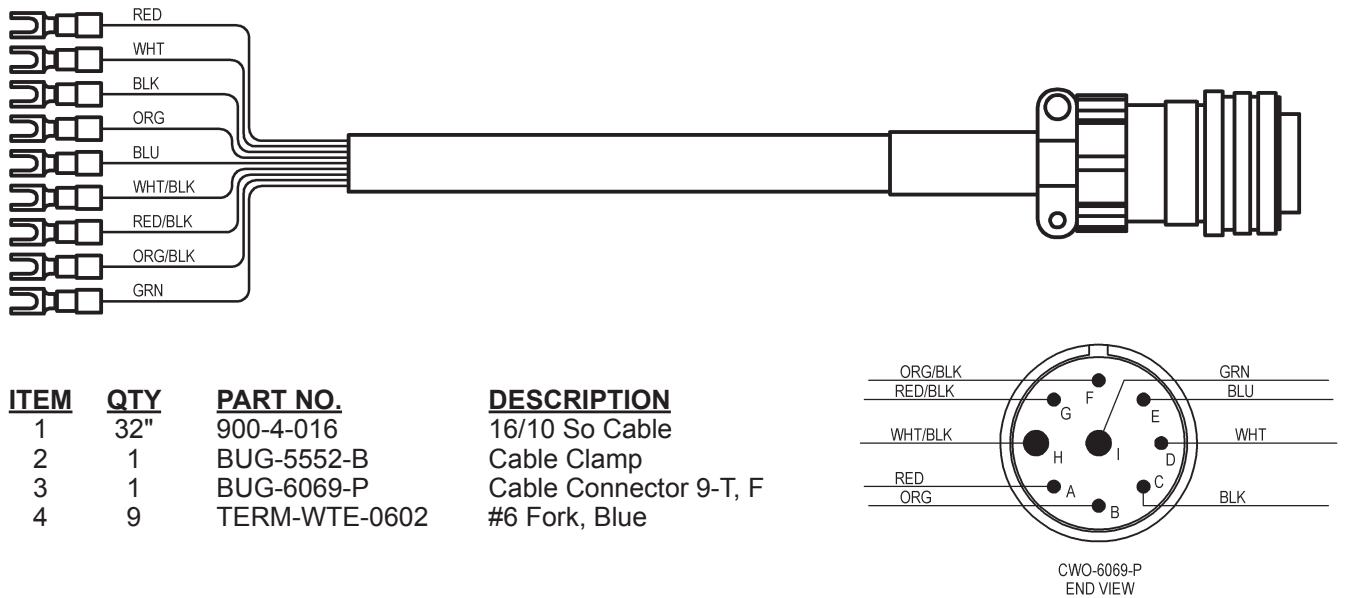


| ITEM | QTY | PART NO. | DESCRIPTION                  |
|------|-----|----------|------------------------------|
| 1    | 1   | CWO-6726 | Terminal Block 14-Pin        |
| 2    | 1   | CWO-9071 | Terminal Block Support CW-18 |
| 3    | 2   | FAS-0215 | Rnd Hd Scr 6-32 x 1/2"       |
| 4    | 1   | FAS-0356 | Hex Hd Cap Scr 1/4-20 x 5/8" |
| 5    | 1   | WAS-0243 | 1/4" Split Lock Washer       |

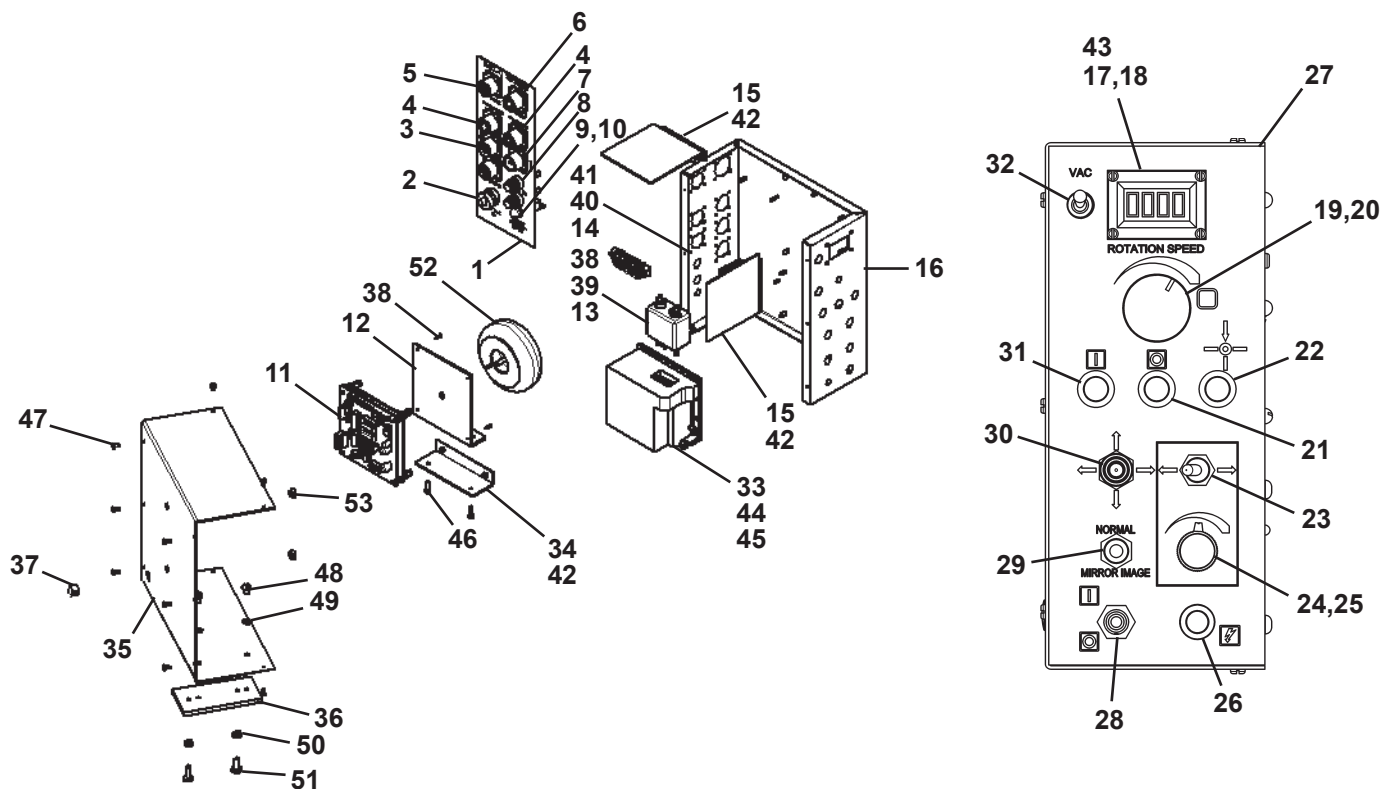
CWO-3971 CONTROL CABLE / DETAIL VIEW / PARTS LIST



CWO-2978 FEEDER CONTROL BOX CABLE / DETAIL VIEW / PARTS LIST

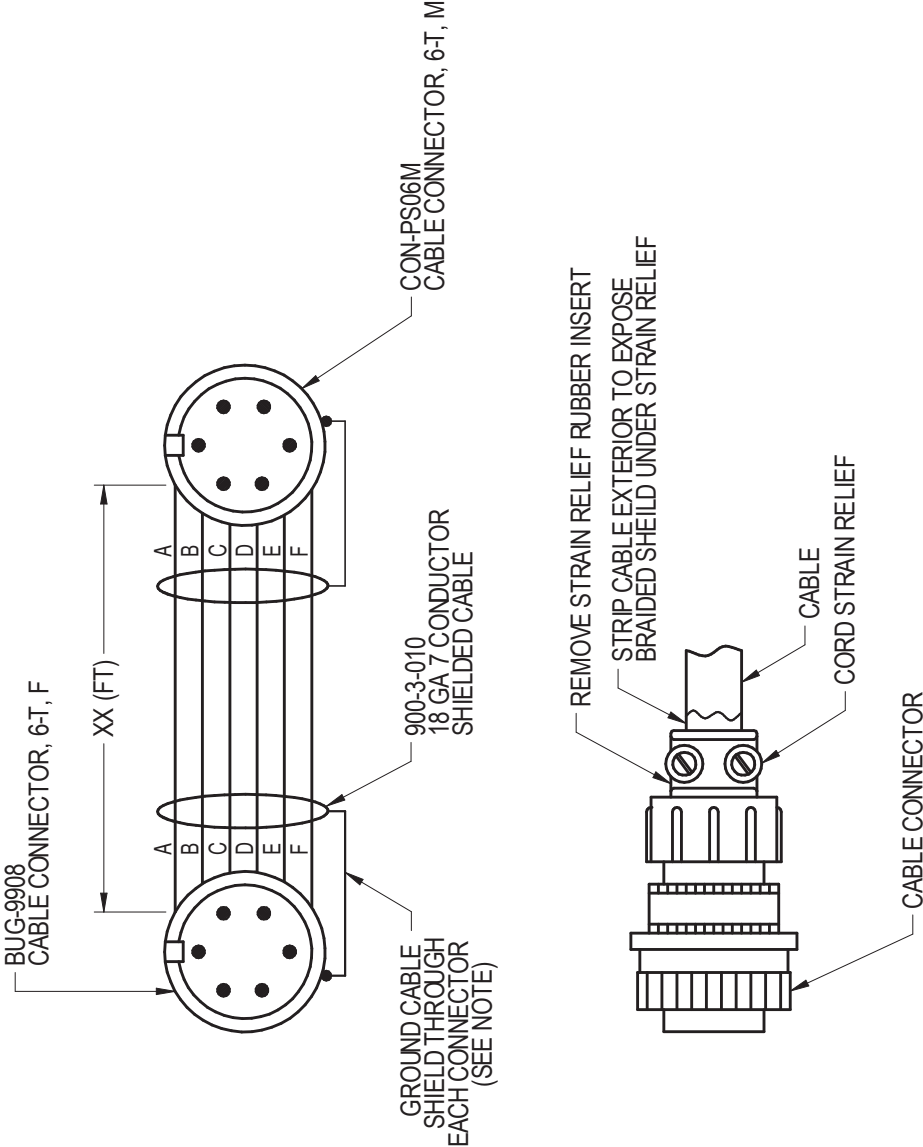


# CBP-1550 ROTATION CONTROL / EXPLODED VIEW / PARTS LIST

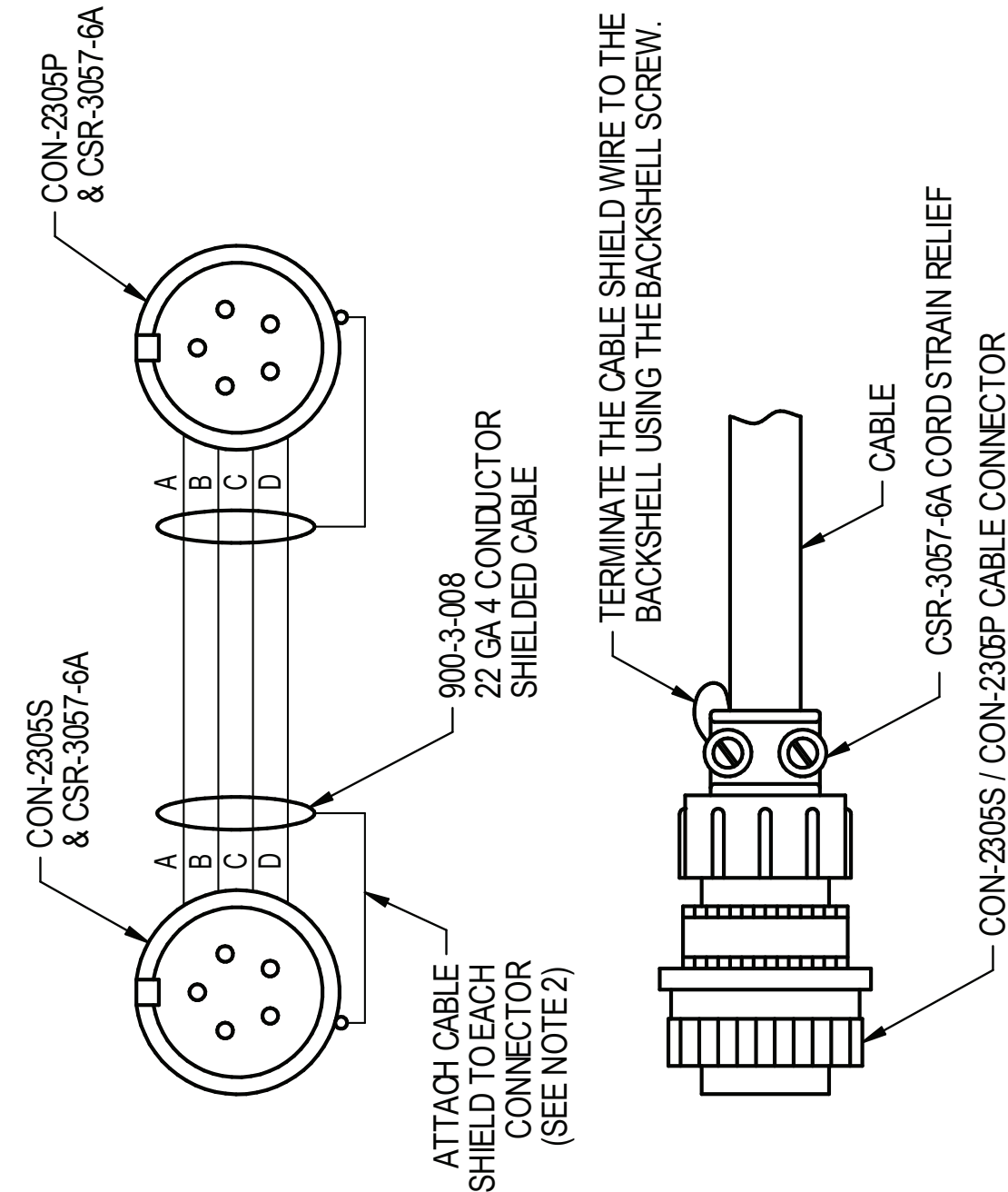


| ITEM | QTY | PART NO. | DESCRIPTION                | ITEM | QTY | PART NO.     | DESCRIPTION                    |
|------|-----|----------|----------------------------|------|-----|--------------|--------------------------------|
| 1    | 1   | CBP-1556 | Rear Legend Plate          | 27   | 1   | CBP-1553     | Front Legend Plate             |
| 2    | 1   | BUG-9446 | Cord Grip                  | 28   | 1   | ARM-2279     | Toggle Switch, DPST            |
| 3    | 2   | BUG-9856 | Panel Connector, 2-T, F    | 29   | 1   | SWT-3601     | Toggle Switch, 4PDT            |
| 4    | 2   | MUG-1156 | Panel Connector, 4-T, F    | 30   | 1   | PRS-1065     | Joystick                       |
| 5    | 1   | BUG-9909 | Panel Connector, 6-T, M    | 31   | 1   | SWT-1113     | Push Button Switch, Green      |
| 6    | 1   | BUG-9902 | Panel Connector, 6-T, F    | 32   | 1   | ABP-1069     | Toggle Switch, SPST            |
| 7    | 1   | BUG-9486 | Panel Connector, 2-T, M    | 33   | 1   | CWO-6520     | 4-Quadrant Speed Control       |
| 8    | 1   | FHO-0188 | Fuse Holder, Panel Mount   | 34   | 1   | CBP-1511     | Transformer Bracket            |
| 9    | 1   | BUG-2923 | Circuit Breaker, 0.7 Amp   | 35   | 1   | CBP-1551     | Control Cover                  |
| 10   | 1   | BUG-2924 | Reset Seal, Transparent    | 36   | 1   | CWO-6417     | Wire Feeder Mount Plate        |
| 11   | 1   | CBP-6030 | Control Module             | 37   | 1   | MUG-1589     | Hole Plug, 0.500"              |
| 12   | 1   | BUG-6029 | Bracket                    | 38   | 34  | FAS-0204     | Screw, Rnd Hd Slit, 4-40 x 3/8 |
| 13   | 1   | BUG-6031 | Filter                     | 39   | 30  | FAS-1305     | Hex Nut, 4-40                  |
| 14   | 1   | BUG-6028 | Terminal Block, Kulka      | 40   | 2   | FAS-0115     | Screw, Pan Hd, 6-32 x 1/2      |
| 15   | 2   | BUG-1770 | Motor Control Board        | 41   | 2   | FAS-1310     | Hex Nut, 6-32                  |
| 16   | 1   | CBP-1557 | Control Case               | 42   | 6   | FAS-0224     | Screw, Rnd Hd, 8-32 x 3/8      |
| 17   | 1   | BUG-1764 | Meter Display Board Ass'y  | 43   | 4   | FAS-0104     | Screw, Pan Hd, 4-40, Black     |
| 18   | 1   | MDS-1011 | Display Bezel              | 44   | 4   | FAS-0244     | Screw, Rnd Hd, 10-32 x 3/8     |
| 19   | 1   | BUG-1562 | Potentiometer, 10k, 3 Turn | 45   | 4   | FAS-1340     | Hex Nut, 10-32                 |
| 20   | 1   | BUG-5757 | Knob, Black                | 46   | 2   | FAS-0525     | Screw, Soc Hd Cap, 8-32 x 1/2  |
| 21   | 1   | SWT-1112 | Push Button Switch, Red    | 47   | 10  | SCW WTE 0264 | Screw, #6 x 1/4" Pan Hd        |
| 22   | 1   | SWT-1111 | Push Button Switch, Black  | 48   | 2   | FAS-0253     | Screw, Rnd Hd, 1/4-20 x 5/16"  |
| 23   | 1   | MUG-1199 | Toggle Switch, DPDT        | 49   | 2   | WAS-0242     | 1/4" External Star Lockwasher  |
| 24   | 1   | BUG-9677 | Potentiometer, 10k ohms    | 50   | 2   | WAS-0243     | 1/4" Split Lock Washer         |
| 25   | 1   | MDS-1044 | Knob, Yellow               | 51   | 2   | FAS-0356     | Screw, Hex Hd Cap, 1/4-20x5/8  |
| 26   | 1   | CWO-6206 | Red Neon Lamp, 125V        | 52   | 1   | BUG-5218     | Transformer, 117V 50/60 HZ     |
|      |     |          |                            | 53   | 2   | SCF-1023     | Self-Clinching Nut 1/4-20      |

CBP-1534-XX SHIELDED CABLE 6-T, F&M WIRING DIAGRAM / PARTS LIST

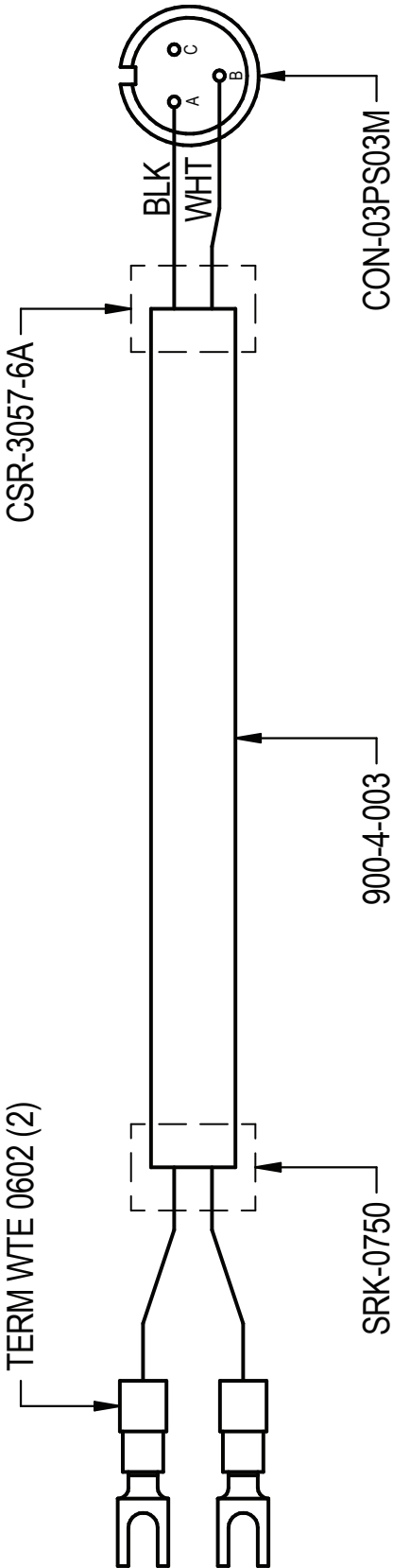


NOTE: BOTH CONNECTORS MUST MAKE ELECTRICAL CONTACT WITH THE CABLE SHIELD AS SHOWN

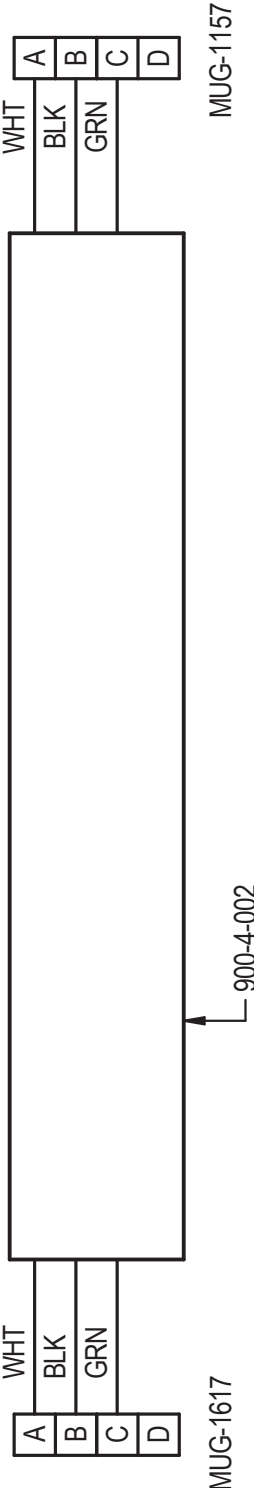


NOTE: BOTH CONNECTORS MUST MAKE ELECTRICAL CONTACT WITH THE CABLE SHIELD AS SHOWN.

CBP-1533/CWP X-MOTOR CABLE WIRING DIAGRAM / PARTS LIST

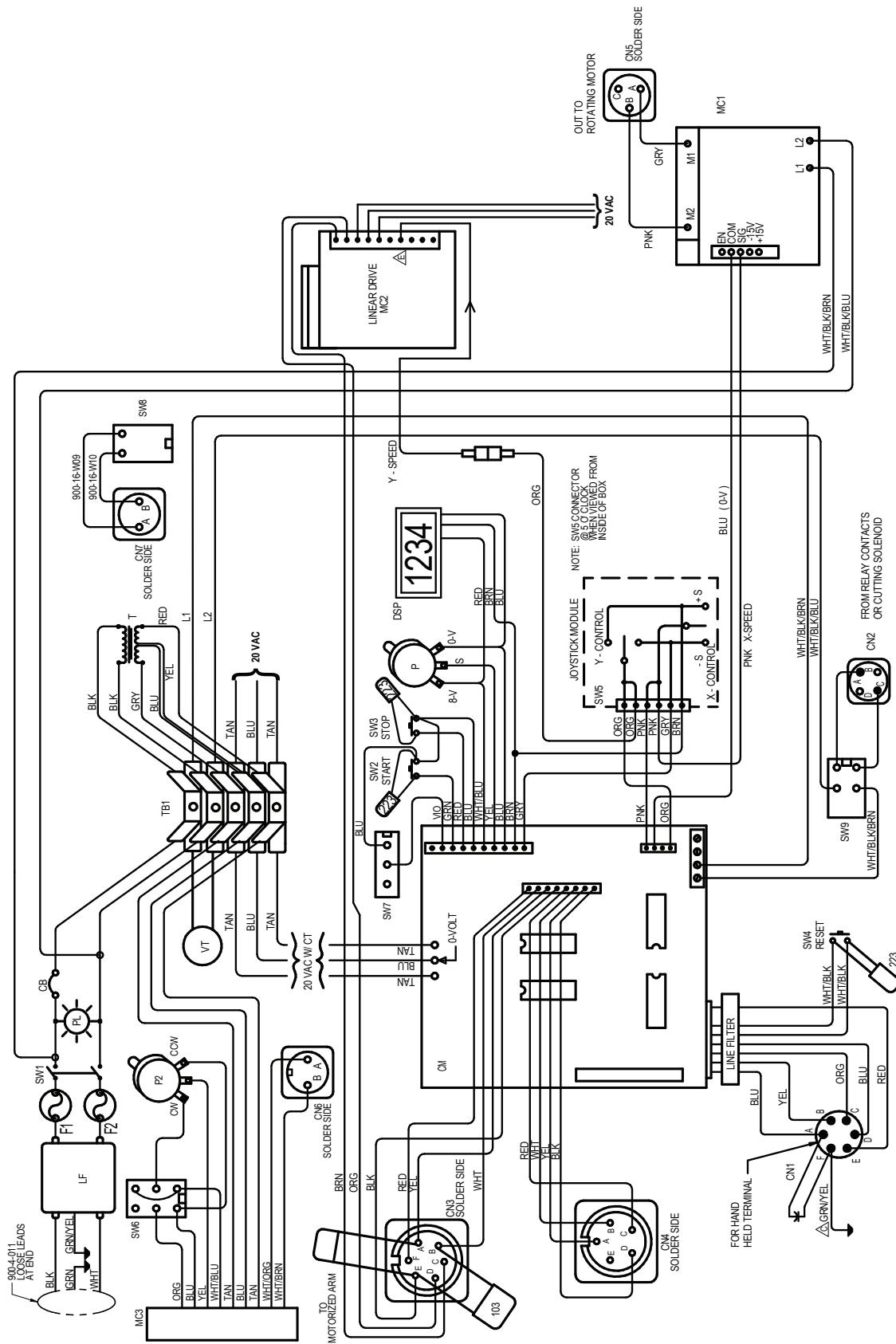


CWP-1816/CWP START/STOP CABLE WIRING DIAGRAM / PARTS LIST





## CBP-1550 ROTATION CONTROL / WIRING DIAGRAM

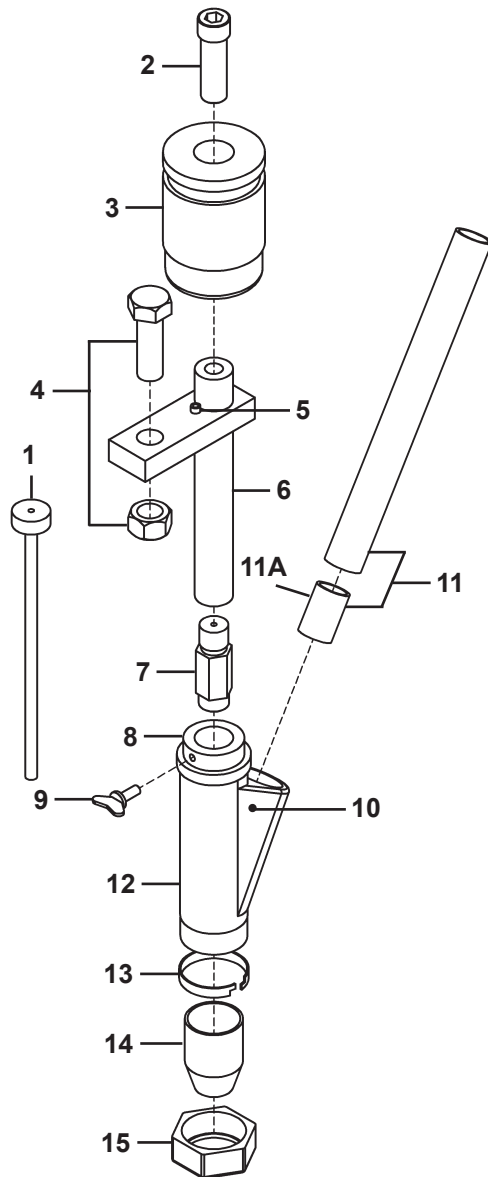


--- = INDICATES ITEMS THAT ARE SUPPLIED TOGETHER.

## CBP-1550 ROTATION CONTROL / ELECTRICAL COMPONENT CHART

| ITEM  | DESCRIPTION              | CBP-1550<br>120 VAC |
|-------|--------------------------|---------------------|
| CB    | Circuit Breaker          | BUG-2923            |
| PL    | Pilot Light              | LED-2111            |
| T     | Transformer              | BUG-5218            |
| VT    | Volt Trap                | BUG-1393            |
| MC1   | 4-Quadrant Speed Control | CWO-6520            |
| CM    | Control Module           | CBP-6030            |
| CN1   | Connector (Pendant)      | BUG-9902            |
| CN2   | Connector (Solenoid)     | MUG-1156            |
| CN3   | Connector (Motor Arm)    | CON-06RP06F         |
| CN4   | Connector (Aux.)         | CON-1305S           |
| CN5   | Connector (Rot. Motor)   | CON-03RS03F         |
| CN6   | Connector (Racker)       | BUG-9856            |
| CN7   | Connector (Vacuum)       | BUG-9486            |
| DSP   | Digital Display          | BUG-1764            |
| LF    | Line Filter              | BUG-6031            |
| MC2   | Motor Control Board      | BUG-1770            |
| MC3   | Speed Control (Racker)   | CAS-1770            |
| P     | Potentiometer            | BUG-1562            |
| P2    | Potentiometer (Racker)   | BUG-9677            |
| SW1   | Toggle Switch (Power)    | ARM-2279            |
| SW2   | PB Switch (Start)        | SWT-1113            |
| SW3   | PB Switch (Stop)         | SWT-1112            |
| SW4   | PB Switch (Reset)        | SWT-1111            |
| SW5   | Joystick Switch          | PRS-1065            |
| SW6   | Switch (Racker)          | MUG-1199            |
| SW7   | Mirror Switch            | BUG-2626            |
| SW8   | Switch (Vacuum)          | ABP-1069            |
| SW9   | Switch (Dry Run)         | ARM-2279            |
| TB1   | Terminal Block           | BUG-6028            |
| F1,F2 | 5A Fuse                  | CWO-7076            |

# CWO-3690-\_ K231 SUB ARC GUN



| ITEM | QTY | PART NO.       | DESCRIPTION                      |
|------|-----|----------------|----------------------------------|
| 1    | 1   | PXS-15106-3/32 | Nozzle Insert                    |
| 2    | 1   | PXT-10570      | Socket Head Screw                |
| 3    | 1   | PXS-10493-1    | Nozzle Insulator                 |
| 4    | 1   | PXS-121312     | Hex Hd Scr 1 1/2" & Nut 1/2"-13  |
| 5    | 1   | PXT-9967-10    | Nozzle Body Roll Pin             |
| 6    | 1   | CWO-8052       | Nozzle Body                      |
| *7   | 1   | PXS-10125-_    | Contact Tip (Specify Wire Size*) |
| 8    | 1   | PXS-10138      | Flux Cone Plug (Insulator)       |
| 9    | 1   | PXT-9078-1     | Thumb Screw                      |
| 10   | 1   | PXT-9967-30    | Flux Cone Roll Pin               |
| 11   | 1   | PXT-13835      | 3/4" x 7" Flux Hose W/Fbr Ins    |
| 11A  | 1   | PXT-3835-IN    | Fiber Insulator                  |
| 12   | 1   | BUG-3161-P     | Cone Body Assembly               |
| 13   | 1   | BUG-3163       | Locking Ferrule                  |
| 14   | 1   | BUG-3164       | Flux Cone (KP2085-1)             |
| 15   | 1   | BUG-3165       | Retaining Nut                    |

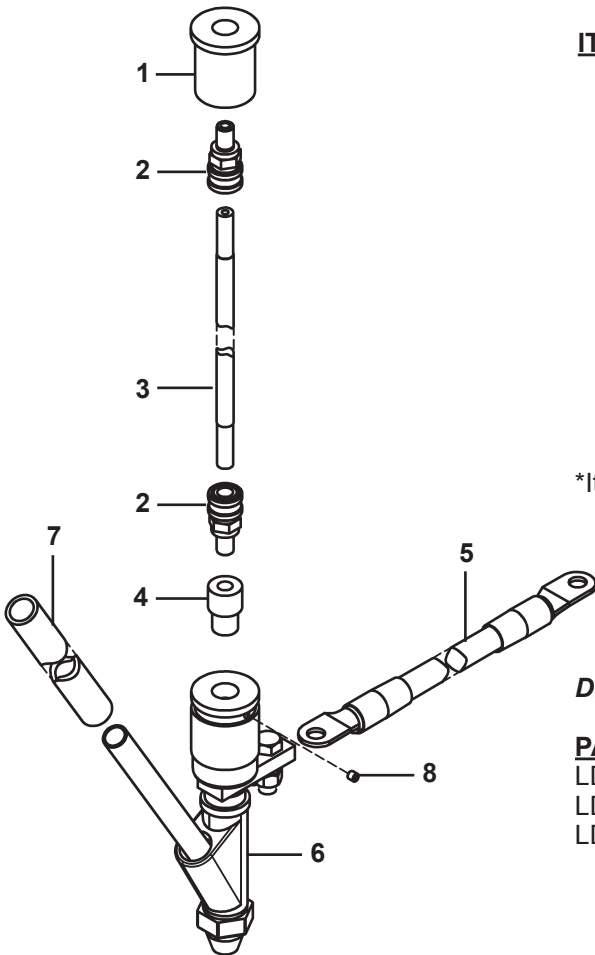
## \*WIRE SIZES AVAILABLE:

| PART NO.      | WIRE SIZE      |
|---------------|----------------|
| CWO-3690-1/16 | 1/16" (1.6 mm) |
| CWO-3690-5/64 | 5/64" (2.0 mm) |
| CWO-3690-3/32 | 3/32" (2.4 mm) |
| CWO-3690-1/8  | 1/8" (3.2 mm)  |
| CWO-3690-5/32 | 5/32" (4.0 mm) |
| CWO-3690-3/16 | 3/16" (4.8 mm) |
| CWO-3690-7/32 | 7/32" (5.6 mm) |

## \*REPLACEMENT CONTACT TIPS AVAILABLE:

| PART NO.         | WIRE SIZE      |
|------------------|----------------|
| CWO-8048         | 5/64" (2.0 mm) |
| CWO-8049         | 3/32" (2.4 mm) |
| CWO-8050         | 5/32" (4.0 mm) |
| CWO-8051         | 1/8" (3.2 mm)  |
| PXS-10125XL-7/64 | 7/64" (2.8 mm) |
| PXS-10125XL-1/16 | 1/16" (1.6 mm) |
| PXS-10125XL-3/16 | 3/16" (4.8 mm) |
| PXS-10125XL-7/32 | 7/32" (5.6 mm) |

CWO-3710-\_ SUB ARC GUN ASSEMBLY



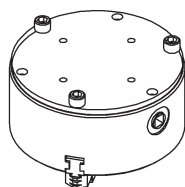
| ITEM | QTY | PART NO.      | DESCRIPTION                              |
|------|-----|---------------|--|
| 1    | 1   | CWO-1816      | Wire Feed Adaptor                        |
| 2    | 2   | CWO-1817      | Bulk Head Connector QCB                  |
| 3    | 1   | CWO-3697      | QCC 72" (1829 Mm) Liner                  |
| 4    | 1   | CWO-3695-1/2  | Adaptor K231 1/2"                        |
| 5    | 1   | CWO-3970-72   | Weld Cable 4/0 Assembly 72" (1829 mm) LG |
| 6    | 1   | CWO-3690-1/8  | Sub-Arc Nozzle 1/8"                      |
|      | 1   | CWO-3690-3/16 | Sub-Arc Nozzle 3/16"                     |
|      | 1   | CWO-3690-5/32 | Sub-Arc Nozzle 5/32"                     |
| 7    | 1   | CWO-3491-48   | Flux Hose 3/4" ID x 1" OD                |
| 8    | 1   | FAS-0452      | Set Scr 1/4-20 x 1/4                     |
| 9*   | 1   | BUG-2708      | Clamp                                    |

\*Item not shown in drawing.

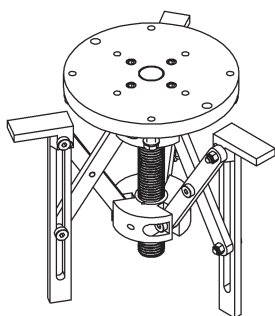
DRIVE ROLLS

| PART NO. | QTY | DESCRIPTION                         |
|----------|-----|-------------------------------------|
| LDC-0013 | 1   | 3/32"-7/32" (2.4-5.6 mm) WIRE SIZES |
| LDC-0014 | 1   | 1/16"-3/32 (1.6-2.4 mm) WIRE SIZES  |
| LDC-0015 | 1   | .035"-.052" (.9-1.3 mm) SOLID WIRE  |

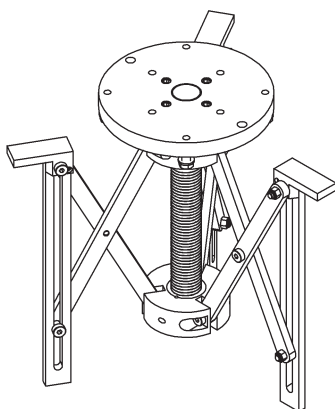
## 3-JAW EXPANDABLE CHUCKS



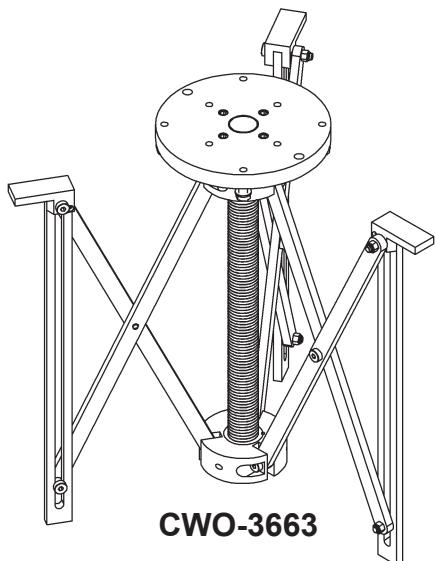
**CWO-3660**



**CWO-3661**



**CWO-3662**

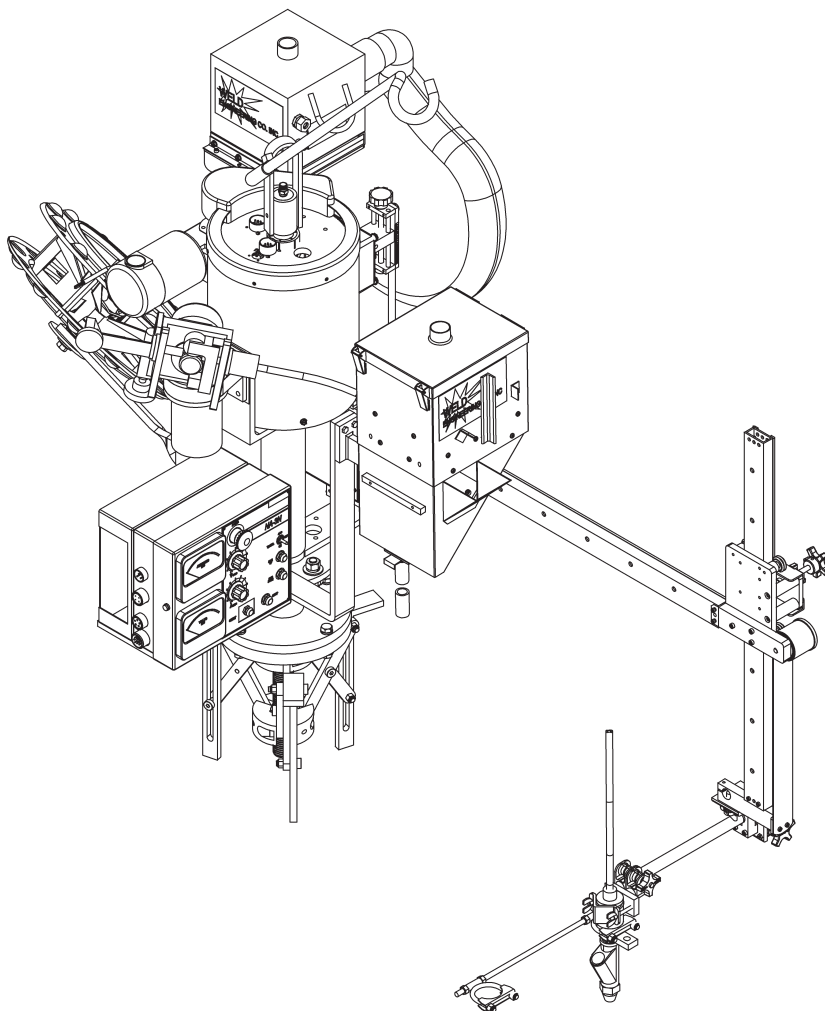


**CWO-3663**

### 3-Jaw Expandable Chucks

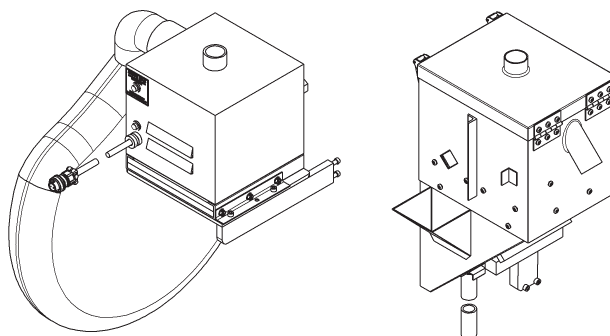
Mounts and automatically centers the Circle Welder on nozzles with or without flanges. As shown below.

| PART NO. | FOR NOZZLE I.D.'S           | WEIGHT          |
|----------|-----------------------------|-----------------|
| CWO-3660 | 2"-8" (51mm-204mm)          | 68 lbs. (31 kg) |
| CWO-3661 | 8"-16" (204-405 mm)         | 36 lbs. (16 kg) |
| CWO-3362 | 10"-24" (255-610 mm)        | 51 lbs. (23 kg) |
| CWO-3663 | 15.75"-47.25" (400-1200 mm) | 64 lbs. (29 kg) |



### Options:

CWO-2020 Flux Recovery System



## PREVENTIVE MAINTENANCE / CW-18 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 CWP-18 Exploded View Parts List. (Pg. 14 & 15)

##### Racking System Item #11:

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.

##### Large Horizontal Racker Item #3:

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 #24:

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 CWP-18 Electrical Component Chart. (Pg. 16)

##### NA-3 Control Cables #11, 14, 15:

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.

##### CW-18 Collector Ring Item #3:

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 #32 on the CW-18 Exploded View Parts List.

**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.

### EVERY SIX MONTHS:

#### Refer to CWP-18 Exploded View Parts List. (Pg. 14 & 15)

##### Aluminum Gear Item #32:

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 #21:

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 #32 and the motor drive pinion.

##### Wire Reel Assembly Item #20:

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 / CW-18 CIRCLE WELDER, CONT'D.

### **Refer to CWP-18 Electrical Component Chart. (Pg. 16)**

#### NA-3 Wire Feed Control Item #6:

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 NA-3 Wire Feeder Control electrical component chart for replacement parts or return for service.

#### Rotation Control Item #12:

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 CBP-1550 Rotation Control electrical component chart for replacement parts or return for service.

#### NA-3 Wire Feeder Assembly Item #1:

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.

#### 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 #7:

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 #8:

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.

## PREVENTIVE MAINTENANCE / CW-18 CIRCLE WELDER, CONT'D.

**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.

### EVERY TWELVE MONTHS:

#### **Refer to CWP-18 Exploded View Parts List. (Pg. 14 & 15)**

##### 2" 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 #21:

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.

##### NA-3 Wire Feeder Assembly Item #34:

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.

#### **Refer to CWP-18 Electrical Component Chart. (Pg. 16)**

##### CW-18 Collector Item #3:

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 4/0 Item #10:

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.

##### NA-3 Control Cables #11, 14, 15:

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.***

\*Bug-O System's warranty applies to Bug-O components only. Where other brands of power sources, wire feeders or sub components are a part of Bug-O Equipment, please refer to that specific Manufacturer's manual for warranty specifications on their components.