

# INSTRUCTIONS AND PARTS MANUAL

## DUAL GUN FILLET WELDER

**K-BUG 2000**  
**K-BUG 2002**

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-KBUG-2000-IPM-0322

Bug-O Systems is committed to empowering our customers by providing operator controlled mechanized solutions for their welding, cutting and custom applications.

**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.



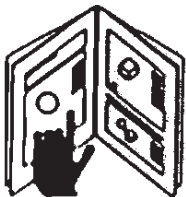
### **EQUIPMENT DAMAGE POSSIBLE.**

- 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.



### **READ INSTRUCTIONS.**

Read the instruction manual before installing and using the 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.

# DUAL GUN FILLET WELDER K-BUG 2000

## INSTRUCTIONS AND PARTS MANUAL

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## INTRODUCTION

The K-BUG 2000 is a compact, light weight unit designed for horizontal fillet welding. The machine is equipped with two, independent weld contacts for increased weld productivity.

## FEATURES

- Height adjustable torch mounting will clear stiffeners up to 11.8 in (300 mm)
- Two independent weld contactors
- Digital speed display
- Precision speed control for consistent weld quality
- User adjustable time settings for puddle build-up and crater-fill.
- Drive wheels rated to 400 °F (204 C)

## TECHNICAL DATA

### Power Input

K-BUG 2000 120 VAC / 50-60 Hz / 1 Phase

K-BUG 2002 240 VAC / 50-60 Hz / 1 Phase

Weight 23.1 lb (10.5 kg)

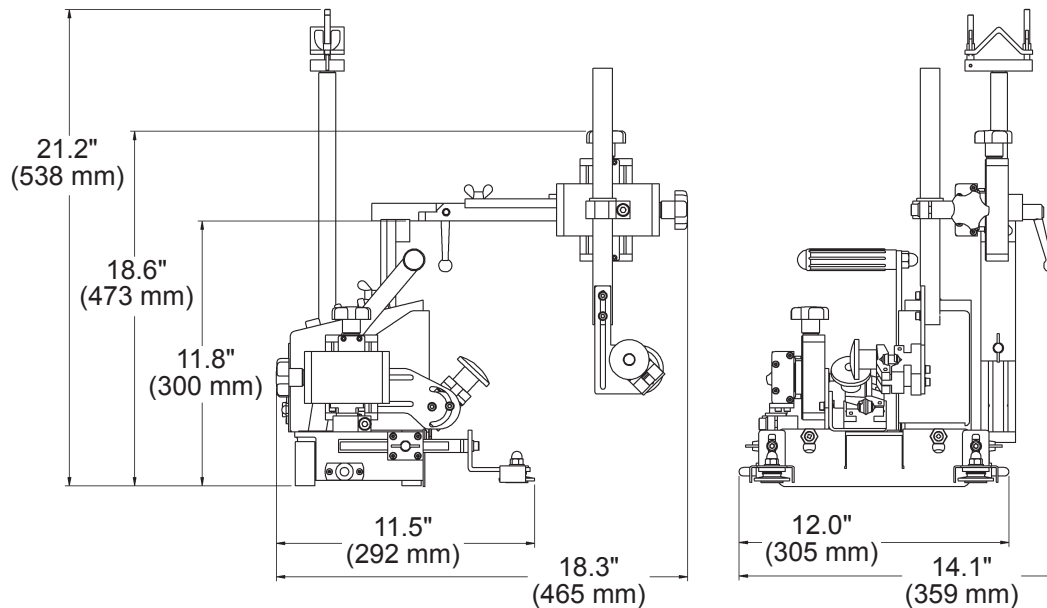
Drive Motor 24 VDC, 12 W, 5000 RPM

Travel Speed 0.3 - 37 in/min (0.1 - 95 cm/min)

Torch Angle 45° (adjustable)

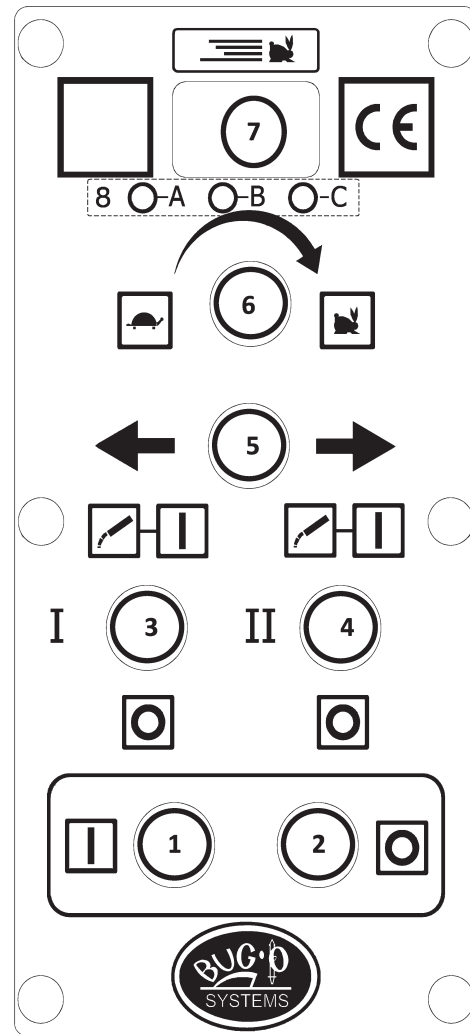
Running Angle up to 10°

## DIMENSIONS



## USER INTERFACE

1. **Cycle Start Button** - Push button to initiate weld cycle. Weld contact will close, according to time settings, if Weld Switch is set to Auto and carriage will travel in the direction selected by the Travel Direction Switch.
2. **Cycle Stop Button** - Push button to stop welding cycle.
3. **Weld I Auto / Off Contactor** - When switched to AUTO, weld contact I will close with cycle start. Switched to the OFF, weld contact I will remain open upon cycle start.
4. **Weld II Auto / Off Contactor** - When switched to AUTO, weld contact II will close with cycle start. Switched to the OFF, weld contact II will remain open upon cycle start.
5. **Travel Direction Switch** - Set switch to determine direction of carriage travel.
6. **Speed Adjustment Dial** - Rotate knob to adjust carriage travel speed. Turning clockwise (right) will INCREASE speed.  
**NOTE:** Travel Speed Adjustment Knob is also used for setting the intermittent function and the time settings.
7. **Digital Display** - Numerically displays real-time values during welding. Exactly what value is displayed is determined by the welding mode (Continuous or Intermittent) and the current step of the welding cycle. Also displays parameters during setup of Intermittent Welding and Time Settings.
8. **Indicator LED's** - Indicate active parameter during intermittent welding and Intermittent Welding mode *before* welding.
  - A. Weld Length
  - B. Non-Weld Length
  - C. Total Length

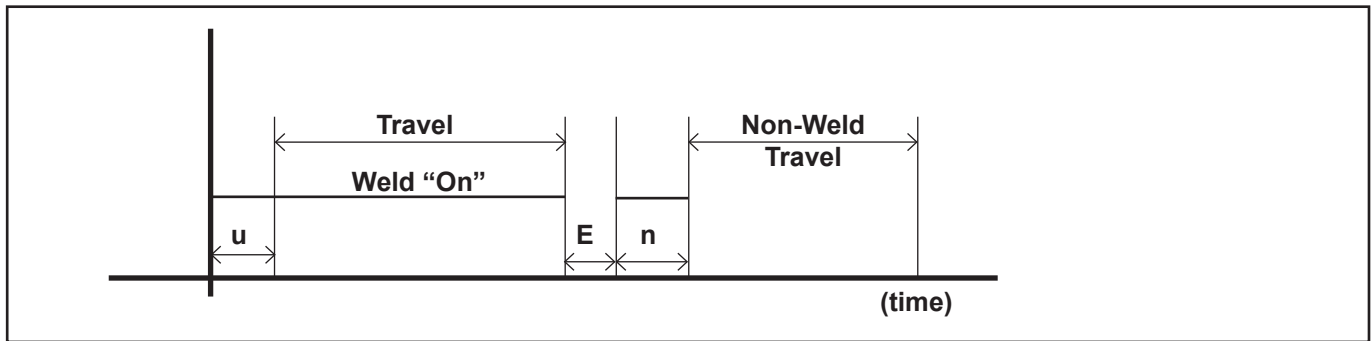


## TIME SETTINGS

The K-BUG 2000 offers three adjustable time settings - Puddle Build-Up (u), Pause Time (E) and Crater Fill (n). The Travel Speed Adjustment knob is used for setting each of the timers, as described below.

1. While pressing the Cycle Start button, connect the power cord to an appropriate power supply.
2. The Display will show "u0.0" flashing.
3. Turn the Travel Speed Adjustment knob until the desired PUDDLE BUILD-UP time is displayed. The default setting is 1.0 seconds. The available range is 0.0 - 9.9 seconds.
4. Press Cycle Start button once more. The Display will show "n0.0" flashing.
5. Turn the Travel Speed Adjustment knob until the desired CRATER FILL time is displayed. The default setting is 1.0 seconds. The available range is 0.0 - 9.9 seconds.
6. Press the Cycle Start button once more. The Display will show "E0.0" flashing.
7. Turn the Travel Speed Adjustment knob until the desired PAUSE TIME is displayed. The default setting is 0.5 seconds. The available range is 0.1 - 9.9 seconds.
8. When finished setting times, press the Cycle Stop button to EXIT time setup mode. The machine is now ready to be setup for welding.

## TIME SETTINGS, CONT'D



A graphic display of the user adjustable time settings.

## WELDING MODES

The K-BUG 2000 offers both Continuous and Intermittent Welding. The value shown in the Digital Display will vary based on the operator selected welding mode. Speed is displayed *only* during Continuous welding.

### CONTINUOUS WELDING

When the Weld Contactor switches are set to AUTO, the Cycle Start button is used to begin the welding sequence and the Cycle Stop button is used to end the welding sequence. Puddle Build-up and Crater Fill will be performed once per cycle. When pressing the Cycle Start button to begin welding, none of the Indicator LED's should be lit. The real time travel speed (in increments of 0.1 in/min or cm/min) will be shown in the Digital Display.

### INTERMITTENT WELDING

The K-BUG 2000 offers two types of intermittent welding - User Defined and Total Length. In each case, the machine features high speed non-welding travel.

#### 1. User Defined Intermittent Welding

With User Defined welding, the operator enters values for Weld Length and Non-Weld Length. The Welding Speed should be set *before* welding. Either A or B LED must be lit when pressing Cycle Start button. Intermittent Weld continues until the operator presses Cycle Stop button.

#### 2. Total Length Intermittent Welding

For Total Length welding, the operator enters values for all three stitch parameters -- Weld Length, Non-Weld Length and Total Length. C LED must be lit when pressing Cycle Start button. Intermittent Weld ends when Total Length has been met. The Welding Speed should be set *before* welding.

## INTERMITTENT WELDING SETUP

The Travel Speed Adjustment knob is used for entering the parameters for intermittent or stitch welding. Follow the steps below to enter the welding parameters.

1. Press the Travel Speed Adjustment knob. The A LED will illuminate.
2. Turn the Travel Speed Adjustment knob clockwise to set the WELD LENGTH. The length adjusts in increments of 0.1 (in or cm) up to 99.9 cm.
3. Press the Travel Speed Adjustment knob again. The B LED will illuminate.
4. Turn the Travel Speed Adjustment knob clockwise to set the NON-WELD LENGTH. The length adjusts in increments of 0.1 (in or cm) up to 99.9 cm.
5. Press the Travel Speed Adjustment knob again. The C LED will illuminate.
6. Turn the Travel Speed Adjustment knob clockwise to set the TOTAL LENGTH. The length adjusts in increments of 1 (in or cm) up to 999 cm.
7. Press the travel Speed Adjustment knob again. All LEDs are unlit.

## INTERMITTENT WELDING LOCK

To lock out the intermittent (stitch) welding controls, press and hold the Travel Speed Adjustment knob for three (3) seconds. All of the LEDs will flash. To unlock the intermittent welding controls, press and hold the Travel Speed Adjustment knob for three (3) seconds. While in lockout, the machine will be unable to perform intermittent welding.

## STOP SENSOR OPERATION

The K-BUG 2000 is equipped with two (2) Stop Sensors. One sensor is placed on the right side of the carriage, the other is placed on the left. The Stop Sensors are normally open switches that engage or close when depressed. If a sensor is tripped during welding, carriage travel will immediately stop and Crater Fill will be performed. Remove the obstacle to reset the Stop Sensor. Press Cycle Start button to begin weld cycle again.

**NOTE:** If Stop Sensor is tripped during intermittent welding, program will reset, NOT resume.

## GLOBAL PARAMETERS

A menu of Global Parameters is maintained in the K-BUG 2000. The menu consists of four (4) items as described in Table 1, below. The menu is unavailable when DIP Switch #1 is in the OFF Position.

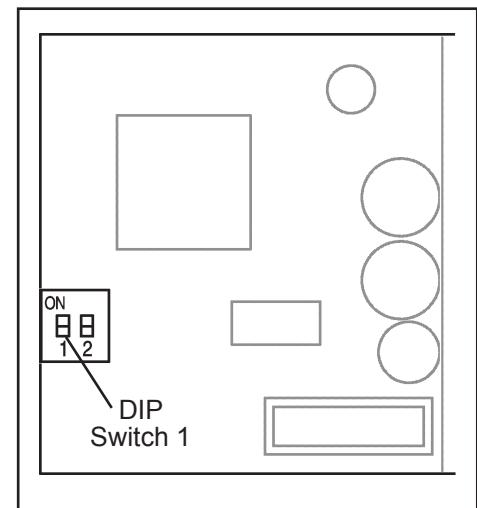
**Table 1: Global Parameters**

Display	Description	Default	Range	Units
n.2*	Travel Motor Reduce Ratio	40	20 - 200	base fig x 10 : 1
n.3*	Diameter of Travel Wheel	50	0.0 - 99.9	mm
n.4	Show Mode	off	off / on	
n.5	Operating Units	U2	U1 / U2	U1 (cm/min), U2 (in/min)

\* Indicates parameters NOT to be changed by the User. Changing these parameters can harm machine performance.

### ACCESS THE GLOBAL PARAMETER MENU

1. With machine unplugged from A/C power supply, remove the six (6) screws securing the Control Interface (Legend Plate and Main PCB) to the Control Panel.
2. Remove the Control Interface and turn it over.
3. Locate DIP Switch 1 and 2 on the Main PCB, see illustration at right.
4. Turn DIP Switch 1 to the "ON" position.
5. Turn over Control Interface. And secure to Control Panel.
6. Plug in machine to A/C power supply of appropriate voltage.
7. "0" should be shown in the Display.
8. Press and release Cycle Start button to cycle through the parameters (0, 1, 2, 3, 4, 5).
9. Turn the Travel Speed Adjustment knob to change the parameter setting.
10. When finished, unplug machine, remove Control Interface and turn it over.
11. Turn DIP Switch 1 to the "OFF" position to lock the Global Parameter Menu.
12. Re-assemble Control Panel and plug in machine to begin operation.



Rear of Main PCB. Move Switch 1 up to the ON position.



## CONVERTING UNITS

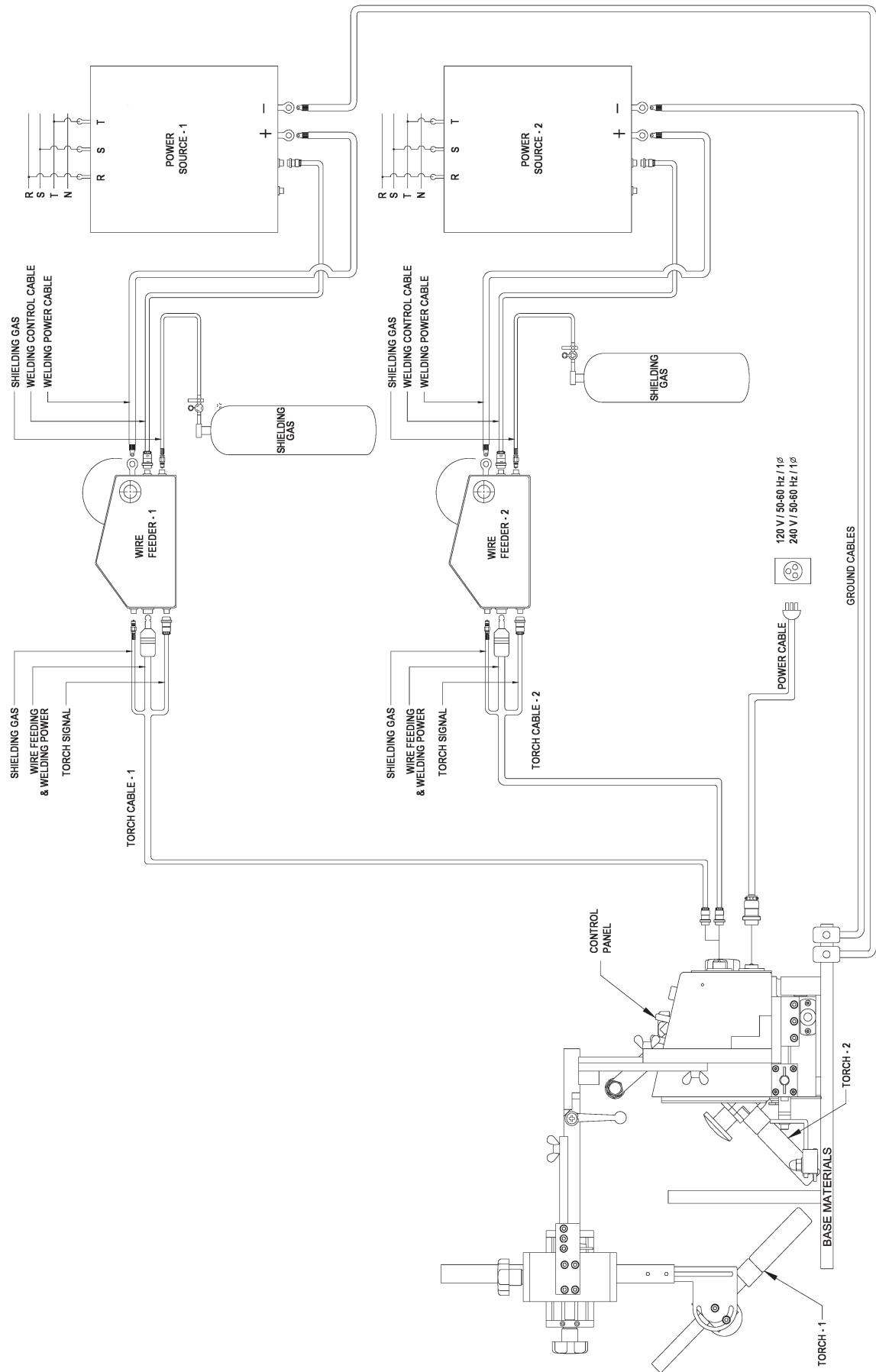
By default, the K-BUG 2000 will be factory set to operate in English units (in/min) and the K-BUG 2002 will be set to operate in Metric units (cm/min). If it is necessary to change units, follow the steps to access the Global Parameters Menu, above. Use the Cycle Start button until “5” is shown on the Display. Turn the Travel Speed Adjustment knob right or left to select the desired Units. Choose “U1” for Metric (cm/min) or “U2” for English (in/min).

## **INSTALLATION AND OPERATION**

1. Cable Connections
  - Connect Weld Contactor Control Cables from K-BUG to Contactor Output on Wire Feeder
  - Plug main Power Cable for K-BUG into appropriate voltage Power Supply

**CAUTION:** Carefully route all cables to prevent entanglement during operation.
2. Welding Process
  - Set the Carriage so the torch is at the weld starting point
  - Install the Guide Arms offset in the direction of travel (leading arm slightly shorter than following arm) for better tracking of joint
  - Adjust the target angle and position of the Torches using Slide Assemblies
  - Verify machine is in the proper welding mode. Set stitch welding parameters, if needed
  - To Start Welding:
    1. Set Weld Auto/Off switch to AUTO
    2. Verify desired Travel Direction is set and Travel Speed is > 0
    3. Press Cycle Start button
  - To End Welding:
    1. Press Cycle Stop button when welding is complete
    2. Turn Weld Auto/Off switch to OFF
  - Confirm Welding End

CABLE INTERCONNECT DIAGRAM



## MAINTENANCE

The K-BUG carriage should be periodically checked and cleaned to maximize service life.

Before use:

Check all screws in the torch clamp and guide rollers. Tighten as needed. Loose fasteners may cause uneven travel or inconsistent weld quality.

During use:

Monitor wheels, motor and welding torch for abnormal noise or overheating.

After each use:

1. Clean control panel to remove dust and other debris.
2. Inspect carriage base, wheels, guide rollers, slide adjustment, magnets and torch for weld spatter or other debris. Clean as needed.
3. Inspect power cable and torch cable for cracked, cut or damaged insulation. Replace as needed.
4. Inspect connectors for damaged pins or loose connections. Replace as needed.

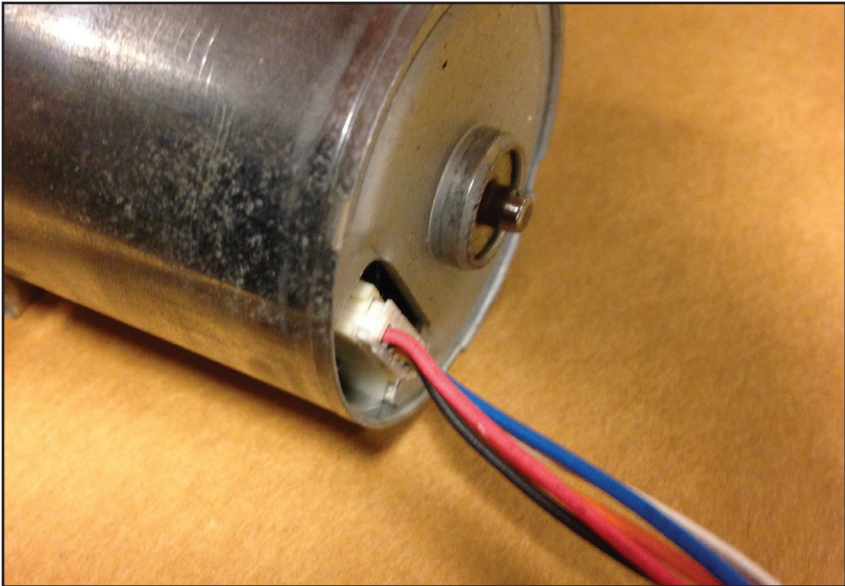
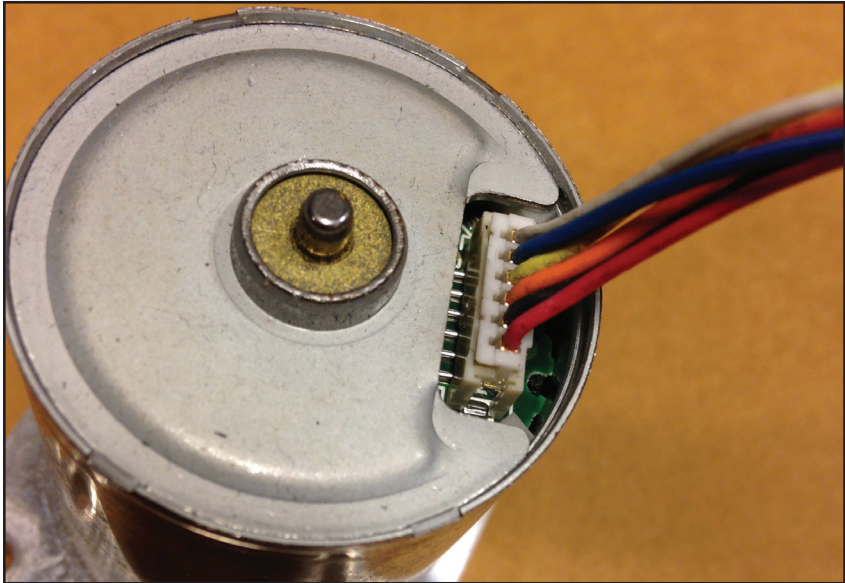
## TROUBLESHOOTING

Symptom	Cause	Repair
Control panel Display is not LIT when machine is plugged in	Disconnected Control Cable	Verify control cable is properly connected to machine
	Faulty Control Cable	Replace cable
	Control Box Fuse tripped or disconnected	Replace fuse. If problem persists, contact service rep.
No Arc when Cycle Start button is pressed	Weld Auto/Off switch set to OFF	Turn Weld Auto/Off switch to AUTO
	Loose contact of Welding Leads	Check ground connections. Verify good contact on clean, unpainted surface
	Faulty or incorrectly wired Welding Auto/Off switch or Cycle Start button	Check Wiring. Replace button or switch, as needed
	Stop Sensor engaged	Disengage Stop Sensor
Carriage does not travel when Cycle Start button is pushed	Failed drive component	Check Motor, Drive Chain and Gearbox. Replace as needed.
	Faulty or incorrectly wired Cycle Start button	Check Wiring. Replace button, if needed
	Faulty main PCB	Replace PCB
Torch targets wrong position	Loose fastener on Torch Clamp or Slide Assemblies	Check and tighten screws, replace if needed.
Slide is hard to adjust	Dust or other debris on slide parts	Clean slide parts. Lubricate with light oil
Carriage stops during automatic welding	Obstacle in carriage path	Remove obstacles
	Stop Sensor engaged	Disengage Stop Sensor
	Distance traveled exceeds Total Length	See "Intermittent Welding" on page 7 for instructions to set Total Length
Arc continues after Cycle Stop button is pressed	Crater Fill is in progress	Adjust Crater Fill Timer, if needed
	Faulty or incorrectly wired Cycle Stop button	Check Wiring. Replace button, if needed
Unable to perform Intermittent Weld	Intermittent Weld Lock-out is engaged	Press and hold Travel Speed Adjustment knob for 3 seconds

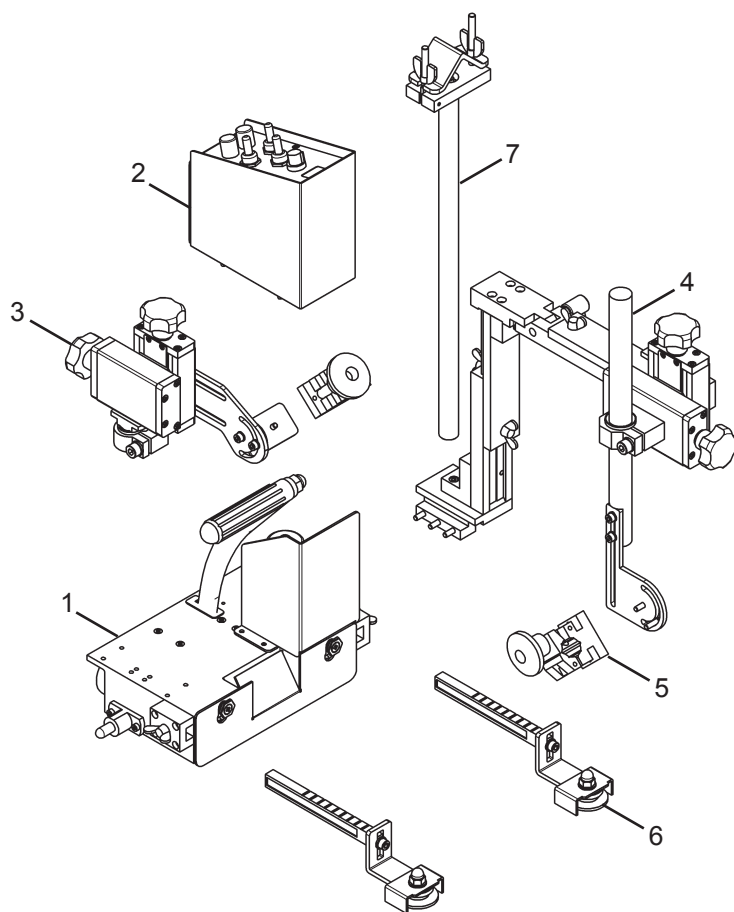
TROUBLESHOOTING, CONT'D.

K-BUG ERROR LIST

NO.	SYMPTOM	CAUSE	SOLUTION
E-03	Motion Stop	Main PCB EET ROM Error	Main PCB Replacement
E-05	Travelling Stop	Auto-Stop Travelling Motor may be overloaded / shorted	Push and release Stop Button  IF UNRESOLVED: 1. Check for loose wiring connection at drive motor and weave motor if equipped (see below). 2. Replace motor or motor reducer 3. Replace main PCB



## K-BUG 2000 EXPLODED VIEW / PARTS LIST

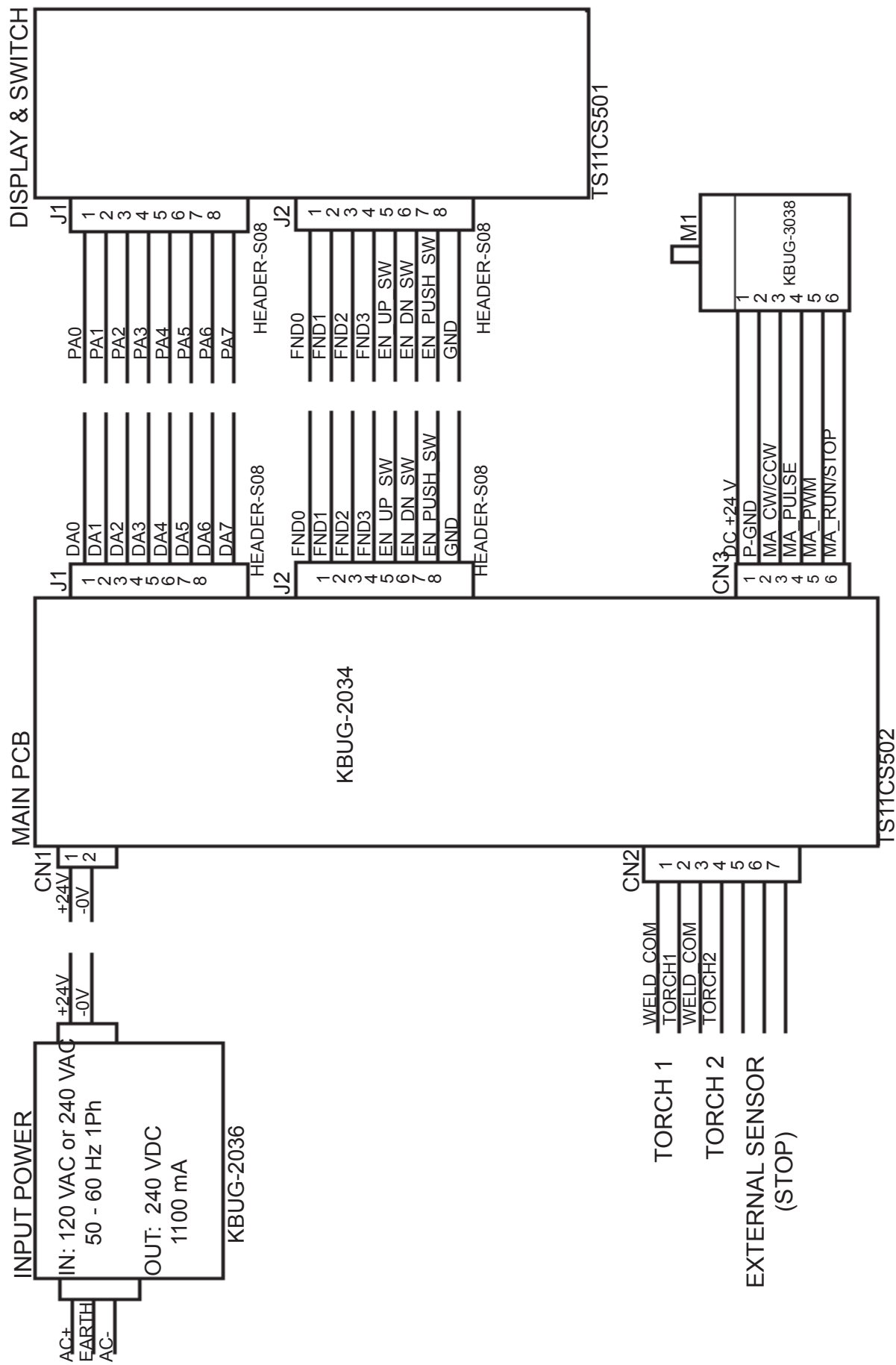


<u>ITEM</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	KBUG-2010	Body Assembly
2	1	KBUG-2030	Control Panel Assembly
3	1	KBUG-2040	Y-Z Slide Assembly
4	1	KBUG-2050	Slide Arm Assembly
5	2	KBUG-2080	Torch Clamp Assembly
6	2	KBUG-2090	Guide Arm Assembly
7	1	KBUG-2668-16	Cable Anchor Assembly
*	2	KBUG-2273-15	Weld Contact Cable, 15 ft (4.6 m)
*	1	KBUG-2274-15**	Power Cable, 120V, 15 ft (4.6 m)

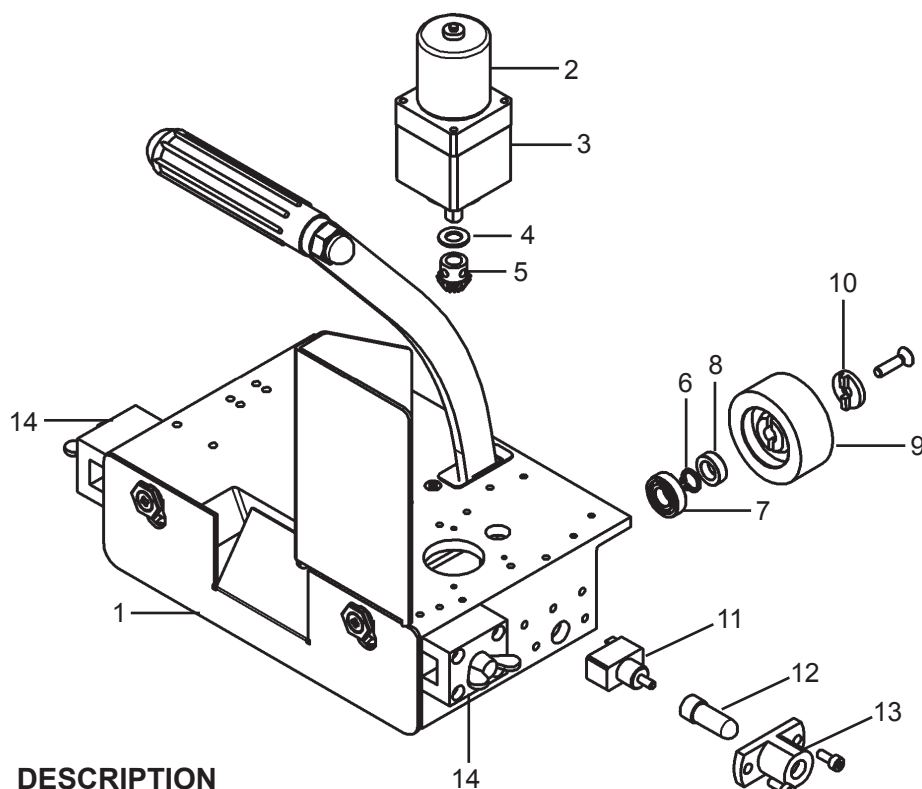
\* Not Shown

\*\*Note: For K-BUG 2002 (240V model), Power Cable is KBUG-2272-15

K-BUG 2000 WIRING DIAGRAM

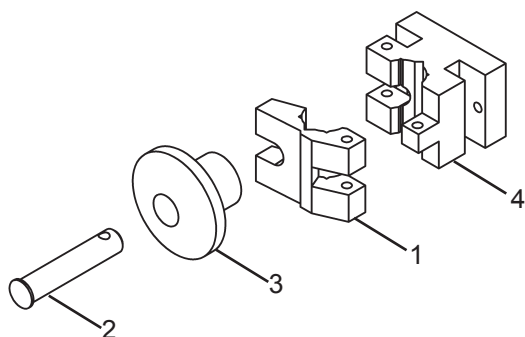


## KBUG-2010 CARRIAGE ASSEMBLY / EXPLODED VIEW / PARTS LIST



<u>ITEM</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	KBUG-2011	Body Assembly
2	1	KBUG-3038	Motor Assembly
3	1	KBUG-5005-GM	Motor Reducer
4	1	KBUG-2027	Gear Spacer
5	1	KBUG-2026	Motor Gear
6	4	KBUG-3042	Snap ring
7	4	KBUG-3048	Bearing
8	4	KBUG-3029	Shaft Bushing
9	4	KBUG-1036	Wheel
10	4	KBUG-3044	Wheel Cover
11	2	KBUG-2084	Stop Sensor
12	2	KBUG-3047	Sensor Bushing
13	2	KBUG-3015	Sensor Case
14	2	KBUG-2021	Guide Arm Bracket

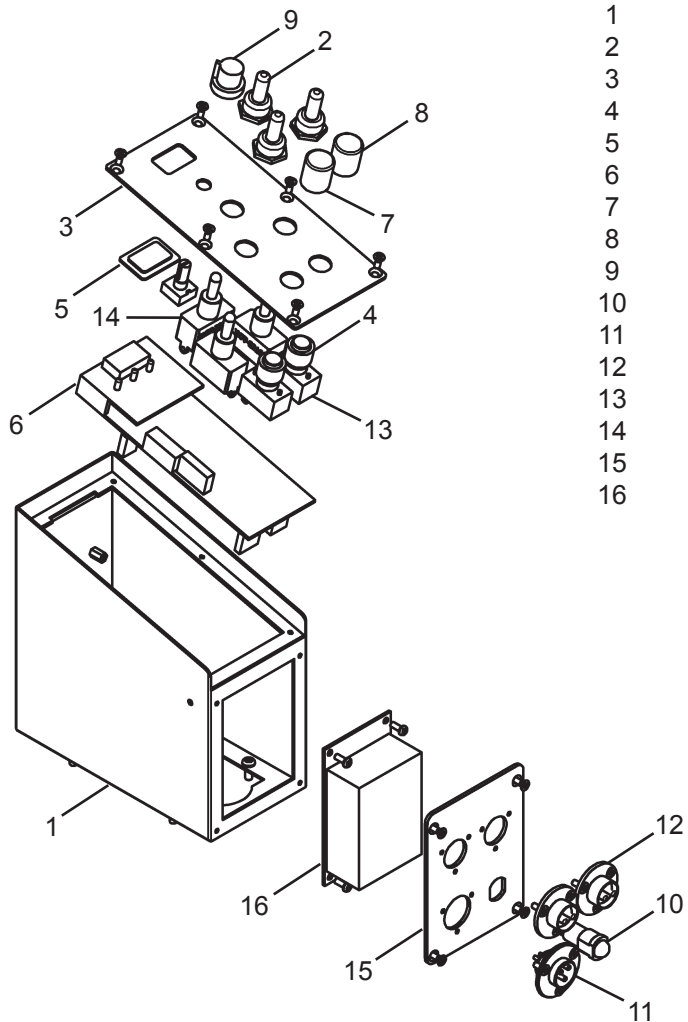
## KBUG-2080 TORCH CLAMP ASSEMBLY / EXPLODED VIEW / PARTS LIST



<u>ITEM</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	KBUG-1111	Torch Clamp Latch
2	1	KBUG-1112	Clamp Fixed Bolt
3	1	KBUG-1113	Clamp Fixed Knob
4	1	KBUG-2081	Torch Clamp (D)

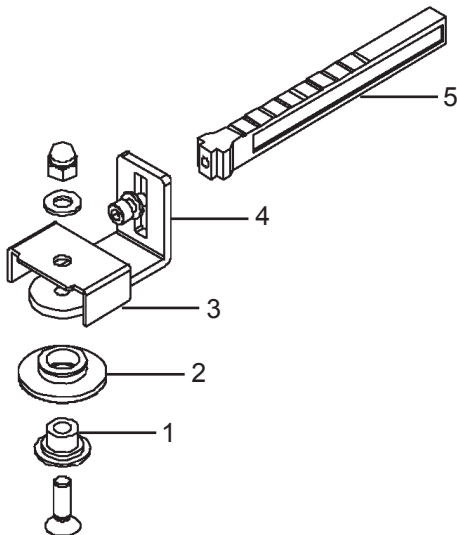


## KBUG-2030 CONTROL PANEL ASSEMBLY / EXPLODED VIEW / PARTS LIST



<u>ITEM</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	KBUG-2031	Panel
2	3	KBUG-1122	Toggle Switch Cover
3	1	KBUG-2033	Legend Plate
4	2	KBUG-1124	Push Button Cover, Brass
5	1	KBUG-1125	Display
6	1	KBUG-2034	Main PCB
7	1	KBUG-1127	Push Button Cover - Stop
8	1	KBUG-1128	Push Button Cover -Start
9	1	KBUG-1129	Volume Knob
10	1	KBUG-1131	Fuse
11	1	KBUG-1132	Power Connector
12	2	KBUG-1133	Torch Connector
13	2	KBUG-3112	Push Button Switch
14	3	KBUG-3114	Toggle Switch
15	1	KBUG-2035	Connector Plate
16	1	KBUG-2036	AC-DC Converter Kit

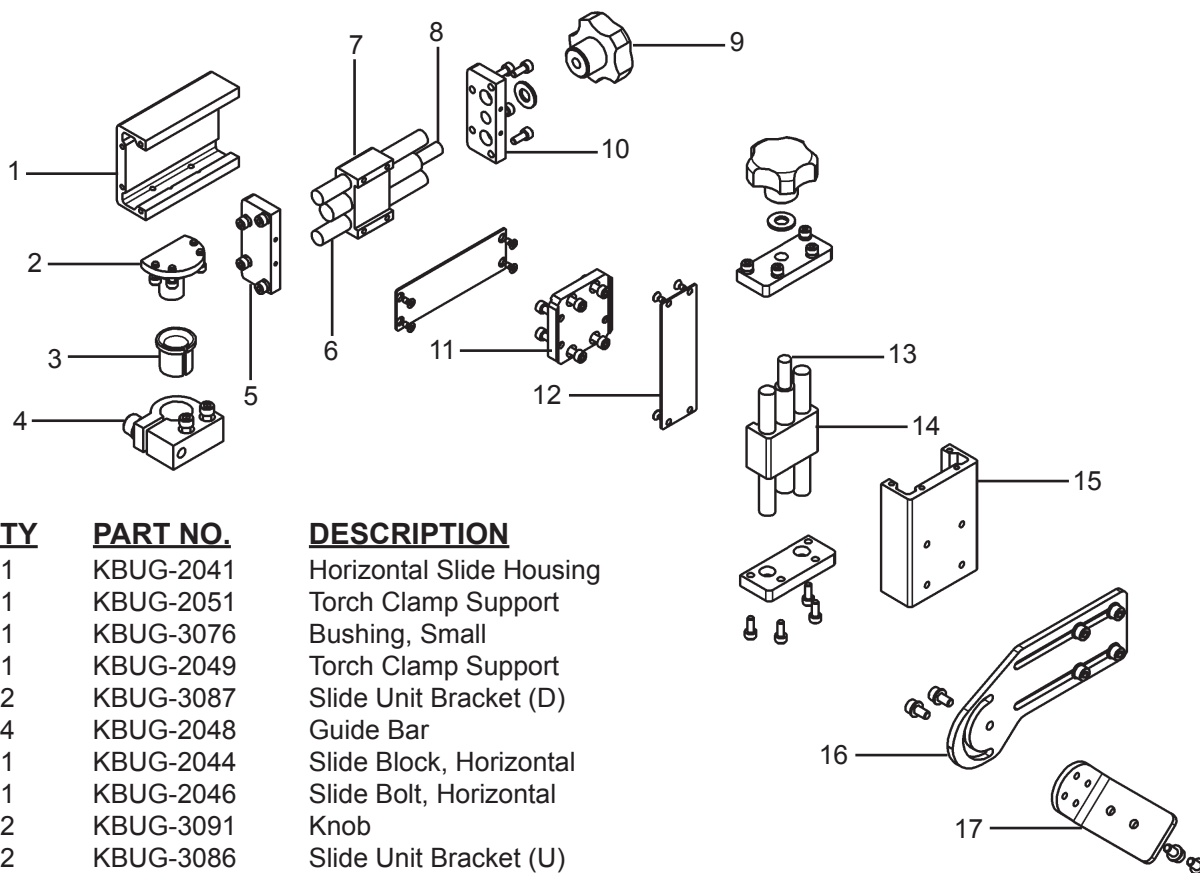
## KBUG-2090 GUIDE ARM / EXPLODED VIEW / PARTS LIST



<u>ITEM</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	KBUG-2094	Guide Roller Bushing
2	1	KBUG-2093	Guide Roller
3	1	KBUG-2095	Guide Roller Cover
4	1	KBUG-2092	Guide Roller Bracket
5	1	KBUG-2091	Guide Arm

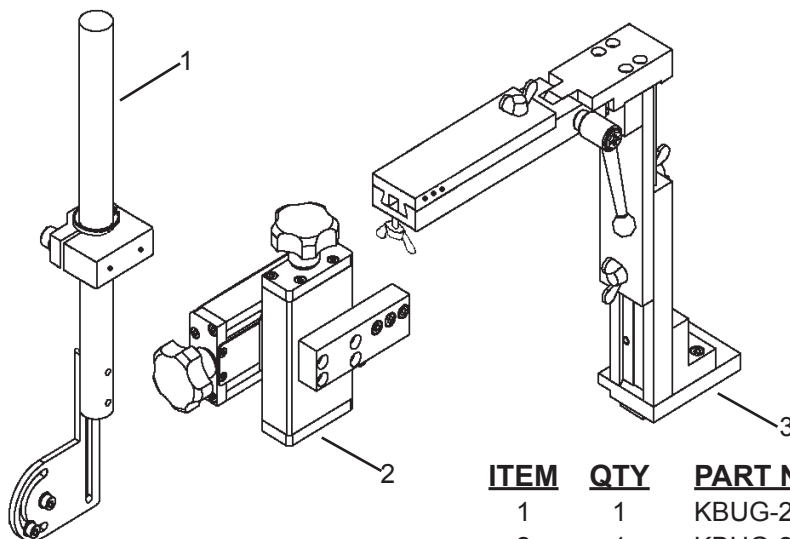


## KBUG-2040 Y-Z SLIDE ASSEMBLY / EXPLODED VIEW / PARTS LIST



ITEM	QTY	PART NO.	DESCRIPTION
1	1	KBUG-2041	Horizontal Slide Housing
2	1	KBUG-2051	Torch Clamp Support
3	1	KBUG-3076	Bushing, Small
4	1	KBUG-2049	Torch Clamp Support
5	2	KBUG-3087	Slide Unit Bracket (D)
6	4	KBUG-2048	Guide Bar
7	1	KBUG-2044	Slide Block, Horizontal
8	1	KBUG-2046	Slide Bolt, Horizontal
9	2	KBUG-3091	Knob
10	2	KBUG-3086	Slide Unit Bracket (U)
11	1	KBUG-2043	X-Y Slide Plate
12	2	KBUG-3085	Slide Cover
13	1	KBUG-2047	Slide Bolt, Vertical
14	1	KBUG-2045	Slide Block, Vertical
15	1	KBUG-2042	Vertical Slide Housing
16	1	KBUG-2082	Torch Clamp Base, Primary
17	1	KBUG-2083	Torch Clamp Base Bracket

## KBUG-2050 SLIDE ARM ASSEMBLY / EXPLODED VIEW / PARTS LIST

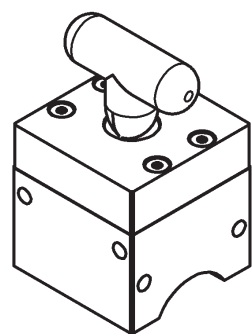


ITEM	QTY	PART NO.	DESCRIPTION
1	1	KBUG-2076	Secondary Torch Height Adjustment
2	1	KBUG-2077	Secondary Torch Positioner
3	1	KBUG-2078	Secondary Torch Slides

ACCESSORIES

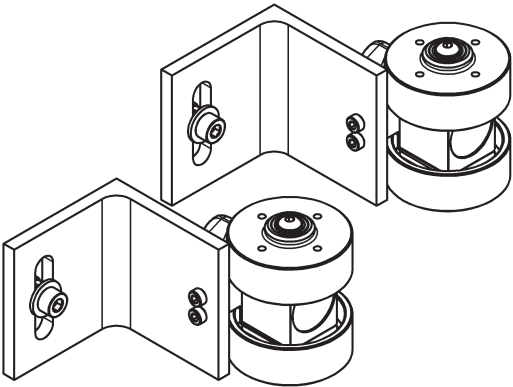
MSQ-150 Magnetic Limit Switch Stop

This On-Off Magnet block can be placed on the work piece, at the end of the desired weld to act as a limit switch by activating the stop sensor.

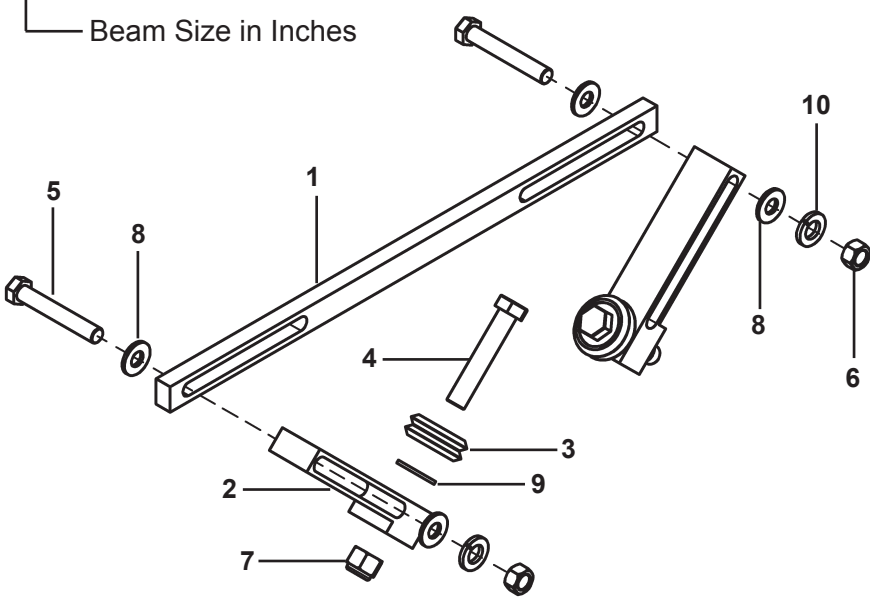


KBUG-2067 Magwheel add-On Kit

Magnetic guide wheels available for curved or irregular seams.



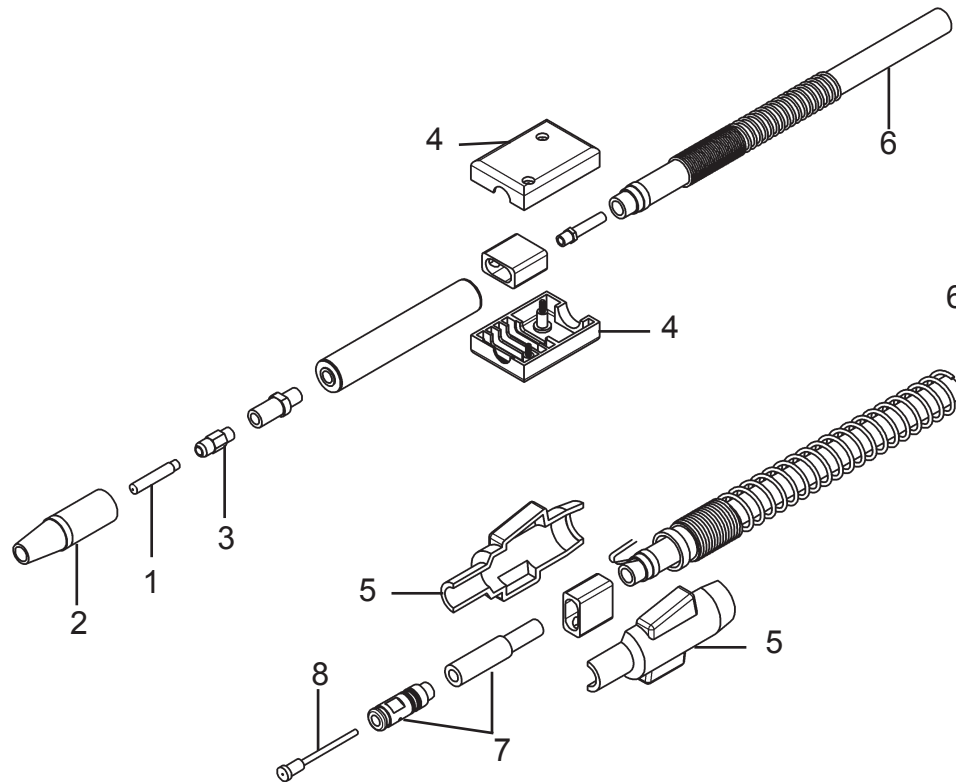
KBUG-2070- FOUR WHEEL BEAM GUIDE ARM KIT



PARTS LIST				BEAM SIZE	
ITEM	QTY	PART NO.	DESCRIPTION	6" (182.9 m)	12" (365.8 m)
1	2	KBUG-2071-6	6" (182.9 m) Extension Arm	X	
1	2	KBUG-2071-12	12" (365.8 m) Extension Arm		X
2	4	KBUG-2072	Guide Wheel Bracket	X	X
3	4	BUG-3332	W2 Wheel	X	X
4	4	FAS-2375	Hex Hd Cap Scr. 3/8-16 x 2"	X	X
5	4	FAS-2395	Hex Hd Cap Scr. 5/16-18 x 2"	X	X
6	8	FAS-1370	Hex Nut 5/16-18	X	X
7	4	FAS-1391	Hex Nut 3/8-16 Nylok	X	X
8	8	WAS-0250	5/16 Washer	X	X
9	4	WAS-0260	3/8 Washer	X	X
10	4	WAS-0251	5/16 Split Lock Washer	X	X

# SBG-450- - GUN & CABLE ASSEMBLY / EXPLODED VIEW / PARTS LIST

Whip Length: 15 (15 ft / 4.6 m) or 25 (25 ft / 7.6 m)  
 Wire Size: 035, 040, 045, 052, 116, 564  
 Connector Type: E (Euro), L (Lincoln 3/4"), M (Miller), T (Lincoln, small)



PARTS LIST				WIRE SIZE					
ITEM	QTY	PART NO.	DESCRIPTION	.035 (.9 mm)	.040 (1.0)	.045 (1.2)	.052 (1.4)	1/16 (1.6)	5/64 (2.0)
1	1	BUG-3159-35	16S-35 (.9 mm) Contact Tip	X					
1	1	BUG-3159-45	16S-45 (1.2 mm) Contact Tip			X			
1	1	BUG-3159-52	16S-52 (1.4 mm) Contact Tip				X		
1	1	BUG-3159-116	16S-116 (1.6 mm) Contact Tip					X	
1	1	BUG-3159-564	16S-564 (2.0 mm) Contact Tip						X
1	1	PWS-4436-1.0	16S-40 (1.0 mm) Contact Tip		X				
2	1	PWS-4447	27S62 H.D. Nozzle 5/8"	X	X	X	X	X	X
3	1	PWS-4449	PX57HD Gas Diffuser	X	X	X	X	X	X
4	1	CWO-8017	Case w/ Binder Screws (Front)	X	X	X	X	X	X
5	1	PWS-4411	Case w/ Binder Screws (Back)	X	X	X	X	X	X
6	1	STW-3044	450 Amp Cable	X	X	X	X	X	X
7	1	R174-T	Connector, Small Lincoln						
7	1	R174-L	Connector, 3/4" Lincoln						
7	1	R174-M	Connector, Miller						
7	1	R174-X	Connector, Euro						
8	1	CWO-8009	44-3545-15 Cable Liner	X	X	X			
8	1	CWO-8011	44-116-15 Cable Liner				X	X	
8	1	CWO-8012	44-564-15 Cable Liner						X
**	1	SBG-1004	Gas Hose Assembly	X	X	X	X	X	X
**	2	SBG-1005	Gas Hose Clamps	X	X	X	X	X	X

\*\* Not shown. Required only with standard Lincoln guns (SBG-450-L).

## WARRANTY

### LIMITED WARRANTY

MODEL \_\_\_\_\_  
SERIAL NO. \_\_\_\_\_  
DATE PURCHASED: \_\_\_\_\_

FOR A PERIOD OF TWELVE (12) MONTHS FROM DELIVERY, BUG-O SYSTEMS WARRANTS TO THE ORIGINAL PURCHASER (DOES NOT INCLUDE AUTHORIZED DISTRIBUTORS), THAT A NEW MACHINE IS FREE FROM DEFECTS IN MATERIAL AND WORKMANSHIP AND AGREES TO REPAIR OR REPLACE, AT ITS OPTION, ANY DEFECTIVE PARTS OR MACHINE. THIS WARRANTY DOES NOT APPLY TO MACHINES, WHICH AFTER OUR INSPECTION, ARE DETERMINED TO HAVE BEEN DAMAGED DUE TO NEGLIGENCE, ABUSE, OVERLOADING, ACCIDENT OR IMPROPER USAGE. ALL SHIPPING AND HANDLING CHARGES WILL BE PAID BY CUSTOMER.

BUG-O SYSTEMS MAKES NO WARRANTY OF MERCHANTABILITY AND MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED, BEYOND THE WARRANTY EXPRESSLY SET FORTH ABOVE. BUYER'S REMEDY FOR BREACH OF WARRANTY, HEREUNDER, SHALL BE LIMITED TO REPAIR OR REPLACEMENT OF NON-CONFORMING PARTS AND MACHINES. UNDER NO CIRCUMSTANCES SHALL CONSEQUENTIAL DAMAGES BE RECOVERABLE.

#### **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 HE 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.**