

# INSTRUCTIONS AND PARTS MANUAL

## PROGRAMMABLE GANTRY SYSTEM

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-PGS-IPM-0907



**B U G - O   S Y S T E M S**

A DIVISION OF WELD TOOLING CORPORATION



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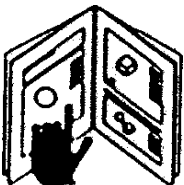
# SAFETY

**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 the 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. Remove from the worksite and store in a safe location when not in use.



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

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



**MOVING PARTS can cause serious injury.**

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

# HIGH FREQUENCY WARNINGS

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



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

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

## PRECAUTIONS:

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

# PROGRAMMABLE GANTRY SYSTEM

## INSTRUCTIONS AND PARTS MANUAL

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**-----CAUTION-----**  
**DO NOT LEAVE EQUIPMENT**  
**UNATTENDED WITH POWER ON.**  
**BE CERTAIN POWER IS OFF WHEN**  
**NOT IN USE!**

## SET UP

The **GANTRY** is shipped in major assemblies, ready to assemble on your burning table. It is very important to construct the burning table carefully; two suggested bed designs are shown on pages 30 and 31. Whichever design is used, it is critical that:

1. The ARR-1080 Rails are mounted on strong supports, independent of the burning bed. By using a 6" (150 mm) beam, the rails may be mounted in a straight line, by using the ARR-1050 mounting system, even though the steel may not be perfectly straight. USE A TRANSIT when setting the rails to ensure they are both **LEVEL AND STRAIGHT**.
2. After the rails are installed and checked, put the carriages one at the time on the rails. The **LEFT** carriage is the one with the Controls.
3. Insert the 2 vertical columns (MUG-1053) into the column bases (MUG-1050). Place the Crossing Rail on the columns, and bolt on loosely. With the drives disengaged, square up the gantry, level the crossing rail, and then tighten the Crossing Rail clamps. Slide the cross drive on to the rail.
4. Connect the cables between various components, referring to diagrams on page 15.
5. Rotate the clutches on the 3 drive units to engage the pinions with the racks. The machine can now be plugged in and run.

## OPERATING INSTRUCTIONS

1. Check that the cross-beam is square to the main track. Adjust the torch position, and connect the required gas hoses or plasma trigger connection.
2. Plug the machine into the power line of correct voltage, and push the **RESET** button.
3. Push the red **STOP/PAUSE** button and use the toggle switches to move the machine and cross drive to the starting position. Press the **RESET** button to make this the starting point.
4. Set the speed knob for correct speed. Speed can be checked by moving the machine manually using the toggle switches.
5. If the required shape has not been programmed, refer to Shape Programming, and enter the program. If the shape has been programmed, turn on the preheat gases, set the torch height and ignite the torch.
6. When the work piece is heated enough, press the black **RUN** button. The solenoid will turn on the cutting oxygen, the machine will start moving along the programmed shape, and at the end of the shape it will stop and turn off the solenoid. Manually turn off the preheat gases. The machine is now ready for the next cut. Note: For Plasma Cutting, see page 24.

# INTRODUCTION

This is a 2-axis gantry that has 2 synchronized drives running on parallel tracks, and a second axis drive carrying a cutting torch that runs on a cross beam. It can be used for flame or plasma cutting, or welding, of a variety of shapes programmed and stored in memory.

## PROGRAM CONTROL DESCRIPTION

The machine has 10 storage areas in memory for different programmed shapes, numbered 0 to 9. At any time, one of these shape numbers is the current one, and will stay current even when power is shut off and turned back on, until the shape number is changed by the operator.

All programming is done with the hand-held terminal provided; this may be plugged into the connector on the rear of the machine or unplugged at any time. The terminal is not needed to run the machine once programmed; it is recommended it be disconnected when cutting.

Shapes are built up only from the segments provided: circular arcs and straight lines, square or inclined, by selecting type and quadrant for each segment. A shape can have up to 50 segments. Some other operations, like solenoid On/Off, time delay, or repeat another shape a number of times, also count as one segment each if used.

## OPERATION

When first plugged in, the position the machine is in becomes the reference Start position. Now there are 3 options (the pendant terminal is not needed for the first two).

### 1. MOVE

To change the Start position, push the **STOP/PAUSE** button, move the machine manually to the required position using the manual X and Y jog switches, and push the **RESET** button.

### 2. RUN

Push the **RUN** button to cut a shape.

### 3. PROGRAM using the Hand Held Terminal

The Programming operation is selected by pressing keys A, B, C, D, E.

**A: ALL SEGMENTS;** data entry for new shape consists of Total number of segments

Data for each:    Type            (arc, x/y line or slope)  
                         Quadrant    1-4  
                         Size            (radius, or x/y dimension) See Shape programming for details.

For example, a 2 inch diameter circle could be 4 Segments:

1.	2	1	100	Counterclockwise arc	quadrant 1	1.00 inch rad
2.	2	2	100	Counterclockwise arc	quadrant 2	1.00 inch rad
3.	2	3	100	Counterclockwise arc	quadrant 3	1.00 inch rad
4.	2	4	100	Counterclockwise arc	quadrant 4	1.00 inch rad

The data should be tabulated on paper from a diagram before entering.

### B: PROGRAM SEGMENT

Press B on terminal to re-program a single segment. This is useful if there is an error in data for just one segment, so the whole shape does not have to be re-entered.

### C: CHANGE Shape Number

Press C on terminal to change the current shape number. Enter the new shape number. The program switches to the new number in memory, and to whatever shape is stored there.

## OPERATION (CON'T)

### D: DISPLAY Shape Data

Press D to display the data for the current shape. The terminal display shows Total No. of segments, and data for each segment one by one each time you press Enter.

### E: END of segment Slowdown.

Press E to set Deceleration value for the shape, when the machine approaches the end of each segment. This is useful when the shape has sharp corners, to prevent overshoot. 99 is maximum slowdown, 0 is no slowdown.

### IMPORTANT:

1. Once the **HOLD** button is pressed, computer control is halted until the **RUN** or the **RESET** button is pressed. Therefore the programming cannot be done with the handheld terminal in this state; the **RESET** button should be pressed first.
2. After pushing A and programming a new shape, End of segment Slowdown will still have the old value unless reprogrammed. To set-new value, push E.

## SHAPE PROGRAMMING

1. Draw the required shape on paper to some scale.
2. Refer to the Segment Chart (Chart #1) and divide the shape into straight line and arc segments.
3. Decide on the operation sequence and mark any other operations such as turning torch on or off, or delay.
4. Number all the segments in sequence, including other operations if any, and make a table with required data.  
Example for a clockwise circle starting from the top:

(Dimensions described for metric version)

Seg. No.	Type	Quadrant	Dimensions
1.	1	1	300 (30 mm)
2.	1	4	300
3.	1	3	300
4.	1	2	300

5. With the machine powered up and pendant plugged in, select which shape number this will be.  
Push C : display reads Shape No.  
Push 3 for No. 3, press Enter key (backward arrow) .The program is now in Shape No. 3
- 6 .Push A : display reads "Total segments?"  
Push 4 for 4 segments and Enter.  
Display reads "1. Type?" waiting for Segment 1 data.
7. Push 1 for type, clockwise arc. (Refer to Chart #1).  
Display reads "Quadrant?"  
Push 1 for quadrant 1.  
Display reads "mm x 10"  
Push 3, 0, 0, Enter, for 300, which is 30.0 mm.  
Segment 1 has now been entered, display reads "2. Type?", asking for data for segment 2.
8. Repeat above steps to enter data for all segments, in sequence. Display will read "Ready" after all segments are entered.

The shape program is now stored in memory as shape No. 3, and the machine is ready to cut the shape.

SEGMENT TYPE AND QUADRANT CHART

SEGMENT  
TYPES:

QUADRANT:

	#1	#2	#3	#4
1. CLOCKWISE 90° ARC				
2. COUNTERCLOCKWISE 90° ARC				
3. X OR Y AXIS LINE				
4. OBLIQUE LINE				
5. FUNCTIONS	WELD/OXY ON	WELD/OXY OFF	WAIT FOR START BUTTON	TIME DELAY
6. FUNCTIONS	REPEAT ANOTHER SHAPE		AUXILIARY MODES	PERCENT SPEED
7. CLOCKWISE PARTIAL ARC				
8. COUNTERCLOCKWISE PARTIAL ARC				

CHART #1



# PROGRAMMING DATA REQUIREMENTS

To program a complete new shape (press "A"):

Count the number of segments or operations and enter the total.

For each segment (refer to DIMENSIONS REQUIRED Chart #2, Page 9)

Enter TYPE : Select from 1 through 8

QUADRANT: 1,2,3 or 4; refer to Chart #1.

SIZE: One or more dimensions per segment as described below; 100 per inch or 10 per mm (depending on machine version); or for time, 100 per second of delay.  
Eg. 150 = 1.5", or for metric 375 = 37.5 mm  
**NOTE:** Maximum distance per segment is 72" (1829 mm)

## DETAILED DESCRIPTION OF TYPES

### Type 1. Clockwise, 90° arc segments.

Quadrant determined by which quarter of a full circle makes the arc. (See Chart #1).

Dimensions required: Radius only.

### Type 2. Counterclockwise , 90° arc segments.

Quadrant determined by which quarter of a full circle makes the arc. (See Chart #1).

Dimensions required: Radius only.

### Type 3. Line along X or Y axis.

Quadrant determined by direction of movement. (See Chart #1) (East: 1, North: 2, West: 3, South:4).

Dimensions required: Length only.

### Type 4. Angled straight line.

Quadrant determined by direction of movement. (See Chart #1) (NE: 1, NW: 2, SW: 3, SE: 4 ).

Dimensions required: (1) X-dimension; movement along X axis  
(2) Y-dimension; movement along Y axis

### Type 5. Functions or other operations.

Quadrant by selecting function. (See Chart #1)

1. **Weld/oxygen ON:** turn ON weld contact-relay or cutting oxygen solenoid.  
Dimensions required: None.

2. **Weld/oxygen OFF.**  
Dimensions required: None.

3. **Pause:** Machine stops and waits until START/RUN button is pushed again.  
Dimensions required: None.

4. **Delay:** Machine stops and holds position for a programmed time period, up to 99.99 seconds.  
Dimensions required: time in .01 second units.  
(eg. 2.5 seconds = 250)

### Type 6. Special functions.

Determine quadrant by selecting function.

1. **Repeat:** Another complete shape will be repeated the specified number of times.  
Shape No. of the repeated shape MUST BE LOWER than the Shape No. of the current shape being programmed.  
Therefore it CANNOT BE USED IN SHAPE No. 0.  
Data required: (1) Shape No. to be repeated  
(2) Number of times.

2. **Ellipse:** This is provided for making a complete true ellipse, always starting from the left (West extremity) and moving clockwise.  
Dimensions required: (1) diameter along X-axis.  
(2) diameter along Y-axis.

## PROGRAMMING DATA REQUIREMENTS (CON'T.)

### Type 7. Clockwise arc, must be less than $180^\circ$ .

Quadrant determined by direction of end point of arc relative to the start point. (See Chart #2).

Dimensions required:

- (1) X-dimension; offset along X-axis from start to end point.
- (2) Y-dimension; offset along Y-axis from start to end point.
- (3) Radius of arc.

### Type 8. Counterclockwise arc, must be less than $180^\circ$ .

Quadrant determined by direction of end point of arc relative to the start point. (See Chart #2).

Dimensions required:

- (1) X-dimension; offset along X-axis from start to end point.
- (2) Y-dimension; offset along Y-axis from start to end point.
- (3) Radius of arc.

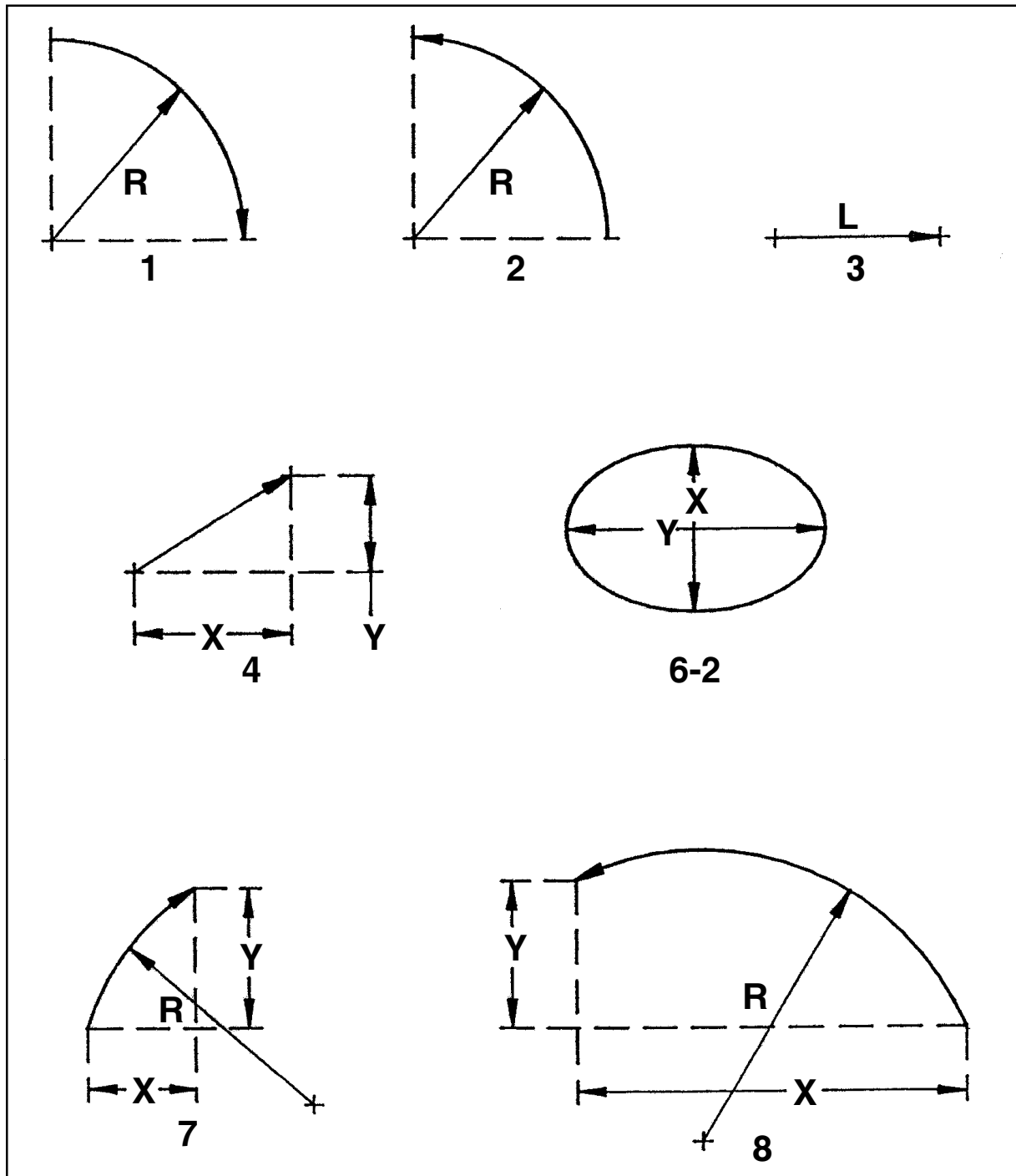


CHART #2

## PROGRAMMING DATA REQUIREMENTS (CON'T.)

### AUXILIARY MODES: TYPE 6, QUADRANT 3

This function allows the 2 internal Solid State Relay outputs to be independently turned ON and OFF, providing control of 2 output signals; and also to switch the machine between Rapid Traverse mode and Set Speed.

The machine is shipped with OUTPUT (1) wired to the amphenol connector for the external relay or solenoid, using pins A and C. By default, this Output turns ON when the Start button is pressed to run a shape, and turns OFF at the end of the shape. Both the contact relay and cutting solenoid use only Output (1).

OUTPUT (2) is present across pins A and D on the amphenol connector, but is not used by the standard relay box - a custom box has to be made to use this output. By default the output is OFF when a shape is started, until specifically turned ON by the Solenoid/Weld ON command Type 5, Quad 1.

Subsequently while running, the Type 5 ON and OFF commands turn both Outputs On and Off together, and both turn Off at the end.

When programming Type 6 Quad 3, a Mode Number is required to be entered. The 8 auxiliary modes, numbered 0 through 7, allow the setting of a mode with any combination of Outputs On or Off, and choice of Set Speed by the speed knob, or maximum speed regardless of setting. The combinations are listed in the table below:

### AUXILIARY MODES CHART

Mode No.	Output 1	Output 2	Speed
0	Off	Off	Set
1	Off	On	Set
2	Off	Off	Hi
3	Off	On	Hi
4	On	Off	Set
5	On	On	Set
6	On	Off	Hi
7	On	On	Hi

## **PROGRAMMING DATA REQUIREMENTS (CON'T.)**

### **SET % SPEED, FRACTION OF SET SPEED: Type 6, Quadrant 4**

Selecting Type 6-4 allows the speed to change to a fraction of the set speed. Display will read "Speed %", and data entry is accepted from 1 to 99. Entering 0 or just return will make the speed 100%, which is the same as set speed.

When the program reaches a Type 6-3 segment while running, the speed will change to the percent entered, and continue at this setting until there is a later Type 6-3 segment which changes it to another % setting or back to 100%.

Note: If Type 6-3 has been set for HI (rapid traverse) then this setting will cut down the HI speed to the same %.

Settings below 10 % are not recommended.

## **SETTING MEASUREMENT UNITS: METRIC OR INCHES**

The machine is factory set in inch or metric units before shipping, and is not meant to be switched between the two systems on a regular basis. However if the machine happens to be set in a unit system not wanted by the user, the setting can be changed to suit.

To set the machine for programming in mm or inches:

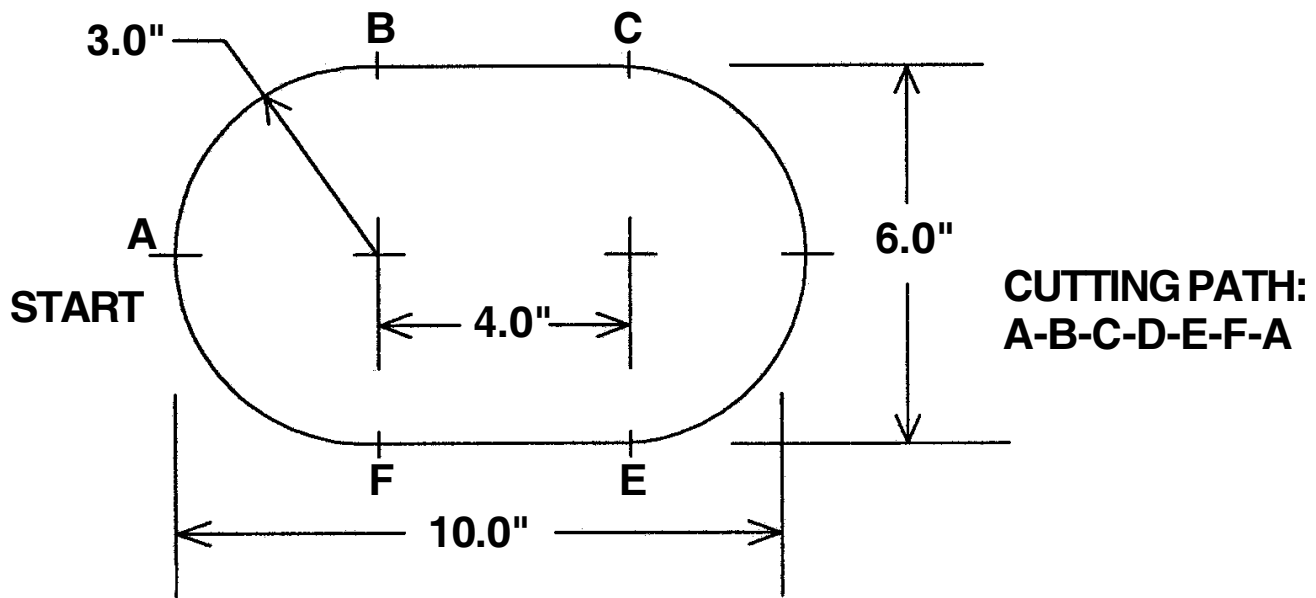
First with power on, push the RESET button on the machine. Next, on the keypad of the handheld terminal, note the blank "Shift" key. (Refer to Hand Held Pendant diagram if necessary, page 33).

Press the Shift Key, then "9", and the display should read: "English/metric, 0/1"

Then Push 1 to select metric dimensions, 0 to select inches. Any shapes in the machine should be reprogrammed; the machine will not convert numbers already entered.

## SHAPE PROGRAMMING EXAMPLES

### EXAMPLE: OBOURND SHAPE



**TOTAL NO. OF SEGMENTS = 6**

SEG	NO	TYPE	QUADRANT	SIZE	COMMENT
AB	1	1	2	300	CW Arc, 3.00" rad
BC	2	3	1	400	X-axis line, 3.00"
CD	3	1	1	300	CW Arc
DE	4	1	4	300	CW Arc
EF	5	3	3	400	X-axis Line
FA	6	1	3	300	CW Arc

**AB: Type 1 specifies Clockwise Arc**

**Quadrant No. is 2**

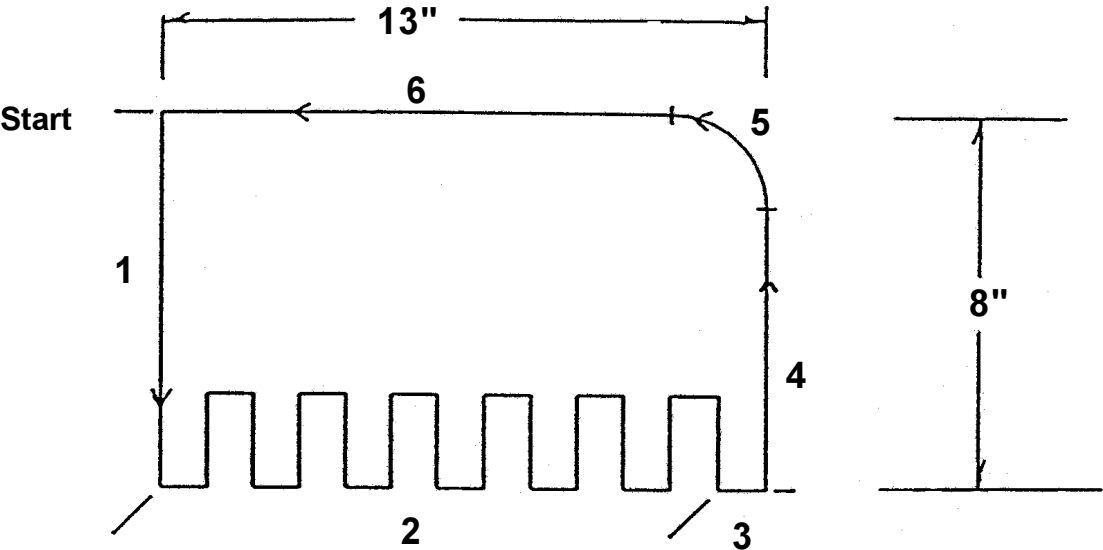
**Size 300 specifies Radius = 3.00" (Metric: 300 = 30.0 mm)**

# SHAPE PROGRAMMING EXAMPLES (CON'T.)

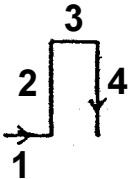
## Type 6 Quadrant 1.

The shape shown has a rectangular tooth form repeated six times. The required shape is numbered Shape 2, and the four segment repeated tooth is Shape 1 so that it can be called for by Shape 2. (A Repeat in a program must call for a lower number shape).

### Shape No. 2:



### Shape No. 1:



### Shape # 1.

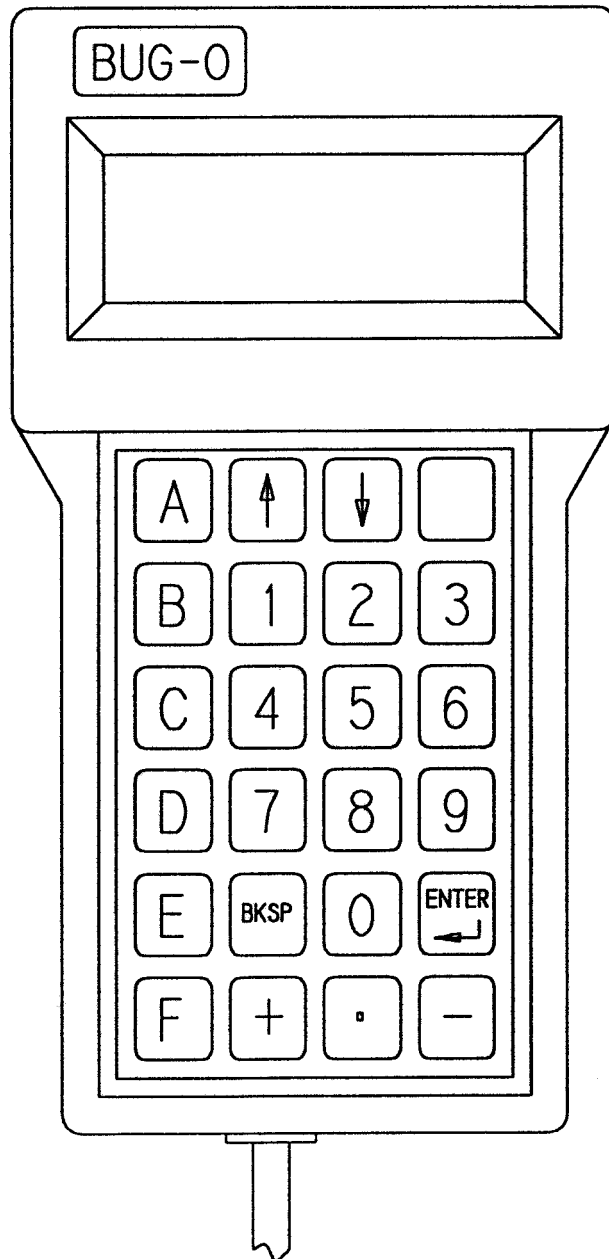
Segment	Type	Quad.	Dimension
1.	3	1	100
2.	3	2	200
3.	3	1	100
4.	3	4	200

### Shape #2.

Segment	Type	Quad.	Dimension
1.	3	4	800
2.	6	1	1
			6
3.	3	1	100
4.	3	2	600
5.	2	1	200
6.	3	3	1100

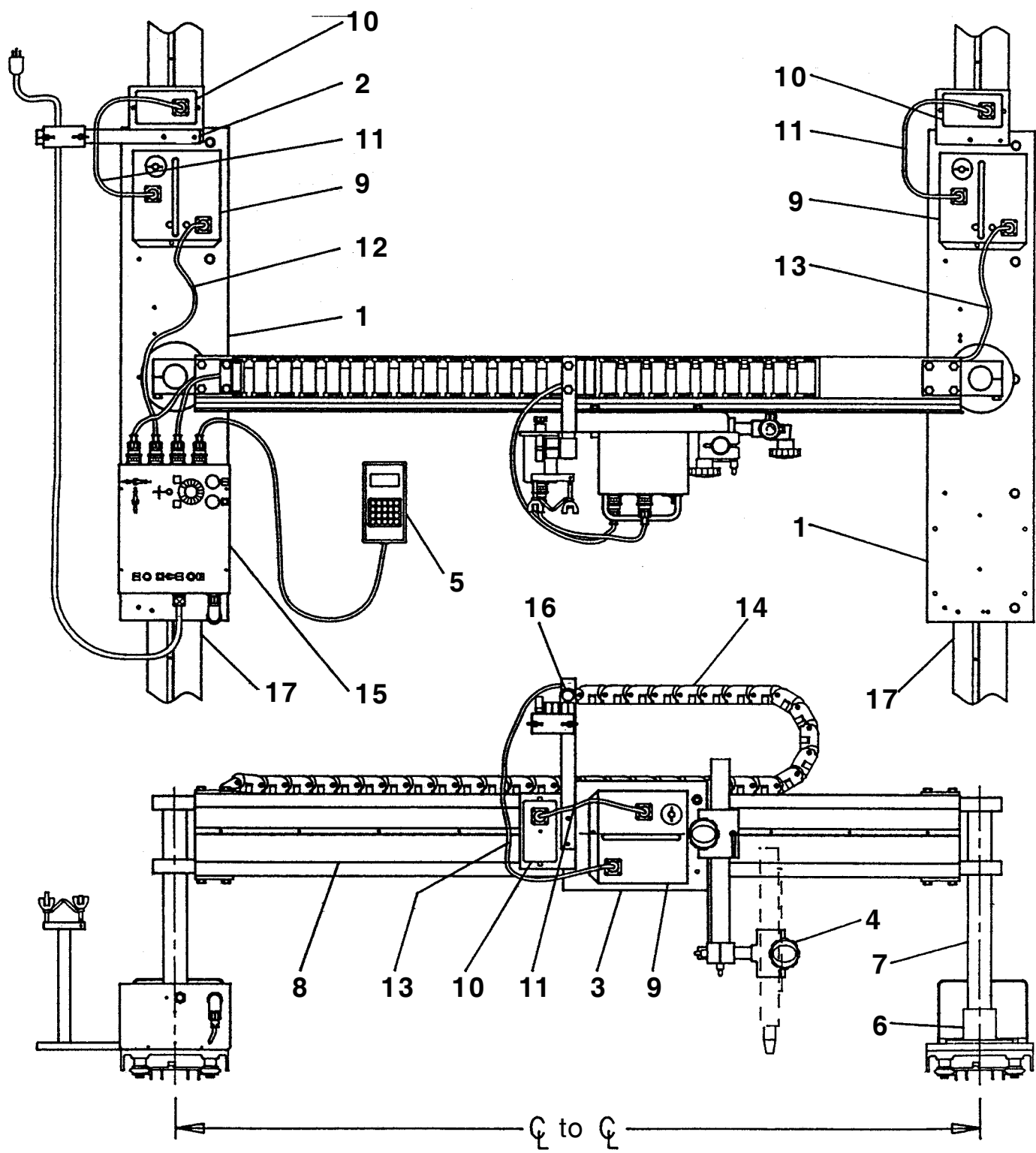
(Repeat #1)  
(6 times)

## HAND HELD PENDANT



This is a hand held terminal with keypad and display, which plugs into the control panel. Press keys A, B, C, D, or E for the function desired, as described in the Programming instructions on pages 6, 7 & 8. Use the digit keys to enter move distances or other dimensions; push the Enter button to store the numeric value entered. The Backspace (BKSP) key deletes the last digit before pushing the Enter button, in case a correction is required.

PGS-1000 PROGRAMMABLE GANTRY SYSTEM





# PGS-1000-8,-10,-12 PROGRAMMABLE GANTRY SYSTEM PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION
1	2	BUG-2785	Carriage, 36"
2	1	BUG-2975	Cable Mounting Assembly
3	1	BUG-5250	Carriage, 12"
4	1	BUG-5285	H. D. Cutting Group (optional)
5	1	BUG-6050	Hand Held Pendant
6	2	MUG-1050	Column Base
7	2	MUG-1053	Column
8	1	MUG-1410-8	Face Rail Assembly 8 ft.
		-10	Face Rail Assembly 10 ft.
		-12	Face Rail Assembly 12 ft.
9	3	MUG-1590-E	Drive Unit (100:1) 4-80 ipm
10	3	MUG-1595	Encoder
11	3	MUG-1621-1.5	Cable 18"
12	1	MUG-1633-3	Shielded Cable 3' (X1)
13	2	MUG-1633-12	Shielded Cable 12'(X2, Y)
		-14	Shielded Cable 14' (X2,Y)
		-16	Shielded Cable 16' (X2,Y)
14	ft	MUG-1678	Cable Carrier (8', 10' or 12')
15	1	MUG-1680	XXY Gantry Control Box 120 VAC
		MUG-1682	same as above except 240 VAC
16	1	MUG-1685	Cable Carrier Mount
17		ARR-1080	H.D. Rigid Rail, 8'

## TECHNICAL DATA

**Gantry Control Box** MUG-1680 120 VAC/50-60 Hz/1  
**Power Requirements:** MUG-1682 240 VAC/50-60 Hz/1

**Travel Speed:** 4-80 in/min (100-2000 mm/min)

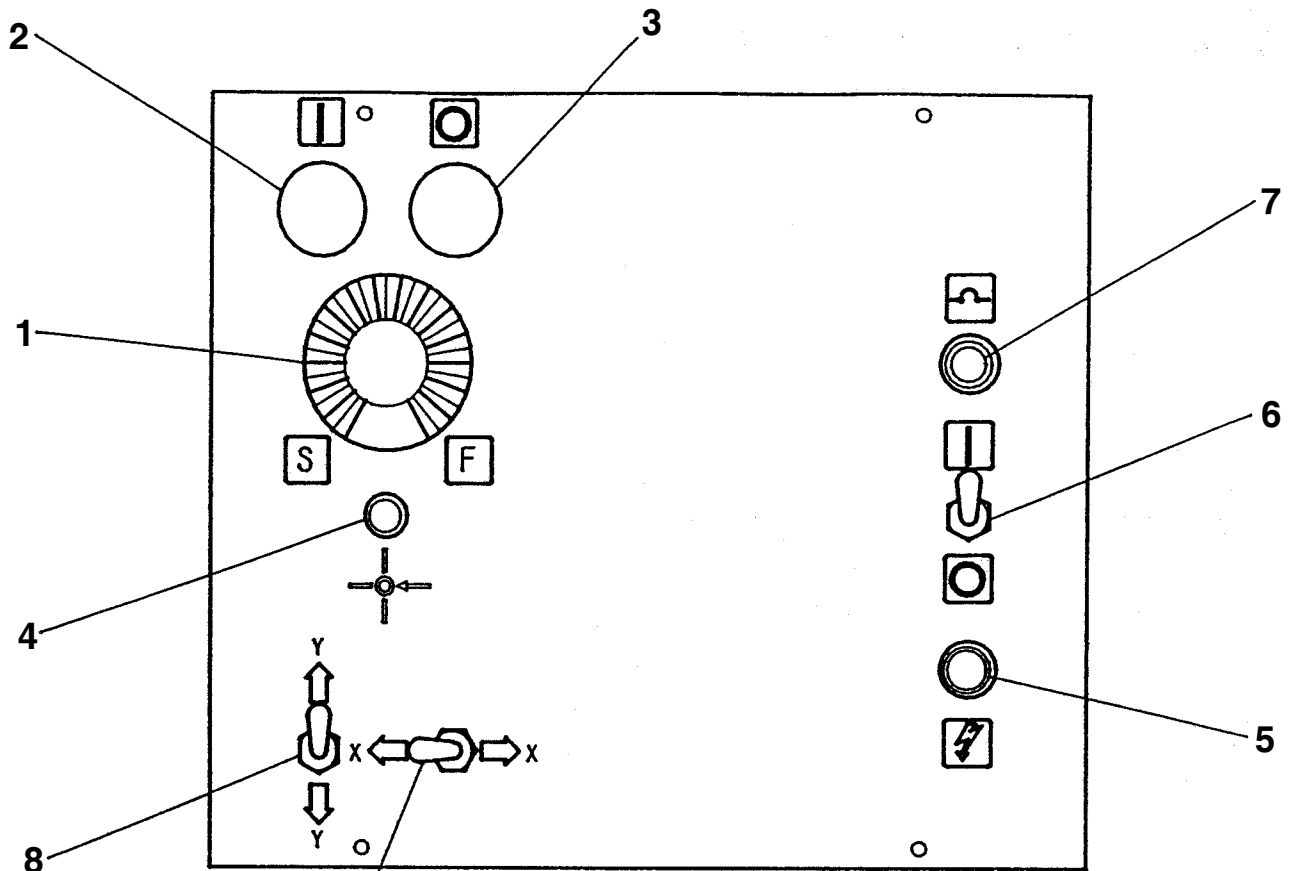
**Maximum Segment Dimension:** 72" (1800 mm) Within Limits of Travel

**Minimum Dimension Increment:** Inches: 0.01" Metric: 0.1 mm

**Delay Increment:** 0.01 seconds

**Maximum Delay:** 99.99 seconds

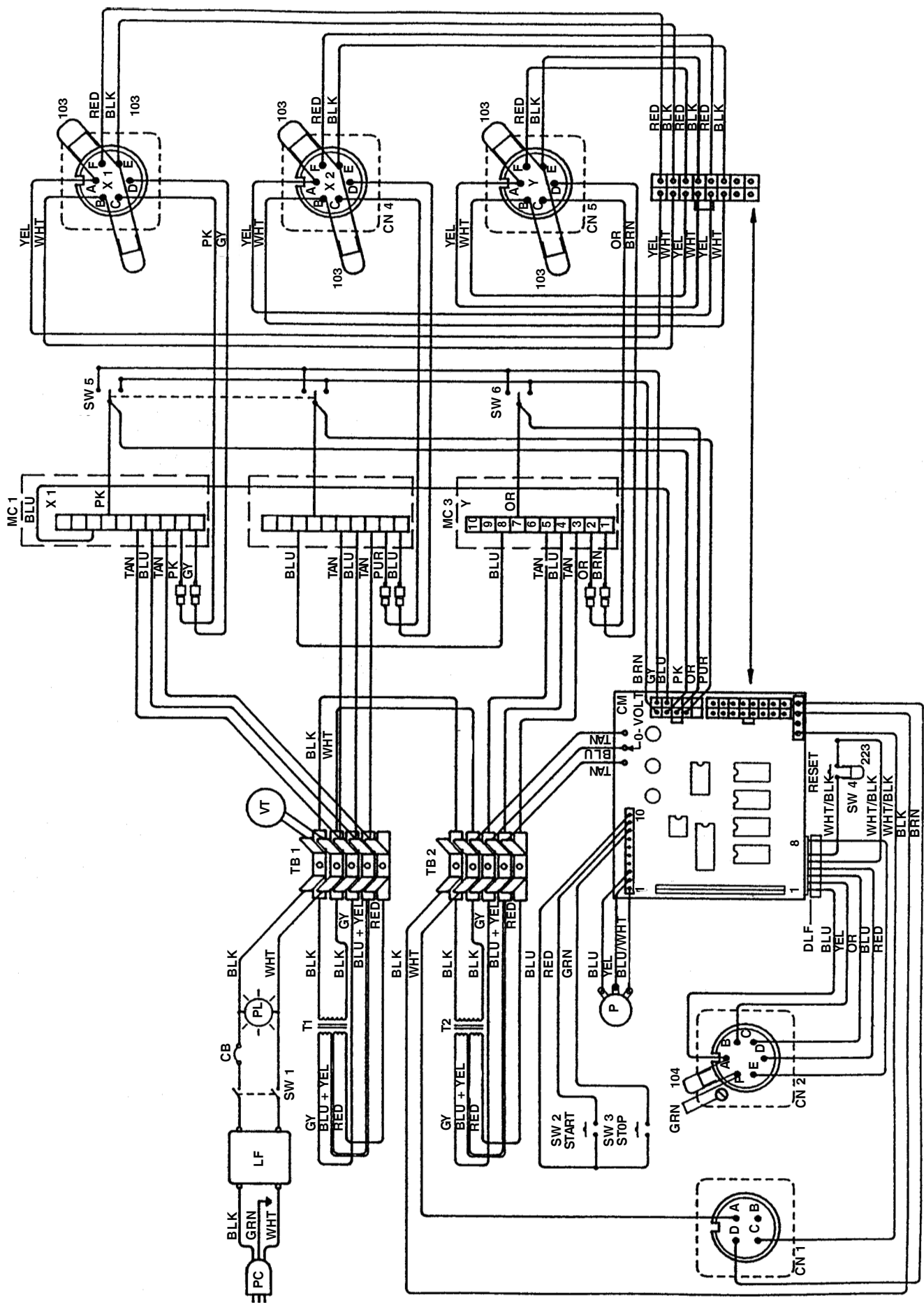
# MUG-1680 CONTROL BOX FUNCTIONS



## PANEL CONTROLS:

1. SPEED
2. START / RUN
3. STOP / PAUSE
4. RESET
5. PILOT LIGHT
6. POWER ON/OFF SWITCH
7. CIRCUIT BREAKER
8. MANUAL JOG Y DRIVE
9. MANUAL JOG X-X DRIVES

# MUG-1680 CONTROL BOX WIRING DIAGRAM

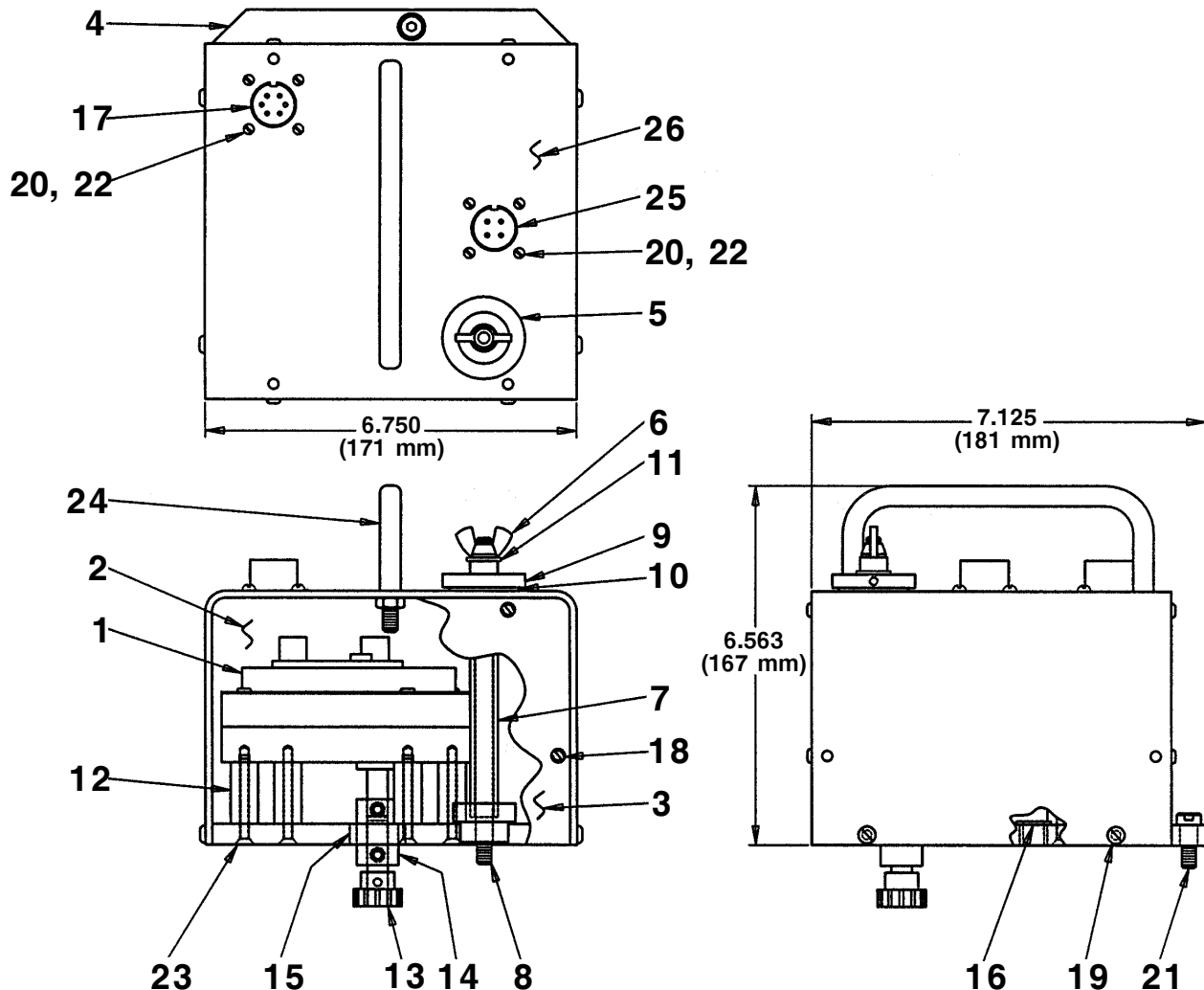


## MUG-1680 CONTROL BOX ELECTRICAL COMPONENT CHART

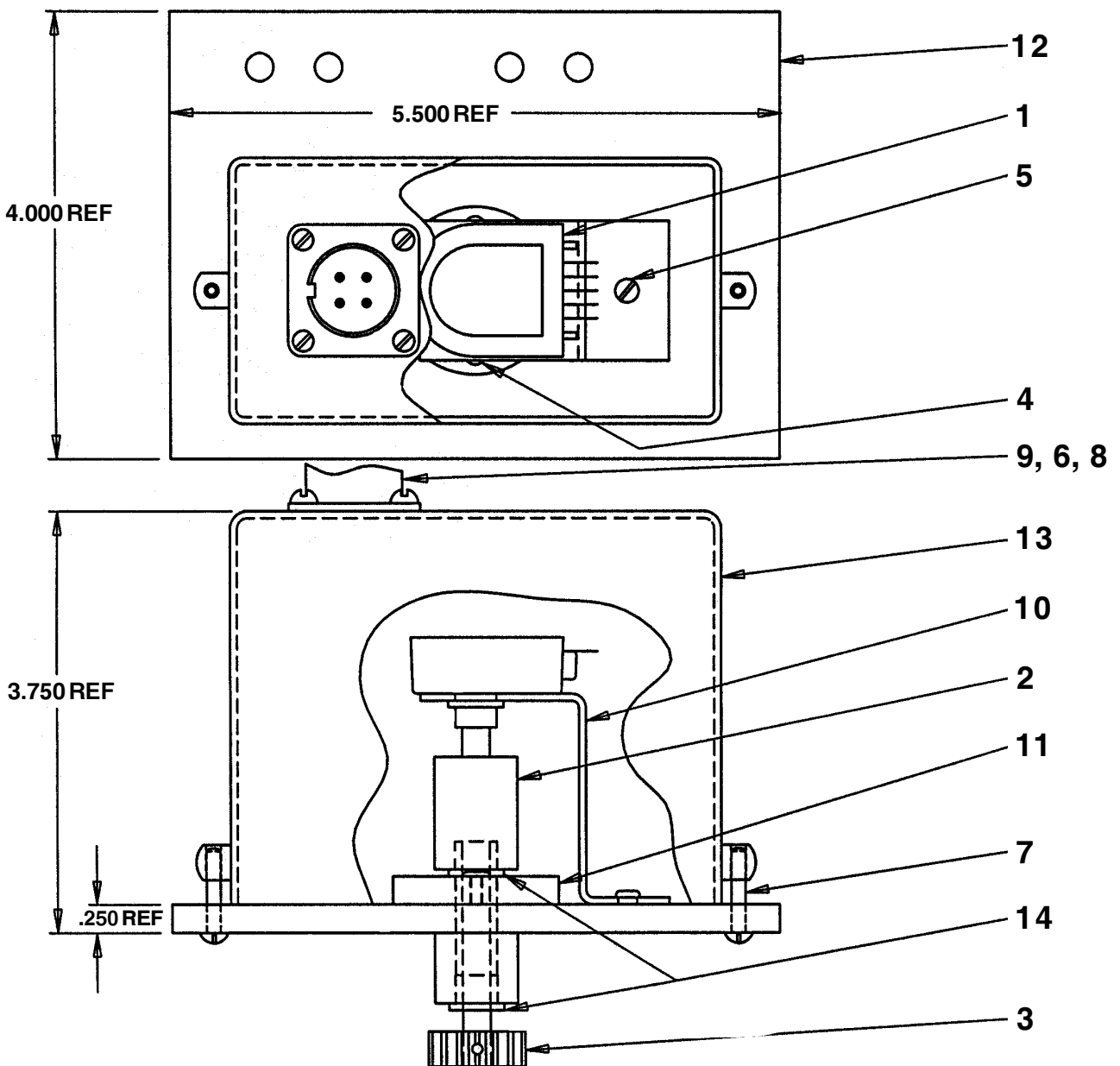
ITEM	DESCRIPTION	MUG-1680 120 VAC	MUG-1682 240 VAC	MUG-1684 42 VAC
PC	Power Cord	BUG-9445	GOF-3115	BUG-9442
CB	Circuit Breaker	BUG-2923 0.7 A	BUG-2952 0.5 A	BUG-2933 2.0 A
PL	Pilot Light	BUG-1415	BUG-1428	BUG-1427
VT	Volt Trap	BUG-1393	BUG-1563	BUG-1393
T1,T2	Transformer	BUG-5218	BUG-5231	BUG-5232
P	Potentiometer		BUG-9686	
SW1	Toggle SW (Power)		ARM-2279	
SW2	PB Switch (Start)		SWT-1113	
SW3	PB Switch (Stop)		SWT-1112	
SW4	PB Switch (Reset)		SWT-1111	
SW5	Toggle SW (X Dir)		MUG-1199	
SW6	Toggle SW (Y Dir)		MUG-1199	
LF	Line Filter		BUG-6069	
CM	Control Module		MUG-1670-XXY	
MC1, 2, 3	Motor Control Board		BUG-1770	
TB1, TB2	Terminal Block		BUG-6028	
CN 1	Connector (AUX)		MUG-1156	
CN2	Connector (Pendant)		BUG-9902	
CN3	Connector (X1)		BUG-9909	
CN4	Connector (X2)		BUG-9909	
CN5	Connector (Y)		BUG-9909	
DLF	Data Line Filter		SEO-4118	

# MUG-1590-E DRIVE UNIT / PARTS LIST

ITEM	QTY	PART NO.	DESCRIPTION
1	1	BUG-1595	Gear Motor (100:1)
2	1	BUG-2988	Left Side Panel
3	1	BUG-5112	Front End Plate
4	1	BUG-5114	Swivel Plate
5	1	BUG-5120	Cam Clutch Assy (Includes Items 6 thru 11)
6	1	BUG-2767	Wing Nut
7	1	BUG-5113	Cam & Tube Assy
8	1	BUG-5116	Stud
9	1	BUG-5119	Knob w/Fastener
10	1	BUG-5122	Delrin Washer
11	1	WAS-0240	1/4 SAE Washer
12	4	BUG-5121	Stand Off
13	1	BUG-5128	Pinion, Long Shaft
14	1	BUG-5131	Sleeve
15	1	BUG-9614	Needle Bearing
16	1	BUG-9635	Flange Bearing 3/8"
17	1	BUG-9909	Panel Connector, 6-T, Male
18	8	FAS-0114	Pan Hd Scr 6-32 x 3/8 Lg.
19	4	FAS-0124	Pan Hd Scr 8-32 x 3/8 Lg.
20	8	FAS-0204	Rnd Hd Scr 4-40 x 318 Lg.
21	1	FAS-0654	Soc Hd Shr Scr 5/6 x 3/8 x 1/4-20
22	8	FAS-1305	Hex Nut 4-40
23	4	FAS-2824	Fit Hd Slit Scr 8-32 x 1-3/4 Lg.
24	1	GOF-3019	Handle w/Nuts
25	1	MUG-1156	Panel Connector, 4-T, Female
26	1	MUG-1586	Cover



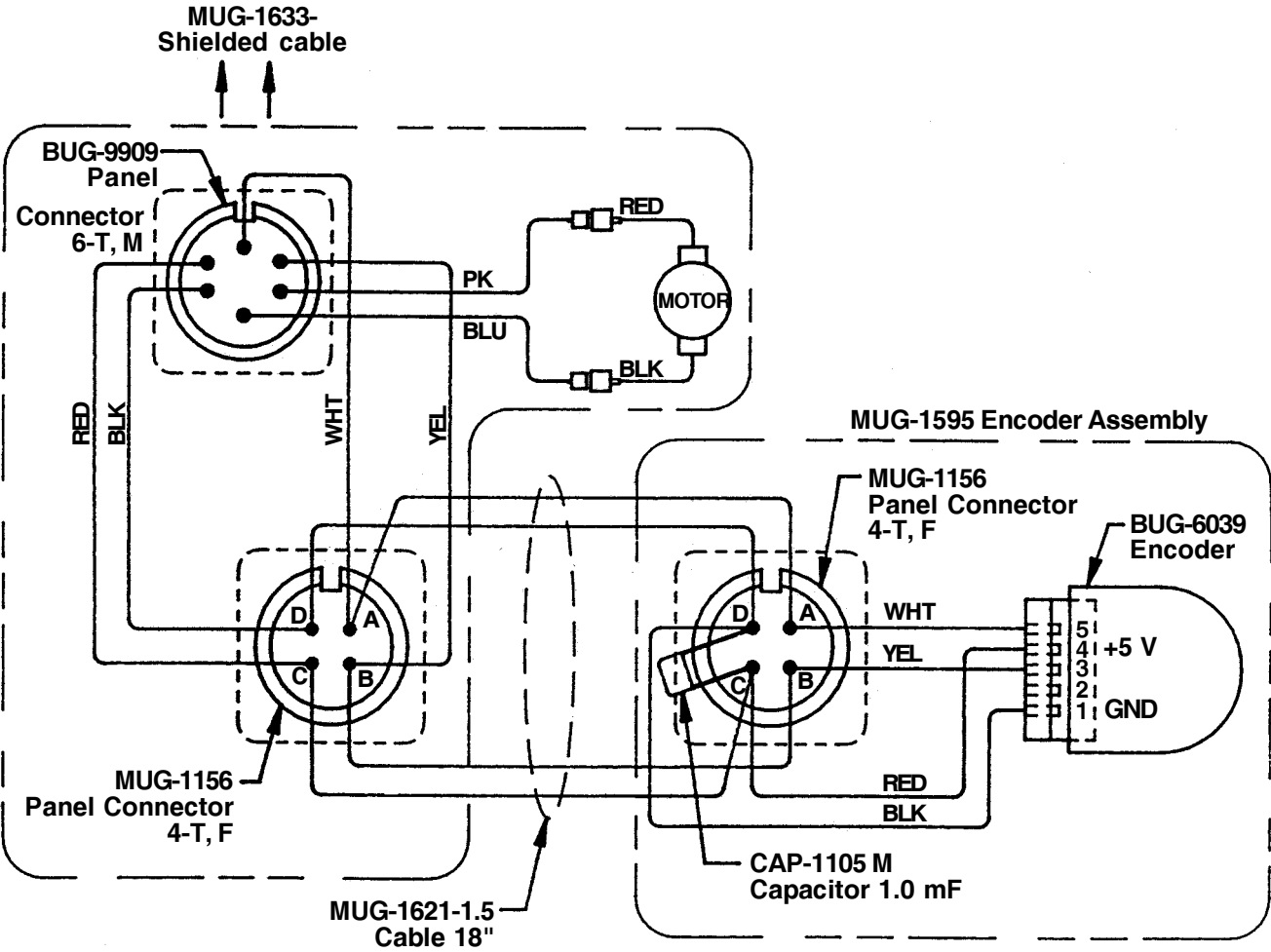
# MUG-1595 ENCODER ASSEMBLY



## Parts List

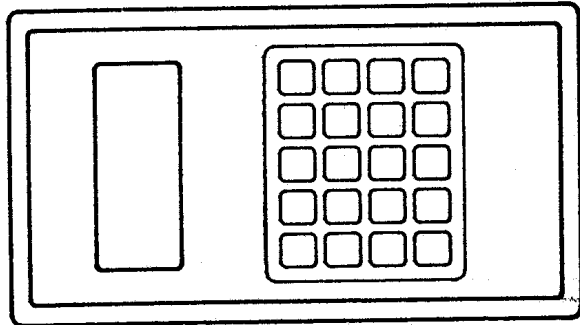
ITEM	QTY	PART NO.	DESCRIPTION
1	1	BUG-6039	Encoder
2	1	BUG-6044	Flexible Coupling
3	1	BUG-6047	Pinion w/ Shaft
4	2	FAS-0115	Pan Hd Scr. 6-32 x 1/2
5	1	FAS-0124	Pan Hd Scr. 8-32 x 3/8
6	4	FAS-0204	Rnd Hd Scr. 4-40 x 3/8
7	2	FAS-0227	Rnd Hd Scr. 8-32 x 3/4
8	4	FAS-1305	4-40 Hex Nut
9	1	MUG-1156	Socket Connector
10	1	MUG-1592	Bracket
11	1	MUG-1593	Pod
12	1	MUG-1594	Plate
13	1	MUG-1596	Enclosure
14	2	SFX-1218	Flange Bearing

DRIVE UNIT / ENCODER ASSEMBLY WIRING DIAGRAM

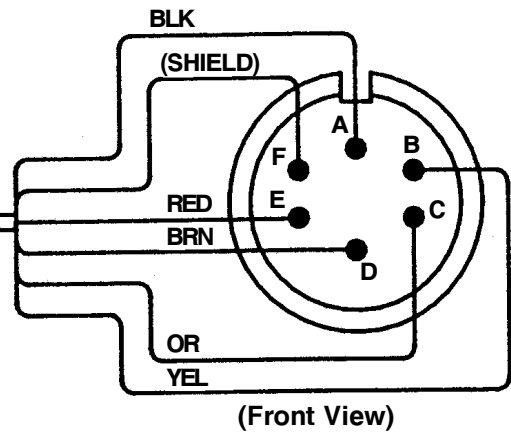


## PENDANT CABLE WIRING

BUG-6050  
Hand Held Terminal



BUG-9906  
Cable Connector, 6-T, M



- A \_\_\_\_ Black: Circuit Com.
- B \_\_\_\_ Yellow: TX (Transmit)
- C \_\_\_\_ Orange: RX (Receive) 9600 Baud
- D \_\_\_\_ Brown: Signal Ground
- E \_\_\_\_ Red: Power (5 V)
- F \_\_\_\_ Shield Drain Wire, Bare, Touching Foil Shielding

**NOTE:** Other wires should be trimmed and unable to touch terminal pins.



# PLASMA CUTTING

The Programmable Gantry System can be used successfully for plasma cutting; however it is important to take certain precautions to avoid interference and protect the control circuits. (These comments also apply to TIG welding or any process that uses high frequency to strike an arc.) An external relay box is available separately or in the welding kit to provide the contact signal to the plasma source.

## PRECAUTIONS:

1. NEVER lay the plasma gun cable across the top of the machine. The further away from the machine it can be routed and supported, the better.
2. See that all grounding procedures specified for the plasma source are followed diligently.
3. If the high frequency is produced using a spark gap, adjust the points so that the gap is as small as possible. The larger the gap, the higher the voltage and stronger the interference.
4. We strongly recommend you disconnect the Hand Held Terminal (programming pendant) when running the machine. Any length of wire acts as an antenna to receive HF radiation, and though the cable is shielded, it is possible for some induced voltage to leak through.
5. Use separate power line branches whenever possible to power the plasma source and the machine. Do not plug them into the same outlet box.
6. Though there is an internal power line filter, an external protective device will always help. Computer equipment line protection boxes are readily available at low cost, with surge suppression and line filtering circuitry. The machine can be plugged into the power line through one of these boxes.

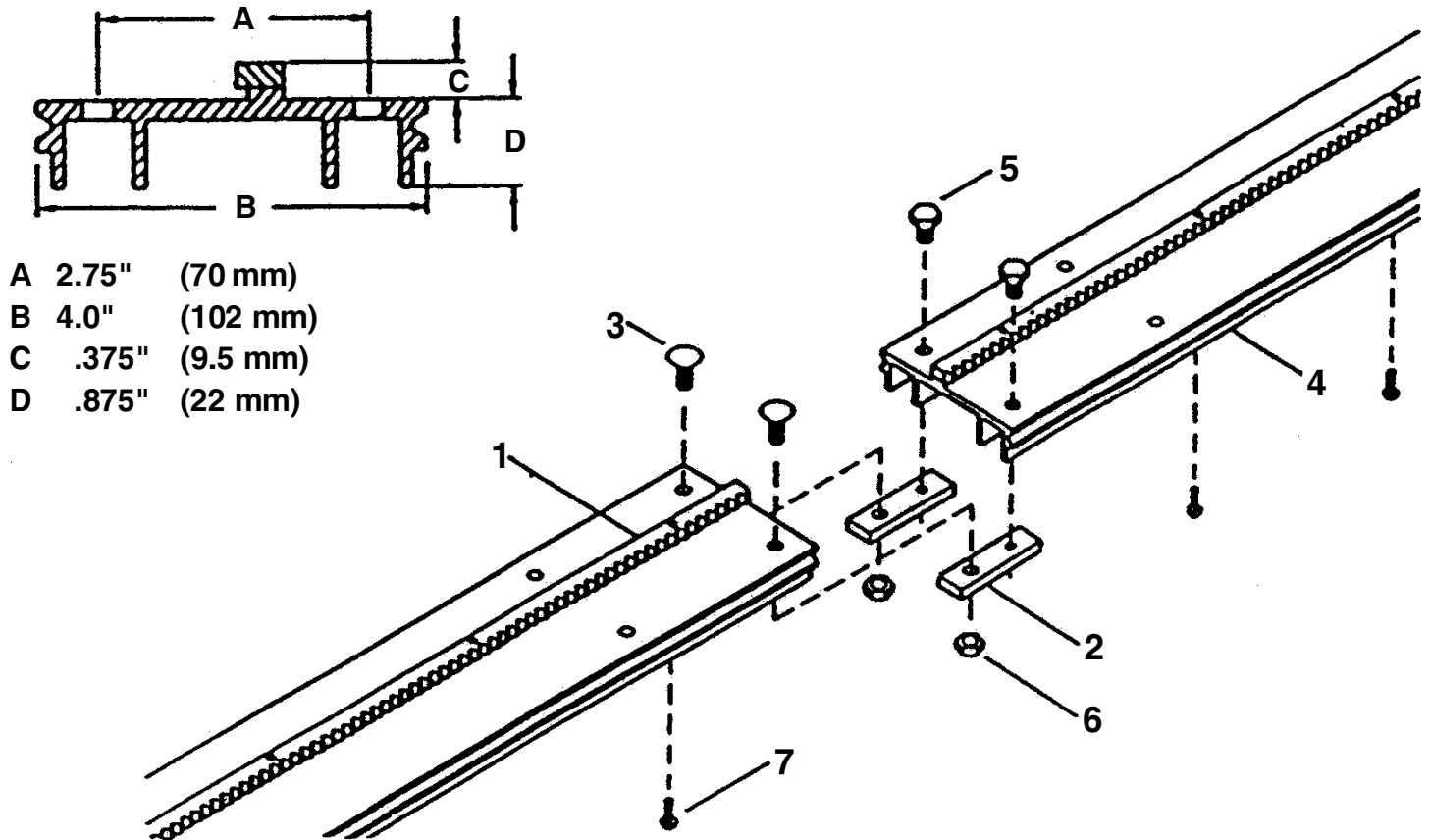
## ALUMINUM RIGID RAIL

ALUMINUM RIGID RAIL is a high quality alloy, rigid section made to the machine tool tolerance shown in the sectional view below. The carriage drive pinion meshes with a machined gear rack that is mounted on the rail. The wheels of the carriage travel in opposed grooves at either side of the rail, locking the carriage to the rail. Heavy duty [H.D.] aluminum four-legged rigid rail is supplied in two lengths: ARR-1080 [93-1/2" (2.37 m)] called 8' (2.37 m) rail and ARR-1085 [46-1/2" (1.18 m)] called 4' (1.18 m) rail - see insert below. Extra heavy duty aluminum four-legged rigid rail: ARR-1250 [93-1/2" (2.37 m)] called 8' (2.37 m) rail and ARR-1200 [46-1/2" (1.18 m)] called 4' (1.18 m) rail, is also available.

### RAIL FOR LONGER SPANS:

When unsupported rail paths longer than 93-1/2" (2.37 m) nominal 8' (2.37 m) rail are required, multiple sections of standard rail are mounted on plate, channel or box sections.

### ARR-1080 / H.D. ALUMINUM RIGID RAIL 8' (2.37 m)



### Parts List

ITEM	QTY	PART NO.	DESCRIPTION
1	1	ARR-1006	Rack
2	2	ARR-1027	Splice Bar
3	2	ARR-1028	Carriage Bolt
4	1	ARR-1081	Rail Extrusion
5	2	FAS-0375	Hex Hd Cap Scr 5/16-18 x 1/2
6	2	FAS-1370	Hex Nut 5/16-18
7	16	FAS-1445	S.T. Pan Hd Scr 10-32 x 1/2

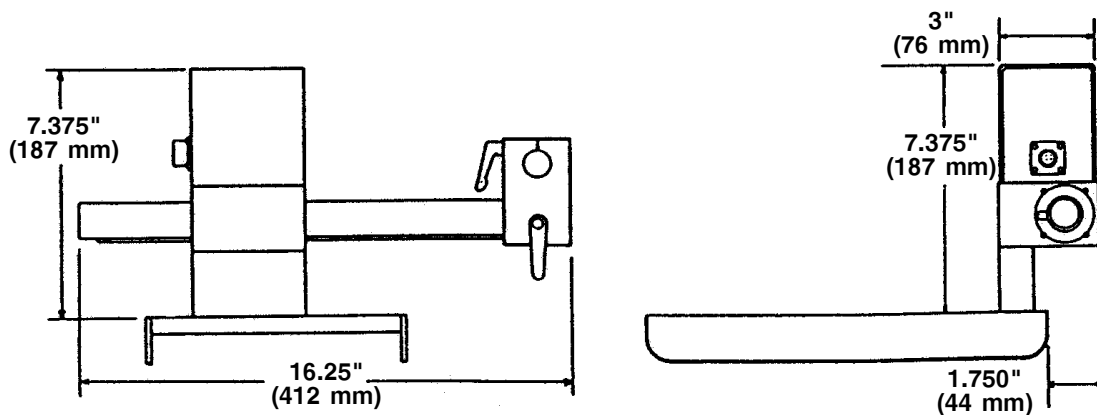
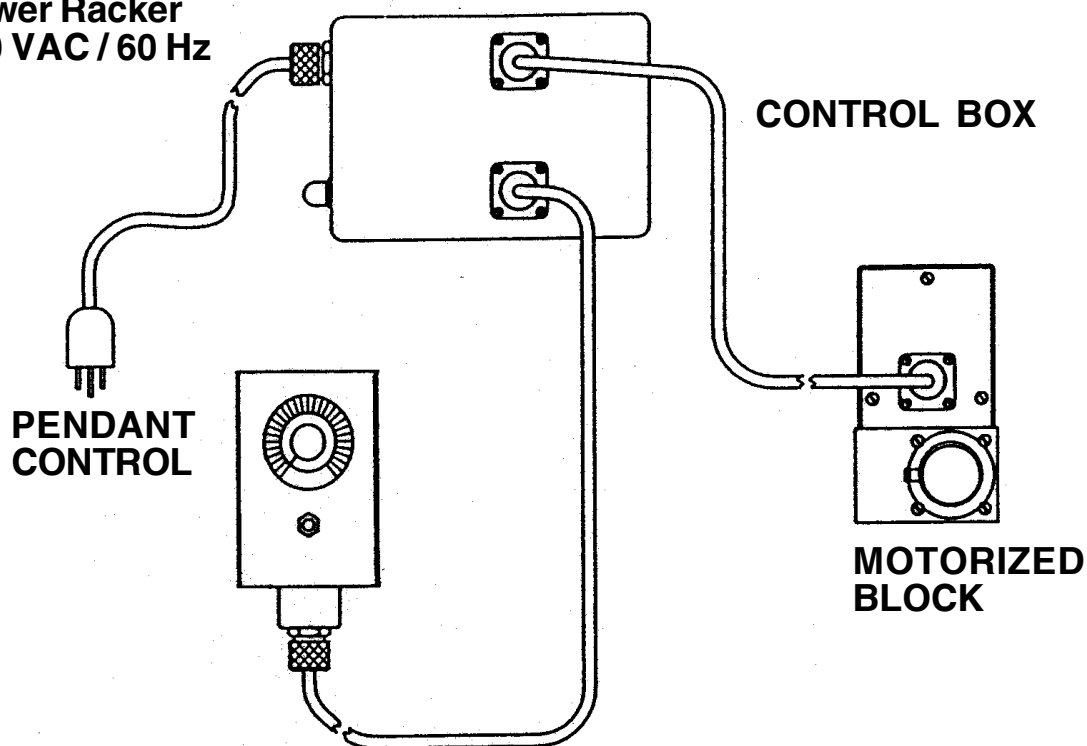
# PRS-1010 POWER RACKER

The POWER RACKER is a compact, motorized drive that enables the operator to position the process tool using a handheld pendant. It consists of a Control Box, Pendant Control and Motorized Block. The Power Racker also includes a 15" Heavy Duty Tube Rack and Right Angle Clamp which can be used in conjunction with a BUG-2708 Clamp for welding, or a BUG-5188 Torchholder for cutting applications.

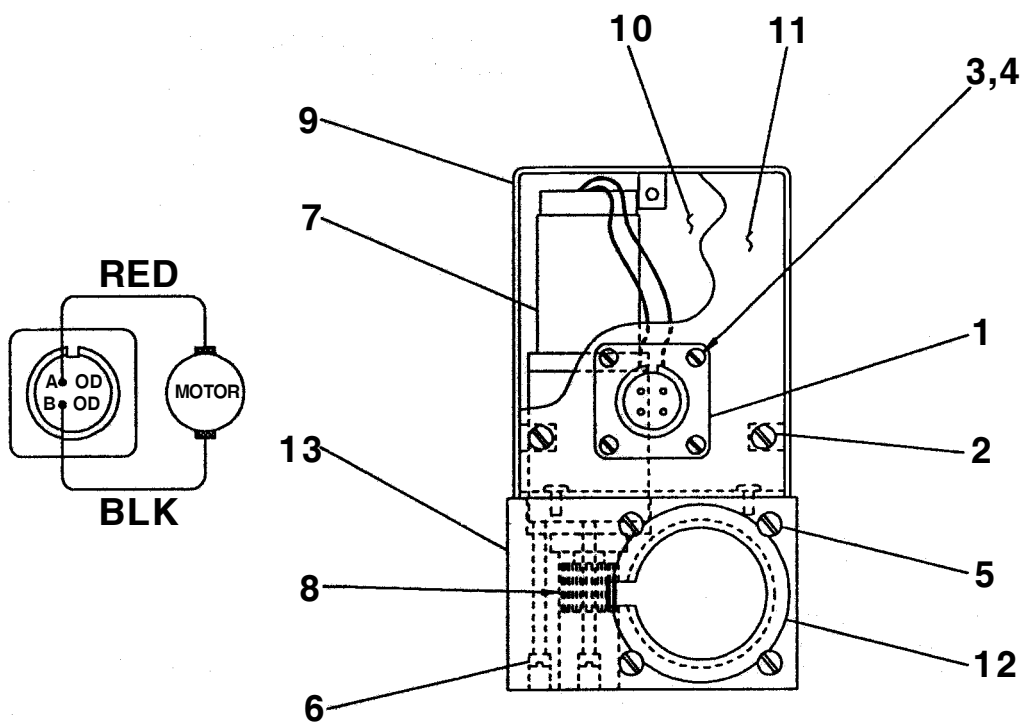
## TECHNICAL DATA:

**PRS-1010**  
**Power Racker**  
**120 VAC / 60 Hz**

**PRS-1012**  
**Power Racker**  
**240 VAC / 60 Hz**



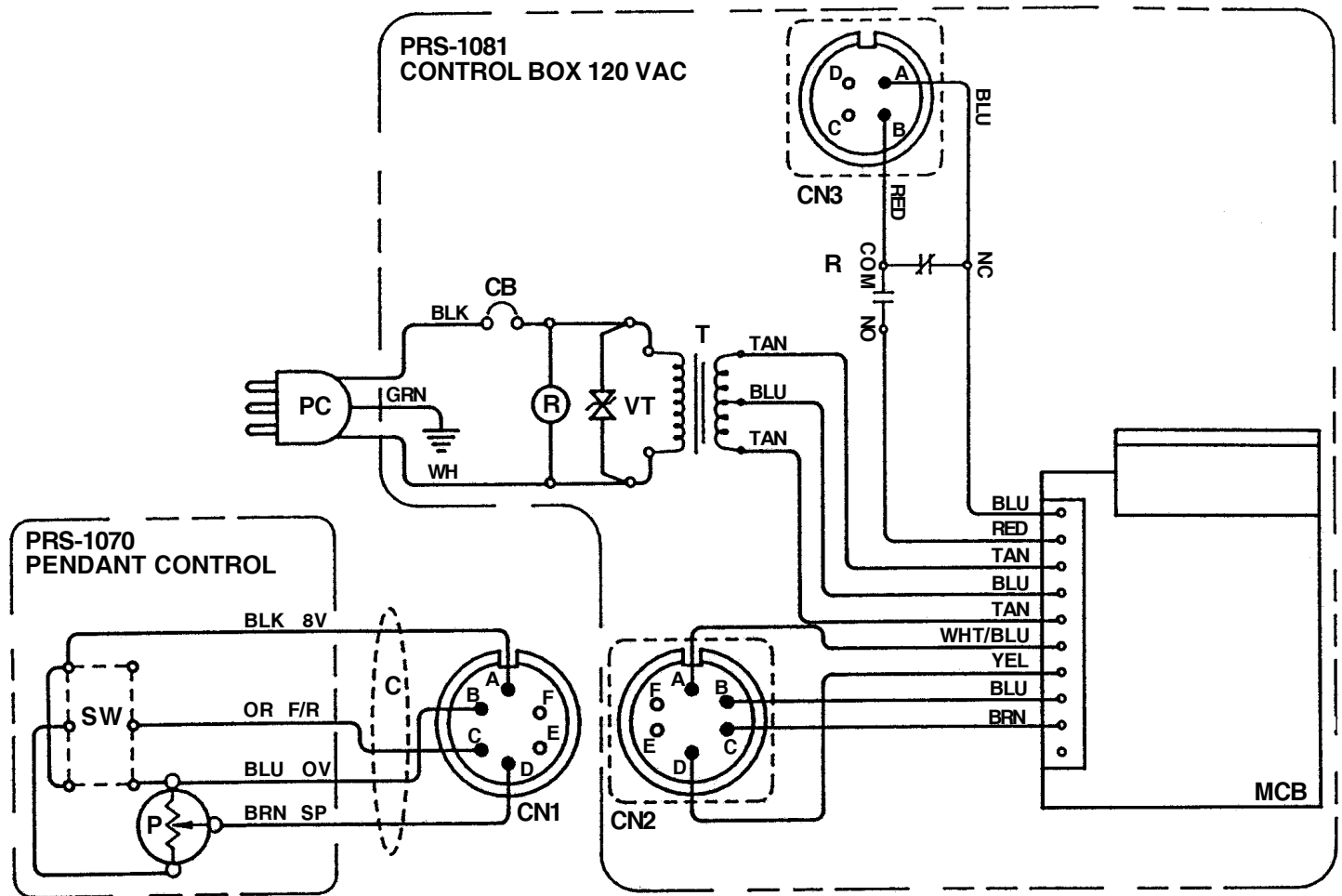
PRS-1050 MOTORIZED BLOCK ASSEMBLY



Parts List

ITEM	QTY	PART NO.	DESCRIPTION
1	1	BUG-1034	Panel Connector, 4-T, M
2	10	FAS-0112	Pan Hd Scr. 6-32 x 1/4
3	4	FAS-0204	Rnd Hd Scr. 4-40 x 3/8
4	4	FAS-1305	Hex Nut 4-40
5	8	FAS-1412	S.T. Pan Hd Screw "F"
6	3	PRS-1027	Soc Hd Cap Scr. 3 mm.5p, 35 L
7	1	PRS-1025-P	Motor
8	1	PRS-1026	Pinion
9	1	PRS-1040	Cover
10	1	PRS-1041	End Plate
11	1	PRS-1042	End Plate
12	2	PRS-1048	Bearing
13	1	PRS-1049	Racker Block

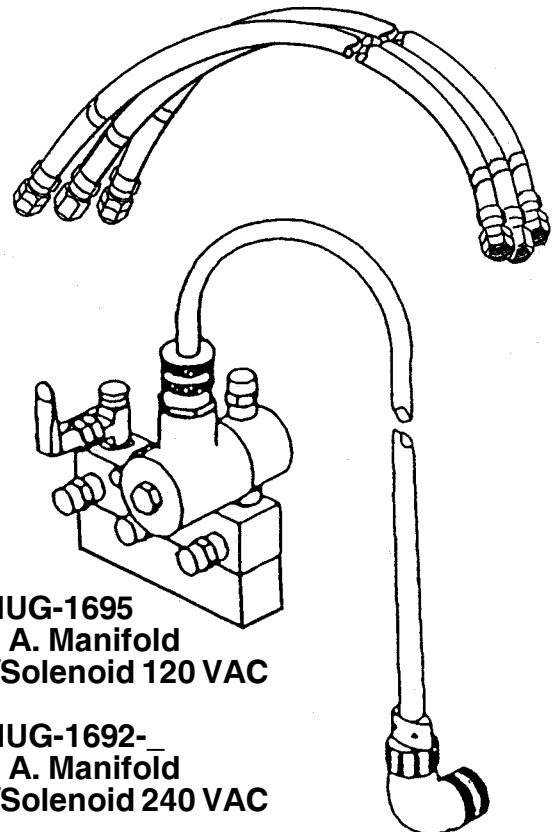
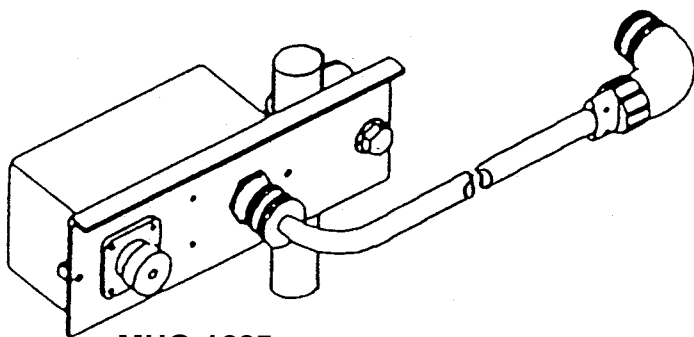
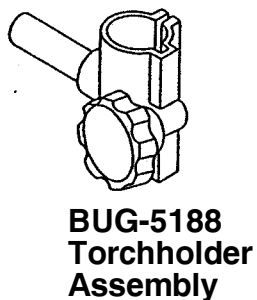
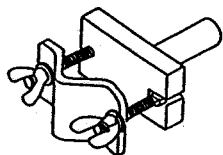
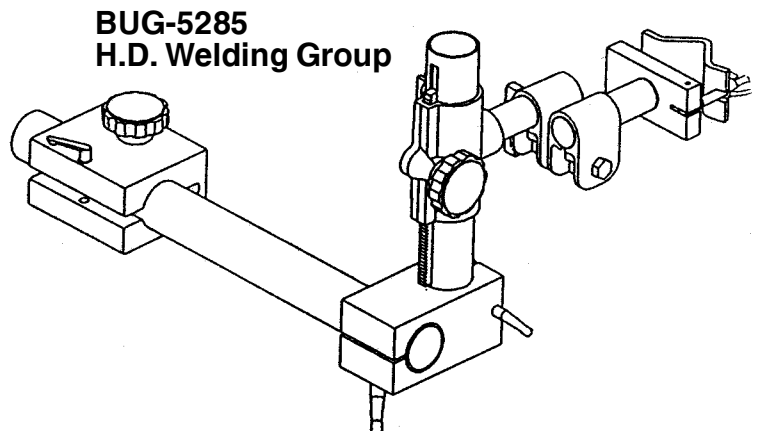
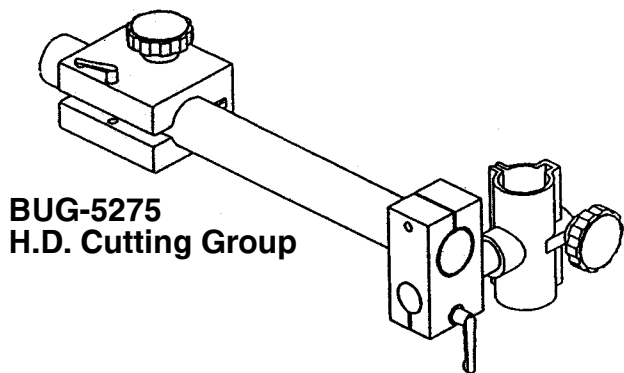
## POWER RACKER WIRING DIAGRAM



## POWER RACKER ELECTRICAL COMPONENT CHART

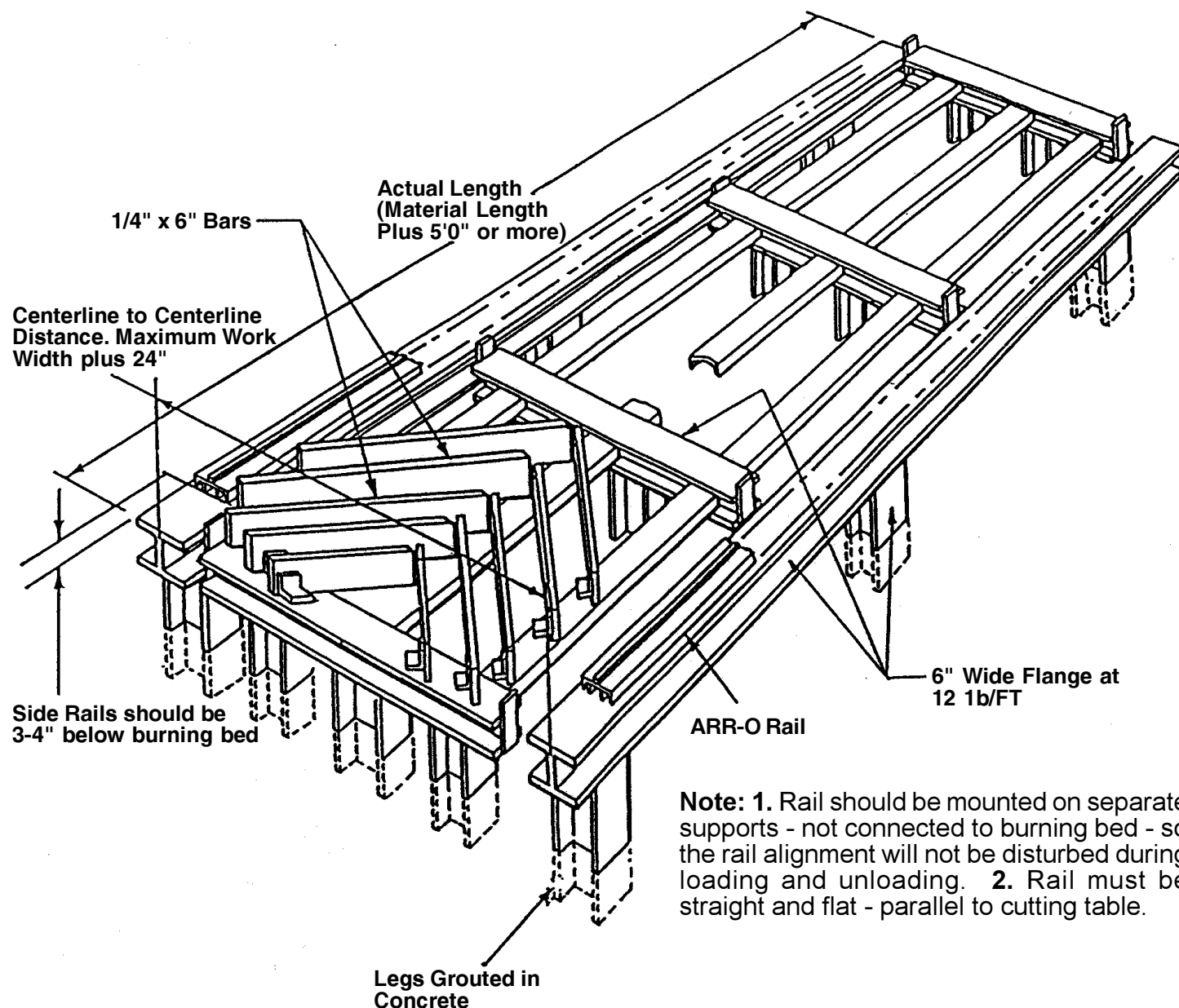
ITEM	DESCRIPTION	PRS-1081 120 VAC	PRS-1083 240 VAC	PRS-1085 42 VAC
CB	Circuit Breaker	BUG-2923	BUG-2952	BUG-2933
PC	Power Cord	BUG-9445	GOF-3115	BUG-9442
R	Relay	BUG-1383	BUG-1551	BUG-9636
T	Transformer	BUG-5001	BUG-5002	BUG-5003
VT	Volt Trap	BUG-1393	BUG-1563	BUG-1393
C	Cable		MUG-1625	
CN1	Cable Connector 6-T, M		BUG-9906	
CN2	Panel Connector, 6-T, F		BUG-9902	
CN3	Panel Connector 4-T, F		MUG-1156	
MCB	Speed Control		CAS-1770	
P	Potentiometer		BUG-9686	
SW	Toggle Switch (For-Off-Rev)		MUG-1199	

# ACCESSORIES



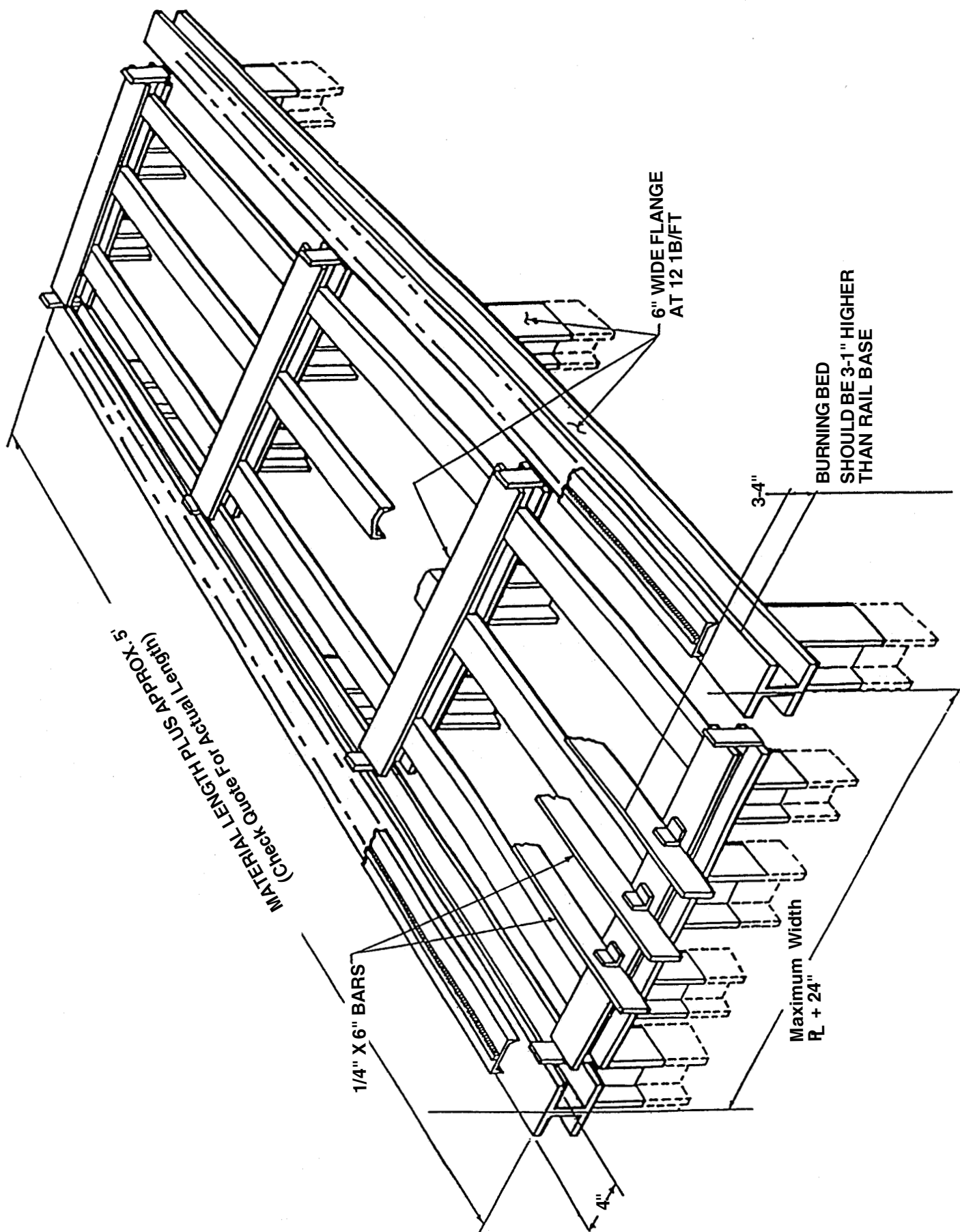
\* Includes 3-Hose Assembly

## SUGGESTED BED DESIGNS FOR BURNING TABLE



The construction of your burning table is very important. The table must be rigid and strong. 6" (150 mm) WF Beams are recommended for rail supports, so that even if they are not straight, the ARR-O rails 4" wide (102 mm) may be mounted in a straight line. A transit is recommended for set-up, but piano-wire can be used. The bolting holes in the rail are uniformly spaced, but rather than laying-out the holes, position the rail on its supports and transfer the holes. Make sure that the rails on each side start at the same place!

SUGGESTED BED DESIGNS FOR BURNING TABLE (CON'T.)





# OPERATION CHECKLIST AND TROUBLE SHOOTING

1. Plug in the machine and turn on the Power Switch. Use the X and Y direction toggle switches to jog the GANTRY in all 4 directions in turn. This overrides any speed command from the computer control. If the drives run in corresponding direction, and the speed can be varied with the Speed Pot, this indicates:

- a) the speed control boards are OK
- b) the controller circuit is supplying the required voltages

If only one motor does not run then it is likely that the motor's speed control is faulty. If both X and Y motors do not operate properly then there may be a bad component on the control module that prevents proper voltages to be supplied to the toggle switches.

A bad connection in the speed signal line to the speed board may also run the motor in one direction only at full speed.

Manual control must function correctly before checking the computer control.

2. Attach the Handheld Pendant and push the Reset button. The display should read "Reset OK". Push D on the keypad and push "RETURN" until the display shows the Shape No. and data for all segments. If the display functions this indicates:

- a) the communication line is functioning
- b) the computer is operating its program

If the message "Reset OK" comes up but pushing D or any other key has no effect, there could be a false signal coming in from the STOP button, due to a wire short or damaged switch.

3. Disconnect the Handheld Terminal and power up.

Toggle the X and Y switches in all 4 directions after pushing Reset. When the switch is let go, the machine should go back to its original position.

This confirms the computer is running its program, and also interfacing correctly with encoders and the speed signal outputs to the speed boards.

If one motor returns to home and not the other, then the computer may not be receiving the encoder signals properly from that axis - encoder pick up gear or coupling may be loose or the pins in the encoder plug may not be making good connection.

If a motor returns home from one direction but not from the other, the speed control may be faulty and drive only in one direction.

KEYPAD CHARACTER / MAP DIRECT AND SHIFTED CHARACTERS

Shift Key

A	B	C	D	E	F
↑	1	4	7	BKSP	+
↓	2	5	8	0	•
↙	3	6	9	ENTER	-

- U: set Units, inch or metric
- R: set Ratio SE4-P; DO NOT USE
- T: Test drives & encoders, function
- V: Version Number

G	J	N	R	V	Z
H	K	O	S	W	@
I	L	P	T	X	(SP)
	M	Q	U	Y	!

- SHIFTED CHARACTER SET**
- E.g. to type U for units, press Shift Key, then “g”

# PROGRAMMED DIAGNOSTICS FOR SHAPE MACHINE AND GANTRY

These diagnostics are being included in the various control modules for programmable machines.  
See character map of keypad for shifted keys to use these commands.

Machines currently done: 1. Shape Machine SH005  
2. SE4: std. cypress prog. only SE041  
3. MUG-O gantry XXYO1

Press “**T**” for Test  
The display should show “D-E-F?”

Next press “**D**” to check **D**rives  
**E** for **E**ncoders  
**F** to **F**inish; get back to main menu

After selecting either D or E, for Drive or Encoder, the display will show  
“Axis No.”

Press 1 for Axis 1: main drive, 2: for Axis 2: cross drive (or 3 for 2nd X- drive on a Gantry).

If drive was selected, the axis selected should run:

1 second forward (display shows “F”)

1 second back (display shows “B”)

The drive should move regardless of whether encoder pulses are counted, at the speed set by the speed pot.

If Encoder was selected, the encoder count of the corresponding encoder (1 or 2) should scroll up continuously in the display. Press any key to stop.

Rotating the encoder in either direction will increase or decrease the displayed count, if the computer is successfully counting the pulses from it. The encoder can be rotated manually if disengaged, or by using the joystick to move in the desired direction.

**Note:** the count is in hexadecimal notation (number base 16) (10H=16 decimal, 400H =1024 decimal).

Press “**V**” for **V**ersion.

The display will show the program version number; e.g. SH005 or XXYOI, etc.  
Applicable to new program versions only.

# 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.**