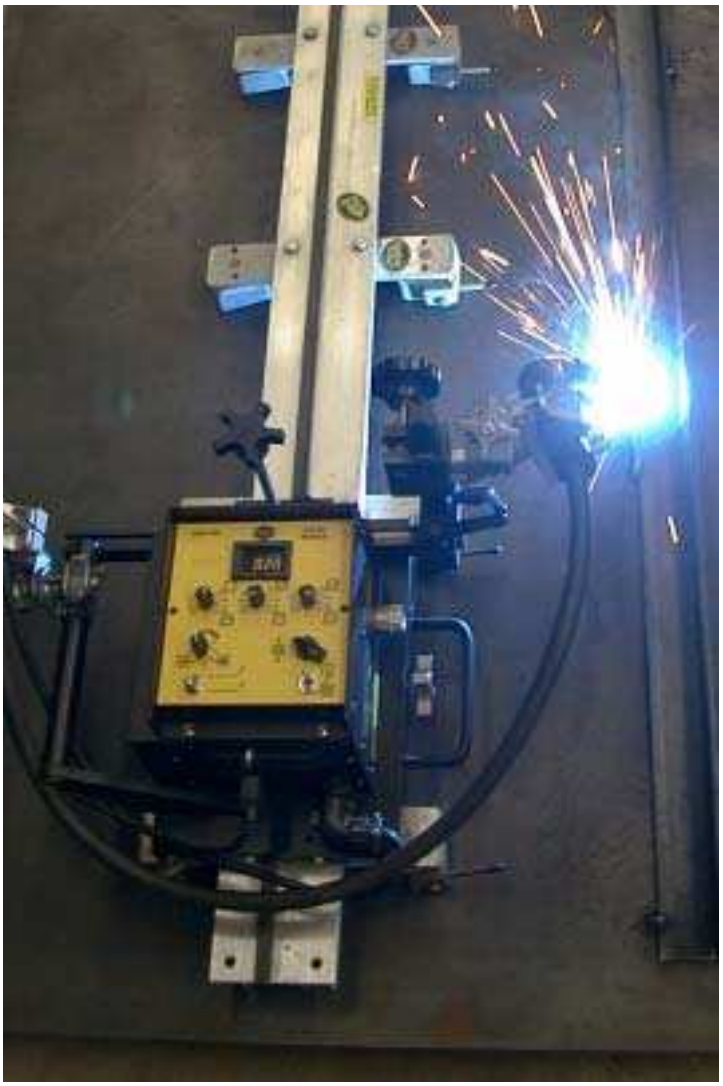
Powerful Solutions for Welding and Cutting Automation with Precision and Versatility!

The Modular Drive System is a powerful machine that allows the operator to custom configure one machine for various applications and runs on standard BUG-O SYSTEMS Rail.



The modular design allows the user to quickly reconfigure the unit for straight line cutting or welding, stitch welding or weave welding, all with the same machine!

BUG-O SYSTEMS

A DIVISION OF WELD TOOLING CORPORATION

3001 WEST CARSON STREET PITTSBURGH, PENNSYLVANIA USA 15204-1899

PHONE: 1-800-245-3186 http://www.bugo.com TELEFAX: 1-412-331-0383

The Modular Drive System is the only product in the industry that allows the user to configure one machine for various automated applications, now and in the future!

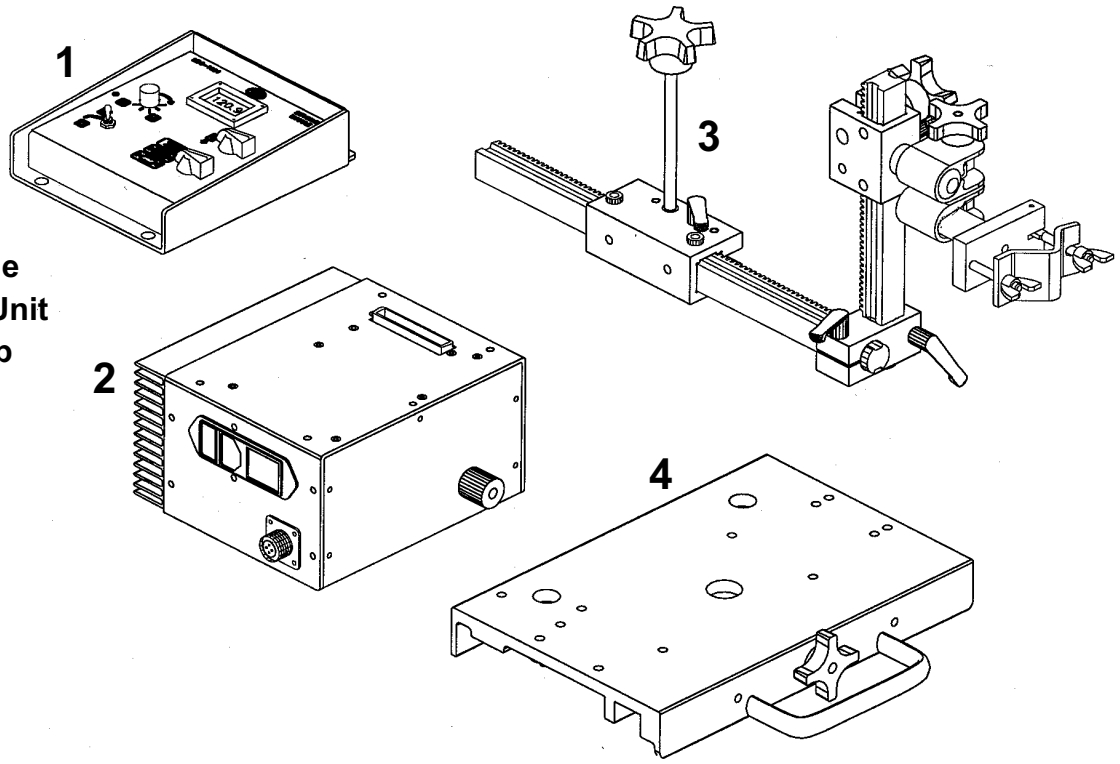
Future development has been engineered into the system allowing its modular components to be easily upgraded. As tomorrow's technologies are introduced, the Modular Drive System can be enhanced to take advantage of new features and capabilities as they are perfected. Other systems will be obsolete as the Modular Drive System will remain "state of the arc" in portable motion control!

The Modular Drive System produces precise, accurate cuts and welds.

The Master Drive Unit has a high torque, low enertia motor for precise stops and starts and a dedicated fail-safe brake with three times the stopping and holding power of the motor. The unit is equipped with motor overload protection which turns the motor off and engages the brake whenever an excessive load is placed on the machine. In addition, the Master Drive features closed loop speed control for adjustable, repeatable control of critical welding or cutting parameters, and closed loop position control to prevent creep.

Assembling a Modular Drive System is easy!

Straightline cutting and welding configurations consist of a Control Module, Master Drive Unit, Machined Racking Group, and Carriage. An optional Remote Control Cable (see page 6) can be used to remote the Control Module, and a Universal Limit Kit to add cycler, stop at limit, and rapid return functions.



1. Control Module
2. Master Drive Unit
3. Racking Group
4. Carriage

Control Modules

A Control Module plugs onto the top of the Master Drive Unit and operates various machine functions. Three Control Modules are available; one for straightline cutting and/or welding, one for stitch welding; and one for weave welding capability.

Control Modules

Order reference:		
	MDS-1001	Straightline Module
	MDS-1003	Stitch Welding Module
	MDS-1005	Weld Weaving Module

MDS-1003 Stitch Module

Master Drive Unit

At the heart of the Modular Drive System is the Master Drive Unit which houses the motor, speed control board, power supply, and clutch, that allows rapid manual positioning of the carriage anywhere along the track. The unit runs from 2-120 in/min (51-3048 mm/min) with a vertical load capacity of 60 lbs (27 kg) and a horizontal load capacity of 100 lbs (45 kg).

Master Drive Unit

Order reference:		
	MPD-1000	120VAC/50-60 Hz
	MPD-1002	240VAC/50-60 Hz
	MPD-1004	42VAC/50-60 Hz

MPD-1000 Master Drive Unit

Racking Groups

There are two machined rack torch mounting groups in the Modular Drive System, one for plasma or oxy-fuel cutting and the other for welding.

Machined Rack Cutting Group
Order reference: **MDS-1050**

Machined Rack Welding Group
Order reference: **MDS-1040**

Carriages

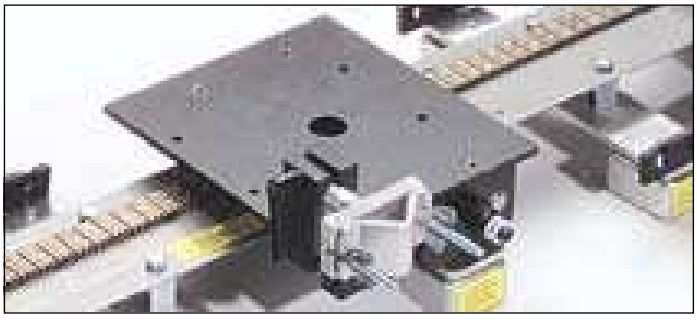
Two carriages are available for the Modular Drive System when using BUG-O Aluminum Rigid and Semi-Flex Rails.* One is a releasable 12" carriage equipped with an engagement knob that allows the unit to be placed anywhere along the track. The other is an 18" carriage shown on page 5.

Order reference: **MPD-1065** Releasable Carriage 12"

MPD-1065 Releasable Carriage 12" on Aluminum Rigid Rail.

Hi-Flex carriages are designed for use with the Modular Drive System when running the equipment on BUG-O Hi-Flex Stainless Steel Rail.* Each carriage has a built-in quick release for mounting or removal at any point along the rail. A cable anchor is also included to keep welding cables and contact wires away from the work surface.

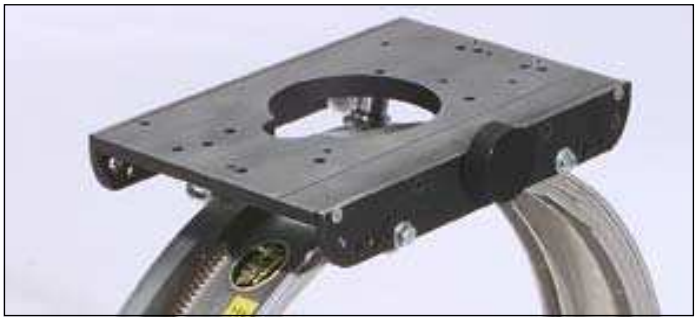
Order reference: **FMD-1100** Drive Carriage



FMD-1100 Flex Rail Carriage w/Cable Anchor on Hi-Flex Rail.

For applications using the Modular Drive System on BUG-O Bent Aluminum Rigid Rail,* a split carriage is available. This releasable carriage can be placed anywhere along the track and easily adjusts to various work diameters. (For outside radii only)

Order reference: **BUG-5910** Tube Carriage



BUG-5910 Tube Carriage on Bent Aluminum Rigid Rail.

* Note: see Rails and Attachments brochure for information on BUG-O Systems rails.

Modular Drive System Accessories

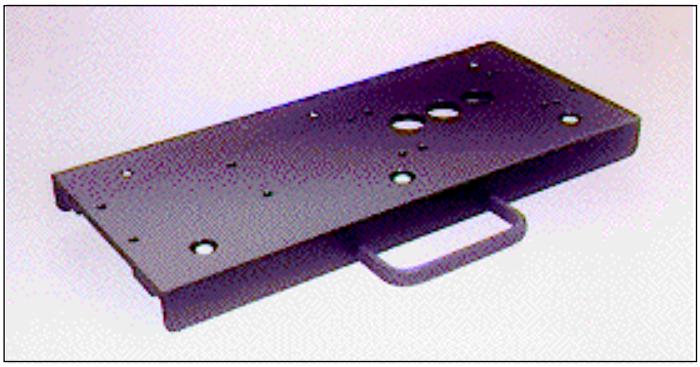
Carriage Trailer w/Hitch for Aluminum Rigid and Semi-Flex Rails supports various accessories. (Non-releasable)

Order reference: **BUG-2205**

Short Trailer for Hi-Flex Rail carries Modular Drive Weavers. (Releasable)

Order reference: **FMD-1095**

18" Carriage has extended deck for mounting accessories, wire feeders, etc. (Non-releasable)



Order reference: **MPD-1055**

Long Trailer for Hi-Flex Rail supports various accessories. (Releasable)

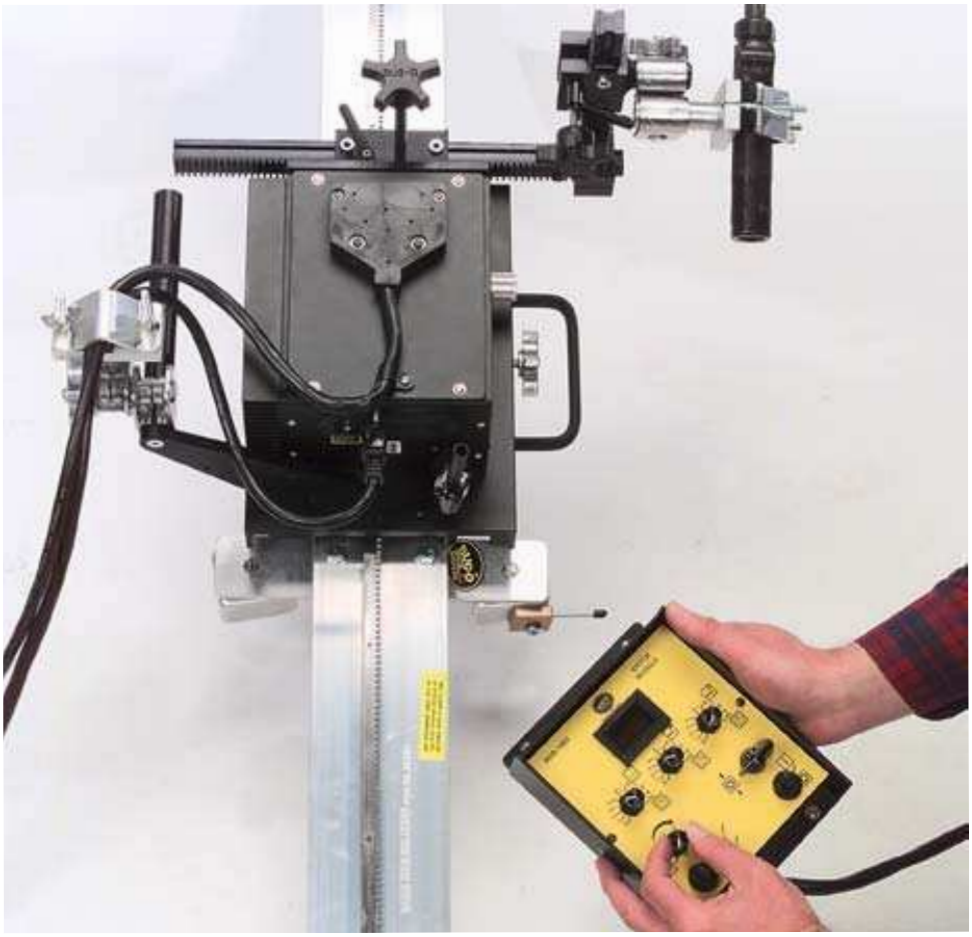
Order reference: **FMD-1090**

Universal Limit Kit

Installs between the Master Drive Unit and any of the control modules. This limit kit adds the ability to cycle between limits, stop at limit, or rapid return. All existing functions of the control modules are maintained.

Order reference: **MDS-1055** For Rigid Rail Applications
FMD-1045 For Hi-Flex Rail Applications (not shown)

Modular Drive System Accessories



Remote Control Cable

Installs between the Master Drive Unit and the Control Module, allowing the operator to perform work in confined areas where it would be difficult to reach the controls. Two sizes are available as shown below.

Order reference: **MDS-1020** 10 Ft (3 m)
MDS-1020-25 25 Ft (7.6 m)

Extended Mounting Plate

Mounts to front of carriage for use with dual cutting or welding groups, heavy duty racking, etc.

Order reference: **MDS-1045**

Spacer w/Screws

Provides height required to position racking group for plasma cutting applications.

Order reference: **PAN-1001**

Quick Action Manifold

Allows quick ON/OFF of preset torch and eliminates hose strain.

Order reference: **MDS-3025** 2-Hose
MDS-9898 3-Hose

Hose Assemblies: **CIR-1010-3** 2-Hose
MUG-1119-32 3-Hose

Handle with Cable Anchor

Keeps welding cables and contact wires away from the work surface, eliminating drag.

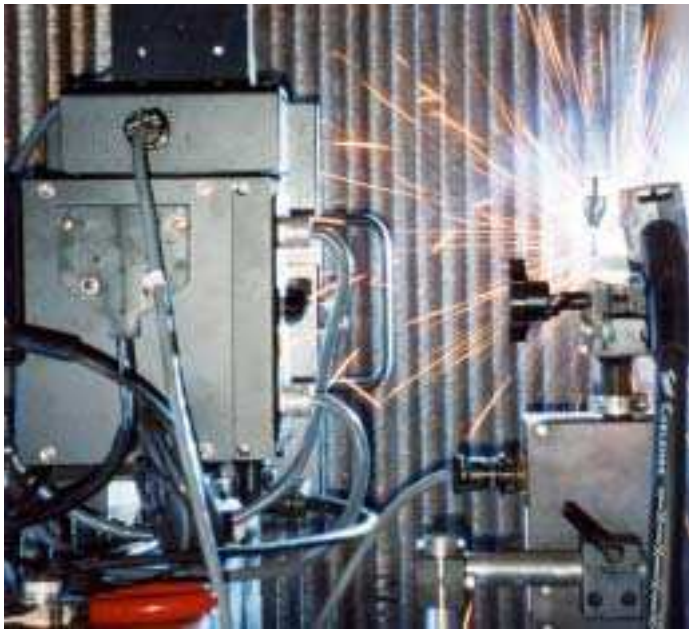
Order reference: **MPD-1035**

A QUALITY PRODUCT FROM BUG-O SYSTEMS • 3001 WEST CARSON STREET • PITTSBURGH, PA USA 15204-1899
A DIVISION OF WELD TOOLING CORPORATION

LIT-MDS-BRO-1098 ROM 1:16 Litho in U.S.A.

Modular Drive Weld Weavers Generate Smooth Consistent Torch Oscillation.

Precision Controls Provide Optimum Weld Results.



BUG-O SYSTEMS
A DIVISION OF WELD TOOLING CORPORATION

280 TECHNOLOGY DRIVE CANONSBURG, PENNSYLVANIA USA 15317-9564
PHONE: 1-412-331-1776 http://www.bugo.com FAX: 1-412-331-0383

WEAVER CONTROL MODULE

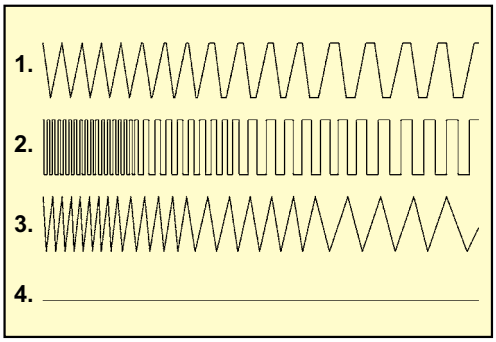
The Weaver Control Module operates the Pendulum or Linear Weaver, and the Master Drive Unit. The Control Module features include: a digital readout and control knob for longitudinal travel speed; a switch for Forward/ Stop/Reverse tractor control; an amplitude knob to set weave width from 1/8"-2" (3-50 mm); weave speed control up to 100 in/min (254 cm/min); controls for left and right dwell; a knob to control steering up to 2" (50 mm), either side of center; weld contact; and a power On/Off switch. One of four weld patterns can be chosen using the mode selector switch, as shown in the figure below.

Weaver Control Module
Order reference: **MDS-1005**

Features:

MDS-1005 Weaver Control Module
Digital display is factory set at cm/min; Field convertible to in/min.

Weld Patterns:



1. **RUN:** In this mode, power to the drive unit is always on and the machine travels continuously both during weave and dwell. Weave speed and dwell time both affect the weld pattern.
2. **STEP:** The unit travels only during dwell, and stops during the oscillator cross stroke. Changing weave speed does not effect the weld pattern – dwell time does.
3. **TRACTOR STOP ON DWELL:** The tractor travels during weave stroke; the tractor and weaver stop during dwell.
4. **NO WEAVE:** In this mode oscillation is stopped. Only the tractor is powered. This mode is used for stringer passes.

WPD-2100 PENDULUM WEAVER

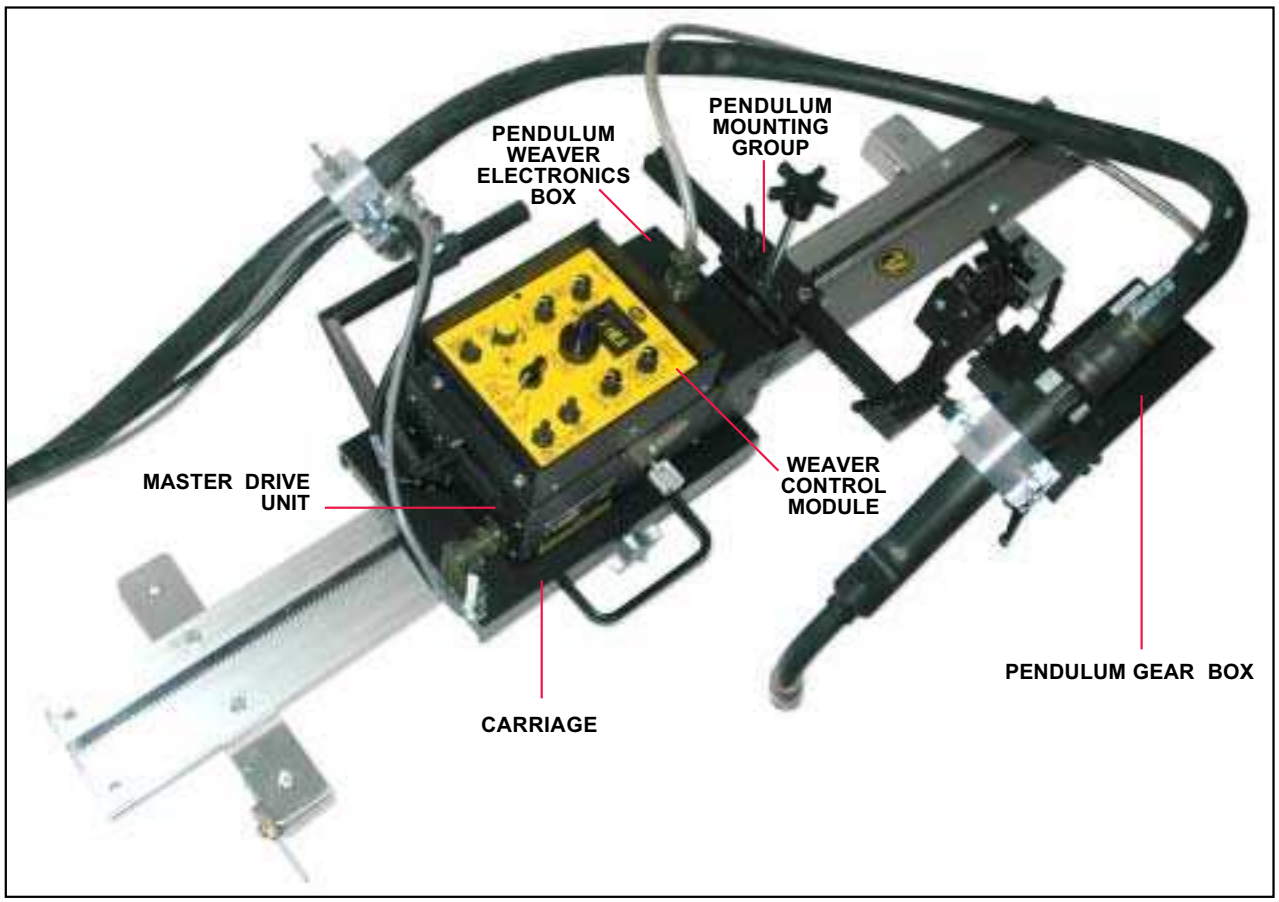
The Pendulum Weaver and the Weaver Control Module add a pendulum weaving motion to the Modular Drive System. The Pendulum Weaver is particularly useful for weaving fillet welds in a corner joint. The Weaver Control Module plugs onto the top of the Master Drive Unit, as shown in the figure below. The Pendulum Weaver Electronics Box bolts onto the front end of the Master Drive. Then, a mounting plate is fastened to the front of the Carriage. The Pendulum Mounting Group attaches to this plate, and supports the Pendulum Gear Box. The Electronics Box and Gear Box connect using the cable provided.

Pendulum Weaver
Order reference: **WPD-2100**

Features:

The Pendulum Weaver and Weaver Control Module incorporate the following standard features:

- High torque, low inertia motor for precise starts and stops.
- Heavy duty planetary gear box with powerful output for rotating welding gun and attachments.
- High speed pendulum motion with independent control of right and left dwell times.
- High motor gearing ratio, prevents the welding gun moving by backdriving the gear train when power is off.
- Closed loop speed control for adjustable and repeatable control of critical welding or cutting parameters.
- Closed loop position control to prevent drift from the center weld position.
- Gun mounting group with adjustable racking for accurate positioning of the gun.
- Weld Contactor ON/OFF switch.



WPD-1100 LINEAR WEAVER

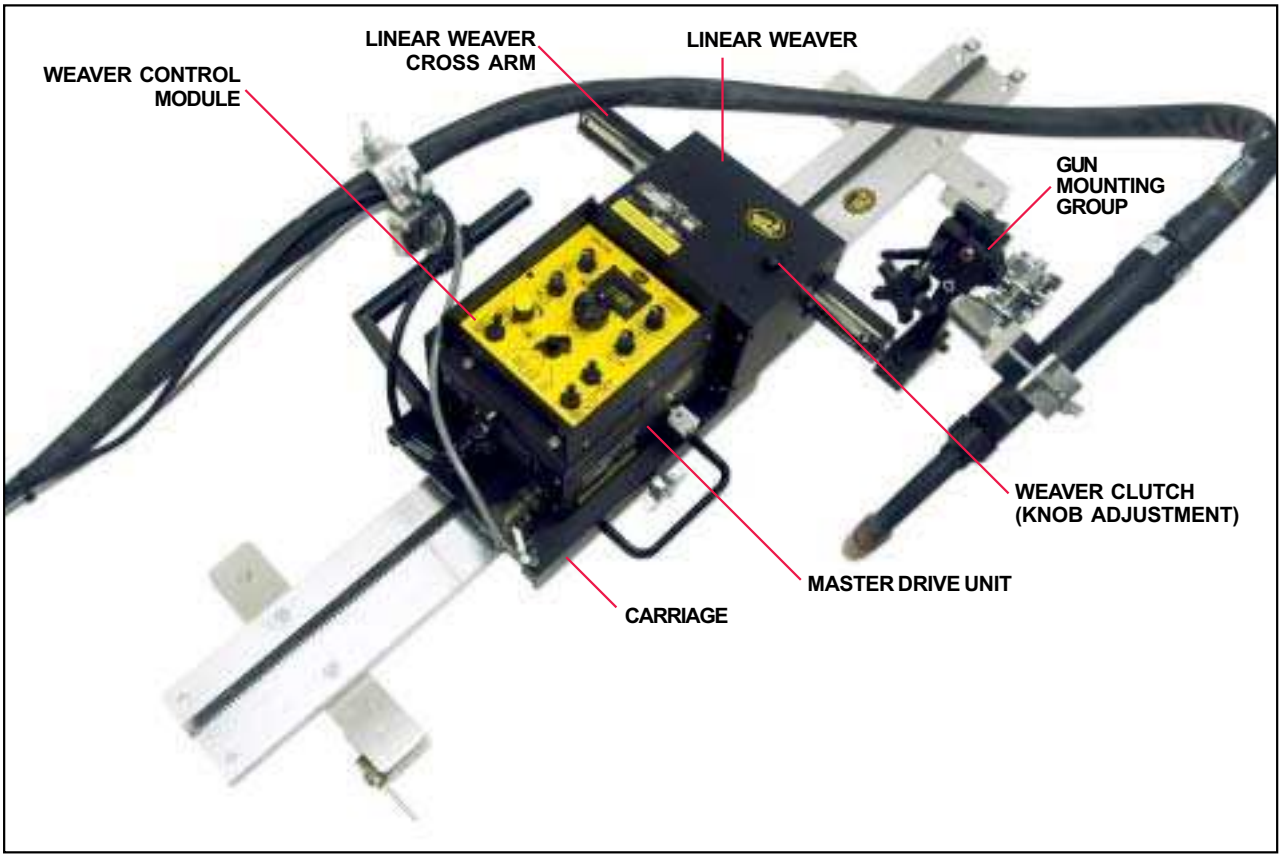
The Linear Weaver and the Weaver Control Module give the Modular Drive System linear weave motion, producing welds from 1/8" to 2" (3-50 mm) wide. The Linear Weaver bolts onto the front of the Carriage and the Weaver Control Module plugs onto the top of the Master Drive Unit, as shown in the figure below. An optional Remote Control Cable is available which mounts between the Master Drive and the Control Module, allowing the operator to perform work in confined areas where it would be difficult to reach the controls.

Linear Weaver
Order reference: **WPD-1100**

Features:

The Linear Weaver and Weaver Control Module incorporate the following standard features:

- High torque, low inertia motor for precise starts and stops.
- High speed Linear Weaver for weaving, with independent control of right and left dwell times.
- Motor overload protection which turns off the motor when too much load is placed on the Linear Weaver.
- High motor gearing which prevents the crossarm from moving when the unit is turned off.
- Closed loop speed control for adjustable and repeatable control of critical welding parameters.
- Closed loop position control to prevent drift from the weld center position.
- Clutch, to enable rapid installation or replacement of the weaver cross arm.
- Gun mounting group with adjustable racking for accurate positioning of the gun.
- Contactor ON/OFF switch.



  ΧΡΙΣΤΟΣ ROM 1:16 Litho in U.S.A. **LIT-MDS-WVR-BRO-0508**

Powerful Solutions For Welding And Cutting Automation

MODULAR DRIVE SYSTEM
PROGRAMMABLE SHAPE MACHINE PACKAGE

Portable Two Axis Shape Machine Cuts In All Positions!

The **Modular Drive Programmable Shape Machine** is an easy to use 2-axis machine which you can program to run any contour or pattern for both welding or cutting applications. A handheld terminal supplied with the machine is used to program the required shape and operation sequence. Other functions besides moves can be programmed, such as repeats, starts, stops, delays, and rapid traverse. Twenty programs can be stored in machine memory at any one time.

An optional computer software program is available. With this program you can select pre-programmed shapes or create your own custom shapes, and store and edit any number of them on disk. Selected shapes can then be downloaded to the machine as needed.

The Modular Drive Programmable Shape Machine is compact and portable and can be easily carried throughout your facility or job site. The system can be configured to run on all types of Bug-O rail. It is held in position with either powerful permanent magnets or vacuum cups, depending on the work material. This enables you to take the machine to the work, which will help reduce your material handling.

PATENTS WORLDWIDE

BUG-O SYSTEMS

A DIVISION OF WELD TOOLING CORPORATION

CE

3001 WEST CARSON STREET PITTSBURGH, PENNSYLVANIA USA 15204-1899

PHONE: 1-800-245-3186 http://www.bugo.com TELEFAX: 1-412-331-0383

MDS - PROGRAMMABLE SHAPE MACHINE

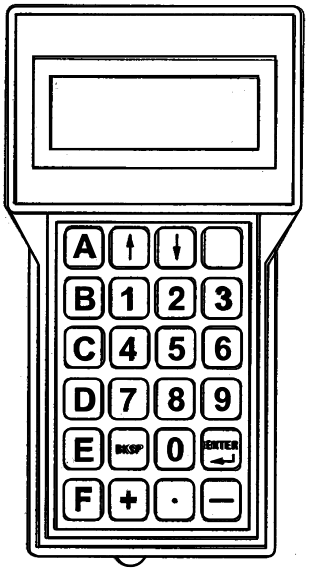
The MDS Programmable Shape Machine is a two-axis machine that runs on a track and carries a torch on a motorized cross-arm. It can be used for flame or plasma cutting, or welding, of a variety of shapes which are programmed and stored in memory.

The machine has storage capacity in memory for 20 different programmed shapes. All programming is done with the provided handheld terminal. The terminal can 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.

Shapes and patterns are built up using segments. To do this, select the type of segment you want and determine what quadrant it is in – type it into the terminal. Any given shape can have up to 50 segments. Other functions such as weld/oxygen, on/off, time delay, or repeat a shape a number of times, also count as one segment each, if used.

Handheld Terminal Functions:

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



A: ALL SEGMENTS; data entry for new shape consists of total number of segments and data for each segment.

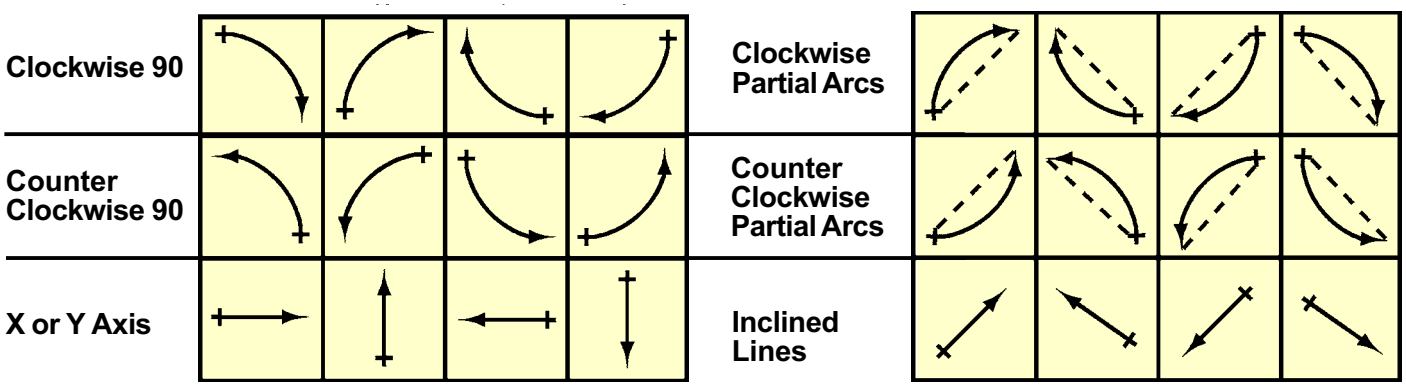
B: PROGRAM SEGMENT; press **B** on terminal to re-program a single segment. This is useful if there is an error in data for just one segment, so that the whole shape does not have to be re-entered.

C: CHANGE SHAPE NUMBER; press **C** on terminal to change the current shape number. The program switches to the new number in memory, and to whatever shape is stored there.

D: DISPLAY SHAPE DATA; press **D** to display the data for the current shape. The terminal display shows a total number of segments, and data for each segment one by one each time you press enter.

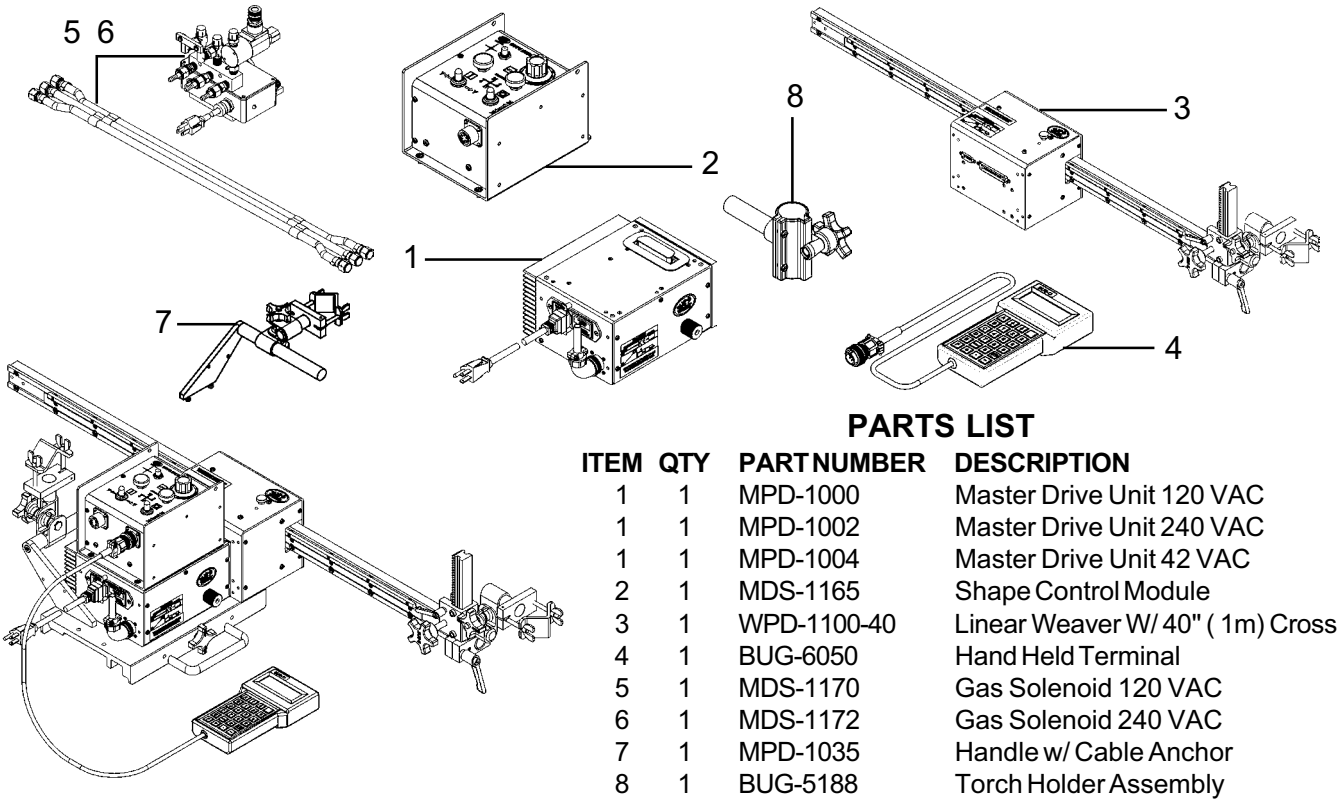
E: END OF SEGMENT SLOWDOWN; press **E** to set value of deceleration for the shape, when the machine approaches the end of each segment. This is useful when the shape has sharp corners to prevent overshoot. **99** is maximum slowdown, **0** is no slowdown.

The different types of segments that can be loaded into the machine are as follows:



Other functions besides the moves shown above are:
Weld Contact/Solenoid On/Off, Pause, Delay, Repeat another shape, Full ellipse, and Rapid Traverse.

MDS - PROGRAMMABLE SHAPE MACHINE

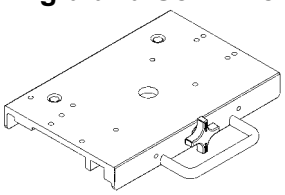


PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	MPD-1000	Master Drive Unit 120 VAC
1	1	MPD-1002	Master Drive Unit 240 VAC
1	1	MPD-1004	Master Drive Unit 42 VAC
2	1	MDS-1165	Shape Control Module
3	1	WPD-1100-40	Linear Weaver W/ 40" (1m) Cross Arm
4	1	BUG-6050	Hand Held Terminal
5	1	MDS-1170	Gas Solenoid 120 VAC
6	1	MDS-1172	Gas Solenoid 240 VAC
7	1	MPD-1035	Handle w/ Cable Anchor
8	1	BUG-5188	Torch Holder Assembly

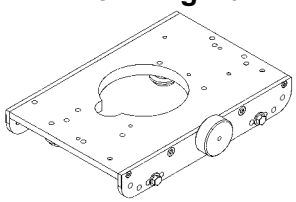
Carriages

For Rigid and Semi-Flex rail



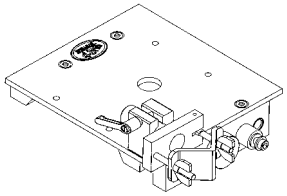
MPD-1065 4-wheel carriage.
Releasable, can be installed or released in any position anywhere on the rail.

For Ring Rail



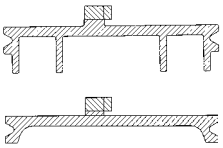
BUG-5910 Ring Rail Carriage.
4 wheels can be adjusted to the required ring diameter. Releasable.

For Hi-Flex Rails

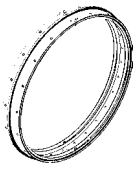


FMD-1105 Hi-Flex Carriage.
Runs on high flex rail as shown below. Releasable.

The above shown carriages can be used on the rails shown below:

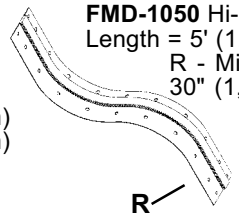


ARR-1080 L = 8' (2.4 m)
HD-Rigid Aluminum Rail
ARR-1085 L = 4' (1.2 m)
HD-Rigid Aluminum Rail
AFR-3000 L = 8' (2.4 m)
Semi-Flex Aluminum Rail



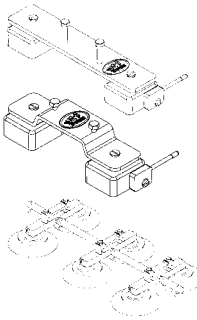
Ring Rails	Diameter
BRR-1210-20	(20" 500 mm)
BRR-1210-27	(27" 680 mm)
BRR-1210-34	(34" 860 mm)
BRR-1210-41	(41" 1040 mm)
BRR-1210-48	(48" 1220 mm)

Custom sizes are available.



FMD-1050 Hi-Flex Rail
Length = 5' (1.5 m)
R - Minimum Radius
30" (1,000 mm)

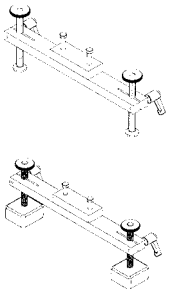
Magnet Bars and Vacuum Bars



ARM-2325
Magnet w/Release

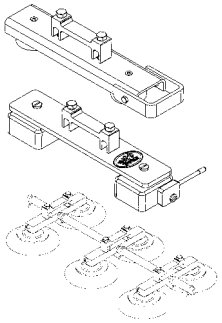
ARM-2425
Magnet w/Release

ARV-1080/1085
Vacuum System



ARM-2380
Support Bar with Screw Feet

ARM-2480
Support Bar with Screw Magnet Feet



ARM-2120
RE-Magnet w/Release

FMD-2325
Magnet w/Release

FMD-1220/1230
Vacuum System

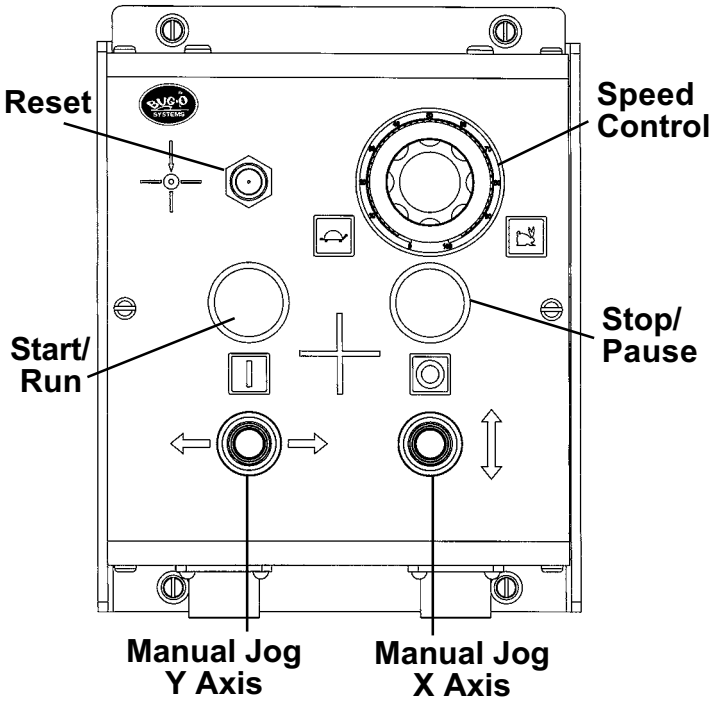
MDS - PROGRAMMABLE SHAPE MACHINE

Operation:

The machine is in the reference start position, when first plugged in.

There are 3 options (the handheld terminal is not needed for the first two):

1. **MOVE:** To change the home position, push the STOP/PAUSE button, move the machine manually to the required position using the joy stick, and push the reset button.
2. **RUN:** Push the START/RUN button to cut/ weld a shape.
3. **PROGRAM:** The programming operation requires the use of the handheld terminal.



Technical Data:

Travel Speed:	5-100 ipm (127-2540 mm/min)
Cross Travel:	24" (610 mm)
Max. Segment Dimension:	72" (1800 mm) Within Limits of Travel
Min. Increment Dimension:	.01" (0.1 mm)
Delay Increment:	.01 seconds

Bug-6140 PC Option

This Windows based software package provides Computer-Aided Programming for Shape Machines and other BUG-O programmable machines. The software will run on any PC with the Windows Operating System. A cable is provided to interface the BUG-O to the PC's serial port. (A USB to RS-232 serial adaptor can be used if a serial port is not available).

The program enables easy creation and editing of a shape while viewing it on screen. When a shape is loaded into the program the segment list is shown on the left, and the shape diagram on the right. Selecting (mouse-click) a segment in the list highlights the corresponding segment in the diagram. Buttons are provided to select Add, Edit, Insert or Delete a segment.

A print function lets you print out the Segment List and/or Shape Diagram.

Any number of shapes can be saved and stored on disk. Saved shapes can be loaded from disk into memory slots corresponding to the 20 shape numbers in the BUG-O machine.

The software is distributed as a single SETUP file, which when run will install the program on your PC.

  ΧΡΙΣΤΟΣ ROM 1:16 Litho in U.S.A. **LIT-MDSPSM-BRO-0407**