

INSTRUCTIONS AND PARTS MANUAL

PLASMA HEIGHT CONTROL AVC-2060

for WPD-2100 Pendulum Weaver

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-AVC-2060-IPM-1120

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



BUG-O SYSTEMS

A DIVISION OF WELD TOOLING CORPORATION



280 TECHNOLOGY DRIVE CANONSBURG, PENNSYLVANIA 15317-9564 USA
PHONE: 412-331-1776 <http://www.bug-o.com> FAX: 412-331-0383

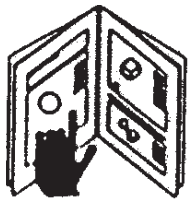
SAFETY

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



ELECTRIC SHOCK can kill.

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



READ INSTRUCTIONS.

Read the instruction manual before installing and using the equipment.



EQUIPMENT DAMAGE POSSIBLE.

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



FALLING EQUIPMENT can cause serious personal injury and equipment damage.

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



MOVING PARTS can cause serious injury.

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

HIGH FREQUENCY WARNINGS

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



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

Read the precautions below before installing and using the equipment.

PRECAUTIONS:

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

PLASMA HEIGHT CONTROL

AVC-2060

FOR WPD-2100 PENDULUM WEAVER

INSTRUCTIONS AND PARTS MANUAL

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INTRODUCTION

The AVC-2060 is an Plasma Height Control (PHC) for the Pendulum Weaver (WPD-2100) that controls the tip to work distance and maintains a constant voltage, which provides a more uniform result. Available in three models, by voltage. Plasma Height Control senses the actual voltage, compares this value to the set point, and raises or lowers the torch accordingly. It features motion based on the plasma source “ok to move” signal and automatically shuts off when voltage drops too low (generally below 36 volts).

The AVC-2060 Plasma Height Control is available as original equipment or as a retrofit unit designed to provide automated height control on the BUG-O Modular Drive Systems (MDS) with a Pendulum Weaver (WPD-2100). Height Slide Assembly (CAS-1500) replaces the welding clamp originally supplied on the Pendulum Weaver.

SPECIFICATIONS

Net Weight:	14.5 lbs (6.6 kg)
Travel:	13" (330 mm)
Carrying Capacity:	10 lbs (4.5 kg)
Operating Range:	36 to 300 Volts
Minimum Recommended Standoff:	1/8" (3.2 mm)

Sensitivity	Difference between DC cutting voltage and set point (ΔV)				
	$\Delta V > 32$	$32 > \Delta V > 15$	$15 > \Delta V > 3$	$3 > \Delta V > 0.4$	$0.4 > \Delta V$
Nominal Maximum Slide Speed	24 in/min (609 mm/min)	24 in/min (609 mm/min)	1.55 in/min per volt (39.3 mm/min per volt)	0.46 in/min per volt (11.8 mm/min per volt)	slide may not move
Nominal Time to Reach 90% Speed	0.2 seconds	0.2 - 2 seconds	2 seconds	2 seconds	slide may not move

ITEMS SUPPLIED

AVC-2060 Plasma Height Control for **WPD-1200 Linear Weaver** includes:

CAS-1500-18	Height Slide Assembly
CAS-1558	Pendulum Weaver Adaptor for CAS-1500-18
AVC-1550-PL-??	Hall Effect Current Sensor Assembly
AVC-2051-10	MDS AHC 10' (3.0 m) Remote Control
AVC-2055	MDS AHC Control Box

“??” is the volt sensor option:

ID for use with Internal Divider

RV for use with Raw Voltage of blowback start type sources

PS for installation inside the Power Source for HF or capacitive discharge type sources

SENSOR OPTIONS FOR PLASMA POWER SOURCES

Manufacturer	Model	AVC Sensor Option	AVC On/Auto Switch Position	Additional Connection Instructions
ESAB ^{®1}	Cutmaster 82 with full-featured automation interface PCB option	-ID	Auto	Contactors wires plug into AVC-1550, which sends them to the plasma source.
Hypertherm ^{®2}	Powermax45 XP [®] with CPC port and voltage divider	-ID	Auto	Contactors wires plug into AVC-1550, which sends them to the plasma source.
Hypertherm [®]	Powermax65 [®] with CPC port and voltage divider	-ID	Auto	Contactors wires plug into AVC-1550, which sends them to the plasma source.
Hypertherm [®]	Powermax85 [®] with CPC port and voltage divider	-ID	Auto	Contactors wires plug into AVC-1550, which sends them to the plasma source.
Hypertherm [®]	Powermax105 [®] with CPC port and voltage divider	-ID	Auto	Contactors wires plug into AVC-1550, which sends them to the plasma source.
Hypertherm [®]	Powermax125 [®] with CPC port and voltage divider	-ID	Auto	Contactors wires plug into AVC-1550, which sends them to the plasma source.
Hypertherm [®]	Powermax1650 [®]	-RV	Auto	AVC-1002 will need to be installed and will need to connect to J15 and J16. Contactors wires will need to be connected to the AVC-1550 and then AVC-1003 (sold separately) can connect the AVC-1550 to the machine interface connection for arc start and arc transfer.
Lincoln Electric ^{®3}	Tomahawk1538 [®]	-RV	On	AVC-1002 will need to be installed and will need to connect to the EL2 and OUT1. Contactors wires will need to connect to the Tomahawk's accessory connector. A competent person must determine how to best make these connections.

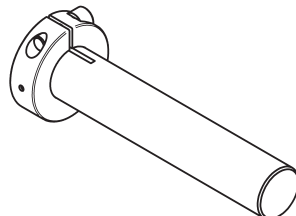
SETUP

AVC-2060 Plasma Height Control

This is available as original equipment or as a retrofit unit designed to provide Plasma Height Control on BUG-O Modular Drive Systems (MDS) with the Pendulum Weaver (WPD-2100).

CAS-1500-18 Height Slide Assembly

This replaces the Gun Mounting Group originally supplied on the Pendulum Weaver. To install, begin by remove the WPD-2050 Gun Mounting Group from the weaver, [Refer to Modular Drive System Instructions and Parts Manual]. Install Pendulum Weaver Adapter CAS-1558. Slide clamp on bottom of Height Slide Assembly CAS-1500-18 onto the CAS-1558 and lock in position.



CAS-1558 Pendulum Weaver Adaptor

SETUP, CONT'D.

AVC-2055 MDS AHC Control Box

This mounts directly on top of the MDS Drive. Align the socket on the top of the MDS Drive with the plug on the bottom of the AHC Control Box and seat it firmly and secure in place with the four (4) screws, one (1) in each corner.

AVC-2051-10 MDS AHC 10' (3.0 m) Remote Control

To install, align the plug in the bottom of the male portion of this Remote Control with the socket on top of the AVC-2055. Seat this plug firmly and secure in place with the four (4) screws, one (1) in each corner.

Position and Clamp Torch

With CAS-1500-18 installed on the Linear Weaver Cross Arm, secure the torch in the clamp located on the end of the Height Slide Assembly. Arrange cables so that they do not interfere with the movement of the machine before securing the cable in the cable anchor.

Connect Control Cables

Connect weld contact outlet pins A&B, on the MPD-1000 Drive unit to the power source contact circuit. If using -ID sensor, use the provided cable to connect to the volt sensor.

Install Voltage Sensor

Connect AVC-1550 type voltage sensor according to the connection diagram on page 15 of this manual. The connections will vary based on whether you have a type -ID, -RV, or -PS sensor assembly.

Choose whether the AVC-1550 sensor will use “Ok to Move” signal or always provide voltage.

The sensor can switch off its feedback based on a power source’s “Ok to Move” signal. On the AVC-1550-PL-ID and AVC-1550-PL-RV, this is done with the “Auto/On” switch on the side of the box. In the “Auto” position, the sensor will automatically switch feedback on or off based on the “Ok to move” signal; in “On”, it will always provide feedback, although the control still has its own lower limit of about 36V below which it will not respond. On the AVC-1550-PL-PS, which gets installed inside the power source, this is done with the CAS-1529 wiring harness (shown in the connection diagram for the AVC-2050-PL-PS); the wires either need to connect to terminals provided by the plasma power source to use the “Ok to move” signal, or shorted together if no such signal is provided by the power source. This may have already been done for you if you ordered a system with the sensor installed.

On systems that provide an “Ok to move” signal, it is better to use it, since it will prevent the initial open-circuit voltage before an arc is transferred from showing up on the feedback signal. If your power source does not have an “Ok to move” signal, you’ll want to try to get the arc transferred as quickly as possible to reduce the impact of the open-circuit voltage, and be prepared to use the manual jog switch to correct movement due to that initial higher voltage.

Installing the AVC-1550-PL-PS (applies to this model only)

If you choose to install the AVC-1550-PL-PS yourself, you can use the connection diagram for AVC-2050-PL-PS.

The CAS-1530 wiring harness plugs into J1 on the PCB-1273.

CAS-1529 is provided to plug into J3. The “Ok to move” signal drives a 12VDC relay on the PCB-1273. J3 includes diodes to avoid reverse polarity on the connection. J3 pin 1 is connected to the PCB-1273’s +15V source through a diode and a 120 Ohm resistor, and pin 2 goes to the relay coil through another diode; the other end of the relay coil is connected to the Bug-O machine’s common power return, which is not isolated. This connection method will work for dry contact closure or optical isolators, provided the polarity is respected (Pin 1 goes to the optical isolator positive terminal or sink and pin 2 to the optical isolator negative terminal or source).

J2 does not need to be connected.

You will need to identify which contactor cable you need and how to wire it based on the plasma source you are using. There are pins on J3 to take a trigger input in, but they only route the signal to J2 to go back out to the power source, so that a single cable can be used between other AVC-1550 models and the power source.

SETUP, CONT'D.

Plug in MDS System with AHC

Inspect the power cord before each use. **Do not use if damaged.** Plug in the machine to a power outlet of the appropriate voltage.

Power ON the MDS System with AHC

CAUTION: machine may start moving as soon as it is powered “ON.” Use the power switch on the MPD-1000 Drive Unit to turn the power “ON” and “OFF” to the machine. For operator safety, set weld pattern to “NO WEAVE” and the Drive Unit to “OFF” before turning on the machine.

Position the Torch

Proper setup of the torch is critical to a successful operation. In addition to manually positioning the torch within the clamp, the torch must also be properly set with respect to three mechanical controls: The Torch Mounting Group, the Plasma Height Controller (PHC), and the motion control position.

Pendulum Mechanism: The pendulum mechanism offers a weave amplitude that varies with distance to work piece. Center the pendulum motion before placing the torch over the work area.

Height Slide Assembly: A clamp, CAS-1510 Dual Position Clamp Block is provided mounted to the bottom of the Height Slide Assembly. This Clamp Block requires a 7/8" (22.2 mm) diameter rod for mounting. Typically, user will mount the Height Slide Assembly to the welding group already on the BUG-O. Consult with your Local Bug-O distributor or the factory for assistance if you require help with mounting the control box.

Tractor Position: Use the tractor Carriage Travel Switch to position the Drive Unit so the torch is over its starting point. The operator can increase or decrease the tractor travel speed at any time using the speed control on the MDS Control Module.

Set Motion Parameters

Use the Weaver Control Module (MDS-1005) to set the motion parameters.

[Refer to Modular Drive System Instructions and Parts Manual]

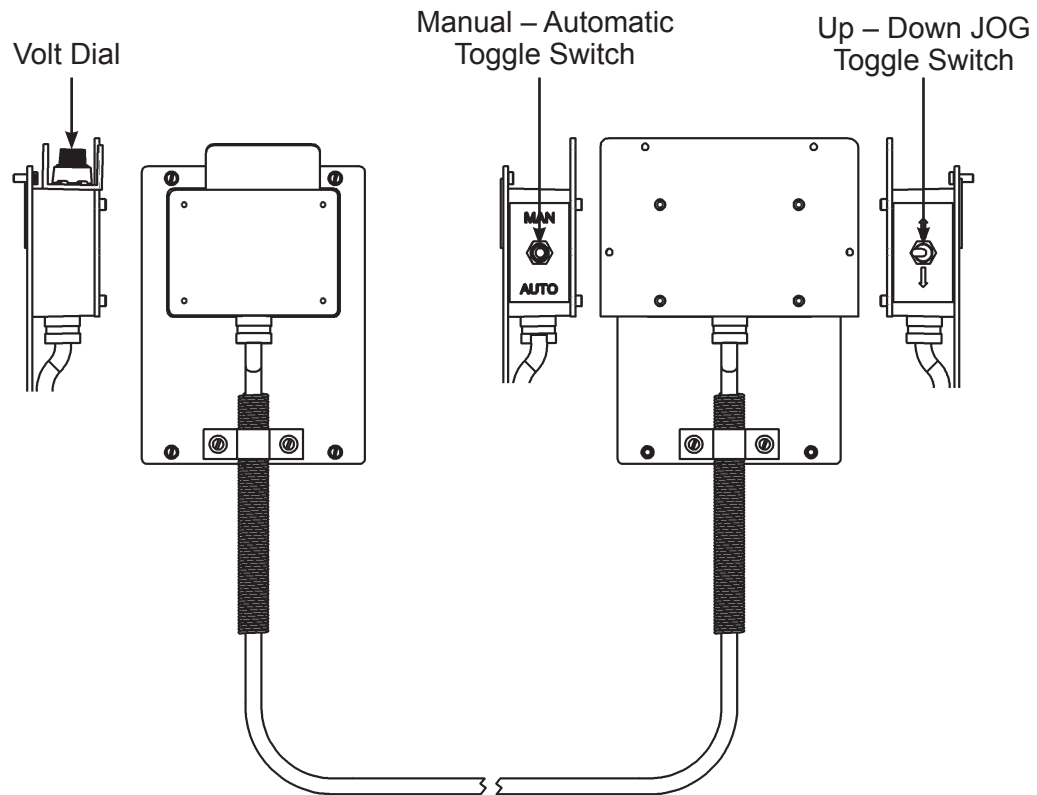
The operator can temporarily override Plasma Height Control using the **Up – Down JOG Toggle Switch** on the Remote Control (AVC-2051-10) while cutting. Plasma Height Control resumes as soon as the jog switch is released. To disable the Plasma Height Control, move the **Manual – Automatic Toggle Switch** on the Remote Control (AVC-2051-10) to **Manual**.

VERIFY SETUP

Before striking an arc, take a moment to verify the machine is set up correctly. With the tractor “ON” and the Arc “OFF”, run the machine and verify it is moving in the intended direction. Verify torch is in the proper position as well as the Drive Unit travel speed. Use the Up – Down JOG Toggle Switch on the Control Box (AVC-2051) to make sure enough vertical travel is available.

SETUP, CONT'D.

Plasma Source, Cutting Torch, and PHC Setup



AVC-2051-10 Remote Control

If using the -RV type sensor, make sure your power source uses a starting method that does not use high frequency such as blowback start or touch start rather than HF start or capacitive discharge, as that may cause premature failure, electromagnetic interference, or an unsafe condition. If HF start or capacitive discharged is used, use the -ID type sensor if your power source has an internal divider, or the -PS type sensor if it does not.

To set your PLASMA HEIGHT CONTROL:

(Reference AVC-2051 Control Box)

- Connect voltage sensor to power source according to sensor wiring instructions.
- Set the height control (**Manual - Automatic Toggle Switch**) to manual mode.
- Confirm the switch on the height slide faces away from the work piece.
- Set the torch height manually (**Up - Down JOG Toggle Switch**) to where you want it.
- Make a small cut and record the volt reading from the power source.
- Now, dial this number, volt reading, into the Height Control (**Volt Dial**).
- Turn the height control (**On - Off Toggle Switch**) back on.
- Run the system and it should run at the same height and thus voltage.

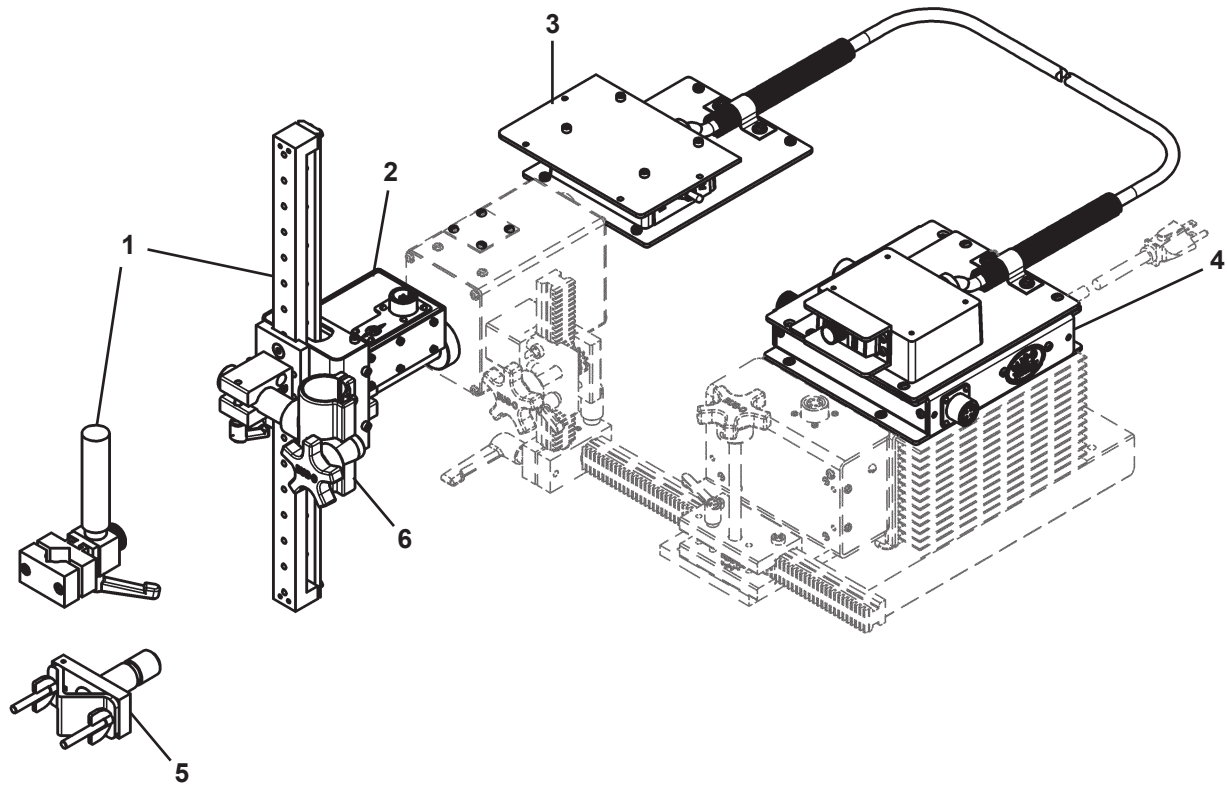
Alternate Setup:

If you already know what voltage you normally use or have charts specifying a voltage that has worked well for you in the past that gives you at least 1/8" (3.2 mm) of standoff, you can begin by entering that voltage on the dial then testing. Adjust the voltage if necessary to account for tolerances in the height control system.

If this does not work please consult "Trouble Shooting Page" in the back of this manual.

The operator can temporarily override Plasma Height Control using the manual jog switch on AVC-2051 Control Box. PHC resumes as soon as the jog switch is released. To disable the PHC, move the Manual -- Automatic Toggle Switch on the AVC-2051 Control Box to manual.

AVC-2060 PLASMA HEIGHT CONTROL / EXPLODED VIEW / PARTS LIST

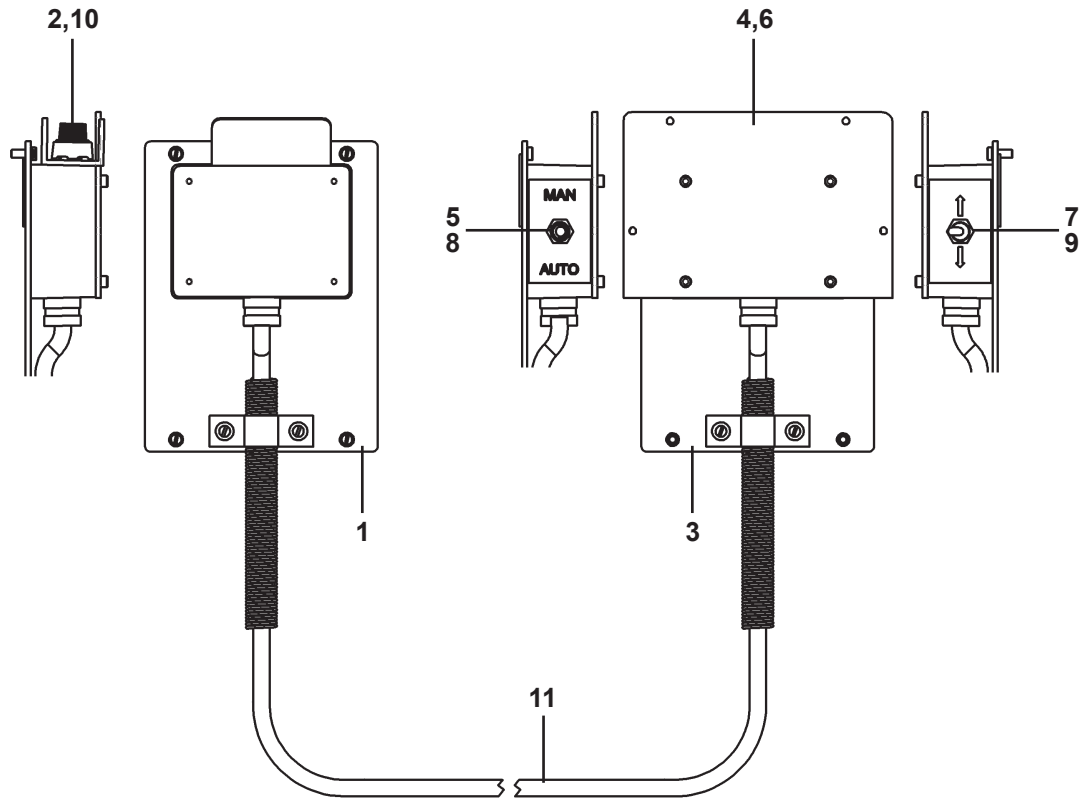


For use with machine barrel plasma torch: Remove standard torch clamp from CAS-1500-18, mount clamp block sideways, and install BUG-5188.

<u>ITEM</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	CAS-1500-18	Height Slide Assembly 18"
2	1	CAS-1558	Pendulum Weaver Adaptor for CAS-1500
3	1	AVC-2051-10	MDS AHC 10' (3.0 m) Remote Control
4	1	AVC-2055	MDS AHC Control Box
5	1	BUG-2708	Clamp
6	1	BIG-5188	Torch Holder Assembly
*	1	CAS-1553	Connecting Cable Hall Effect

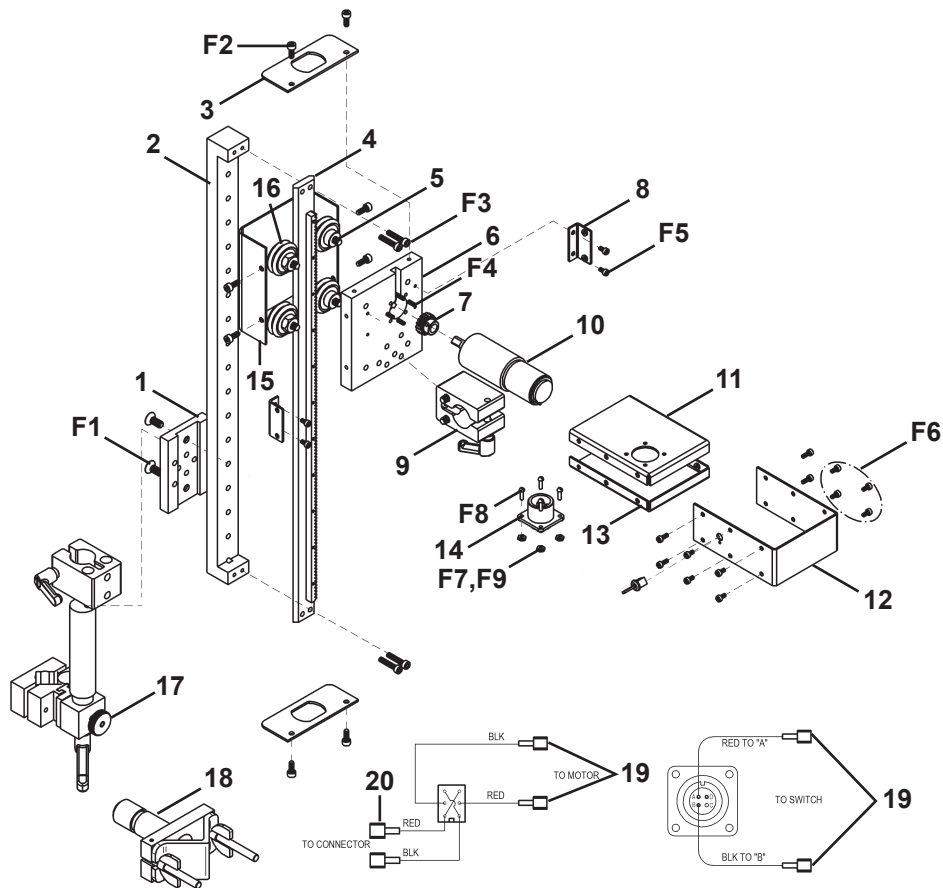
*Not Shown

AVC-2051-10 MDS AHC 10' (3.0 M) REMOTE CONTROL



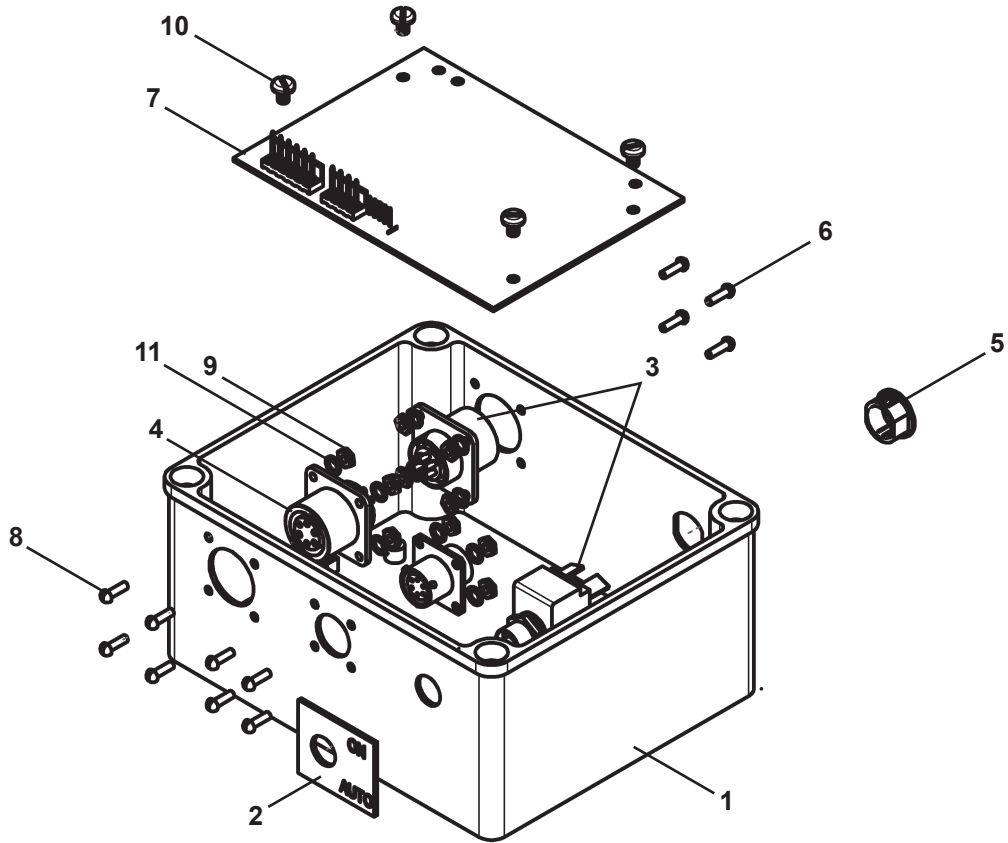
<u>ITEM</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	AVC-2045-M	AVC Pendant, Male End
2	1	BUG-9676	Dial Counter
3	1	CAS-2045-F	CAS Pendant, Female End
4	1	CAS-2052	Guard
5	1	CWO-6335	Toggle Switch, DPDT, On-None-On
6	1	FAS-0525	Soc Hd Cap 8-32 x 1/2
7	1	MUG-1199	Toggle Switch, DPDT, On-Off-On
8	1	PLT-1001	Man / Auto
9	1	PLT-1002	In / Out
10	1	POT 5483	Potentiometer, 10k 3 Turn
11	1	WRE-3659/50	50 Cond. Round Ribbon Cable

CAS-1500-18 HEIGHT SLIDE ASSEMBLY / EXPLODED VIEW / PARTS LIST



<u>ITEM</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	CAS-1512	Torch Mount Plate
2	1	CAS-1509-18	18" Height Arm Mounting Bar
3	2	CAS-1523	End Cap
4	1	CAS-1505-18	18" Height Arm Assembly
5	2	PWS-1028	Fixed Wheel & Leg Assembly
6	1	CAS-1522	Mounting Plate
7	1	CAS-1511	Steel Pinion
8	2	CAS-1517	CAS Drive Motor Cover Mount Angle
9	2	CAS-1510	Dual Position Clamp Block
10	1	PRS-1025	Motor
11	1	CAS-1518	CAS Drive Motor Cover Panel A
12	1	CAS-1521	CAS Drive Motor Outer Cover
13	1	CAS-1519	CAS Drive Motor Cover Panel B
14	1	BUG-1034	Panel Connector, 4-T, M
15	1	CAS-1503-P	Arm Cover
16	2	PWS-1029	Adjustable Wheel & Leg Assembly
17	1	UCW-0261-03-02-00-0	Quick Disconnect Clamp Assembly
18	1	BUG-2708	Clamp
19	4	GOF-3036	QD Female, Fully Insulated
20	2	GOF-3037	QD Male, Fully Insulated
F1	2	MET-0975-SS	Flt Hd Soc Scr M6 x 14
F2	8	MET-0553-SS	Soc Hd Cap Scr M4 x 10
F3	4	MET-0559-SS	Soc Hd Cap Scr M4 x 20
F4	4	MET-0147-SS	Pan Hd Phil Scr M3 x 16
F5	8	MET-0542-SS	Soc Hd Cap Scr M3 x 8
F6	8	MET-0541-SS	Soc Hd Cap Scr M3 x 6
F7	4	FAS-1305	Hex Nut 4-40
F8	4	FAS-1204	But Hd Sk Hd Scr 4-40 x 3/8
F9	4	WAS-0201	#4 Internal Star Lockwasher
*	1	CAS-1557	Control to Slide Cable 3ft

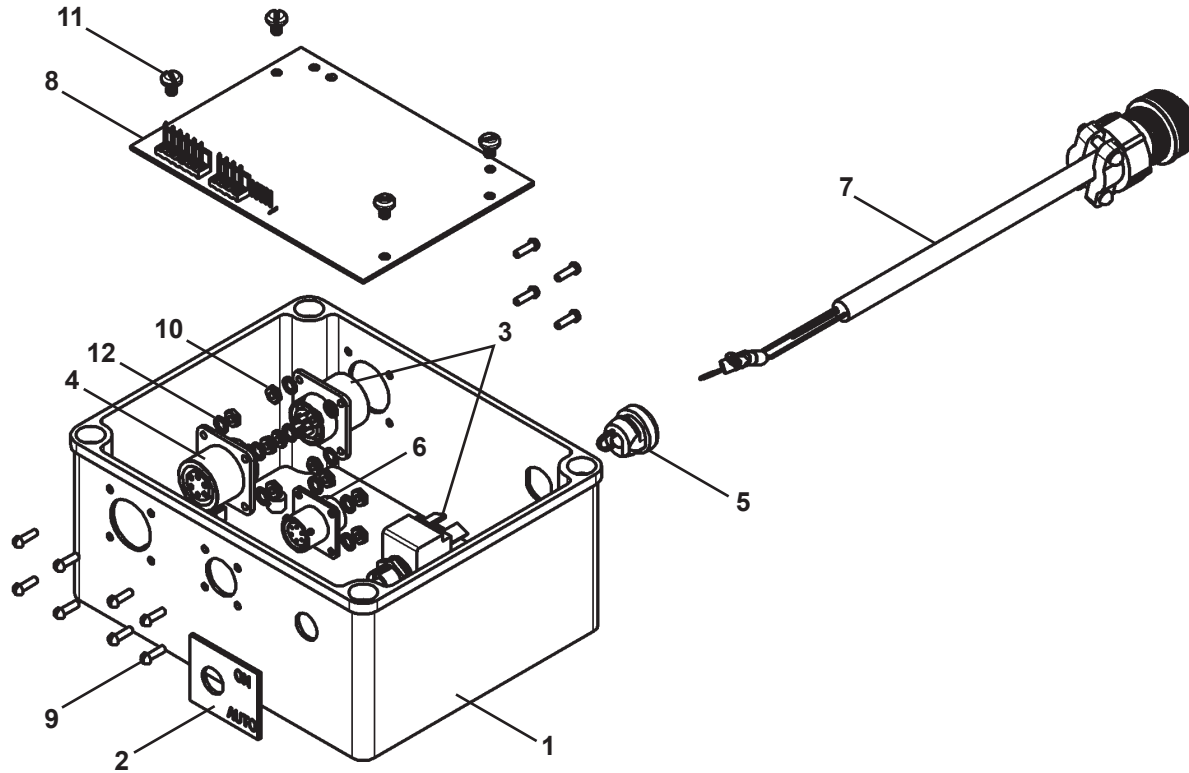
AVC-1550-PL-ID VOLT SENSOR ASSEMBLY, INTERNAL DIVIDER MODEL / EXPLODED VIEW / PARTS LIST



<u>ITEM</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	CAS-1525	AVC Voltage Enclosure
2	1	CAS-1526	Sensor Legend Plate
3	1	CAS-1532	AVC Harness Volt To Pwr
4	1	CAS-1531	AVC Harness Volt To Bug CNN
5	1	PLUG-2666	Hole Plug
6	1	PWS-0305	Main Current Sense Harness
7	1	PCB-1273-PL-ID	PCB Board
8	1	FAS-0104	4-40 x 3/8 Pan Hd Screw
9	12	FAS-1305	4-40 Hex Nut
10	12	MET-0151-N	*Pan Hd Slotted Screw
11	4	WAS-0201	#4 Internal Star Lockwasher

*Do not overtighten

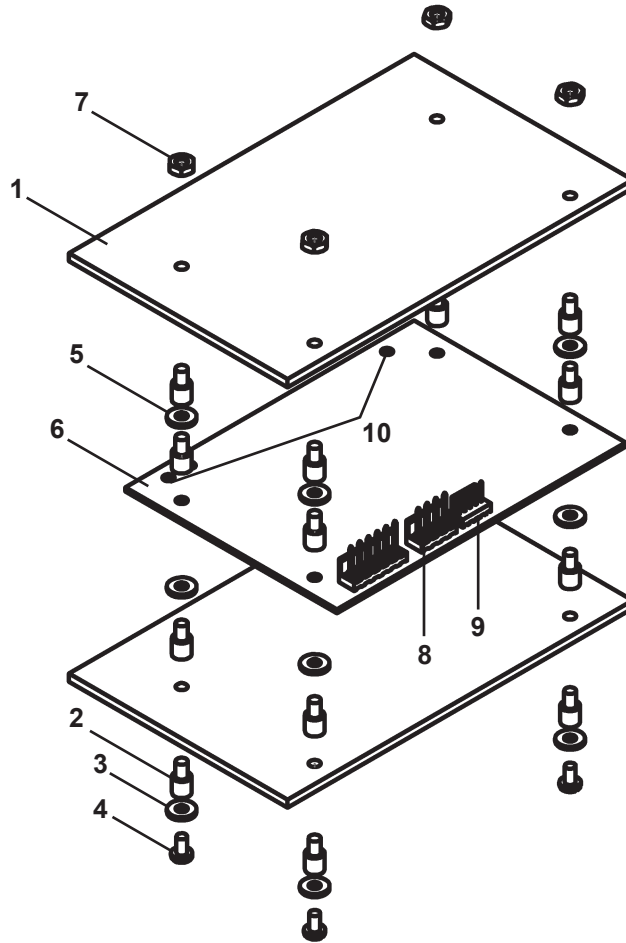
AVC-1550-PL-RV VOLT SENSOR ASSEMBLY, RAW VOLTAGE MODEL / EXPLODED VIEW / PARTS LIST



<u>ITEM</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	CAS-1525	AVC Voltage Enclosure
2	1	CAS-1526	Sensor Legend Plate
3	1	CAS-1532	AVC Harness Volt To Pwr
4	1	CAS-1531	AVC Harness Volt To Bug CNN
5	1	CRS-1598	Hole Plug
6	1	PWS-0305	Main Current Sense Harness
7	1	CAS-1527	Raw Volt Sense Cable
8	1	PCB-1273-PL-RV	PCB Board
9	1	FAS-0104	4-40 x 3/8 Pan Hd Screw
10	12	FAS-1305	4-40 Hex Nut
11	12	MET-0151-N	*Pan Hd Slotted Screw
12	4	WAS-0201	#4 Internal Star Lockwasher

*Do not overtighten

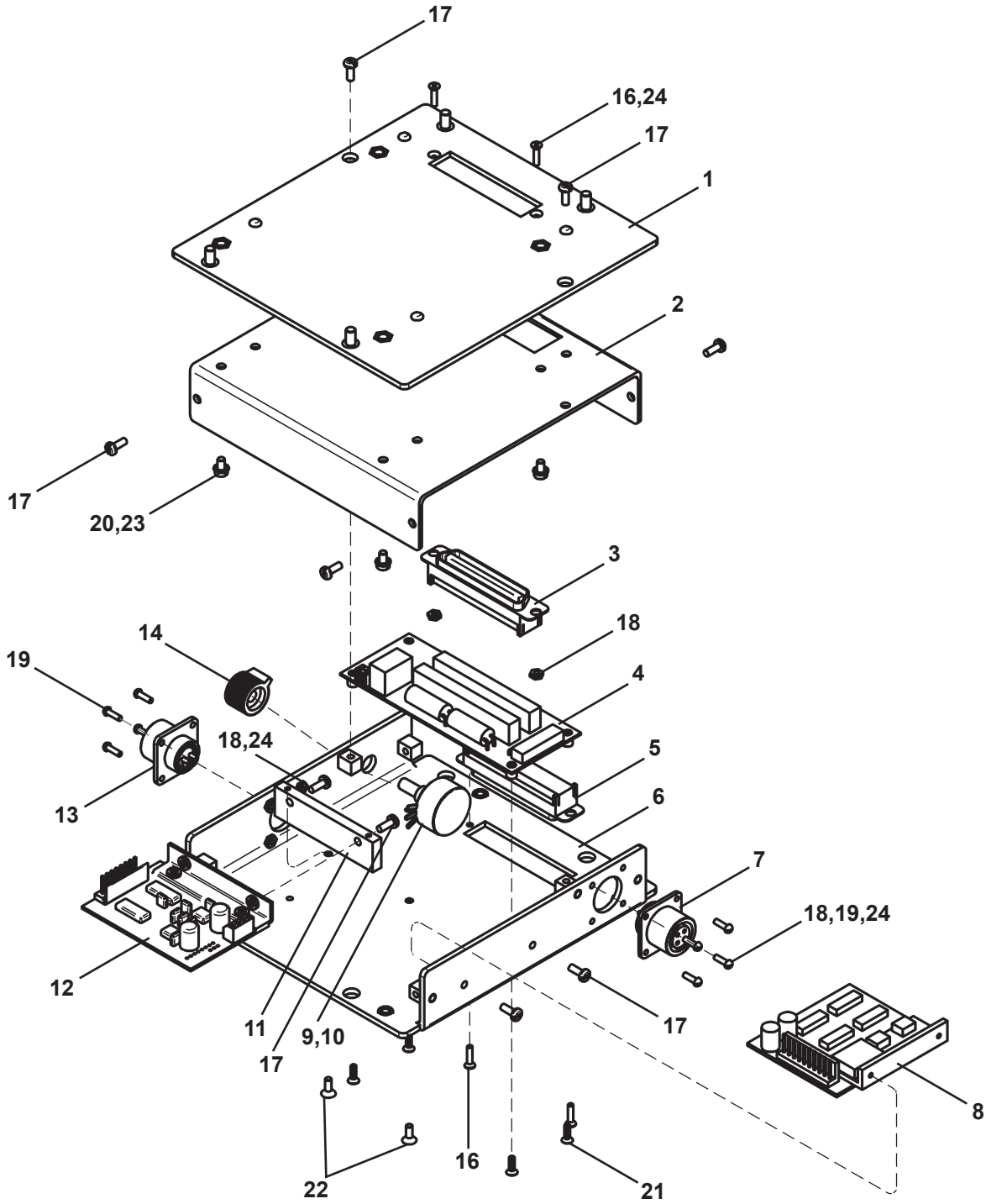
AVC-1550-PL-PS VOLT SENSOR ASSEMBLY, POWER SOURCE MODEL / EXPLODED VIEW / PARTS LIST



<u>ITEM</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	2	CAS-1524	Voltage Sensor Mtg
2	16	STOF-2009	6-32 M/F Nylon
3	4	WAS-0210	#6 SAE Flat Washer
4	4	FAS-0112	Pan Hd Slit 6-32 x 1/4 Black
5	8	WSH 5432	#6 Flat Nylon Washer
6	1	PCB-1273	AVC Volt Sensor
7	4	FAS-1310	Hex Nut 6-32
8	1	CAS-1529	Ok To Move Harness
9	2	CAS-1530	Sense Harness
10	1	CAS-1528	AVC Voltage Leads

Note: Do not overtighten fasteners & standoffs

AVC-2055 CONTROL BOX / EXPLODED VIEW

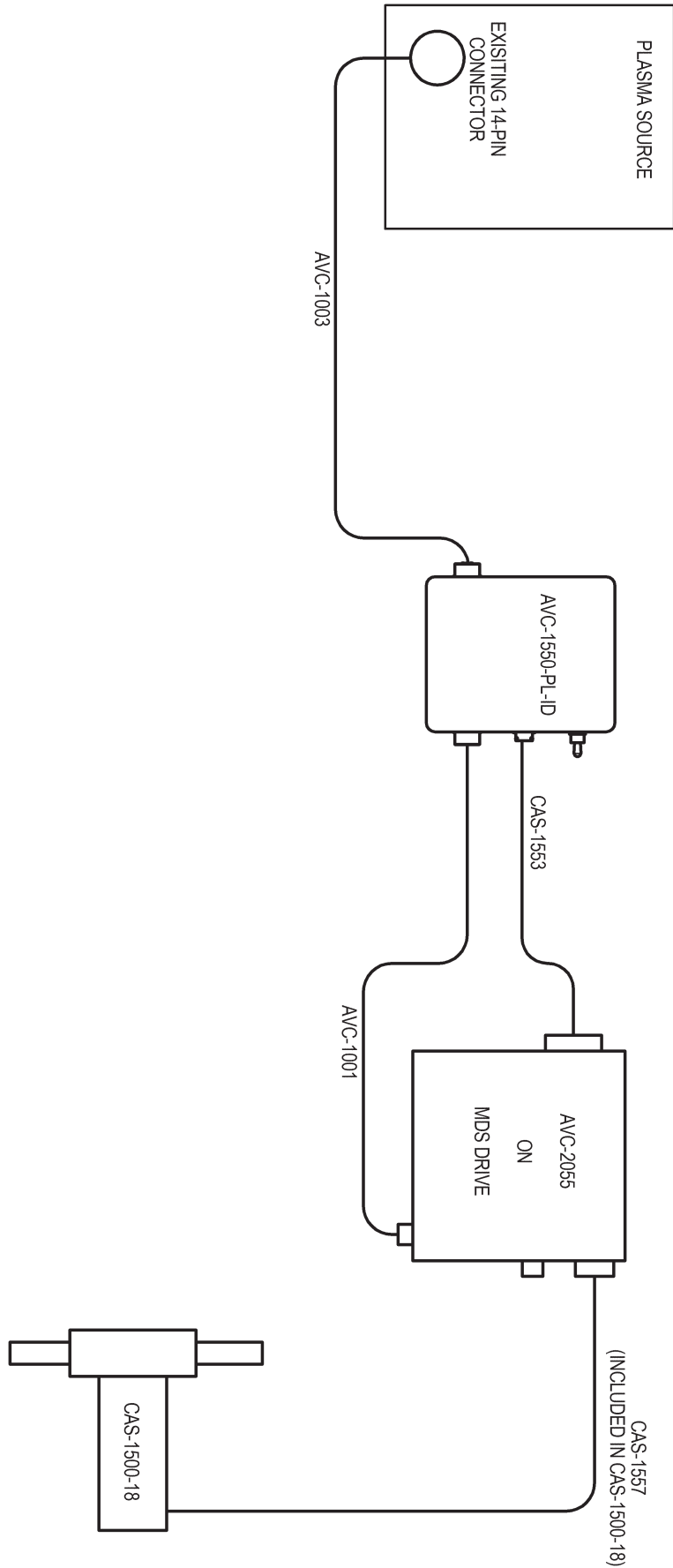


AVC-2055 CONTROL BOX / PARTS LIST

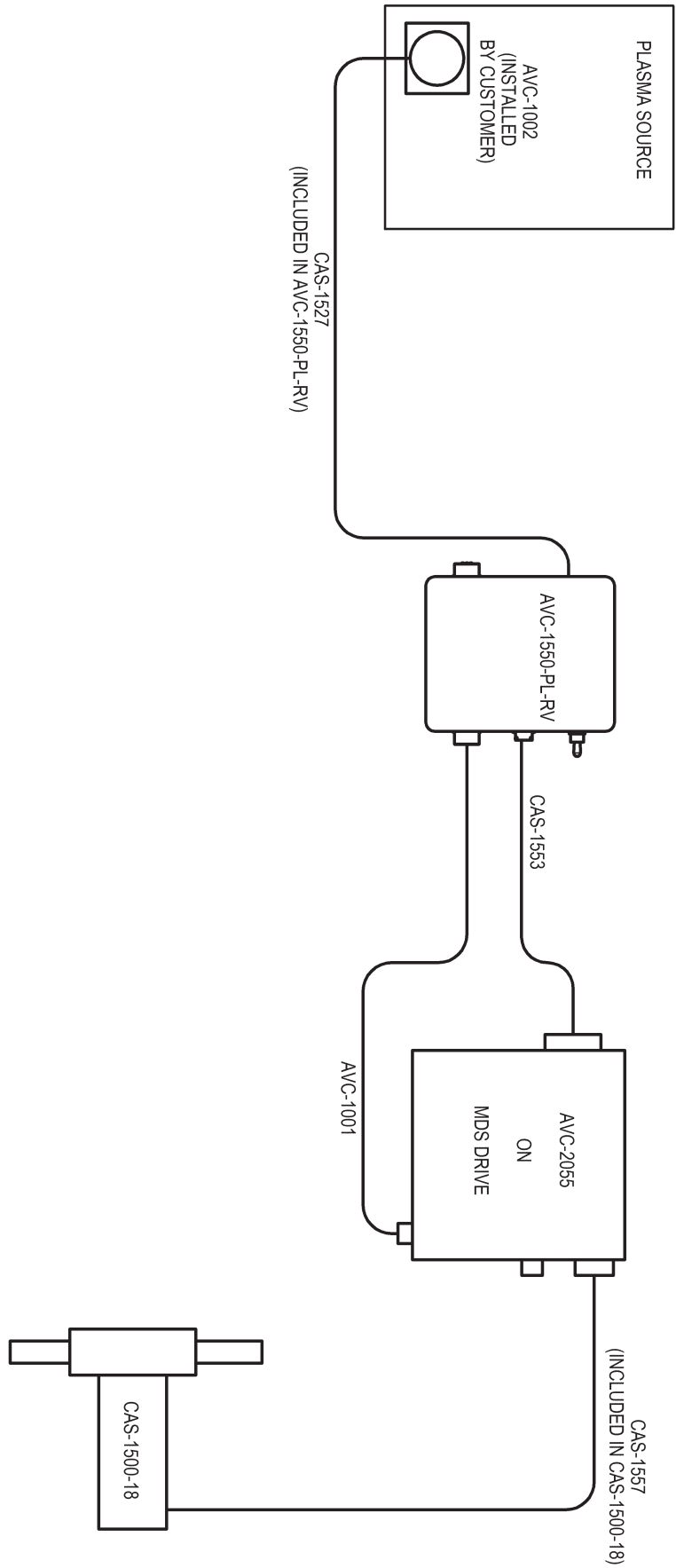
<u>ITEM</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	MDS-1058	Mounting Panel
2	1	MDS-1057	Rear Panel
3	1	PCB-1036	Connector 50-Pin, M
4	1	PCB-1070	MDS AHC Break Out Board
5	1	PCB-1035	Connector 50-Pin, F
6	1	CAS-2056	Front Panel
7	1	MUG-1156	Panel Connector, 4-T, F
8	1	CAS-1780	DC Speed Card w/ 1770 Interface
9	1	BUG-9677	Potentiometer, 10k Ohms
10	1	BUG-5759	Pot Shaft Seal 1/4"
11	1	CAS-2057	CAS-1050-500 Mounting Bracket
12	1	CAS-1060-PL	Control Board, Plasma
13	1	BUG-9856	Panel Connector, 2-T, F
14	1	MDS-1044	Knob for Pot
*15	1	BUG-2005	Bug-O Label
16	4	FAS-0905	Flt Hd Soc Scr #4-40 x 1/2"
17	12	FAS-0114	Pan Hd Scr 6-32 x 3/8 Black
18	10	FAS-1305	Hex Nut 4-40
19	8	FAS-0204	Rnd Hd Slit Scr 4-40 x 3/8 Zinc
20	2	WAS-0221	#8 Internal Star Lock Washer
21	4	MET-0943	Flt Hd Soc M3 x 10
22	2	FAS-0914	#6-32 x 3/8" Flt Hd Socket
23	4	FAS-0722	Fil Hd Scr 8-32 x 1/4
24	12	WAS-0201	#4 Internal Star Lock Washer

* Not Shown

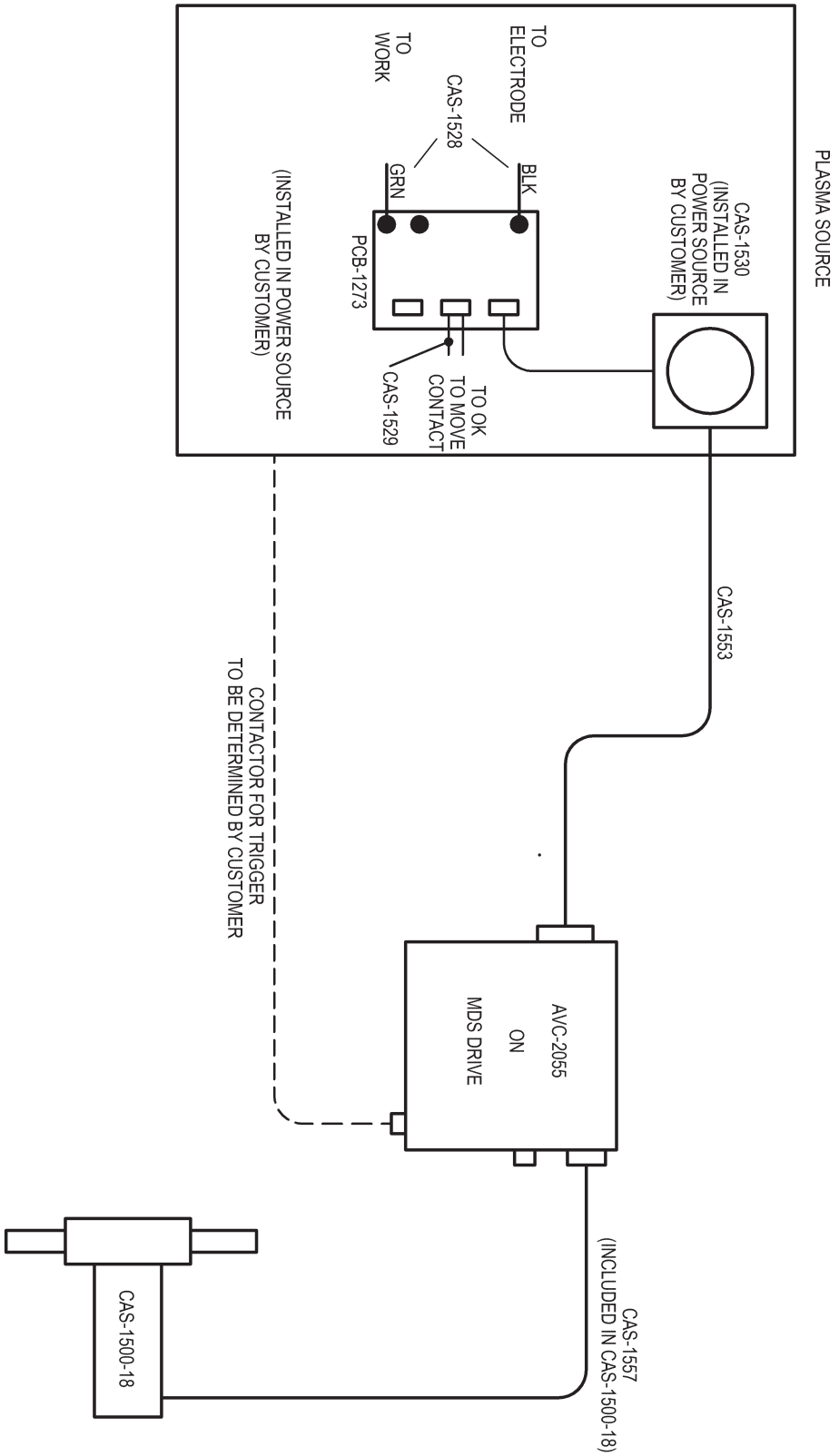
AVC-2050-PL-ID CONNECTION DIAGRAM



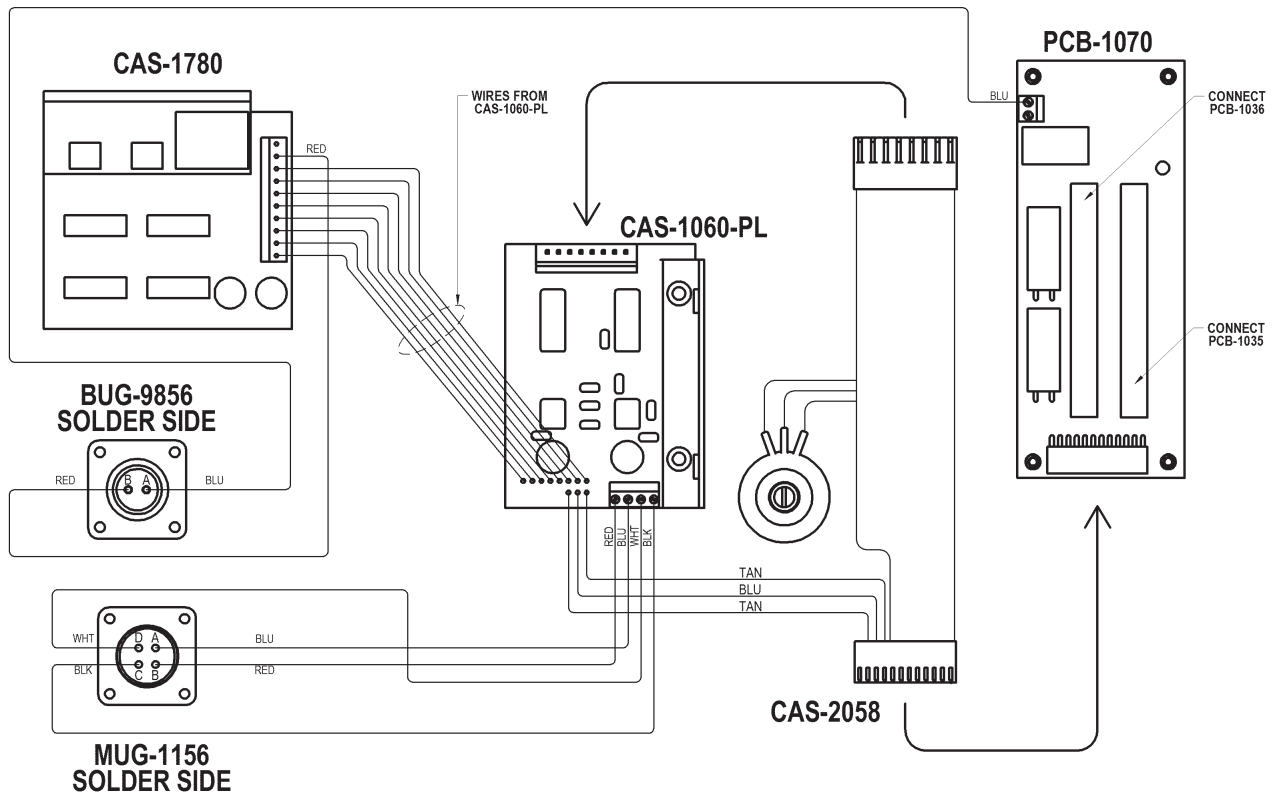
AVC-2050-PL-RV CONNECTION DIAGRAM



AVC-2050-PL-PS CONNECTION DIAGRAM

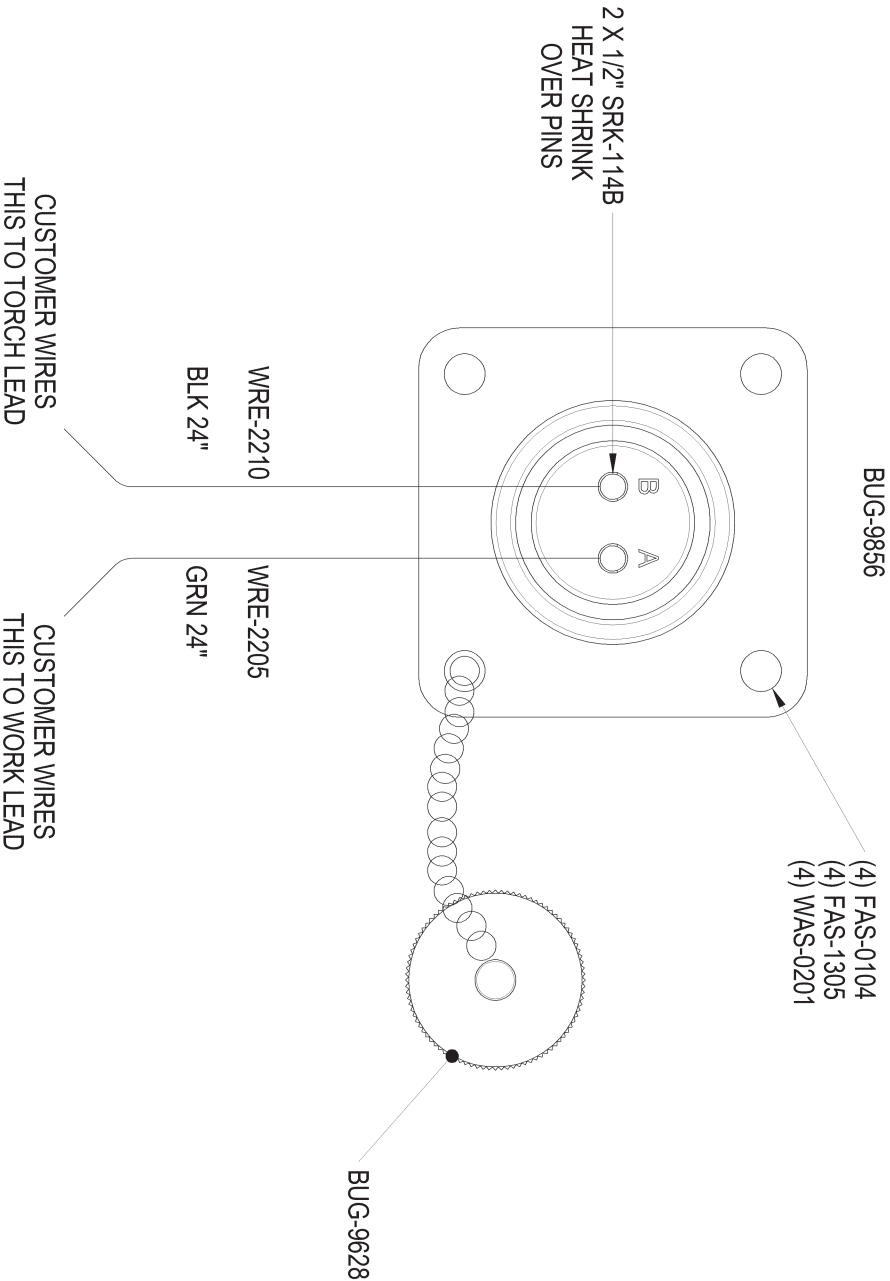


AVC-2055-WD CONTROL BOX / WIRING DIAGRAM / PARTS LIST

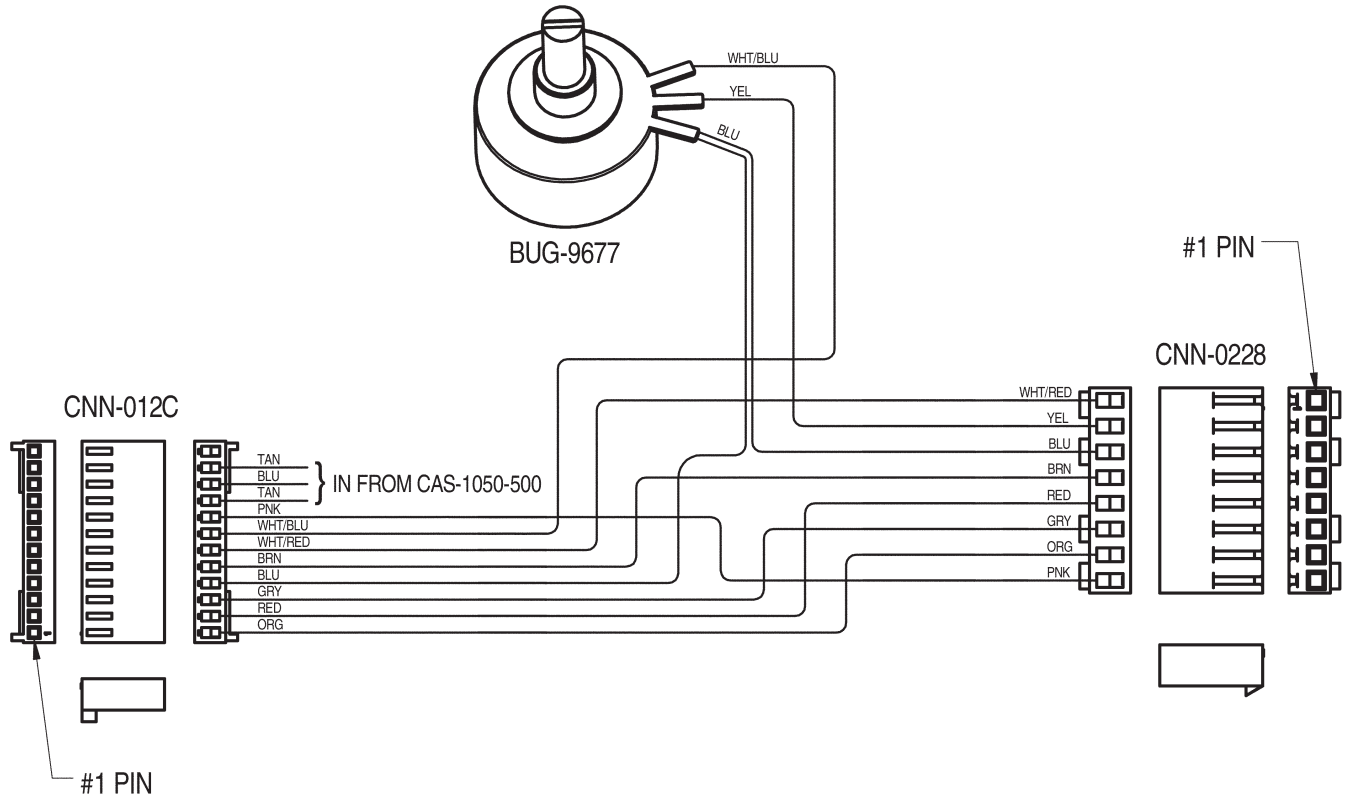


<u>PART NO.</u>	<u>DESCRIPTION</u>
CAS-1780	DC Speed Card with CAS-1770 Interface
BUG-9856	Panel Connector, 2-T, F
MUG-1156	Panel Connector, 4-T, F
CAS-1060-PL	Control Board, Plasma
CAS-2058	MDS AHC Wiring Harness
PCB-1070	MDS AHC Break Out Board
PCB-1036	Connector 50 Pin (M) w/ Ribbon to Socket
PCB-1035	Connector 50 Pin (F) w/ Ribbon to Socket

AVC-1002-WD WIRING DIAGRAM

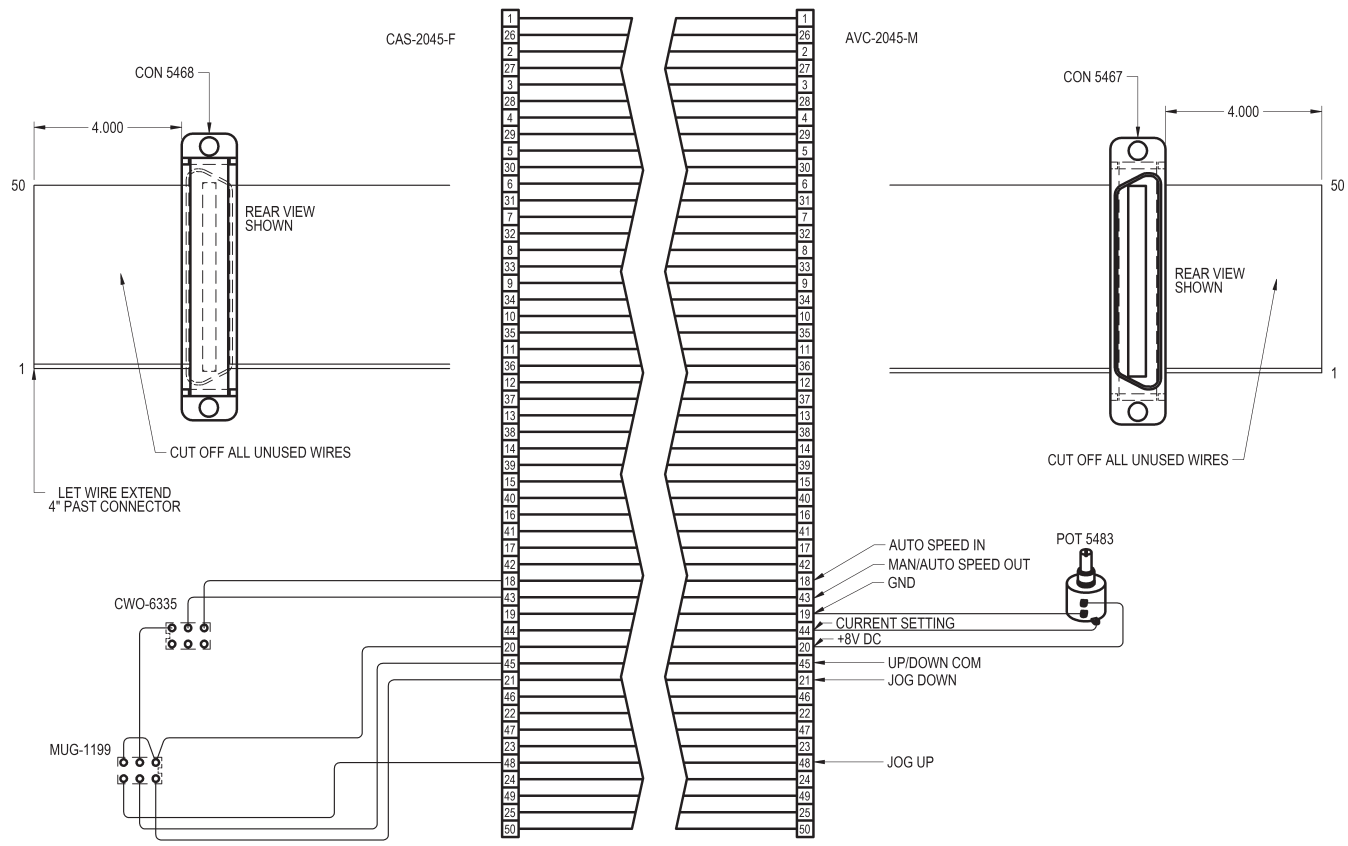


CAS-2058 MDS AHC WIRING HARNESS / WIRING DIAGRAM / ELECTRICAL COMPONENT CHART



PART NO.	DESCRIPTION
CNN-012C	12 Position Housing w/ Pins
BUG-9677	Potentiometer, 10K OHMS
CNN-0228	Housing 8 Pin

AVC-2051-10-WD MDS AHC 10' (3.0 M) REMOTE CONTROL / WIRING DIAGRAM / PARTS LIST



PART NO.	DESCRIPTION
CWO-6335	Toggle Switch, DPDT, On-None-On
MUG-1199	Toggle Switch, DPDT, On-Off-On
CON 5468	50 Position D-Ribbon, Female, Gold
CON 5467	50 Position D-Ribbon, Male, Gold
POT 5483	Potentiometer

TROUBLESHOOTING

If your control board has jumper J5 on it, you can test your height control without cutting by following the steps below. If you have an older style control board without jumper J5, or if you prefer to test by cutting rather than opening the control box, skip this test and use the instructions for the cutting test.

1. Turn your height control system off and unplug it
2. Verify height slide switch is facing away from the work piece
3. Verify speed knob is not set to minimum
4. Open control box to access control board
5. Move jumper J5 to between pins 1 & 2
6. Close control box
7. Set height control to manual mode
8. Change set point voltage dial to 150
9. Plug in system and turn on
10. Jog the height slide so the slide has room to move down
11. Switch to automatic mode; the slide should move down
12. Switch back to manual mode
13. Change set point voltage dial to 250
14. Jog the height slide so the slide has room to move up, if necessary
15. Switch to automatic mode; the slide should move up
16. Switch back to manual mode
17. Turn system off and unplug it
18. Move jumper J5 to between pins 2 & 3
19. Close control box

If the setting is lower than that of the actual cutting voltage, the Height Control should move toward the work piece. If the setting is higher than that of the actual cutting voltage, the Height Control should move away from the work piece. To test, set 60 Volt setting and a large standoff; Height Control should back out. 300 Volts and a small standoff, and Height Control should dive in.

If you cannot fix Plasma Height Control with the above information, please provide the following:

1. How old is the system?
2. Did it ever work correctly?
3. Does the height slide move up and down in the proper directions when jogged in manual mode?
4. If not using AVC-1550-ID, how is the sensor wired to the plasma source?
5. If using AVC-1550-RV, does your plasma source use HF start or capacitive discharge?
6. Give some indication on how it failed the above procedures.

WARRANTY

Limited 3-Year Warranty

MODEL _____
SERIAL NO. _____
DATE PURCHASED: _____
WHERE PURCHASED: _____

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

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

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

Distributor's Warranty:

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

HOW TO OBTAIN SERVICE:

IF YOU THINK THIS MACHINE IS NOT OPERATING PROPERLY, RE-READ THE INSTRUCTION MANUAL CAREFULLY, THEN CALL YOUR AUTHORIZED BUG-O DEALER/DISTRIBUTOR. IF THEY CANNOT GIVE YOU THE NECESSARY SERVICE, WRITE OR PHONE US TO TELL US EXACTLY WHAT DIFFICULTY YOU HAVE EXPERIENCED. BE SURE TO MENTION THE MODEL AND SERIAL NUMBERS.