

INSTRUCTIONS AND PARTS MANUAL

AUTOMATIC HEIGHT CONTROL CAS-2050

for WPD-1100 Linear 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-CAS-2050-IPM-0321

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



B U G - O S Y S T E M S

A DIVISION OF WELD TOOLING CORPORATION



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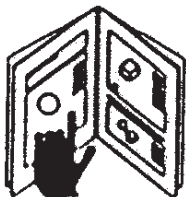
SAFETY

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



ELECTRIC SHOCK can kill.

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



READ INSTRUCTIONS.

Read the instruction manual before installing and using the equipment.



EQUIPMENT DAMAGE POSSIBLE.

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

AUTOMATIC HEIGHT CONTROL

CAS-2050

FOR WPD-1100 PENDULUM WEAVER

INSTRUCTIONS AND PARTS MANUAL

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INTRODUCTION

The CAS-2050 is an Automatic Height Control (**AHC**) for the WPD-1100 Linear Weaver that controls the welding tip to work distance and maintains a constant weld current, helping to provide uniform weld penetration. The CAS-2050 senses the actual weld current, compares this value to the set point, and raises or lowers the welding gun accordingly.

The CAS-2050 features a built-in time delay after the arc is struck, and automatically shuts off when the current drops too low (generally below 60 amps). The operator can temporarily override the Automatic Height Control using the **Up – Down JOG Toggle Switch** on the Remote Control (CAS-2051-10) while welding. Automatic Height Control resumes as soon as the jog switch is released. To disable the Automatic Height Control, move the **Manual – Automatic Toggle Switch** on the Remote Control (CAS-2051-10) to the manual position.

OVERVIEW

CAS-2050 AHC is available as original equipment or as a retrofit unit designed to provide Automatic Height Control on BUG-O Modular Drive Systems (**MDS**) with the WPD-1100 Linear Weaver. The CAS-1500 Height Slide Assembly replaces the welding clamp originally supplied on the Linear Weaver.

ITEMS SUPPLIED

CAS-2050 Automatic Torch Height Control for **WPD-1100 Linear Weaver** includes:

CAS-1500	Height Slide Assembly
CAS-1550	Hall Effect Current Sensor Assembly
CAS-2051-10	MDS AHC 10' (3.0 m) Remote Control
CAS-2055	MDS AHC Control Box

SPECIFICATIONS

Weight (Net):	14.5 lbs (6.6 kg)
Travel:	2" (50.8 mm)
Carrying capacity:	10 lbs (4.5 kg)
Operating Range:	60 to 500 amps

ALL BUG-O Automatic Height Controls require a Constant Voltage (CV**) Power Source. Consult the factory for your particular application.**

SETUP

CAS-1500 Height Slide Assembly

The Height Slide Assembly replaces the Welding Clamp originally supplied on the Linear Weaver. It mounts to the 7/8" (22.2 mm) diameter rod. *(Remove CON-1020 Swivel Clamp and BUG-2708 Clamp and set aside for use when Automatic Height Control is not used.)*

Slide clamp on bottom of CAS-1500 Height Slide Assembly onto UNI-1036 Rackrider with Post and lock in position.

CAS-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 securely in place with the four (4) screws, one (1) in each corner.

CAS-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 CAS-2055. Seat this plug securely in place with the four (4) screws, one (1) in each corner.

SETUP, CONT'D.

Position and Clamp Welding Gun

With CAS-1500 installed on the Linear Weaver Cross Arm, secure the welding gun 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 wire feeder contact circuit.

Install Current Sensor

Connect CAS-1550 Hall Effect Current Sensor "in-line" in the welding current circuit. NOTE: It can be installed on either side of the circuit.

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 Welding Gun

Proper setup of the welding gun is critical to a successful weld. In addition to manually positioning the welding gun within the clamp, the welding gun must also be properly set with respect to three mechanical controls: The cross arm, the height controller and the tractor position.

Cross Arm: The cross arm offers a weave of up to 1" (25.4 mm) left and right, 2" (50.8 mm) total. Center the cross arm before placing the welding gun over the work area.

Height Slide Assembly: The slide assembly has 2" (50.8 mm) of travel available. For best results, position the slide assembly in the middle of the total range before setting the welding gun. Use the Up – Down JOG Toggle Switch located on Remote Control (CAS-2051-10).

Tractor Position: Use the tractor Carriage Travel Switch to position the Drive Unit at the start of the weld. 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

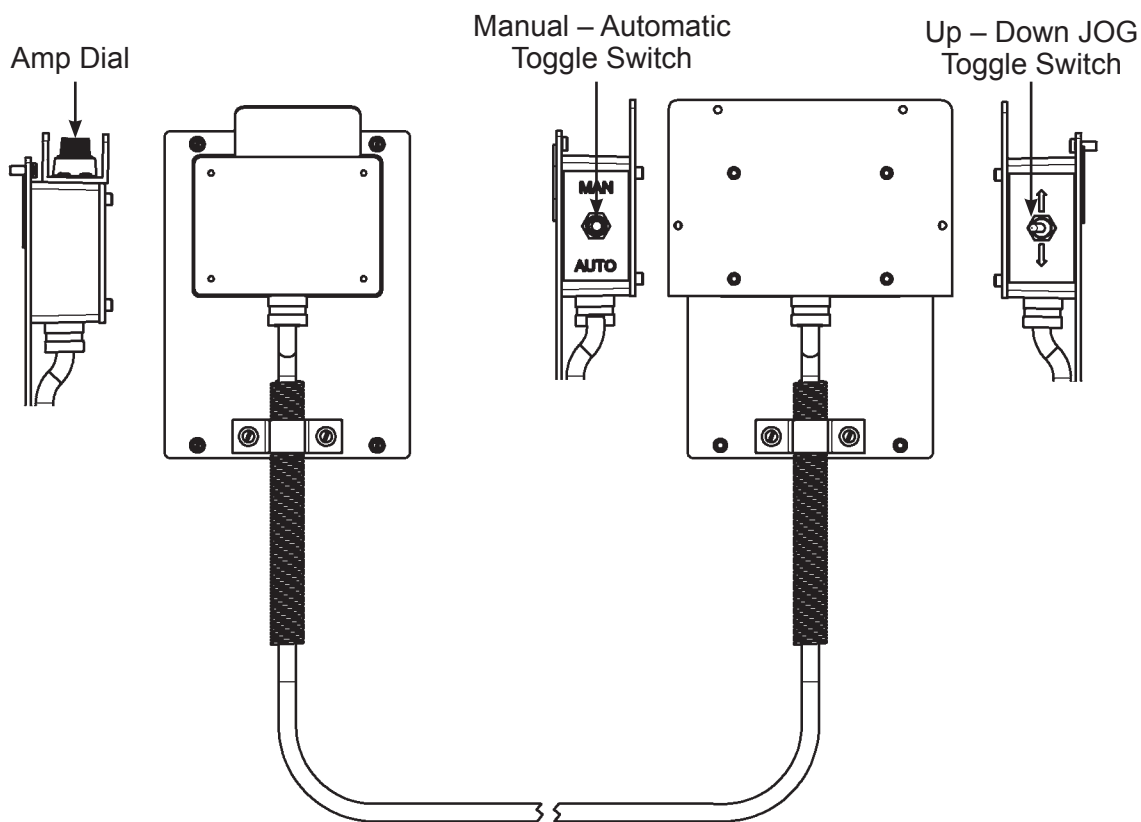
Use the Weaver Control Module (MDS-1005) to set the motion parameters. Refer to "**Modular Drive System Instructions and Parts Manual**" for detailed explanation of all settings and adjustments for a Linear Weaver (WPD-1100).

VERIFY SETUP

Before welding, 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 cross arm is in the proper position as well as the Drive Unit travel speed. Use the Up – Down JOG Toggle Switch on the Control Box (CAS-2051) to make sure enough vertical travel is available.

SETUP, CONT'D.

Welder, Wire-feeder, Welding Gun, Weld and Automatic Height Control Setup



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

MAKE SURE THE WELDING POWER SOURCE is a Constant Voltage model and that it is in the *CV MODE!!!* If your welding power source is not or does not have a Constant Voltage option the Automatic Height Control WILL NOT WORK!

To set your AUTOMATIC HEIGHT CONTROL:

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

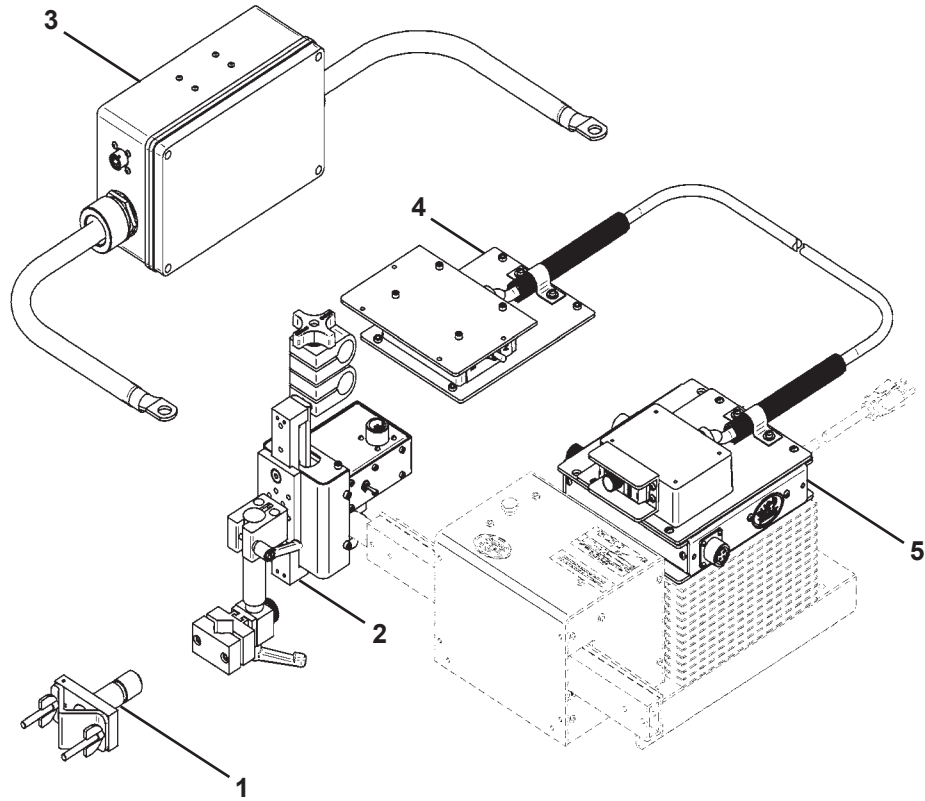
- Verify that the connection of the CAS-1550 Hall Effect Sensor Box is in-line within the welding current circuit
- Set the height control (**Manual – Automatic Toggle Switch**) to manual mode.
- Set the torch height manually to the correct distance from the work piece using the **Up – Down JOG Toggle Switch**
- Make a small weld and record the current reading from the power source.
- Now, dial the current reading into the Height Control (**Amp Dial**).
- Turn the height control (**Manual – Automatic Toggle Switch**) to “Automatic”.
- The system should run at the same height and thus current.

NOTE: Some minor adjustment of the Amp Dial may be required to achieve the current output desired. If the above does not work, it is possible that the slide on the Height Control is positioned in reverse. If this happens;

- Physically turn the slide over, or reverse the motor leads.
- Then repeat the “running procedure” above again.
 - If it works now, check that the **Up – Down JOG Toggle Switch** works in the proper direction. If not, it can be fixed by rotating the switch in the panel 180 degrees.

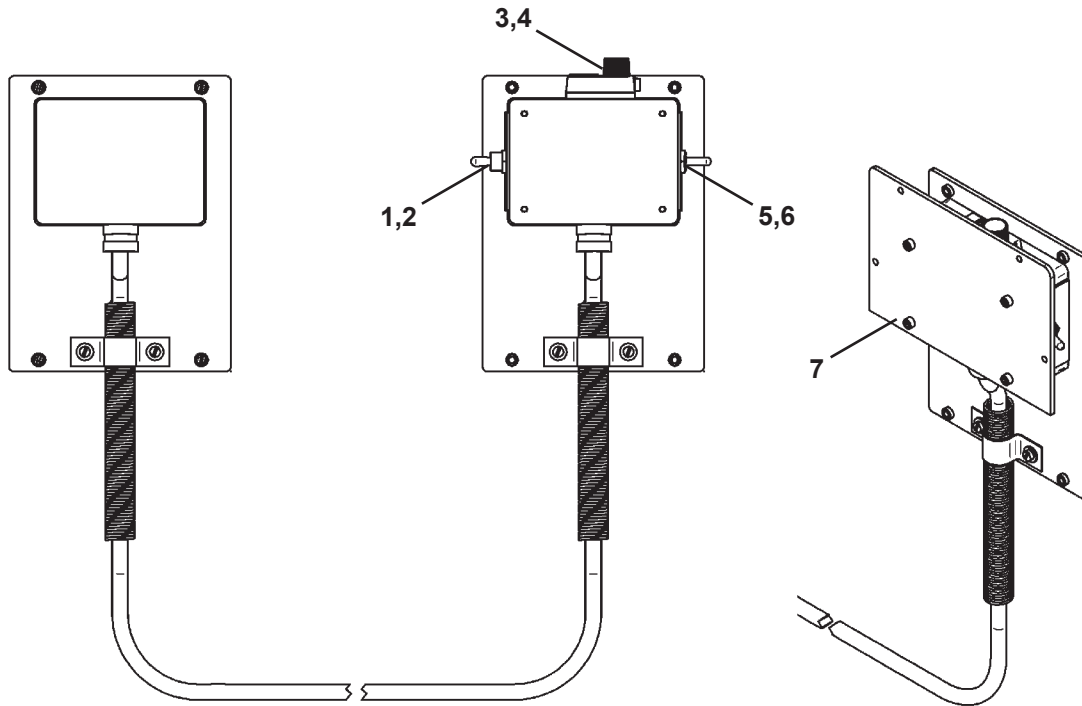
If this does not work please consult “Troubleshooting Page” in the back of this manual.

CAS-2050 AUTOMATIC HEIGHT CONTROL FOR WPD-2100 LINEAR WEAVER



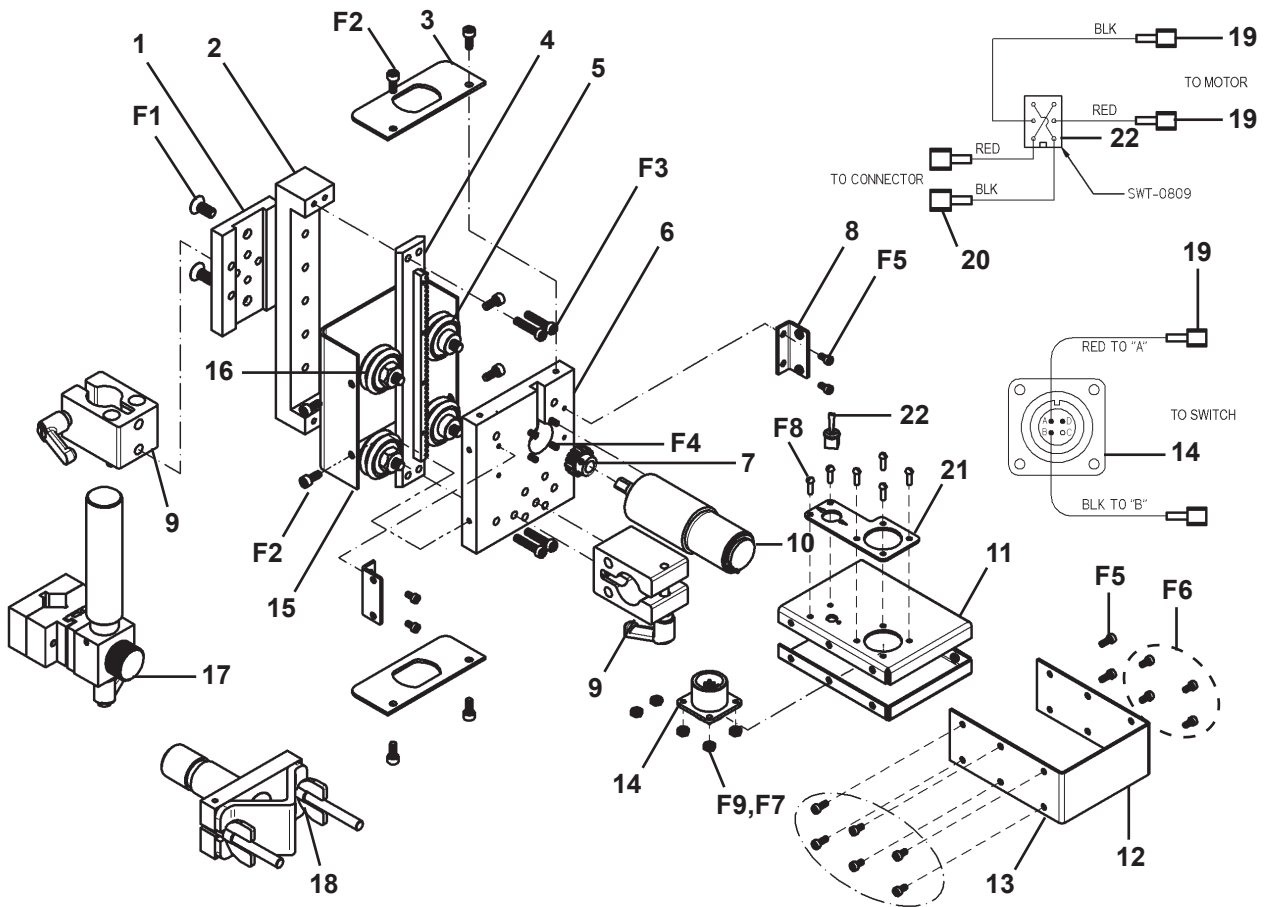
<u>ITEM</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	BUG-2708	Clamp
2	1	CAS-1500	Height Slide Assembly
3	1	CAS-1550	Hall Effect Sensor Assembly
4	1	CAS-2051-10	MDS AHC 10' (3.0 m) Remote Control
5	1	CAS-2060	MDS AHC Control Box

CAS-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	CWO-6335	DPDT Toggle Switch
2	1	PLT-1001	Auto/Man Plate
3	1	BUG-1572	Potentiometer
4	1	BUG-9676	Dial Counter
5	1	MUG-1199	DPDT Toggle Switch
6	1	PLT-2002	Up/Down Plate
7	1	CAS-2052	Guard for CAS Controls

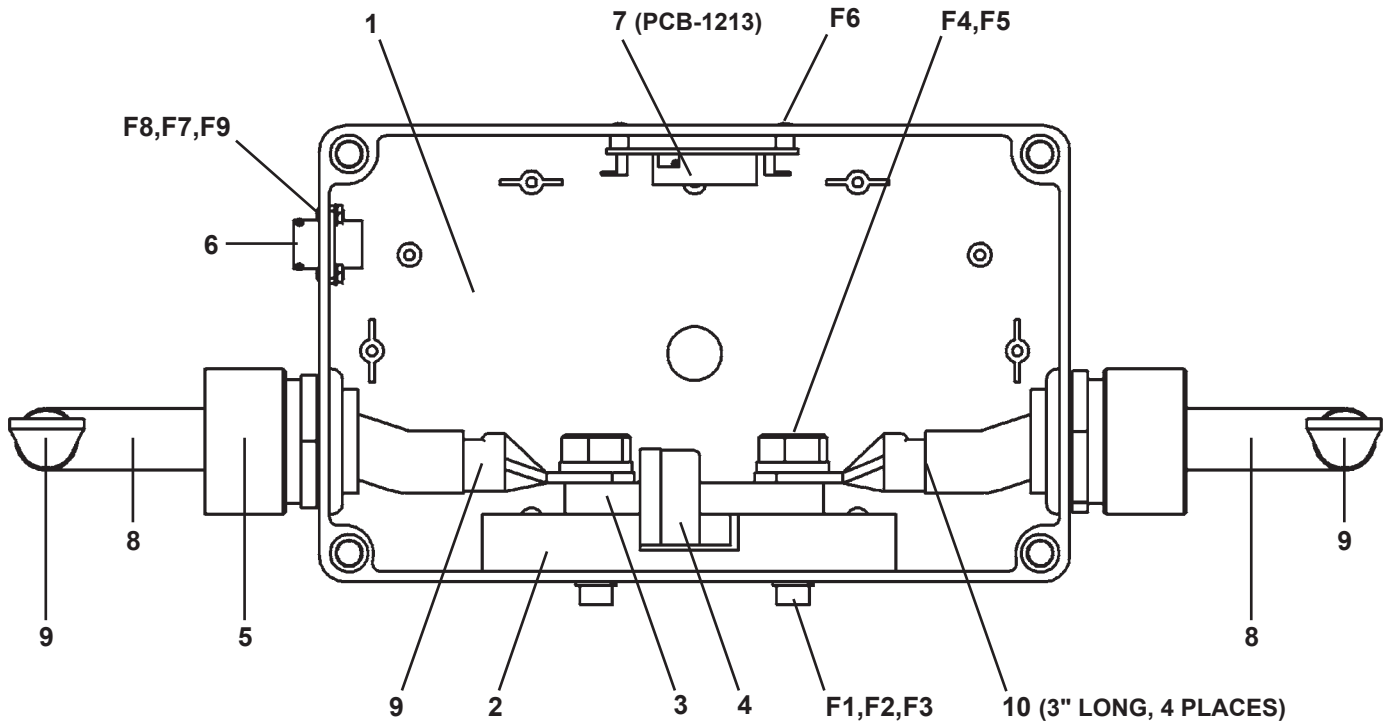
CAS-1500 HEIGHT SLIDE ASSEMBLY / EXPLODED VIEW / PARTS LIST



<u>ITEM</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	CAS-1512	Torch Mount Plate
2	1	CAS-1509	Height Arm Mounting Bar
3	2	CAS-1523	End Cap
4	1	CAS-1505	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	CAS-1590	Torch Holder Assembly
18	1	BUG-2708	Clamp
19	4	GOF-3036	Qd Female, Fully Insulated
20	2	GOF-3037	Terminal, QD, Insulated
21	1	AVC-2116	Amp-Volt, Legend Plate
22	1	SWT-0809	Toggle Switch, DPDT, On-None-On
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	6	FAS-1305	Hex Nut # 4-40
F8	6	FAS-1204	But Hd Sk Hd Scr # 4-40 x 3/8
F9	6	WAS-0201	#4 Internal Star Lockwasher
*	1	CAS-1557	Control to Slide Cable 3ft

* Not Shown

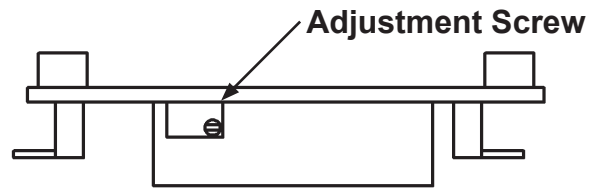
CAS-1550 HALL EFFECT CURRENT SENSOR ASSEMBLY



<u>ITEM</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
1	1	CAS-1552	Hall Effect Current Sensor Assembly
2	1	PWS-0303	Insulator Block
3	1	PWS-0304	Brass Current Bar
4	1	CAS-1551	500A Current Sensor
5	2	PWS-0307	1" Cord Grip .63" to .75" Cable
6	1	PWS-0305	Main Current Sense Harness
*	1	PWS-0306	Sensor Harness
7	1	PCB-1213	Hall Effect Interface Board
8	2 x 20"	CWO-6001	2/0 Weld Cable
9	4	CWO-8061	Lug, 1/0-2/0 Welding
10	12"	CWO-6029	Heat Shrink Tube
F1	2	MET-0578-SS	Soc Hd Cap Screw M6 x 18
F2	2	WAS-0243	1/4" Split Lock Washer
F3	2	WAS-0240	1/4" Sae Flat
F4	2	FAS-2301	Hex Hd Cap Screw 1/2-13 x 1-1/4"
F5	2	WAS-0281	1/2" Split Lock Washer
F6	4	MET-0141-SS	Pan Hd Phil Screw M3 x 6
F7	4	WAS-5541-SS	M3 Lock Washer
F8	4	MET-1340-SS	M3 Hex Nut
F9	4	MET-0143-SS	Pan Hd Phil Screw M3 x 10

* Not Shown

PCB-1213 ADJUSTMENT POT



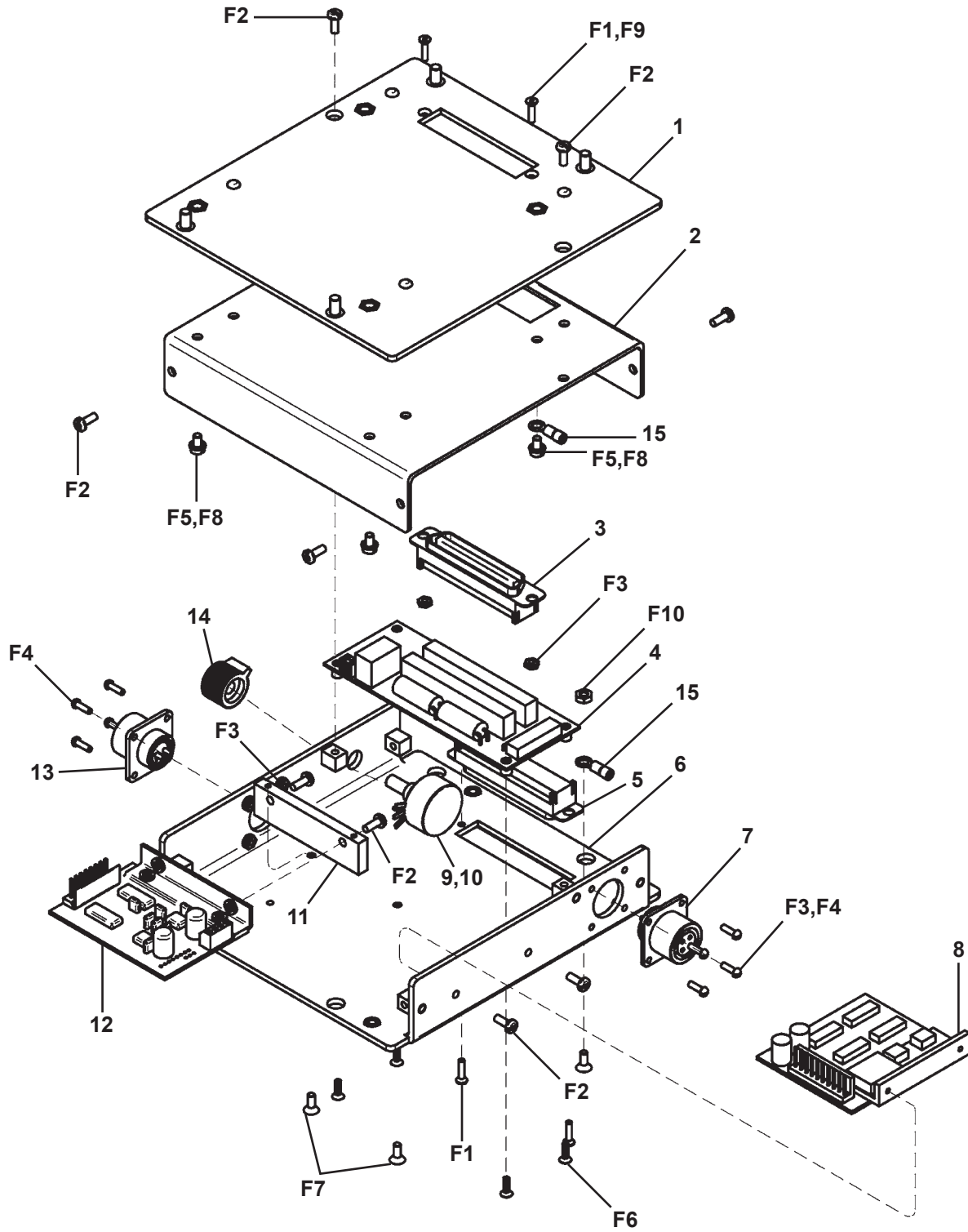
The **Amp Dial** setting **MDS AHC Remote Control (CAS-2051-10)** may not exactly match the current display on the power source. If precise matching is important, the user can calibrate the system so that they match using the **Adjustment Pot (PCB-1213)** found inside the Hall Effect Sensor Assembly (CAS-1550).

While the system is welding and the AHC is "ACTIVE", turn the **Adjusting Screw** using a small "Jeweler's Style" screw driver.

As this screw is turned, the current display on the power source will change. When the display on the welding power source matches the **Amp Dial** setting, the system is calibrated.

NOTE: This adjustment is not normally needed.

CAS-2055-WD CONTROL BOX / EXPLODED VIEW

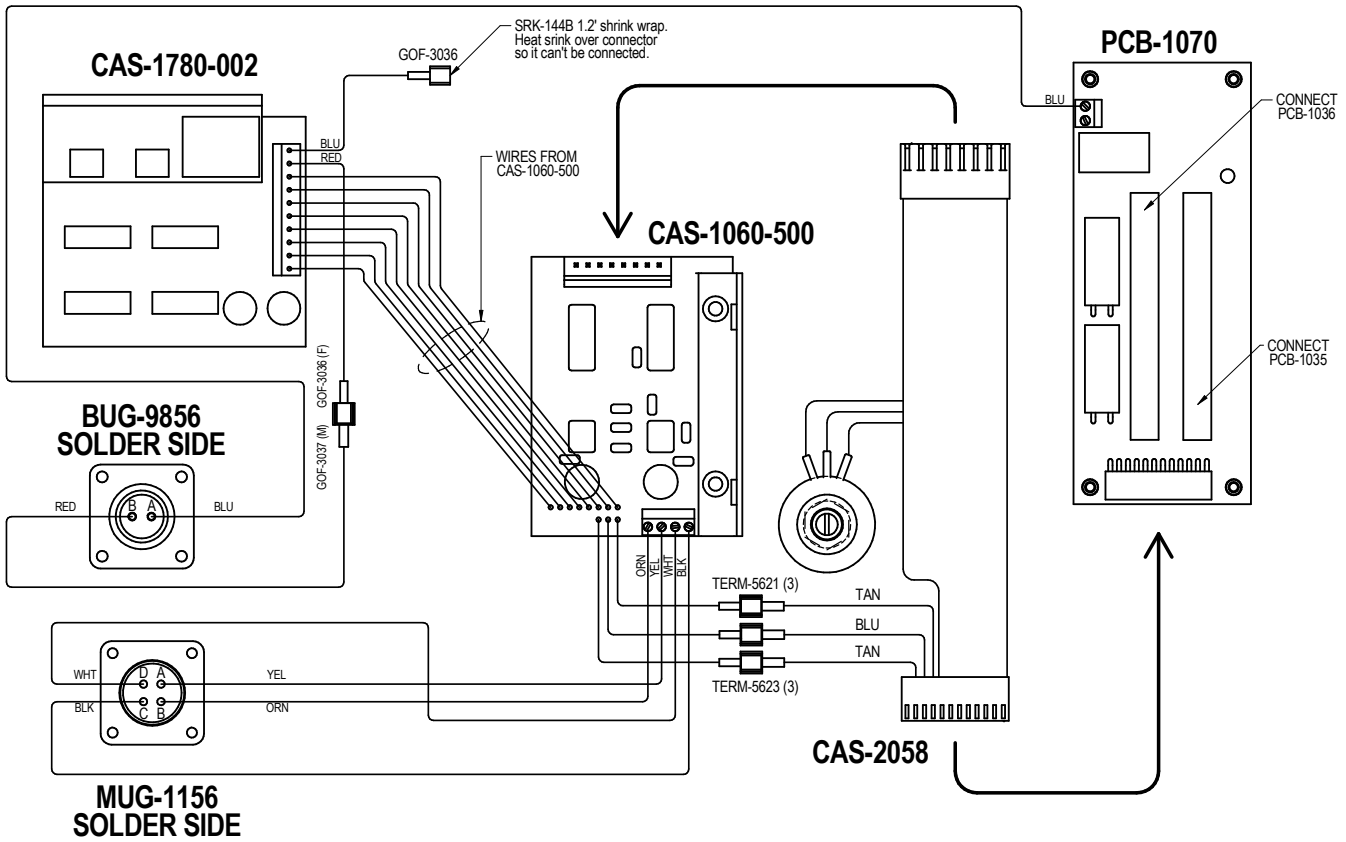


CAS-2055-WD CONTROL BOX / PARTS LIST

<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, Painted
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 MDS AHC Control Box
7	1	MUG-1156	Panel Connector, 4-T, F
8	1	CAS-1780-002	DC Speed Card with 1770 Interface
9	1	BUG-9677	10K OHMS Potentiometer (Part of CAS-2058)
10	1	BUG-5759	Pot Shaft Seal 1/4" Gray
11	1	CAS-2057	CAS-1050-500 Mounting Bracket
12	1	CAS-1060-500	Arc Sensing Control Board
13	1	BUG-9856	Panel Connector, 2-T, F
14	1	MDS-1044	Knob For Pot. Yellow
15	1	100-0432-15	Ground Wire
*	1	BUG-2005	Label/ BUG-O
F1	4	FAS-0905	Flt Hd Soc Screw #4-40 x 1/2"
F2	12	FAS-0114	Pan Hd Screw 6-32 x 3/8 Black
F3	10	FAS-1305	Hex Nut #4-40
F4	8	FAS-0204	Rnd Hd Slit Screw #4-40 x 3/8 Zinc
F5	2	WAS-0221	#8 Internal Star Lockwasher
F6	4	MET-0943	Flt Hd Socket M3 x 10
F7	2	FAS-0914	#6-32 x 3/8" Flt Hd Socket
F8	4	FAS-0722	Fil Hd Screw #8-32 x 1/4
F9	4	WAS-0201	#4 Internal Star Lockwasher
F10	1	FAS-1310	Hex Nut 6-32

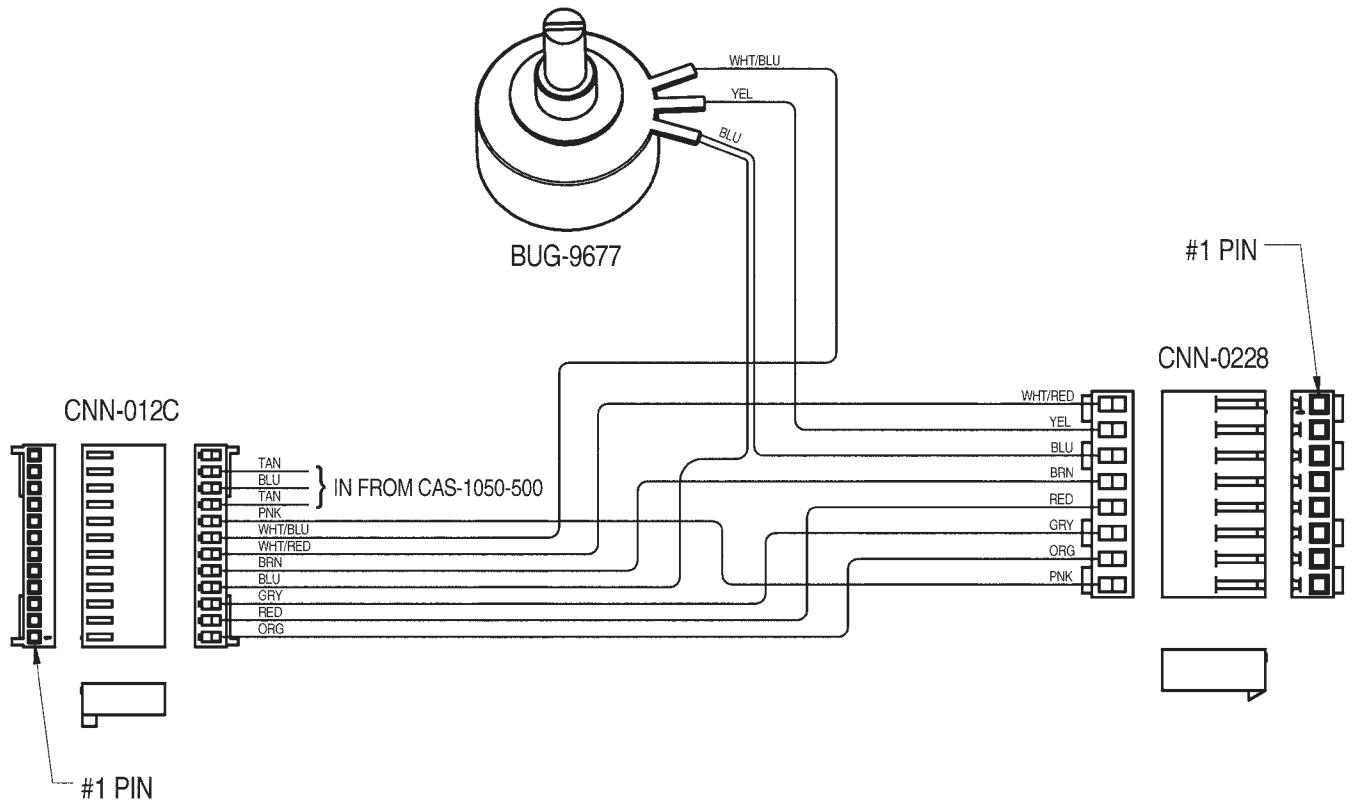
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CAS-2055-WD CONTROL BOX / WIRING DIAGRAM



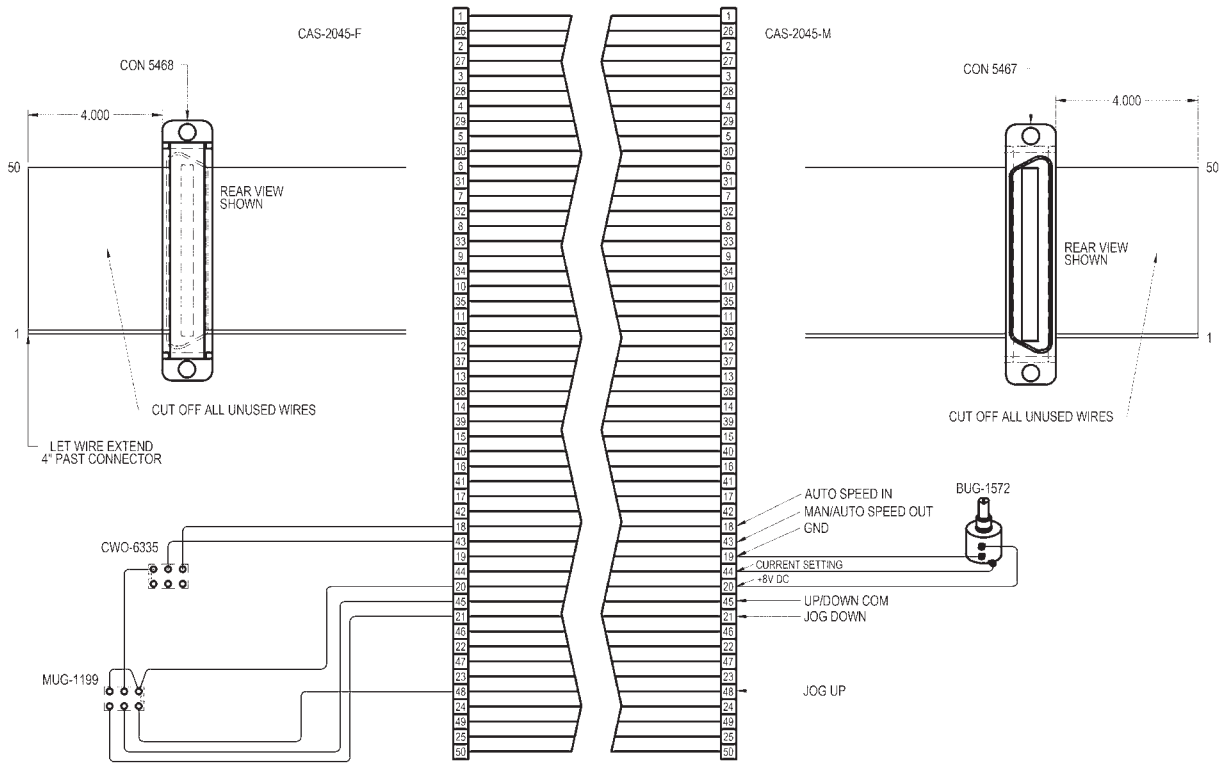
<u>PART NO.</u>	<u>DESCRIPTION</u>
CAS-1780	DC Speed Card with CAS-1770 Interface
BUG-9856	Panel Connector, 2-T, F
MUG-1156	Panel Connector, 4-T, F
CAS-1060-500	ARC Sensing Control Board for CAS-1550 Hall Effect
CAS-2058	MDS AHC Wiring Harness
PCB-1070	MDS AHC Break Out Board
PCB-1036	Connector 50 Pin (M) w/ Ribbon to Socket
PCB-1035	Connector 50 Pin (F) w/ Ribbon to Socket

CAS-2058 MDS AHC WIRING HARNESS / WIRING DIAGRAM



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

CAS-2051-10 MDS AHC 10' (3.0 M) REMOTE CONTROL / WIRING DIAGRAM



PART NO.

CWO-6335
 BUG-1572
 MUG-1199
 CON 5468

DESCRIPTION

Toggle Switch. DPDT. ON-NONE-ON
 Potentiometer
 Toggle Switch, DPDT, (ON)-OFF-(ON)
 50 position D-Ribbon, Female, Gold

TROUBLESHOOTING

If the amp setting is lower than that of the actual welding current, the AHC will back out of the joint.

If the amp setting is higher than that of the actual welding current, the AHC will dive into the joint.

To test set 100 Amp setting (no less than 100 to avoid minimum) with a close stick-out, AHC should back out. Set at 500 Amp with a large stick-out and the AHC should dive in.

If you cannot fix the AHC with the above information, please contact Bug-O and provide the following information:

1. How old is the system?
2. Did it ever work correctly?
3. Does the height slide move up & down in the proper directions when jogged in manual mode?
4. Is the CAS-1550 Hall Effect sensor box connected in-line in the weld current circuit?
5. Is the welding power source CV (constant voltage)?
6. Give some indication on how it failed the above procedures.

NOTE: Some applications require the CAS-1500 Slide to be positioned opposite of the designed orientation. This may cause the slide to react opposite of the intended direction. In this scenario, the motor leads of the slide need to be reversed.

SPK-CAS-2050-2060 SPARE PARTS KIT / PARTS LIST

<u>PART NO.</u>	<u>QTY</u>	<u>DESCRIPTION</u>
CAS-1060-500	1	ARC SENSING CONTROL BOARD
CAS-1553	1	CONNECTING CABLE HALL EFFECT
CAS-1780-002	1	DC SPEED CARD
FAS-0114	5	PAN HD SCR 6-32 X 3/8 BLACK
FAS-0204	5	RND HD SLT SCR 4-40 X 3/8 ZINC
FAS-0722	5	FIL HD SCR 8-32 X 1/4"
FAS-0905	5	FLT HD SOC SCR #4-40 X 1/2"
FAS-0914	5	#6-32 X 3/8" FLT HD SOCKET
FAS-1305	5	HEX NUT 4-40

BUG-O SYSTEMS INTERNATIONAL

EU DECLARATION OF CONFORMITY

Manufacturer and technical
documentation holder:

Bug-O Systems International
a Division of Weld Tooling Corporation
280 Technology Drive
Canonsburg, PA 15317-9564

Hereby declare that machinery:

Modular Drive System, including options and accessories

Sales codes:

MPD-1000, MPD-1002, MPD-1004, MDS-1002, MDS-1003, MDS-1004, MDS-1005, MDS-1005-DIAL, MDS-1165, BUG-6050, FMD-1090, FMD-1095, FMD-1100, FMD-1105, MPD-1065, BUG-5910, BUG-5960, PSR-1050, MPD-1035, MDS-1050, BUG-5285, MDS-1040, BUG-5275, WPD-2100, CAS-2060, AVC-2060-XX, WPD-1100, AVC-2050-PL-XX, CAS-2050, WPD-1100-40, MDS-1055, FMD-1045

(All of which may also contain prefixes and suffixes)

Kits that include the above:

MDS-4000 series Kits

FMD-4000 series Kits

(kits in each series may also contain prefixes and suffixes)

Is in conformity with Council Directives and amendments:

- 2006/42/EC – Machinery Directive
- 2014/35/EU – Electromagnetic Compatibility (EMC) Directive
- 2011/65/EU – Restriction of the use of certain hazardous substances (RoHS)

Standards:

- EN 12100:2010 – Safety of Machinery – General principles for design – Risk assessment and risk reduction.
- EN 60204-1:2016 Safety of machinery – Electrical equipment of machines Part 1: General Requirements.
- EN 61000-6-2 Electromagnetic compatibility (EMC) – Part 6-2 Generic standards – Immunity for industrial environments.
- EN 61000-6-4 Electromagnetic compatibility (EMC) – Part 6-4 Generic standards – Emissions for industrial environments.
- EN 50581:2012 Technical documentation for the assessment of electrical and electronic products with respect to restriction of hazardous substances.

-The machinery, product, assembly or sub-assembly covered by this Declaration of Conformity must not be put into service until the machinery into which it is to be incorporated (if applicable) is declared in conformity with provisions of the applicable directives(s).

Authorized representative for the compilation of the relevant technical documentation and issuer of EC Declaration of Conformity:

Date of Issue: MAY 23,2019

Place of issue: 280 Technology Drive, Canonsburg, PA 15317, USA

Typed Name of Authorized Person: MATTHEW W. CABLE - PRESIDENT

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.