

THIN-LINE® Series 180 Weld Heads



MODEL NUMBER	STOCK NUMBER	MODEL NUMBER	STOCK NUMBER	MODEL NUMBER	STOCK NUMBER
180F	2-164-01	180AHS/115	2-165-01-04	182AHS/24	2-167-01-02
180A/24	2-165-01	180A/EZ	2-165-01-09	188A/24	2-166-01
180A/115	2-165-01-01	182A/24	2-167-01	188A/115	2-166-01-01
180ADS/24	2-165-01-03	182A/115	2-167-01-01		

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REVISION RECORD

Revision	EO	Date	Basis of Revision
A	None	2/96	None. Original edition.
B	17792	9/99	Upgrade and add new equipment information.
C	18780	3/01	Add reflow instructions.
D	17899	1/02	Delete reflow heads. Major revision/reformat.

FOREWORD

Thank you for purchasing a Unitek Peco™ THIN-LINE® SERIES 180 Weld Head.

Upon receipt of your equipment, please thoroughly inspect it for shipping damage before its installation. Should there be any damage, please immediately contact the shipping company to file a claim, and notify us at:

Unitek Miyachi
1820 South Myrtle Avenue
P.O. Box 5033
Monrovia, CA 91017-7133
Telephone: (626) 303-5676
FAX: (626) 358-8048
e-mail: info@unitekmiyachi.com

The purpose of this manual is to supply operating, maintenance and service personnel with the information needed to properly and safely operate and service the THIN-LINE® SERIES 180 Weld Heads.

We have made every effort to ensure that the information in this manual is accurate and adequate. Should questions arise, or if you have suggestions for improvement of this manual, please contact us at the above location/numbers.

Unitek Miyachi is not responsible for any loss due to improper use of this product.

SAFETY WARNINGS

HIGH VOLTAGE

is used in the operation of this equipment.

DEATH ON CONTACT

may result if personnel fail to observe the safety precautions labeled on the equipment and noted on this page.

- *Never* work on electronic equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment, and who is competent in administering first aid. The technician who is aided by operators must warn them about the hazards.
- Whenever possible, turn the power supply to the equipment **OFF** before beginning work on it.
- Do *not* touch high-voltage connections, including input power connections, when installing or operating the equipment.
- Do *not* be misled by the term "low voltage." Potentials as low as 50 volts can be lethal under certain conditions.

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CHAPTER 1

SYSTEM DESCRIPTION

Section I. Features

Overview

This manual is organized to assist you in getting productive quickly with your THIN-LINE® Series 180 Weld Head. *Chapter 1* describes the equipment, *Chapter 2* describes installation, *Chapter 3* describes operating procedures so you can run the weld head safely and efficiently, and *Chapter 4* describes maintenance and troubleshooting procedures.

Unitek Miyachi THIN-LINE Series 180 Weld Heads are production line heads having a narrow vertical profile. They are characterized by low inertia, force fired operation. Depending on the model, their primary operational features allow them to be used in a wide variety of precision resistance welding applications.

- 1.75 inch (4.44 cm) width (actual head module)
- 1.25 inch (3.17 cm) stroke
- 5 to 100 pound (22.2 to 445 N) force range
- 6.031 to 10.125 inch (15.32 to 25.72) throat depth

Bearing life is designed for a minimum of 20 million operations when the head is used according to specifications.

The design of the aluminum extrusion mounting system and main shaft ensures that the offset electrodes do not slide from side to side more than 0.015 inch (0.381 mm) at 100 pounds (445 N). The four mounting holes on the head spine allow you to easily incorporate the head into your custom welding machines. In addition, you can modify the aluminum extrusion used for the base of the head to accommodate your custom fixtures and tooling.

Precision Welding

The weld heads excel in their ability to deliver repeatable weld force and electrode placement on your parts. The low inertia, lightweight design ensures fast dynamic response. This allows the top electrode to follow the minute expansion and contraction of the weld joint as it heats and cools. A "differential motion" force-firing system triggers the weld energy power source at the precise moment when the electrodes reach the preset firing force applied on the work pieces.

Rugged construction, linear ball bearing bushings, and an over-sized anti-rotation system provide perfect in-line electrode travel, which assures smooth vertical travel of the upper electrode arm. This system minimizes the "wiping" (side-to-side sliding) action of the electrodes during welding, even at maximum force settings.

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Weld Force

The weld force is continuously adjustable from a minimum of 5 pounds (22.2 N) to a maximum of 100 pounds (445 N). Settings are quickly reproduced by using the force adjustment knob and easy-to-read visual scale. An adjustable tare spring allows you to compensate for the weight of non-standard electrode holders. An adjustment screw allows you to adjust the sensitivity of the force-firing switch.

Weld force is applied via a foot pedal in the case of the manual weld head model. It is applied via an air cylinder in the case of an air-actuated model.

Adjustable Stops

All of the Series 180 Weld Heads have adjustable upstops and downstops. You can use the downstop to limit excessive over-travel. You can use the upstop to reduce the stroke and, therefore, the travel time of the head. This is a particularly useful feature when using the head in an automated system.

Electrode Holders

Electrode holders for the Models 180F, 180A, and 182A use 0.25 inch diameter, ES0800 Series Electrodes. The Model 188A comes with a pair of 0.245-inch diameter ES0850E Offset Electrodes.

Welding Cables

Depending upon model, either #2 or #2/0 Welding Cables are provided to connect Series 180 Heads to the power source. Unitek Peco Heads deliver maximum performance when used with the appropriate Unitek Peco power sources.

Footpedal Actuation

The Series 180F Weld Head is manually actuated using the Model MSP, Swing Action Footpedal, which provides an approximate 5 to 1 mechanical advantage.

Air Actuation

Series 180 Weld Heads are equipped with two different types of air-actuation:

- **Standard Air-Actuation**
- **EZ-AIR[®]**

Standard Air-Actuation

The Model 180A, 182A, and 188A heads come with factory-installed air actuation kits. Air actuation facilitates incorporation of these heads into automated welding systems. The speed of the air-actuated system is limited by the speed at which the upper electrode can move without damaging both the electrode or work pieces as a result of the impact. A repetition rate of one weld per second is possible.

For Air Head instructions, see the separate Operator Manual supplied with the Air Kit installed on the weld head.

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EZ-AIR™

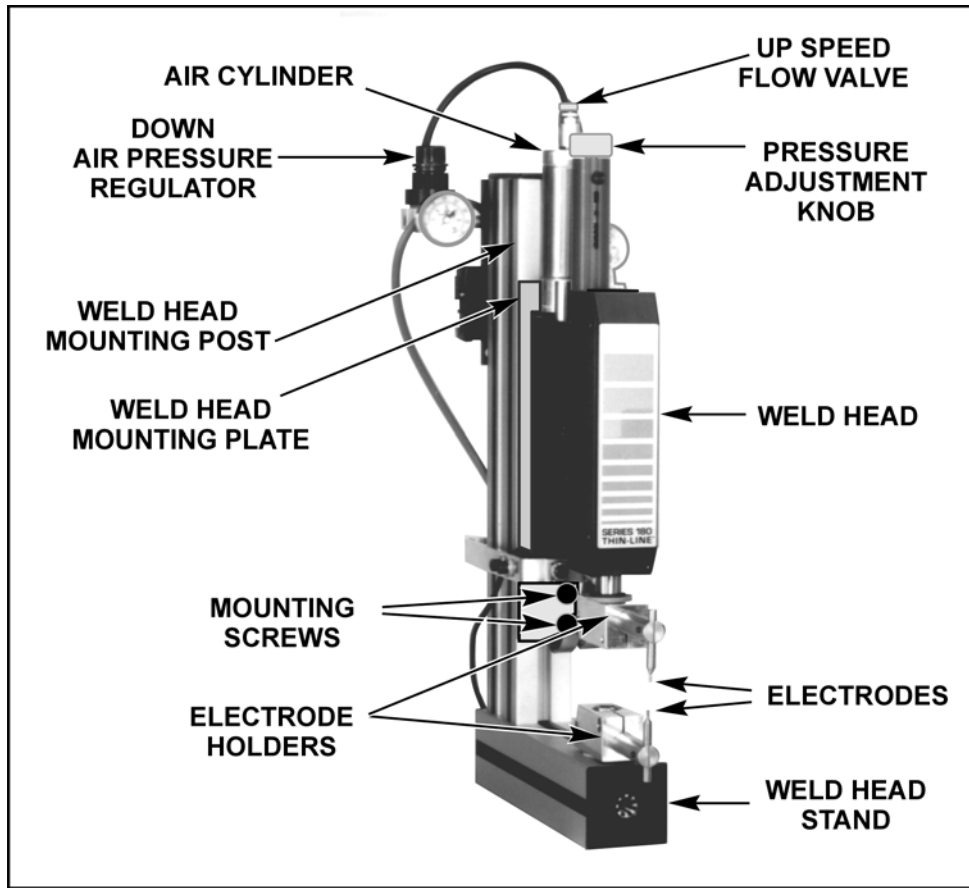
The Model 180A/EZ weld head is equipped with factory-installed EZ-AIR, a Unitek Peco pneumatic control that actuates the electrodes and maintains a preset firing force. At a predetermined firing force, EZ-AIR closes the inlet and outlet valves to the weld head actuation cylinder and eliminates over-force. Series 180 air-actuated heads are easy to incorporate into automated welding systems. EZ-AIR can be energized by most of the Unitek Peco power sources, or by a Model FSAC Footswitch. The Footswitch can be a single or two-level type, dependent upon the power supply and the user's preference.

For EZ-AIR instructions, see the separate EZ-AIR Operator Manual supplied with the weld head.

Reflow Soldering

The Series 180 heads described in this manual are used for welding not reflow soldering. The Unitek Peco 180SA is a Reflow Soldering head and is described in a separate manual that is shipped with the 180SA. If you have questions about reflow soldering, or if you have an older model 180RF head that uses thermodes for Reflow Soldering, contact your Unitek Miyachi representative, or visit the Unitek Miyachi website listed in the front of this manual for assistance.

Section II. System Components



Typical Series 180 Weld Head

Model 180A

The Model 180A is an air-actuated head. The actuation source is the top-mounted, 1.5-inch (3.81 cm) diameter air cylinder. This model provides throat depth of 10.125 inches (25.72 cm). The Model 180F Weld Head includes the Model HE180K Offset Electrode Holder Block and the 5/8 inch diameter Model HE2000 Electrode Holders.

Model 180F

This is a manually-actuated head that uses the Model MSP Foot Pedal for operation. This head includes the Model HE180K Offset Electrode Holder Block and the 5/8 inch diameter Model HE2000 Electrode Holders. These electrode holders use the 0.25 inch diameter ES0800 Series electrodes. The Model 180F provides a throat depth of 7.75 inches (19.68 cm).

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Model 182A

The Model 182A has a single upper in-line electrode holder, Model HE-182. The electrode holder housing incorporates cooling fins, which radiate heat and reduce the necessity for forced cooling. The holder uses 0.25 inch diameter ES0800 Series Electrodes.

The lower electrode holder may be replaced by a user-supplied welding fixture that can be mounted in a through-hole or in the tee-slot located in the extruded aluminum platform.

You may remove the weld head from the mounting post and incorporate it into an automatic welding station. At the welding station, the parts would feed automatically into the lower welding fixture.

Model 188A

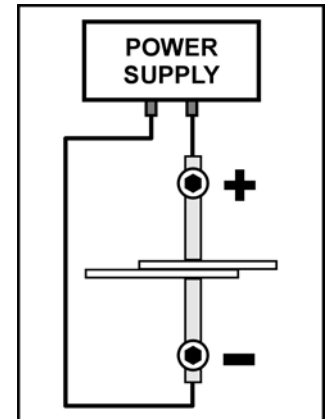
The Model 188A uses two independent Model 180A Weld Heads, bolted together side-by-side on an adapter plate. This weld head can be used in a series, step, or dual-opposed electrode configuration. It is supplied with a lower table electrode, Part No. 4-32417-01, which you can use to hold parts and conduct current when performing opposed welding, using one or two weld energy controls.

Section III. Welding Capabilities

Opposed Welding

With opposed welding, the top and bottom electrodes are used to hold the parts and provide the current path. Weld current flows from one electrode through both parts to the other electrode.

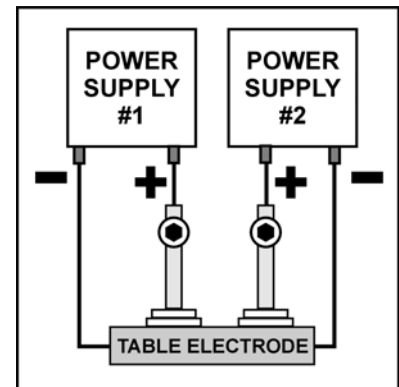
An opposed weld is preferred over other configurations because it is easier to set up and the current path is more easily controlled. It should be used whenever possible.



Dual-Opposed Welding

This method of welding uses two opposed welds being made on a single part, using two separate weld energy power supplies. Weld energy can be delivered in a simultaneous or alternate fashion, depending on your manufacturing requirements. Opposed welding provides maximum weld strength repeatability.

The Table Electrode, or a user supplied fixture, acts as a support for the workpieces in step welding. If the Table is insulated from the workpieces, there is no possibility of shunting current away from the (-) electrode.

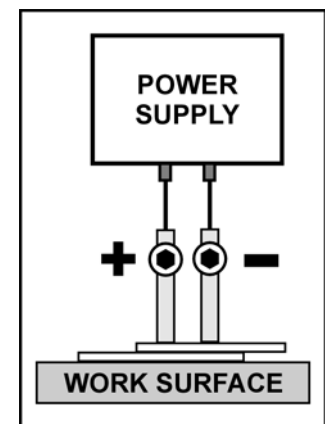


Series Welding

In series welding applications, both electrodes contact the *same* surface of each workpiece. The weld current flows from one electrode through the workpiece to the other electrode. This technique is used to weld workpieces which have only one surface accessible.

The work surface, or a user supplied fixture, acts as a support for the workpieces in series welding. If the Table is insulated from the workpieces, there is no possibility of shunting current away from the (-) electrode.

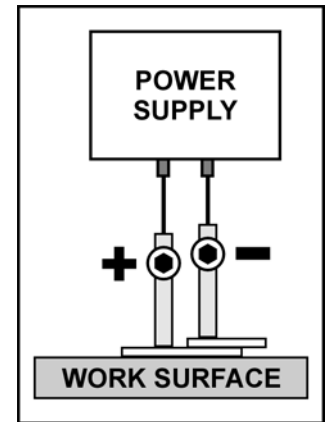
To use the Model 88 or 89 Weld Heads in the series welding mode, you **must** use the **Model DFS/88** Series Firing Switch Junction Box, which is supplied with the head.



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Step Welding

Series welding is ideal for welding thin resistive parts, 0.006 inch (0.15 mm) maximum thickness, to a larger part that cannot easily accommodate an opposed electrode. Model HE 188 Electrode Holders provide up to 0.75 inch (19.0 mm) of electrode gap adjustment. In step welding, the size of the weld and the surface marking is frequently controlled by the diameter of the face of each electrode. If the (+) Electrode is significantly larger than the (-) Electrode the lower workpiece will not have any marking and the weld will be under the (-) Electrode.



Section IV. Operating Controls

Air Cylinders

The top mounted 1.5 inch (3.81 cm) diameter air cylinder is supplied with two pressure gauges, pressure regulators, and flow controls. The four-way air solenoid, which controls the direction of air flow to the air cylinder, is available with either a 24 VAC (standard) or 115 VAC rating. The pressure regulators and flow control valves allow independent adjustment of the up and down speed of the upper electrode. The solenoid and regulator assembly is contained in a separate package, which mounts on the spine of the head.

There are several Unitek Peco direct energy welding controls, high frequency inverter controls, and microprocessor controlled series of stored energy power supplies that have a 24/115 VAC valve output for automatically energizing and controlling the timing of the air solenoid valve. The Model FS1L or FS2L Foot Switch is used to initiate all of these Unitek Miyachi weld energy controls.

Any control that does not supply a valve output requires the use of the 115 VAC FSAC Foot Switch to provide switched solenoid power to the Series 180, 115 VAC, air-actuated heads. Series 180, 24 VAC air actuated heads can also be used in automated environments where a programmable logic control (PLC) provides solenoid power and timing control. The Footswitch can be a single or two level types, depending on the power supply and the user's preference. Lubricators should not be used in "clean" environments. However, the user will then be required to periodically put a few drops of oil in the cylinder. Some users use lubricators, some do not.

Hall Effect Limit Switch Option

Air actuated Heads which are equipped with magnetic pistons and a Hall Effect Limit Switch contain an "HS" in their model number, for example: 182A**HS**/24. The Hall Effect Switch only operates with stainless steel pneumatic cylinders equipped with internal magnets on the pistons. By accurately sensing the magnetic field of the piston when it passes beneath the Sensor, the position of the rod piston is determined, and a feedback signal is created which can be used by the user to detect when the Head is in the *up* position.

The magnetic piston surrounds the rod at the top of the piston. The Hall Effect Sensor, which uses solid state circuitry, mounts at any position around the exterior of the cylinder. The parts required to retrofit an existing Head to include this feature, and the circuitry to supply the required 5 to 28 VDC, are described in *Chapter 2, Section VI, Hall Effect Switch*.

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ELECTRICAL SPECIFICATIONS HALL EFFECT LIMIT SWITCH	
Output Type	Open Collector - current sink
Input Voltage (V_{in})	5 to 28 VDC
Input Current	25 Ma maximum
Output Voltage Drop	0.4 VDC maximum
Output Current	0.3 V_{IN} , m00 mA maximum
Power Dissipation	300 mW maximum
Circuit Protection	Reverse polarity, transient voltage and false pulse protected

CHAPTER 2 INSTALLATION

Section I. Introduction

Overview

Before you start installation, become familiar with the specific model you are using. Series 180 Weld heads come in different sizes and configurations, which require different stands and installation hardware.

Despite differences from model-to-model, the installation principle is the *same* for each head:

- If not already attached, the weld head mounting post is attached to the stand.
- The weld head stand is bolted securely to a workbench.
- If not already attached, the weld head is attached to the mounting post.
- If necessary, the air head (if used), foot pedal (if used), and optics (if used) are installed.
- Electrodes and weld cables are installed on the weld head.

Requirements

Work Area

We recommend that you install your weld head in a well-ventilated area that is free from excessive dirt and moisture. The workstation must be stable, free from vibration, and capable of supporting the combined weight of the head, its accessories, and the weld energy power supply and welding transformer. The combined system weight can reach approximately 120 lbs (54.4 kg).

Utilities

- **AC Power**

For Model 180F – None required.

For Models 180A, 182A and 188A -- Included in Unitek Miyachi weld energy power supplies.
115 VAC required for use with power supplies, which do not supply valve power.

- **Compressed Air**

For Models 180A, 182A and 188A only. 65 psi (4.5 bar) minimum.

Section II. Weld Head Installation

Overview

First, this section will give "Typical Installation" instructions that are common to *all* Series 180 weld heads. Then, additional instructions for installing *specific* weld head models are listed by model number. **Before you start installation:**

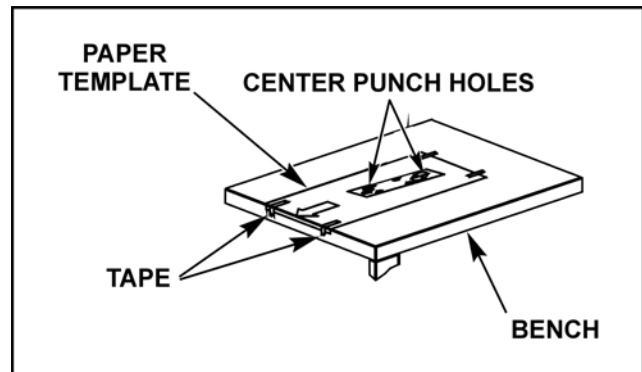
- Read the *Typical Installation* instructions **and** the instructions for the *specific* weld head you want to install.
- Make sure you have all necessary parts and mounting hardware. Use the shipping list as a reference. Verify that the paper mounting template corresponds to the model number of the weld head. If you do **not** have the correct template, contact Unitek Miyachi at the address shown in the front of the manual.

Series 180 weld heads may be purchased with or without mounting hardware. Unitek Miyachi provides an extruded aluminum post with channels on the front and back. By inserting T-Nuts into the channels, mounting plates can be screwed onto the front (for weld head), back (for air head), or both sides of the post (only the weld head is shown). This installation allows you to adjust the height of the weld head and air head separately.

Typical Installation

Allow about 8-10 inches (20.32-25.4 cm) between the front edge of the bench and the stand so the operator can use the bench as a support when positioning the workpiece.

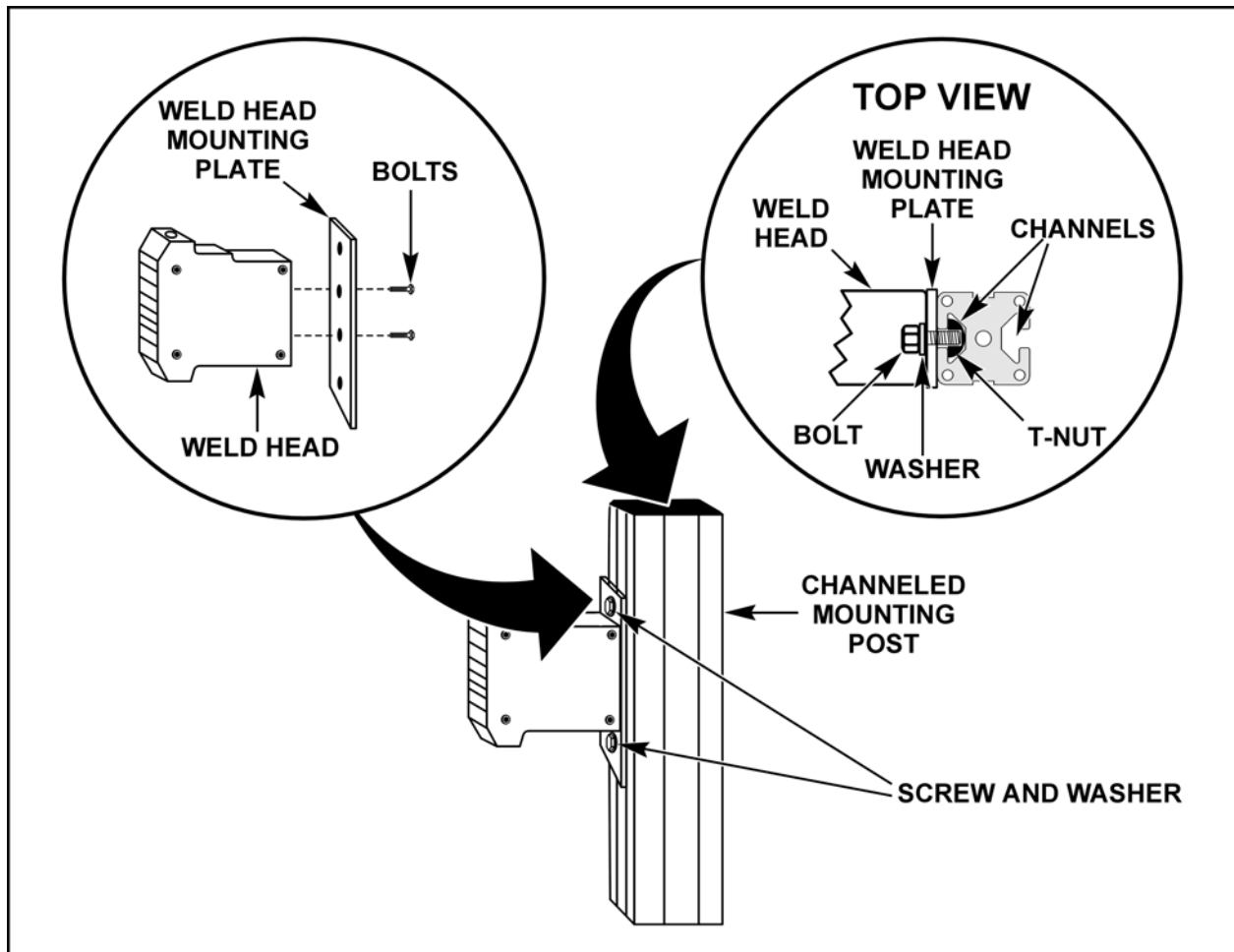
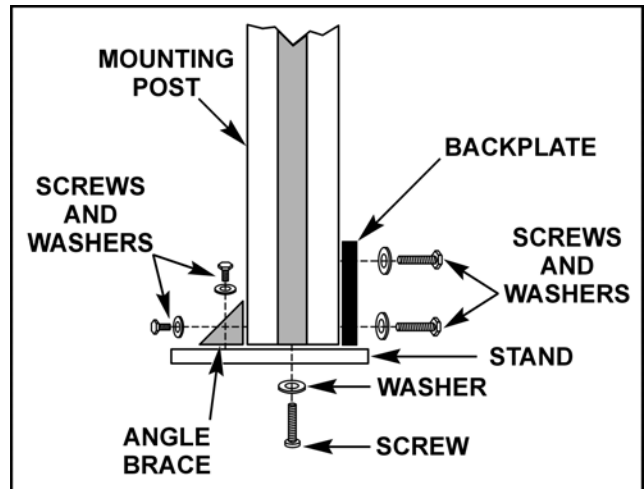
- 1 Place the mounting template in the desired location on the workbench and tape it in place.
- 2 Drill the mounting holes as shown on the template.



- 3 If necessary, install the weld head mounting post to the stand.

NOTE: If you are using optional optics (microscope/illuminator), install the optics according to the instructions that came with the optics.

- 4 Screw the weld head stand (and optics baseplate if used) to the workbench.

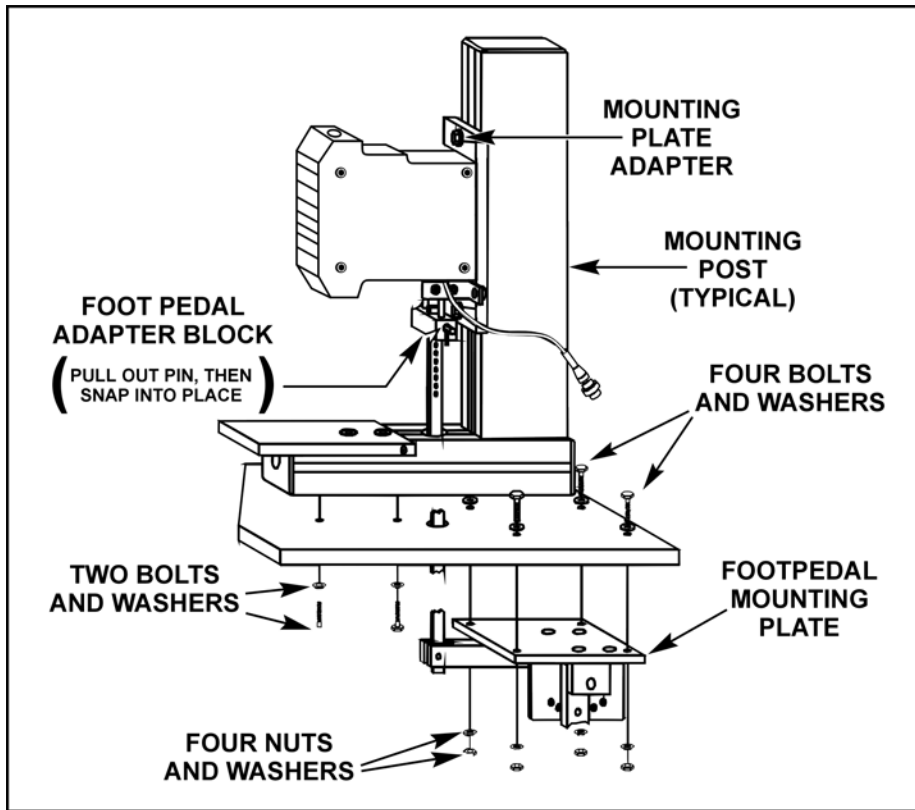


- 5 Install the weld head mounting plate onto the weld head using the screws as shown.
- 6 Install the screws, washers, and T-nuts into the weld head mounting plate as shown.

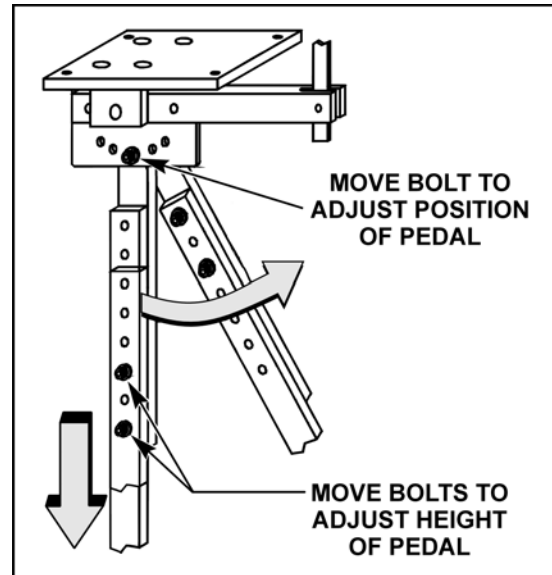
CHAPTER 2: INSTALLATION

- 7 If necessary, remove the end cap from the mounting post to expose the channels in the mounting post.
- 8 Raise the weld head and mounting plate above the mounting post, insert the bottom T-nut into the front channel of the mounting post, and slowly lower the weld head until you can insert the top T-nut into the channel. Slide the weld head to the desired height, then tighten the mounting screws.
- 9 If you are using an air head, install it on the rear of the mounting post following the procedures in Steps 3 through 7.

Model 180F MSP Footpedal Installation



- 1 Screw the head to the bench and Model MSP Footpedal using four (4) screws, washers and nuts supplied with the shipping kit.
- 2 To adjust the height of the head, loosen two hex head cap screws on the mounting plate adapter, as illustrated, and slide Head up or down the stand.
- 3 Pull out the pin on footpedal adapter block, as illustrated. Insert the pullrod and allow the pin to snap back into place.
- 5 Attach the pullrod to footpedal. Adjust the height of head, loosen two Allen head cap screws on the mounting plate adapter as shown, and slide Head up or down the stand.
- 6 Attach the pullrod to footpedal. Adjust the angle and length of the footpedal so that it is comfortable for the operator.



CHAPTER 2: INSTALLATION

Air Head Installation

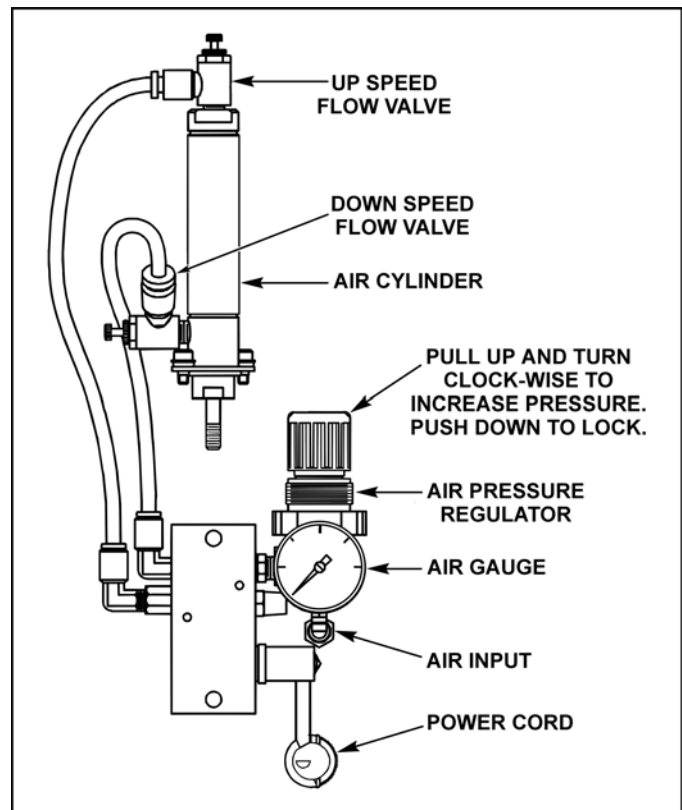
Unitek Peco Air Kits are factory-installed to the Series 180 Weld Heads. User installation consists of connecting the airhead to an air source and connecting the airhead power cable to a welding control.

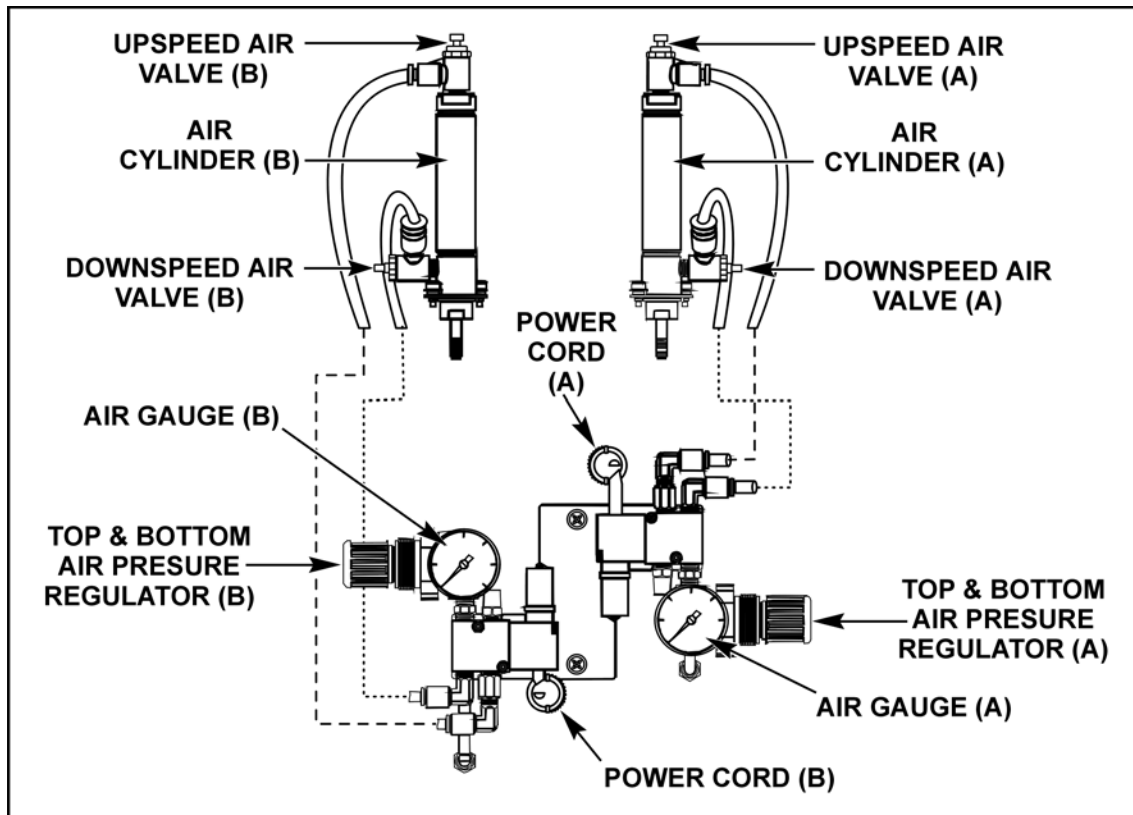
The air input line on each head uses a "quick release" fitting so special tools are not needed. The hoses simply push into the "quick release" fitting as far as they will go. Despite mechanical configuration differences between the air heads, the installation instructions are the *same* for each head. **EZ-AIR** components are enclosed in a metal box, **Standard** Air Head components are exposed and shown below.

Single-Air Installation

NOTES:

- The inside diameter of the main air supply line must be at least 0.5 inch (13 mm) to allow sufficient air flow.
- The air supply must be properly filtered at a maximum pressure of 100 psi (690 kPa).
- Unitek Miyachi suggests that in-line lubricators only be used in automated applications, since excess oil can blow-by worn seals in the Air Cylinder and be deposited on the workpieces.
- If an in-line lubricator is *not* used, then the air line should be removed from the top of the cylinder(s) once every 1 million cycles, and several drops of a light machine oil should be squirted into the top of the cylinder(s).
 - Verify that the air lines are inserted all the way into the sleeve on the fittings to prevent inadvertent blow-outs.
- Use the shortest air lines possible to obtain the fastest mechanical response.
- To facilitate dressing the electrodes, reduce the air pressure to the top of the cylinder. As an alternative to changing the setting of the Top Air Pressure Regulator, a customer supplied bleeder valve connected to the output of the Top Air Pressure Regulator can be used to reduce the air pressure.



Dual-Air Installation**Installation Instructions**

- 1 Insert the air supply hose into the "quick release" fitting(s) on the air head(s).
- 2 Connect the power cord from the air head to the Welding Control following the instructions in the Welding Control Users' Manual.
- 3 Install the system in accordance with established safety practices and standards. Anti-Tiedown Palm Buttons are not usually required if the electrode spacing will not allow the operator's fingers to fit between them.

Optics

If you are using any of the optional optics (microscope or illuminator):

- 1 Verify that the optics mounting post is securely attached to the optics baseplate.
- 2 Install the optics following the instructions provided with the optics.

Section III. Connect Weld Cables

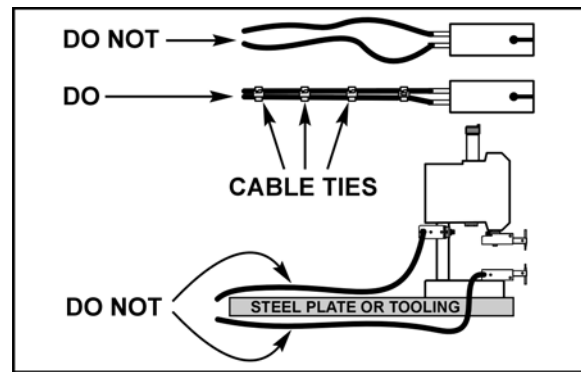
Weld Cables and Energy Losses

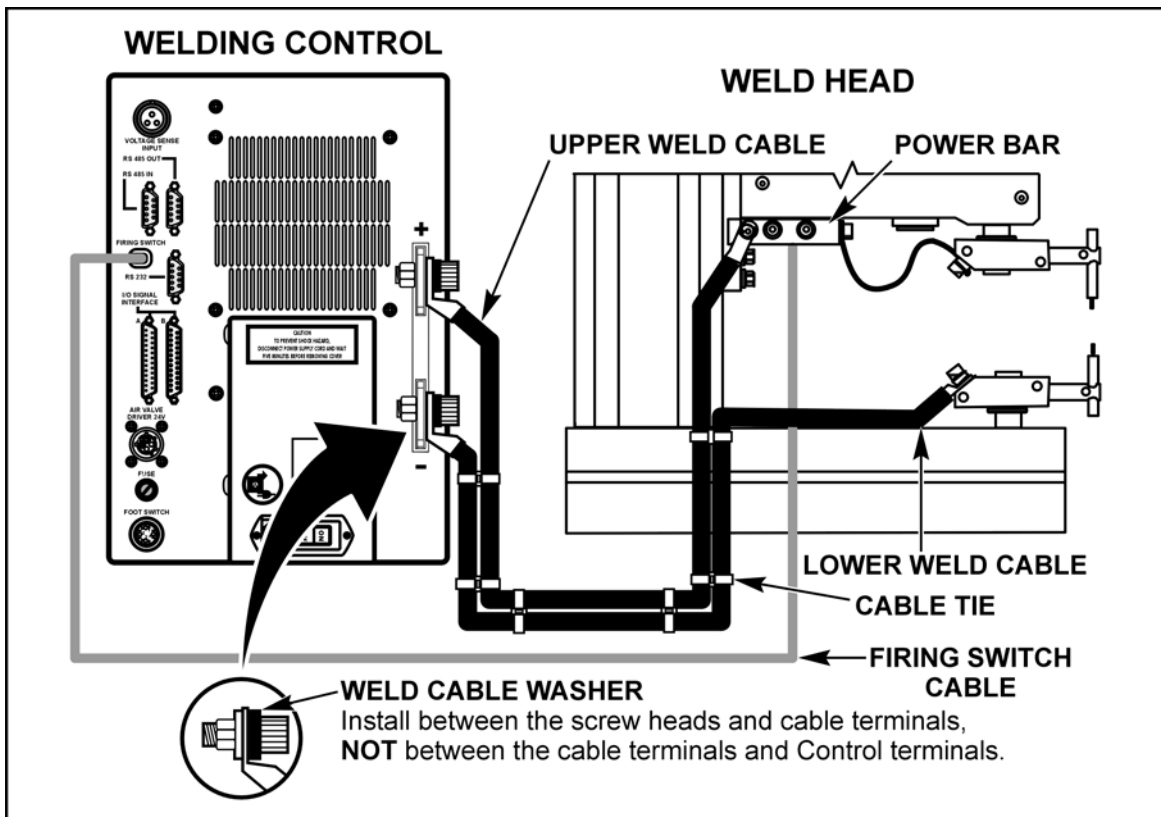
All Unitek Peco weld heads are supplied with the correct weld cables to provide maximum weld energy. If you need to install longer cables, or replace damaged cables,

- **Use #2 AWG for lengths under 12 inch (30.5 cm) and #2/0 AWG for longer lengths.** Tie or tape cables together to minimize inductive losses. A separation of weld cables surrounding an area of one square foot could result in losses of up to 65%.
- **Use the shortest possible Welding Cables.** It is common to have losses of up to 50% per foot for #6 cables and 20% for #2 cables.
- Connect the welding cables on the **same side of the head.** Otherwise, the inductive losses added by the intervening support post could substantially increase the amount of energy required to join metal satisfactorily

Connect Cables to Head

- Place the washer securing the welding cable terminal between the screw head and the welding cable terminal, *not* the welding cable terminal, and the terminal to which the cable is being attached.
- Make sure the connections are free of oxidation, dirt and grease.
- Use 2/0 AWG cable for lengths under 18 inches (45 centimeters), and 4/0 AWG for longer lengths.
- Use the shortest possible welding cables. Energy losses can range up to 20% per foot for 2/0 AWG cables.
- Tie the welding cables together to minimize weld energy losses caused by unwanted welding cable inductance.
- Route the welding cables so that they do not run adjacent to magnetic materials and devices such as air solenoids, tooling and steel heads. Run the welding cables through a single hole in a steel plate.

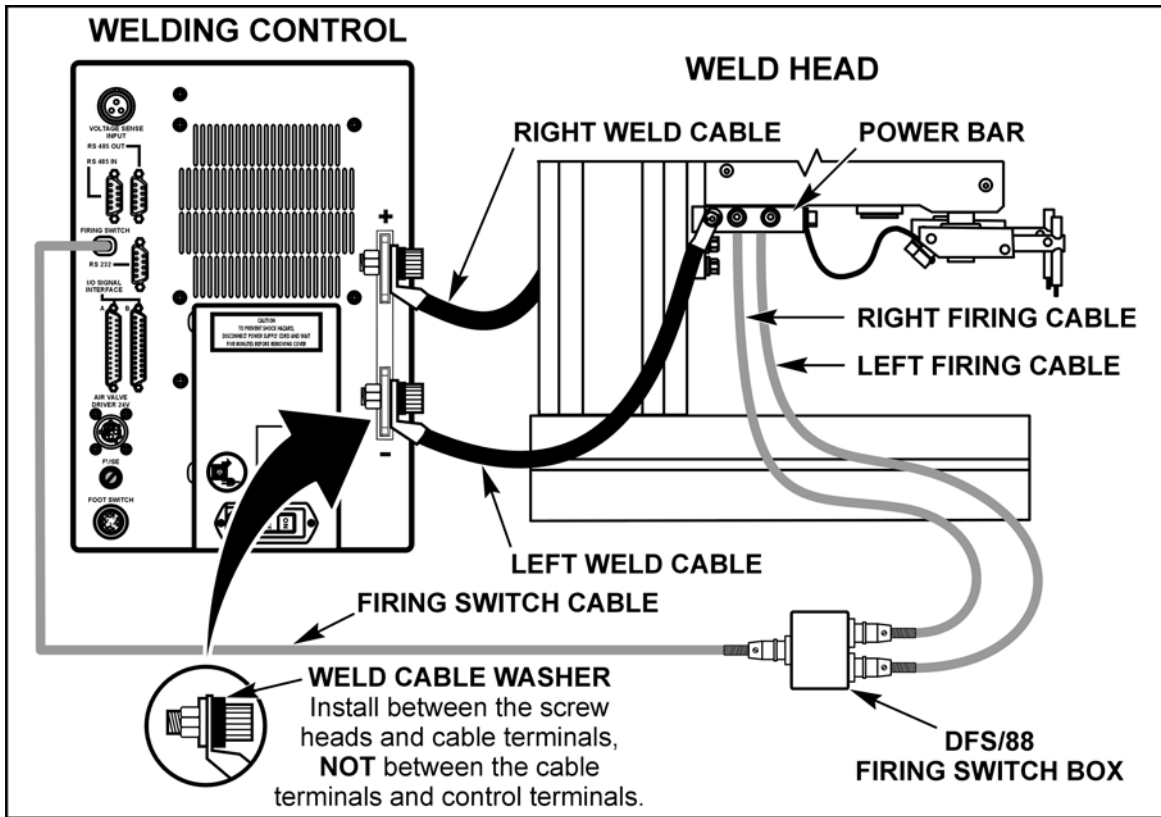


Model 180F, 180A, and 182A Offset and In-Line Weld Head Connections

- 1 Place the welding control, weld energy power supply, or welding transformer approximately 4 to 5 inch (10.2 to 12.7 cm) behind the weld head.
- 2 Inspect the connections on the weld cables, welding control, weld energy power supply, or welding transformer. Remove any oxidation, dirt, or grease.
- 3 Connect the short welding cable to one terminal on the weld head power bar, using a 5/16-18 x 1/2 inch hex head bolt, and flat washer. Place the washer between the bolt head and the welding cable terminal, do **not** place the washer between the Cable and the Power Bar because you will get an unstable connection and, consequently, unstable current flow. Tighten connections securely.
- 4 Connect the longer welding cable to the lower electrode holder, or user-supplied welding fixture, using the procedures in Step 3.
- 5 Connect the other end of the cables to the welding control, weld energy power supply, or welding transformer in accordance with the instructions in its Users' Manual.
- 6 Connect the firing switch cable to the welding control, weld energy power supply, or welding transformer in accordance with the instructions in its Users' Manual.

CHAPTER 2: INSTALLATION

Model 188A Series Weld Head

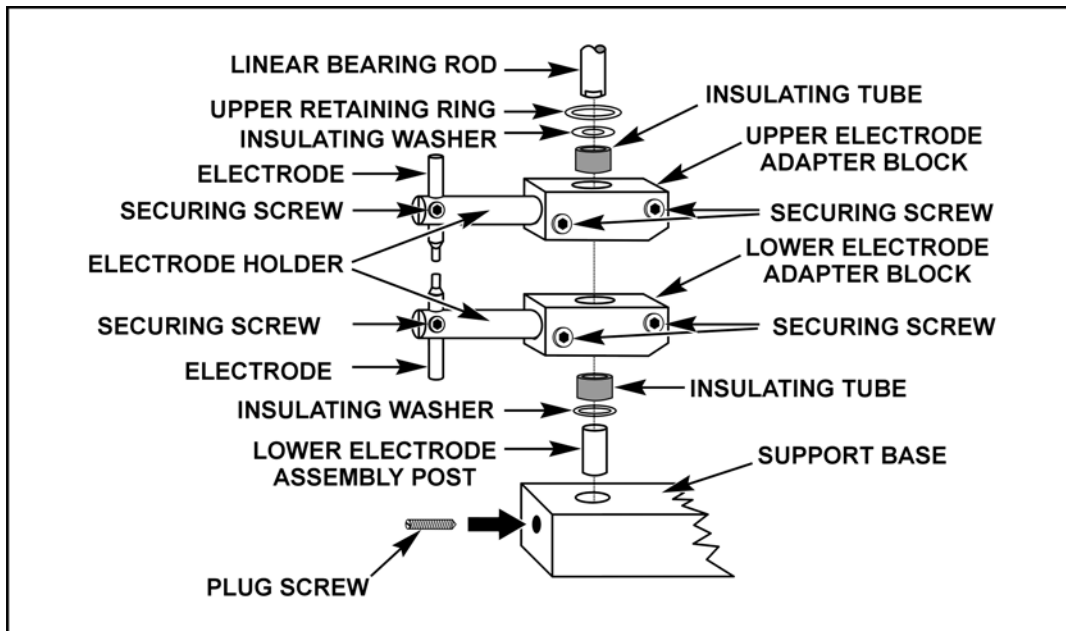


- 1 Place the welding control, weld energy power supply, or welding transformer approximately 4 to 5 inch (10.2 to 12.7 cm) behind the weld head.
- 2 Inspect the connections on the weld cables, welding control, weld energy power supply, or welding transformer. Remove any oxidation, dirt, or grease.
- 3 Connect one welding cable to the terminal on the **right** weld head power bar, using a 5/16-18 x 1/2 inch hex head bolt, and flat washer. Place the washer between the bolt head and the welding cable terminal, **not** between the cable and the power bar or you will get an unstable connection and, consequently, unstable current flow. Tighten connections securely.
- 4 Connect the other welding cable to the terminal on the **left** weld head power bar using the procedures in Step 3.
- 5 Connect the other end of the cables to the welding control, weld energy power supply, or welding transformer in accordance with the instructions in its Users' Manual.
- 6 Connect the left and right firing switch cables coming from the weld head to the input connectors on the DFS/88 Firing Switch Box.
- 7 Connect the cable from the DFS/88 Firing Switch Box to the welding control, weld energy power supply, or welding transformer in accordance with the instructions in its Users' Manual.

Section IV. Install Electrode Holders

Various electrode holders are interchangeable, as required by your weld head application. All Series 180 Weld Heads are shipped with the electrode holders installed. Use the following procedures to change electrode holders.

Models 180F and 180A Offset Electrode Holders



- 1 Install the upper insulating washer on the linear bearing rod, followed by the upper insulating tube.

Note: Do *not* remove the upper retainer ring from the linear bearing rod.
- 2 Slip the upper electrode adapter block over the upper insulating tube. The linear bearing rod should now be flush with the bottom of the upper electrode adapter block.
- 3 Secure the upper electrode adapter block on the linear bearing rod by tightening the upper electrode adapter block securing screw.
- 4 Slip the lower insulating washer over the lower electrode assembly post, followed by the lower insulating tube.
- 5 Slip the lower electrode adapter block over the lower insulating tube. Secure the lower electrode adapter block on the lower electrode post by tightening the lower electrode adapter block securing screw.
- 6 Insert one finger into the lower electrode post mounting hole in the support base until you feel the plug screw. Turn the plug screw counter-clockwise until it no longer protrudes from the mounting hole.

CHAPTER 2: INSTALLATION

- 7 Insert the lower electrode assembly post into the support base mounting hole. Secure the assembly by turning the plug screw clockwise.
- 8 To remove the offset electrode holder assembly, reverse the installation procedure.

Model 182A Upper In-Line Electrode Holder Installation

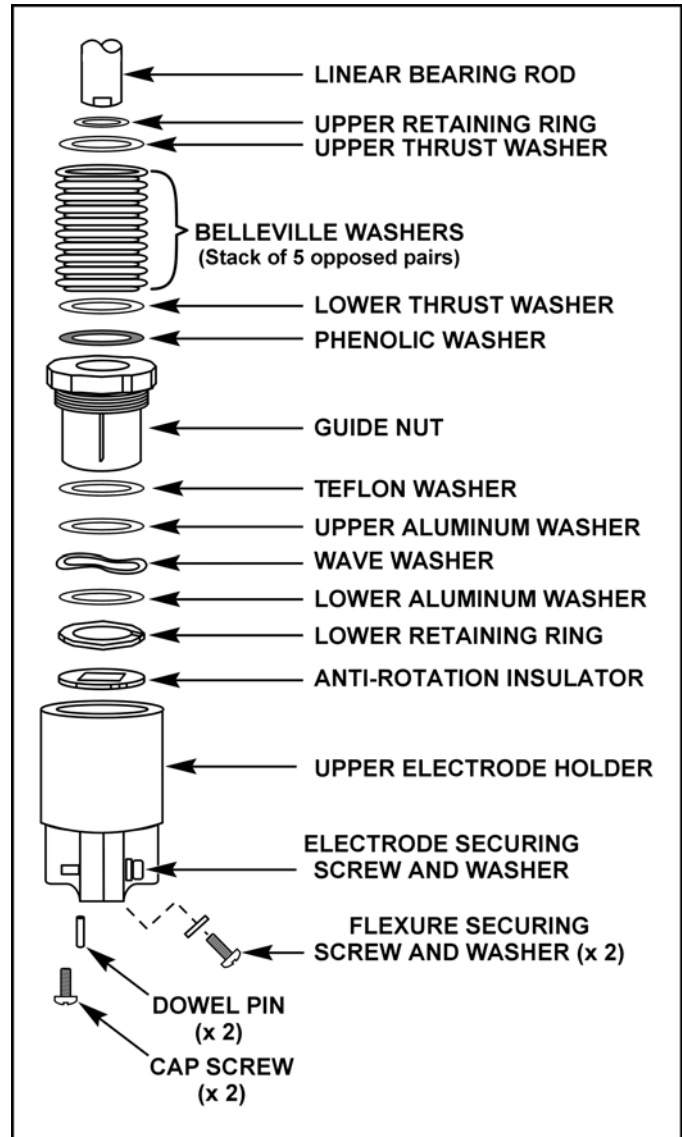
- 1 Insert the anti-rotation insulator in the bottom of the upper electrode holder. Secure the anti-rotation insulator with the two 4-40 \square 3/8 inch securing screws and dowel pins.

Note: Do not remove the upper retaining ring from the linear bearing rod.

- 2 Assemble all parts down to the lower aluminum washer onto the linear bearing rod in the order shown.

Note: Assemble the 10 Belleville washers in five opposed pairs, with the concave surface of each pair facing inward.

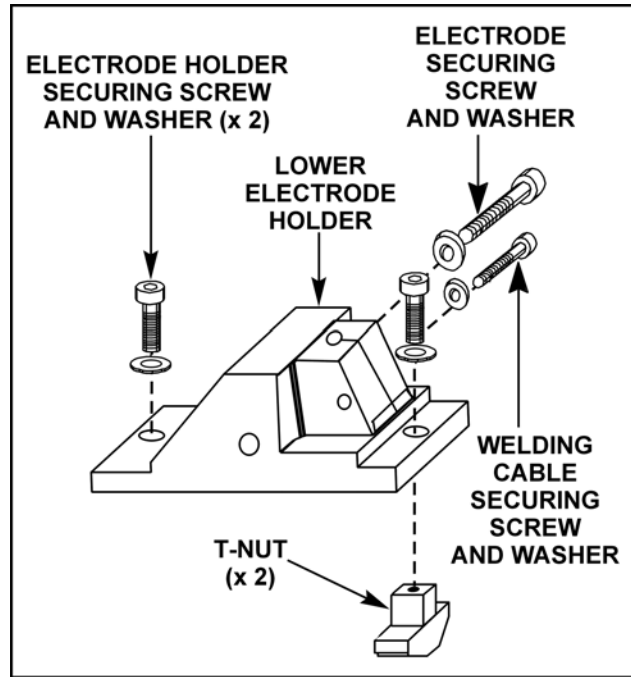
- 3 Secure the part buildup on the linear bearing rod with the lower retaining ring.
- 4 Slide the upper electrode holder onto the linear bearing rod and engage it with the threads on the guide nut.
- 5 Hold the upper electrode holder stationary with a large wrench. Rotate the guide nut until the upper electrode holder is secured firmly to the guide nut.



- 6 Attach the copper flexures to the upper electrode holder with the two 1/4-20 securing screws and washers.
- 7 To remove the Model 182A upper in-line electrode holder assembly, reverse the installation procedure.

Model 182A Lower In-Line Electrode Holder Installation

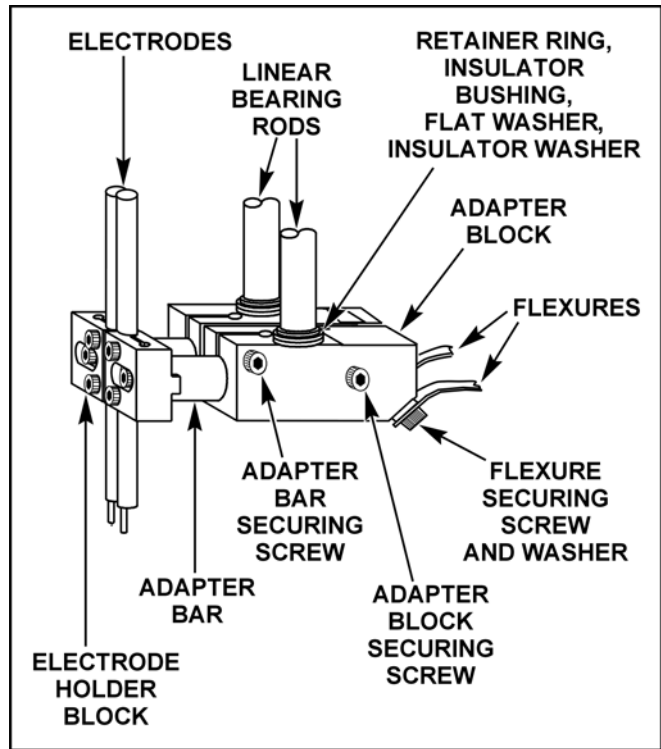
- 1 Snap the plastic end cap out of the front end of the support base.
- 2 Slide two 8 mm T-nuts into the upper T-slot in the support base.
- 3 Attach the lower electrode holder to the T-nuts with two M8 x 16 mm hex head bolts and washers. Do *not* tighten the securing hardware *until* you install the lower electrode as described later in this chapter.
- 4 Secure the lower welding cable terminal to the lower electrode holder with a 5/16-18 x 2 socket head screw and washer.
- 5 To remove the lower in-line electrode holder assembly, reverse the installation procedure.

**Model 188A Electrode Holder Installation**

The procedure for mounting the right hand series electrode holder assembly and the left hand series electrode holder assembly on the Model 188A linear bearing rods is identical.

CHAPTER 2: INSTALLATION

- 1 Assemble the insulator bushing on the linear bearing rod, followed by the flat (phenolic) washer. Do **not** remove the upper retainer ring from the linear bearing rod.
- 2 Slip the adapter block over the insulator bushing. The bottom of the linear bearing rod should now be flush with the bottom of the adapter block.
- 3 Secure the adapter block on the linear bearing rod by tightening the adapter block securing screw.
- 4 Loosen the adapter bar securing screw.
- 5 Slide the adapter bar into the adapter block and tighten the adapter bar securing screw.
- 6 Attach the flexure to the adapter block with the flexure securing screw and washer.

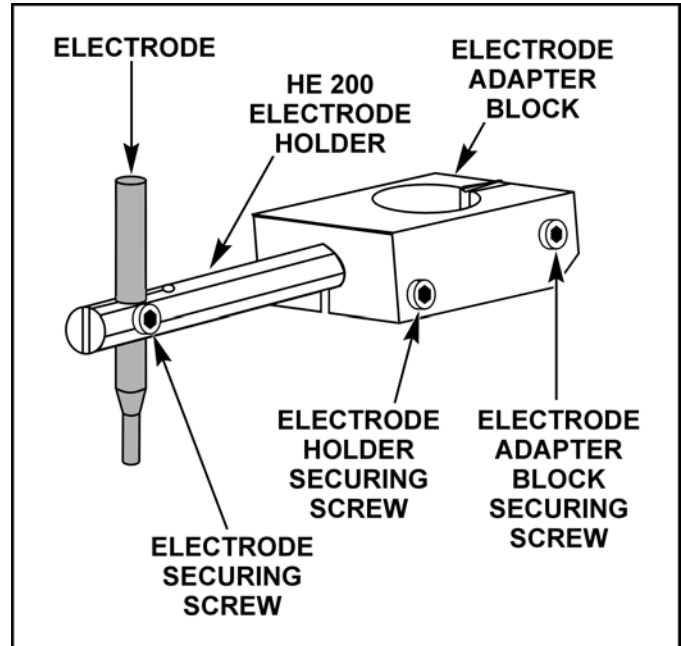


Section V. Install Electrodes

Model 180F and Model 180A Offset Electrodes

- 1 Turn the electrode securing screw in the upper electrode holder counterclockwise to loosen it.
- 2 Insert the electrode in the electrode holder and turn the electrode securing screw clockwise to secure the electrode in the holder.
- 3 Repeat Steps 1 and 2 for the lower electrode and electrode holder.

CAUTION: For safety purposes, adjust the upper and lower electrodes so that the gap between the electrode tips is less than a finger diameter.

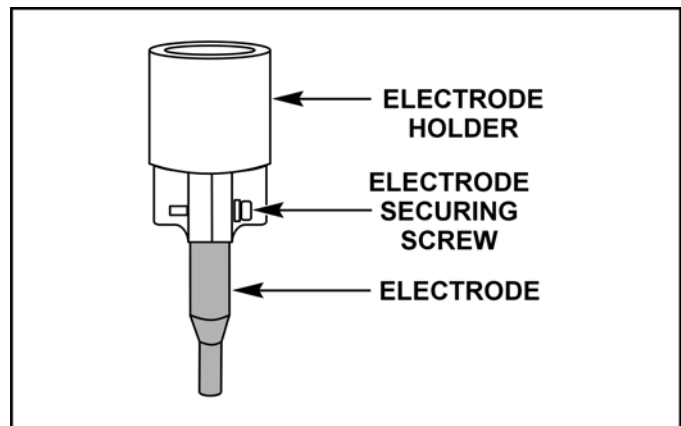


- 4 Loosen the lower electrode holder securing screw and rotate the HE-2000 electrode holder to bring the lower electrode into alignment with the upper electrode. Re-tighten the lower electrode holder securing screw.
- 5 Loosen the lower electrode adapter block securing screw and rotate the lower electrode holder assembly to bring the lower electrode into alignment with the upper electrode. Re-tighten the lower electrode adapter block securing screw.
- 6 Tighten the plug screw to secure the lower electrode holder assembly.

Model 182 In-Line Electrodes

Upper Electrode:

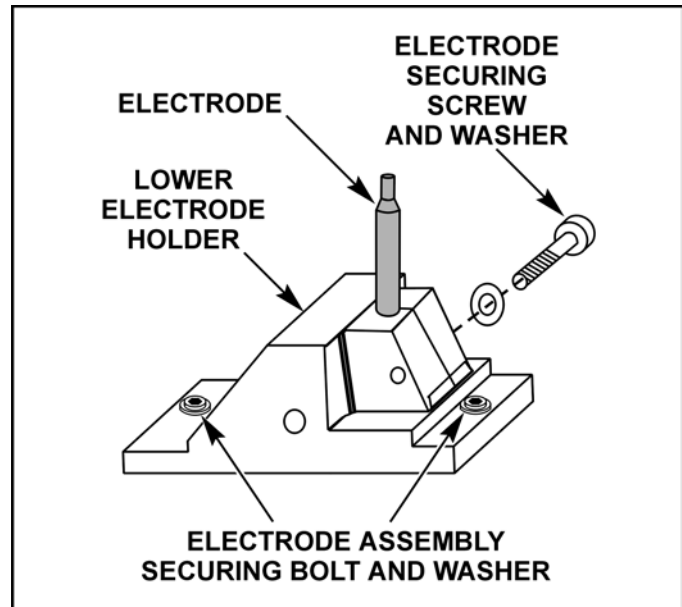
- 1 Loosen the electrode securing screw.
- 2 Insert the electrode in the electrode holder and tighten the electrode securing screw.



CHAPTER 2: INSTALLATION

Lower Electrode:

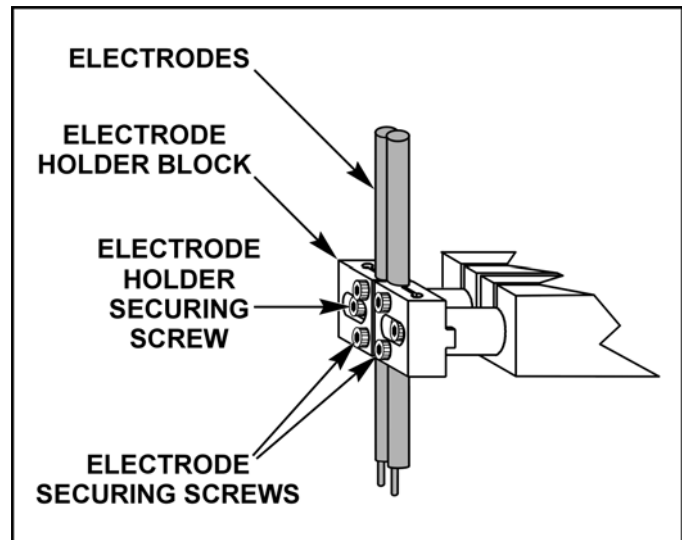
- 1 Loosen the electrode securing screw.
- 2 Insert the electrode in the electrode holder and tighten the electrode securing screw.
- 3 Loosen the two lower electrode assembly securing bolts.
- 4 Slide the lower electrode assembly to bring the lower electrode into alignment with the upper electrode.
- 5 Tighten the two electrode assembly securing bolts to re-secure the lower electrode assembly to the support base.



- 6 For safety purposes, adjust the upper and lower electrodes so that the gap between the electrode tips is less than a finger diameter.

Series Electrodes

- 1 Loosen the two electrode securing screws on the face of both electrode holder blocks.
- 2 Insert an electrode into one electrode holder block, then rotate one electrode securing screw enough for the electrode holder block to hold the electrode at finger-tightness.
- 3 Repeat Step 2 for the other electrode and electrode holder block.
- 4 Rotate the ES-0800E offset style electrodes so that both electrode tips are facing toward the electrode gap.



- 5 Set the vertical position of the electrode tips to fit your work application. Tighten the four electrode securing screws to lock the electrodes into the electrode holder blocks.
- 6 For safety purposes, adjust the upper and lower electrodes so that the gap between the electrode tips is less than a finger diameter.

- 7 To adjust the width of the electrode gap:
 - a) Loosen both recessed electrode holder block securing screws in the electrode holder blocks.
 - b) Swing the electrode holder blocks backward to widen the gap or forwards to narrow the gap.
 - c) Tighten the two electrode holder block securing screws to secure the selected gap width. Verify that both electrodes are not touching.

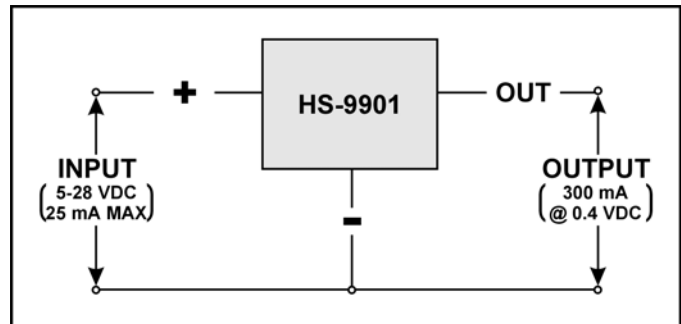
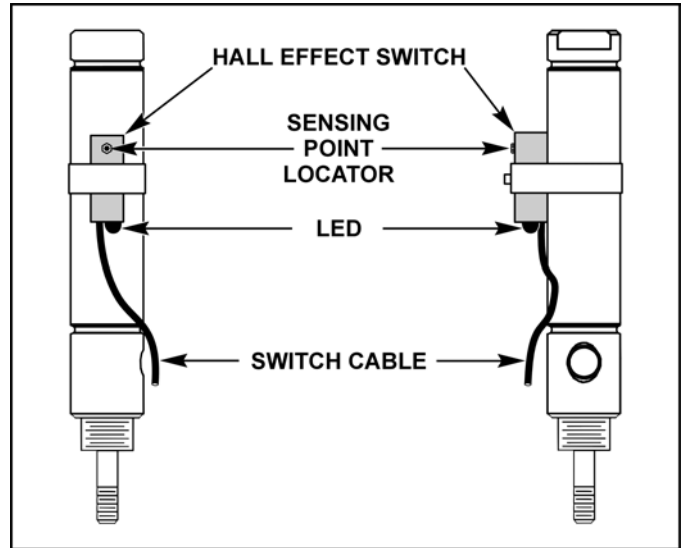
Section VI. Hall Effect Switch

Connect Hall Effect Limit Switch

The Hall Effect Limit Switch cylinder's magnetic disk surrounds the actuation rod located on the top of its internal piston.

The magnetic field, which is produced when the piston passes the sensor, produces an output, which can be used to control other equipment.

- 1 Mount the Hall Effect Switch using the clamp which is supplied.
- 2 Position the switch at the top (bottom) of the cylinder to detect when the head is in the *up (down)* position.
- 3 Wire the Hall Effect switch as shown in the schematic diagram on the right.



NOTES:

- **Resistor.** Be sure to include a resistor in series with the output, which limits the output current to a **maximum of 50 mA**.
- **Wire Colors.** Newer versions of the Hall Effect switch have different wire colors than older versions. The table at the right shows the wire colors for each version. Verify the colors on your switch, then connect them according to the schematic.

Old Version		New Version	
Red	= +	Brown	= +
Black	= -	Blue	= -
White	= Out	Black	= Out

CHAPTER 3 OPERATING INSTRUCTIONS

Section I. Getting Started

Installation Checklists

INSTALLATION CHECKLIST FOR ALL HEADS	
✓	Check that the cables are correctly attached at both ends.
✓	Verify that the Firing Switch Cable is attached to the welding power supply or Control.
✓	Set the WELD/NO WELD Switch, located on the front of the welding power supply (Control), to the NO WELD position.
✓	Verify that the welding power supply (Control) is connected to the appropriate power source and that the power is switched to ON .
✓	Switch the welding power supply (Control) to ON . Follow the procedures in the manual to program and operate the welding power supply (Control).
INSTALLATION CHECKLIST FOR AIR ACTUATED HEADS	
✓	Verify that the air lines are properly connected to the head and the main air supply (65 psi/448 kPa nominal) is turned ON .
✓	Verify that the line cord from the air solenoid is connected to the power supply (Control) or to a 115 VAC source, if required.
✓	Verify that the footswitch is connected to the welding power supply (Control).

CHAPTER 3: OPERATING INSTRUCTIONS

Welding Force Theory

Welding force (pressure) is a key variable in the resistance welding process. Excessive or insufficient welding force or pressure can cause a weak weld. More information is available from Unitek Miyachi:

- A) Resistance Welding Troubleshooting Guide
- B) Electrode/Material Selection Guide
- C) Resistance Welding Spot Welding Applications
- D) Technical Service Bulletins on a variety of subjects

Troubleshooting

WELDHEAD TROUBLESHOOTING GUIDE			
SYMPTOM OR PROBLEM	PRIMARY CAUSE Weldhead-Related Cause	PRIORITY*	SOLUTION
Overheating of Weldment	Excess Welding Time	1	Decrease Welding Time (A.C. Welding)
	Insufficient Force	2	Increase force in steps of 10-20%
	Wrong Electrode Material	2	Check Electrode/Material Selection Guide
	Dirty Electrodes	3	Clean electrodes and/or parts to be welded
	Electrode Tip Shape	3	Use constant area electrodes or shape to suit application
Discoloration	Excess Welding Time	1	Decrease Welding Time (A.C. Welding)
	Wrong Electrode Material	1	Check Electrode/Material Selection Guide
	Insufficient Force	2	Increase force in steps of 10-20%
Weak Weld	Insufficient Current/Energy	1	Increase current/energy in steps of 5-10%
	Dirty Electrodes	1	Clean electrodes and/or parts to be welded
	Electrode Tip Shape	1	Use constant area electrodes or shape to suit application
	Mushroomed Electrodes	1	Replace or reshape electrodes or increase cleaning schedule
	Excess Force	2	Decrease force in steps of 10-20%
	Insufficient Force	2	Increase force in steps of 10-20%
	Wrong Electrode Material	2	Check Electrode/Material Selection Guide
	Poor Weldhead Follow-up	3	Reduce mass of top electrode holder assembly

CHAPTER 3: OPERATING INSTRUCTIONS

WELDHEAD TROUBLESHOOTING GUIDE			
SYMPTOM OR PROBLEM	PRIMARY CAUSE Weldhead-Related Cause	PRIORITY*	SOLUTION
Insufficient Nugget **	Insufficient Current/Energy	1	Increase current/energy in steps of 5-10%
	Wrong Electrode Material	1	Check Electrode/Material Selection Guide
	Electrode Tip Shape	1	Use constant area electrodes or shape to suit application
	Mushroomed Electrodes	1	Replace or reshape electrodes or increase cleaning schedule
	Dirty Electrodes	2	Clean electrodes and/or parts to be welded
Metal Expulsion	Excess Current/Energy	1	Decrease current/energy in steps of 5-10%
	Insufficient Force	1	Increase force in steps of 10-20%
	Poor Weldhead Follow-up	1	Reduce mass of top electrode holder assembly***
	Dirty Electrodes	2	Clean electrodes and/or parts to be welded
	Electrode Tip Shape	2	Use constant area electrodes or shape to suit application
Sparking	Excess Current/Energy	1	Decrease current/energy in steps of 5-10%
	Insufficient Force	1	Increase force in steps of 10-20%
	Poor Weldhead Follow-up	1	Reduce mass of top electrode holder assembly***
	Electrode Tip Shape	1	Use constant area electrodes or shape to suit application
	Wrong Electrode Material	2	Check Electrode/Material Selection Guide
Warping	Excess Welding Time	1	Decrease Welding Time (A.C. Welding)
	Excess Force	1	Decrease force in steps of 10-20%
	Electrode Tip Shape	2	Use constant area electrodes or shape to suit application
Electrode Sticking	Insufficient Force	1	Increase force in steps of 10-20%
	Wrong Electrode Material	1	Check Electrode/Material Selection Guide
	Electrode Tip Shape	1	Use constant area electrodes or shape to suit application
	Dirty Electrodes	2	Clean electrodes and/or parts to be welded
	Poor Weldhead Follow-up	3	Reduce mass of top electrode holder assembly ***

CHAPTER 3: OPERATING INSTRUCTIONS

WELDHEAD TROUBLESHOOTING GUIDE			
SYMPTOM OR PROBLEM	PRIMARY CAUSE Weldhead-Related Cause	PRIORITY*	SOLUTION
Electrode Damage	Excess Current/Energy	1	Decrease current/energy in steps of 5-10%
	Insufficient Force	1	Increase force in steps of 10-20%
	Electrode Tip Shape	1	Use constant area electrodes or shape to suit application
	Excess Force	2	Decrease force in steps of 10-20%
	Wrong Electrode Material	2	Check Electrode/Material Selection Guide
	Dirty Electrodes	2	Clean electrodes and/or parts to be welded

* Priority numbers refer to troubleshooting priority, with 1 as highest priority. Start troubleshooting with 1 and then proceed to 2 and so on. When there are multiple causes with the same priority, use personal judgement in determining which is more probable in the specific application.

** In most cases capacitor discharge welds do not have a significant nugget.

*** For non-Unitek Peco weld heads.

A certain amount of experimentation is necessary to achieve the proper welding force setting for a specific application. The following are some general rules to make quality welds:

- a. Larger parts require higher force.
- b. Larger diameter electrode faces require higher force.
- c. Higher electrode forces require higher weld currents (energy).

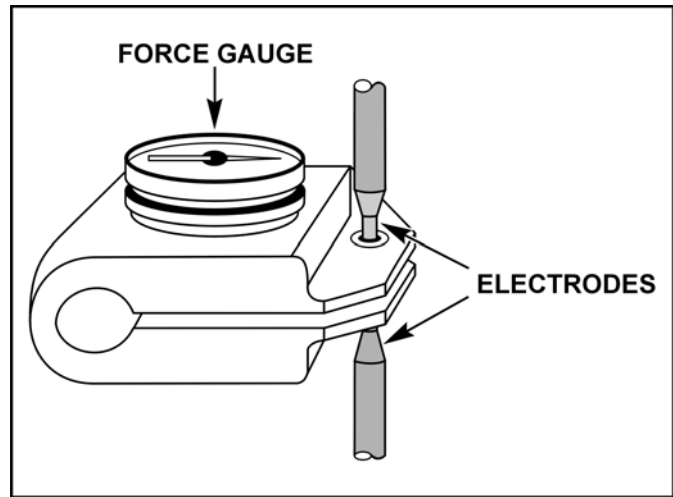
Section II. Model 180 Manually-Actuated Head Setup

This Section describes the following adjustments for the Model 180F:

- **Firing force** to the value required by the specific application.
- **Maximum force** the electrodes can exert on the workpiece during the welding cycle.
- **Down stroke** limits.

CAUTION: Excessive force can damage the electrodes and/or the workpiece.

- 1 Use the force adjustment knob to set the weld head force indicator to "4." The indicator is located on the front of the force tube just below the force adjustment knob. Set heads with digital readouts to "100."
- 2 Adjust the electrode spacing so that a Unitek Peco Force Gauge fits between the electrodes, as illustrated.
- 3 Depress and hold the footpedal. Note the force indication on the force gauge when the head firing switch "clicks." If the firing switch closure is inaudible, it is easily detected by observing the firing switch indicator on the welding power supply or control. For older or non-Unitek Peco controls, an ohmmeter or continuity checker can be connected to the pins on the firing switch connector.
- 4 Use the force gauge reading from the previous step as a starting point. Use the force adjustment knob to **increase** the indicated force if the initial force reading is **less than** the required force setting. If the initial force reading is **greater than** the required force setting, **decrease** the indicated force.
- 5 Depress and release the footpedal. Verify that the force applied by the operator does not exceed the force required to close the firing switch by more than five percent (5%).
- 6 After setting the required force, remove the force adjustment knob by loosening the two setscrews that secure it to the shaft. Invert the knob and place it on the shaft. Be sure to insert the locking tab on the knob into the slot on the force tube. Re-tighten both setscrews.
- 7 If necessary, re-adjust the electrodes in their holders to accommodate the workpiece.



CHAPTER 3: OPERATING INSTRUCTIONS

- 8 Turn the downstop screw counter-clockwise to its fullest extension without actually disengaging it. This will allow maximum downward travel of the upper arm. The following downstop adjustment should be made *only* if the workpiece would be damaged if the upper arm travels too far. *In most applications, use of the downstop is not recommended.*
 - A) Place the workpiece in the appropriate position. Rotate the downstop screw clockwise until the electrode(s) no longer contacts the workpiece. Check the adjustment by depressing and releasing the footpedal.
 - B) Depress and *hold* the footpedal. Slowly rotate the downstop counter-clockwise until the force-firing switch in the head closes. Rotate the downstop one or two additional turns counter-clockwise. The additional turn(s) will allow for electrode wear and/or the slight variations of the position of the electrode in its holder. Re-check that the firing switch consistently closes.

CAUTION: Do *not* attempt to use the downstop adjustment to limit the force, which is applied to the workpiece. This will result in inconsistent welds.

Section III. Model 180 EZ-AIR Air-Actuated Head Setup

This Section describes the following adjustments for the Model 180A/EZ:

- **Welding force** to the value required by the specific application.
- **Down speed** of the electrode approaching the parts.
- Eliminating any **down stop** setting.

CAUTION: Excessive force can damage the electrodes and/or the workpiece.

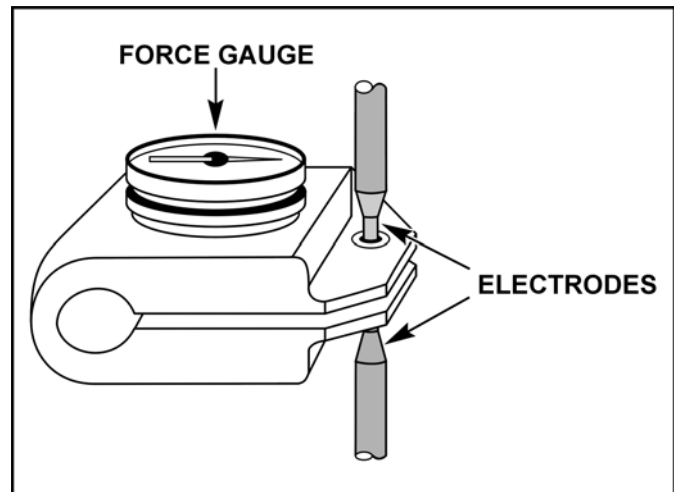
The Model 180A/EZ air-actuated weld head is supplied with EZ-AIR, a pneumatic control that actuates the electrodes and maintains a preset firing force. At a predetermined firing force, EZ-AIR automatically closes the inlet and outlet valves to the weld head actuation cylinder and eliminates over-force.

Down speed and welding force are the only two adjustments to be made when setting up the EZ-AIR. Down stops are *not* required.

NOTE: *Before* performing the following instructions, get the separate EZ-AIR Operator Manual supplied with the weld head and follow the detailed procedures for operating and adjusting EZ-AIR.

- 1 Use the force adjustment knob to set the weld head force indicator to "4." The indicator is located on the front of the force tube, just below the force adjustment knob. Set heads with digital readouts to "100."
- 2 If electrodes are being used, adjust the electrode spacing so that a Unitek Peco Force Gauge fits between the electrodes, as shown.

Depress and hold the footswitch. Note the force indication on the force gauge. When the head-firing switch "clicks" (closes), the force will stabilize. If the firing switch does not close, or the force keeps increasing, verify that all of the connections have been properly made as described in the EZ-AIR manual.



- 3 Cycle the electrode up and down several times and adjust the down speed by turning the knob that is located on the back of the EZ AIR. The down speed should be adjusted to provide a comfortable speed for the operator or automation without excessive impact force to the parts.
- 4 The force gauge will indicate the electrode force. Use the force adjustment knob to increase the indicated force if the initial force reading is less than the required force setting for the welding application. If the initial force reading is greater than the required force setting, decrease the indicated force.

CHAPTER 3: OPERATING INSTRUCTIONS

- 5 After setting the required force, particularly in automated applications, remove the force adjustment knob by loosening the two setscrews, which secure it to the shaft. Invert the knob and place it on the shaft. Be sure to insert the locking tab on the knob into the slot on the force tube. Re-tighten both setscrews.
- 6 If necessary, re-adjust the electrodes in their holders to accommodate the work piece.
- 7 A down stop is never required when using EZ-AIR. Turn the down stop screws counter-clockwise to their fullest extension without actually disengaging them. This will allow maximum downward travel of the upper arms.

Section IV. Model 180 and 182 Standard Air-Actuated Head Setup

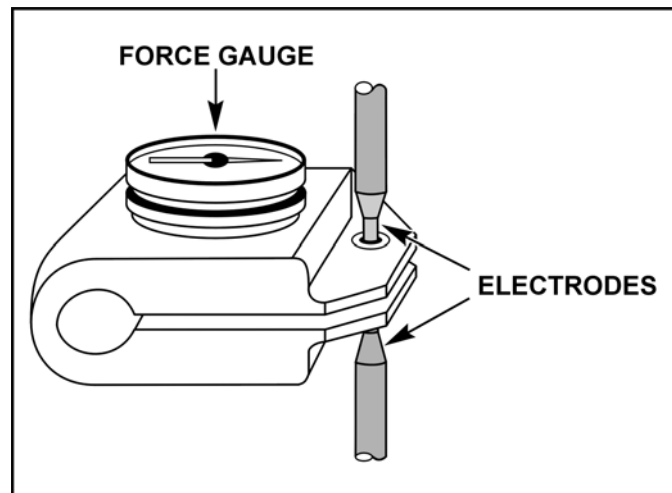
This Section describes the following adjustments for Models 180A/24, 180A/115, 180ADS/24, 180AHS/115, 182A/24, 182A/115, 182AHS/24:

- **Firing force** to the value required by the specific application.
- **Maximum force** the electrodes can exert on the workpiece during the welding cycle.
- **Down stroke** limits.

CAUTION: Excessive force can damage the electrodes and/or the workpiece.

In automated applications, the maximum repetition rate is usually limited by the stroke of the head and the air pressure on the top of the air cylinder. The higher the pressure, the faster the upper arm will move. The air pressure on the top of the cylinder will determine the *welding*, *but not the firing force*. If the welding force exceeds the firing force, which is set by the force adjustment knob on the head, by more than five percent, a noticeable decrease in weld quality often results.

- 1 Use the flow control on the bottom of the cylinder to reduce the down speed.
- 2 Use the force adjustment knob to set the weld head force indicator to "4". Indicator is located on the front of the force tube just below the force adjustment knob. Set heads with digital readouts to "100."
- 3 Close, but do not tighten, both air flow control valves.
- 4 Re-open each valve 3 or 4 turns.
- 5 Adjust the air pressure regulator to an indicated 10 psi (69 kPa).
- 6 Cycle the weld head by depressing and releasing the footswitch. Adjust the upspeed air flow control valve located at the *top* of the air cylinder, so that the upper arm moves up at a reasonable rate. It should not move so rapidly that it slams against the upstop.
- 7 If the application is a welding application, adjust the electrode spacing so that a Unitek Peco Force Gauge fits between the electrodes, as illustrated.
- 8 Depress and hold the footswitch. Note the force indication on the force gauge when the head firing switch "clicks." If the firing switch does not close, increase the pressure from the air pressure regulator until the firing switch does close. If the firing switch closure is inaudible, it is easily detected by observing the firing switch indicator on



CHAPTER 3: OPERATING INSTRUCTIONS

the welding power supply or control.

NOTE: For older or non-Unitek Peco controls, an ohmmeter or continuity checker can be connected to the pins on the firing switch connector.

- 9 Use the force gauge reading from the previous step as a starting point. Use the force adjustment knob to increase the indicated force if the initial force reading is less than the required force setting. If the initial force reading is greater than the required force setting, decrease the indicated force.
- 10 Release and depress the footswitch. Verify that the welding force applied by the upper arm does not exceed the force required to close the firing switch by more than five percent (5%). If necessary, adjust the pressure from the air pressure regulator and/or the force adjustment knob on the head.
- 11 After setting the required force, particularly in automated applications, remove the force adjustment knob by loosening the two set screws which secure it to the shaft. Invert the knob and place it on the shaft. Be sure to insert the locking tab on the knob into the slot on the force tube. Re-tighten both set screws.
- 12 If necessary, re-adjust the electrodes in their holders to accommodate the workpiece.
- 13 Turn the downstop screw counter-clockwise to its fullest extension without actually disengaging it. This will allow maximum downward travel of the upper arm. The following downstop adjustment should be made only if the workpiece would be damaged if the upper arm travels too far. In most applications, use of the downstop is not recommended.
 - A) Depress and **hold** the footswitch. Slowly rotate the downstop counter-clockwise until the force firing switch in the head closes. Rotate the downstop one or two additional turns counter-clockwise. The additional turn(s) will allow for electrode wear and/or the slight variations of the position of the electrode in its holder.
 - B) Re-check that the firing switch consistently closes.

CAUTION: Do **not** attempt to use the downstop adjustment to limit the force, which is applied to the workpiece. This will result in inconsistent welds.

- 14 Depress the footswitch. Adjust the downspeed air flow control valve so that the upper electrode arm descends slowly enough to prevent impact damage to the workpiece and electrodes.
- 15 Re-adjust upspeed air flow control valve if necessary.

NOTE: Once the required firing force is setup, **do not change the regulator setting!** Use only the air flow control valves to control the up and down speed of the upper arm. Changes in the regulator setting will change the welding force.

Section V. Model 188

Standard Air-Actuated Head Setup

This Section describes the following adjustments for the Model 188A/24 and 188A/115:

- **Firing force** to the value required by the specific application.
- **Maximum force** the electrodes can exert on the workpiece during the welding cycle.
- **Down stroke** limits.

CAUTION: Excessive force can damage the electrodes and/or the workpiece.

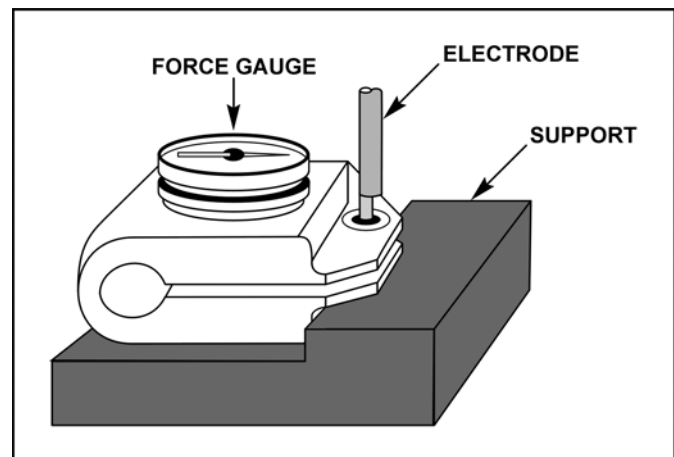
In automated applications, the maximum repetition rate is usually limited by the stroke of the head and the air pressure on the top of the air cylinder. The higher the pressure, the faster the upper arm will move. The air pressure on the top of the cylinder will determine the *welding*, *but not the firing force*. If the welding force exceeds the firing force, which is set by the force adjustment knob on the head, by more than five percent, a noticeable decrease in weld quality often results. Use the flow control on the bottom of the cylinder to reduce the down speed.

NOTE: Start with the *right* side of the head. Do *not* connect the DFS/88 switch box at this time.

- 1 Connect the right side firing switch cable to the power supply firing switch connector.
- 2 Use the force adjustment knob to set the weld head force indicator to "4". Indicator is located on the front of the force tube just below the force adjustment knob.
- 3 Close, but do not tighten, both air flow control valves.
- 4 Re-open each valve 3 or 4 turns. Adjust air pressure regulator to an indicated 10 psi (69 kPa).
- 5 Cycle the weld head by depressing and releasing the footswitch. Adjust the upspeed air flow control valve located at the **TOP** of the air cylinder, so that the upper arm moves up at a reasonable rate. It should not move so rapidly that it slams against the upstop.
- 6 Place a Unitek Peco Force Gauge beneath the electrode, as shown. The force gauge *must* be supported on the **bottom** for proper indication of force.

NOTE: If the application is a welding application, adjust the spacing so that a Unitek Peco Force Gauge fits between the right electrode and a workpiece.

- 7 Depress and hold the footswitch.
NOTE: the force indication on the force gauge when the head firing switch "clicks."



CHAPTER 3: OPERATING INSTRUCTIONS

- 8 If the firing switch does not close, increase the pressure from the air pressure regulator until the firing switch does close.
NOTE: If the firing switch closure is inaudible, it is easily detected by observing the firing switch indicator on the welding power supply or control. For older or non-Unitek Peco controls, an ohmmeter or continuity checker can be connected to the pins on the firing switch connector.
- 9 Use the force gauge reading from the previous step as a starting point. Use the force adjustment knob to increase the indicated force if the initial force reading is less than the required force setting. If the initial force reading is greater than the required force setting, decrease the indicated force.
- 10 Repeat steps 8 and 9 to set the firing force on the left side of the head. Disconnect the power supply firing switch connector from the right side firing switch cable and connect to the left side firing switch cable.
- 11 Release and depress the footswitch. Verify that the welding force applied by the upper arm does not exceed the force required to close the firing switch by more than five percent (5%). If necessary, adjust the pressure from the air pressure regulator and/or the force adjustment knob on the head.
- 12 After setting the required force, particularly in automated applications, remove the force adjustment knob by loosening the two set screws which secure it to the shaft. Invert the knob and place it on the shaft. Be sure to insert the locking tab on the knob into the slot on the force tube. Re-tighten both set screws. Reconnect the DFS/88 to both the right/left side firing cables and attach to the power supply firing switch connector.
- 13 If necessary, re-adjust the electrodes in their holders to accommodate the workpiece. The faces of both electrodes should be in the same plane and the gap (spacing) between the electrodes should be uniform.
- 14 Turn the downstop screws counter-clockwise to their fullest extension without actually disengaging them. This will allow maximum downward travel of the upper arms. The following downstop adjustments should be made only if the workpiece would be damaged if the upper arms travel too far. In most applications, use of the downstop is not recommended.
 - A) Start with the right downstop. Place the workpiece in the appropriate position. Rotate the downstop screw clockwise until the electrode no longer contacts the workpiece. Check the adjustment by depressing and releasing the footswitch.
 - B) Depress and **hold** the footswitch. Slowly rotate the downstop counter-clockwise until the force firing switch in the head closes. Rotate the downstop one or two additional turns counter-clockwise. The additional turn(s) will allow for electrode wear and/or the slight variations of the position of the electrode in its holder. Re-check that the firing switch consistently closes.

C) Repeat this procedure for the left downstop.

CAUTION: Do *not* attempt to use the downstop adjustments to limit the force which is applied to the workpiece. This will result in inconsistent welds.

- 15 Depress the footswitch. Adjust the downspeed air flow control valves so that the upper electrode arms descend slowly enough to prevent impact damage to the workpiece and electrodes.
- 16 Re-adjust upspeed air flow control valves if necessary.
- 17 Once the required firing force is setup, **DO NOT CHANGE THE REGULATOR SETTING!** Use only the air flow control valves to control the up and down speed of the upper arm. Changes in the regulator setting will change the welding force.

CHAPTER 4

USER MAINTENANCE

Section I. General Maintenance

Inspection

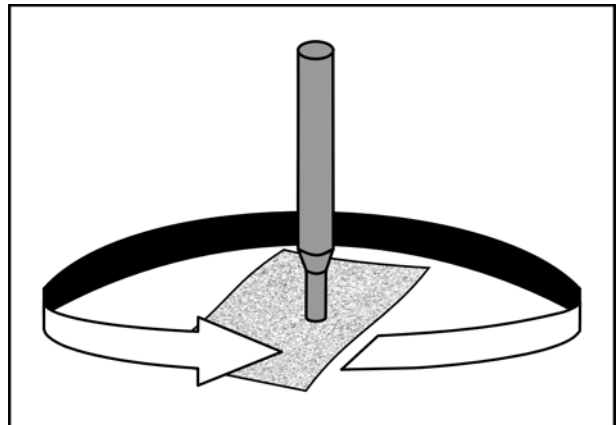
Clean all electrical connections every six months to minimize welding circuit resistance. Inspect all bearings and braces for excessive wear every three years and replace as necessary.

Lubrication

All bearing surfaces are designed for non-lubricated operation. Do *not* oil any bearings or sleeves *except* for the use of a dry lubricant on weld heads used in automated, air actuated systems.

Section II. Electrode Cleaning

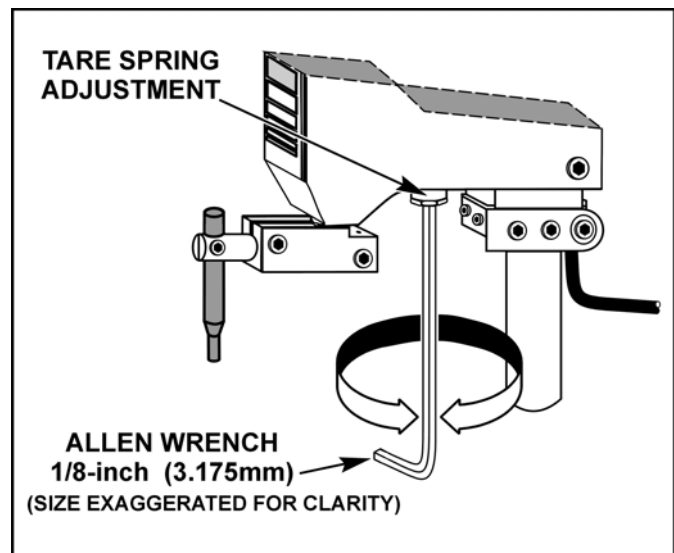
- 1 Re-surface tips periodically to remove oxides and welding debris from the electrodes.
- 2 Set the **WELD/NO WELD** Switch on the welding power supply, or control, to the **NO WELD** position.
- 3 Clean the electrodes using 400 to 600 grit emery paper. Fold the emery paper over a *flat, rigid backing* with the grit surface facing out. The rigid backing will maintain the "flatness" of the electrode face during cleaning.
- 4 Place emery paper and backing between electrodes. If the head is air actuated, reduce the pressure on the top of the cylinder. Actuate the head. The electrodes should contact with the paper with a force which is low enough to allow the paper to be moved without damaging its surface. Move the paper in a circular motion while maintaining the contact force.
- 5 Wipe the electrodes so that they are clean.



Section III. Tare Spring Adjustment

The tare spring adjustment compensates for the varying mass of different upper electrodes and adapters.

- 1 With the head in a vertical position and the upper arm and electrodes installed, set the force adjustment to *minimum* by turning the firing force adjustment knob fully counterclockwise.
- 2 Hold a measuring scale beside the upper electrode adapter block, grasp the block, and move the block up and down between the tare spring travel limits. The total travel will be about 1/8 inch (3.2 mm). Push the block down against the bottom limit, then gently release it. The tare spring should exert enough force to return the electrode to the center of its travel, approximately 1/16 inch (1.6 mm) from either extreme. If the electrode block does not re-center, adjust the tare spring.
- 3 If necessary, adjust the tare spring tension adjustment screw setting with a 1/8 inch (3.2 mm) Allen wrench. The adjustment screw is recessed in the center of the tare spring assembly at the bottom of the force spring tube.
- 4 Adjust the screw until the electrode block centers itself after being depressed and released. Tightening the screw increases tare spring tension, which increases the upward force on the upper electrode assembly. If the upper electrode interconnecting flexure interferes with the adjustment procedure, temporarily disconnect it from the upper electrode adapter block.
- 5 After adjusting the tare spring tension, recheck the firing force adjustment and readjust if required.



APPENDIX B ACCESSORIES

Accessories

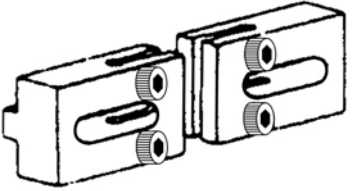
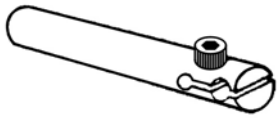
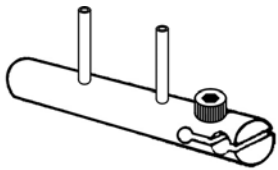
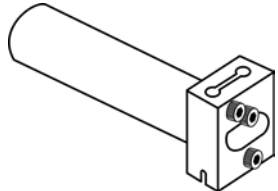
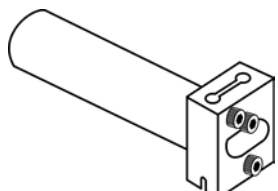
MODEL	DESCRIPTION
BLFOI	Fiber Optic Illuminator System , 115V-50/60Hz. Self-Supporting Gooseneck, Bifurcated Light Pipes, Focusing Lenses, and Mounting Adapter for Optic Mounting Assembly.
BLFOI/230	Fiber Optic Illuminator System , 230V-50/60Hz. Self-Supporting Gooseneck, Bifurcated Light Pipes, Focusing Lenses, and Mounting Adapter for Optic Mounting Assembly.
DFS	Firing Switch Junction Box . Connects 2 Firing Switch Cables to one Power Supply.
DFS/88	Series Firing Switch Junction Box . Connects two firing switch cables in Series. (Model 188)
FG100	Electrode Force Gage , 100 lb, SCALE 100 lb x 1 lb.
FG20	Electrode Force Gage , 20 lbs, SCALE 20 lb x 0.2 lb
FG10KG	Electrode Force Gage , 10 kg, SCALE 10 kg x 0.1 kg.
FSAC	Footswitch, Single Level . Switches 115V-50/60Hz to air heads. USE with HFIC power supplies and/or any power supply or control which does NOT have a built-in Valve Driver.
FS1L	Footswitch, Single Level .
FS2L	Footswitch, Two Level .
MSP	Footpedal, Medium Force Swing Type , 100 lb maximum, 5:1 mechanical advantage (Model 180F).
OMA	Optic Mounting Assembly . Use with SZO and BPTL.
PD	Polishing Disks , 600 grit, 1.5 in. diameter, 50 pieces. Use to polish electrodes.
SMZ-660	Nikon SMZ 660 Stereo Zoom Microscope , 10X wide eyepieces, object lens 0.5X wide field, 195 mm maximum working distance. Includes C-Bonder arm.
VDAC-24P	Valve Driver Adapter Cable , 115 V Receptacle, 4 pin Plug. Allows for Connection of OLD Style 115V Air Head Valve to NEW Type 115/24V Receptacle.
VDAC-115P	Valve Driver Adapter Cable , 4 pin Receptacle, 115 V Plug. Allows for Connection of Standard 24/115V Plug on NEW Style Air Head Valve to OLD Type 115V Receptacle.
WP	Work Positioner , 3 inch diameter, Height Adjustable from 1-7/16 to 2 inches.

APPENDIX B. ACCESSORIES

Electrodes

MATERIAL	DESCRIPTION
RWMA 2 -- Copper-Chromium Alloy	83B Rockwell Hardness, 85% conductivity. Used for welding steels, nickel alloys and other high resistance materials.
RWMA 3 -- Copper-Beryllium Alloy	100B Rockwell Hardness, 48% conductivity. Used for welding high resistance materials requiring high weld forces.
GLIDCOP -- AL-15 -- Dispersion Strengthened Copper With 0.15% Aluminum Oxide	68B Rockwell Hardness, 92% conductivity. Longer life, greater thermal stability, higher strength than RWMA 2. Generally interchangeable with RWMA 2 without changing schedules. GLIDCOP is a trademark of SCM.
RWMA 11 -- Copper-Tungsten Alloy	90B Rockwell Hardness, 46% conductivity. Usually inserted into an RWMA 2 shank. Used for welding cuprous and precious metals. Used for light projection welding dies.
RWMA 13 -- Tungsten	70A Rockwell Hardness, 32% conductivity. Usually inserted into an RWMA 2 shank. Cannot be machined but may be ground to the desired shape. Used to weld non-ferrous metals such as copper and brass.
RWMA 14 -- Molybdenum	90B Rockwell Hardness, 31% conductivity. Usually inserted into an RWMA 2 shank. Machineable. Used for welding copper, silver, gold, and their alloys.

Electrode Holders

MODEL HE188	
	<p>Electrode Holder, .245 inch diameter for ESO800E Series electrodes. Used on Model 188 weld heads.</p>
MODEL HE2000	
	<p>Electrode Holder, holds 1/4 inch diameter electrodes. Used on Model 180 weld heads.</p>
MODEL HE2000WC	
	<p>Water-Cooled Electrode Holder, holds 1/4 inch diameter and 1/8 inch diameter electrodes. Includes plastic tubing. (Set of 2) Used on Model 188 weld heads.</p>
MODEL HE38V	
	<p>Electrode Holder, holds 1/4 inch diameter ESO800E electrodes. Used on Model 188 weld heads.</p>
MODEL HE38V04	
	<p>Electrode Holder, vertical, anti-rotation feature. Holds 1/8 inch diameter ESO400 electrodes. Used to weld battery tabs. Used on Model 188 weld heads.</p>

APPENDIX B. ACCESSORIES

Electrodes

ES0800 1/4 INCH DIAMETER STRAIGHT ELECTRODES		
Used with 180 and 182 Series Weld Heads		
Model	Material	
ES0802	RWMA 2	
ES0803	RWMA 3	
ES0850	GLIDCOP	
ES0811	RWMA 11 INSERT	
ES0813	RWMA 13 INSERT	
ES0820	MOLY INSERT	
ES0820A	1/8 IN. DIAMETER MOLY INSERT	
* Copper Alloy ** Refractory Alloy Insert		

ES0800E 0.245 INCH DIAMETER ECCENTRIC STRAIGHT ELECTRODES		
Used with 188 Series Weld Heads		
Model	Material	
ES0802E	RWMA 2	
ES0803E	RWMA 3	
ES0850E	GLIDCOP	
ES0820E	MOLY INSERT	
ES0820E	GLIDCOP (0.062 FACE)	

APPENDIX B. ACCESSORIES

12 INCH ELECTRODE RODS					
MODEL	MATERIAL	DIAMETER (Inch)	MODEL	MATERIAL	DIAMETER (Inch)
ER0213	RWMA 13	1/16	ER0450	GLIDCOP	1/8
ER0220	MOLY	1/16	ER0802	RWMA 2	1/4
ER0402	RWMA 2	1/8	ER0803	RWMA 3	1/4
ER0403	RWMA 3	1/8	ER0850	GLIDCOP	1/4
ER0413	RWMA 13	1/8	ER1202	RWMA 2	3/8
ER0420	MOLY 1/8	1/8	ER2002	RWMA 2	5/8

THIN-LINE® SERIES 180 WELD HEADS

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