

WELD HEAD

THINLINE 90 SERIES

OPERATION MANUAL



990-130 REV F

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REVISION RECORD

Revision	EO	Date	Basis of Revision
1	Not Recorded		Original Release
A	19161	01/02	Added Unitek Peco™ name
B	21776	05/08	Update to Miyachi Unitek logo, and added new CAUTION information.
C	42860	11/13	Update to Miyachi America name and logo.
D	43481	11/14	Updated to Amada Miyachi America name and logo.
E	43866	08/15	Updated to Amada Miyachi America format.
F	44244	05/16	Updated Contact Information

FOREWORD

Thank you for purchasing a Miyachi Unitek™ THIN-LINE® SERIES 90 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:

Amada Miyachi America
1820 South Myrtle Avenue
Monrovia, California 91016
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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 90 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.

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

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LIMITED WARRANTY

1. (a) Subject to the exceptions and upon the conditions set forth herein, Seller warrants to Buyer that for a period of one (1) year from the date of shipment (“**Warranty Period**”), that such Goods will be free from material defects in material and workmanship.

(b) Notwithstanding the foregoing and anything herein to the contrary, the warranty set forth in this Section 1 shall be superseded and replaced in its entirety with the warranty set forth on **Exhibit A** hereto if the Goods being purchased are specialty products, which include, without limitation, laser products, fiber markers, custom systems, workstations, Seller-installed products, non-catalogue products and other custom-made items (each a “**Specialty Products.**”

(c) EXCEPT FOR THE WARRANTY SET FORTH IN SECTION 1(A), SELLER MAKES NO WARRANTY WHATSOEVER WITH RESPECT TO THE GOODS (INCLUDING ANY SOFTWARE) OR SERVICES, INCLUDING ANY (a) WARRANTY OF MERCHANTABILITY; (b) WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE; (c) WARRANTY OF TITLE; OR (d) WARRANTY AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS OF A THIRD PARTY; WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE.

(d) Products manufactured by a third party and third party software (“**Third Party Product**”) may constitute, contain, be contained in, incorporated into, attached to or packaged together with, the Goods. Third Party Products are not covered by the warranty in Section 1(a). For the avoidance of doubt, **SELLER MAKES NO REPRESENTATIONS OR WARRANTIES WITH RESPECT TO ANY THIRD PARTY PRODUCT, INCLUDING ANY (a) WARRANTY OF MERCHANTABILITY; (b) WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE; (c) WARRANTY OF TITLE; OR (d) WARRANTY AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS OF A THIRD PARTY; WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE.** Notwithstanding the foregoing, in the event of the failure of any Third Party Product, Seller will assist (within reason) Buyer (at Buyer’s sole expense) in obtaining, from the respective third party, any (if any) adjustment that is available under such third party’s warranty.

(e) Seller shall not be liable for a breach of the warranty set forth in Section 1(a) unless: (i) Buyer gives written notice of the defect, reasonably described, to Seller within five (5) days of the time when Buyer discovers or ought to have discovered the defect and such notice is received by Seller during the Warranty Period; (ii) Seller is given a reasonable opportunity after receiving the notice to examine such Goods; (iii) Buyer (if requested to do so by Seller) returns such Goods (prepaid and insured to Seller at 1820 South Myrtle Avenue, Monrovia, CA 91016 or to such other location as designated in writing by Seller) to Seller pursuant to Seller’s RMA procedures and Buyer obtains a RMA number from Seller prior to returning such Goods for the examination to take place; and (iii) Seller reasonably verifies Buyer’s claim that the Goods are defective and that the defect developed under normal and proper use.

(f) Seller shall not be liable for a breach of the warranty set forth in Section 1(a) if: (i) Buyer makes any further use of such Goods after giving such notice; (ii) the defect arises because Buyer failed to follow Seller’s oral or written instructions as to the storage, installation, commissioning, use or maintenance of the Goods; (iii) Buyer alters or repairs such Goods without the prior written consent of Seller; or (iv) repairs or modifications are made by persons other than Seller’s own service personnel, or an authorized representative’s personnel, unless such repairs are made with the written consent of Seller in accordance with procedures outlined by Seller.

(g) All expendables such as electrodes are warranted only for defect in material and workmanship which are apparent upon receipt by Buyer. The foregoing warranty is negated after the initial use.

(h) Subject to Section 1(e) and Section 1(f) above, with respect to any such Goods during the Warranty Period, Seller shall, in its sole discretion, either: (i) repair or replace such Goods (or the defective part) or (ii) credit or refund the price of such Goods at the pro rata contract rate, provided that, if Seller so requests, Buyer shall, at Buyer's expense, return such Goods to Seller.

(i) THE REMEDIES SET FORTH IN SECTION 1(H) SHALL BE BUYER'S SOLE AND EXCLUSIVE REMEDY AND SELLER'S ENTIRE LIABILITY FOR ANY BREACH OF THE LIMITED WARRANTY SET FORTH IN SECTION 1(A). Representations and warranties made by any person, including representatives of Seller, which are inconsistent or in conflict with the terms of this warranty, as set forth above, shall not be binding upon Seller.

Exhibit A
Warranty for “Specialty Products”

Limited Warranty

EXCEPT FOR THE WARRANTY SET FORTH BELOW IN THIS EXHIBIT A, SELLER MAKES NO WARRANTY WHATSOEVER WITH RESPECT TO THE GOODS (INCLUDING ANY SOFTWARE) OR SERVICES, INCLUDING ANY (a) WARRANTY OF MERCHANTABILITY; (b) WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE; (c) WARRANTY OF TITLE; OR (d) WARRANTY AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS OF A THIRD PARTY; WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE.

Warranty Period: The Warranty Period for Specialty Products is for one (1) year, and the Warranty Period for laser welders and laser markers is two (2) years (unlimited hours), and the Warranty Period for the laser pump diodes or modules is two (2) years or 10,000 clock hours, whichever occurs first (as applicable, the “**Warranty Period**”). The Warranty Period begins as follows: (i) on orders for Goods purchased directly by Buyer, upon installation at Buyer’s site or thirty (30) days after the date of shipment, whichever occurs first; or (ii) on equipment purchased by a Buyer that is an OEM or systems integrators, upon installation at the end user’s site or six (6) months after the date of shipment, whichever occurs first.

Acceptance Tests: Acceptance Tests (when required) shall be conducted at Amada Miyachi America, Inc., Monrovia, CA, USA (the “**Testing Site**”) unless otherwise mutually agreed in writing prior to issuance or acceptance of the Acknowledgement. Acceptance Tests shall consist of a final visual inspection and a functional test of all laser, workstation, enclosure, motion and accessory hardware. Acceptance Tests shall include electrical, mechanical, optical, beam delivery, and software items deliverable under the terms of the Acknowledgement. Terms and conditions for Additional Acceptance Tests either at Seller’s or Buyer’s facility shall be mutually agreed in writing prior to issuance or acceptance of the Acknowledgement.

Performance Warranty: The system is warranted to pass the identical performance criteria at Buyer’s site as demonstrated during final Acceptance Testing at the Testing Site during the Warranty Period, as provided in the Acknowledgement. Seller explicitly disclaims any responsibility for the process results of the laser processing (welding, marking, drilling, cutting, etc.) operations.

Exclusions: Seller makes no warranty, express or implied, with respect to the design or operation of any system in which any Seller’s product sold hereunder is a component.

Limitations: The limited warranty set forth on this Exhibit A does not cover loss, damage, or defects resulting from transportation to Buyer’s facility, improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the equipment, or improper site preparation and maintenance. This warranty also does not cover damage from misuse, accident, fire or other casualties of failures caused by modifications to any part of the equipment or unauthorized entry to those portions of the laser which are stated. Furthermore, Seller shall not be liable for a breach of the warranty set forth in this Exhibit A if: (i) Buyer makes any further use of such Goods after giving such notice; (ii) the defect arises because Buyer failed to follow Seller’s oral or written instructions as to the storage, installation, commissioning, use or maintenance of the Goods; (iii) Buyer alters or repairs such Goods without the prior written consent of Seller; or (iv) repairs or modifications are made by persons other than Seller’s own service personnel, or an authorized representative’s personnel, unless such repairs are made with the written consent of Seller in accordance with procedures outlined by Seller.

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Seller further warrants that all Services performed by Seller's employees will be performed in a good and workmanlike manner. Seller's sole liability under the foregoing warranty is limited to the obligation to re-perform, at Seller's cost, any such Services not so performed, within a reasonable amount of time following receipt of written notice from Buyer of such breach, provided that Buyer must inform Seller of any such breach within ten (10) days of the date of performance of such Services.

Seller shall not be liable for a breach of the warranty set forth in this Exhibit A unless: (i) Buyer gives written notice of the defect or non-compliance covered by the warranty, reasonably described, to Seller within five (5) days of the time when Buyer discovers or ought to have discovered the defect or non-compliance and such notice is received by Seller during the Warranty Period; (ii) Seller is given a reasonable opportunity after receiving the notice to examine such Goods and (a) Buyer returns such Goods to Seller's place of business at Buyer's cost (prepaid and insured); or (b) in the case of custom systems, Seller dispatches a field service provider to Buyer's location at Buyer's expense, for the examination to take place there; and (iii) Seller reasonably verifies Buyer's claim that the Goods are defective or non-compliant and the defect or non-compliance developed under normal and proper use.

All consumable, optical fibers, and expendables such as electrodes are warranted only for defect in material and workmanship which are apparent upon receipt by Buyer. The foregoing warranty is negated after the initial use.

No warranty made hereunder shall extend to any product whose serial number is altered, defaced, or removed.

Remedies: With respect to any such Goods during the Warranty Period, Seller shall, in its sole discretion, either: repair such Goods (or the defective part). **THE REMEDIES SET FORTH IN THE FOREGOING SENTENCE SHALL BE BUYER'S SOLE AND EXCLUSIVE REMEDY AND SELLER'S ENTIRE LIABILITY FOR ANY BREACH OF THE LIMITED WARRANTY SET FORTH IN THIS EXHIBIT A.**

Representations and warranties made by any person, including representatives of Seller, which are inconsistent or in conflict with the terms of this warranty, as set forth above, shall not be binding upon Seller.

Products manufactured by a third party and third party software ("**Third Party Product**") may constitute, contain, be contained in, incorporated into, attached to or packaged together with, the Goods. Third Party Products are not covered by the warranty in this Exhibit A. For the avoidance of doubt, **SELLER MAKES NO REPRESENTATIONS OR WARRANTIES WITH RESPECT TO ANY THIRD PARTY PRODUCT, INCLUDING ANY (a) WARRANTY OF MERCHANTABILITY; (b) WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE; (c) WARRANTY OF TITLE; OR (d) WARRANTY AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS OF A THIRD PARTY; WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE.** Notwithstanding the foregoing, in the event of the failure of any Third Party Product, Seller will assist (within reason) Buyer (at Buyer's sole expense) in obtaining, from the respective third party, any (if any) adjustment that is available under such third party's warranty.

CHAPTER 1

DESCRIPTION

Section I: Features

Miyachi Unitek Thin-Line Series 90 Welding and Reflow Soldering Heads are precision, low inertia, force-fired designs with a narrow vertical profile. Depending on the model, their 3 inch width, 1 1/2 inch stroke, 7 to 100 or 150 pounds force range and 6 1/4 to 10 3/8 inch throat depth allows them to be used in a wide variety of precision resistance welding and reflow soldering applications. The Series 90 is a "production line" head. Bearing life is designed for a minimum of 10 million operations when used according to the specifications. The diameter of the mounting post and the main shaft have been selected to ensure that the electrodes do not "wipe" more than .001 inch at 150 pounds. This is an important consideration in critical welding applications such as hermetic seals and pressure transducers. Series 90 Thin-Line Heads have six mounting holes on the spine which allow them to be easily incorporated into custom welding machines. The aluminum base of the Model 90 can be modified by the user in order to provide additional space to accommodate custom fixtures and tooling. The Series 90 Head is available in three different electrode configurations. Each configuration can be foot pedal or air actuated.

Miyachi Unitek Series 90 Heads excel in their ability to precisely place consistent, high quality welds, even in complex welding applications. They feature low inertia, light weight designs which ensure fast dynamic response. This allows the electrodes to follow the minute expansion and contraction of the weld joint as it heats and cools. A "differential motion" Force-Firing System initiates the power source at the precise moment when the Preset Firing Force is applied to the workpieces. Rugged construction, linear ball bearing bushings and an over-sized, anti-rotation bearing system provide perfect in-line electrode travel which assures smooth vertical travel of the upper electrode arm. This system minimizes the wiping action of the electrodes during welding, even at maximum force settings.

The Firing force is continuously adjustable from a minimum of 7 to a maximum of 150 pounds using In-Line Electrode Holders or Thermode Adapter Block and a maximum of 100 pounds using Offset Electrode Holders. Settings are quickly reproduced by using the Force Adjustment Knob and easy-to-read visual scale. An adjustable Tare Spring allows the user to compensate for the weight of non-standard electrode holders. An adjustment screw is provided which allows the user to adjust the sensitivity of the Force Firing Switch.

All Series 90 Heads have adjustable Up Stops and Down Stops. The Down Stop can be used to limit excessive over-travel. The Up Stop can be used to reduce the stroke, and therefore the travel time, of the Weld Head. The stroke of these Weld Heads should not be reduced to less than 1/4 inch, when used in automated machines, in order to obtain long bearing life and ensure that the ball bearings recirculate properly.

The Terminal Block, Flexible Copper Strap and Upper Electrode Assembly are electrically insulated from

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CHAPTER 1: DESCRIPTION

the frame of the Weld Head. The Frame, Support Post and Support Base are grounded to the bench top.

Electrode Holders for the Models 90F, 90A, 90F/DT, and 90A/DT use 1/4 inch diameter, ES0800 Series Electrodes. These electrodes contain snap ring grooves. User ordered snap rings can be put on each electrode to prevent slipping in the electrode holder whenever the welding force exceeds 100 pounds. The Model ETB3 Table Electrode can be used with the Offset Electrode Holders. Models 90RF and 90RA use the 17BW Series of Blade Thermodes and 17FW2187 Fold-up Thermode for reflow soldering applications.

Foot Actuated Series 90 Heads

Targeting of the work pieces is generally easier using foot actuation since foot actuation allows the operator to easily control the rate of electrode descent. Table 1-1 lists the features of each model:

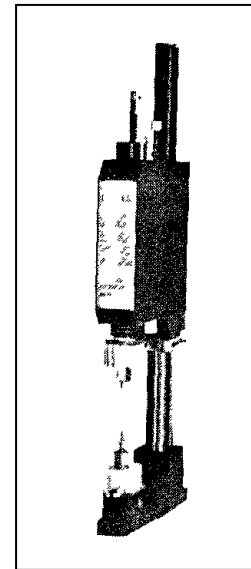
Table 1-1. Foot Actuated Model Features

Model	Stock Number	Electrode Holder	Electrode Type	Application
90F	2-150-01	HEU90K	ES0800 series	Welding
90F/DT	2-150-01-01	HE90ABK	ES0800 series	Welding
90RF	2-150-01-02	HE90TAB	17BW or 17FW	Reflow

Model 90F, In-line Electrode Weld Head

The Model 90F, as shown in Figure 1-1, is a conventional opposed "In-Line" electrode welding head. The mechanism in the Series 90 provides a three-to-one mechanical advantage in addition to the three-to-one advantage provided by the Model MSP Footpedal. This means that the operator must apply approximately 17 pounds to the Footpedal in order to obtain a welding force of 150 pounds. The Model 90F includes the Linkage and Hardware Kit required to install the Model MSP Footpedal. Also included are one pair of 1/4 inch diameter RWMA-2 Electrodes and #2 AWG Welding Cables.

The In-Line Model HEU90 Electrode Holder Housings are designed with cooling fins which radiate heat and reduce the necessity for forced cooling. The Electrode Holders can be forced air or water cooled by drilling and tapping a hole in the Housing as illustrated in Figure 13. In-Line Electrode Holders use a collet to clamp 1/4 inch diameter, ESO800 Series Electrodes. The Lower Electrode Assembly can be easily aligned with the Upper Electrode Assembly.

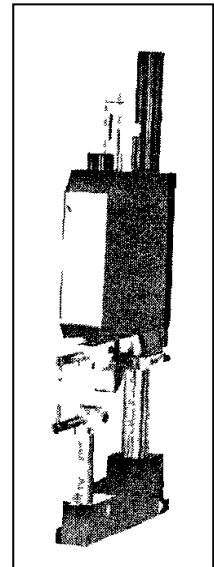


**Figure 1-1.
Model 90F In-line
Electrode Weld Head**

Model 90F/DT, Offset Electrode Weld Head

Figure 1-2 shows the Model 90F/DT which uses the HE90ABK Offset Electrode Holder Block in both the upper and lower electrode position. The offset configuration provides a throat depth of 10 3/8 inches. Welding force is limited to 100 pounds.

The Model HE90ABK Offset Electrode Holder Block accepts 5/8 inch diameter, Model HE2000 Electrode Holders, which use the 1/4 inch diameter, ESO800 Series Electrodes. The Model HE2000 Electrode Holders can be replaced with the Model HE2000WC Water Cooled Electrode Holders.



**Figure 1-2.
Model 90F/DT Offset
Electrode Weld Head**

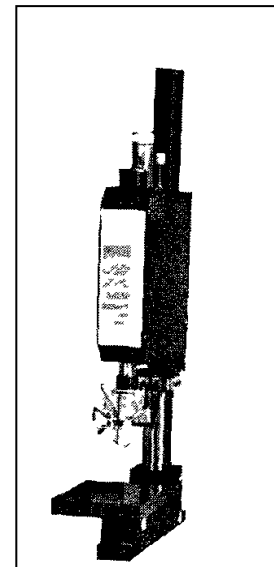
Model 90RF, Reflow Soldering Head

Reflow soldering ribbon cables or printed circuit connectors can be accomplished by using the Model 90RF Reflow Soldering Head with Blade Thermodes as shown in Figure 1-3.

The 17BW Series of Blade Thermodes can be mounted using pivot or fixed mounting hardware attached to the Model HE90TAB Thermode Adapter Block. The single 17FW2187 Fold-up Thermode only uses the pivot mounting hardware. See Chapter 2, Section III for detailed thermode mounting instructions.

Air Actuated Series 90 Heads

All Series 90 Foot Actuated Heads can be ordered with air actuation already installed. Air actuation makes it easier to incorporate the Series 90 Heads into automated systems. An air cylinder replaces the Model MSP Footpedal as the actuation source. The speed of the air actuation system is limited by the speed at which the electrode holder can move without damaging the electrodes, thermodes or workpieces as a result of the impact. Welding rates of 1 per second are possible. Table 1-2 lists the features of each model, shown in Figure 1-4.



**Figure 1-3.
Model 90RF Thermode Adapter
Reflow Soldering Head**

CHAPTER 1: DESCRIPTION

Table 1-2. Air Actuated Model Features

Model	Stock Number	Electrode Holder	Electrode Type	Application
90A	2-151-01	HEU90K	ES0800 series	Welding
90A/DT	2-151-01-01	HE90ABK	ES0800 series	Welding
90RA	2-151-01-02	HE90TAB	17BW or 17FW	Reflow

The top mounted 1 1/16 inch diameter Air Cylinder is supplied with two 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 24 (standard) or 115 VAC ratings. The Pressure Regulators and Flow Controls allow independent adjustment of the up and downspeed of the upper electrode. The Solenoid and Regulator Assembly is contained in a separate package that mounts on the spine of the Weld Head.

The Models 250, 500 and 800 Stored Energy Power Supplies require that the Model FSAC Footswitch be used to energize the Four-Way Air Solenoid Valve.



Model 90A In-Line
Electrode Weld
Head



Model 90A/DT
Offset Electrode
Weld Head



Model 90RA Thermode
Adapter Reflow Soldering
Head

Figure 1-4. Air Actuated Series 90 Models

CHAPTER 1: DESCRIPTION

The Phasemaster IV Time-At-Temperature Control (PM4), the Phasemaster series of direct energy welding controls and the microprocessor controlled series of stored energy power supplies. Each of these controls or power supplies has a 24/115 VAC Valve Output for energizing and controlling the timing of the Air Solenoid Valve. The Model FS2L Footswitch is used to initiate all controls.

Section II: Accessories

Model	Description
BLCS	Microscope, .3X objective, 20X eyepieces, 4 to 18X magnification. Includes Arm and Porthole Assembly.
DFS	Dual Firing Switch Junction Box. Connects two firing switch cables to a single power source.
ES0802	Electrode, RWMA-2, 1/4 inch diameter x 2 inches long.
ES0803	Electrode, RWMA-3, 1/4 inch diameter x 2 inches long.
ES0811	Electrode, RWMA-11, copper tungsten insert, 1/4 inch diameter x 2 inches long.
ES0813	Electrode, RWMA-13, tungsten insert, 1/4 inch diameter x 2 inches long.
ES0820	Electrode, RWMA-14, molybdenum insert, 1/4 inch diameter x 2 inches long.
ES0850	Electrode, Glidcop, 1/4 inch diameter x 2 inches long.
ETB3	3 inch Table Electrode, RWMA-2 for use with Offset Electrode Holders.
FG100	100 lb Electrode Force Gage. 1 lb x 100 lb scale.
FG100KG	100 kg Electrode Force Gage. 1 kg x 100 kg scale.
FG200	200 lb Electrode Force Gage. 2 lb x 200 lb scale.
FSAC	Medium duty Single Level Footswitch which switches 115 VAC to air heads. Use with Stored Energy Power Supplies.
FS2L	Footswitch for controlling Phasemaster controls.
HE2000	Electrode Holders, 5/8 inch diameter, 2 inch long. Holds 1/4 inch diameter electrodes.
HE2000WC	Water/Air Cooled Electrode Holders, 5/8 inch diameter, 2 inch long. Holds 1/4 inch diameter electrodes.
HE90ABK	Offset Upper and Lower Electrode Adapter Blocks for 90F Weld Head. Not for use over 100 pounds. Includes Lower Electrode Mounting Post, 1 pair HE2000 Electrode Holders, 1 pair ESO802 Electrodes and Hardware.
HE90C	Collet and Nut Assembly for the Model 90 In-Line Electrode Holders.
HE90TAB	Thermode Adapter Block for 90RF and 90RA Reflow Soldering Heads.
HEL90K	In-Line LOWER Electrode Holder Assembly for 90 Series Weld Head. Includes hardware.
HEU90K	In-Line UPPER Electrode Holder Assembly for 90 Series Weld Head. Includes hardware.
MSP	Medium Force Swing type Footpedal. Rated 100 pounds.
OMAA90	Allows the use of Model BLCS Microscope with Series 90 Heads.

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CHAPTER 1: DESCRIPTION

Model	Description
PD	Polishing Disks, package of 50.
17BW1200	Blade Thermode, 1.20 inches wide x .060 inches thick, with thermocouple and air cooling tube.
17BW2187	Blade Thermode, 2.18 inches wide x .060 inches thick, with thermocouple and air cooling tube.
17BW2500	Blade Thermode, 2.50 inches wide x .060 inches thick, with thermocouple and air cooling tube.
17FW2187	Fold-up Thermode, 2.18 inches wide x .060 inches thick, with thermocouple and air cooling tube. Not for use over 350°C.
2AA16	Welding Cable, #2, 16 inches long.
570-2-040	Retaining Ring for 1/4 inch diameter electrodes.
325-1-119	1/4 inch O.D. Plastic Tube Fitting with 1/4 NPT pipe thread. Use to convert HEL90K and HEU90K In-Line Electrode Holders for water cooling.

CHAPTER 2

INSTALLATION

Section I: Physical Installation

Foot Pedal Actuated Weld Heads

- 1 Position Mounting Template, located in the Ship Kit, in the desired location on the workbench. Make certain that sufficient working space is provided from front edge of the bench to the Mounting Base. This permits operator to use the bench as a support when positioning parts. Most applications require about six to ten inches from edge of the bench to front of the Support Base.

NOTE: All dimensions use inches and all mounting hardware is American standard unless specified otherwise.

- 2 Drill six 3/8 inch diameter mounting holes as shown on the Mounting Template. Drill the 2.00 DIA. hole for all models. Drill the 1.25 DIA hole for the Model 90F/DT.

CAUTION: Use a 1/4 inch hex driver to tighten the support post locking screws location on the back of the right side of the support base to ensure that the weld head does not slip and pinch your fingers!

NOTE: All mounting hardware such as screws, lock washers, and washers are contained in the Ship Kit.

- 3 Reference Figure 2-1 for the following instructions. Remove the PEDAL ACTUATOR, item [1], by removing the BELLCRANK NUT, item [2], and the BELLCRANK BOLT, item [3].
- 4 Remove the BUSHING BOLT, item [4], and BUSHING WASHER, item [5].
- 5 Remove the BELLCRANK SPRING, item [6]. Slip the BUSHING, item [7], inside the BELLCRANK SPRING, replace the BELLCRANK SPRING and secure in position using the BUSHING WASHER and BUSHING BOLT.
- 6 Slide the EXTENSION ARM, item [8], over the end of the Bellcrank Arm and secure with two 10-32 X 3/4 CAP HEAD SCREWS, item [9].

NOTE: The middle screw must pass through the clearance hole in the Bellcrank Arm.

- 7 Line up the weld head with the correct holes in the Mounting Template. **CAUTION:** Be careful not to bend the LINK ASSEMBLY, item [18]. Attach the SPACER PLATE, item [10], to the WORKBENCH, item [11], using two 5/16-18 x 2 3/4 CAP HEAD SCREWS, item [13], LOCK WASHERS, item [14], and WASHERS, item [15]. **NOTE:** The CAP HEAD SCREWS must pass through the SPACER PLATE and WORKBENCH and thread into the two rear mounting holes on the weld head support base.
- 8 Attach the FOOTPEDAL MOUNTING PLATE, item [12] to the SPACER PLATE, item [10], using two 5/16-18 x 3/4 HEX HEAD SCREWS, item [16], ITL WASHERS, item [17], and WASHERS, item, [15].

CHAPTER 2: INSTALLATION

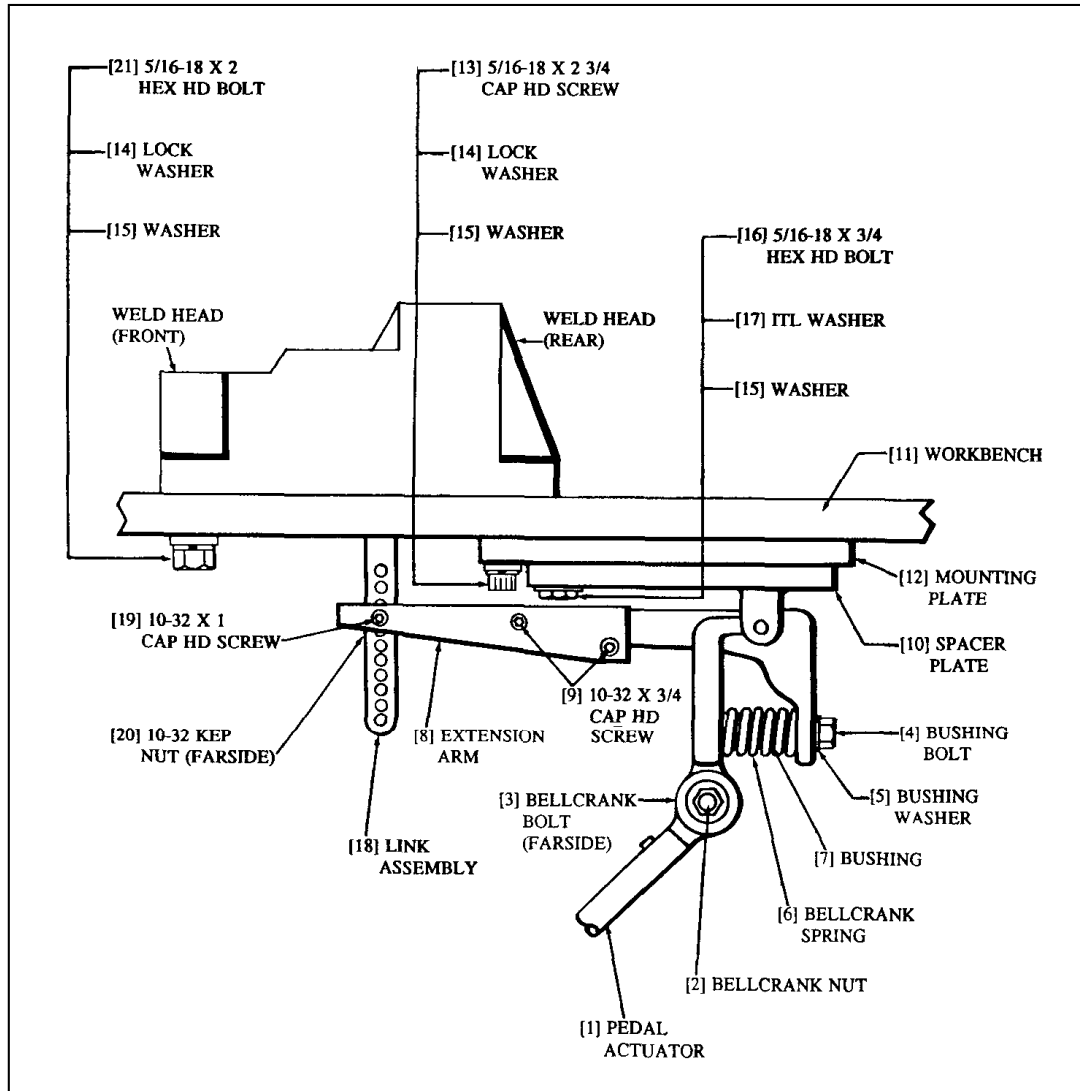


Figure 2-1. Model 90F and MSP Footpedal installation

- 9 Secure the front of the weld head to the WORKBENCH using two 5/16-18 x 2 HEX HEAD BOLTS, item 21, LOCK WASHERS, item [14], and WASHERS, item [15].
- 10 Connect the EXTENSION ARM, item [8], to the LINK ASSEMBLY, item [18] using the 10-32 X 1.00 CAP HEAD SCREW, item [19], and KEP NUT, item [20]. The ADAPTER ARM should be parallel to the bottom of the work bench. Re-attach the PEDAL ACTUATOR and set it to the desired operating angle.

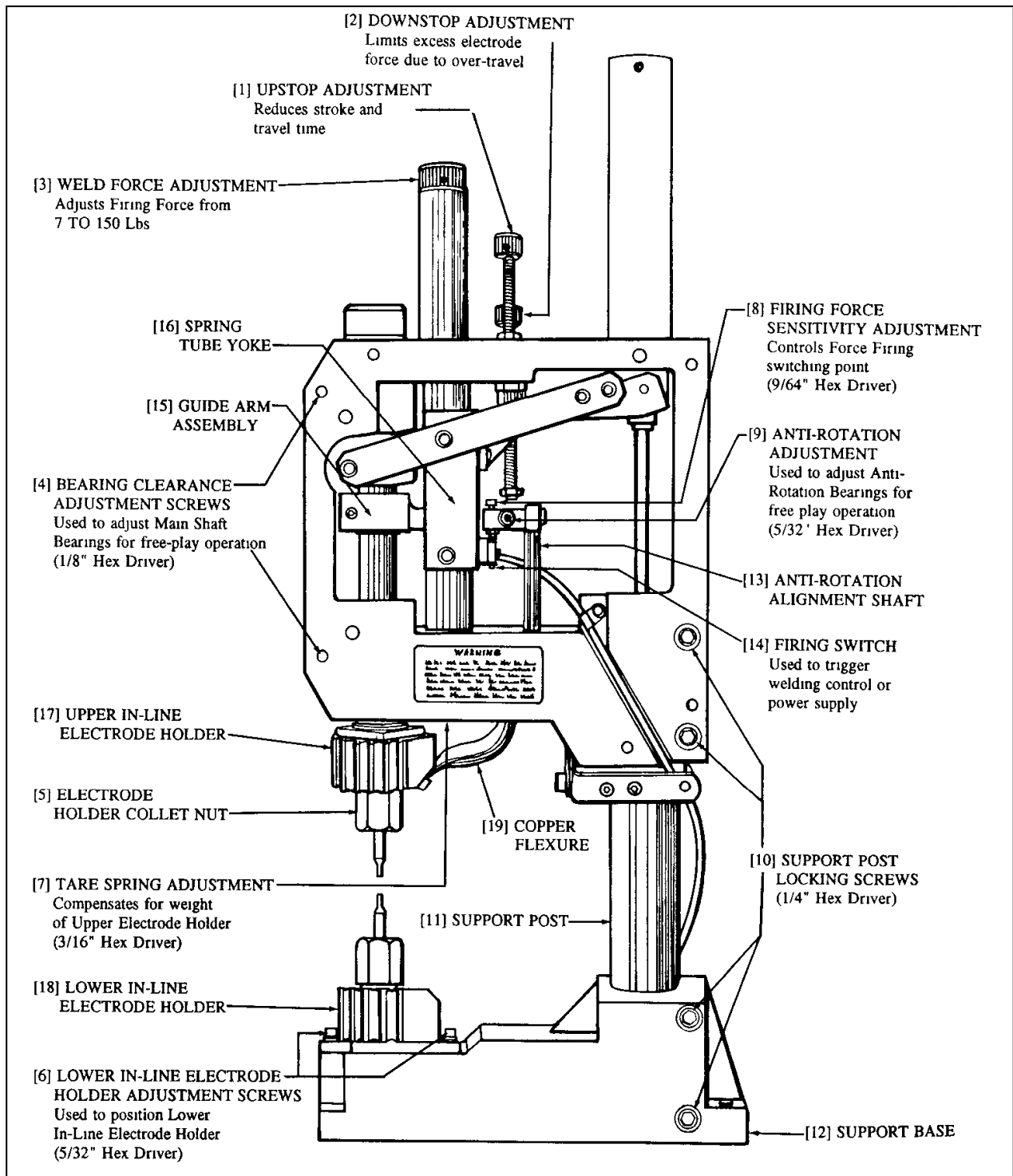


Figure 2-2. Series 90 Cutaway Illustrates Location and Size of Adjustment Screws

THINLINE® SERIES 90 WELD AND REFLOW SOLDER HEADS

CHAPTER 2: INSTALLATION

Air Actuated Weld Heads

- 1 Position Mounting Template, Figure 43, in the desired location on the workbench. Make certain that sufficient working space is provided from the front edge of bench to the Support Base. This permits operator to use the bench as a support when positioning parts. Most applications require about six to ten inches from edge of the bench to front of the Support Base.
- 2 Drill six 3/8 inch diameter mounting holes as shown on the Mounting Template. Drill the 2.00 DIA. hole for all models. Drill the 1.25 DIA hole for the Model 90A/DT.

NOTE: All mounting hardware such as screws, lock washers, and washers are contained in the Ship Kit.

- 3 Reference Figure 2-2 for the following instructions.

CAUTION: use a 1/4 inch hex driver to tighten the support post locking screws location on the back of the right side of the support base to ensure that the weld head does not slip and pinch your fingers!

- 4 Align the SUPPORT BASE, item [11], over the mounting holes. Attach the SUPPORT BASE to the workbench using four 5/16-18 x 1 1/2 inch hex head bolts with lock washers and washers (not shown) to secure the front and rear of the SUPPORT BASE.

- 5 Reference Figure 2-3 for the following instructions. Insert a 0.25 inch outside diameter plastic hose, with a rated burst pressure of 250 psi, into the AIR INPUT, item [6], located on the bottom of the Solenoid Air Valve Assembly. The AIR INPUT uses a "quick release" connector so special tools are not needed. Simply push the hose into the "quick release" fitting as far as it will go. Connect the other end to a FILTERED AIR SUPPLY (100 psig maximum). Amada Miyachi America suggests that in-line lubricators not be used since excess oil can blow-by worn seals in the AIR CYLINDER, item [1], ending up on the workpieces. Every one million cycles, the user should put a few drops of oil in the AIR CYLINDER. The tubing connecting the TOP AIR PRESSURE REGULATOR, item [4], with the UPSPEED AIR FLOW VALVE, item [2], and BOTTOM AIR PRESSURE REGULATOR, item [5], with the DOWNSPEED AIR FLOW VALVE, item [3], has been pre-assembled at the factory.

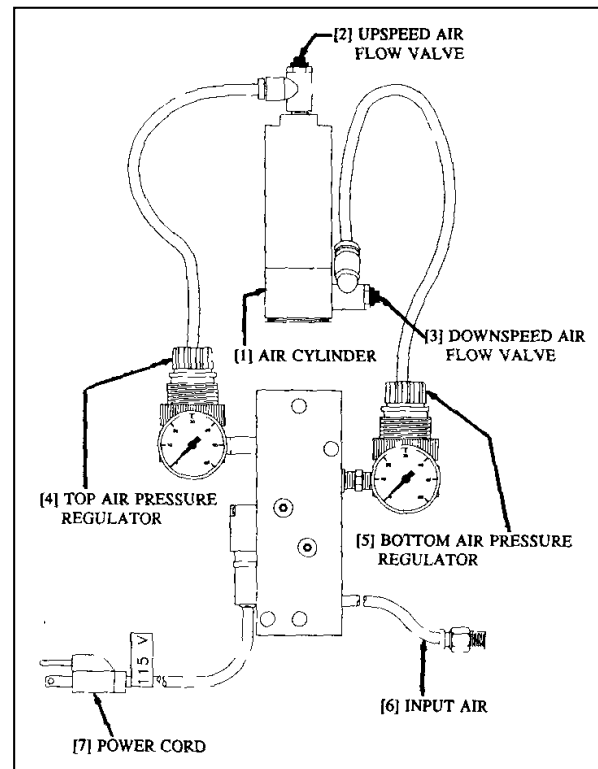


Figure 2-3. Solenoid Air Valve Assembly

- 6 When dressing electrodes, the TOP AIR PRESSURE REGULATOR must be turned down. An auxiliary regulator, or a customer supplied bleeder valve connected to output of the of the TOP AIR PRESSURE REGULATOR, can also be used to lower air pressure to facilitate dressing the electrodes.

Additional Attachments

Solenoid Air Valve Power Connection

Stored Energy Power Supplies require a 115 VAC Solenoid Air Valve Assembly for plugging directly into a Model FSAC Foot Switch receptacle.

7500A - Both the 115 VAC and 24 VAC Solenoid Valve Assemblies plug directly into the 115 VAC receptacle on the back of the 7500A. An internal switch, set by the user, applies 115 or 24 VAC to the receptacle.

PHASEMASTER (TM) Controls - The 115 VAC Solenoid Air Valve Assembly plugs directly into the 115 VAC VALVE receptacle on the rear panel. The 24 VAC Solenoid Valve Assembly requires that the user replace the 115 VAC connector with the 24 VAC connector provided in the Phasemaster Shipping Kit. The new connector plugs into the 24 VAC VALVE located on the rear panel.

Install the system in accordance with established safety practices and standards. Anti-Tie-Down Palm Buttons are not usually required if the electrode spacing is insufficient to allow the operator's fingers to fit between them.

In-line Water Cooled Electrode Holders

If forced cooling is required, drill a .399 inch diameter hole in the Upper and Lower In-Line Electrode Holder as shown in Figure 2-4. Tap a 1/4 NPT standard pipe thread into both ends of the hole.

Order four 1/4 inch O.D. Plastic Tube Fittings from Amada Miyachi America (AMADA MIYACHI AMERICA P/N 325-1-119). Apply pipe sealant to each tread and then thread two fittings into the Upper and Lower Electrode Holders. Connect 1/4 inch O.D. plastic tubing to the fittings as shown in Figure 2-5. Support the tubing on the Upper In-Line Electrode Holder using a cable clamp placed under one of the weld head side cover screws. Be sure to leave an adequate service loop.

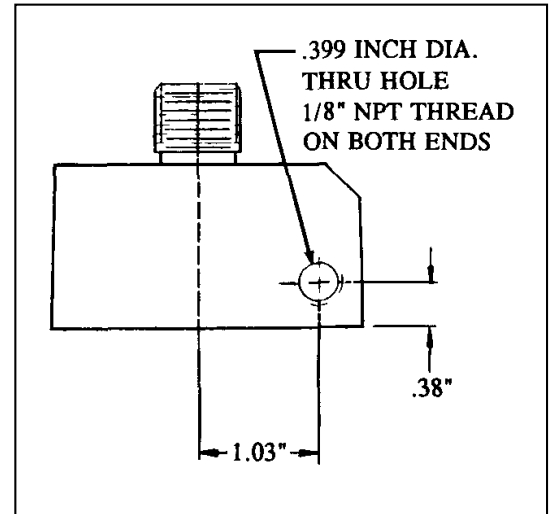


Figure 2-4. In-line Electrode Holder Modification for Water Cooling

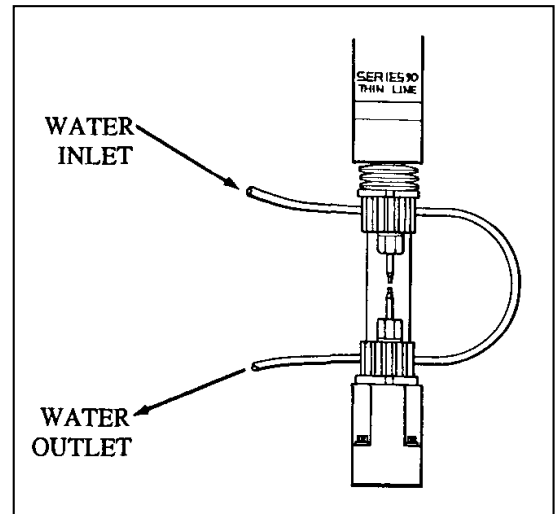


Figure 2-5. Tubing Path for Water Cooling In-line Electrode Holder

CHAPTER 2: INSTALLATION

Model HE2000WC, Offset Water Cooled Electrode Holders

Models 90A/DT and 90F/DT use the HE90ABK Offset Electrode Holders which in turn use Model HE2000, 5/8 inch diameter by 3 3/4 inch long, solid electrode holders for extending the weld head throat depth. In those applications where the duty cycle approaches 10 percent or where the electrodes are too hot to comfortably touch, the HE2000WC Water Cooled Electrode Holders should be used in place of the solid HE2000 holders. Electrode life is inversely proportional to Electrode Temperature. These holders can be cooled by connecting them to an air supply or a water supply as illustrated in Figure 2-6.

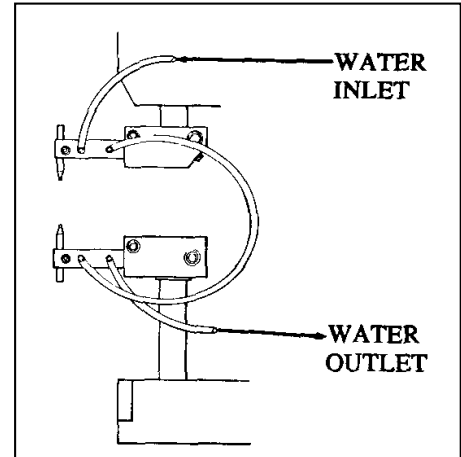


Figure 2-6. Water Cooled HE2000WC Offset Electrode Holders

Reducing the Length of the Support Base

The Support Base can be cut to provide additional room for tooling. It can be reduced to 5.5 inch by cutting the Base just in front of the support web that contains the mounting holes, as shown in Figure 2-7.

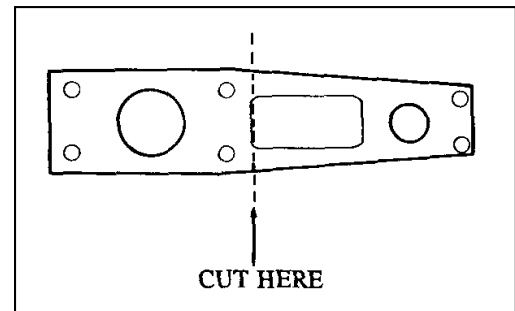


Figure 2-7. Bottom View of Support Base

Section II: Connection to Power Source

General

The Series 90 Heads come with the necessary fastening hardware for connecting the Welding already installed on the weld head power straps. The hardware for connecting the other end of the Welding Cables to the Power Supply or Welding Transformer can be found in the Power Supply or Welding Transformer Ship Kit.

Connect the Weld Head Firing Switch Cable to the Firing Switch Receptacle located on the front panel of all Stored Energy Power Supplies or to the matching connector/cable found on all Direct Energy Power Supplies.

90F, 90A, 90F/DT, and 90A/DT Weld Head Connections

- 1 Reference Figures 2-8 AND 2-9. Position the Power Supply or Welding Transformer approximately 4 to 5 inch behind the Weld Head. Connect one 16 inch WELDING CABLE to the left side of the WELD HEAD POWER STRAP using a 5/16-18 x 1/2 CAP HEAD SCREW. The FLAT WASHER goes between the CAP HEAD SCREW and the WELDING CABLE terminal.
- 2 Connect the second WELDING CABLE to the left side of the LOWER ELECTRODE HOLDER using a 5/16-18 x 1/2 CAP HEAD SCREW. The FLAT WASHER goes between the CAP HEAD SCREW and the WELDING CABLE terminal.
- 3 Connect the opposite ends of each WELDING CABLE to the Power Supply or Welding Transformer using the hardware supplied with the Welding Transformer Ship Kit. The hardware is sized for each WELDING TRANSFORMER.

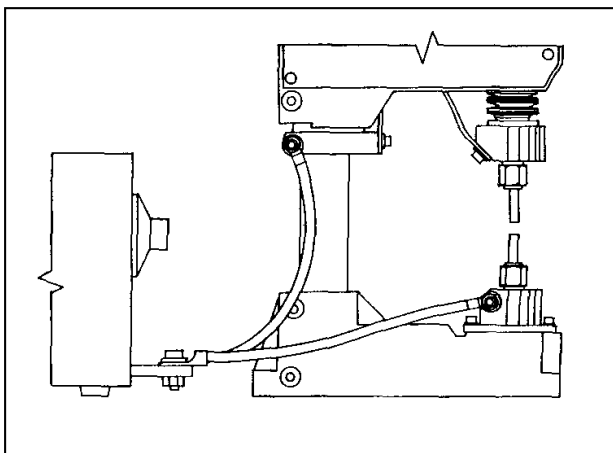


Figure 2-8. 90F and 90A In-line Weld Head Connections

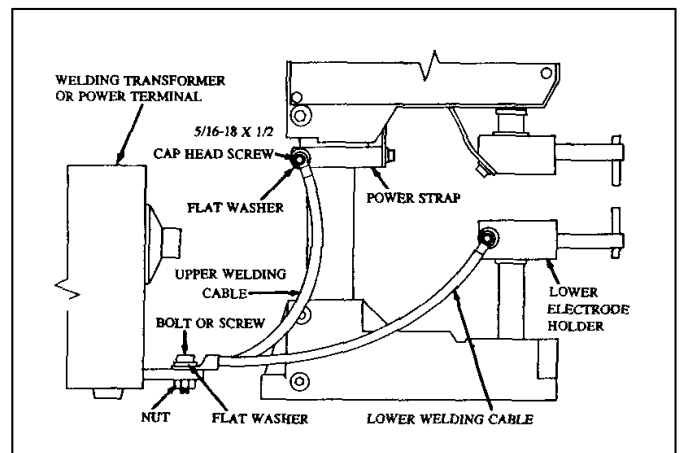


Figure 2-9. 90F/DT & 90A/DT Offset Weld Head Connections

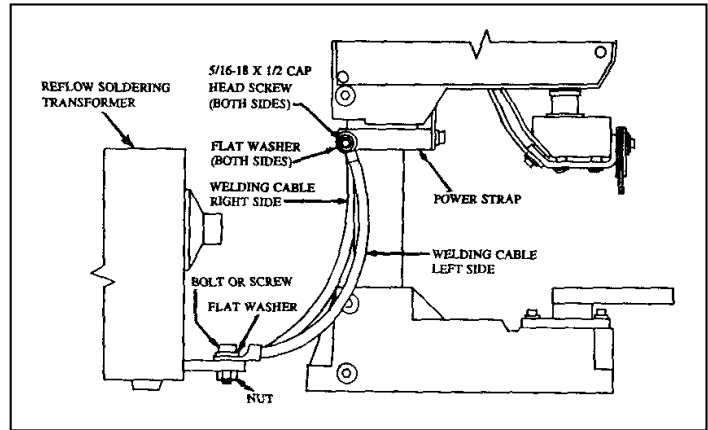
CHAPTER 2: INSTALLATION

NOTES:

Do not put a flat or lock washer between the welding cable and the power terminal.

Be sure to place both cables on the same side of the support post. Failure to do so could dramatically increase the amount of energy required to make a satisfactory weld because of added inductive losses caused by the support post.

For the same reason, do not run welding cables through a steel workbench.



90RF and 90RA Reflow Soldering Head Connections

- 1 Reference Figure 2-10. Position the Power Supply or Welding Transformer approximately 4 to 5 inch

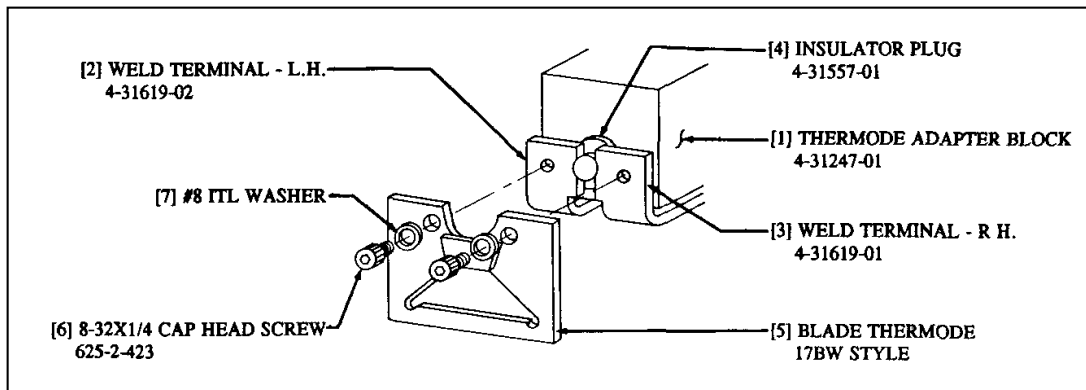


Figure 2-13. Blade Thermode, Fixed Installation

behind the Weld Head. Connect one 16 inch WELDING CABLE to the left side of the WELD HEAD POWER STRAP using a 5/16-18 x 1/2 CAP HEAD SCREW. The FLAT WASHER goes between the CAP HEAD SCREW and the WELDING CABLE terminal.

- 2 Connect the second WELDING CABLE to the right side of the POWER STRAP using a 5/16-18 x 1/2 CAP HEAD SCREW. The FLAT WASHER goes between the CAP HEAD SCREW and the WELDING CABLE terminal.

CHAPTER 2: INSTALLATION

- 3 Connect the opposite ends of each WELDING CABLE to the Power Supply or Welding Transformer using the hardware supplied with the Welding Transformer Ship Kit. The hardware is sized for each REFLOW SOLDERING TRANSFORMER.

NOTES:

- Do not put a flat or lock washer between the welding cable and the power terminal.
- Do not run welding cables through a steel workbench.. This could dramatically increase the amount of energy required to a satisfactory weld due to added inductive losses caused by the table.

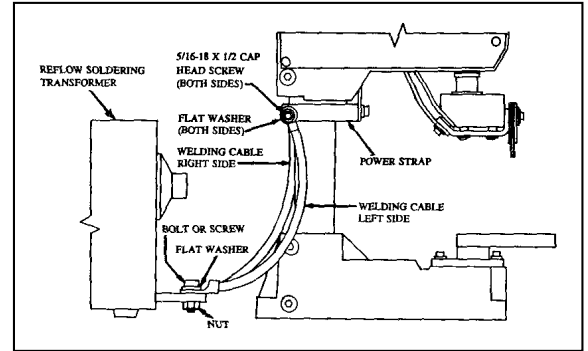


Figure 2-10. 90RF and 90RA Reflow Soldering Head Connections

CHAPTER 2: INSTALLATION

Section III: Electrode and Thermode Installation

90F and 90A Electrode Installation



CAUTION

Do *not* modify the electrode holders or attach additional mechanisms to the moving parts of the head. Doing so may hurt welding performance, damage the head, and *void the warranty*.

Verify that the COLLET is loose by turning it in the counter-clockwise direction. Insert the electrode into the COLLET. Tighten by turning clockwise as shown in Figure 2-11. Check the alignment of the electrodes. Loosen the three cap head screws holding the LOWER IN-LINE ELECTRODE HOLDER ASSEMBLY, re-align the holder, and then tighten the screws.

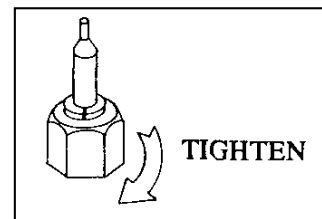


Figure 2-11. In-line Electrode Holder installation

90F/DT and 90A/DT Electrode Installation

Loosen the 10-32 CAP HEAD SCREW on the side of the HE2000 ELECTRODE HOLDER. Insert the electrode into the holder. Tighten by turning clockwise as shown in Figure 2-12. Check the alignment of the electrodes. Loosen the cap head screw in the SUPPORT BASE and then rotate the LOWER OFFSET ELECTRODE HOLDER ASSEMBLY into alignment with the upper electrode. Tighten the cap head screw.

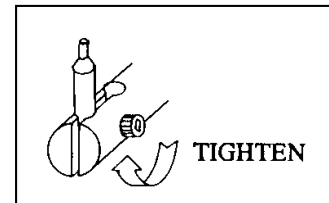


Figure 2-12. Offset Electrode Holder installation

90RF and 90RA Blade Thermode, Fixed Installation

- 1 Reference Figure 2-13. Verify that the THERMODE ADAPTER BLOCK, item [1], has two separate WELD TERMINALS, item [2] and [3]. The INSULATOR PLUG, item [4], should be positioned between the THERMODE ADAPTER BLOCK and both WELD TERMINALS. Attach the BLADE THERMODE, item [5] to the WELD TERMINALS using two 8-32x1/4 CAP HEAD SCREWS, item [6], and #8 ITL WASHERS, item [7]. Leave the screws loose.
- 2 Reference Chapter 3 for operating instructions. Bring the BLADE THERMODE down onto the workpiece.

CAUTION: do not heat the thermode at this time or the loose screws will weld to the thermode and/or weld straps.

- 3 While applying pressure against the workpiece, tighten each 8-32x1/4 CAP HEAD SCREW. This action will ensure that the bottom of the BLADE THERMODE is parallel to the workpiece.

90RF and 90RA Blade Thermode, Pivot Installation

- 1 Reference Figure 2-4. Verify that the THERMODE ADAPTER BLOCK, item [1], has a single separate WELD TERMINAL, item [2].

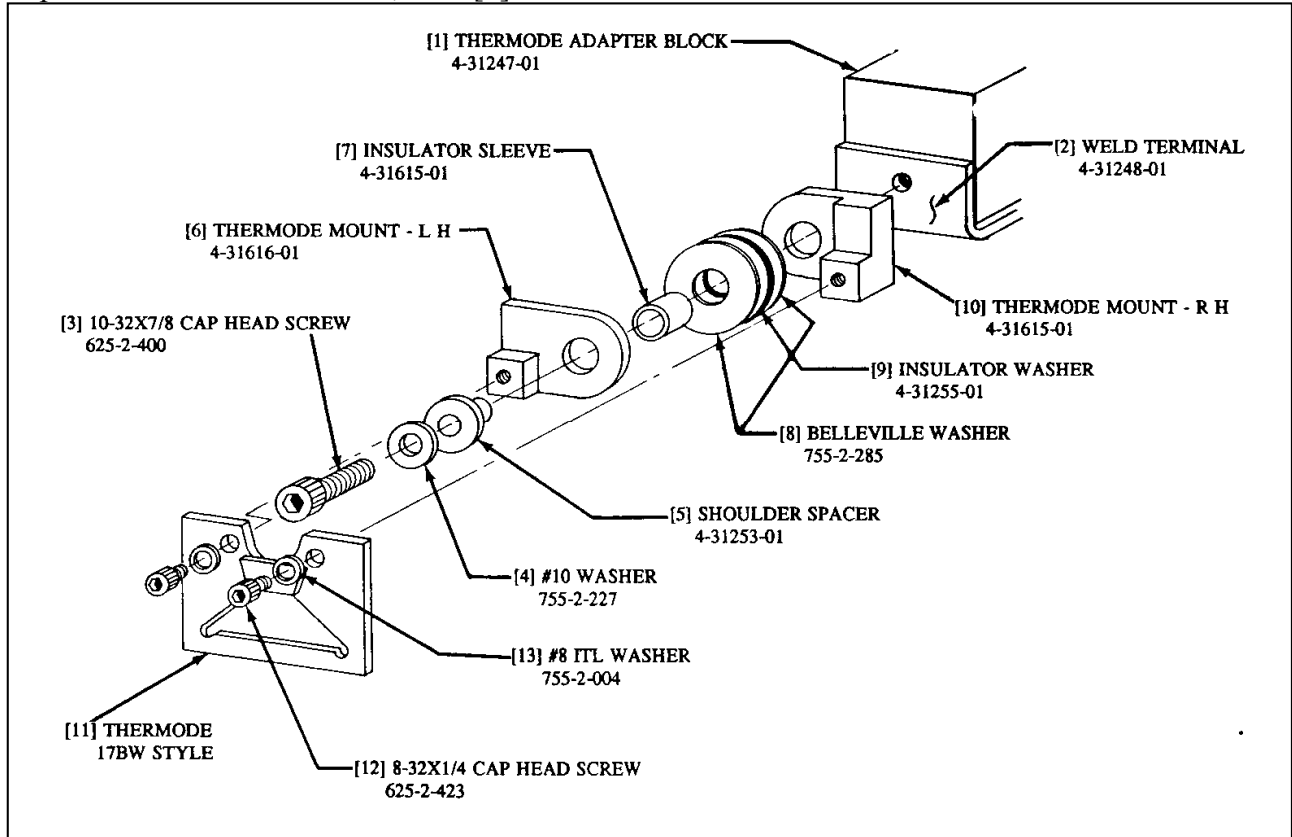


Figure 214. Blade Thermode, Pivot Installation

- 2 Assemble items [3] through [10] in numerical order.

NOTE: the convex surface of both BELLEVILLE WASHERS, item [8], must be placed against the face of the INSULATOR WASHER, item [9].

- 3 Attach the Blade Thermode Pivot Assembly to the THERMODE ADAPTER BLOCK using the single 10-32x7/8 CAP HEAD SCREW, item [3].

CAUTION: Tighten this screw securely or it will weld to the THERMODE ADAPTER BLOCK.

- 4 Attach the BLADE THERMODE, item [11] to the WELD TERMINALS using two 8-32x1/4 CAP HEAD SCREWS, item [12], and #8 ITL WASHERS, item [13].

CAUTION: Tighten both screws securely or they will weld to the THERMODE PIVOT MOUNTS.

CHAPTER 2: INSTALLATION

90RF and 90RA Fold-Up Thermode, Pivot Installation

- 1 Reference Figure 2-15. Verify that the THERMODE ADAPTER BLOCK, item [1], has a single separate WELD TERMINAL, item [2].

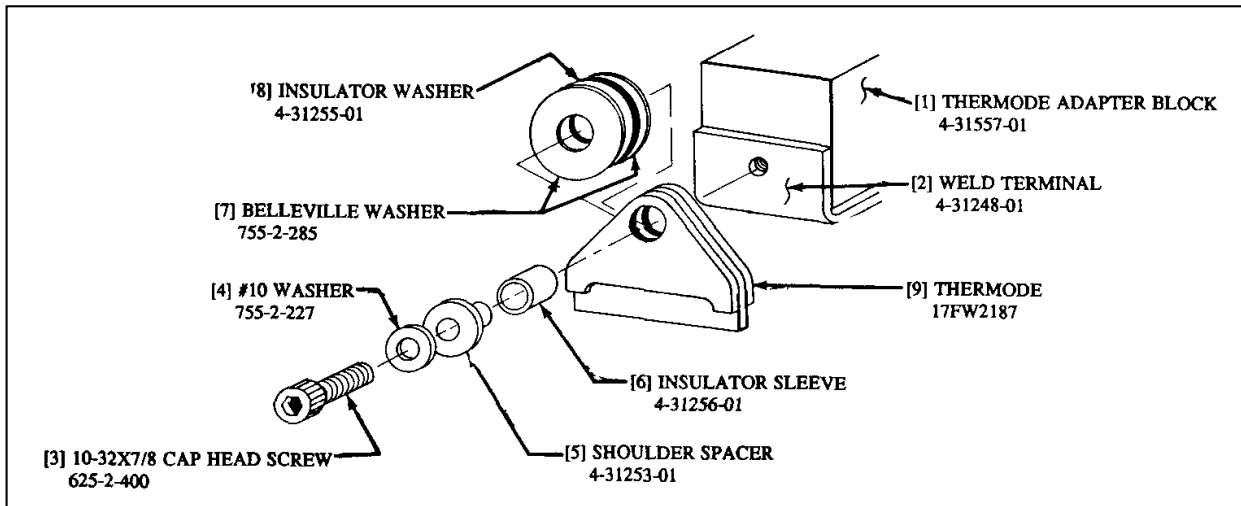


Figure 2-15. Fold-up Thermode, Pivot Installation

- 2 Assemble items [3] through [6] in numerical order.
- 3 Place the convex surface of both BELLEVILLE WASHERS, item [7], against the face of the INSULATOR WASHER, item [8]. Slip this "Belleville Sandwich" between the top sides of the FOLD-UP THERMODE, item [9].
- 4 Attach the Fold-up Thermode Pivot Assembly to the THERMODE ADAPTER BLOCK using the single 10-32x7/8 CAP HEAD SCREW, item [3].

CAUTION: Tighten this screw securely or it will weld to the THERMODE ADAPTER BLOCK.

CHAPTER 3

OPERATING INSTRUCTIONS

Section I: Welding Force Theory

Welding Force

Welding Force (Pressure) is a key variable in the resistance welding process. Excessive or insufficient welding force or pressure can cause a weak weld as shown in Figure 3-1. For more information on the basics of resistance welding, a handbook entitled, "Fundamentals of Resistance Welding" is available from Amada Miyachi America.

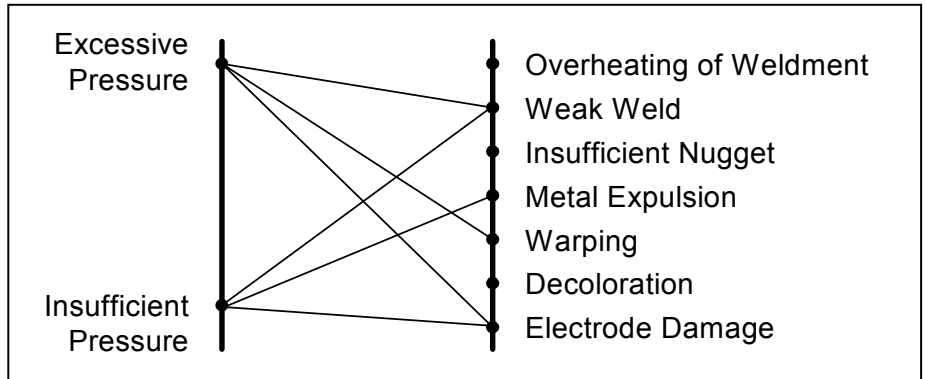


Figure 3-1. Welding Force (Pressure) Defect Diagram

A certain amount of experimentation is necessary to achieve the proper Welding Force setting for a specific application. Larger parts require higher force. The greater the diameter of electrode face, the higher force required. Generally higher electrode force requires a greater amount of energy to make a weld.

Reflow Soldering Force

The reflow soldering process is not as force sensitive as resistance welding. Sufficient force or pressure is necessary to ensure adequate thermal conduction and to hold the workpieces as the solder solidifies.

CHAPTER 3: OPERATING INSTRUCTIONS

Section II: Operation

Foot Actuated Heads

- 1 Reference Figure 2-2. Rotate the WELD FORCE ADJUSTMENT KNOB, item [3], located on the top of the Weld Head, clockwise to increase the Welding Force and counterclockwise to decrease force. The maximum Welding Force is reached when the indicator reads "10" at the bottom of scale. "4" or "5" on the Welding Force Scale represents a good initial setting.
- 2 Check the alignment of the electrodes.
- 3 Adjust the vertical work opening by either lowering the height of the lower Offset Electrode Holder or by lowering the position of the SUPPORT POST in the SUPPORT BASE using a 1/4 inch hex key.

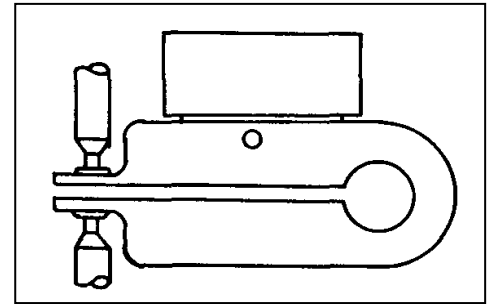


Figure 3-2. Using a Force Gauge to Measure the Weld Firing Force

- NOTE:** The vertical work opening must be less than 1.5 inch (3.8 cm) or the weld head firing switch may not function properly.
- 4 As the actual Welding Force may vary slightly between similar weld heads due to manufacturing tolerances, we recommend that a Force Gauge be used to precisely measure the Welding Force at which the Power Supply is triggered.
 - 5 Figure 3-2 shows how a Miyachi Unitek Force Gauge can be used to set-up and measure the actual Welding Force . Force Gauges are available in 100 lbs.(FG100), 200 lbs. (FG200), and 100 Kgs. (FG100KG) models.
 - 6 Set the WELD or HEAT Switch on all PHASEMASTER and 7500A Direct Energy Power Supplies to the "OFF" position. Set the POWER Switch on Stored Energy Power Supplies to the "OFF" position.
 - 7 Disconnect the Weld Head Firing Switch Cable from the Power Supply.
 - 8 Adjust the Weld Head Electrode spacing so that a Miyachi Unitek Force Gauge just fits between the electrodes.

NOTE: The maximum opening must be less than 1.5 inches (3.8 cm).

- 9 Reference Figure 2-2. Turn the DOWNSTOP ADJUSTMENT SCREW, item [2], fully counterclockwise. This will allow maximum downward travel of the Upper Electrode.
- 10 Depress the Footpedal and note the force indication on the Force Gauge when the Firing Switch inside of the Weld Head "clicks", then release the Footpedal. If the Firing Switch closure is inaudible, it is easily detected by connecting an Ohmmeter or continuity checker to the Firing Switch Connector pins.

CHAPTER 3: OPERATING INSTRUCTIONS

- 11 Reconnect the Weld Head Firing Switch Cable, turn on the WELD or HEAT Switch on all PHASEMASTER and 7500A Direct Energy Power Supplies, and switch on Stored Energy Power Supplies.
- 12 Make several welds. If the welding application requires more Welding Force, as typically indicated by heavy electrode or workpiece sparking, increase the Welding Force and re-measure.
- 13 If the welding application requires less Welding Force, as indicated by heavy electrode marking accompanied by a cold weld, decrease the Welding Force and re-measure.

Air Actuated Heads

- 1 This system should be installed in accordance with your established safety standards. Anti-Tie-Down Palm Buttons are not usually required if the electrode spacing is not sufficient to allow the operator's fingers to fit between them.
- 2 Review *Air Actuated Weld Heads and Solenoid Air Valve Power Connections*, in Chapter 2, *Installation*, to verify that the air lines and solenoid power cord have been correctly installed.
- 3 It is very important to adjust the Bottom Air Pressure Regulator to a pressure level that just triggers the Firing Switch in the Weld Head. Proper adjustment of the Bottom Air Pressure ensures that the Actual Welding Force, as experienced by the workpieces, will be identical to the user Set Welding Force. The typical user mistake is to set the Bottom Air Pressure at maximum for the fastest electrode travel. This action results in inconsistent welds, workpiece and electrode damage.
- 4 Set the WELD or HEAT Switch on all PHASEMASTER and 7500A Direct Energy Power Supplies to the "OFF" position. Set the POWER Switch on Stored Energy Power Supplies to the "OFF" position.
- 5 Set all PHASEMASTER Power Supplies to the BEAT/NON BEAT or ABORT ON Footswitch Operating Mode and 1-LEVEL or 2-LEVEL.
- 6 Disconnect the Weld Head Firing Switch Cable from the Power Supply.
- 7 Adjust the Weld Head Electrode spacing so that a Miyachi Unitek Force Gauge just fits between the electrodes.

NOTE: The maximum opening must be less than 1.5 inches (3.8 cm).

- 8 Reference Figure 2-2. Using the WELD FORCE ADJUSTMENT KNOB, set the Weld Force Indicator to an initial setting of "4".
- 9 Turn the DOWNSTOP ADJUSTMENT SCREW, item [2], fully counter-clockwise. This will allow maximum downward travel of the Upper Electrode.
- 10 Reference Figure 2-3. Close, but do not tighten, the UPSPEED AIR FLOW VALVE, item [2], and the DOWNSPEED AIR FLOW VALVE, item [3]. Re-open both valves 3 to 4 turns.

CHAPTER 3: OPERATING INSTRUCTIONS

- 11 Set the BOTTOM AIR PRESSURE REGULATOR, item [5], and the TOP AIR PRESSURE REGULATOR, item [4] to 15 Psig.
 - 12 Cycle the Weld Head by depressing and releasing the Footswitch. Adjust the UPSPEED AIR FLOW VALVE located at the top of the AIR CYLINDER, item [1], so that the Upper Electrode moves upward at a reasonable rate. It should not move so rapidly that it slams against the Upstop.
 - 13 Insert a Force Gauge between the electrodes as shown in Figure 3-2. Depress and hold the Footswitch. If the Firing Switch does not close, turn the TOP AIR PRESSURE REGULATOR clockwise until the Firing Switch "clicks". Note the force indication on the Force Gauge when the Weld Head Firing Switch "clicks" and then release the Footswitch. If the Firing Switch closure is inaudible, it is easily detected by connecting an Ohmmeter or continuity checker to the Firing Switch Connector pins. If more Welding Force is needed, go to Step 14. If less Welding Force is required, go to Step 15.
 - 14 Reference the force reading from Step 13 as the starting point. If more Welding Force is required, turn the WELD FORCE ADJUSTMENT KNOB clockwise and then increase the TOP AIR PRESSURE REGULATOR setting until the Firing Switch closes. Repeat this trial and error process until the desired Welding Force is reached. To provide the most sensitive DOWNSPEED AIR VALVE control, the BOTTOM AIR PRESSURE REGULATOR setting should be within 15 to 20 Psig of the TOP AIR PRESSURE REGULATOR Psig final setting.
 - 15 Reference the force reading from Step 13 as the starting point. If less Welding Force is required, turn the WELD FORCE ADJUSTMENT KNOB counter-clockwise and then decrease the TOP AIR PRESSURE REGULATOR setting until the Firing Switch opens. Slowly increase the TOP AIR PRESSURE REGULATOR setting until the Firing Switch just re-closes. Repeat this trial and error process until the desired Welding Force is reached. To provide the most sensitive DOWNSPEED AIR VALVE control, the BOTTOM AIR PRESSURE REGULATOR setting should be within 15 to 20 Psig of the TOP AIR PRESSURE REGULATOR Psig final setting.
 - 16 Readjust both the TOP AIR FLOW and BOTTOM AIR FLOW VALVES to provide smooth Upper Electrode motion.
- CAUTION:** Using the air pressure regulators to control electrode speed can result excess welding force being applied to the workpieces.
- 17 Readjust the electrodes in their holders as necessary to accommodate the actual workpiece.
 - 18 Reconnect the Weld Head Firing Switch Cable to the Power Supply.

Downstop Adjustment

- 1 The DOWNSTOP ADJUSTMENT should only be used to prevent excessive workpiece deformation. In most applications use of the DOWNSTOP ADJUSTMENT is unnecessary.
- 2 Depress and hold the Footswitch, closing the electrodes on the workpiece. Loosen the JAM NUT at the base DOWNSTOP ADJUSTMENT SCREW. Rotate the DOWNSTOP ADJUSTMENT SCREW until it just "bottoms out".
- 3 Release the Footswitch and then turn the DOWNSTOP ADJUSTMENT SCREW counter-clockwise one or two turns to allow for electrode wear.
- 4 Do not attempt to use the DOWNSTOP ADJUSTMENT to limit the Welding Force. Doing so will cause inconsistent weld quality.

CHAPTER 4

USER MAINTENANCE

Maintenance

Series 90 Weld Heads are designed to minimize routine maintenance. Daily maintenance should be limited to electrode dressing and cleaning.

Procedures for changing electrodes and thermodes are contained in Chapter 2, Section III, *Electrode and Thermode Installation*

Electrode Dressing

- 1 Depending on use, periodic tip resurfacing is required to remove oxides and welding debris from electrodes.
- 2 Set the WELD or HEAT Switch on all PHASEMASTER and 7500A Direct Energy Power Supplies to the "OFF" position. Set the POWER Switch on Stored Energy Power Supplies to the "OFF" position.
- 3 Cleaning of the electrodes on production line should be limited to use of #400 - 600 grit emery paper. In addition, the emery paper should have a solid backing so that it will not distort flat electrode surfaces.
- 4 Reference Figure 2-3. Temporarily reduce the TOP AIR PRESSURE. Place the emery paper between the electrodes and actuate the Footpedal or Footswitch to bring the electrodes into light contact with paper. Move the paper in a rotary motion.
- 5 Wipe the electrode tips so that they are clean.

CHAPTER 5 SERVICE

Section I: Adjustments

Linear Ball Bearing Bushing Adjustment

CAUTION: Do not adjust bearings unless the side play in the shaft exceeds 0.001 inch. Do not over-tighten the bearings. If you can feel the balls move as the shaft is moved, the bearings are too tight! This will dramatically reduce bearing life!

- 1 Remove the Covers from both sides of Weld Head with a 1/8 inch hex key. Use a 1/8 inch hex key to loosen the two BEARING CLEARANCE ADJUSTMENT SCREWS on each side of the UPPER and LOWER BEARINGS. If necessary, realign each BEARING so that the BEARING split faces forward as indicated in Figure 5-1. If the BEARINGS will not turn easily, it can be assumed that the bearings are correctly oriented.
- 2 Carefully tighten the BEARING CLEARANCE ADJUSTMENT SCREWS to reduce bearing play. The object of this adjustment is to reduce the lateral movement of the Main Shaft while maintaining smooth, low friction operation.

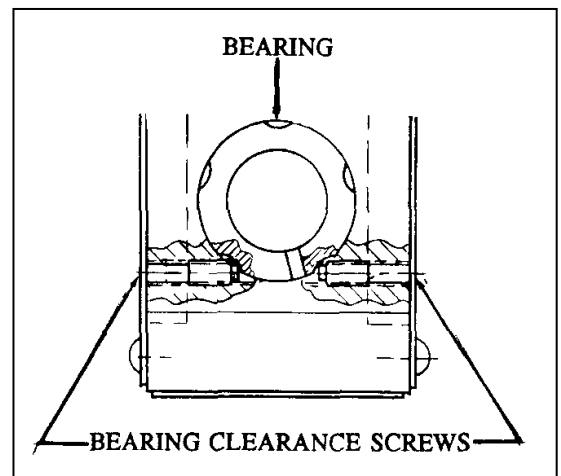


Figure 5-1. Bearing Clearance Adjustment

Anti-Rotation Yoke Adjustment

- 1 Anti-Rotational play in upper the Electrode Arm Assembly is controlled by the ANTI-ROTATION ADJUSTMENT, item [9], in Figure 2-2. Use a 5/32 inch hex wrench to adjust the YOKE. Turn the WELD FORCE ADJUSTMENT KNOB fully counter-clockwise to the minimum force position.
- 2 Move the Upper Electrode Assembly slowly up and down by actuating the Footpedal or Footswitch. Tighten the YOKE until both ANTI-ROTATION BEARINGS start to turn, without skidding, as the YOKE is moved so that the Upper Electrode travels at least 1 inch.
- 3 Loosen the YOKE 1 turn. One of the ANTI-ROTATION BEARINGS should stop turning or start to skid. Re-tighten the YOKE until both ANTI-ROTATION BEARINGS just stop skidding. The ANTI-ROTATION BEARINGS should just barely touch the ANTI-ROTATION ALIGNMENT SHAFT.

CHAPTER 5: SERVICE

Tare Spring Adjustment

- 1 Reference Figure 2-2. Set the WELD FORCE ADJUSTMENT KNOB fully counter-clockwise to minimum. Place the Weld Head in a vertical position. The UPPER ELECTRODE ASSEMBLY, item [17], and the Upper Electrode must be in place to adjust the TARE SPRING, item [7].
- 2 Adjust the TARE SPRING using a 3/16 inch hex key. The TARE SPRING ADJUSTMENT SCREW is recessed in the Center of the SPRING TUBE PLUG (not shown) on the bottom of the Weld Head. Adjust the TARE SPRING ADJUSTMENT SCREW until the bottom edge of the GUIDE ARM ASSEMBLY, item [15], reaches its lowest point. Mark this position on the SPRING TUBE YOKE, item [16].
- 3 Turn the TARE SPRING ADJUSTMENT SCREW clockwise until the GUIDE ARM ASSEMBLY moves up from its lowest point by .06 to .09 inches (1.5 to 2.3 mm) as shown in Figure 5-2.

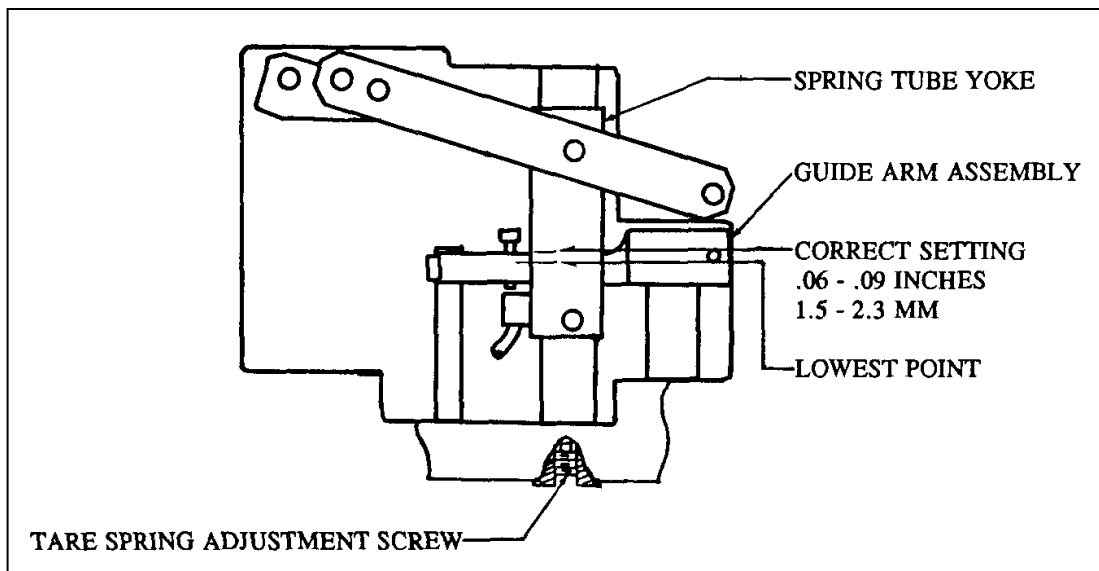


Figure 5-2. Tare Spring Adjustment

Force Firing Switch Adjustment

- 1 Reference Figures 2-2 and 5-3. Set the WELD FORCE ADJUSTMENT KNOB fully counter-clockwise (minimum Welding Force).

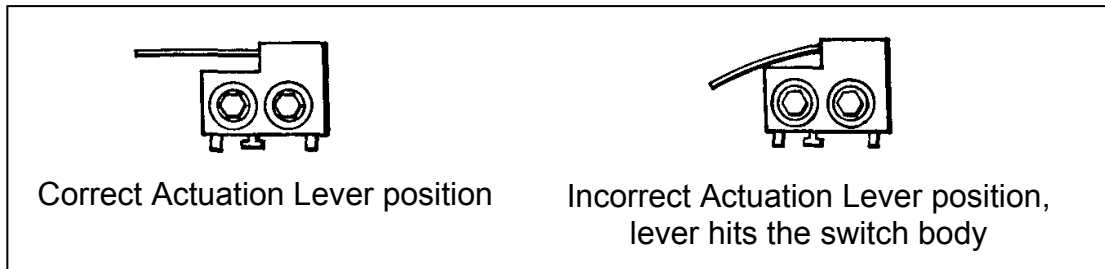


Figure 5-3. Firing Force Switch Adjustment

- 2 Adjust the FIRING FORCE SENSITIVITY ADJUSTMENT SCREW, item [8], with a 9/64 inch hex wrench so that Actuation Lever on Firing Switch is horizontal as shown in Figure 5-3.
- 3 Set the WELD FORCE ADJUSTMENT KNOB fully clockwise (maximum Welding Force. The Actuation Lever should not touch the body of the Firing Switch.

Minimum Firing Force

The minimum Welding Force at which the Firing Switch closes is 7 lbs. If the Welding Head fails to meet this specification, repeat the above four adjustments.

Spring Tube Bearings

The bearings which guide the SPRING TUBE YOKE, item [16], Figure 2-2, are bronze bushings with a Teflon/lead bearing surface. During normal operation, these bearings quickly seat and transfer a small amount of material, an average of 0.0005 inch (0.013 mm) thick, to the tube housing, forming a physically bonded, gray-green lubricant film. The rubbing surface of the Bronze Bushing also acquires a gray-green color as the Teflon/lead coating wears. Any excess of the Teflon/lead surface layer will be shed as fine, feathery particles.

Following the break-in period, the wear rate becomes extremely low. The Bronze Bushings should last at least 10 million operations. After an extended period of operation, the wear rate increases as the Bronze Bushings approach the end of their useful life as a self-lubricating bearings. When the radial wear exceeds 0.0025 inch (0.064 mm), replace both Bronze Bushings.

Section II: Disassembly/Re-assembly

Electrode Holder Disassembly/Re-assembly

Lower In-line Electrode Holder Disassembly

- 1 Reference Figure 5-4. Remove the Lower Electrode from the ELECTRODE COLLET NUT, item [1].

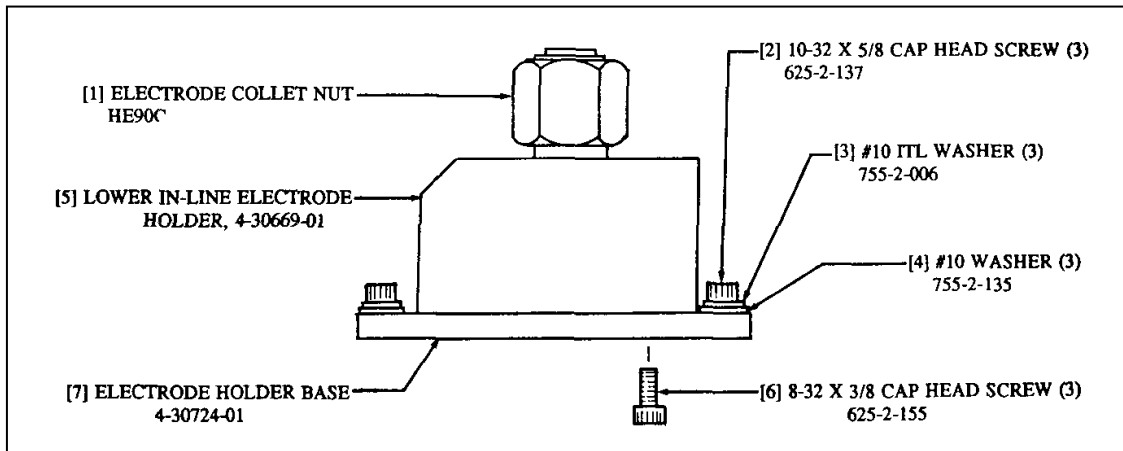


Figure 5-4. Lower Electrode Disassembly

- 2 Remove all three 10-32 x 5/8 CAP HEAD SCREWS, item [2], #10 ITL WASHERS, item [3], and #10 FLAT WASHERS, item [4].
- 3 Lift the LOWER IN-LINE ELECTRODE HOLDER, item [5], from the BASE SUPPORT.
- 4 Remove all three 8-32 x 3/8 CAP HEAD SCREWS, item [6], from the ELECTRODE HOLDER BASE, item [7], to separate the LOWER IN-LINE ELECTRODE HOLDER from the ELECTRODE HOLDER BASE.

Lower In-line Electrode Holder Re-assembly

To re-assemble the LOWER IN-LINE ELECTRODE HOLDER, reverse the above disassembly procedure.

Upper In-line Electrode Holder Disassembly

CAUTION: Turn the flange, not the housing, of the upper electrode assembly in order to remove it.

- 1 Reference Figure 2-2. Remove the Upper Electrode from the ELECTRODE COLLET NUT, item [5].
- 2 Actuate the Weld Head and hold in the down position. Adjust the UPSTOP, item [1], so that the top of the UPPER IN-LINE ELECTRODE HOLDER, item [17], is approximately 1.5 inches (4 cm) from the bottom of the Weld Head Casting.
- 3 Remove the COPPER FLEXURE, item [19], using a 3/16 inch hex key to remove the socket head screws and brass washers which hold the COPPER FLEXURE to the UPPER IN-LINE ELECTRODE HOLDER.
- 4 Reference Figure 5-5. Remove the ELECTRODE HOLDER COLLET NUT, item [16], from the UPPER IN-LINE ELECTRODE HOLDER, item [13].
- 5 Use a large wrench to hold the UPPER IN-LINE ELECTRODE HOLDER Housing so that it cannot turn.
- 6 Rotate the ELECTRODE HOLDER GUIDE NUT, item [8], counter-clockwise until it releases the UPPER IN-LINE ELECTRODE HOLDER.
- 7 Note that the ANTI-ROTATION INSULATOR, item [12] is held in the bottom of the UPPER IN-LINE ELECTRODE HOLDER by a 4-40 x 3/8 CAP HEAD SCREW, item [15], and two DOWEL PINS, item [14].
- 8 Remove the LOWER RETAINING RING, item [11] from the bottom of the UPPER ELECTRODE SHAFT, item [1].
- 9 Remove all of the other parts except the UPPER RETAINING RING, item [2].

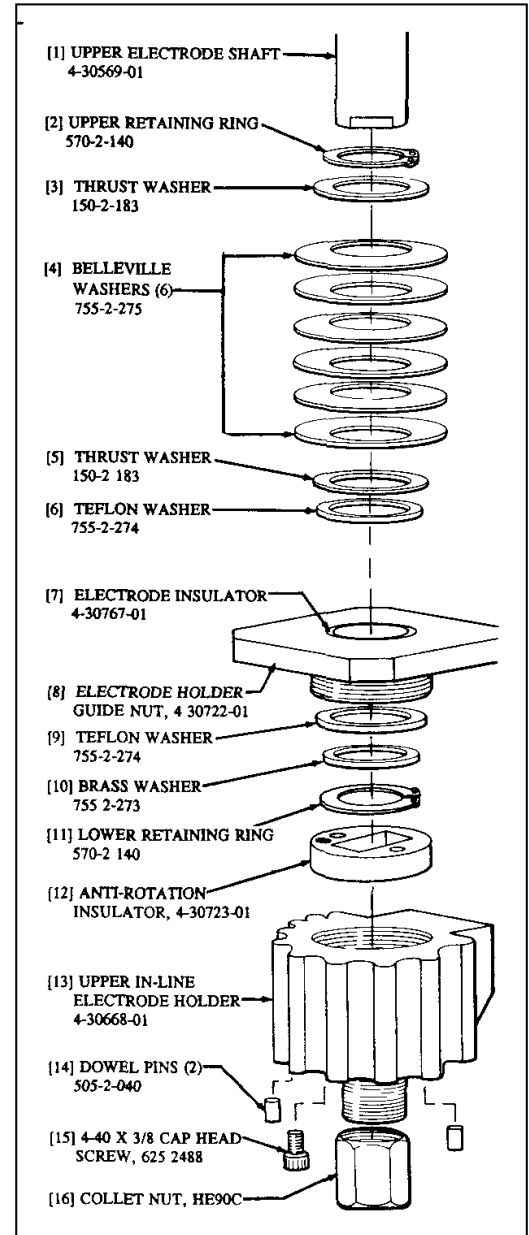


Figure 5-5. Upper In-line Electrode Holder Exploded View.

CHAPTER 5: SERVICE

Upper In-line Electrode Holder Re-assembly

To re-assemble the UPPER IN-LINE ELECTRODE HOLDER, reverse the above disassembly procedure.

CAUTION: The six Belleville washers, item [4] must be re-assembled in groups of three, with the concave surface of each pair facing inward.

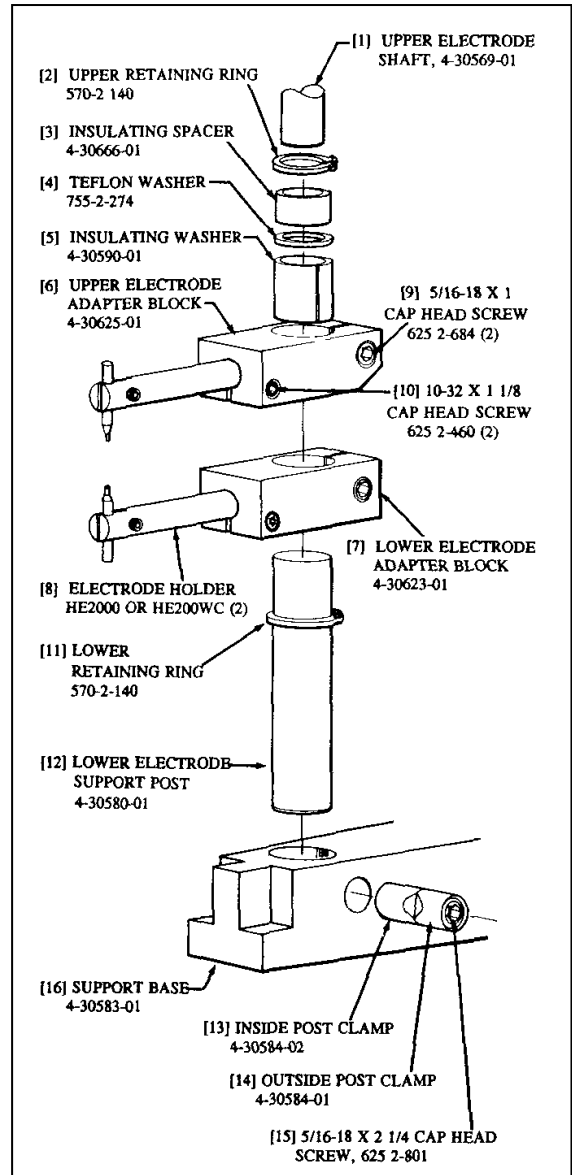


Figure 5-6. Offset Electrode Holder Exploded View

Section III: Electrode/Thermode Holder Conversion

Offset Electrode Holder Conversion

- 1 Reference Figure 5-5. Remove the In-Line Electrode Holders parts by following the procedure outlined in Section 8.03. **DO NOT REMOVE THE UPPER RETAINING RING, ITEM [2], FROM THE UPPER ELECTRODE SHAFT, ITEM [1].**
- 2 Reference Figure 5-6. Install the INSULATING SPACER, item [3] followed by the TEFLON WASHER, item [4].
- 3 Verify that the ELECTRODE SHAFT INSULATOR, item [5], has been installed in the UPPER ELECTRODE ADAPTER BLOCK, item [6].
- 4 Slip the UPPER ELECTRODE ADAPTER BLOCK Assembly over the bottom of the UPPER ELECTRODE SHAFT. If installed correctly, the UPPER ELECTRODE SHAFT will be flush with the bottom of the UPPER ELECTRODE ADAPTER BLOCK.
- 5 Tighten the 5/16-18 X 1.0 CAP HEAD SCREW, item [9], using a 1/4 inch hex key.
- 6 Verify that the LOWER RETAINING RING, item [11], is on the LOWER ELECTRODE SUPPORT POST, item [12].
- 7 Assemble the Support Post Clamp using the INSIDE POST CLAMP, item [13], OUTSIDE POST CLAMP, item [14], and the 5/16-2 1/4 CAP HEAD SCREW, item [15].
- 8 Insert the completed Support Post Clamp Assembly into the side of the SUPPORT BASE, item [14]. The "V" notch in the Clamp Assembly should face into the 1 inch diameter hole in the SUPPORT BASE.
- 9 Slip the LOWER ELECTRODE SUPPORT POST into the 1 inch diameter hole in the SUPPORT BASE. Secure the LOWER ELECTRODE SUPPORT POST by tightening the screw in the end of the SUPPORT POST CLAMP using a 1/4 inch hex key.
- 10 Slip the LOWER ELECTRODE ADAPTER BLOCK, item [7], over the top of the LOWER ELECTRODE SUPPORT POST. If installed correctly, the LOWER ELECTRODE SUPPORT POST will be flush with the top of the LOWER ELECTRODE ADAPTER BLOCK.
- 11 Re-attach the COPPER FLEXURES, item [19], Figure 2-2.
- 12 Install a HE2000, Standard 5/8 inch diameter ELECTRODE HOLDER, item [8], or a HE2000WC Water/Air Cooled 5/8 inch diameter Electrode Holders in the UPPER and LOWER ELECTRODE ADAPTER BLOCKS. Secure by tightening the 10-32 X 1 1/8 CAP HEAD SCREWS, item [10], with a 5/32 inch hex key.
- 13 Install a 1/4 inch diameter Electrode in each Electrode Holder. Use Snap Rings if the operating force is in excess of 50 pounds.

CHAPTER 5: SERVICE

Thermode Holder Conversion

- 1 Reference Figure 5-6. Remove the In-Line Electrode Holders parts by following the procedure outlined in Section 8.03. DO NOT REMOVE THE UPPER RETAINING RING, ITEM [2], FROM THE UPPER ELECTRODE SHAFT, ITEM [1].
- 2 Reference Figure 5-7. Install the INSULATING SPACER, item [3] followed by the TEFLON WASHER, item [4].
- 3 Verify that the ELECTRODE SHAFT INSULATOR, item [5], has been installed in the THERMODE ADAPTER BLOCK, item [6].
- 4 Slip the THERMODE ADAPTER BLOCK over the bottom of the UPPER ELECTRODE SHAFT. If installed correctly, the UPPER ELECTRODE SHAFT will be flush with the bottom of the THERMODE ADAPTER BLOCK.
- 5 Tighten the 5/16-18 X 1.0 CAP HEAD SCREW, item [7], using a 1/4 inch hex key.
- 6 If Blade Thermodes are to be used, insert the INSULATOR PLUG, item [8], into the threaded hole located on the front of the THERMODE ADAPTER BLOCK. If Fold-up Thermodes are to be used, go to Step 9.
- 7 Attach WELD TERMINAL-LH, item [9], and WELD TERMINAL-RH, item [10], to the THERMODE ADAPTER BLOCK using items [12], [13], [14], and [15].
- 8 Attach each separate COPPER FLEXURE, item [19], Figure 11, to the ends of each WELD TERMINAL. Go to Step 11.
- 9 If Fold-up Thermodes are used, attach WELD TERMINAL, item [11], to the THERMODE ADAPTER BLOCK using items [12], [13], [14], and [15]. Go to Step 2-2.
- 10 Attach the LEFT COPPER FLEXURE, item [19], Figure 11, to the WELD TERMINAL finger. Attach the RIGHT COPPER FLEXURE to the THERMODE ADAPTER BLOCK.
- 11 Reference Chapter 2, Section III, for installing Thermodes.

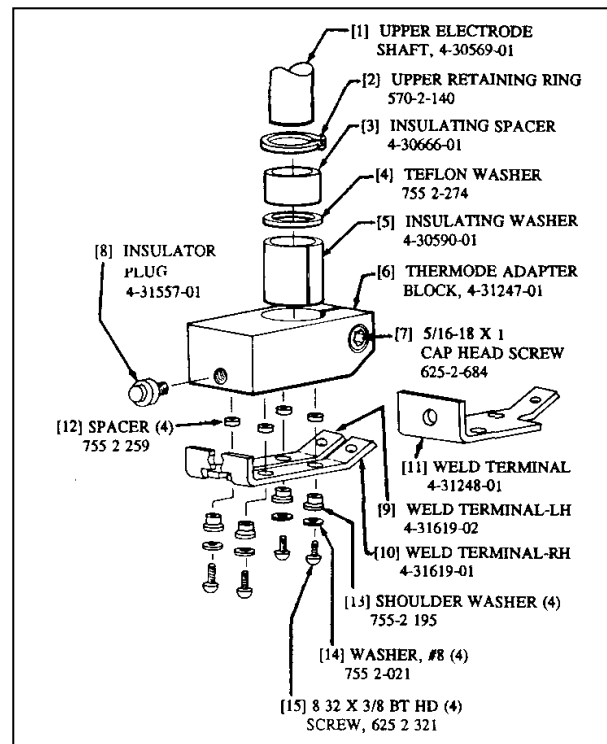


Figure 5-7. Thermode Adapter Block Exploded View

Section IV: Repair Service

Telephone Service

Call our Repair Department at the telephone number shown in the Foreword of this manual. Before calling, please obtain the model number and serial number from the name plate on the product.

Factory Service Repair

We provide a quick turn-around repair service for both warranty and non-warranty repairs. Call the Customer Service Department at the telephone number shown in the Foreword of this manual for a Return Material Authorization number. All equipment to be returned to us for repair must be shipped PREPAID.

Please include information concerning the type problem that you are experiencing. Include with the shipping information the name and telephone number of the person whom we should call with the estimated cost of repairs.

APPENDIX A

TECHNICAL SPECIFICATIONS

Specifications

Table A-1. Specifications

Items	Specifications		
Dimensions	See Outline Drawings		
Energy Rating*	<u>90F/90A</u>	<u>90F/DT/90A/DT</u>	<u>90RF/90RA</u>
Watt-Seconds	1000	30	3%
KVA	500	16	3%
Duty Cycle	--	5	3%
Air Specifications (Air Weld Heads only)			
Air Pressure Line	Nominal 65 psi.; 100 psi maximum		
Regulator Output	100 psi maximum.		
Pressure Gauge	60 psi. Scale 2 x 60 psi		
Solenoid Voltage	Either 115 VAC or 24 VAC, 50/60 Hz.		
Air Cylinder Diameter	1-1/8 inch with 1-1/16 inch bore		
Air Cylinder Stroke	5 inch		
Repetition Rate	1 weld per second		

* Two #2 AWG Welding Cables, both 16 inches long, are provided to connect Series 90 Weld Heads to Miyachi Unitek Stored Energy and AC Power Sources. Miyachi Unitek Weld and Reflow Soldering Heads deliver maximum performance when used with the appropriate Miyachi Unitek power sources. Consider the maximum energy rating of the Weld Head when selecting a Power Source. For applications that require more than 16KVA and/or duty cycles over 3%, use #0 welding cable or two #2 welding cables in parallel.

APPENDIX A: TECHNICAL SPECIFICATIONS

Outline Drawings

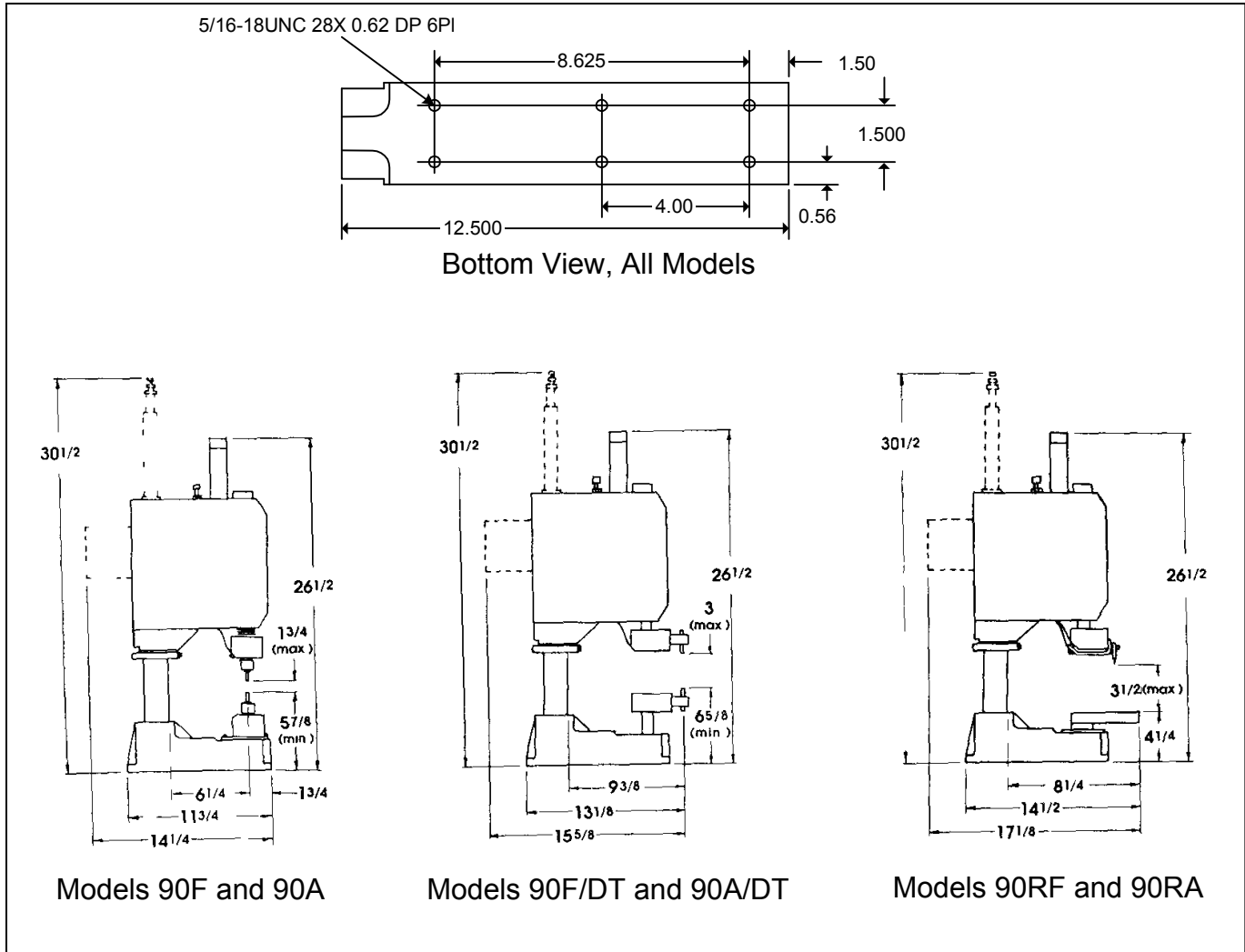


Figure A-1. Outline Drawings

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