# THIN-LINE™ TL-180B SERIES WELD HEAD

## USER MANUAL


990-125 REV M

### REVISION RECORD

| Revision | EO | Date | Basis of Revision |
|---|---|---|---|
| A | None | 02/96 | None. Original edition. |
| B | 17792 | 09/99 | Upgrade and add new equipment information. |
| C | 18780 | 03/01 | Add reflow instructions. |
| D | - - - - | 01/02 | Delete reflow heads. Major revision/reformat. |
| E | 21776 | 05/08 | Update to Miyachi Unitek logo, and added new CAUTION information. |
| F | 21852 | 08/08 | Updated reflow information, specifications, accessories, minor format changes. |
| G | 42860 | 08/08 | Updated to Miyachi America name and logo. |
| H | 43207 | 06/14 | Updated technical information. |
| J | 43207 | 03/15 | Updated to Amada Miyachi America name and logo. |
| K | 43866 | 08/15 | Updated to Amada Miyachi America format. |
| L | 45853 | 04/20 | Update Company Name (Amada Weld Tech) + Model Names |
| M | 41579 | 01/24 | Update Manual Title |

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**Chapter 4. User Maintenance**

# FOREWORD

Thank you for purchasing an Amada Weld Tech THIN-LINE™ TL-180B 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 Weld Tech Inc.**
**1820 South Myrtle Ave.**
**Monrovia, California 91017-7135**
**Phone:** **(626) 303-5676**
**FAX:** **(626) 358-8048**
**E-mail:** **info@amadaweldtech.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 TL-180B 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. The contents of this manual are subject to change without notice. Amada Weld Tech is not responsible for any loss or injury due to improper use of this product.

This manual covers the following Weld Head models:

| Original Model Name | | Current Model Name | Basic Part Number |
|---|---|---|---|
| 180F | → | TL-180B-F | 2-164-xx |
| 180SA | → | TL-180B-SA | 2-182-xx |
| 180A/EZ | → | TL-180B-EZ | 2-165-xx |
| 182A/EZ | → | TL-182B-EZ | 2-167-xx |
| 188A/EZ | → | TL-188B-EZ | 2-166-xx |

Note: This manual covers both current and discontinued models.

# SAFETY WARNINGS

DANGER

**DEATH ON CONTACT** may result if you fail to observe the safety precautions labeled on the equipment and noted on this page.

WARNING

**HIGH VOLTAGE** is used in the operation of this equipment.

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***.

- ***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.

# LIMITED WARRANTY

**GENERAL TERMS AND CONDITIONS FOR THE SALE OF GOODS**

**1. Applicability.**

(a) These terms and conditions of sale (these "**Terms**") are the only terms which govern the sale of the goods ("**Goods**") by Amada Weld Tech Inc. ("**Seller**") to the buyer identified in the Sales Quotation and/or Acknowledgment (as each defined below) to which these Terms are attached or incorporated by reference ("**Buyer**"). Notwithstanding anything herein to the contrary, if a written contract signed by authorized representatives of both parties is in existence covering the sale of the Goods covered hereby, the terms and conditions of said contract shall prevail to the extent they are inconsistent with these Terms.

(b) The accompanying quotation of sale (the "**Sales Quotation**") provided to Buyer, and/or sales order acknowledgement ("**Acknowledgement**") and these Terms (collectively, this "**Agreement**") comprise the entire agreement between the parties, and supersede all prior or contemporaneous understandings, agreements, negotiations, representations and warranties, and communications, both written and oral. For clarification, after the Acknowledgement is received by Buyer, the order for Goods is binding and cannot be cancelled by Buyer for any reason and the full purchase price amount set forth in the Acknowledgement shall be due and payable by Buyer to Seller pursuant to the payment schedule set forth in the Acknowledgement unless otherwise agreed to in writing by Seller. All terms and conditions contained in any prior or contemporaneous oral or written communication which are different from, or in addition to, the terms and conditions in this Agreement are hereby rejected and shall not be binding on Seller, whether or not they would materially alter this Agreement. These Terms prevail over any of Buyer's terms and conditions of purchase regardless whether or when Buyer has submitted its purchase order or such terms. Fulfillment of Buyer's order does not constitute acceptance of any of Buyer's terms and conditions and does not serve to modify or amend these Terms. Notwithstanding anything herein to the contrary, all orders for Goods must be for a minimum purchase price of $100 or such orders will be rejected by Seller.

**2. Delivery.**

(a) The Goods will be delivered within a reasonable time after Seller provides Buyer the Acknowledgment, subject to availability of finished Goods. Seller will endeavor to meet delivery schedules requested by Buyer, but in no event shall Seller incur any liability, consequential or otherwise, for any delays or failure to deliver as a result of ceasing to manufacture any product or any Force Majeure Event. Delivery schedules set forth in the Acknowledgment are Seller's good faith estimate on the basis of current schedules. In no event shall Seller be liable for special or consequential damages resulting from failure to meet requested delivery schedules.

(b) Unless otherwise agreed in writing by the parties in the Acknowledgement, Seller shall deliver the Goods to Seller's plant in Monrovia, CA, USA (the "**Shipping Point**") using Seller's standard methods for packaging and shipping such Goods. Buyer shall take delivery of the Goods within three (3) days of Seller's written notice that the Goods have been delivered to the Shipping Point. Buyer shall be responsible for all loading costs (including freight and insurance costs) and provide equipment and labor reasonably suited for receipt of the Goods at the Shipping Point. Seller shall not be liable for any delays, loss or damage in transit.

(c) Seller may, in its sole discretion, without liability or penalty, make partial shipments of Goods to Buyer, if applicable. Each shipment will constitute a separate sale, and Buyer shall pay for the units shipped whether such shipment is in whole or partial fulfillment of Buyer's purchase order.

(d) If for any reason Buyer fails to accept delivery of any of the Goods on the date fixed pursuant to Seller's notice that the Goods have been delivered at the Shipping Point, or if Seller is unable to deliver the Goods at the Shipping Point on such date because Buyer has not provided appropriate instructions, documents, licenses or authorizations: (i) risk of loss to the Goods shall pass to Buyer; (ii) the Goods shall be deemed to have been delivered; and (iii) Seller, at its option, may store the Goods until Buyer picks them up, whereupon Buyer shall be liable for all related costs and expenses (including, without limitation, storage and insurance).

**3. Non-delivery.**

(a) The quantity of any installment of Goods as recorded by Seller on dispatch from Seller's place of business is conclusive evidence of the quantity received by Buyer on delivery unless Buyer can provide conclusive evidence proving the contrary.

(b) Seller shall not be liable for any non-delivery of Goods (even if caused by Seller's negligence) unless Buyer gives written notice to Seller of the non-delivery within three (3) days of the date when the Goods would in the ordinary course of events have been received.

(c) Any liability of Seller for non-delivery of the Goods shall be limited to (in Seller's sole discretion) replacing the Goods within a reasonable time or adjusting the invoice respecting such Goods to reflect the actual quantity delivered.

**4. Shipping Terms.** Unless indicated otherwise in the Acknowledgment, Delivery shall be made EXW (Incoterms 2010), Shipping Point, including without limitation, freight and insurance costs. If no delivery terms are specified on the Acknowledgement, the method of shipping will be in the sole discretion of Seller. Unless directed in writing otherwise by Buyer, full invoice value will be declared for all shipments.

**5. Title and Risk of Loss.** Title and risk of loss passes to Buyer upon delivery of the Goods at the Shipping Point. As collateral security for the payment of the purchase price of the Goods, Buyer hereby grants to Seller a lien on and security interest in and to all of the right, title and interest of Buyer in, to and under the Goods, wherever located, and whether now existing or hereafter arising or acquired from time to time, and in all accessions thereto and replacements or modifications thereof, as well as all proceeds (including insurance proceeds) of the foregoing. The security interest granted under this provision constitutes a purchase money security interest under the California Commercial Code.

**6. Amendment and Modification.** These Terms may only be amended or modified in a writing which specifically states that it amends these Terms and is signed by an authorized representative of each party.

**7. Inspection and Rejection of Nonconforming Goods.**

(a) Buyer shall inspect the Goods within two (2) days of receipt ("**Inspection Period**"). Buyer will be deemed to have accepted the Goods unless it notifies Seller in writing of any Nonconforming Goods during the Inspection Period and furnishes such written evidence or other documentation as required by Seller. "**Nonconforming Goods**" means only the following: (i) product shipped is different than identified in Buyer's Acknowledgement; or (ii) product's label or packaging incorrectly identifies its contents. Notwithstanding the foregoing, for shipped Goods that require field installation, the "re-verification" terms in the Acknowledgement shall apply and for custom installations, the inspection and verification shall take place at Buyer's site immediately after the installation is completed.

(b) Seller will only accept Nonconforming Goods that are returned under Seller's Return Material Authorization procedures then in effect ("**RMA**"). Buyer shall obtain a RMA number from Seller prior to returning any Nonconforming Goods and return the Nonconforming 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 for the examination to take place there. If Seller reasonably verifies Buyer's claim that the Goods are Nonconforming Goods and that the nonconformance did not developed by use from Buyer, Seller shall, in its sole discretion, (i) replace such Nonconforming Goods with conforming Goods, or (ii) credit or refund the Price for such Nonconforming Goods pursuant to the terms set forth herein. Notwithstanding the foregoing, the only remedy for Nonconforming Goods that are custom systems is repair (not refund or replacement). No returns for Nonconforming Goods are allowed after thirty (30) days from the original shipping date.

(c) Buyer acknowledges and agrees that the remedies set forth in Section 7(a) are Buyer's exclusive remedies for the delivery of Nonconforming Goods. Except as provided under Section 7(a) and Section 14, all sales of Goods to Buyer are made on a one-way basis and Buyer has no right to return Goods purchased under this Agreement to Seller.

**8. Price.**

(a) Buyer shall purchase the Goods from Seller at the prices (the "**Prices**") set forth in Seller's published catalogue literature in force as of the date of the Sales Quotation. However, the Prices shown in such catalogue literature or any other publication are subject to change without notice. Unless specifically stated to the contrary in the Sales Quotation, quoted Prices and discounts are firm for thirty (30) days from the date of the Sales Quotation. Unless otherwise stated, prices are quoted EXW (Incoterms 2010), Shipping Point. Unless otherwise stated in the Acknowledgement, if the Prices should be increased by Seller before delivery of the Goods to a carrier for shipment to Buyer, then these Terms shall be construed as if the increased prices were originally inserted herein, and Buyer shall be billed by Seller on the basis of such increased prices.

(b) All Prices are exclusive of all sales, use and excise taxes, and any other similar taxes, duties and charges of any kind imposed by any governmental authority on any amounts payable by Buyer. Buyer shall be responsible for all such charges, costs and taxes (present or future); provided, that, Buyer shall not be responsible for any taxes imposed on, or with respect to, Seller's income, revenues, gross receipts, personnel or real or personal property or other assets.

**9. Payment Terms.**

(a) Unless otherwise provided in the Acknowledgement, if Buyer has approved credit with Seller, Buyer shall pay all invoiced amounts due to Seller within thirty (30) days from the date of Seller's invoice. If Seller does not have Buyer's financial information and has not provided pre-approved credit terms for Buyer, the payment must be made in cash with order or C.O.D. in US dollars. If Buyer has approved credit terms, the payment may be made by cash with order, wire transfer of immediately available funds, or check in US dollars. Certain products require a down payment. Any payment terms other than set forth above will be identified in the Acknowledgement. Notwithstanding anything herein to the contrary, all prepaid deposits and down payments are non-refundable. If a deposit is not received when due, Seller reserves the right to postpone manufacturing of Goods until payment is received. Seller will not be responsible for shipment delays due to deposit payment delays.

(b) In Seller's sole discretion, Seller may access Buyer interest on all late payments at the lesser of the rate of 1.5% per month or the highest rate permissible under applicable law, calculated daily and compounded monthly. Buyer shall reimburse Seller for all costs incurred in collecting any late payments, including, without limitation, attorneys' fees. In addition to all other remedies available under these Terms or at law (which Seller does not waive by the exercise of any rights hereunder), Seller shall be entitled to suspend the delivery of any Goods if Buyer fails to pay any amounts when due hereunder and such failure continues for ten (10) days following written notice thereof.

(c) Buyer shall not withhold payment of any amounts due and payable by reason of any set-off of any claim or dispute with Seller, whether relating to Seller's breach, bankruptcy or otherwise.

**10. Intellectual Property; Software License.**

(a) To the extent that any Goods provided under this Agreement contains software, whether pre-installed, embedded, in read only memory, or found on any other media or other form ("**Software**"), such Software and accompanying documentation are licensed to Buyer, not sold and shall remain the sole and exclusive property of Seller or third party licensors of Seller. Seller grants Buyer a non-exclusive license to use the Software solely as provided in and in connection with the use of the Goods in which such Software is contained and in accordance with any applicable user documentation provided with such Goods and subject to the provisions of this Agreement. Certain of Seller's Goods may include third party software such as computer operating systems. Licenses to such third party software are subject to the terms and conditions of any applicable third party software license agreements. Unless identified in the Acknowledgement, no license is granted by Seller with respect to such third party software products that may be provided with the Goods (if any). Seller makes no warranties regarding any third party software that may accompany the Goods or otherwise and such software is explicitly included in the definition of Third Party Products below.

(b) Buyer shall not copy, modify, or disassemble, or permit others to copy, modify, or disassemble, the Software, nor may Buyer modify, adapt, translate, reverse assemble, decompile, or otherwise attempt to derive source code from the Software. Buyer shall not transfer possession of the Software except as part of, or with, the Goods, and each such transfer shall be subject to the restrictions contained herein. Buyer may not sublicense, rent, loan, assign or otherwise transfer the Software or documentation, and Buyer shall retain on all copies of the Software and documentation all copyright and other proprietary notices or legends appearing therein or thereon. Seller may terminate this license upon written notice for any violation of any of the terms of this license

or any material breach of any provision of this Agreement. Buyer shall immediately discontinue use of the Software upon any termination of this license or Agreement. This license shall terminate upon any termination of the Agreement.

(c) All patents, trademarks, copyrights or other intellectual property rights embodied in the Goods, including without limitation the Software, are owned by Seller and its licensors. Seller and its licensors retain all right, title and interest in such intellectual property rights. Except as expressly set forth herein, no license rights or ownership in or to any of the foregoing is granted or transferred hereunder, either directly or by implication. ALL RIGHTS RESERVED.

(d) If Buyer is the United States Government or any agency thereof, each of the components of the Software and user documentation are a "commercial item," and "computer software" as those terms are defined at 48 C.F.R. 2.101, consisting of "commercial computer software" and "commercial computer software documentation," as such terms are used in 48 C.F.R. 12.212. Consistent with 48 C.F.R. 12.212 and 48 C.F.R. 227.7202-1 through 227.7202-4, all United States government Buyers acquire only those rights in the Software and user documentation that are specified in this Agreement.

**11. Installation and Other Services.** Seller shall provide installation services ("**Installation Services**") to Buyer if set forth in the Acknowledgment. If Installation Services are provided for in the Acknowledgement, Buyer will prepare the location for the installation consistent with Buyer's written specifications and Buyer will install necessary system cable and assemble any necessary equipment or hardware not provided by Seller, unless agreed otherwise in writing by the parties. For Goods that will be operated on or in connection with Buyer supplied hardware or software, Buyer is responsible for ensuring that its hardware and software conform with Seller minimum hardware and software requirements as made available to Buyer. Seller shall provide other field services, such as maintenance visits and field repairs (the "**Other Services**" and together with the Installation Services, the "**Services**") if set forth in the Acknowledgement.

**12. Limited Warranty.**

(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 12 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 Product**").

(c) **EXCEPT FOR THE WARRANTY SET FORTH IN SECTION 12(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 12(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 12(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 91016or 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 12(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 12(e) and Section 12(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 12(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 12(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.

**13. Limitation of Liability.**

(a) **IN NO EVENT SHALL SELLER BE LIABLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR PUNITIVE DAMAGES, LOST PROFITS OR REVENUES OR DIMINUTION IN VALUE, LOSS OF INFORMATION OR DATA, OR PERSONAL INJURY OR DEATH ARISING IN ANY WAY OUT OF THE MANUFACTURE, SALE, USE, OR INABILITY TO USE ANY GOODS, SOFTWARE OR SERVICE, ORARISING OUT OF OR RELATING TO ANY BREACH OF THESE TERMS, WHETHER OR NOT THE POSSIBILITY OF SUCH DAMAGES HAS BEEN DISCLOSED IN ADVANCE BY BUYER OR COULD HAVE BEEN REASONABLY FORESEEN BY BUYER, REGARDLESS OF THE LEGAL OR EQUITABLE THEORY (CONTRACT, TORT OR OTHERWISE) UPON WHICH THE CLAIM IS BASED, AND**

**NOTWITHSTANDING THE FAILURE OF ANY AGREED OR OTHER REMEDY OF ITS ESSENTIAL PURPOSE.**

(b) **IN NO EVENT SHALL SELLER'S AGGREGATE LIABILITY ARISING OUT OF OR RELATED TO THIS AGREEMENT, WHETHER ARISING OUT OF OR RELATED TO BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHERWISE, EXCEED THE TOTAL OF THE AMOUNTS PAID TO SELLER FOR THE GOODS SOLD HEREUNDER.**

(c) **ALL WARRANTIES SET FORTH HEREIN, DIRECT OR IMPLIED, ARE VOIDED IF THE INITIAL INSTALLATION AND START-UP OF THE SUBJECT GOOD IS NOT SUPERVISED BY AN AUTHORIZED REPRESENTATIVE OF SELLER. AFTER INSTALLATION, ANY RE-ALIGNMENT, RE-CLEANING, OR RE-CALIBRATION, PROVIDED THEY ARE NOT RELATED TO A PROVEN DEFECT IN MATERIALS OR WORKMANSHIP, SHALL BE PERFORMED BY AN AUTHORIZED REPRESENTATIVE OF SELLERAT THE CURRENT SERVICE RATES.**

(d) **WHERE GOODS ARE SUBJECT TO A MOVE TO ANOTHER LOCATION AFTER THE ORIGINAL INSTALLATION HAS BEEN MADE, THE WARRANTY MAY BE MAINTAINED ONLY IF SUPERVISED BY AN AUTHORIZED REPRESENTATIVE OF SELLER. SELLER, FOR A SERVICE CHARGE, WILL ARRANGE FOR AND SUPERVISE THE DISCONNECTION, TRANSPORTATION, REINSTALLATION AND START-UP OF THE EQUIPMENT. CLAIMS FOR DAMAGE IN SHIPMENT ARE THE RESPONSIBILITY OF BUYER AND SHALL BE FILED PROMPTLY WITH THE TRANSPORTATION COMPANY.**

**14. Return Goods Policy.** Seller's products may be returned to Seller for credit within sixty (60) days of shipment subject to the following conditions.

(a) In order to return products for credit, Buyer must obtain a RMA number from Seller. Upon receipt, it must be executed by an authorized person and then returned with the Goods. Goods returned to Seller without a RMA will be returned at Buyer's expense.

(b) Goods are to be returned to Seller at 1820 South Myrtle Avenue, Monrovia, CA 91016 with Freight Prepaid. Seller will not accept collect shipments.

(c) Restocking fees will be assessed in accordance with the following schedules: (i) Goods returned within the first thirty (30) days from shipment date will be restocked less twenty percent (20%) of the amount billed on the original invoice. (ii) Goods returned over thirty (30) days of shipment but less than sixty (60) days will be restocked less thirty percent (30%) of the amount billed on the original invoice. (iii) No returns are allowed after sixty (60) days from the original shipping date.

(d) The restocking fees set forth above are the minimum fees. If a returned Good requires rework to restore it to a saleable condition, further charges will be assessed. Seller's quality assurance department will document the condition of the Goods when received by Seller and report their findings to Buyer.

(e) **Notwithstanding the foregoing provisions of this Section 14, the following Goods cannot be returned, are not eligible for any credit and cannot be restocked: (i) custom or modified products and (ii) any expendable product(s) that have been used.**

**15. Compliance with Law and Indemnification.** Buyer shall comply with all applicable laws, regulations and ordinances. Buyer shall maintain in effect all the licenses, permissions, authorizations, consents and permits that it needs to carry out its obligations under this Agreement. Buyer shall comply with all export and import laws of all countries involved in the sale of the Goods under this Agreement or any resale of the Goods by Buyer. Goods, Services and technical data delivered by Seller shall be subject to U.S. export controls. Buyer shall, and shall cause its customers to, obtain all licenses, permits and approvals required by any government and shall comply with all applicable laws, rules, policies and procedures of the applicable government and other competent authorities. Buyer will indemnify and hold Seller harmless for any violation or alleged violation by Buyer of such laws, rules, policies or procedures. Buyer shall not transmit, export or re-export, directly or indirectly, separately or as part of any system, the Goods or any technical data (including processes and Services) received from Seller, without first obtaining any license required by the applicable government, including without limitation, the U.S. government. Buyer also certifies that none of the Goods or technical data supplied by Seller under this Agreement will be sold or otherwise transferred to, or made available for use by or for, any entity that is engaged in the design, development, production or use of nuclear, biological or chemical weapons or missile technology. No Buyer information will be deemed "technical data" unless Buyer specifically identifies it to Seller as such. Buyer assumes all responsibility for shipments of Goods requiring any government import clearance. Seller may terminate this Agreement if any governmental authority imposes antidumping or countervailing duties or any other penalties on Goods. For all international shipments, Seller requires that all required Export Control documentations, including Form BIS-711 Statement by Ultimate Consignee and Purchases, are submitted by Buyer along with the purchase order. Seller reserves the right to postpone shipment until all documentations are completed and submitted to Seller. Seller will not be responsible for shipment delays due to non-compliance by Buyer of the foregoing two sentences.

**16. Termination.** In addition to any remedies that may be provided under these Terms, Seller may terminate this Agreement with immediate effect upon written notice to Buyer, if Buyer: (i) fails to pay any amount when due under this Agreement and such failure continues for ten (10) days after Buyer's receipt of written notice of nonpayment; (ii) has not otherwise performed or complied with any of these Terms, in whole or in part; or (iii) becomes insolvent, files a petition for bankruptcy or commences or has commenced against it proceedings relating to bankruptcy, receivership, reorganization or assignment for the benefit of creditors.

**17. Waiver.** No waiver by Seller of any of the provisions of this Agreement is effective unless explicitly set forth in writing and signed by Seller. No failure to exercise, or delay in exercising, any rights, remedy, power or privilege arising from this Agreement operates or may be construed as a waiver thereof. No single or partial exercise of any right, remedy, power or privilege hereunder precludes any other or further exercise thereof or the exercise of any other right, remedy, power or privilege.

**18. Confidential Information.** All non-public, confidential or proprietary information of Seller, including, but not limited to, specifications, samples, patterns, designs, plans, drawings, documents, data, business operations, customer lists, pricing, discounts or rebates, disclosed by Seller to Buyer, whether disclosed orally or disclosed or accessed in written, electronic or other form or media, and whether or not marked, designated or otherwise identified as "confidential," in connection with this Agreement is confidential, solely for the use of performing this Agreement and may not be disclosed or copied unless authorized in advance by Seller in writing. Upon Seller's request, Buyer shall promptly return all documents and other materials received from Seller. Seller shall be entitled to injunctive relief for any violation of this Section 18. This Section 18 does not apply to information that is: (a) in the public domain through no fault of Buyer; (b) known to Buyer at the time of disclosure without restriction as evidenced by its records; or (c) rightfully obtained by Buyer on a non-confidential basis from a third party.

**19. Force Majeure.** Seller shall not be liable or responsible to Buyer, nor be deemed to have defaulted or breached this Agreement, for any failure or delay in fulfilling or performing any term of this Agreement when and to the extent such failure or delay is caused by or results from acts or circumstances beyond the reasonable control of Seller including, without limitation, acts of God, flood, fire, earthquake, explosion, governmental actions, war, invasion or hostilities (whether war is declared or not), terrorist threats or acts, riot, or other civil unrest, national emergency, revolution, insurrection, epidemic, lock-outs, strikes or other labor disputes (whether or not relating to either party's workforce), or restraints or delays affecting carriers or inability or delay in obtaining supplies of adequate or suitable materials, materials or telecommunication breakdown or power outage (each a "**Force Majeure Event**"), provided that, if the event in question continues for a continuous period in excess of thirty (30) days, Buyer shall be entitled to give notice in writing to Seller to terminate this Agreement.

**20. Assignment.** Buyer shall not assign any of its rights or delegate any of its obligations under this Agreement without the prior written consent of Seller. Any purported assignment or delegation in violation of this Section 20 is null and void. No assignment or delegation relieves Buyer of any of its obligations under this Agreement.

**21. Relationship of the Parties.** The relationship between the parties is that of independent contractors. Nothing contained in this Agreement shall be construed as creating any agency, partnership, joint venture or other form of joint enterprise, employment or fiduciary relationship between the parties, and neither party shall have authority to contract for or bind the other party in any manner whatsoever.

**22. No Third-Party Beneficiaries.** This Agreement is for the sole benefit of the parties hereto and their respective successors and permitted assigns and nothing herein, express or implied, is intended to or shall confer upon any other person or entity any legal or equitable right, benefit or remedy of any nature whatsoever under or by reason of these Terms.

**23. Governing Law.** All matters arising out of or relating to this Agreement is governed by and construed in accordance with the internal laws of the State of California without giving effect to any choice or conflict of law provision or rule (whether of the State of California or any other jurisdiction) that would cause the application of the laws of any jurisdiction other than those of the State of California.

**24. Dispute Resolution.**

(a) If Buyer is an entity formed under the laws of the United States of America, or any of its states, districts or territories ("**U.S. Law**"), then any dispute, legal suit, action or proceeding arising out of or relating to this Agreement shall be adjudicated and decided in the federal courts of the United States of America or the courts of the State of California in each case located in the City of Los Angeles and County of Los Angeles, California and each party irrevocably submits to the exclusive and personal jurisdiction of such courts in any such dispute, suit, action or proceeding.

(b) If Buyer is an entity formed under the laws of any country, state, district or territory other than U.S. Law, then the parties irrevocably agree that any dispute, legal suit, action or proceeding arising out of or relating to this Agreement shall be submitted to the International Court of Arbitration of the International Chamber of Commerce ("**ICC**") and shall be finally settled under the Rules of Arbitration of the ICC. The place and location of the arbitration shall be in Los Angeles, California, pursuant to the ICC's Rules of Arbitration and shall be finally settled in accordance with said rules. The arbitration shall be conducted before a panel of three arbitrators. Each party shall select one arbitrator and the two arbitrators so selected shall select the third arbitrator, who shall act as presiding arbitrator. Notwithstanding the foregoing, if the matter under dispute is $500,000 or less, there shall only be one arbitrator who shall be mutually selected by both parties. If the party-selected arbitrators are unable to agree upon the third arbitrator, if either party fails to select an arbitrator, or in the case that only one arbitrator is required and the parties are unable to agree, then the International Court of Arbitration shall choose the arbitrator. The language to be used in the arbitral proceeding shall be English. The arbitrator(s) shall have no authority to issue an award that is contrary to the express terms of this Agreement or the laws of the State of California or applicable US Federal Law, and the award may be vacated or corrected on appeal to a court of competent jurisdiction for any such error. The arbitrator(s) shall be specifically empowered to allocate between the parties the costs of arbitration, as well as reasonable attorneys' fees and costs, in such equitable manner as the arbitrator(s) may determine. The arbitrator(s) shall have the authority to determine issues of arbitrability and to award compensatory damages, but they shall not have authority to award punitive or exemplary damages. Judgment upon the award so rendered may be entered in any court having jurisdiction or application may be made to such court for judicial acceptance of any award and an order of enforcement, as the case may be. In no event shall a demand for arbitration be made after the date when institution of a legal or equitable proceeding based upon such claim, dispute or other matter in question would be barred by the applicable statute of limitations. Notwithstanding the foregoing, either party shall have the right, without waiving any right or remedy available to such party under this Agreement or otherwise, to seek and obtain from any court of competent jurisdiction any interim or provisional relief that is necessary or desirable to protect the rights or property of such party, pending the selection of the arbitrator(s) hereunder or pending the arbitrator(s)' determination of any dispute, controversy or claim hereunder.

**25. Notices.** All notices, request, consents, claims, demands, waivers and other communications hereunder (each, a "**Notice**") shall be in writing and addressed to the parties at the addresses set forth on the face of the Acknowledgement or to such other address that may be designated by the receiving party in writing. All Notices shall be delivered by personal delivery, nationally recognized overnight courier (with all fees pre-paid), facsimile (with confirmation of transmission) or certified or registered mail (in each case, return receipt requested, postage prepaid). Except as otherwise provided in this Agreement, a Notice is effective only (a) upon receipt of the receiving party, upon confirmation of delivery by nationally recognized overnight courier or upon forty-eight (48) hours after being sent by certified or registered mail (as applicable), and (b) if the party giving the Notice has complied with the requirements of this Section 25.

**26. Severability.** If any term or provision of this Agreement is invalid, illegal or unenforceable in any jurisdiction, such invalidity, illegality or unenforceability shall not affect any other term or provision of this Agreement or invalidate or render unenforceable such term or provision in any other jurisdiction.

**27. Survival.** Provisions of these Terms which by their nature should apply beyond their terms will remain in force after any termination or expiration of this Order including, but not limited to, the following provisions: Compliance with Laws, Confidentiality, Governing Law, Dispute Resolution, Survival, and the restrictions on Software in Sections 10(b), (c) and (d).

# CHAPTER 1
# SYSTEM DESCRIPTION

## Section I. Features

### Overview

This manual is organized to assist you in getting productive quickly with your THIN-LINE™ TL-180B 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.

Amada Weld Tech THIN-LINE TL-180B 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.

## 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 TL-180B 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 TL-180B-F, TL-180B-A, and TL-182B-A use 0.25 inch diameter, ES0800 Series Electrodes. The TL-188B-A 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 TL-180B Heads to the power source. Amada Weld Tech Heads deliver maximum performance when used with the appropriate Amada Weld Tech power supplies.

## Footpedal Actuation

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

## Air Actuation

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

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

### Standard Air-Actuation

The TL-180B-A, TL-182B-A, and TL-188B-A weld 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.

### EZ-AIR™

The Model TL-180B-EZ weld head is equipped with factory-installed EZ-AIR, an Amada Weld Tech 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. TL-180B-F air-actuated heads are easy to incorporate into automated welding systems. EZ-AIR can be energized by most of the Amada Weld Tech power supplies, 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.

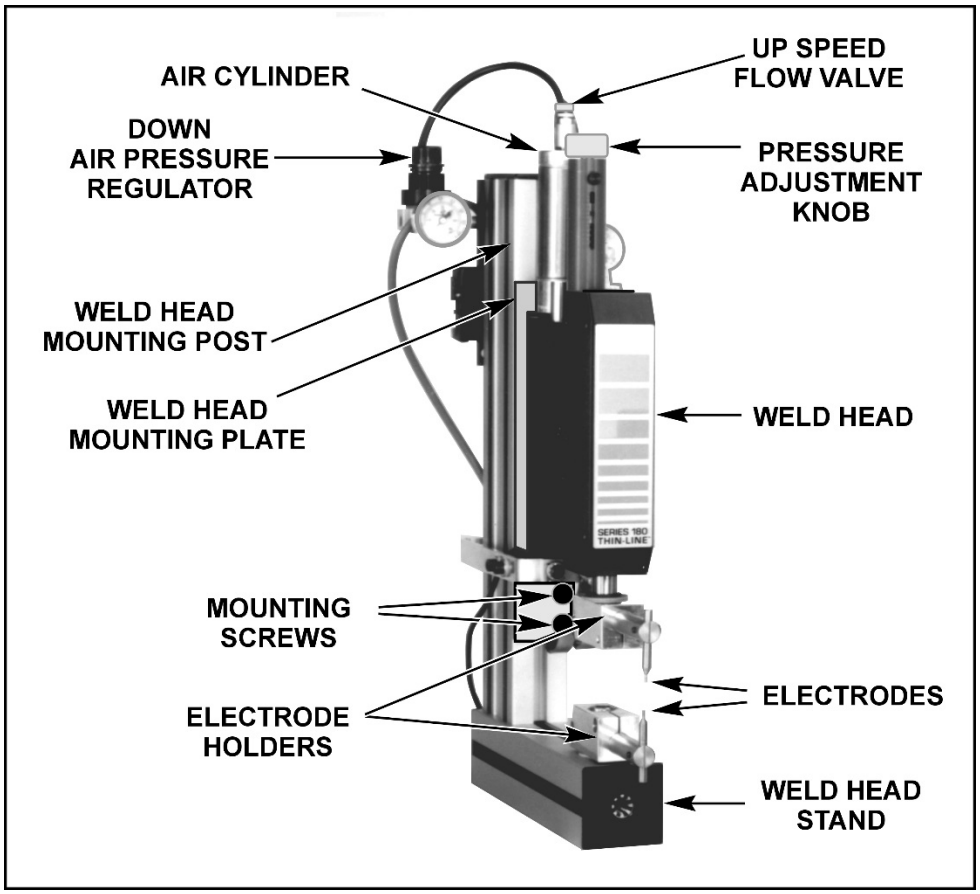
For EZ-AIR instructions, see the separate EZ-AIR Operator Manual supplied with the weld head.

## Reflow Soldering

The TL-180B-SA is the TL-180B weld head specifically designed for Reflow Soldering.

If you have questions about reflow soldering, or if you have an older model 180RF head that uses thermodes for Reflow Soldering, contact your Amada Weld Tech representative, or visit the Amada Weld Tech website listed in the front of this manual for assistance.

# Section II. System Components




**Typical TL-180B Weld Head**

## Model TL-180B-A

The Model TL-180B-A 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 TL-180B-F Weld Head includes the Model HE180K Offset Electrode Holder Block and the 5/8 inch diameter Model HE2000 Electrode Holders.

## Model TL-180B-F

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 TL-180B-F provides a throat depth of 7.75 inches (19.68 cm).

## Model TL-182B-A

The Model TL-182B-A 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.

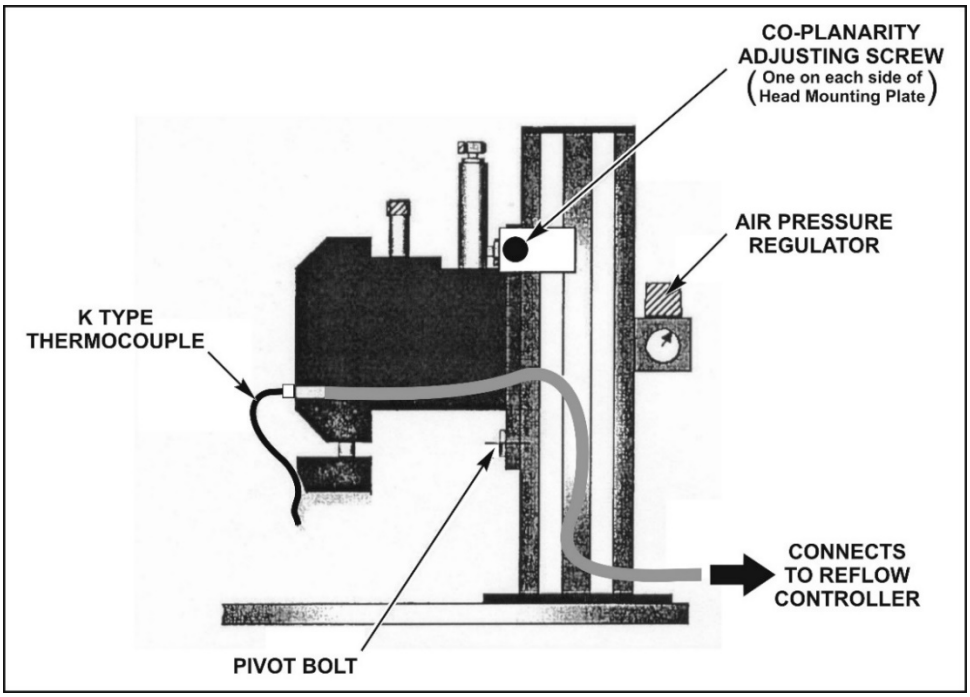
You may remove the weld head from the mounting post and incorporate it into an automatic welding station. At the welding station, the parts would feed automatically into the lower welding fixture.

## Model TL-188B-A

The Model TL-188B-A uses two independent Model TL-180B-A 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, Amada Weld Tech Part # 4-32417-01, which you can use to hold parts and conduct current when performing opposed welding, using one or two weld energy power supplies.

## Model TL-180B-SA

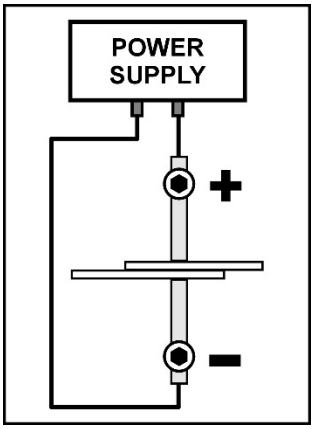
The Model TL-180B-SA is designed specifically for high-precision reflow soldering. It contains a Model 17TDLB413 mounting block which can hold any of the TD series of thermodes. It also contains two co-planarity adjustments for consistent distribution of thermode pressure on the bonding surface.




**Model TL-180B-SA with Co-Planarity Adjustments and # 17TDLB413 Mounting Block**

# Section III. Welding Capabilities

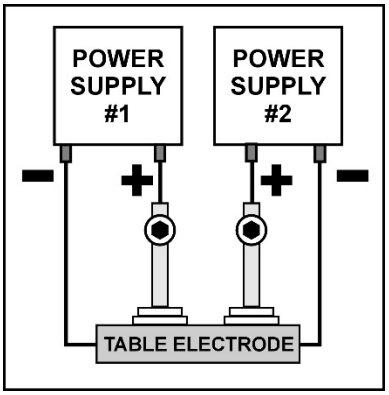
## Opposed Welding




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.

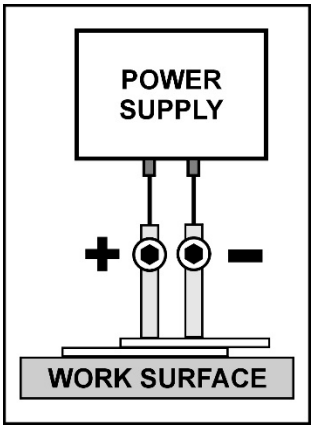
## Dual-Opposed Welding




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



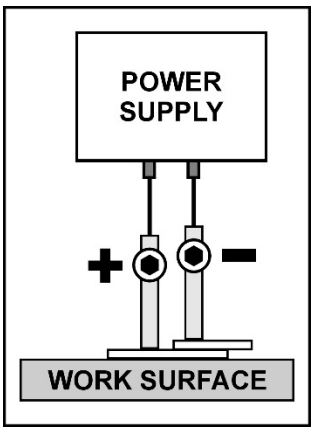

In series welding applications, both electrodes contact the *same* surface of each workpiece. The weld current flows from one electrode through the workpiece to the other electrode. This technique is used to weld workpieces which have only one surface accessible.

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 TL-088B or TL-089B 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.

## 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 are contained in a separate package that mounts on the spine of the head.

There are several Amada Weld Tech direct energy and high frequency inverter power supplies, 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 Amada Weld Tech weld energy power supplies.

Any Power Supply that does not supply a valve output requires the use of the 115 VAC FSAC Foot Switch to provide switched solenoid power to the TL-180B, 115 VAC, air-actuated heads. TL-180B, 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: TL-182B-A**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.*

| 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** | 300mA @ 0.4V 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. TL-180B 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 TL-180B-F – None required.

  For Models TL-180B-A, TL-182B-A and TL-188B-A - Included in Amada Weld Tech weld energy power supplies. 115 VAC required for use with power supplies, which do not supply valve power.

- **Compressed Air**

  For Models TL-180B-A, TL-182B-A and TL-188B-A 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*** TL-180B 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 Amada Weld Tech at the address shown in the front of the manual.

TL-180B weld heads may be purchased with or without mounting hardware. Amada Weld Tech 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.

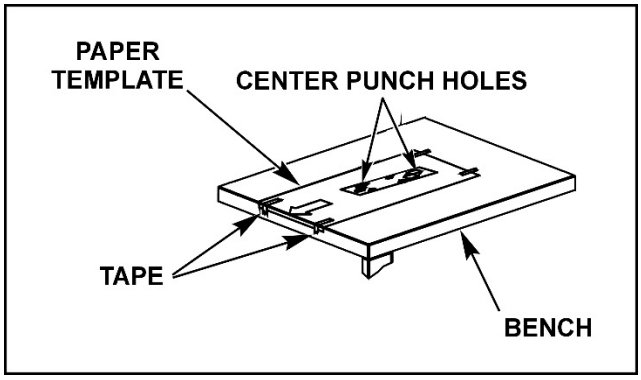
1 Place the mounting template in the desired location on the workbench and tape it in place.

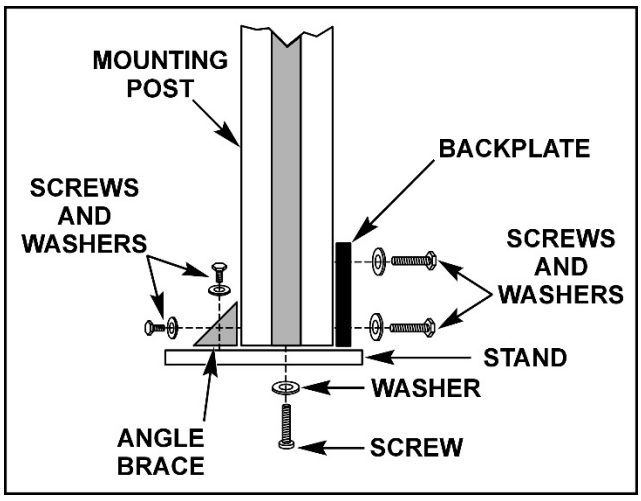
2 Drill the mounting holes as shown on the template.

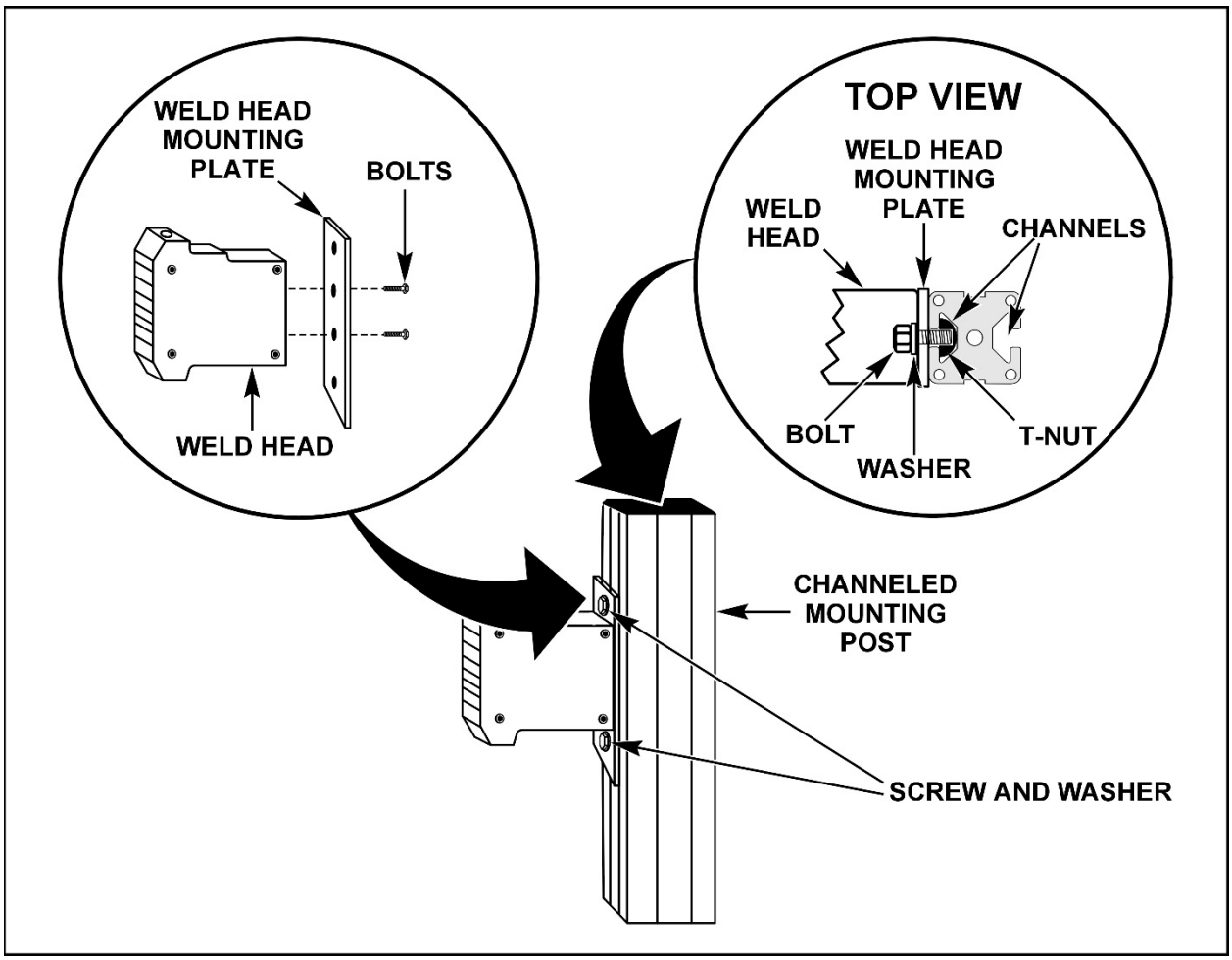
3 If necessary, install the weld head mounting post to the stand.

**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.

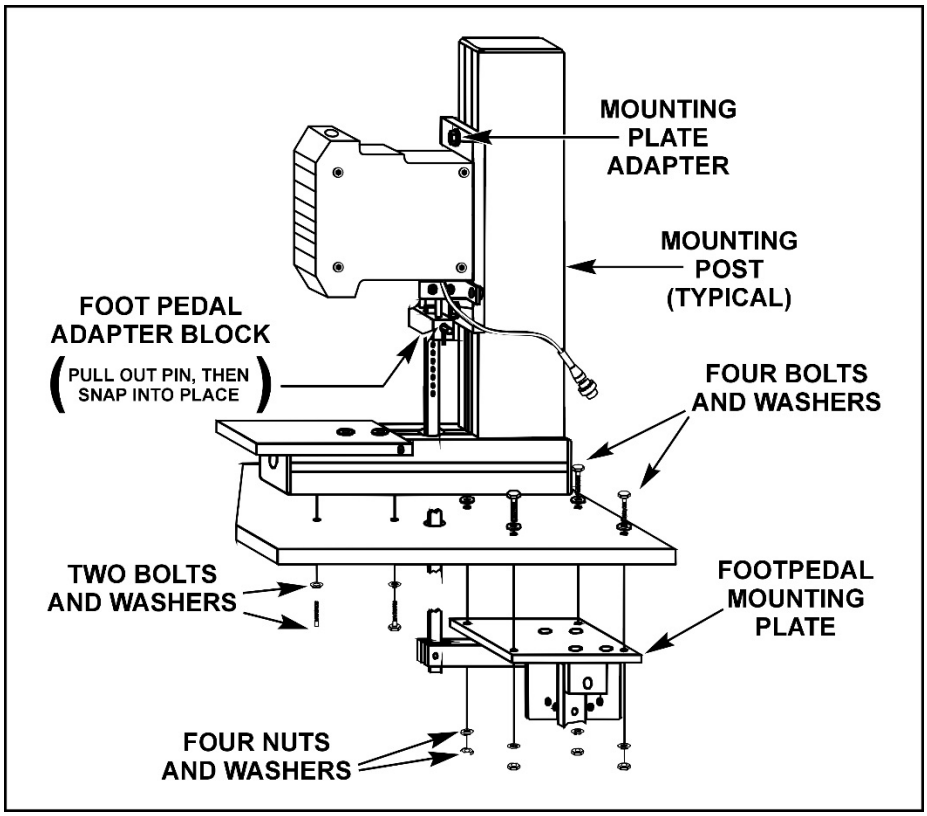
6 Install the screws, washers, and T-nuts into the weld head mounting plate as shown.

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.

## TL-180B-F MSP Foot Pedal Installation



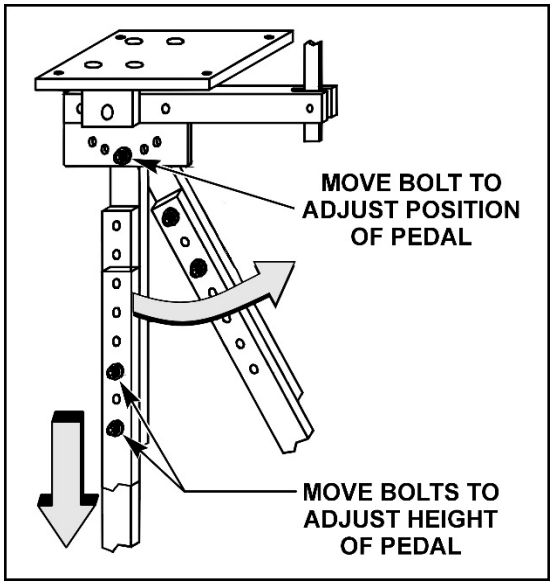

1 Screw the head to the bench and Model MSP Foot Pedal using four (4) screws, washers and nuts supplied with the shipping kit.

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 foot pedal adapter block, as illustrated. Insert the pullrod and allow the pin to snap back into place.

5 Attach the pullrod to foot pedal. 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 foot pedal. Adjust the angle and length of the foot pedal so that it is comfortable for the operator.



## Air Head Installation

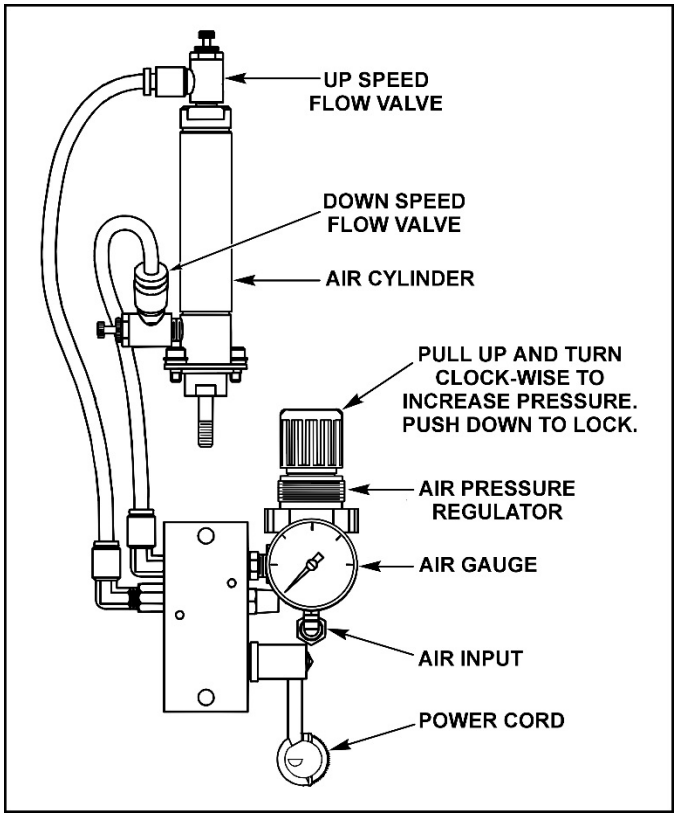
Amada Weld Tech Air Kits are factory-installed on the TL-180B Weld Heads. User installation consists of connecting the airhead to an air source and connecting the airhead power cable to a power supply.

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

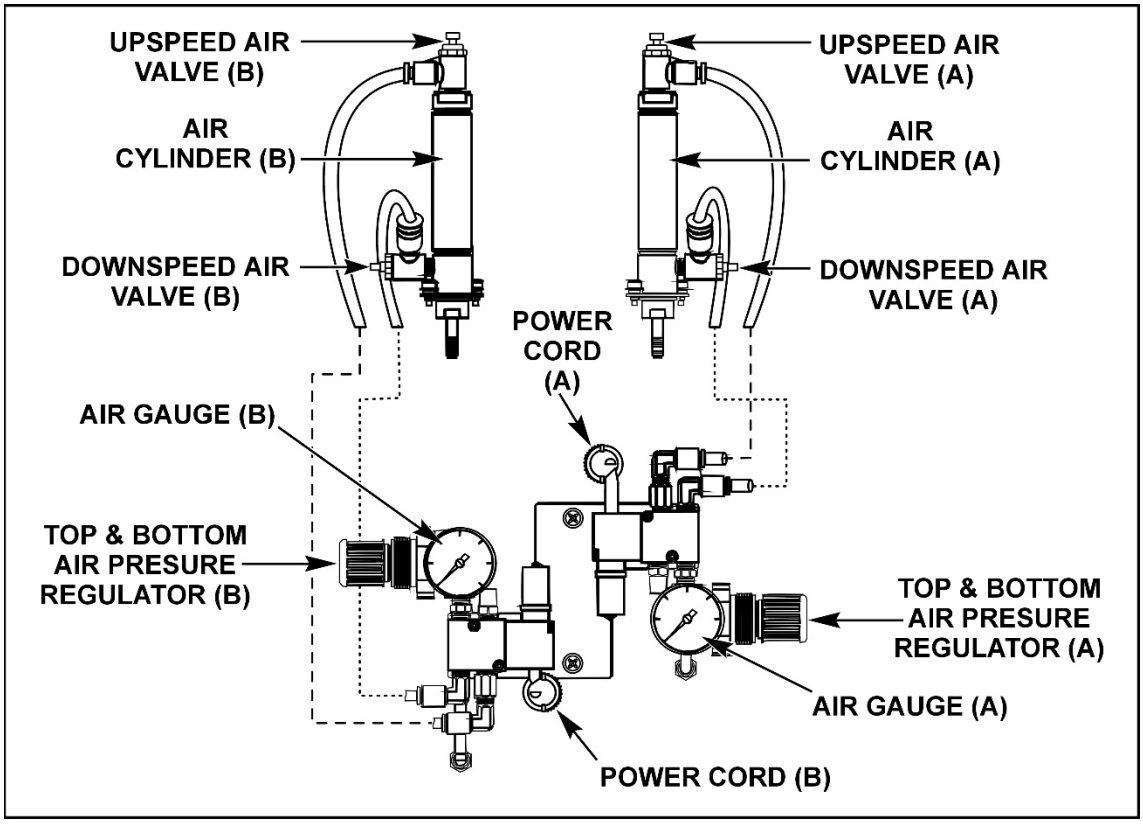
**NOTES:**

- 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).
- Amada Weld Tech 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 Power Supply following the instructions in the Welding Power Supply 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

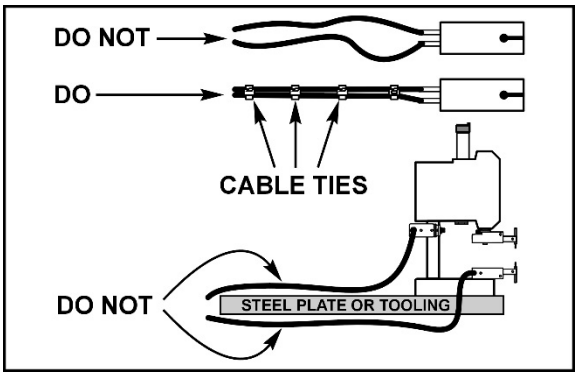
## Weld Cables and Energy Losses

All Amada Weld Tech 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

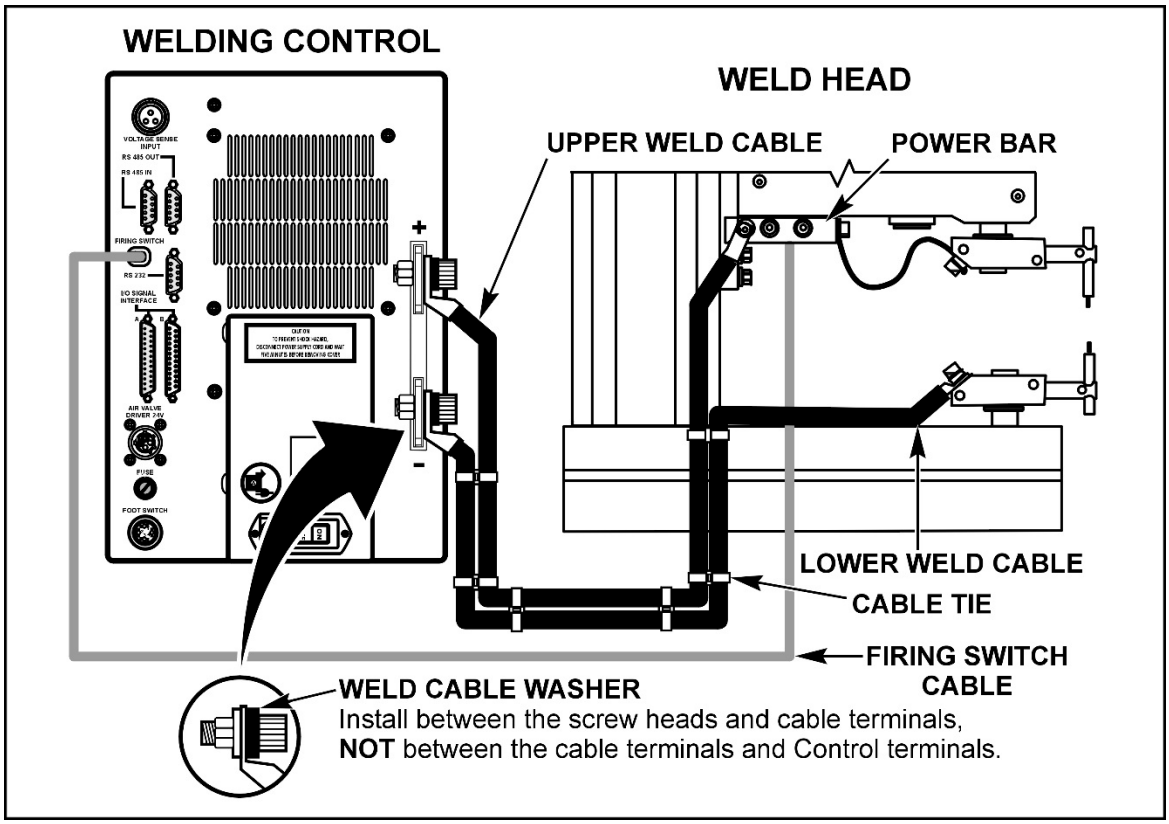
## Connect Cables to Head

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




1 Place the welding power supply, 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 weld cable connections on the weld energy power supply and/or welding transformer. Remove any oxidation, dirt, or grease.

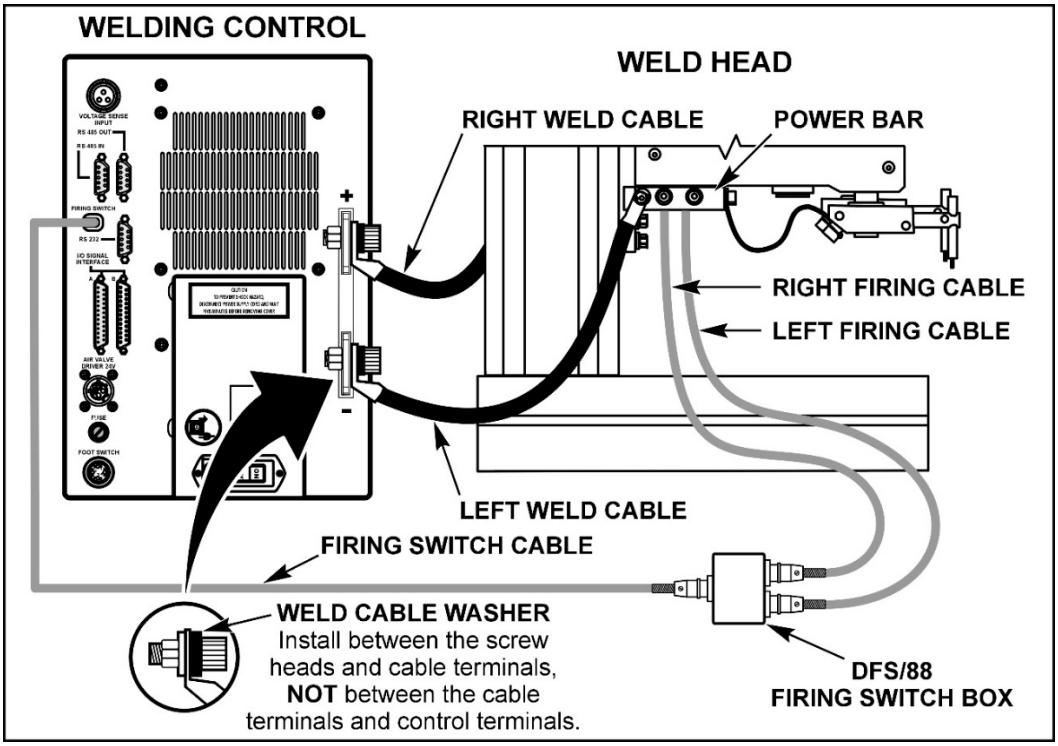
3 Connect the short welding cable to one terminal on the weld head power bar, using a 5/16-18 x 1/2 inch hex head bolt, and flat washer. Place the washer between the bolt head and the welding cable terminal, do ***not*** place the washer between the Cable and the Power Bar because you will get an unstable 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 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 power supply, weld energy power supply, or welding transformer in accordance with the instructions in its Users' Manual.

## Model TL-188B-A Weld Head




1 Place the welding power supply, 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 power supply, 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 power supply, 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 power supply, weld energy power supply, or welding transformer in accordance with the instructions in its Users' Manual.

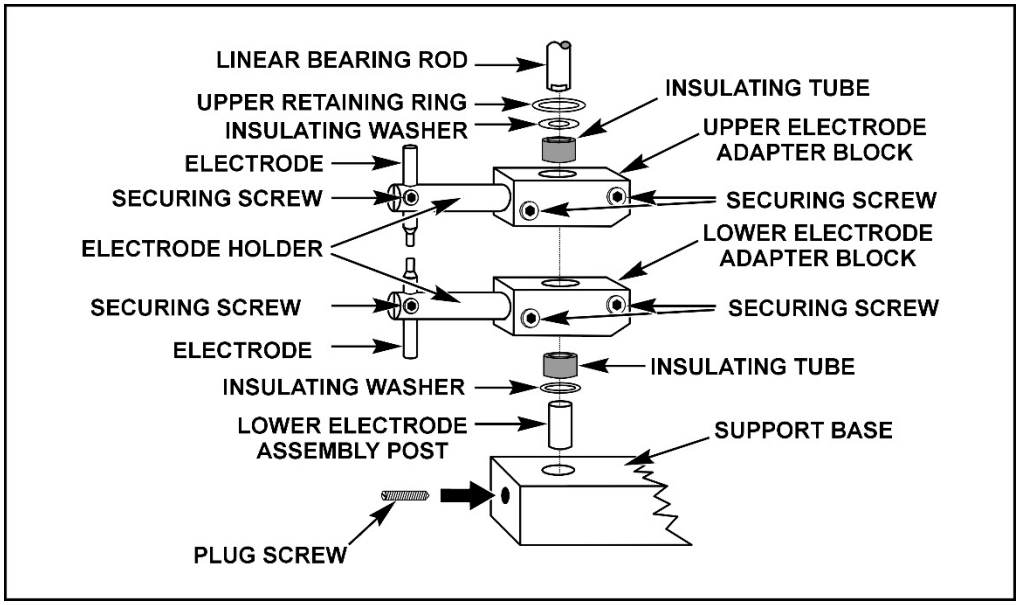
# Section IV. Install Electrode Holders

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

**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***.

## Models TL-180B-F and TL-180B-A 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.

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 TL-182B-A 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 x 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.

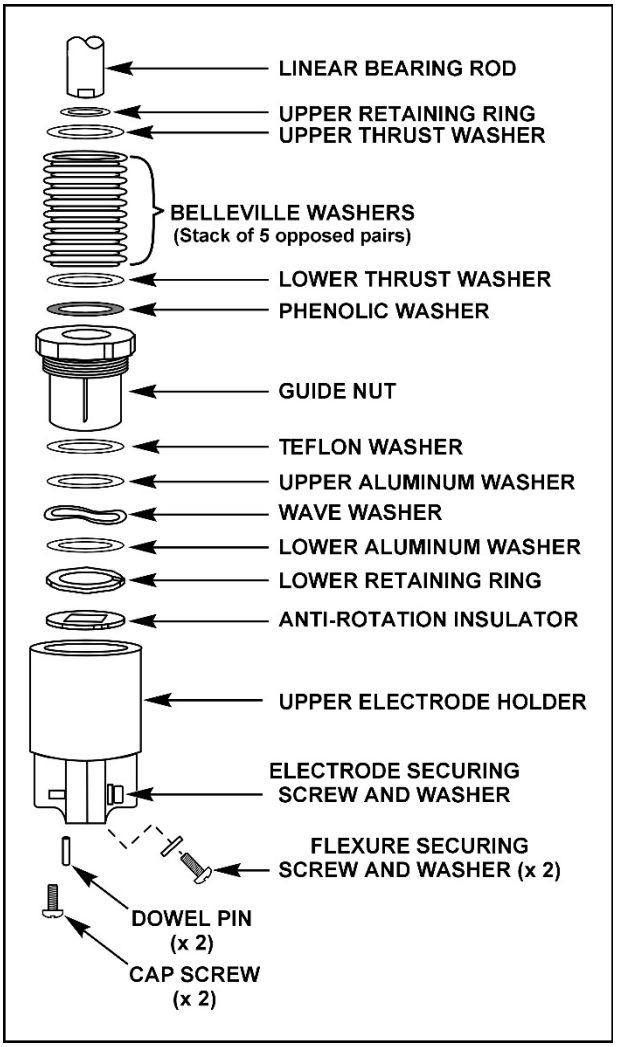
**Note:** Assemble the 10 Belleville washers in five opposed pairs, with the concave surface of each pair facing inward.

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 TL-182B-A Lower In-Line Electrode Holder Installation

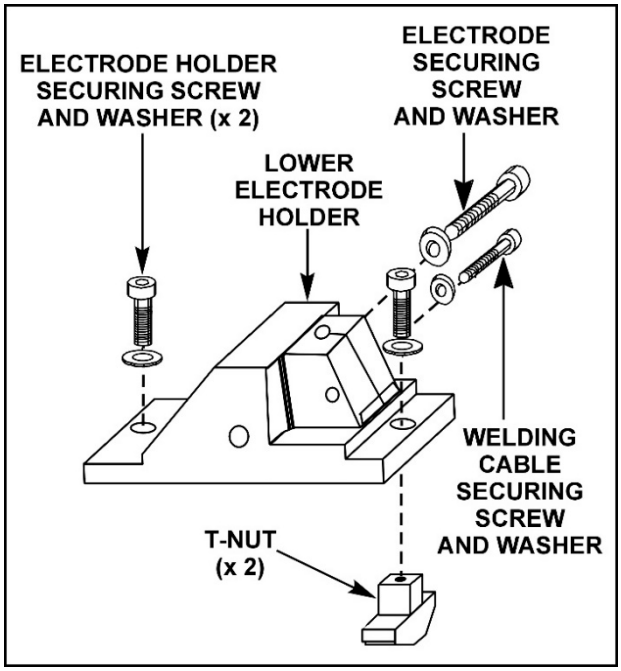
1 Snap the plastic end cap out of the front end of the support base.

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 TL-188B-A Electrode Holder Installation

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

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.

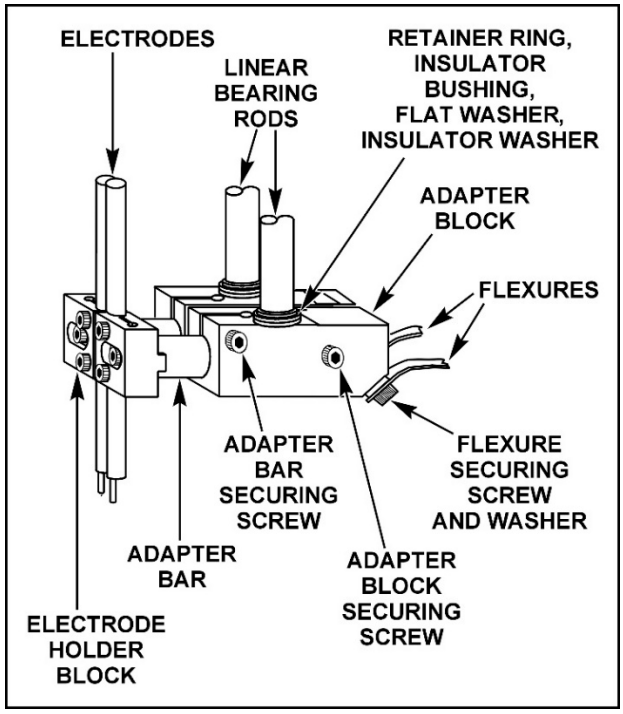
2 Slip the adapter block over the insulator bushing. The bottom of the linear bearing rod should now be flush with the bottom of the adapter block.

3 Secure the adapter block on the linear bearing rod by tightening the adapter block securing screw.

4 Loosen the adapter bar securing screw.

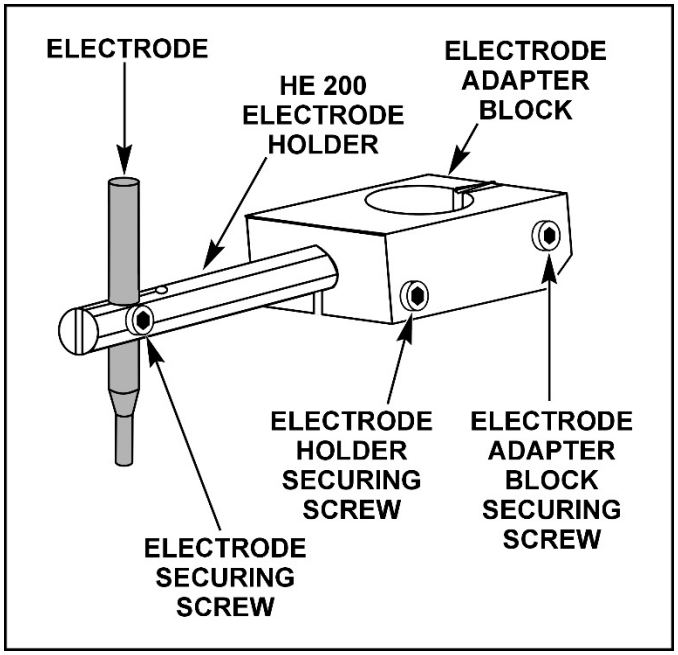
5 Slide the adapter bar into the adapter block and tighten the adapter bar securing screw.

6 Attach the flexure to the adapter block with the flexure securing screw and washer.



# Section V. Install Electrodes for Welding

## Model TL-180B-F and TL-180B-A 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.

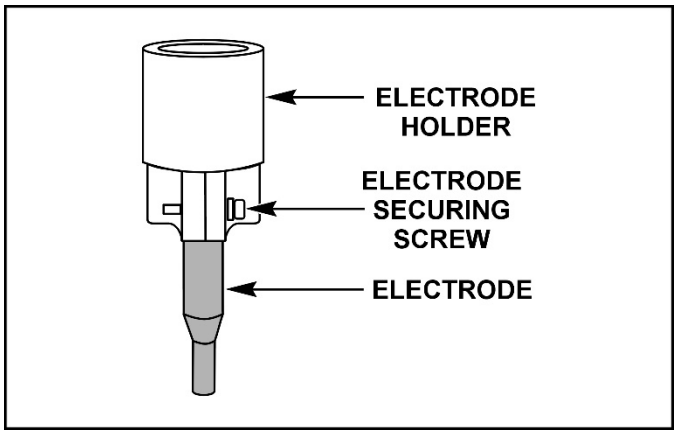
6 Tighten the plug screw to secure the lower electrode holder assembly.

## Model TL-182B 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.




### Lower Electrode:

1 Loosen the electrode securing screw.

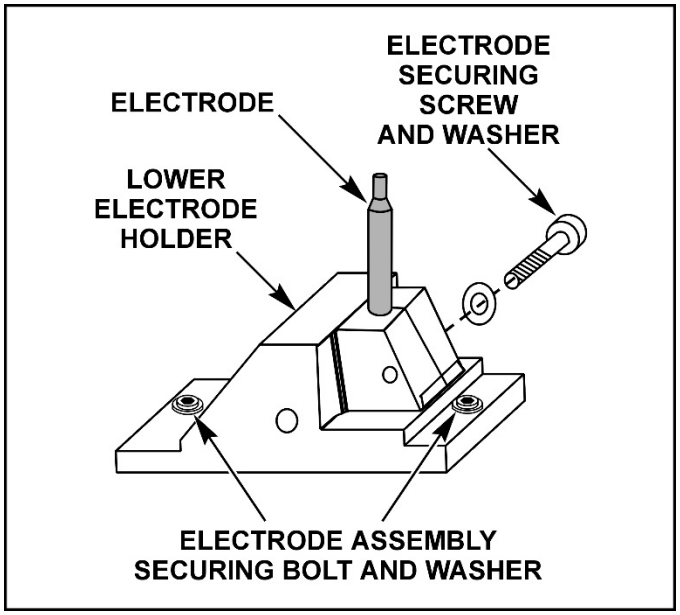
2 Insert the electrode in the electrode holder and tighten the electrode securing screw.

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.



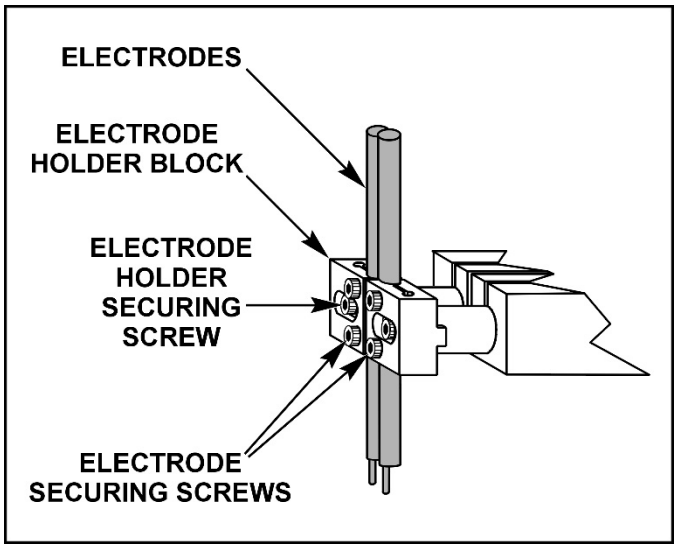
## Series Electrodes

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.

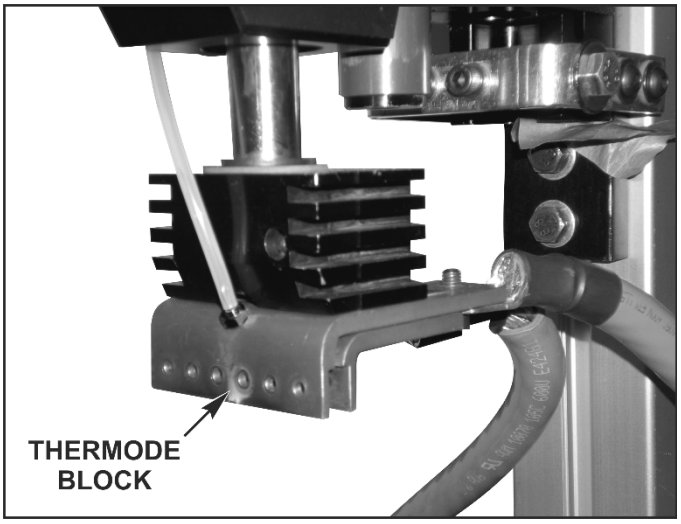
b) Swing the electrode holder blocks backward to widen the gap or forwards to narrow the gap.

c) Tighten the two electrode holder block securing screws to secure the selected gap width. Verify that both electrodes are not touching.

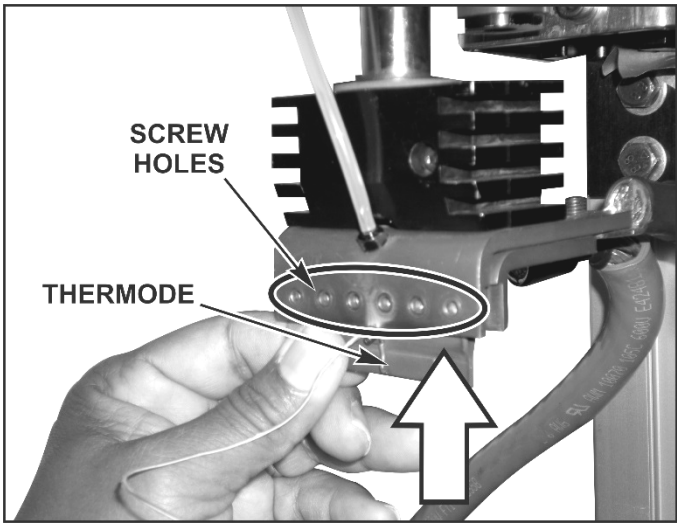
# Section VI. Install Thermodes for Reflow Soldering

The Model TL-180B-SA is designed specifically for high-precision reflow soldering. It contains a Model 17TDLB413 mounting block which can hold any of the TD series of thermodes.

It also contains two co-planarity adjustments for consistent distribution of thermode pressure on the bonding surface.



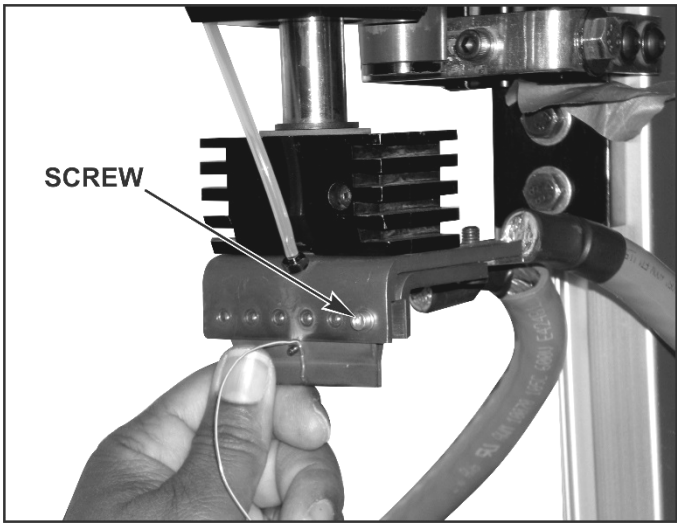

1. Slide the thermode up into the groove of the thermode block.
2. Adjust the position of the thermode so that the screw holes in the mounting block line up with the screw holes in the thermode.



**NOTE:** There are screw holes in the front and back of the thermode block. You must attach the thermode using ***all*** the screws necessary for the thermode on ***both*** sides of the block.

3. Insert the thermode screws alternating between the front and back.

   Do ***not*** tighten the screws when you insert them. This allows you to adjust the position of the thermode so that all screws will fit into the holes properly.




**NOTE:** Hot spots can occur on the contact surfaces of 17TD style thermodes if the mounting screws are not properly tightened. To assure good contact, perform the following steps.

4. Torque the thermode mounting screws to 18-27 lb.in. (2-3 N.m).
5. After a few reflow cycles, verify the torque values on the mounting screws.

   **NOTE:** If hot spots occur on the contact faces of the thermode, check the copper surfaces on the thermode mounting block for damage. Re-surface copper surfaces or replace if they are extensively damaged.

# Section VII. Hall Effect Switch

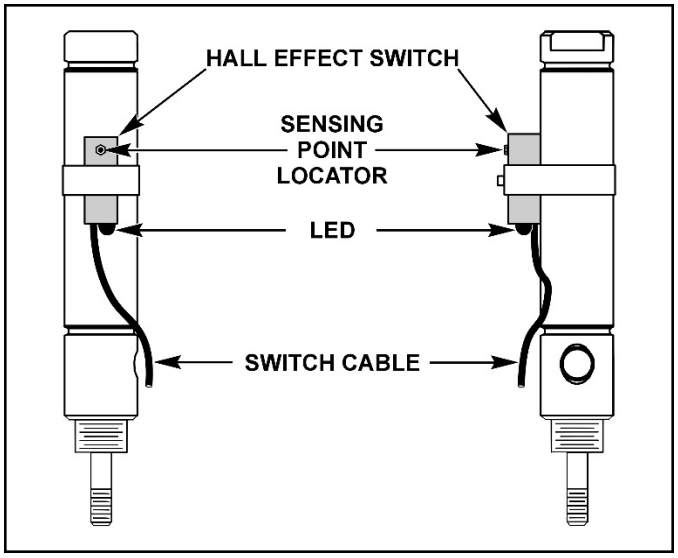
## Connect Hall Effect Limit Switch

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.

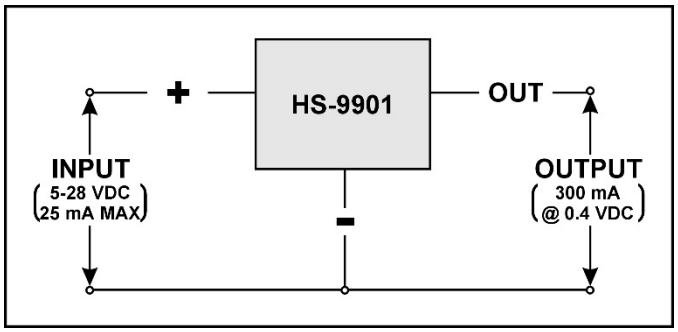
2 Position the switch at the top (bottom) of the cylinder to detect when the head is in the *up (down)* position.




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). |

## 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 A:

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 |

| 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 |
| | Excess Force | 2 | Decrease force in steps of 10-20% |
| | Insufficient Force | 3 | Increase force in steps of 10-20% |
| 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 |
| | Dirty Electrodes | 2 | Clean electrodes and/or parts to be welded |
| 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 ******* |

| 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 judgment in determining which is more probable in the specific application.

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

******* For non-Amada Weld Tech 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.

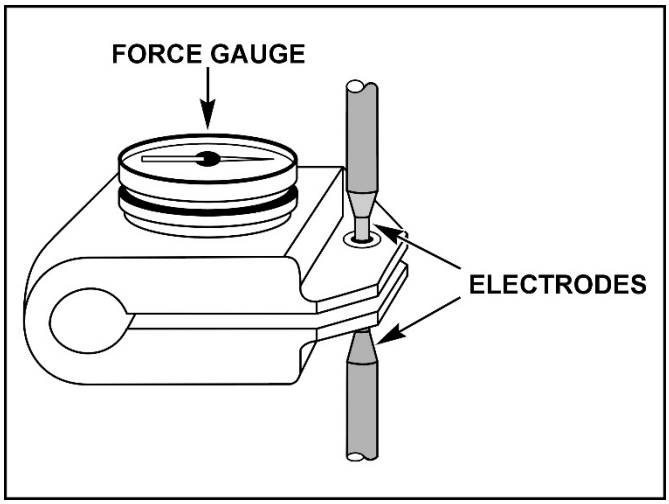
c. Higher electrode forces require higher weld currents (energy).

# Section II. Model TL-180B-F Manually-Actuated Head Setup

This Section describes the following adjustments for the TL-180B-F:

- **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 an Amada Weld Tech 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-Amada Weld Tech power supplies, 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.

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 TL-180B-EZ
# EZ-AIR™ Air-Actuated Head Setup

This Section describes the following adjustments for the Model TL-180B-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 TL-180B-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.

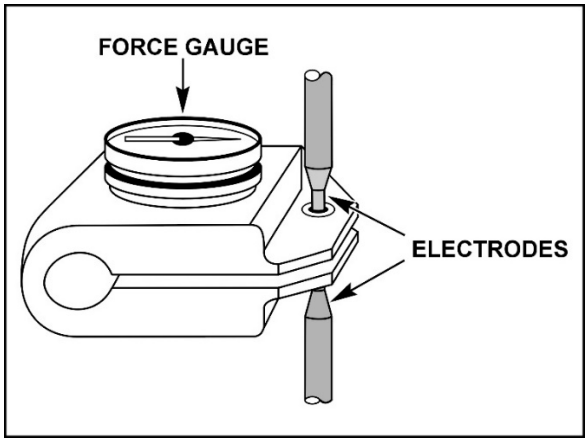
Down speed and welding force are the only two adjustments to be made when setting up the EZ-AIR. Down stops are ***not*** required.

**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 an Amada Weld Tech 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.

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 TL-180B-A and TL-182B-A Standard Air-Actuated Head Setup

This Section describes the following adjustments for Models TL-180B-A/24, TL-180B-A/115, TL-180B-ADS/24, TL-180B-AHS/115, TL-182B-A/24, TL-182B-A/115, TL-182B-AHS/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."

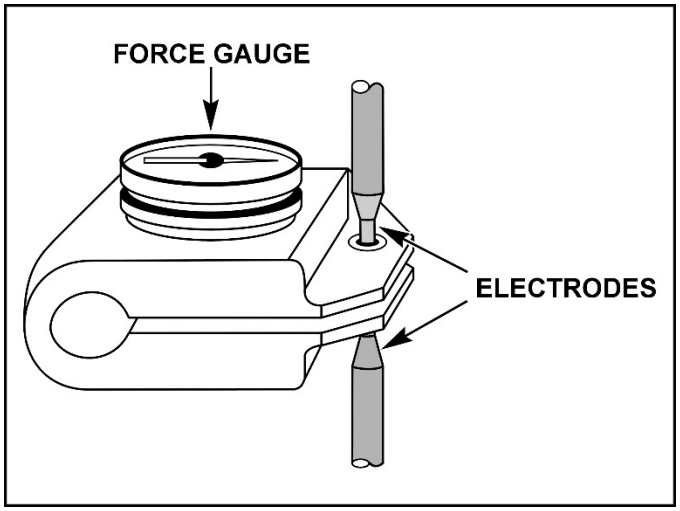
3 Close, but do not tighten, both air flow control valves.

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 an Amada Weld Tech 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 the welding power supply or control.

**NOTE:** For older or non-Amada Weld Tech power supplies, 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 TL-188B-A
# Standard Air-Actuated Head Setup

This Section describes the following adjustments for the Model TL-188B-A/24 and TL-188B-A/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.

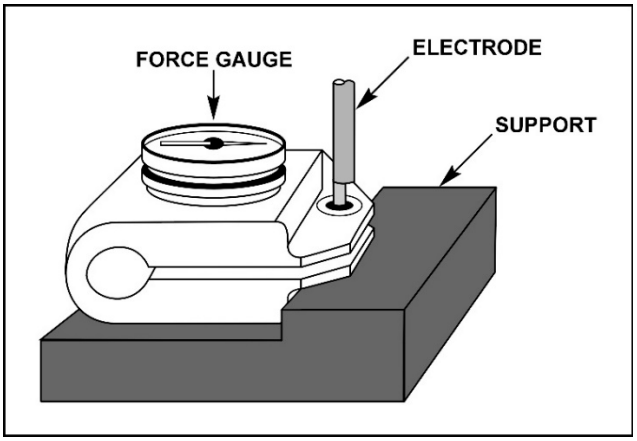
3 Close, but do not tighten, both air flow control valves.

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 an Amada Weld Tech 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 an Amada Weld Tech 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."

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-Amada Weld Tech power supplies, 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

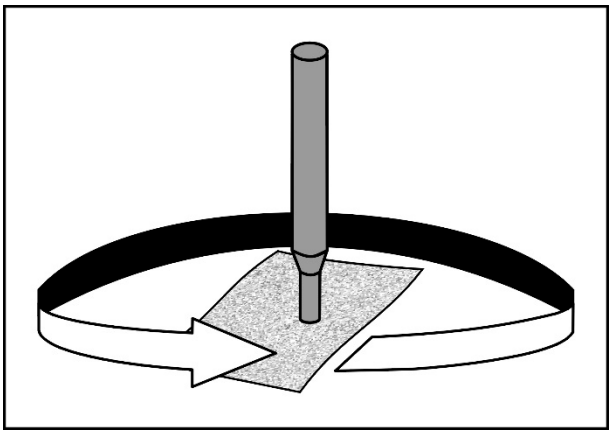
### Inspection

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 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.

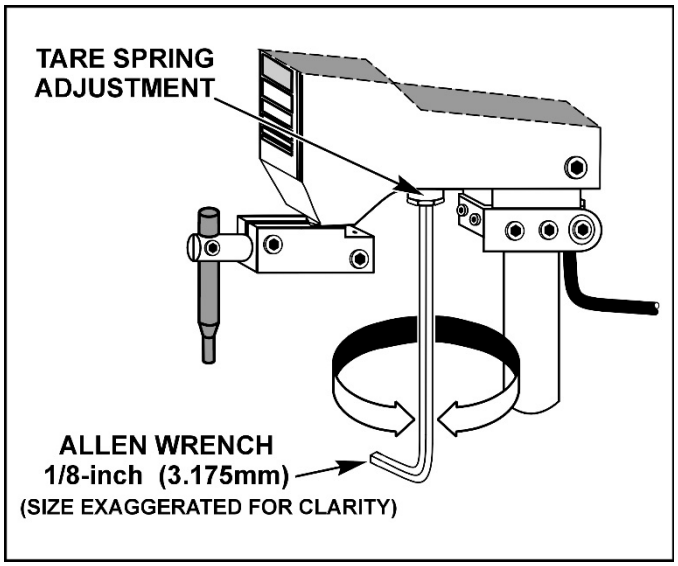
# Section III. Tare Spring Adjustment

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 ⅛ 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 ⅛ 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 A.
# Technical Specifications

## Model TL-180B-F, TL-180B-A, TL-182B-A, TL-188B-A

| FEATURES | | TL-180B-F | TL-180B-A | TL-182B-A | TL-188B-A |
|---|---|---|---|---|---|
| Actuation | | Manual | Air | Air | Air |
| Air Cylinder Inside Diameter | inch (mm) | - | 1.5 (38.1) | 1.5 (38.1) | 1.5 (38.1) |
| Air Cylinder Stroke | inch (mm) | - | 2 (50.8) | 2 (50.8) | 2 (50.8) |
| Air Pressure for Max. Force | psi ($kg/cm^2$) | - | 65 (4.57) | 65 (4.57) | 65 (4.57) |
| Air Solenoid Voltage (All EZ-Air: 24VAC or 24VDC) | (VAC) | - | 24VAC ± 10%<br>24VDC -5% +10% | 24VAC ± 10%<br>24VDC -5% +10% | 24VAC ± 10%<br>24VDC -5% +10% |
| Cycle Rate (full strokes/sec) | | 1 | 1 | 1 | 1 |
| Electrode Diameter | inch (mm) | 0.25 (6.4) | 0.25 (6.4) | 0.25 (6.4) | 0.25 (6.4) |
| Electrode Holder Type | | Offset | Offset | In-line | Series |
| Electrode Series | | ES-0800 | ES-0800 | ES-0800 | ES-0800<br>ES-0800E |
| Electrode Stroke Maximum | inch (mm) | 1.25 (31.75) | 1.25 (31.75) | 1.25 (31.75) | 1.25 (31.75) |
| Foot Pedal Model Number | | MSP | - | - | - |
| Max. Throat Size<br>Height x Width | (in)<br>(mm) | N/A | 1.8 x 3.1<br>46 x 79 | 1.8 x 4.8<br>46 x 122 | 3.3 x 6.1<br>84 x 155 |
| Maximum Electrode Adjustment: | (in)<br>(mm) | -<br>- | -<br>- | -<br>- | 0.125 - 3.0<br>(3.175 - 76.2) |
| Maximum Rating kVA | (watt-seconds) | 20 (1,000) | 20 (1,000) | 20 (1,000) | 20 (1,000) |
| Weld Cable Size (AWG) | | #2/0 | #2/0 | #2/0 | #2/0 |
| Weld Foce | Maximum: lbs (N)<br>Minimum: lbs (N) | 100 (445)<br>2 (8.9) | 100 (445)<br>5 (22.3) | 100 (445)<br>5 (22.3) | 100 (445)<br>5 (22.3) |
| Dimensions: | Height: inch (mm)<br>Width: inch (mm)<br>Depth: inch (mm) | 24 (609.6)<br>3.75 (95.3)<br>15.75 (400.2) | 24 (609.6)<br>6.75 (171.5)<br>15.75 (400.2) | 24 (609.6)<br>6.75 (171.5)<br>14.75 (374.7) | 23 (584.2)<br>6.75 (171.5)<br>16 (406.4) |
| Weight | lbs (kg) | 18.5 (8.4) | 21.5 (9.8) | 21.5 (9.8) | 36.5 (16.6) |

Add /24 for 24 VAC and /115 for 115 VAC Solenoid. 24 VAC is standard.

## Model TL-180B-SA

| | | |
|---|---|---|
| Weld Force | Maximum (lbs/N) | 100/444.8 |
| | Maximum (lbs/N) | 7/31.1 |
| Maximum Rating | KVA | 30 |
| | watt-seconds | 1000 |
| Electrode Stroke Maximum | (inch) | 1.25 |
| | (mm) | 31.75 |
| Electrode Diameter | (inch) | N/A* |
| Electrode Holder | -- | Thermode Mounting Style Block |
| Maximum Electrode | (inch) | -- |
| Adjustment | (mm) | -- |
| Electrode Series | | 17TJ (Thermode) |
| Weld Cable Size (AWG) | | # 2/0 |
| Foot Pedal | | -- |
| Air Solenoid Voltage (VAC) | | -- |
| Air Solenoid Voltage /24 Suffix | | 24 |
| Maximum Air Actuation Rate | | 1 |
| (Welds per second) | | |
| Cooling Valve (VAC) | | 24 |

Add /24 for 24 VAC and /115 for 115 VAC Solenoid. 24 VAC is standard.

# APPENDIX B
# ACCESSORIES

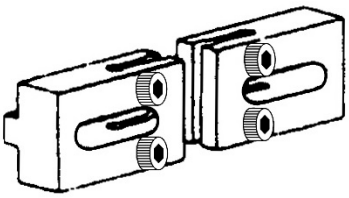
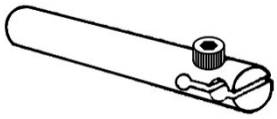
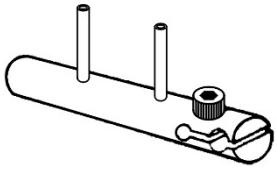
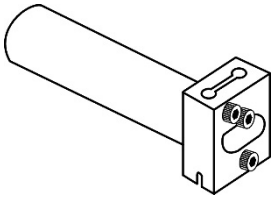
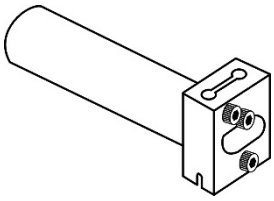
## Accessories

| 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. |

## 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

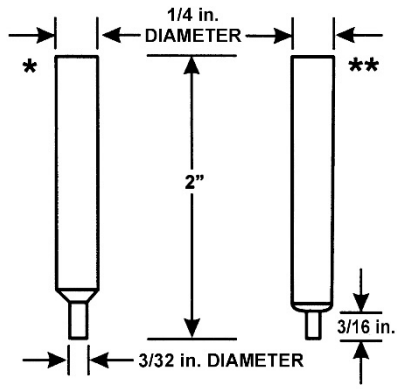
| MODEL HE188 | |
|---|---|
|  | **Electrode Holder**, .245 inch diameter for ESO800E Series electrodes.<br>Used on TL-188B weld heads. |
| **MODEL HE2000** | |
|  | **Electrode Holder**, holds 1/4 inch diameter electrodes.<br>Used on TL-180B weld heads. |
| **MODEL HE2000WC** | |
|  | **Water-Cooled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

## Electrodes

**ES0800 1/4 INCH DIAMETER STRAIGHT ELECTRODES**
**Used with TL-180B and TL-182B Weld Heads**

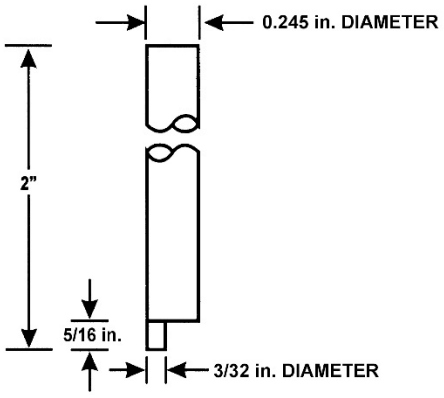
| Model | Material |
|---|---|
| ES0802 | RWMA 2 |
| ES0803 | RWMA 3 |
| ES0850 | GLIDCOP |
| ES0811 | RWMA 11 INSERT |
| ES0813 | RWMA 13 INSERT |
| ES0820 | MOLY INSERT |
| ES0820A | 1/8 IN. DIAMETER MOLY INSERT |

* Copper Alloy
** Refractory Alloy Insert



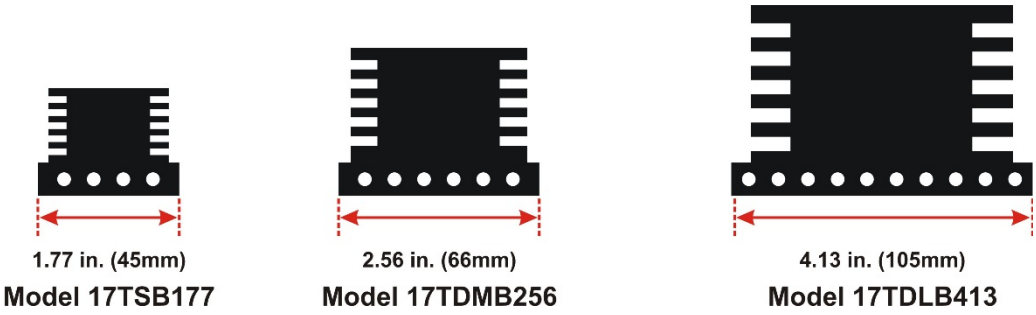

**ES0800E 0.245 INCH DIAMETER ECCENTRIC STRAIGHT ELECTRODES**
**Used with TL-188B Weld Heads**

| Model | Material |
|---|---|
| ES0802E | RWMA 2 |
| ES0803E | RWMA 3 |
| ES0850E | GLIDCOP |
| ES0820E | MOLY INSERT |
| ES0820E | GLIDCOP (0.062 FACE) |



| 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 |

## Thermode Blocks



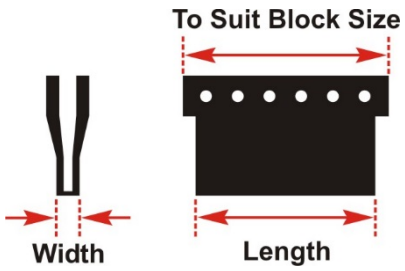
1.77 in. (45mm)
**Model 17TSB177**

2.56 in. (66mm)
**Model 17TDMB256**

4.13 in. (105mm)
**Model 17TDLB413**

**NOTES:**

- **Thermodes** are normally supplied with **Type K Thermocouples** attached. You may order either **Type E** or **Type J Thermocouples** instead. Contact Amada Weld Tech for details.
- Hot spots can occur on the contact surfaces of 17TD style thermodes if the mounting screws are not properly tightened. ***When you install a thermode***, perform the following steps to make sure you have good contact**:**
  1) Torque the thermode mounting screws to 18-27 lb.in (2-3 N.m).
  2) After a few reflow cycles, verify the torque values on the mounting screws.
  3) If hot spots occur on the contact faces of the thermode, check the copper surfaces on the thermode mounting block for damage. Re-surface copper surfaces or replace if they are extensively damaged.

| 17TD<br>THREE-DIMENSIONAL THERMODES | |  | |
|---|---|---|---|
| **CATALOG #** | **TYPE** | **MATERIAL** | **SIZE (W x L)** |
| **Used With TL-180B-SA Reflow Heads (Fits Small, Medium, and Large Blocks)** | | | |
| 17TDS1000/059 | 3-DIMENSIONAL | Special alloy | 0.059” x 1.0” (1.5 mm x 25.4 mm) |
| 17TDS1000/079 | 3-DIMENSIONAL | Special alloy | 0.079” x 1” (2.0 mm x 25.4 mm) |
| 17TDS1000/098 | 3-DIMENSIONAL | Special alloy | 0.098” x 1” (2.5 mm x 25.4 mm) |
| 17TDS1000/l18 | 3-DIMENSIONAL | Special alloy | 0.118” x 1” (3.0 mm x 25.4 mm) |
| I7TDS1500/059 | 3-DIMENSIONAL | Special alloy | 0.059” x 1.5” (1.5 mm x 38.1 mm) |
| I7TDS1500/079 | 3-DIMENSIONAL | Special alloy | 0.079” x 1.5” (2.0 mm x 38.l mm) |
| I7TDS1500/098 | 3-DIMENSIONAL | Special alloy | 0.098” x 1.5” (2.5” / 38.l mm) |
| 17TDS 1500/118 | 3-DIMENSIONAL | Special alloy | 0.118” x 1.5” (3.0 mm x 38.1 mm) |
| **Used With TL-180B-SA Reflow Heads (Fits Medium and Large Blocks)** | | | |
| 17TDM2000/059 | 3-DIMENSIONAL | Special alloy | 0.059” x 2” (1.5 mm x 50.8 mm) |
| 17TDM2000/079 | 3-DIMENSIONAL | Special alloy | 0.079” x 2” (2.0 mm x 50.8 mm) |
| I7TDM2000/098 | 3-DIMENSIONAL | Special alloy | 0.098” x 2” (2.5 mm x 50.8 mm) |
| 17TDM2000/118 | 3-DIMENSIONAL | Special alloy | 0.118” x 2” (3.0 mm x 50.8 mm) |
| 17TDM2500/059 | 3-DIMENSIONAL | Special alloy | 0.059” x 2.5” (1.5 mm x 63 mm) |
| 17TDM25001079 | 3-DIMENSIONAL | Special alloy | 0.079” x 2.5” (2.0 mm x 63 mm) |
| 17TDM2500/098 | 3-DIMENSIONAL | Special alloy | 0.098” x 2.5” (2.5mm x 63 mm) |
| 17TDM2500/118 | 3-DIMENSIONAL | Special alloy | 0.118” x 2.5” (3.0 mm x 63 mm) |
| **Used With TL-180B-SA Reflow Heads (Fits Large Block)** | | | |
| 17TDL3000/059 | 3-DIMENSIONAL | Special alloy | 0.059” x 3” (1.5 mm x 76.2 mm) |
| 17TDL3000/079 | 3-DIMENSIONAL | Special alloy | 0.079” x 3” (2.0 mm x 76.2 mm) |
| 17TDL3000/098 | 3-DIMENSIONAL | Special alloy | 0.098” x 3” (2.5 mm x 76.2 mm) |
| 17TDL3000/118 | 3-DIMENSIONAL | Special alloy | 0.118” x 3” (3.0 mm x 76.2 mm) |

# AMADA WELD TECH INC.

http://www.amadaweldtech.com


**AMADA WELD TECH INC.**

1820 South Myrtle Ave., Monrovia, CA 91016, U.S.A.

TEL. +1-626-303-5676 FAX, +1-626-358-8048

http://www.amadaweldtech.com

**AMADA WELD TECH CO., LTD.**

200, Ishida, Isehara-shi, Kanagawa 259-1196, Japan

**AMADA WELD TECH KOREA CO., LTD.**

28, Dongtanhana 1-gil, Hwaseong-si, Gyeonggi-do, 18423, Korea

TEL. +82-31-8015-6810 FAX. +82-31-8003-5995

**AMADA WELD TECH SHANGHAI CO., LTD.**

Unit 401, A206(C8), No. 77, Hongcao Road, Xuhui District, Shanghai, China

TEL. +86-21-6448-6000 FAX. +86-21-6448-6550

**AMADA WELD TECH GmbH**

Lindberghstrasse 1, DE-82178 Puchheim, Germany

TEL. +49-89-839403-0 FAX. +49-89-839403-68

**AMADA WELD TECH TAIWAN CO., LTD.**

Rm. 5, 2F., No. 9, Dehui St., Zhongshan Dist., Taipei 10461, Taiwan (R.O.C.)

TEL. +886-2-2585-0161 FAX. +886-2-2585-0162

**AMADA VIETNAM CO., LTD.**

469 Ha Huy Tap Road, Yen Vien, Gia Lam, Ha Noi, Vietnam

TEL. +84-4-6261-4583 FAX. +84-4-6261-4584

**AMADA (THAILAND) CO., LTD.**

Asia Industrial Estate Suvarnabhumi (AIES) 88/41 Moo 4, Khlongsuan, Bangbo, Samutprakarn 10560, Thailand

TEL. +66 2170-5900 FAX. +66 2170-5909

**AMADA WELD TECH INDIA PVT. LTD.**

G-A Ground Floor, 5C-409, 5th Cross, Kammanahalli Main Road, HRBR Layout, Kalyan Nagar, Bengaluru, - 560043, India

TEL. +91-80-4092-1749 FAX. +91-80-4091-0592

**AMADA WELD TECH LTDA.**

Av. Tamboré, 965/973, Salas P22e F11, bairro Tamboré, 06460-000-Barueri-SP, Brazil

TEL. +55-11-4193-1187

**AMADA WELD TECH INC.**
1820 South Myrtle Ave., Monrovia, CA 91016, U.S.A.
TEL. +1-626-303-5676  FAX. +1-626-358-8048