

# **LIGHT FORCE LT-050B WELD HEAD**

## **USER MANUAL**



## Copyrighted © 1990 – 2024 Amada Weld Tech

The engineering designs, drawings and data contained herein are the proprietary work of Amada Weld Tech and may not be reproduced, copied, exhibited or otherwise used without the written authorization of Amada Weld Tech.

Printed in the United States of America

### Revision Record

Revision	EO	Date	Basis of Revision
	None	1990	None. Original edition.
A	17949	10/99	Add new force indication graph to match equipment.
B	19146	01/02	Complete revision
C	21776	05/08	Update to Miyachi Unitek logo, and added new CAUTION information.
D	42860	11/13	Update to Miyachi America name and logo.
E	43481	12/14	Update to Amada Miyachi America name and logo.
F	43866	08/15	Updated to Amada Miyachi America format.
G	44244	05/16	Updated technical information
H	45853	04/20	Update Company Name (Amada Weld Tech) + Model Names
J	47210	01/24	Update Manual Title

# FOREWORD

Thank you for purchasing an Amada Weld Tech LT-050B Light Force Weld Head.

Upon receipt of your equipment, please thoroughly inspect it for shipping damage prior to 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 Avenue**  
**Monrovia, California 91016**  
**Phone: (626) 303-5676**  
**FAX: (626) 358-8048**  
**E-mail: info@amadaweldtech.com**

The purpose of this manual is to supply operating and maintenance personnel with the information needed to properly and safely operate and maintain the Light Force Weld Head.

We have made every effort to ensure that the information in this manual is accurate and adequate. The contents of this manual are subject to change without notice.

Should questions arise, or if you have suggestions for improvement of this manual, please contact us at the above location/numbers.

Amada Weld Tech is not responsible for any loss or injury due to improper use of this product.

This Manual covers the following models:

Original Model Name	Original P/N		Current Model Name	Current P/N
50F Unitip Weld Head	2-162-03	→	LT-050B-F Weld Head	2-162-04
50F/UB Unibond Weld Head	2-162-03-01	→	LT-050B-F/UB Weld Head	2-162-04-01
50F/RF Reflow Weld Head	2-162-03-02	→	LT-050B-F/RF Weld Head	2-162-04-02
50F/LRF Reflow Weld Head	2-162-03-03	→	LT-050B-F/LRF Weld Head	2-162-04-03

50A/24 Unitip Weld Head	2-163-03-01	→	LT-050B-A/24 Weld Head	2-163-04-01
50AUB/24 Unibond Weld Head	2-163-03-03	→	LT-050B-A/UB Weld Head	2-163-04-03
50ARF/24 Reflow Weld Head	2-163-03-05	→	LT-050B-A/RF Weld Head	2-163-04-05
50ALRF/24 Reflow Weld Head	2-163-03-07	→	LT-050B-A/LRF Weld Head	2-163-04-07

## SAFETY NOTES

This instruction manual describes how to operate, maintain and service the LT-050B Light Force Weld Head, and provides instructions relating to its SAFE use. Procedures described in this manual **MUST** be performed, as detailed, by **QUALIFIED** and **TRAINED** personnel.

For **SAFETY**, and to effectively take advantage of the full capabilities of the tester, please read these instruction manuals before attempting to use the workstation.

Procedures other than those described in this manual or not performed as prescribed in it, may expose personnel to electrical hazards.

After reading this manual, retain it for future reference when any questions arise regarding the proper and **SAFE** operation of the tester.

Please note the following conventions used in this manual:

**WARNING:** Comments marked this way warn the reader of actions which, if not followed, might result in immediate death or serious injury.

**CAUTION:** Comments marked this way warn the reader of actions which, if not followed, might result in either damage to the equipment, or injury to the individual if subject to long-term exposure to the indicated hazard.

# CONTENTS

	Pg
<b>CHAPTER 1: DESCRIPTION</b> .....	1-1
Section I: Features .....	1-1
Section II: Model Descriptions .....	1-2
Foot Actuated LT-050B-F Heads .....	1-2
Model LT-050B-F, Light Force Weld Head .....	1-3
Model LT-050B-F/UB, Light Force Weld Head with Parallel Gap Adjustment .....	1-3
Model LT-050B-F/RF, Reflow Soldering Head .....	1-4
Model LT-050B-F/LRF, Light Force Reflow Soldering Head .....	1-4
Air Actuated LT-050B-F Weld and Reflow Soldering Heads .....	1-6
Section III: Major Components .....	1-7
Section IV: Accessories .....	1-9
<b>CHAPTER 2: GETTING STARTED</b> .....	2-1
Section I: Planning for Installation .....	2-1
Section II: Air Actuated Weld Head Installation .....	2-1
Section III: Installation of Electrode Holder and Tip .....	2-2
Unitip Electrode Installation, Models LT-050B-F and LT-050B-A .....	2-2
Thermode Installation, Models LT-050B-F/LRF and LT-050B-A/LRF .....	2-3
Unibond Electrode Installation, Models LT-050B-F/UB and LT-050B-A/UB .....	2-4
Thermode Installation, Models LT-050B-F/RF and LT-050B-A/RF .....	2-5
Section IV: Optic Pod (Microscope) Installation .....	2-6
Section V: Power Supply Connections .....	2-7
Connection to Power Source .....	2-7
Microwave Circuit Precautions .....	2-8
<b>CHAPTER 3: OPERATION</b> .....	3-1
Parallel Gap Welding Variables .....	3-1
Electrode Materials .....	3-1
Area of Electrode Face .....	3-1
Gap .....	3-1
Welding Force .....	3-1
Pulse Duration .....	3-1
Procedure .....	3-2
<b>CHAPTER 4: USER MAINTENANCE</b> .....	4-1
Section I: Precautions .....	4-1
Section II: Maintenance Procedures .....	4-2
Unitip and Unibond Electrode Dressing .....	4-2
Unitip and Unibond Electrode Cleaning .....	4-2

## CONTENTS (continued)

	Pg
CHAPTER 5: REPAIR SERVICE.....	5-1
Service Repair at Plant.....	5-1
APPENDIX A: TECHNICAL SPECIFICATIONS .....	A-1
APPENDIX B: ELECTRODE/THERMODE HOLDER CONVERSIONS .....	B-1

# 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 Acknowledgment, 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 Acknowledgment.

## **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 91016 or to such other location as designated in writing by Seller) to Seller pursuant to Seller’s RMA procedures and Buyer obtains a RMA number from Seller prior to returning such Goods for the examination to take place; and (iii) Seller reasonably verifies Buyer’s claim that the Goods are defective and that the defect developed under normal and proper use.

(f) Seller shall not be liable for a breach of the warranty set forth in Section 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, OR ARISING 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 SELLER AT 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).

---

## LT-050B LIGHT FORCE WELD HEAD



# CHAPTER 1

## DESCRIPTION

### Section I: Features

- The Amada Weld Tech LT-050-B are precision, low inertia, weld heads designed for a wide variety of delicate, parallel gap welding and reflow soldering applications. True vertical electrode motion, an LT-050B-F feature, eliminates electrode wiping action at all welding levels and may increase electrode life. Targeting the work piece is made easier with true vertical motion. The  $\frac{3}{4}$  inch (1.91 cm) vertical stroke permits easy access into deep packages. A low mass spring and compound lever force system ensures accurate, repeatable welding force in the 40/125 to 1000 gram force (gf) (0.39/1.23 to 9.807 N) range. The mechanism is designed so that the work pieces and electrodes will not be subjected to forces in excess of the Preset Force. Excessive welding force is a major cause of bond failure or inconsistent bonds, and short electrode life.
- The LT-050B-F Heads are available in four different electrode configurations. Each configuration can be foot pedal or air actuated. The Baseplate and Optic Mounting Assembly provide a stable work place and impose little restriction on the size of the work piece. Machined mounting surfaces on the left hand side and top of the Head allow them to be easily incorporated into a custom machine or work station.
- A selection of electrodes and thermodes allows welding or reflow soldering on devices such as semiconductor, thick film ceramic substrates, or printed circuit boards. See Appendix B for complete information on electrode/thermode conversions.
- The Welding Force is set by turning the knob located on the front of the weld head. A Force Curve, located on the right-hand side of the cover, converts the digital counter readings to gf. Calibration is set at the factory and does not change with time.
- All LT-050B-F Heads are supplied with a Baseplate, Optic Mounting Assembly, Model CP Cable Pedal, Voltage Sensing/Thermocouple Sensing Cable, and #2 AWG Welding cables. Optional Work Holders and Optic Accessories are available.

Section II: Model Descriptions

Foot Actuated LT-050B-F Heads

Foot actuation allows the operator to control the rate of electrode descent. Targeting of micro or sub-miniature work pieces is generally easier using foot actuation. Four different electrode configurations, each designed for different welding or reflow soldering applications comprise the LT-050B-F Foot Actuated Heads (figure 1-1). Table 1-1 lists the features of each model.



Table 1-1. LT-050B-F Models

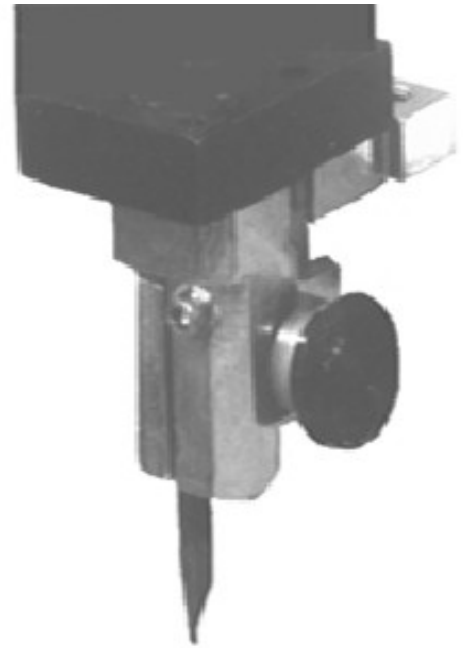
Model	Part #	Electrode Holder	Electrode Type	Application
LT-050B-F	2-162-xx	HE50	Unitip®	Welding
LT-050B-F/UB	2-162-xx-01	HE50UB	Unibond®	Welding
LT-050B-F/RF	2-162-xx-02	HE50RF	Thermode	Reflow
LT-050B-F/LRF	2-162-xx-03	HE50LRF	Thermode	Reflow

**NOTE:** The “xx” in the Stock number is the design sequence.

**Model LT-050B-F, Light Force Weld Head**

Model LT-050B-F, Stock Number 2-162-xx, uses only Unitip electrodes for micro-welding. Applications include welding gold or copper ribbon as thin as 0.0003 inch (0.0008 cm) to make interconnections in microwave and hybrid packages, and welding sub-miniature components such as beam lead diodes to flexible printed circuit boards and ceramic substrates. Welding Force is adjustable from 40 to 1000 gf (0.039 to 1.23 N). The LT-050B-F is used with a power supply. Voltage sensing wires, connected to the HE50 Electrode Holder, provide the feedback required by the power supply.

Model HE50 Electrode Holder, Stock Number 12-077-xx, (figure 1-2) standard on the LT-050B-F, is a low inertia, compliant electrode holder which ensures that the Unitip electrode will maintain the Preset Force on the work piece as it deforms during the welding process. The HE50 compliance feature functions in the Preset Force range from 40 to 125 gf (0.039 to 1.23 N).

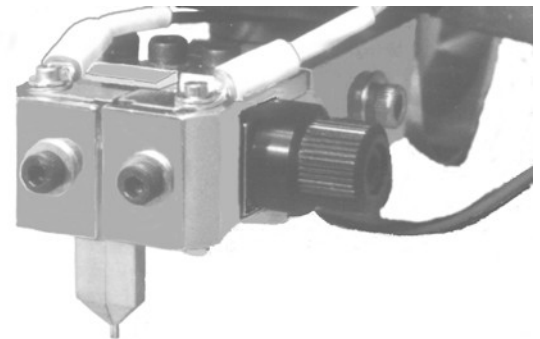


**Figure 1-2. Close-up of the Model HE50 Unitip Electrode Holder with Model UTM 112C Unitip Electrode**

**Model LT-050B-F/UB, Light Force Weld Head with Parallel Gap Adjustment**

Model LT-050B-F/UB, Stock Number 2-162-xx-01, uses parallel gap Unibond electrodes. Applications include fine wire or ribbon bonding and tacking of hybrid lids to their packages in preparation for seam sealing. Welding Force is adjustable from 125 to 1000 gf (1.23 to 9.807 N).

Model HE50UB Unibond Electrode Holder (figure 1-3), Stock Number 12-078-xx, standard on the LT-050B-F/UB, features flexures which allow the Unibond electrodes to conform to uneven work surfaces. The Electrode Gap Adjustment Knob feature permits a 0.040 inch (0.10 cm) maximum electrode gap spacing.



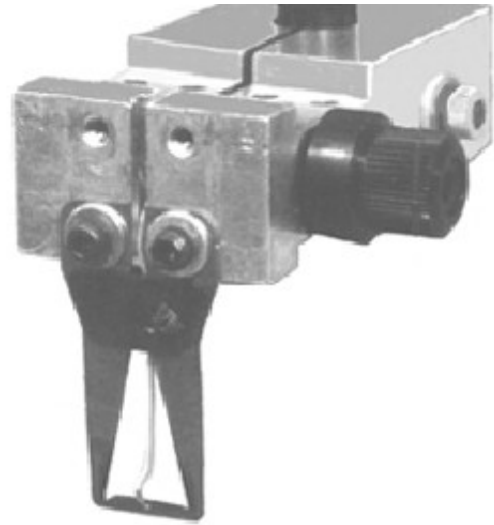
**Figure 1-3. Close-up of the Model HE50UB Unibond Electrode Holder with Unibond Electrodes**

### Model LT-050B-F/RF, Reflow Soldering Head

Model LT-050B-F/RF, Stock Number 2-162-xx-02, uses single point and small reflow soldering tips called thermodes. Applications include sub-miniature wire bonding, multiple lead bonding, and interocular lens staving. The Reflow Soldering Force is adjustable from 125 to 1000 gf (1.23 to 9.807 N).

Model HE50RF Thermode Holder, Stock Number 12-079-xx, standard on the LT-050B-F/RF, should only be used with the 17P Series of Single Point Thermodes, 17M Series of non-thermocouple controlled Blade Thermodes, and the 17BM Series of Blade Thermodes (figure 1-4).

The HE50RF does not use flexures since thermode follow-up is not critical to making a reflow soldering joint. In addition, long time-at-temperatures of one to three seconds can cause flexures to anneal which radically reduces their life

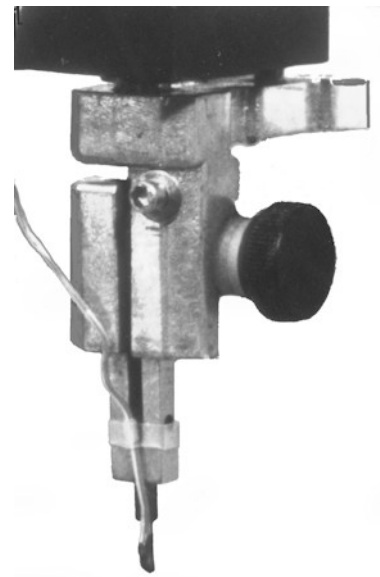


**Figure 1-4. Close-up of the Model HE50RF Thermode Holder with a Model 17BM770 Blade Thermode**

### Model LT-050B-F/LRF, Light Force Reflow Soldering Head

Model LT-050B-F/LRF, Stock Number 2-162-xx-03, uses only single point thermodes (figure 1-5). Applications include TAB (Tape Automated Bonding) solder joint repair and gold-to-gold thermo-compression bonding. The Reflow Soldering Force is adjustable from 40 to 1000 gf (0.039 to 9.807 N).

Model HE50LRF Thermode Holder (figure 1-5), Part Number 12-080-xx, standard on the LT-050B-F/LRF, can only be used with the 17T Series of Micro-miniature Single Point Thermodes. Table 1-2 lists the recommended thermodes, all thermode holders, and application uses.



**Figure 1-5. Close-up of the Model HE50LRF Thermode Holder with a 17T08/10 Single Point Thermode**



**Table 1-2. Thermode Holders**

<b>Thermode Model</b>	<b>Thermode Holder</b>	<b>Application</b>
17T08/10	HE50LRF	Thermocompression bonding
17P20	HE50RF	Single Point Reflow
17P40	HE50RF	Single Point Reflow
17P50	HE50RF	Single Point Reflow
17P75	HE50RF	Single Point Reflow
17P93	HE50RF	Single Point Reflow
17SR40	HE50RF	Single Point Reflow
17M300	HE50RF	PCB Trace Repair
17BM070	HE50RF	Multiple Lead Reflow
17BM180	HE50RF	Multiple Lead Reflow
17BM360	HE50RF	Multiple Lead Reflow

### Air Actuated LT-050B-F Weld and Reflow Soldering Heads

All LT-050B-A heads can be ordered with air actuation already installed. Air actuation makes it easier to incorporate the LT-050B-A Heads into automated systems. An air cylinder replaces the Model CP Cable Pedal as the actuation source. The speed of the air actuated system is limited by the speed at which the electrode holder can move without damaging the electrodes, thermodes, or work pieces as a result of the impact.

115 VAC and 24 VAC solenoid valves are offered. A ¾ inch (1.9 cm) air cylinder, with two flow controls, is mounted on the rear of the head using adaptor hardware which is supplied with the Air Kit. A separate housing contains a Four-Way Air Solenoid Valve, a Pressure Gauge, and a Pressure Regulator which ensures easy control of the electrode holder.

The two Flow Controls on the Air Cylinder allow independent adjustment of the up and down speed of the electrode holder. Model 50AK, 115 VAC Air Kit, and Model 50AK/24, 24 VAC Air Kit, can be ordered to convert existing foot pedal models to air actuated models. Air actuated model and stock numbers for each head type are listed in table 1-3.

**Table 1-3. LT-050B-A Models**

Model	Part #	Electrode Holder	Electrode Type	Application
LT-050B-A/24	2-163-xx-01	HE50	Unitip	Welding
LT-050B-A/UB	2-163-xx-03	HE50UB	Unibond	Welding
LT-050B-A/RF	2-163-xx-05	HE50RF	Reflow	Reflow Soldering
LT-050B-A/LRF	2-163-xx-07	HE50LRF	Reflow	Thermocompression Bonding

**NOTE:** The “xx” in the Stock number is the design sequence.

The Model 60, and Model 125 Power Supplies require that the Model FSAC footswitch be used to energize the four-way air solenoid valve.

The reflow control Time-At-Temperature Control has a 115 and 24 VAC valve output for energizing and controlling the timing of the air solenoid valve. The Model FS2L Footswitch is used to initiate the reflow control.

## Section III. Major Components

Figure 1-6 identifies the major components of the Light Force Weld Head.

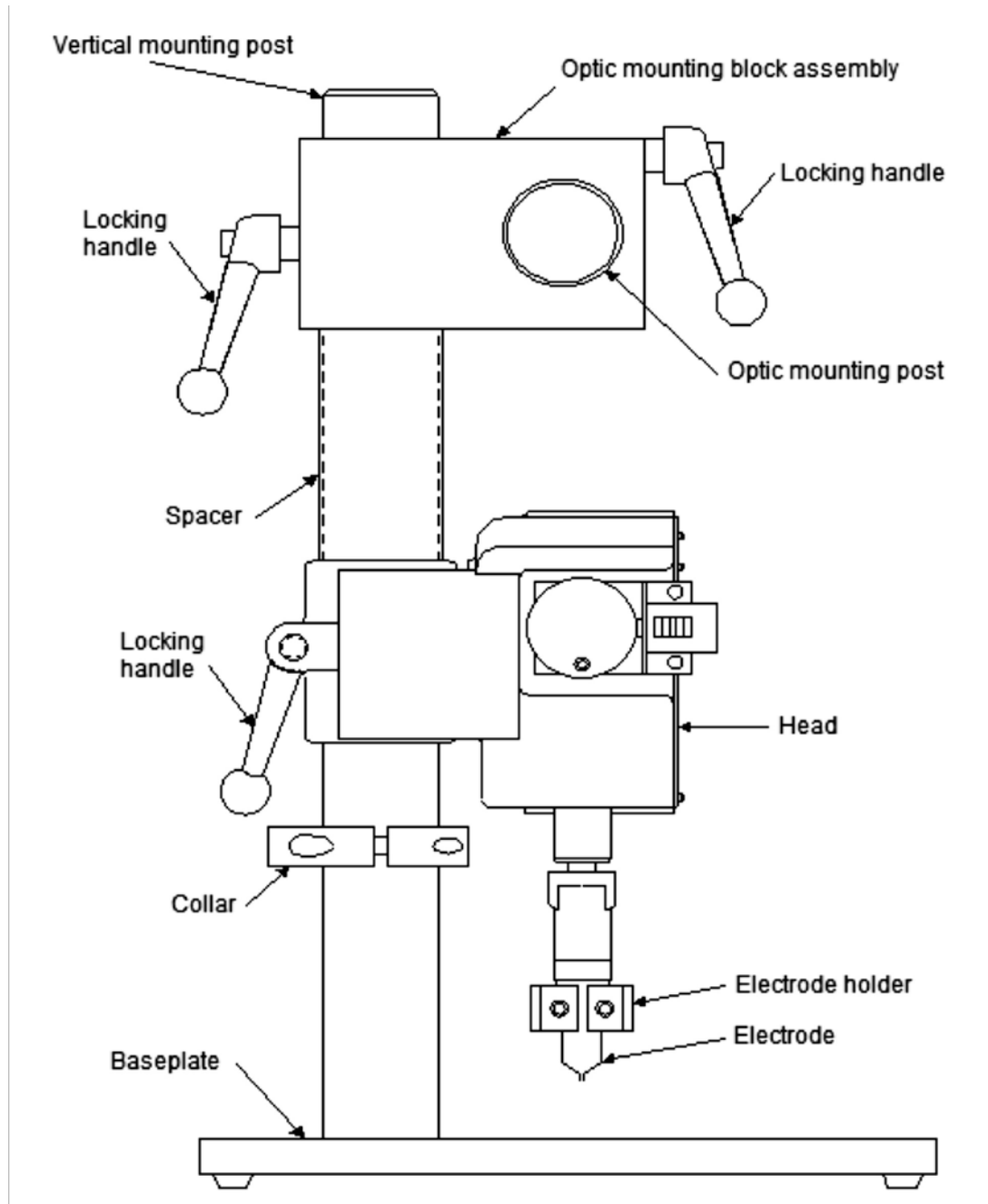
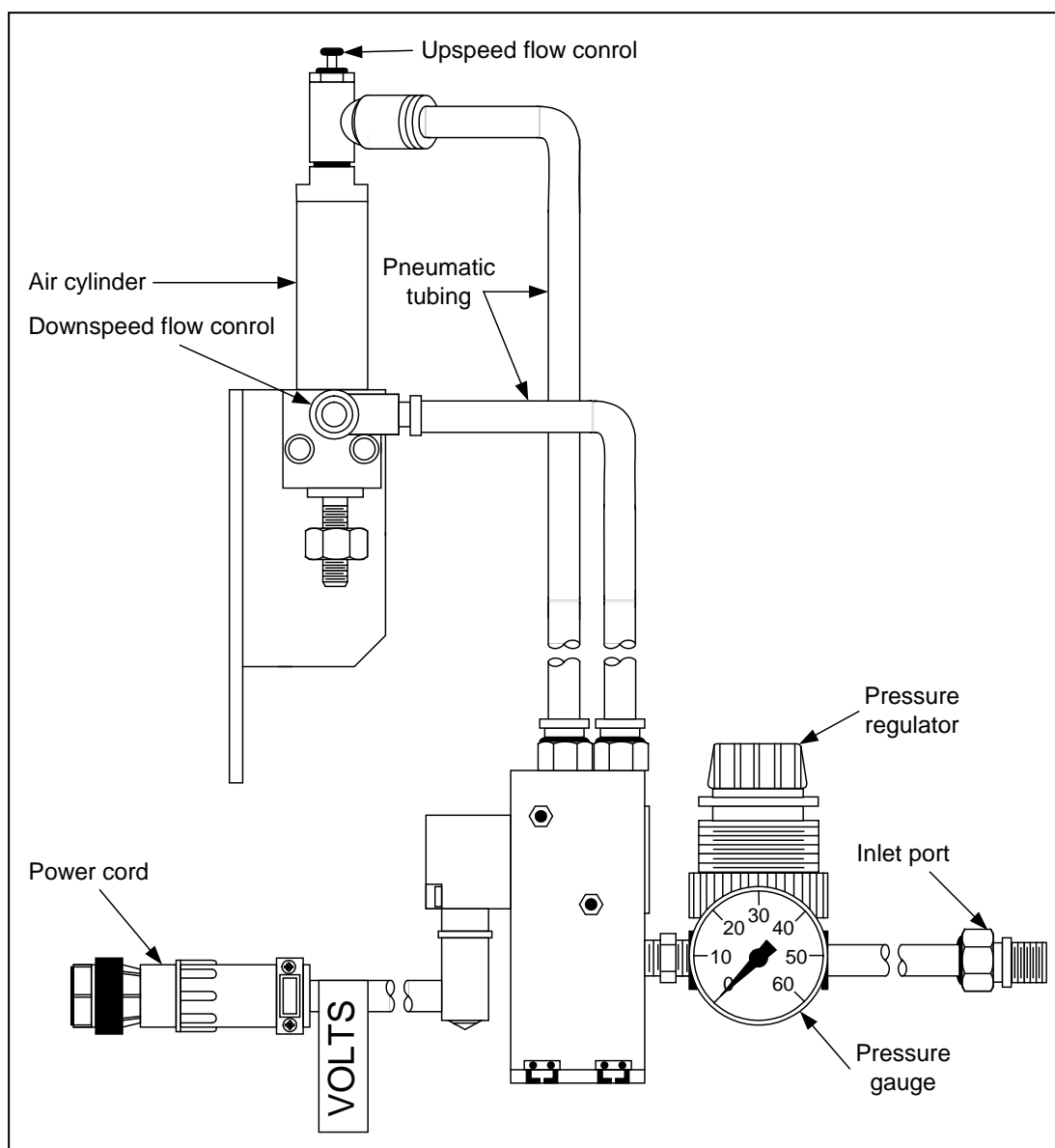


Figure 1-6. LT-050B Weld Head Components

## CHAPTER 1: DESCRIPTION

---

Figure 1-7 identifies the major components of the Optional Air Kit.



**Figure 1-7. 50AK Air Kit Components**

## Section IV: Accessories

Table 1-4 lists the Accessories available for the LT-050B Weld Head.

**Table 1-4. Accessories**

<b>MODEL</b>	<b>DESCRIPTION</b>
SMZ-660	Nikon, Stereo-Zoom 0.5X objective lens, 10X eyepieces, 195mm max. working distance.
DFS	Dual Firing Switch Junction Box. Connects two firing switch cables from two different heads to a single power source.
DHD	Device Holder for 0.3 to 0.6 inch (0.8 to 1.5 cm) wide Sidebrazing Packages and 0.250 inch (0.64 cm) wide Cerdip/Plastic Packages with lengths up to 2.070 inch (5.258 cm). Has a spring loaded base.
DHF	Device Holder for Flat Substrates or Packages that are 0.250 to 2 inches (5.258 to 5.08 cm) square. Has a spring loaded base.
DHL	Device Holder for Lead Frames that have 8 to 40 leads and are up to 10 inches long.
FSAC	AC Footswitch for Models LT-050B-A and LT-050B-A/UB. Use with 60, and 125 Power Supplies.
FS2L	AC Footswitch for Model LT-050B-A/RF.
HE50	Replacement Unitip Electrode Holder. Converts LT-050B/UB, LT-050B/RF, or LT-050A/LRF to accept Unitip Electrodes. Power straps included.
HE50UB	Replacement Unibond Electrode Holder. Converts LT-050B/RF, or LT-050B/LRF to accept Unibond Electrodes. Power straps included.
HE50RF	Replacement Thermode Holder. Converts LT-050B/UB, or LT-050B/LRF to accept 17P Single Point and 17BM Blade Thermodes. Power straps included.
HE50LRF	Replacement Thermode Holder. Converts LT-050B/UB, or LT-050B/RF to accept 17T Single Point Thermodes. Power straps included.
UTA	Adapts HE50UB Unibond electrode holders for use with Unitip electrodes.
PD	Polishing Disks. Package of 50. (Not recommended for Unitips.)
CPD	Ceramic Polishing Disks for Unitip electrodes. Package of 20.
WP	Work Positioner, 3 inch (7.6 cm) diameter. Height adjustable from 1 7/16 to 2 inches (3.65 to 5.08 cm).
50AK	Air-Actuation Kit. Converts Models LT-050B-F, LT-050B-F/UB, and LT-050B-F/RF to air actuation. Uses 115 VAC, 60/50 Hz, solenoid. Requires FSAC or FS2L footswitch.
50AK/24	Air-Actuation Kit. Same as 50AK except that it uses a 24 VAC, 60/50 Hz, solenoid.

## CHAPTER 1: DESCRIPTION

---

Table 1-5 lists the electrodes and thermodes that are available.

**Table 1-5. Electrodes and Thermodes**

MODEL	DESCRIPTION
EU1000	RWMA 2 Unibond Electrode, 1½-inch long with 0.020 x 0.030 inch deep face.
EU1002	RWMA 2 Unibond Electrode, 2 inch long with 0.020 x 0.030 inch deep face.
EU2030M	Unibond Electrode, Molybdenum, Copper-Clad Shank, 1½-inch long with 0.020 x 0.030 inch deep face.
EU2030ML	Unibond Electrode, Molybdenum, Copper-Clad Shank, 2 inch long with 0.020 x 0.030 inch deep face.
UTM111C	Unitip Electrode, Molybdenum, 0.009 W x 0.010 D with 0.001 inch gap.
UTM112C	Unitip Electrode, Molybdenum, 0.010 W x 0.010 D with 0.002 inch gap.
UTM222C	Unitip Electrode, Molybdenum, 0.018 W x 0.020 D with 0.002 inch gap.
UTM224C	Unitip Electrode, Molybdenum, 0.020 W x 0.020 D with 0.004 inch gap.
UTM111L	Unitip Electrode, Molybdenum, 0.009 W x 0.010 D with 0.001 inch gap.
UTM112L	Unitip Electrode, Molybdenum, 0.010 W x 0.010 D with 0.002 inch gap.
UTM152L	Unitip Electrode, Molybdenum, 0.010 W x 0.005 D with 0.002 inch gap.
UTM222L	Unitip Electrode, Molybdenum, 0.018 W x 0.020 D with 0.002 inch gap.
UTM224L	Unitip Electrode, Molybdenum, 0.020 W x 0.020 D with 0.004 inch gap.
UTM237L	Unitip Electrode, Molybdenum, 0.030 W x 0.020 D with 0.007 inch gap.
17BM070	Blade Thermode, Molybdenum, 0.075" W x 0.030" T, with thermocouple.
17BM180	Blade Thermode, Molybdenum, 0.220" W x 0.030" T, with thermocouple.
17BM360	Blade Thermode, Molybdenum, 0.400" W x 0.030" T, with thermocouple.
17P20	Probe Thermode, Tungsten, 0.020" dia. x 0.020" L, with thermocouple.
17P40	Probe Thermode, Tungsten, 0.040" dia. x 0.070" L, with thermocouple.
17P50	Probe Thermode, Tungsten, 0.050" dia. x 0.200" L, with thermocouple.
17P75	Probe Thermode, Tungsten, 0.075" dia. x 0.070" L, with thermocouple.
17P93	Probe Thermode, Tungsten, 0.093" dia x 0.250" L, with thermocouple.
17T08/10	Probe Thermode, Tungsten, 0.008" W x 0.010" D face, with thermocouple.

# CHAPTER 2

## GETTING STARTED

### Section I: Planning for Installation

The outline dimensions of the weld head and air pressure requirements for the air actuator option are contained in Appendix A.

### Section II: Air Actuated Weld Head Installation

Refer to figure 1-7 and use the following procedure to attach the air lines, adjust the air pressure regulator, and set the air flow valves.

Place the Solenoid Valve/Regulator Assembly on the work bench near the back of the head housing.

Connect inlet port to a properly filtered air supply (65 psi, 448 N/m<sup>2</sup>) maximum. Using the short tubing and long tubing, connect the outlet ports of Solenoid/Regulator Assembly to correct quick release fittings on the air cylinder, as shown in the figure.

Amada Weld Tech does not recommend using a lubricator with the Solenoid/Regulator Assembly since it is assumed that this system will usually be operated in a "clean" environment. Once every six months or million operations, whichever occurs first, place two or three drops of ARCO Duro S-315 Oil, or equivalent, in the top of the air cylinder.

Plug the Power Cord from Solenoid/Regulator Assembly into appropriate Footswitch or Time-At-Temperature Control. See Chapter 1.

Adjust the regulator so that the gauge reads 12 psi (30.48 N/m<sup>2</sup>). Actuate the footswitch and adjust the air flow valves so that the air cylinder causes the air cylinder rod to move smoothly and slowly. The Down-Speed Air Flow Valve, located at the back of the Air Cylinder controls the electrode down-speed. The Up-Speed Air Flow Valve, located near the front of the Air Cylinder, controls the electrode up-speed.

### Section III: Installation of Electrode Holder and Tip



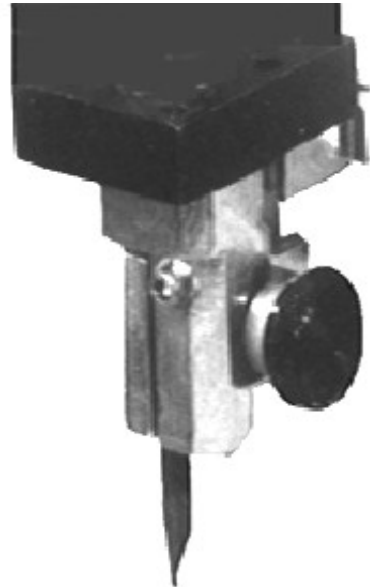
#### CAUTION

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**.

#### Unitip Electrode Installation, Models LT-050B-F and LT-050B-A

- 1 Open the electrode holder approximately  $\frac{1}{8}$  inch by loosening the Electrode Clamping Screw.
- 2 Hold the left half of the Electrode Holder open using the left hand. Using the right hand, insert the Unitip into the Electrode Holder. Each half of the Electrode Holder has been machined with concave grooves to accept 0.125 inch (3 mm) diameter electrodes.
- 3 Gently squeeze the Electrode Holder closed and then rotate the Unitip so that the vertical line formed on the tip by the insulation layer lies exactly between the two Electrode Holder halves when viewed from the front of the head.
- 4 Verify that the upper end of the Unitip is seated against the top of the machined groove in the Electrode Holder. Wiggle the left half of the Electrode Holder to ensure that it fits against the Unitip and then finger tighten the Electrode Clamping Screw.

**CAUTION:** Do not over-tighten the clamping screw.



**Figure 2-1. HE50 Unitip Electrode Holder with Unitip Installed**



Unitip electrode faces can be severely damaged by applying excessive bonding forces. Table 2-1 gives maximum operational force limits in kilograms of force. See Chapter 4 for Unitip cleaning and dressing instructions.

There is no problem with using Unitip electrodes with the LT-050B-A as long as the impact is limited to less than the maximum force.

**Table 2-1. Maximum Unitip Operational Force Limit**

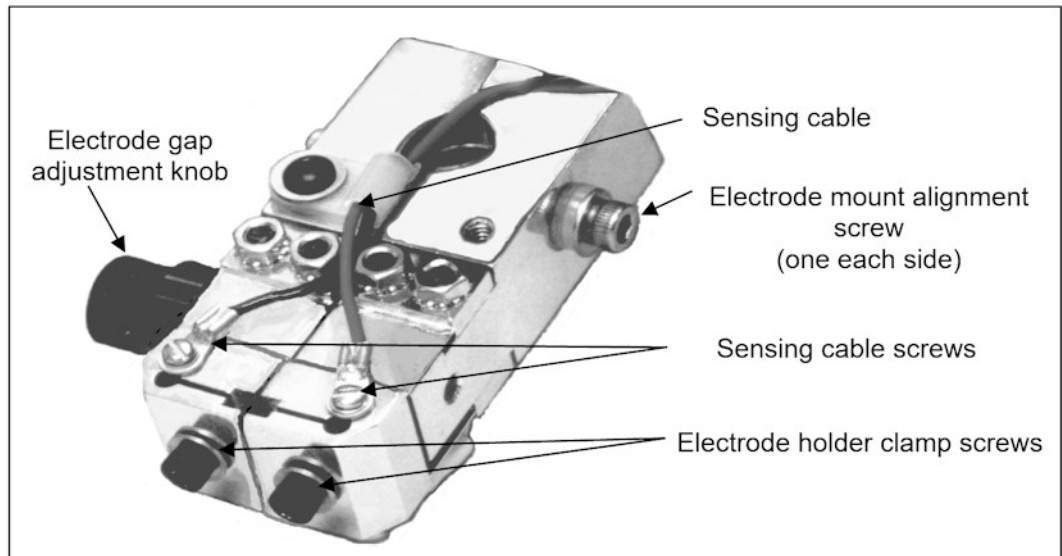
<b>UNITIP P/N</b>	<b>MAX FORCE (kgf)</b>
UTM111L	0.94
UTM112L	0.94
UTM152L	0.47
UTM222L	3.75
UTM111C	0.94
UTM112C	0.94
UTM222C	3.75
UTM224C	3.75
UTM237L	4.57

### **Thermode Installation, Models LT-050B-F/LRF and LT-050B-A/LRF**

Follow the same procedure described above to install the 17T08/10 Single Point Thermode. Ignore step 3.

### Unibond Electrode Installation, Models LT-050B-F/UB and LT-050B-A/UB

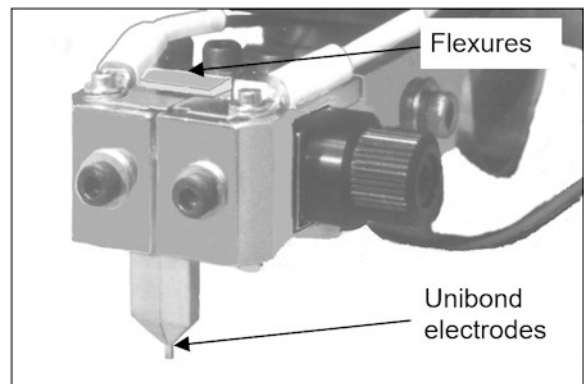
- 1 Check the voltage sensor cable located on the underside of the HE50UB Electrode Holder. Verify that the two slotted head screws attaching the voltage sensing cable to the flexure assemblies, shown in figure 2-2, are securely tightened. Erratic operation results if they are loose



**Figure 2-2. HE50UB Electrode Holder, Bottom View**

**NOTE:** The Amada Weld Tech closed-loop power supplies are the only controls that uses remote voltage sensing.

- 2 Loosen the Electrode Holder Clamp Screws. Set the Electrode Gap Adjustment Knob for maximum gap width and insert the Unibond Electrodes into the holders as shown in figure 2-3.
- 3 Loosely hold the tips or electrodes in place and rotate the Electrode Gap Adjustment Knob to its fully clockwise (closed) position.
- 4 Orient the electrodes so they contact each other along their entire length and are perpendicular to the working surface. Position the electrodes vertically in the holder so the tip ends coincide
- 5 Tighten the Electrode Holder Clamp Screws.



**Figure 2-3. HE50UB Electrode with EU1000Unibond Electrodes**

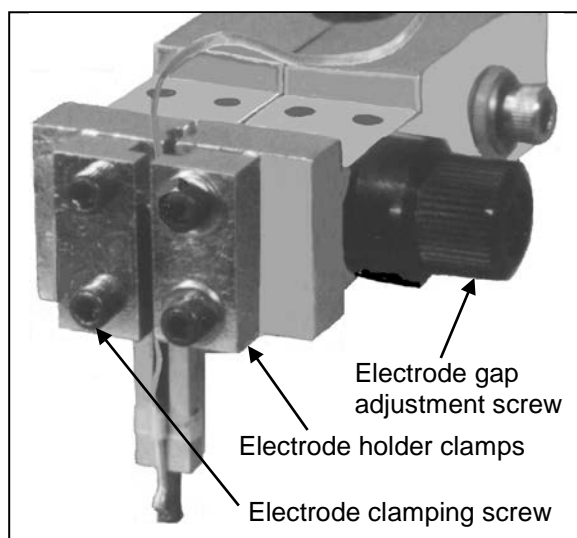
**CAUTION:** Do not over-torque the Clamp Screws. Doing so will deform the Flexure, dramatically reducing its life.

- 6 Open the electrodes to the desired operating gap by turning the Electrode Gap Adjustment Knob counterclockwise.

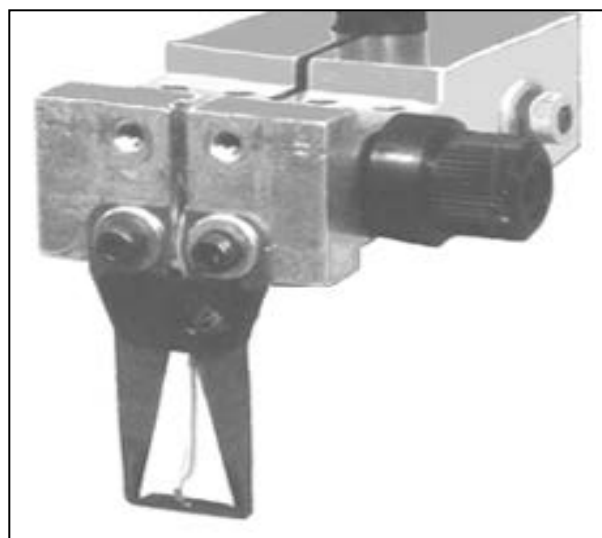
**NOTE:** The operating gap can be safely opened to a maximum of 0.040 inches (1.0 mm).

### Thermode Installation, Models LT-050B-F/RF and LT-050B-A/RF

- 1 Single point reflow soldering can be performed using the 17P Peg Tip Thermodes. Limited multiple reflow soldering is possible using the 17BM070, 17BM180, and 17BM360 Blade Thermodes. Blade Thermodes wider than 0.380 inches (0.97 cm) should use the Amada Weld Tech TL-087B Reflow Soldering Head since they generally require more than 1 kgf (9.8 N) reflow force to produce a good, multiple lead, reflow joint.
- 2 Loosen the Electrode Holder Clamps on the Weld Head. Rotate the Electrode Gap Adjustment Knob counterclockwise to its maximum gap opening.
- 3 Insert the Thermode into the HE50RF Electrode Holder as shown in figure 2-4. Return the Electrode Gap Adjustment Knob to its full clockwise position, clamping the Thermode. Verify that the power supply Output switch is in the off position. Depress the Foot Pedal to lower the Thermode onto the work piece.
- 4 Gently apply reflow pressure to ensure that the Thermode face makes good thermal contact with the work piece. Tighten the Electrode Clamping Screws.
- 5 Mount 17B Thermodes by removing the Electrode Holder Clamps. Attach the Thermode directly to the Electrode Mounting Block Face using the lower set of screw holes as shown in figure 2-5.
- 6 Insert the Thermocouple Plug on the thermocouple lead wire into the receptacle on the Thermocouple Extension Cable and then plug the Thermocouple Extension Cable into the reflow control.

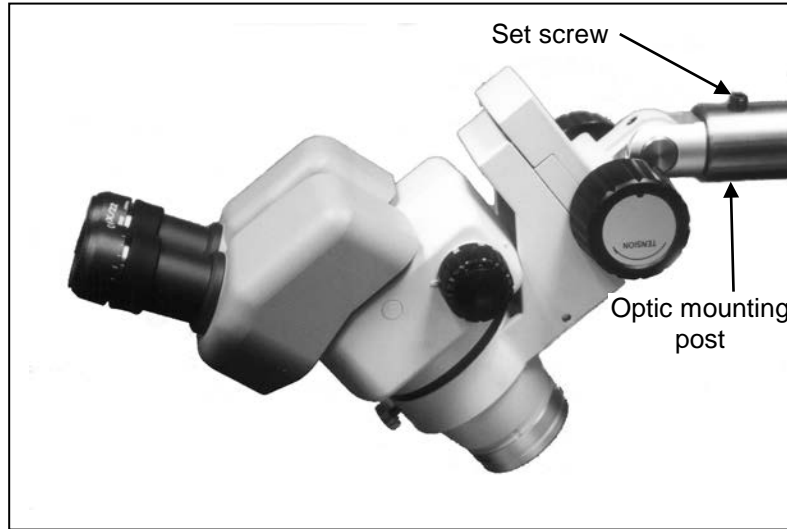


**Figure 2-4. HE50RF Thermode Holder with 17P40 Single Point Thermode**



**Figure 2-5. HE50RF Thermode Holder with 17M070 Blade Thermode**

### Section IV. Optic Pod (Microscope) Installation



**Figure 2-6. Installation of the Optic Assembly**

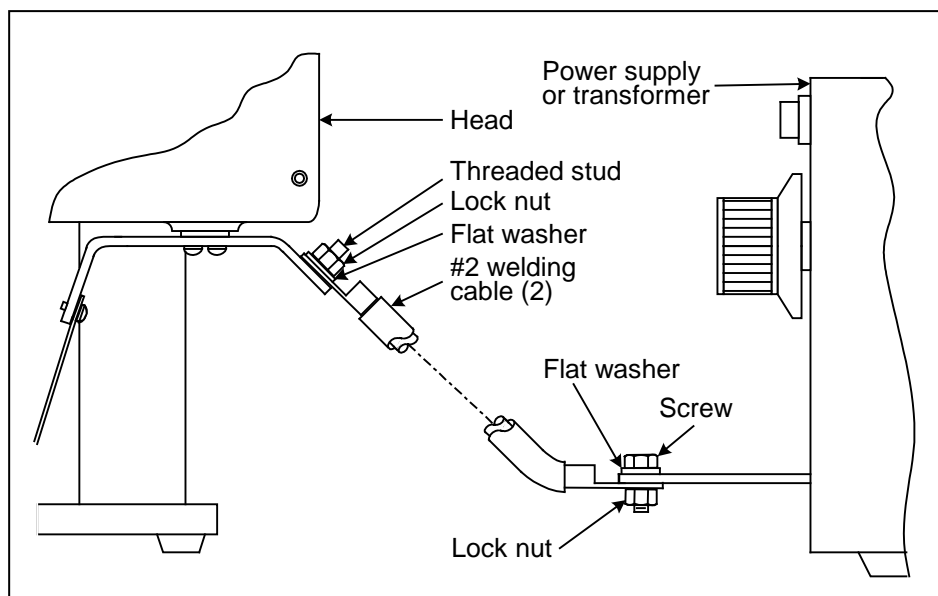
Place the Optic Pod (figure 2-8) into the Optic Mounting Post and secure it with the Mounting Set Screw. Assemble the Optic Pod in accordance with instructions that came with the Assembly.

## Section V: Power Supply Connections

### Connection to Power Source

1 Reference figure 2-7. Place one end of each #2 welding cable over the threaded stud found at the lower back of the head. Using the hardware supplied in the Shipping Kit, secure each cable with a flat washer and lock nut.

2 Connect the terminal at the other end of each welding cable to the power supply or transformer, using the screw, flat washer, and lock nut supplied with that unit, as shown. Ensure that the washers are placed under the screw heads, not between the bus bars and terminals. Tighten all of the connections.



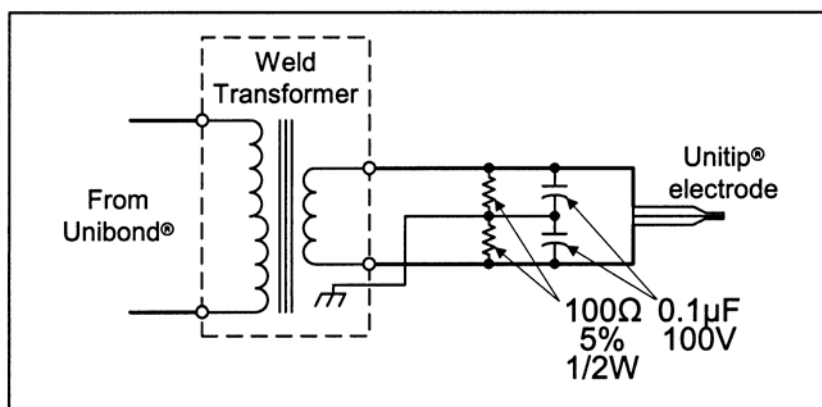
**Figure 2-7. Welding Cable / Transformer Power Connections**

**NOTE:** Do not cross cables when connecting the weld head to a power supply. This will cause the power supply Overload Light to come on, preventing weld current from occurring.

- 3 If the power supply has closed-loop feedback, connect the Voltage Sensing Cable on the LT-050B-F, LT-050B-A, LT-050B-F/UB, and LT-050B-A/UB the power supply as illustrated in the power supply manual.
- 4 Connect the Thermocouple Extension Cable on the LT-050B-F/RF, LT-050B-A/RF, LT-050B-F/LRF, and LT-050B-A/LRF to the reflow control as illustrated in the power supply manual.
- 5 Connect the Weld Head Firing Switch Cable to the matching Firing Switch Cable coming from the reflow control or power supply. For Models 60 and 125 Power Supplies, the Firing Switch Receptacle is located on the front panel.

### Microwave Circuit Precautions

Some hybrid microwave component manufactures have experienced a transient voltage problem during welding which can damage Field Effect Transistors (FETs). This problem is caused by voltage leakage through the primary to secondary capacitance of the Welding Transformer in combination with a low package to ground capacitance. Figure 2-8 shows the External Filter Network required to shunt the transient voltage through a very low impedance path to ground, thus protecting the FET device.



**Figure 2-8. External Filter for Elimination of Transient Voltage Problems**

# CHAPTER 3

## OPERATION

### Parallel Gap Welding Variables

#### Electrode Materials

Use RWMA 2 copper electrodes for resistive and/or hard materials such as gold plated Kovar and nichrome. Use molybdenum or tungsten electrodes for conductive or soft materials such as copper and gold. Unibond Electrodes are available in both RWMA-2 copper and RWMA-14 molybdenum. Unitip Electrodes are only available in molybdenum. Testing has shown that Unitip Electrodes with a face size of 0.018 inches wide by 0.020 inches deep or larger can be used to weld gold plated kovar ribbon that is 0.002 inches thick or less without experiencing electrode sticking to the gold plated kovar ribbon. Testing has also shown that Unitip Electrodes UTM111C, UTM111L, UTM112C, and UTM112L can not be used to weld gold plated kovar ribbon because these tips sizes experience severe electrode sticking, regardless of weld energy settings or gold plated kovar ribbon thickness. See Chapter 1, Section IV for a complete listing of Unibond and Unitip electrodes.

#### Area of Electrode Face

For a given Welding Force, a large electrode face puts less pressure on the workpieces and produces a larger welding area. A larger electrode face also requires more energy, provided the contact resistance between the electrode face and work piece does not change drastically. Insufficient pressure on the workpieces is likely to cause spitting of the work piece material or electrode sticking. When welding conductive materials, use electrodes with the smallest face possible.

#### Gap

The larger the distance between the electrodes, the greater the energy required to make a given weld. Unitip Electrodes come in a variety of fixed gap sizes ranging from 0.001 to 0.007 inch (0.0025 to 0.018 cm) with 0.001, 0.002, and 0.004 inches (0.0025, 0.0050, and 0.0102 cm) being the most popular gap sizes. As a starting point, select a gap size that approximately matches the thickness of the work piece material.

#### Welding Force

Increasing the Welding Force lowers the contact resistance between the workpieces and between the workpieces and the electrodes, requiring more energy to make a given weld.

#### Pulse Duration

The longer the Pulse Duration, the greater the penetration of the weld into both top and bottom workpieces and the greater the effect of the heat upon the metallurgical structure of the workpieces. In general, use pulse durations less than 15ms for welding and durations greater than 20ms for brazing or reflow soldering. To maximize electrode life, use Unibond Electrodes for brazing. Pulse Duration is critical when welding conductive materials such as copper and gold and should be kept to a minimum.

## CHAPTER 3: OPERATION

### Procedure

Use the force curve label displayed on the side of the weld head as shown in figure 3-1 to set the welding force. The vertical axis represents the actual welding force. The horizontal axis represents the corresponding force setting required to produce the actual force. Use the appropriate curve as follows:

Top curve	LT-050B-F/UB, LT-050B-A/UB
Middle curve	LT-050B-F/RF, LT-050B-A/RF
Bottom curve	LT-050B-F, LT-050B-A, LT-050B-F/LRF, LT-050B-A/LRF

Refer to the Instruction Manual which accompanies Power Supply or Time-At-Temperature Controller to supplement these instructions.

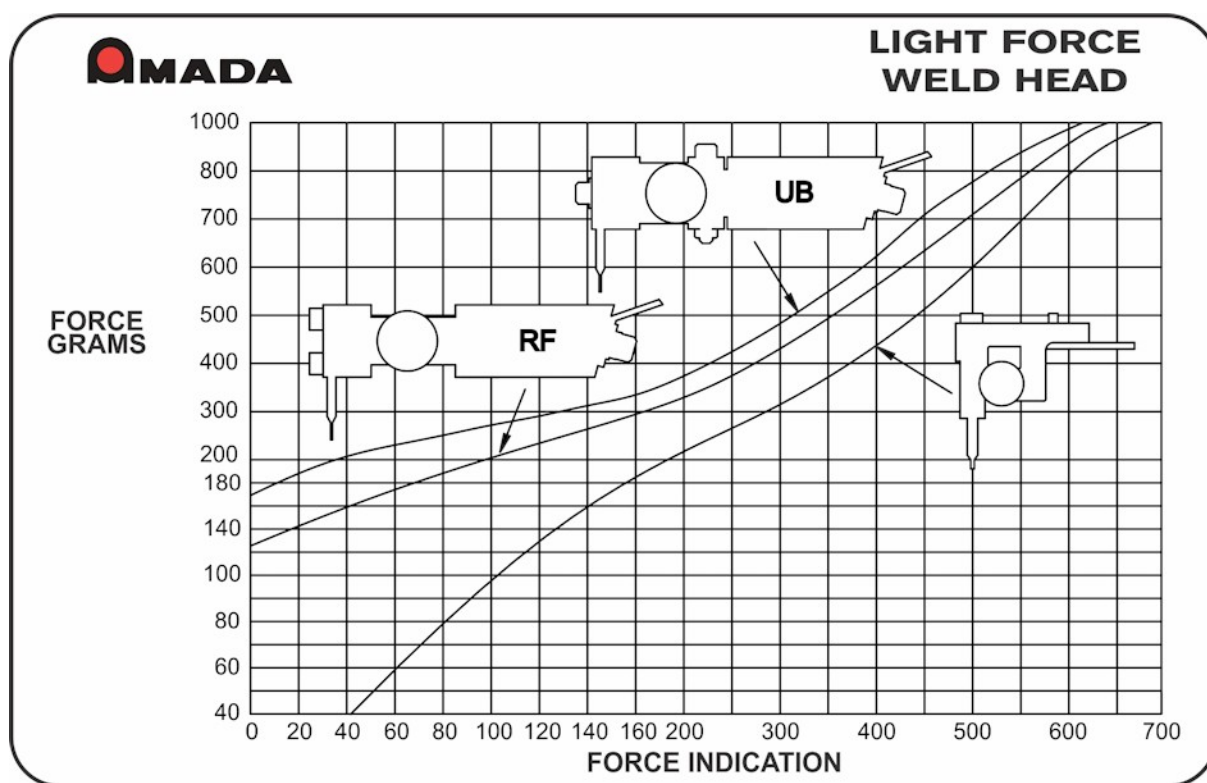


Figure 3-1. Actual Force Versus Force Setting



# CHAPTER 4

## USER MAINTENANCE

### Section I: Precautions

**WARNING:** Do not remove the spring housing cover for any reason. This cover protects the user should the force spring break during operation. The force spring does not require maintenance nor is it accessed during calibration.

**CAUTION:** All bearing surfaces are designed for non-lubricated operation. Do not oil any bearings.

Guide bearings are factory pre-loaded and therefore do not require adjustment. All vertical motion bearings are installed at the factory and are sealed with a locking compound. If the seal is broken, the warranty on the bearings will be void.

### Section II: Maintenance Procedures

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

#### Unitip and Unibond Electrode Dressing

New Unitip and Unibond electrodes must be dressed to ensure that the electrode face is parallel to the work piece surface. The small Unitip and Unibond tip geometry makes the electrode face extremely susceptible to damage during dressing or cleaning. Dress Unibond electrodes with a Model PD Polishing Disk, which is made from #600 grit emery paper. Dress Unitip electrodes with a Model CPD Ceramic Polishing Disk. **Do not use the PD (#600 grit) on Unitip.**

**NOTE:** Thermodes do not require dressing.

Install Unitip or Unibond electrode.

Adjust the Work Holder surface height so that it is at the same level as the work piece surface.

Place a Model CPD polishing disk or CPD ceramic polishing disk on the Work Holder surface, directly beneath the electrode face. Figure 4-1 shows a Unitip electrode being correctly and incorrectly dressed.

Bring the electrode face into contact with the polishing disk. Avoid applying a force of more than 150 grams to smallest Unitip electrode tips.

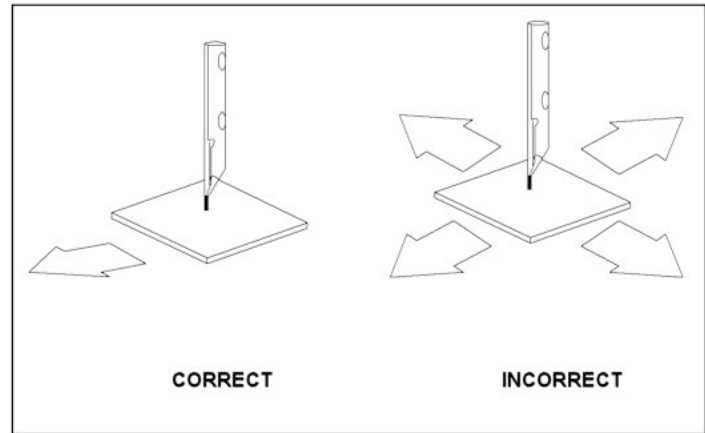
Gently pull the polishing disk forward, keeping the direction of pull parallel to the electrode gap.

**NOTE:** Do not rock the polishing disk from side to side or front to back.

Clean the electrode face with a small lint free swab saturated in alcohol to remove any residue created by the dressing procedure. Low pressure compressed air can also be used to remove any residues.

Examine the electrode face with a small mirror for flatness and direction of surface scratches.

A properly dressed electrode will have small scratch marks that are parallel to the electrode gap.



**Figure 4-1. Unitip Dressing Procedure**

#### Unitip and Unibond Electrode Cleaning

Depending on use, periodically resurface Unitip and Unibond electrodes using the techniques described above to remove oxides and welding debris from the electrodes. These oxides are a natural result of the bonding process. When welding with Unitip electrodes, a small puff of smoke appears as each bond is made. The absence of this puff of smoke is a clear signal to the operator that it is time to clean the electrode face. Use organic solvents to clean flux and other buildup from Thermode tips.

# **CHAPTER 5**

## **REPAIR SERVICE**

### **Service Repair at Plant**

Amada Weld Tech provides a quick turn-around repair service for both warranty and non-warranty repairs. Call the Customer Service Department at the telephone number shown in the Foreword of this manual.

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



# APPENDIX A

## TECHNICAL SPECIFICATIONS

### Specifications for Air Actuation

Description	Specification
Air Pressure Line	65 psi. (448 N/m <sup>2</sup> ) maximum
Repetition Rate	0.5 welds per second
Solenoid Voltage	Either 115V or 24V, 50/60 Hz
Air Cylinder Diameter	0.75 inch (19mm) bore
Regulator Output	35 psi (88.9 N/m <sup>2</sup> ) maximum
Regulator Gauges	1 x 50 psi (127 N/m <sup>2</sup> )

## APPENDIX A: TECHNICAL SPECIFICATIONS

### Weld Head Dimensions

Dimensions in inches (millimeters)

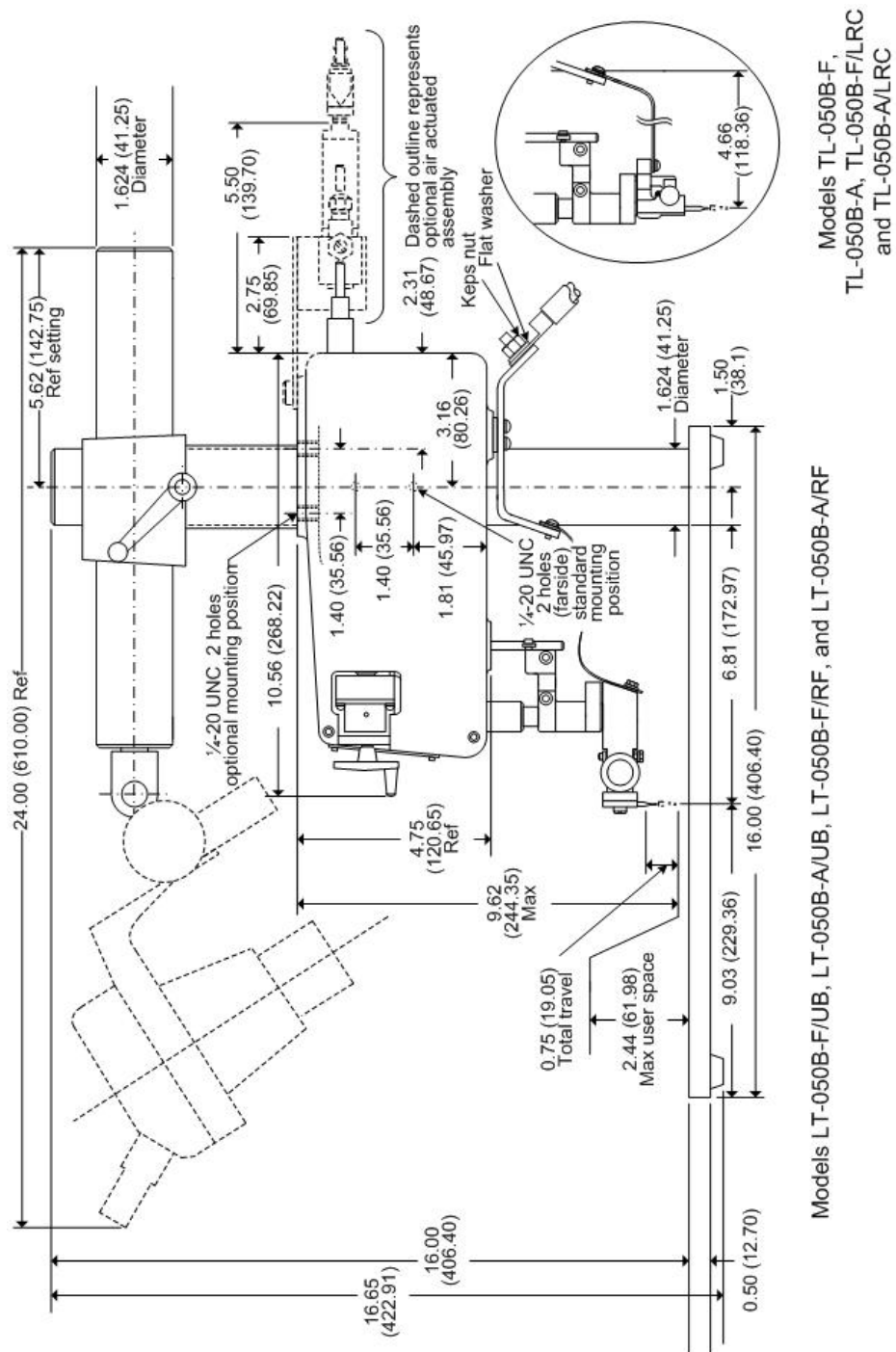
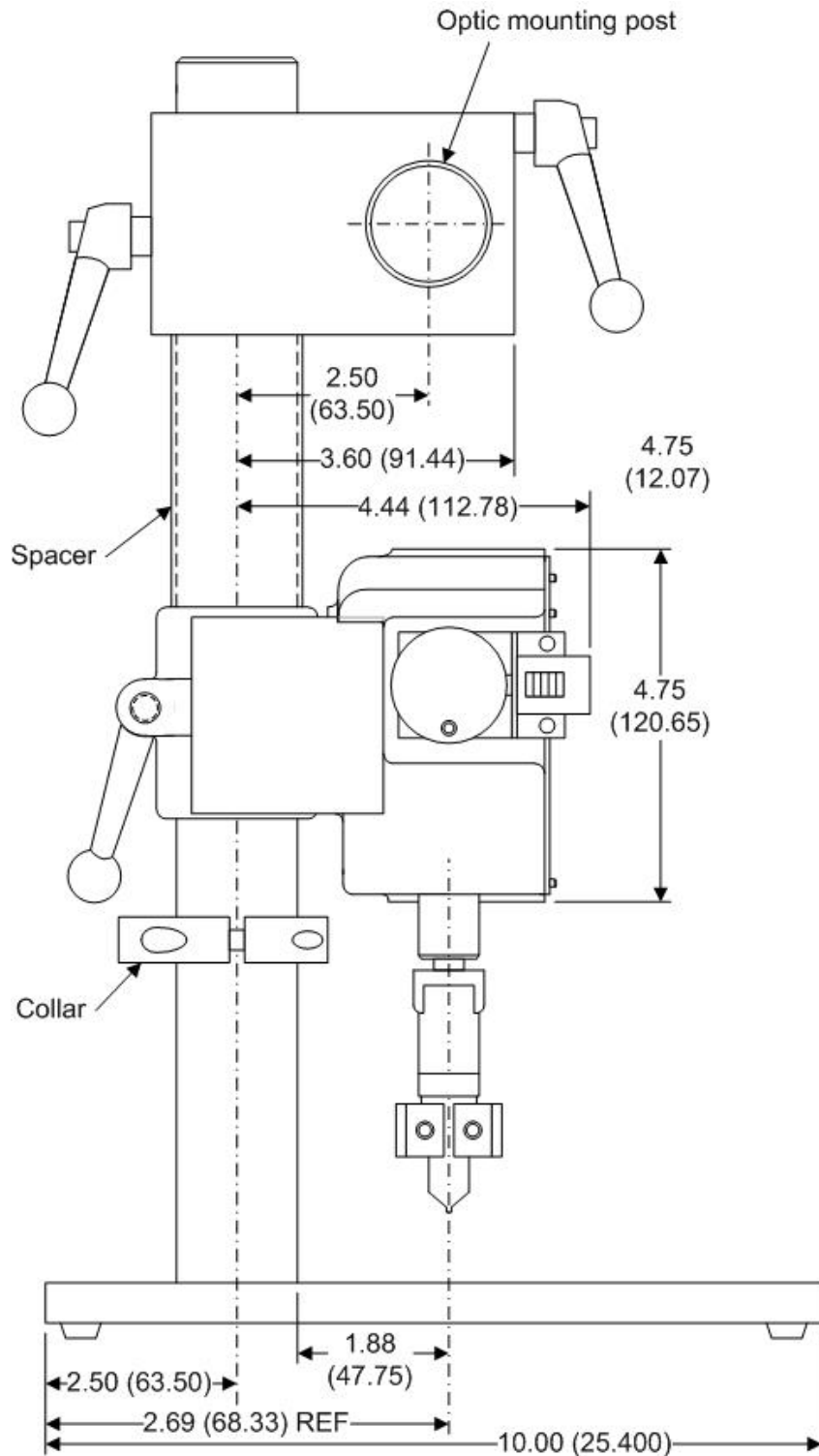


Figure A-1. Light Force Weld Head, Side View

### LT-050B LIGHT FORCE WELD HEAD



**Figure A-2. Light Force Weld Head, Front View**

---

**LT-050B LIGHT FORCE WELD HEAD**





# APPENDIX B

## ELECTRODE/THERMODE HOLDER CONVERSIONS

Conversion kits contain all of the necessary parts to convert Models LT-050B-F and LT-050B-A (Unitip electrode holder) to Models LT-050B-F/UB and LT-050B-A/UB (Unibond electrode holder), Models LT-050B-F/RF and LT-050B-A/RF (thermode holder), or Models LT-050B-F/LRF and LT-050B-A/LRF (light force thermode holder). In addition, a UTA Unitip Adapter is available to convert a Unibond electrode holder for use with Unitip electrodes. Table B-1 lists the Conversion Kits.

**Table B-1. Conversion Kits**

Function	Amada Weld Tech P/N	Contents
Convert: LT-050B-F and LT-050B-A (with Unitip electrode holder) to: LT-050B-F/UB and LT-050B-A/UB (with Unibond electrode holder)	12-078-01	Electrode Flexure Assy, 4-31966-01; Ship Kit (Pt # 4-80940-01), containing: - Block Assy Adapter, 4-31948-01; - Electrode Sleeve, 4-30365-01; - 2 (ea) #8 flat + lock washers, 8-32 x 1/4 socket button cap screws, assorted socket wrenches.
Convert: LT-050B-F and LT-050B-A (with Unitip electrode holder) To: LT-050B-F/RF and LT-050B-A/RF (with Thermode holder)	12-079-01	Thermode Unitip Holder Assy, 4-31967-01; Ship Kit (Pt # 4-80941-01), containing: - Block Assy Adapter, 4-31948-01; - Electrode Sleeve, 4-30365-01; - 2 (ea) #8 flat + lock washers, 8-32 x 1/4 socket button cap screws, assorted socket wrenches.
Convert: LT-050B-F and LT-050B-A (with Unitip electrode holder) To: LT-050B-F/LRF and LT-050B-A/LRF (with light force Thermode holder)	12-080-01	Electrode Holder Assy, Peg Tip Thermode, 4-32074-01; Ship Kit (Pt # 4-80959-01), containing: - Compression Spring, 660-039 - 2 (ea) #8 flat + lock washers, 8-32 x 1/4 socket button cap screws, assorted socket wrenches.
Convert Unibond electrode holder for use with Unitip electrodes	12-048-02 (UTA)	Set of two adapters.

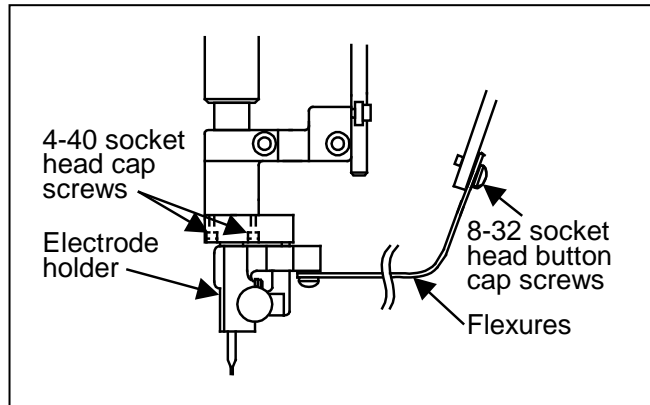
## APPENDIX B: ELECTRODE/THERMODE HOLDER CONVERSION

---

### Unitip to Unibond Electrode or Thermode Holder Conversion

Reference figure B-1. Perform the following steps:

- 1 Remove both flexures from the weld head, by removing the two 8-32 socket head button cap screws, lock washers and flat washers.
- 2 Remove the four 4-40 socket head cap screws that hold the electrode holder, to the head. Carefully remove the electrode holder by lowering it straight down. Retain the screws.
- 3 From the Adapter Kit, obtain the Electrode Sleeve and Adapter Block Assembly and slip the sleeve over the shaft on the adapter block.
- 4 Position the assembled sleeve and adapter block under the slide shaft and rotate the sleeve so that the split in the sleeve is toward the back of the weld head. Attach the assembly to the weld head with the four 4-40 socket head cap screws removed in step 2.
- 5 Slide the Unibond electrode holder (Electrode Flexure Assembly) or Thermode holder (Thermode Unitip Holder Assembly) over the insulator. Align both halves so that they are parallel to each other on a horizontal plane and lock them into position by tightening the 8-32 socket cap screws on each side of the electrode holder. Alternate the tightening process from side to side. Verify that the electrode holder halves are not shorted together at the back of the holder and that they are still parallel.
- 6 Connect both flexures to the weld head using the two 8-32 socket head button cap screws, lock washers and flat washers in the Ship Kit.



**Figure B-1. Unitip to Unibond Electrode, Thermode Holder, or Light Force Thermode Holder Conversion**

### Unitip to Light Force Thermode Holder Conversion

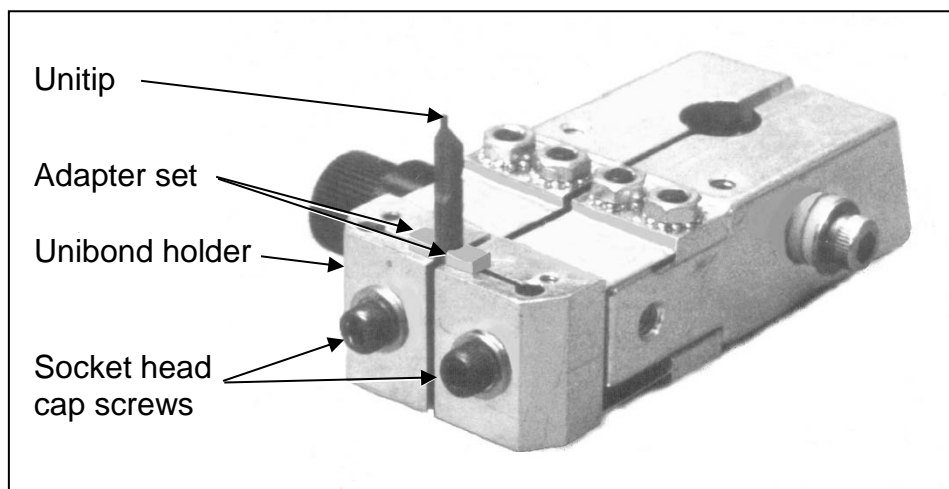
Reference figure B-1. Perform the following steps:

- 1 Remove both flexures from the weld head, by removing the two 8-32 socket head button cap screws, lock washers and flat washers.
- 2 Remove the four 4-40 socket head cap screws that hold the electrode holder, to the weld head. Carefully remove the electrode holder by lowering it straight down. Retain the screws.
- 3 Obtain the Compression Spring from the Ship Kit and slide it into the top of the Thermode holder (Electrode Holder Assembly, Peg Tip Thermode).
- 4 Attach the Thermode holder to the weld head with the four 4-40 socket head cap screws removed in step 2.
- 5 Connect both flexures to the weld head using the two 8-32 socket head button cap screws, lock washers and flat washers in the Ship Kit.

### Unibond to Unitip Conversion

Reference figure B-2. Perform the following steps:

- 1 Slide the set of Adapters into the slot in the Unibond holder. The Adapters may be slid in either from the top or bottom, whichever is most convenient.
- 2 Slide the Unitip into the holder between the adapter set halves, and secure them by tightening the socket head cap screws in the front of the holder.



**Figure B-2. Unibond to Unitip Conversion**



# 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