# WELD HEAD TL-080B/BF

# **OPERATION MANUAL**



AA10OM1214700-01

Thank you for purchasing our Weld Head TL-080B/BF.

- This operation manual explains its method of operation and precautions for use.
- Before using, read this operation manual carefully; after reading, save it in a proper place where you can easily access.

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# **1. Special Precautions**

# (1) Safety Precautions

Before using, read "Safety precautions" carefully to understand the correct method of use.

- These precautions are shown for safe use of our products and for prevention of damage or injury to operators or others.
  Be sure to read each of them, since all of them are important for safety.
- The meaning of the words and symbols is as follows.



Denotes operations and practices that may imminently result in serious injury or loss of life if not correctly followed.

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Denotes operations and practices that may result in serious injury or loss of life if not correctly followed.

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Denotes operations and practices that may result in personal injury or damage to the equipment if not correctly followed.



These symbols denote "prohibition". They are warnings about actions out of the scope of the warranty of the product.



These symbols denote actions which operators must take.



Each symbol with a triangle denotes that the content gives notice of DANGER, WARNING or CAUTION to the operator.

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Do not touch the inside of the Welding Head unnecessarily

You may receive an electric shock or be burned.

Do not touch the inside of the Welding Head other than for maintenance as described in the operation manual.



#### Never disassemble, repair or modify the Welding Head

These actions can cause electric shock and fire. Do not do anything other than the maintenance described in the operation manual.

**Never burn, destroy, cut, crush or chemically decompose the Transformer.** This product incorporates parts containing gallium arsenide (GaAs).

#### 1. Special Precautions

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#### Do not put your hands between the electrodes

When welding, keep your fingers and hands away from the electrodes.



# Do not touch any welded part or electrodes during welding and just after welding finished

The welded part of a workpiece, electrodes and electrode holder are very hot. Do not touch them; otherwise you may be burnt.



#### Connect the specified cables securely

Cables of insufficient current-carrying capacities and loose connections can cause fire and electric shock.



# Use proper tools (wire strippers, pressure wire connectors, etc) for termination of the connecting cables

Do not cut the conductor of wire. A flaw on it can cause fire and electric shock.



#### Do not damage the power cable and connecting cables

Do not tread on, twist or tense any cable. The power cable and connecting cables may be broken, and that can cause electric shock and fire. When you need any repair or replacement, consult us or your distributor.



#### Stop the operation if any trouble occurs

Continuous operation after occurrence of a trouble such as burning smell, abnormal sound, abnormal heat, smoke, etc. can cause electric shock and fire. If such a trouble occurs, immediately consult us or your distributor.



#### Persons with pacemakers must stay clear of the welding machine

A person who uses a pacemaker must not approach the welding machine or walk around the welding shop while the welding machine is in operation, without being permitted by his/her doctor. The welding machine generates a magnetic field and has effects on the operation of the pacemaker while it is turned on.

#### Protective gear must be worn

Put on protective gear such as protective gloves, long-sleeve jacket, leather apron, etc. Surface flash and expulsion can burn the skin if they touch the skin.



#### Wear protective glasses

If you look at the spatter directly during welding, your eyes may be damaged.

#### 1. Special Precautions

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	<b>Do not splash water on the Welding Head</b> Water splashed over the electric parts can cause electric shock and short circuits.
0	Install the Welding Head on firm, level surface. If the Welding Head falls or drops, injury may result.
0	Keep combustible matter away from the welding machine. Surface flash and expulsion can ignite combustible matter. If it is impossible to remove all combustible matter, cover them with non-combustible material.
$\bigcirc$	Do not cover the Welding Head with a blanket, cloth, etc. If such a cover is used, it may be heated and burn.
0	Keep a fire extinguisher nearby. Keep a fire extinguisher in the welding shop in case of fire.
0	Maintain and inspect the Welding Head periodically. Maintain and inspect the Welding Head periodically, and repair any damage nearby before starting operation.
$\bigcirc$	<b>Do not use this Welding Head for purposes other than welding</b> Use of this Welding Head in a manner other than specified can cause electric shock and fire.

## (2) Precautions for Handling

- Install this Welding Head on a firm, level, horizontal surface. If it is inclined, malfunction may result.
- Do not install this Welding Head in the following:
  - Damp places where humidity is 90% or higher,
  - Dusty places,
  - Places where chemicals are handled,
  - Places near a high-frequency noise source,
  - Hot or cold places where temperatures are above 40°C or below 5°C, and
  - Places where water will be condensed.
- Clean the outside of the Welding Head with a soft, dry cloth or one wet with a little water. If it is very dirty, use diluted neutral detergent or alcohol. Do not use paint thinner, benzine, etc., since they can discolor or deform the Welding Head.
- Do not put anything other than a workpiece, e.g., a tool, a screw, etc., between the electrodes. It can cause serious trouble.
- Do not put a screw, a coin, etc., in the Welding Head, since they can cause a malfunction.
- Operate the Welding Head according to the method described in this operation manual.

### (3) On Disposal

This product incorporates parts containing gallium arsenide (GaAs). At the time of disposal, separate it from general industrial waste or domestic waste and carry out the disposal in accordance with applicable laws and regulations.

# **2. System Description**

## (1) Features

#### Overview

This manual is organized to assist you in getting productive quickly with your TL-080B/BF.

TL-080B/BF come in different sizes and configurations and may be installed on our mounting hardware, custom mounting posts, or installed directly on your equipment using the two tapped holes on the rear of the weld head. Some heads are manually-actuated, others are air-actuated.

Mounting templates and all necessary installation hardware are shipped with each weld head.

TL-080B/BF are precision, low inertia, force-fired Weld Heads with a narrow vertical profile. The 1-3/4 inch (4.5 cm) width, 1 in. (2.5 cm) stroke, 20 pound (89 N) maximum force, and throat depth allow their use in a wide variety of precision resistance welding applications. Offset electrode holder is available. The dimensions of the mounting post and the main shaft have been selected to ensure that the electrodes do not "wipe" more than 0.003 in. (0.076 mm) on the 20 lb. (89 N) heads. This is an important consideration in critical welding applications such as hermetic seals and pressure transducers.

TL-080B/BF is a "production line" head with a bearing life designed for a minimum of 20 million operations. Our Weld Heads excel at precisely placing consistent, high quality welds. Their low inertia, lightweight design assures fast dynamic response, allowing the electrodes to follow the minute expansion and contraction of the weld joint as it heats and cools during the welding cycle. A differential motion Force-Firing System initiates the power source at the precise moment the Preset Firing Force is applied to the workpieces. Linear ball bearing bushings and an oversized, anti-rotational bearing system provide true, vertical in-line electrode motion, assuring smooth vertical travel of the upper electrode arm. This system minimizes the wiping action of the electrodes, even at maximum force settings.

#### **Preset Firing Force**

Firing force is continuously adjustable from 0.5 lbs (2.2 N) to 20 lbs. (89 N). An adjustable Tare Spring compensates for the weight of the electrode holders. The Firing Force Adjustment Cam easily adjusts the sensitivity of the Firing Force Switch.

#### **Up And Down Stops**

TL-080B/BF have adjustable Upstops and Downstops. The Downstop can be used to limit excessive downward travel. The Upstop controls the stroke, and consequently, the travel time of the head. In automated machine applications, using a stroke of less than 1/8 in. (3.2 mm) may significantly reduce bearing life.

#### Electrodes

TL-080B/BF accept a wide variety of standard and special purpose electrodes. There are models available, which accept 1/8 in. (3.2 mm), Unibond®, and Unitip® Electrodes. The optional Model ETB4 Table Electrode fits **TL-80**.

#### Insulation

The Terminal Block, Flexible Copper Strap, and Upper Electrode Assembly are electrically insulated from the frame of the Weld Head. The Frame, Support Post, and Support Base are grounded to the bench top.

#### Welding Cables

#2 Welding Cables is provided to connect TL-080B/BF Heads to the power source. Our Heads deliver maximum performance when used with the appropriate our power sources.

#### **Footpedal Actuation**

TL-080B/BF Weld Heads, model number suffix "F," are footpedal (manually) actuated. The Model CP Cable Pedal is a treadle-type cable actuator providing an approximate 3 to 1 mechanical advantage. This pedal is used with **TL-80BF**.

#### **Air Actuation**

**TL-80B** is equipped with a top mounted Air Cylinder with two Flow Controls, one or two Air Pressure Regulators, and a four-way Solenoid, making it easy to incorporate these weld heads into automated welding systems. The Air Solenoid Valve is available with 115 V AC ratings. Two Flow Controls are used to adjust the up and down speed of the upper electrode. The Air Solenoid Valve can be energized by most of our power sources, or by a Model FSAC Footswitch. The Footswitch can be a single or two level type, dependent upon the power supply and the user's preference. We suggest that lubricators 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.

# (2) System Components



Typical TL-080 Series Weld Head

These are conventional, 20 lb. (89 N) capacity welding heads with offset, opposed electrodes. Both the pedestal mounting (post) and lower electrode assembly can be removed and replaced by custom fixtures.

All air actuated heads in the TL-080B/BF are available with 115 V AC, 50/60 Hz. (**TL-80B-00**) solenoids. **TL-80** is supplied with 3 mm diameter electrodes.

# (3) Welding Capabilities

#### **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.



#### **Step Welding**

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.

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.



# (4) Operating Controls

#### **TL-80 Series Air Actuation Specifications**

Input Air Pressure – Nominal / Maximum	65/100 psi (448/690 kPa)
Regulator Output – Maximum	65 psi (448 kPa)
Cycle Rate (full strokes/sec) at Min. Force at greater than 20% of Rated Force	1.0 2.5
Solenoid Valve Voltage	115 V AC
Air Cylinder Inside Diameter	0.75 in. (1.9 cm)

#### **Air Cylinders**

All air models are supplied with one air cylinder, one air pressure gauge, one air pressure regulator, and two flow controls. The Air Solenoid, which controls the direction of air flow to the Air Cylinder, is available with 115 V AC 50/60 Hz. ratings. The Flow Controls allow independent adjustment of the up and downspeed of the upper electrode. The Solenoid and Regulator Assembly mounts on the spine of the Weld Head.

#### Footswitches

A one-level Footswitch actuates the head, and the Firing Switch in the head initiates the welding sequence. The first level of a two-level Footswitch actuates the head. The second level and the Force Firing Switch initiate the welding sequence. A two-level Footswitch is recommended when the operator is required to position the workpieces. It also allows the operator to actuate an air head without initiating the weld cycle since both the Firing Switch **and** the second level of the Footswitch must close before the weld portion of the sequence can begin.

# **3. Installation**

## (1) Introduction

#### Overview

**Before** you start installation, become familiar with the specific model you are using. As shown below, TL-080B/BF Weld heads come in different sizes and configurations which require different mounting baseplates, mounting posts, and installation hardware.

Installation procedures depend on the size and configuration of a specific model, and whether the weld head, mounting post, and baseplate were shipped as separate pieces requiring assembly or shipped from the factory fully assembled. Some manually-actuated heads are shipped with foot pedals attached, others are not. Some air-actuated heads are shipped with the air head attached, others are not.

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 baseplate.
- The weld head mounting baseplate is bolted securely to a workbench.
- The weld head is attached to the mounting post.
- If necessary, the air head (if used) and foot pedal (if used) are installed.
- Electrodes and weld cables are installed on the weld head.

#### **Mounting Posts**

TL-080B/BF weld heads may be purchased with or without mounting hardware. we provide three types of mounting posts (and corresponding installation hardware) designed for different models:

#### Mounting Tube

Smaller TL-080B/BF Weld Heads are installed on short mounting tubes. These are factory-installed and do not require any assembly by the user.

Mounting tubes come in fixed lengths, the height of the weld head is not adjustable.



#### Dual-Post

This consists of two parallel posts connected at the top and bottom, leaving an open slot for the full length of the post. The mounting screws are installed from the back of the post and screwed directly into the weld head. The mounting screws can be loosened from the back of the post for adjusting the height of the weld head.

#### **Channeled Post**

This is 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.

## (2) Weld Head Installation

#### Overview

First, this section will give "Typical Installation" instructions that are common to **all** TL-080B/BF weld heads. Then, additional instructions for installing **specific** weld head models are listed by model number. **Before you start installation**:

- Make sure you are familiar with the mounting configurations and installation hardware described and illustrated in this section.
- 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 us at the address shown in the rear of the manual.

#### **Typical Installation**

**NOTE:** Allow sufficient working space, usually 8–10 in. (20.32–25.4 cm), between the front edge of the bench and the mounting base. This allows the operator to use the bench as a support when positioning the workpiece.

- 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 baseplate.



- ④ If not already attached, install the weld head mounting post to the weld head baseplate.
- (5) Screw the weld head mounting baseplate to the workbench.





- i) Install the mounting screws and washers onto the mounting backplate.
- Place the weld head on the front of the mounting post, then insert the mounting screws through the slot in the back of the mounting post and screw them into the weld head.
- iii) Adjust the weld head to the desired height, then tighten the mounting screws.

- 6-B Install the weld head on the Channeled-Post.
  - i) Install the weld head mounting plate onto the weld head using the screws as shown.
  - ii) Install the screws, washers, and T-nuts into the weld head mounting plate as shown.
  - iii) If necessary, remove the end cap from the mounting post to expose the channels in the mounting post.
  - iv) 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.
  - v) If you are using an air head, install it on the rear of the mounting post following the procedures in Steps i through iv.



#### TF-080BF Model CP Footpedal Installation

- ① Push down on top of weld head to extend end of pullrod.
- ② Secure Electrode Holders with string to hold in place.
- ③ Position head (and optional baseplate) on bench as shown.
- ④ Route footpedal cable up through bench (and baseplate).

PUSH DOWN ON TOP OF WELD HEAD TO EXTEND END OF PULL ROD



- ⑤ Attach cable from footpedal to pullrod (larger hole up) using small screw, which is supplied.
- <sup>6</sup> Untie string and release the electrode holders.
- ⑦ Depress pedal, and push cable sheath into pullrod hole until it is flush with base.
- <sup>®</sup> Secure sheath with set-screw as illustrated.



- In the electrode holders move the distance required by the application.
- <sup>(1)</sup> Adjust the angle of the treadle so that it provides the electrode stroke necessary for the application and is comfortable for the operator.

#### **TL-080B Air Head Installation**

- Insert a 0.25 in. (6.35 mm) outside diameter plastic hose, with a rated burst pressure of 250 psi (1,724 kPa), into the Air Input of the air solenoid valve assembly, as illustrated. The air input line uses a "quick release" fitting so special tools are not needed. Simply push the hose into the "quick release" fitting as far as it will go.
- ② Connect the other end to a properly filtered air supply (100 psi/690 kPa maximum). Use the shortest air lines possible to obtain the fastest mechanical response. The inside diameter of the main air supply line must be at least 0.5 in. (13 mm) to allow sufficient air flow. The air supply should be filtered to ensure the maximum life of the air cylinder, flow controls, and regulator.







**Dual-Air Installation** 

#### NOTES:

- We suggest 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).
- 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.
- ③ Connect the power cord from the solenoid air valve as specified in the Users' Manual for the appropriate power supply or control.
- ④ 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.

## (3) Connect Weld Cables

#### Weld Cables and Energy Losses

Our 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 in. (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.
- Both cables must always be on the same side of the head. Route cables so that they do not surround magnetic materials such as air solenoids, tooling, or steel weld heads. The cable routing and weld head design should be such that the secondary loop does not encompass magnetic materials (steel) and/or is not encompassed by any magnetic material.



#### **Connect Cables to Head**



- ① Connect one of the two cables supplied to the Power Bar.
- Place the washer, which is supplied, between the head of the Socket Head Screw and the Terminal on the Cable. *Do NOT place the washer between the Cable and the Power Bar.* Tighten connections securely; they must be free from oxidation, dirt, and/or grease.
- ③ Connect the other end of the cables to the power supply or output transformer, in accordance with the instructions in its Users' Manual.

## (4) Install Electrodes and Thermodes

- ① Loosen screws and insert electrodes.
  Loosely tighten screws to hold electrodes in position.
- ② Align the electrodes, then tighten into position.

**NOTE:** The maximum distance between the electrode tips is 1.0 in. (25.4 mm).



# **4. Operating Instructions**

# (1) Getting Started

#### **Installation Checklists**

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

#### Troubleshooting

WELDHEAD TROUBLESHOOTING GUIDE			
SYMPTOM OR PROBLEM	PRIMARY CAUSE Weldhead-Related Cause	PRIORITY*	SOLUTION
	Excess Welding Time	1	Decrease Welding Time (A.C. Welding)
	Insufficient Force	2	Increase force in steps of 10–20%
Overheating of Weldment	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
	Excess Welding Time	1	Decrease Welding Time (A.C. Welding)
Discoloration	Wrong Electrode Material	1	Check Electrode/Material Selection Guide
	Insufficient Force	2	Increase force in steps of 10–20%

WELDHEAD TROUBLESHOOTING GUIDE			
SYMPTOM OR PROBLEM	PRIMARY CAUSE Weldhead-Related Cause	PRIORITY*	SOLUTION
	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
Weak Weld	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
	Insufficient Current/Energy	1	Increase current/energy in steps of 5–10%
	Wrong Electrode Material	1	Check Electrode/Material Selection Guide
Insufficient Nugget **	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%
	Excess Current/Energy	1	Decrease current/energy in steps of 5–10%
	Insufficient Force	1	Increase force in steps of 10–20%
Metal Expulsion	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
	Excess Current/Energy	1	Decrease current/energy in steps of 5–10%
	Insufficient Force	1	Increase force in steps of 10–20%
Sparking	Poor Weldhead Follow-up	1	Reduce mass of top electrode holder assembly ***
Sparking	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

4. Operating Instructions 4-2

WELDHEAD TROUBLESHOOTING GUIDE			
SYMPTOM OR PROBLEM	PRIMARY CAUSE Weldhead-Related Cause	PRIORITY*	SOLUTION
	Excess Welding Time	1	Decrease Welding Time (A.C. Welding)
Warping	Excess Force	1	Decrease force in steps of 10–20%
	Electrode Tip Shape	2	Use constant area electrodes or shape to suit application
	Insufficient Force	1	Increase force in steps of 10–20%
	Wrong Electrode Material	1	Check Electrode/Material Selection Guide
Electrode Sticking	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 ***
	Excess Current/Energy	1	Decrease current/energy in steps of 5–10%
	Insufficient Force	1	Increase force in steps of 10–20%
Electrode Damage	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-our 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).

#### **Reflow Soldering Force**

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

4. Operating Instructions

### (2) Air-Actuated Head Setup

This Section describes the following adjustments:

- 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 (reflow soldering) 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 th e electrode spacing so that our 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. For older or non-our controls, an ohmmeter or continuity checker can be connected to the pins on the firing switch connector.

- Ise 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.
- 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.
- ① 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.
- If necessary, re-adjust the electrodes (thermode) in their holders to accommodate the workpiece.
- 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.
  - 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 (thermode) in its holder.
  - ii) 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 (reflow soldering).

- 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 (thermode).
- (5) Re-adjust upspeed air flow control valve if necessary.
- <sup>(i)</sup> 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 (reflow soldering) force.

## (3) Manually-Actuated Head Setup

This Section describes the following adjustments:

- 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."

**NOTE:** If the application is a welding application, adjust the electrode spacing so that our force gauge fits between the electrodes, as illustrated.



② 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-our controls, an ohmmeter or continuity checker can be connected to the pins on the firing switch connector.

- ③ 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.
- ④ 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%).
- ⑤ After setting the required force, remove the force adjustment knob by loosening the two set screws 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 set screws.
- ⑥ If necessary, re-adjust the electrodes (thermode) in their holders to accommodate the workpiece.

- 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*.
  - Place the workpiece in the appropriate position. Rotate the downstop screw clockwise until the electrode(s) or thermode no longer contacts the workpiece. Check the adjustment by depressing and releasing the footpedal.
  - ii) 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 counterclockwise. The additional turn(s) will allow for electrode wear and/or the slight variations of the position of the electrode (thermode) 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 (reflow soldering).

# **5. User Maintenance**

## (1) 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.

## (2) Standard Resistance Welding Electrode Cleaning

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

### (3) Unitip Electrode Maintenance

To ensure the best possible welds, new Unitip electrodes must be cleaned (or "dressed") before they are first used. This ensures that the electrode tip is flat, which is necessary to make maximum contact with the workpiece surface. During normal welding operations, oxides build up as a natural result of the welding process. Oxide buildup limits the flow of current to the workpieces, so Unitips must be cleaned periodically. If the electrode starts to stick to the workpiece, the electrode has become dirty and needs to be cleaned.

**CAUTION:** The small size of the Unitip makes the electrode tip **extremely susceptible to damage** during cleaning. **Never apply a force greater than 3 ounces (100 grams)** when cleaning, because the Ceramic Polishing Squares (Model CPD) have a hard surface which can cause the two halves of the electrode to split away from the insulator.

- ① If necessary, install the Unitip in an electrode holder. Adjust the surface height of the work holder so that it is at the same level as the workpiece surface.
- ② Place a polishing square on the work holder surface, directly beneath the tip of the electrode.



- ③ Bring the electrode tip into contact with the polishing square by applying a force *less than 100 grams (3 ounces)*. Gently pull the polishing disk forward, *keeping the direction of pull in a straight line parallel to the insulator as shown above*. Do *not* move the polishing square from side-to-side, or from front-to-back, or the two halves of the electrode will split away from the insulator.
- ④ After using the polishing square, clean the electrode tip with a small cotton swab saturated in alcohol.
- ⑤ Examine the electrode tip with a small mirror for flatness and direction of surface scratches. A properly dressed Unitip will have small scratch marks parallel to the insulator.

## (4) Tare Spring Adjustment

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

- ① With the head in a vertical position and the upper arm and electrodes installed, set the force adjustment to *minimum* by turning the firing force adjustment knob fully counterclockwise.
- ② Hold a measuring scale beside the upper electrode adapter block, grasp the block, and move the block up and down between the tare spring travel limits. The total travel will be about 1/8 inch (3.2 mm). Push the block down against the bottom limit, then gently release it. The tare spring should exert enough force to return the electrode to the center of its travel, approximately 1/16 inch (1.6 mm) from either extreme. If the electrode block does not re-center, adjust the tare spring.
- ③ If necessary, adjust the tare spring tension adjustment screw setting with a 1/8 inch (3.2 mm) Allen wrench. The adjustment screw is recessed in the center of the tare spring assembly at the bottom of the force spring tube.
- 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.

# 6. Specifications

1 Specifications

Foaturos	Model Name	TL-080B-00	TL-080BF-00
		A :	
Actuation	—	Air	Manual
Weld Force	N (kgf)	2.2 t (0 23 1	to 89
Maximum Rating (at 5% duty cycle)	kVA watt-seconds	25	2 50
Electrode Stroke	mm	2	5
Electrode Diameter	mm	;	3
Electrode Holder Type	—	Offset	
Maximum Distance between Electrodes	mm	41	
Max. Throat Depth	mm	135	
Foot Pedal Model Number	—	-	СР
Air Solenoid Voltage	—	115 V AC	—
Air Pressure for Max. Force	MPa (kgf/cm²)	0.35 (3.6)	—
Cylinder Inside Diameter	mm	18.9	—
Cycle Rate at Min. Force at greater than 20% of Rated Force	full strokes/sec	1 2.5	—
Max. Dimensions	—	See outline	e drawings.
Weight	kg	3.2	2.3

#### 2 Accessories

Items	Q'ty
Electrode (Material: Cr-Cu, φ3)	2
Hexagon Socket Head Bolt M6 x 30 <sup>*1</sup> (For fixing Base)	4
Plain Washer for M6 (For fixing Base)	4
Hexagon Wrench 3/32, 5/32, 3/16	1 each
Hexagon Wrench 1.5, 2.5, 3, 4, 5 mm	1 each
Polishing Disk	1
Connector 80-MC2F <sup>*2</sup>	1
Operation Manual	1

\*1 Bolt length for mounting the head to workbench **MH-11A**.

\*2 The model numbers of accessories are subject to change without notice. Depending on the part to be changed, the mounting screw shape may change and a necessary tool may be different. For the latest parts information, contact a nearest sales office.

## 3 Sold Separately Items

• Accessories

Model	Description
BPTL	Base Plate (For installing Head Base), 432 mm I x 150 mm w x 10 mm t
СР	Cable Pedal (25.4-mm stroke, 6-foot cable (For <b>TL-80BF</b> ))
CPD	Ceramic Polishing Disks (20 pieces, 25.4 mm square x 0.63 mm <b>t</b> , For polishing electrode)
PD	Polishing Disks (50 pieces, 600 grit, 38.1 mm dia., For polishing electrode)
WP	Work Positioner, 76.2 mm dia., Height adjustment from 36.5 to 50.8 mm

#### • Table Electrode

Model	Description
ETB4	Table Electrode, Material: Cr-Cu (RWMA 2), 95.3mm I x 76.2mm w

# 7. Outline, Connection and Workbench Drilling

# (1) Outline

#### ① TL-080B

Dimensions in mm



2 TL-080BF

Dimensions in mm



# (2) Connection

Dimensions in mm







Connect the grounding wire to the grounding terminal located near the grounding mark.

# (3) Workbench Drilling

Dimensions in mm

#### ① TL-080B



#### ② TL-080BF



# 8. Metric Screws Location

Inch screws are used except as shown below.

Dimensions in mm

