

# PRO WELD INTERNATIONAL

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## ***C-2 BANTAM GUN***



## ***OPERATION/MAINTENANCE MANUAL***



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## SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

### 1-1. Symbol Usage



Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ Marks a special safety message.

☞ Means "Note"; not safety related.



This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

### 1-2. Arc Welding Hazards

▲ The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section NO TAG. Read and follow all Safety Standards.

▲ Only qualified persons should install, operate, maintain, and repair this unit.

▲ During operation, keep everybody, especially children, away.



#### ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.

- If earth grounding of the workpiece is required, ground it directly with a separate cable – do not use work clamp or work cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

#### SIGNIFICANT DC VOLTAGE exists after removal of input power on inverters.

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any parts.



#### FUMES AND GASES can be hazardous.

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
- If ventilation is poor, use an approved air-supplied respirator.
- Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watchperson nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.



### ARC RAYS can burn eyes and skin.

Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

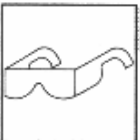
- Wear a welding helmet fitted with a proper shade of filter to protect your face and eyes when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (leather and wool) and foot protection.



### WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

- Protect yourself and others from flying sparks and hot metal.
- Do not weld where flying sparks can strike flammable material.
- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.



### FLYING METAL can injure eyes.

- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.



### BUILDUP OF GAS can injure or kill.

- Shut off shielding gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.



### HOT PARTS can cause severe burns.

- Do not touch hot parts bare handed.
- Allow cooling period before working on gun or torch.



### MAGNETIC FIELDS can affect pacemakers.

- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.



### NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.



### CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

## 1-3. Additional Symbols for Installation, Operation, and Maintenance



### FIRE OR EXPLOSION hazard.

- Do not install or place unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not overload building wiring – be sure power supply system is properly sized, rated, and protected to handle this unit.



### MOVING PARTS can cause injury.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.



### FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.



### H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.



### OVERUSE can cause OVERHEATING

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.



### STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.



### MOVING PARTS can cause injury.

- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.



### WELDING WIRE can cause injury.

- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.



### ARC WELDING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding machine is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

## 1-4. Principal Safety Standards

*Safety in Welding and Cutting*, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami FL 33126

*Safety and Health Standards*, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

*Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances*, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126

*National Electrical Code*, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

*Safe Handling of Compressed Gases in Cylinders*, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

*Code for Safety in Welding and Cutting*, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

*Safe Practices For Occupation And Educational Eye And Face Protection*, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

*Cutting And Welding Processes*, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

## 1-5. EMF Information

### Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

Welding current, as it flows through welding cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: "The body of evidence, in the committee's judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard." However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

#### **About Pacemakers:**

Pacemaker wearers consult your doctor first. If cleared by your doctor, then following the above procedures is recommended.

## 1.0 INTRODUCTION

Your new stud welding equipment is carefully constructed of the finest components and materials available. Used properly, this equipment will give you years of profitable, efficient service.

The system incorporates the latest in engineering advances, for completely reliable end welding of mild steel, stainless steel, aluminum and lead free copper and brass fasteners.

A careful study of this manual will enable you to understand how the welder operates to insure proper performance under all operating conditions.

## 2.0 WARRANTY

The electrical and mechanical components of the stud welder are thoroughly performance inspected prior to assembly in the welder. The assembled welder is completely performance checked. The welder is delivered to you in functional electro-mechanical condition.

All parts used in the assembly of the welder and its accessories are fully warranted for a period of ninety (90) days from the date of delivery. In addition, the welding capacitors are warranted for a period of one hundred twenty (120) days from the date of delivery.

Under the warranty, the manufacturer reserves the right to repair or replace, at their option, defective parts which fail during the guarantee period. Notice of any claim for warranty repair or replacement must be furnished to the manufacturer by the purchaser within ten (10) days after the defect is first discovered. The manufacturer does not assume any liability for paying shipping cost or any labor or materials furnished where such cost are not expressly authorized in writing.

The manufacturer does not warrant any parts or accessories against failures resulting from misuse, abuse, improper installation, maladjustment, or use not in accordance with the operating instructions furnished by the manufacturer. The warranty is valid only when studs are purchased from sources approved by the manufacturer or are of identical specifications to the manufacturer's

## 3.0 SUGGESTED SAFETY PRECAUTIONS

In any welding operation, it is the responsibility of the welder to observe certain safety rules to insure his personal safety and to protect those working near him.

Reference is directed, without endorsement or recommendation, to ANSI Z49.1, Safety in Welding and Cutting, and to AWG Publication A6,1-66, Recommended Safety Practices for Gas-Shield Arc Welding.

1. Always treat electricity with respect. Under open circuit conditions, the welding machine output voltage may be dangerous.
2. Don't work on live circuits or conductors. Disconnect the main power line before checking the machine or performing any maintenance operations.
3. Be sure the welding machine cabinet is properly grounded to a good electrical ground.
4. Don't stand in water or on a damp floor while welding or weld in the rain. Avoid wearing wet sweaty cloths when welding.
5. Don't operate with worn or poorly connected cables. Don't operate weld gun with loose cable connections. Inspect all cables frequently for insulation failures, exposed wires, loose connections, and repair as needed.
6. Don't overload welding cables or continue to operate with hot cables.
7. Don't weld near flammable materials or liquids, in or near atmospheres, or on ducts carrying explosive gases.

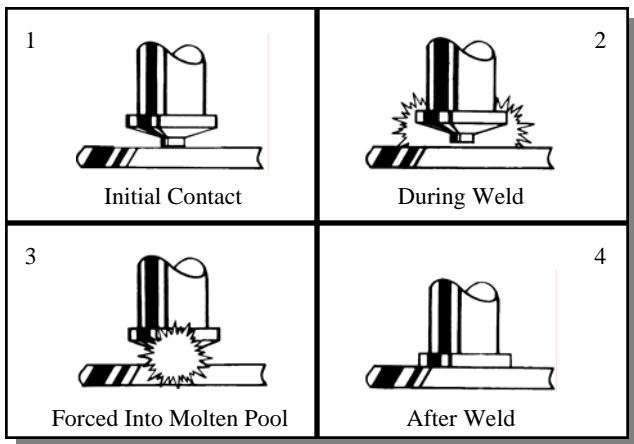


8. Don't weld on containers which have held combustible or flammable materials, or on materials which give off flammable or toxic vapors when heated, without proper cleaning, purging, or inerting.
9. Be sure to provide for proper ventilation when welding in confined spaces.
10. Never look at the electric arc without wearing protective eye shields.
11. Always use the proper protective clothing, gloves, ect.
12. Never strike an arc when near a bystander who is unaware of the dangers of ultraviolet light on their eyes.

## 4.0 THE CD WELDING PROCESS

Contact welding is the simplest and most common method of CD stud welding. Practically foolproof, it produces no reverse side marking in most cases and is suitable for most commercial and industrial applications.

First, the gun must be set-up with the proper accessories for the length and diameter stud you are going to weld. Refer to the CD Accessories Guide and CD Stud Welding Gun Section for information on accessories and gun set-up.



(CONTACT CD WELD)

The stud is first placed in contact with the base material (SEE FIGURE 1). Verify that the gun is held perpendicular to the work. Pulling the trigger discharges the capacitors through the stud which vaporizes the tip. The proper tip design is critical. This is what determines the length of time of the weld. An arc is briefly sustained which melts the stud base surface and the work surface directly underneath the stud. The spring pressure in the gun then forces the stud into the molten pool, completing the weld in approximately six milliseconds.

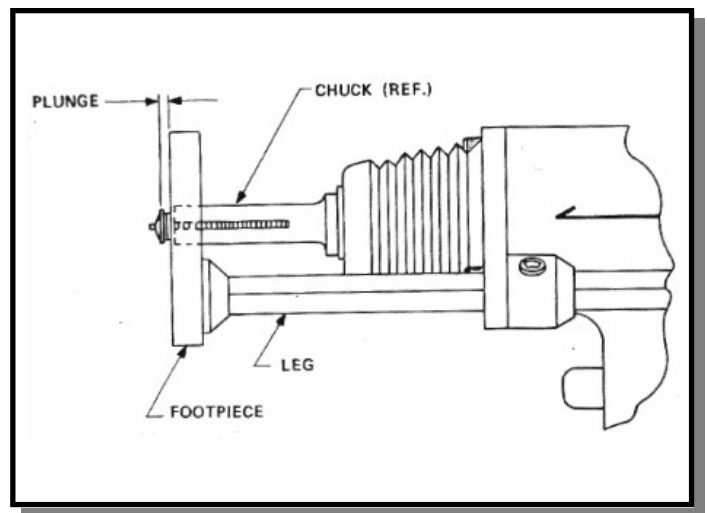
## 5.0 GUN SET-UP

### 5.1 STANDARD (see pic below)

The standard gun set-up is used for welding the majority of applications. It consists of the standard adjustable face plate, two legs, a foot, chuck, stop, and spring for your specific stud size.

A step-by-step explanation of the correct way to set-up and operate the standard CD gun.

To prepare for stud welding, it is necessary to have the proper accessories for the stud to be welded. Those required are the legs, footpiece, spring, chuck, and appropriate screws and washers



Standard Gun Setup

For CD welding, the stud normally should be engaged for all but 1/4" of its length, whenever possible. Selecting the proper stop will accomplish this for you. The objective of the chuck is to maintain a firm grip on the fastener to assure correct alignment and a good electrical connection, yet allow for ease of loading.

Once the selection of the correct accessory is made, assembly may begin. The footpiece is mounted on the legs using 1/4-20 x 1 1/4 screws, inserted through the holes at the base of the footpiece. These holes are recessed so that the head of the screws will not protrude.

After assembling the legs and footpiece, insert the chuck into the open end of the gun shaft. Locate the legs, with footpiece attached, in the

holes provided in the gun faceplate. (It may be necessary to back off the socket screw in the faceplate to allow the legs to enter the hole). Center the opening of the footpiece around the weld end of the fastener. Tighten the footpiece in position at this time. Adjustment for the plunge which is the distance the stud protrudes beyond the end of the footpiece can now be made. This is done by loosening the two set screws at the bottom of the faceplate using the Allen wrench. Then sliding the legs for proper adjustment. Refer to the set-up chart for correct plunge distance (from 1/8" to 5/16").

**NOTE:**

Correct set-up on all CD units is 1/8"- 5/16" plunge. This must be assured for proper weld results in all cases.

The gun is now ready to weld. Select the proper setting for the size stud to be welded. Voltage is determined by the weld base diameter. Be sure your power source is set for the proper polarity: straight for steel, reverse for galvanized.

**6.0 WELDABLE MATERIAL COMBINATIONS**

<b>BASE MATERIAL</b>	<b>STUD MATERIALS</b>
Mild Steel (1008-1018)	Mild Steel 1008, 1018 Stainless Steel 304, 305 Brass 65-35, 70-30 Copper, Silicon/Bronze
Galvanized Sheet (duct-"Q" Decking)	Mild Steel 1008-1018 Stainless Steel 304,305
Structural Steel ( <b>Must Be Clean</b> )	Mild Steel 1008,1018 Stainless Steel 304,305 Brass 65-35, 70-30
Aluminum – Most alloys of the 1100, 3000 and 5000 series.	Aluminum 1100,5356
Zinc Alloys (Die Cast)	Aluminum 1100, 5356
Medium Carbon Steel (1030-1018)	Mild Steel 1008, 1018 Stainless Steel 304,305 Brass 65-35, 70-30
Lead Free Brass Lead Free Rolled Brass Electrolytic Copper	Mild Steel 1008, 1018 Stainless Steel 304, 305 Copper, Silicon/Bronze

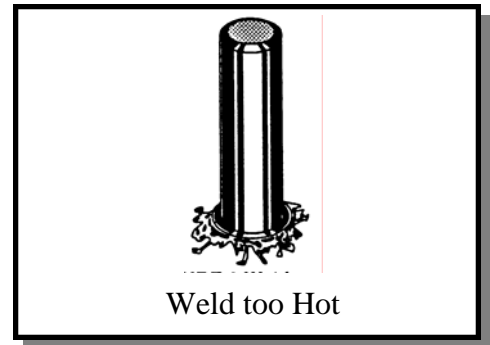
## 7.0 CAUSE OF POOR OR ERRATIC WELDS

1. Loose collet. Does not grip stud tightly. (REPLACE) Not enough engagement of stud to collet. (CHANGE STOP)
2. Fault or loose ground connection. (REPAIR OR TIGHTEN)
3. Poor surface condition of base material, excessive oil, grease, rust, ect. (CLEAN)
4. Voltage or capacitance setting too low or too high. (ADJUST TO DIAMETER OF STUD)
5. Broken or loose cables. (REPAIR)
6. Dirt in gun. (CLEAN)
7. Incorrect polarity. (CABLES HOOKED-UP WRONG)
8. Use of center punch or deep scribe. (DO NOT USE CENTER PUNCH OR DEEP SCRIBES)
9. Cables too closely coiled.
10. Arc blow is evidenced by “one side” welds. In severe cases there will be no melting under one edge of flange while the opposite side is gouged out or appears excessively hot. The principle cause of arc blow is magnetic field induced by the current flow during the weld. It occurs most often on long, narrow strips of metal or near edges of sheets or plates. In some cases, a change in grounding positions, or two grounds on the work piece, one at each end or edge of work, will correct the problem. For assistance in severe cases, contact your local sales representative.
11. Incorrect plunge setting. (ADJUST TO PROPER SETTING)

12. Incorrect spring. (REPLACE WITH PROPER SPRING)

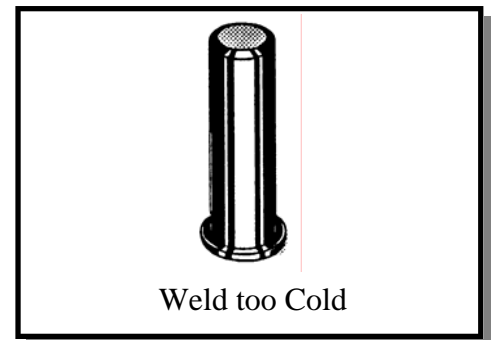
13. Poor stud quality.

## 8.0 TROUBLE SHOOTING POOR WELDS



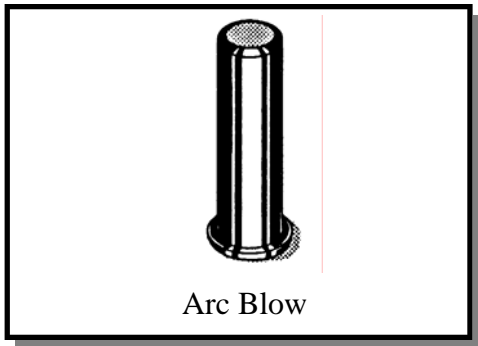
**Weld too Hot**

- A) Decrease voltage.
- B) Decrease capacitance.
- C) Increase stud protrusion.
- D) Increase spring pressure.



**Weld too Cold**

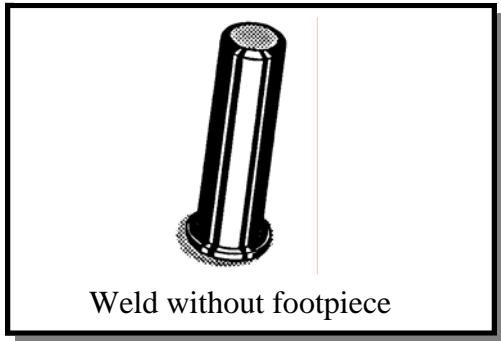
- A) Increase voltage.
- B) Increase capacitance.
- C) Decrease stud protrusion.
- D) Decrease spring pressure.



Arc Blow

### Arc Blow

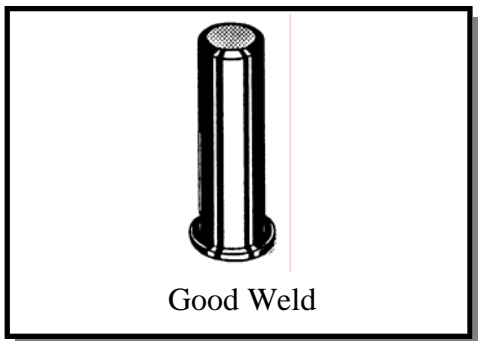
- A) Use double grounds.
- B) Ground too close or not spaced evenly.



Weld without footpiece

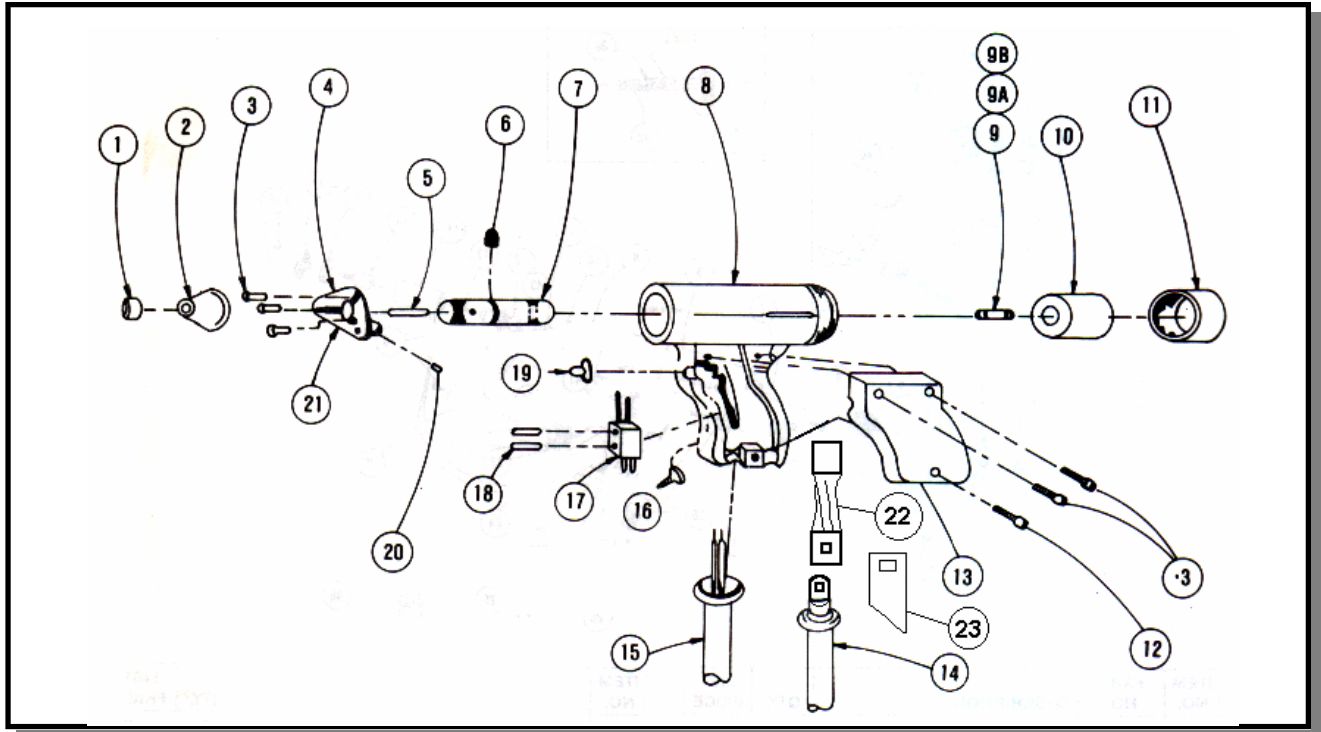
### Weld without footpiece

- A) Use standard footpiece.
- B) Use template adapter.
- C) Use tripod blunt legs.



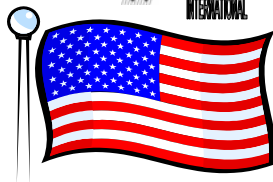
Good Weld

**C-2 BANTAM CD WELDING GUN  
PART # 300-0301**



ITEM	DESCRIPTION	PART NO.	ITEM	DESCRIPTION	PART NO.
1	BELLOWS RETAINER	001-816	12	10-24 X 3/4 SOCKET CAP SCREW	
2	BELLOWS	003-499	13	HANDLE COVER	016-384
3	10-24 X 1/2 SOCKET CAP SCREW		14	WELD CABLE ASSY (25FT)	015-793-25
4	FACE PLATE ASSY (TWIN LEG)	003-500	15	CONTROL CABLE ASSY (25FT)	015-809-25
5	5/16-18 X 1-3/4 SET SCREW	016-405	16	HANDLE POST NUT	002-906
6	SPINDLE ASSY (TAPERED CHUCK)	015-805	17	TRIGGER SWITCH	015-807
7	GUN BODY	016-383	18	5-40 X 5/8 PAN HEAD SCREW	
8	MAIN SPRING SILVER	001-800	19	TRIGGER BUTTON	006-586
9A	MAIN SPRING BLACK	001-801	20	5/16-24 X 5/16 SET SCREW	
9B	MAIN SPRING RED	001-802	21	FACE PLATE BUSHING	003-501
10	SPRING PLUG	022-357	22	INTERNAL WELD CABLE	602-056B
11	BACK CAP	015-803	23	CABLE MOUNTING LUG	029-039

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