

# OPERATION MANUAL

## MODELS

**TWE-250 SPC**

**TWE-321 SPC**

**TWE-375 SPC**



**TRU-WELD EQUIPMENT COMPANY**

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# INTRODUCTION

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The complete range of the capacitor discharge equipment is compact, portable stud welding equipment. The units are specifically designed to enable a small diameter range of ferrous and nonferrous weld studs to be welded to light gauge metal materials with little or no reverse-side marking.

The equipment consists of a control unit, a welding hand gun, and all necessary inter-connecting cables.

## THE PROCESS

Capacitor Discharge (CD) stud welding is a form of welding in which the energy required for the welding process is derived from a bank of charged capacitors. This stored energy is discharged at the base of the specially designed CD stud and it fuses the stud to the base material. The time of the weld is determined in such a short duration that no burn through marking is made on the finish side of the material.

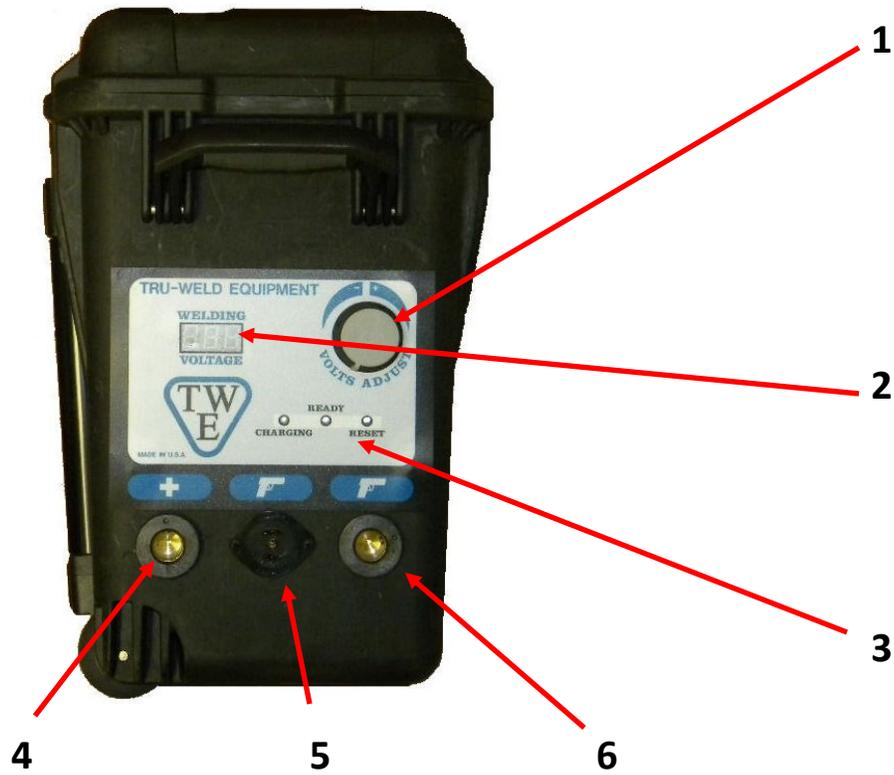
## CONTACT

In contact CD welding, the stud is placed under spring pressure on the material to be welded. When the capacitors are discharged, the special tip of the CD stud melts and the spring pressure forces the stud to fuse with the base material.

# EXTERNAL FEATURES

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## SIDE PANEL



1. Weld Voltage Selector - rotate to change to required voltage.
2. Welding Voltage Digital Display - displays selected voltage.
3. LED Lights - Charging (capacitors are being charging to desired voltage), Ready (unit is ready to weld), Reset (indicates an error and unit should be turned off).
4. Welding Ground Cable Connector (+)
5. Stud Gun Control Connector
6. Welding Stud Gun Cable Connector (-)

# EXTERNAL FEATURES

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## SIDE PANEL

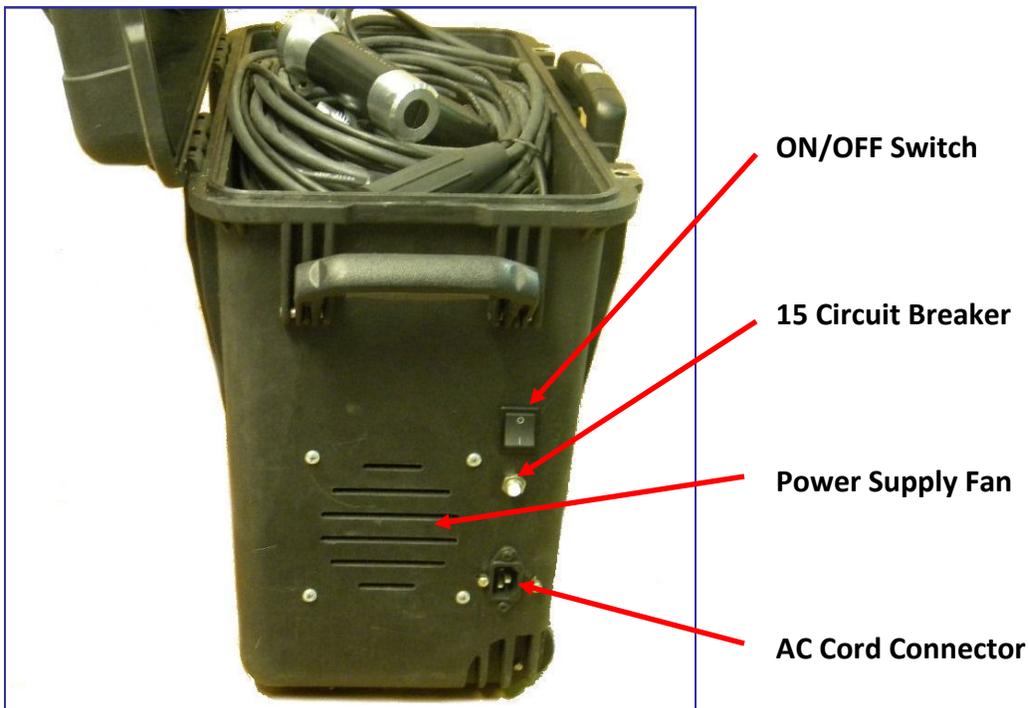
- 1.On/Off Switch
- 2.Fuse Holder (10 amp)
- 3.AC Power Cord Connector

## WARNING!

This unit operates from a 110 VAC 50/60 Hertz @10 amp circuit or  
220 VAC 50/60 Hertz @ 5 amp circuit

Do not obstruct the ventilation fan, as this may cause unit to over heat.

Do not remove any portion of the unit housing without first disconnecting the unit from the power supply.



# SAFETY

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## PROTECT YOURSELF AND OTHERS!

Read the safety notices before using welder.



## ELECTRICAL

No portion of the outer cover of the welding controller should be removed by anyone other than qualified personnel. Always disconnect the unit from the main power prior to removing cover.

- This equipment contains a transformer power supply system, which is energized by AC current and transforms the AC to DC current. Due to potential dangerous electrical input and output the equipment must be disconnected from all incoming power when servicing.
- Capacitors store electrical energy. Check for residual charge before performing any maintenance.
- Do not use fluids to clean electrical components as these may penetrate the electrical system and cause shorts.

Connection of the unit into service must be in accordance with the setup procedures as detailed in this manual. Operation of this equipment must be in accordance with all local, regional, and national safety codes.

# **SAFETY**

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## **FIRE**

During welding, small particles of hot metal can be expelled. Ensure that no combustible materials are near the welding area.



## **PERSONAL SAFETY**

Arc rays can burn your eyes and skin. Wear protective clothing and eye protection when welding.

Loud noises from welding can damage hearing. Wear earplugs or other protective gear, if applicable.

Fumes and gases expelled during welding can be hazardous to your health. Make sure welding is done in a well-ventilated area.

Hot metal splatter can cause fires and burns. Wear protective clothing, free of combustible materials. Have a fire extinguisher nearby and know how to use it.

## **MAINTENANCE**

All cables must be inspected regularly to ensure that no danger exists from worn or damaged insulation or unsafe electrical connections. Take special note to the cables near the stud gun - this is where maximum wear occurs.

Worn cables not only produce inconsistent welds, but can overheat or spark.

# **SAFETY**

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## **TRAINING**

Use of this equipment must be limited to authorized personnel only. They must be adequately trained, and have read and understood everything in this manual. The manual must be available to operators at all times.



## **INSTALLATION**

Select a site for the equipment which is capable of supporting the weight of the equipment, which is clear from traffic routes where people may trip over cables, or they may be damaged by other equipment or vehicles.

Do not hang connecting cables over sharp edges or have near heat sources.

## **DISPOSAL**

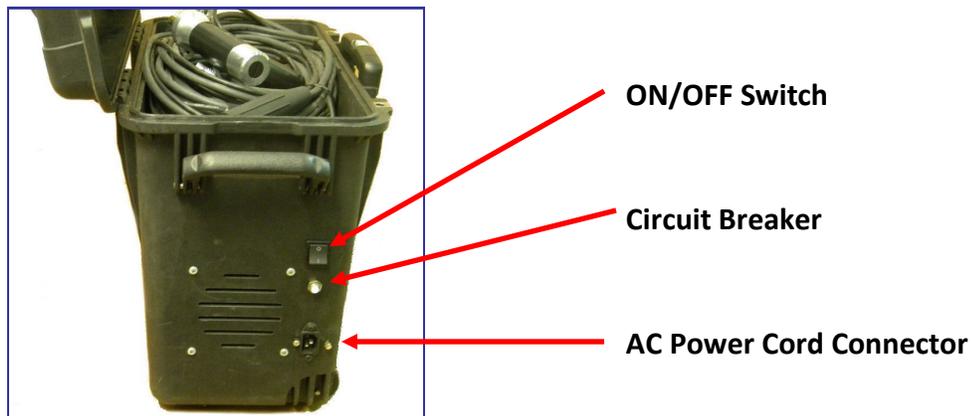
The equipment, in its entirety or as components/parts may be disposed of as general industrial waste or scrap. None of the components used in the manufacturing of the CD Welders are toxic, carcinogenic, or otherwise harmful to your health.

# SET-UP AND WELDING

## POWERING UP THE EQUIPMENT

Setup the equipment power supply (Control Unit) and connect to the main power, making certain of the proper voltage requirement of the particular unit.

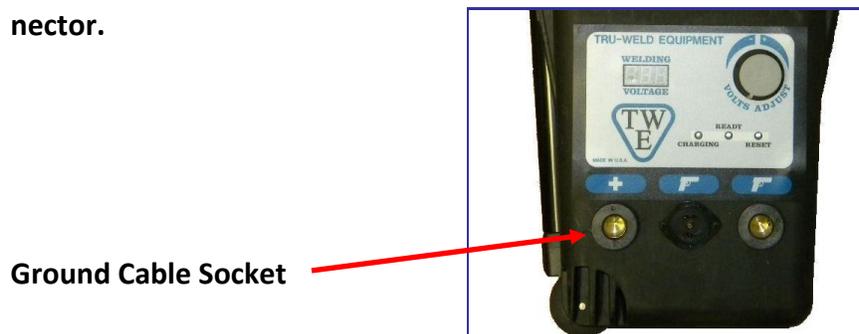
Capacitor Discharge (CD) units generally require 110 VAC @ 60Hz incoming power. Refer to the safety recommendations before plugging this unit in.



## CONNECTING THE WELDING LEADS

Connect the welding ground cable into the (+) terminal mount socket on the front of the welding unit.

\*\*\*NOTE - the cable end plug has a flat which aligns with a dot on the panel mount socket. Secure the connector into the panel mount socket, and then turn it clockwise until it locks into proper position. Failure to do so could result in damage to the connector.



# SET-UP AND WELDING

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## CONNECTING THE WELDING LEADS

Connect the welding stud gun power cable into the (-) terminal panel mount socket (designated by the gun symbol) on the side of the welding unit.

**\*\*\*NOTE** - the cable end plug has a flat which aligns with a dot on the panel mount socket. Secure the connector into the panel mount socket, and then turn it clockwise until it locks into proper position. Failure to do so could result in damage to the connector.



Welding Gun Control Cable Connector

Connect the weld gun control cable into the center panel 2-pin socket.

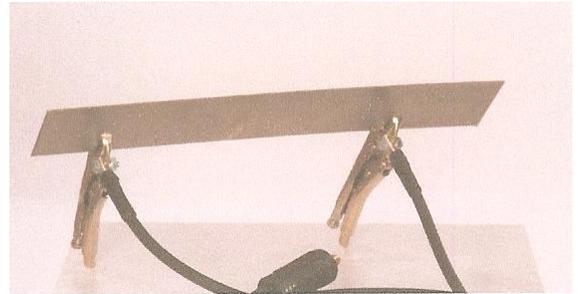
**\*\*NOTE** - the plug has a large pin and a small pin that match the socket on the unit. This is to prevent incorrect connections. Push the plug firmly into the socket and twist clockwise to secure the plug into the correct position.

# SET-UP AND WELDING

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## CONNECTING THE GROUND CLAMP

Attach the clamp of the welding ground lead to the work piece. Prior to securing the clamp, make certain that the contact area is free of rust, paint, grease, or any other impurities to ensure a good ground connection.



**NOTE\*\*\***Most applications will require only one ground clamp, but certain applications will require an additional dual clamp.

# SET-UP AND WELDING

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## SELECTING THE PROPER STUD COLLET (STUD HOLDER)

The collet is selected to the proper diameter that you are welding.

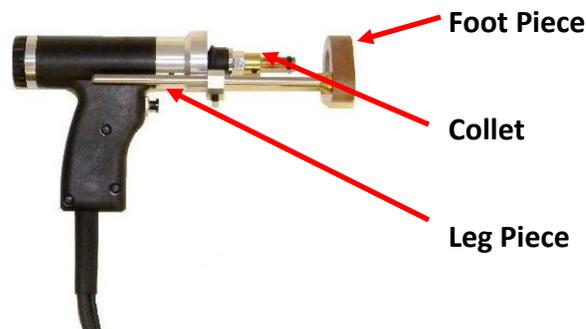
There are three styles of collets;

- The “B” collet which is a two-piece assembly (collet and insert). The insert determines how much of the stud is engaged in the collet.
- The CI (Collet Insert) which is a single part and the amount of the stud that is engaged is predetermined.
- Standard Adjustable Chucks have an adjustable internal screw to manually adjust for the engagement of the stud.

The choice between these systems is usually a matter of personal preference.

Inserting the selected collet into the stud gun is a simple task. Place the collet into the front holder of the stud gun and set the locking screws to hold it in place.

After inserting the collet, mount the two legs and foot piece onto the stud gun. The collet should be centered through the opening of the foot piece.



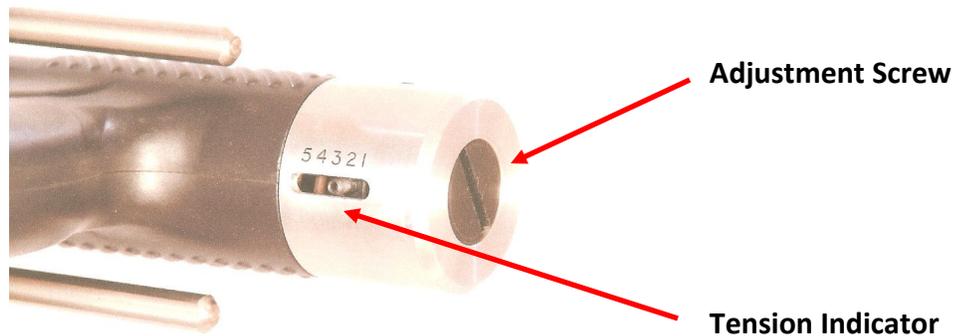
When the legs and foot piece are in place, insert the stud to be welded into the collet. Adjust the leg and foot piece by sliding it into position until approximately 1/8” of the stud protrudes from beyond the foot piece. Lock legs in place with the set screws.

# SET-UP AND WELDING

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## SELECTING THE SPRING LOAD

The proper spring pre-load setting on the stud gun will vary depending on the selected application. General rules of application would be; mild steel or stainless steel usually in the 1 to 2 range, depending on the stud diameter and the thickness of the base material. Aluminum and other nonferrous metals would require settings from 3 to 5 depending on the diameter of the stud and base material thickness.



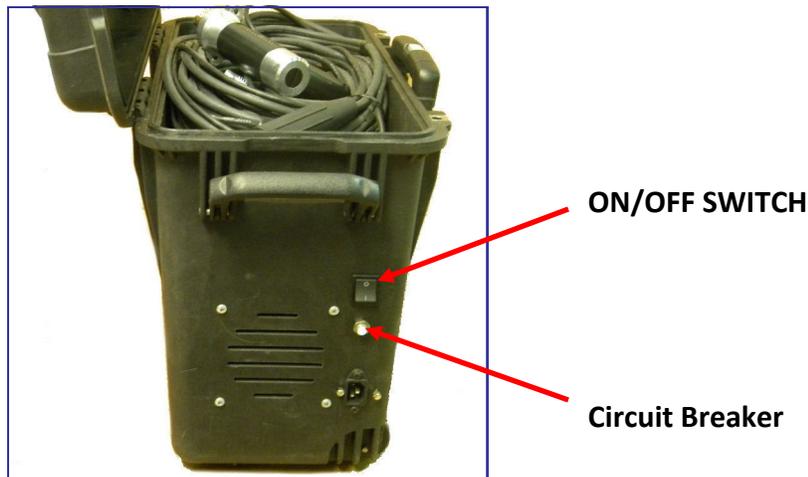
This spring pre-load adjustment is made by turning the screw insert in the back of the stud gun with a screwdriver. On the bottom of the back cap of the stud gun is the indicator numbered 1 thru 5, which will show you the tension setting during the adjustment.

# SET-UP AND WELDING

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## READY FOR WELDING

When you have completed all of the previous steps to prepare for welding, including connecting the stud gun and ground cables to the unit, attaching the ground cable(s) to the work area, setting up and adjusting the stud gun for the selected stud diameter and material, you can now power on the welder.



The controller ON/OFF switch is located on the side of the unit in the upper right hand corner. Below this switch is the 15amp Circuit Breaker for the system.

# SET-UP AND WELDING

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## VOLTAGE SELECTION

Selecting the required weld voltage is achieved by turning the selector knob. The voltage range is from 35VDC to 200VDC.

The voltage is determined by the diameter of the stud and the base material.



Voltage Adjustment Knob

Approximate voltage starting points are listed below. Fine tuning the voltage to meet your requirement for your specific application is recommended.

MODEL TWE-250	
Diameter	Voltage (DC)
14 ga.	50-75
12 ga.	75-110
#8	110-130
#10	125-160
1/4"	160-190

MODEL TWE-321 & 375	
Diameter	Voltage (DC)
14 ga.	35-50
12 ga.	50-75
#8	75-100
#10	100-120
1/4"	120-140
5/16"	140-160
3/8" (TWE-375)	160-200

**NOTE\*\*\***when welding cupped-head insulation pins, set the DC Voltage to 35 volts to begin and increase as necessary. Adjust the spring pressure on the CD gun between #1 and #3 as necessary.

# TESTING WELD SETTINGS

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## TESTING YOUR SETTINGS

When you have performed all of the presets as discussed in this manual, it is recommended that you perform several test welds with the same diameter stud and base material that you will be using. This will verify that all of the settings are correct to the results you desire. Welding is done by placing the stud into the collet, and pressing the stud gun to the work piece, compressing the spring. This is why the stud must protrude beyond the foot piece at least 1/8".

Holding the gun perpendicular to the work piece, and aligning the stud to the desired position on the work piece, press down so that the foot piece is flush with the work piece (spring compressed), and depress the trigger.



When removing the stud gun from the welded stud, always lift the stud gun vertically from the welded stud in order to maintain the proper tension of the collet. Spreading the collet when lifting the stud gun from the welded stud will shorten the life of the collet and will eventually create an undesirable weld.

# SET-UP AND WELDING

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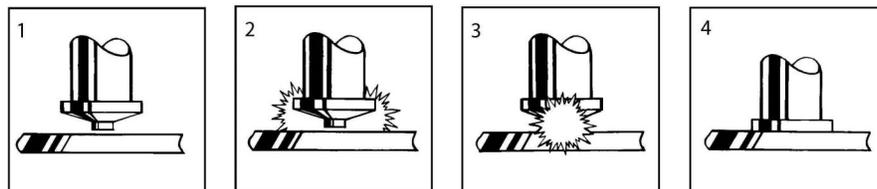
## INSPECTING THE WELD

Visually inspect the weld. A good weld will result in an all-around weld, with a small visible amount of weld surrounding the flange of the stud. Too much splatter and the weld is too hot, lower the voltage. No splatter and the weld is too cold, increase the voltage.

If you get weld flash to one side of the stud as opposed to an even amount around the base of the flange, this is called “arc blow”, and can be solved by repositioning the ground clamp or using a dual ground clamp.

Proper welded studs can be tested by either torquing or bending the stud. The welded flange of the stud should stay in place using either method, even though the threaded portion of the stud breaks. If the base material is very thin, then a full slug, the diameter of the flange will pull from the base metal for a properly welded stud.

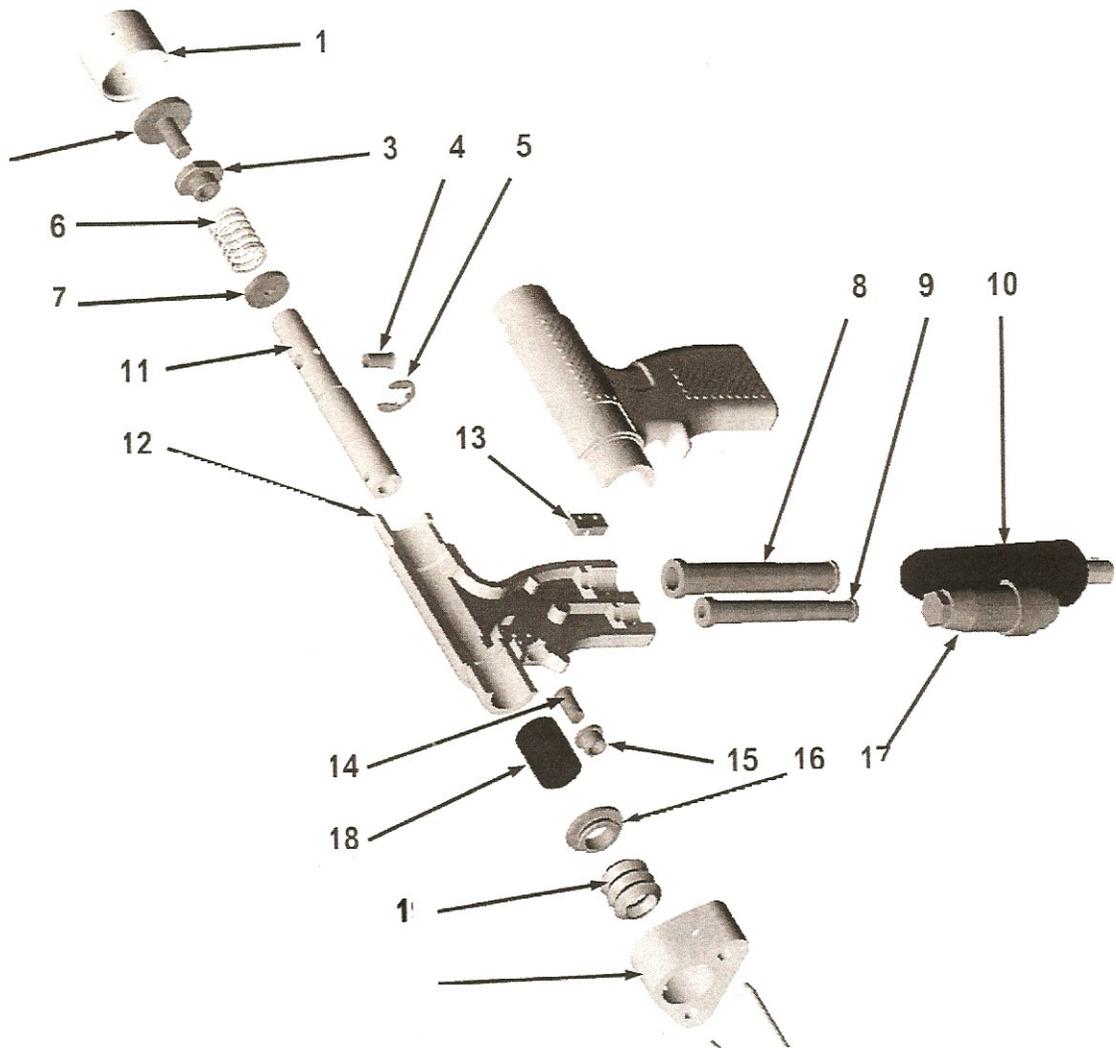
### CD Stud Welding Steps



# CD Parts and Accessories

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## CD STUD GUN EXPLODED VIEW



# CD Controller Parts List

ITEM	QUANTITY	PART#	DESCRIPTION
1	1	TWE01021	Handle
2	1	TWE01031	Cover
3	1	TWE01014	Relay
4	1	TWE01010	TRIAC
5	1	TWE01073	Thyristor Plate
6	2	TWE01030	Cross-Over Link
7	1	TWE01028	Negative BUSS
8	1	TWE01002	Thyristor
9	1	TWE01003	Thyristor Clamp
10	3	TWE01011	Flyback Diode
11	2	TWE01004	Main Capacitor
13	1	TWE01027	Link BUSS Bar
17	1	TWE01001	PC Board
18	1	TWE01033	Front Panel
19	1	TWE01026	Front Label
21	1	TWE01017	Control Knob
23	2	107-0002	Weld Connector
24	1	107-0031	Control Socket
25	4	TWE01018	Rubber Feet
26	1	TWE01055	Serial Number
27	1	TWE01034	Base Plate
28	1	TWE01045	Strain Relief
29	1	TWE01012	15Amp Breaker
30	1	TWE01013	Power Switch
31	1	TWE01005	Transformer
33	1	TWE01015	Fan
34	1	TWE01016	Fan Guard
35	1	TWE01008	Main Resistor
36	1	TWE01029	Positive BUSS
37	3	TWE01058	Nylon Standoff
38	1	TWE01009	Rectifier
39	1	TWE01019	Terminal Block
40	2	TWE01040	Resistor Mounts
41	1	TWE01006	Wire Harness

# CD Unit Views

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