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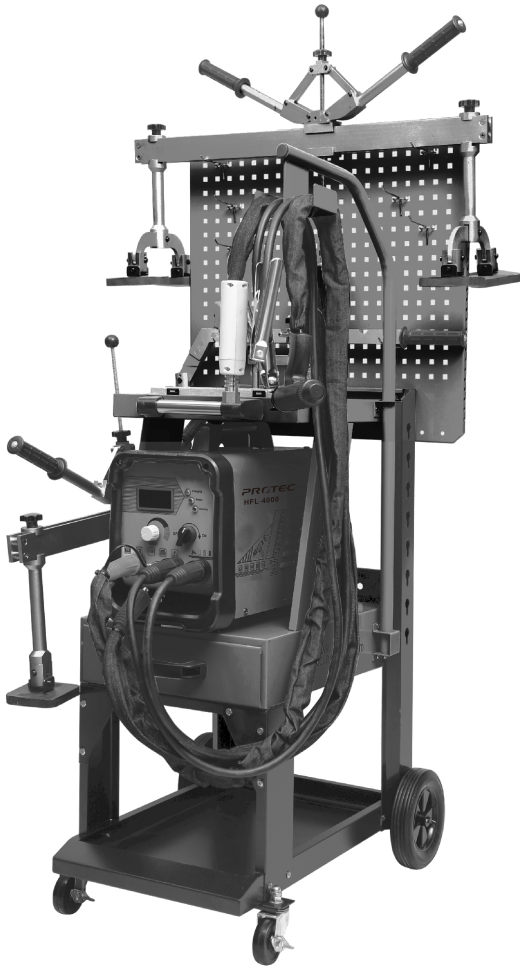
MULTIFUNCTIONAL ALUMINUM BODY CAR COLLISION REPAIR MACHINE

HFL-4000



INSTRUCTION & MAINTENANCE MANUAL

Read this entire manual carefully and completely

before installation or operation of the wheel balancer

Multifunctional Aluminum Body Car Collision Repair Machine

Manual

Please read this manual carefully before use our machine

Catalogue

1. Safety Precaution

★ please read and full understanding this manual before install and operate our machine.

★The manual safety precautions listed in is to allow you to secure and standardize the use of this product, and to keep you away from all hard.

★although our machine design and production strict compliance with national standards GB15579.1—2004Arc welding Equipment Part 1: GB/T8118—1995 arc welding power source and welding machines have been fully considered safe, but to avoid major personal injury during operation machine, please follow the safety instruction listed noted.

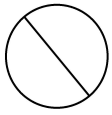
★use and operation of this product must be specially trained personnel that can understand and familiar with the welding operation.

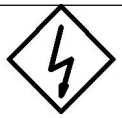
★Do not put this product for purposes of other than welding.

★please notice wrong use and operation of this product may cause 3 different levels of injuries and accidents. This manual use attention words and warning language to remind and alert!

Mark	Alert Words	accidents and injuries may cause
	High risk	May lead to severe accidence and injuries if misuse this machine!
	Dangerous	May lead to big accidence and injuries if misuse this machine!
	Attention	May lead to moderate injuries or mild injuries if misuse this machine!

In additional, during use and operate this machine, there have below marks and attention words to indicate “the work must be done” and “the work prohibit to do”

	Forced	the work must be done, such as external protective conductor “ground connection”
	Prohibit	the work prohibit to do

		Dangerous In order to avoid electric touch, please follow below notes.
		Touching live parts can cause fatal electrical shock or serious burins, when the machine is in working condition, as welding circuit is open, then both electrode or the workpiece will be electrified, while the power circuit, electrical main circuit and control circuit of machine all electrified. Wrong installation and not properly "ground connection", may lead to risk of electric shock.

★This machine should installed by professional electrical personnel in accordance with the instructions in the 8 Installation and Commissioning. Machine and workpiece must be reliable 'ground'.
★Must ensure had cut off the input power in distribution box before operation of install, maintenance, repair this machine.
★ Do not touch live parts,
★ Please insulate cable connect part, ensure reliable insulation,
★ Always check the power input cable for damage, if damaged replace it immediately,
★ In the operation, please wear dry, no damage insulated gloves, shoes and work clothes,
★ Please keep workplaces clean and dry, avoid working in wet conditions;
★ Do not use this machine when the cover of this machine is removed.
★ When operation this machine in the high-altitude places, please wear safety equipment;
★ Cut off the power supply when not use this machine.

 **Dangerous**	Please use protective tools in case dangerous fumes and toxic gas arising from welding.
	During welding process will produce some smoke and toxic gas, inhalation of these fumes and gases will be harmful to health. Avoid operate this machine in narrow places, which will cause dangerous of suffocation.

★ To prevent gas poisoning and suffocation, please take adequate ventilation and take air-breathing apparatus.
★ during welding operations, keep the head away from the smoke as far as possible, do not inhale the smoke generated from welding;
★ when operated in narrow places, should equipped with the ventilation equipment, if necessary, use respiratory protection equipment should be equipped.

 **Dangerous**	To prevent fire, explosion and cracking, please follow below precautions.
	Splash and workpiece just finished operation can cause fire., Cable connection, the negative clip if poor contact with the workpiece joint, will cause fire because heat from contacting with electric resistance, Do not weld sealed tank, fuel tank, otherwise will cause the risk of workpiece burst.

★ Protect ones own and others from flying and hot metal against the danger;
★ Avoid splash on combustible material, clear away the combustible materials. If you can not clear the material, please cover it with flame-retardant,
★ Do not work near flammable gases,
★ Cable connection must be firm and well insulated;
★ Please connect the clip as close as possible with workpiece,
★Grinding and clean the workpiece during operations, try to avoid splashing,
★ Please place the fire extinguisher near the work site, just in case of any dangerous occurred.

 **Attention**	To prevent the electromagnetic field impact on o person or products, please follow the precautions.

	Electromagnetic fields may has undesirable impact on pacemaker, Electromagnetic fields may has unknown impact on human body, Electromagnetic fields may has electromagnetic interference with some electric equipment.

★ Electromagnetic fields generated by the machine operation will has undesirable effect to operator's pacemaker. Operator with pacemaker should consult doctor first, and do not close machine and its workplace around if without doctor's permission.

★ Electromagnetic fields generated by the machine operation on the health effects not confirmed and prove, does not exclude a negative impact on the body,

★ Operating construction personnel shall follow below methods to achieve the reduction of electromagnetic fields on human hazards, take preventive measures:

■ Try to reduce the welding cable and ground (piece) cable length,

■ Do not exposure on the middle of welding and earth cables, please place cables on one side of the operator, that is, if welding cable on the left of operator, then the grounding cable should also keep in the left and parallel to, and away from the operator,

■ Be sure not wrapped around cable to the body, the body exposed to electromagnetic fields in order to avoid health effects,

■ Do not sharing the ground connection of the workpiece and machine with other machine(equipment).

■ Do not use the machine when the cover of machine removed.

★ Electromagnetic fields may produce electromagnetic interference with some electrical equipment, should take appropriate precautions to guard against it.

2 Main usage and applicable scope

Energy accumulation type stub welding machine adopt large capacity to achieve good energy storage and battery charging. instantaneous discharge to make arc during welding process, is a welder that can melt and connect base metal and stud together. high-power thyristors are used to control the charge voltage adjustment is very accurate during charging and discharging process, and continuously adjustable discharge energy, which makes the welding heat-affected of base metal small, prototype parts maintain beautiful, stud welding firm.

The welder in use has following features:

1. This series welder adopts Japanese original capacitance, has character of fast filling and quick release. We adopt Siemens SCR to ensure accuracy control and reliable quality.
2. Welding time is short, the base metal heat affected is small, can maintain the original shape appearance, and firm welding position.
3. The series of stud welding machine to a large extent replaced the micro-plasma arc welding, simply welding technology. Convenient welding achieved for thin piece in industrial manufacturing, ultra thin pieces of precision welding.
4. The series of stud welder can weld iron nail on iron plate, aluminum, electrolytic plate and stainless steel plate, stainless steel nails welding in stainless steel and iron plate, attention aluminum nails can only welding on the aluminum plate.
5. The series of stud welding machine can be widely applied to shipbuilding, rolling stock, automotive, boiler, electronic control, engine room and other industries on the production of the plate.

3 Applied work environment and condition

Environmental conditions:
3.1.1 elevation is not more than 3000m,
3.1.2 ambient air temperature range,
During operation: -40 ~ +45 ℃,
In the transport and storage conditions: -25 ~ +55 ℃.
3.1.3 Relative humidity:
when temperature in 40 ℃, humidity should less than 50%,
when temperature in 20 ℃, humidity should less than 90%.
3.1.4 air dust, acids, corrosive gases or substances of around ambient do not exceed normal levels, except those substances produced due to process operations, the site should be no violent vibrations and bumps.
3.1.5 should be placed in dry and ventilated place, and to prevent direct sunlight and rain.
3.1.6 The gradient of the product placement should not exceed 10 ℃, when the product placed in the inclined plane, should pay attention to prevent dumping.
3.2 working conditions:
3.2.1 to meet the needs of work product distribution capacity, see "8.2 Installation";
3.2.2 Power supply is: 3 ~ 380V/50Hz; two-phase 190V/60Hz (Americas only).
3.2.3 Voltage fluctuation range: (1 ± 10%) 380V;
3.2.4 Power frequency ranges of: (1 ± 1%) 50Hz/60Hz.

4. Main Tech Data

Model		HFL-4000
Voltage(V）		Single phase AC220V±10%/50HZ or Single phase110V±10%(for South America market use)
Frequency（Hz）		50/60
Capacity（KVA）		≤2
Rated Storage Amount（J）		2500
Capacity charge Voltage（V）		50∽170
Weldable Stud Dia（mm）	SS, Carbon Steel	3∽10
	Al and Alloy Al.	3∽8
Welding Frequency（pc/min）		15

5. Main Structure

The products are mainly compose of movement, cover, handle, frame, wheels and other components. Movement composed of the control transformer, silicon controlled, transformer, control board. Shown in Figure 1.
The display shows:

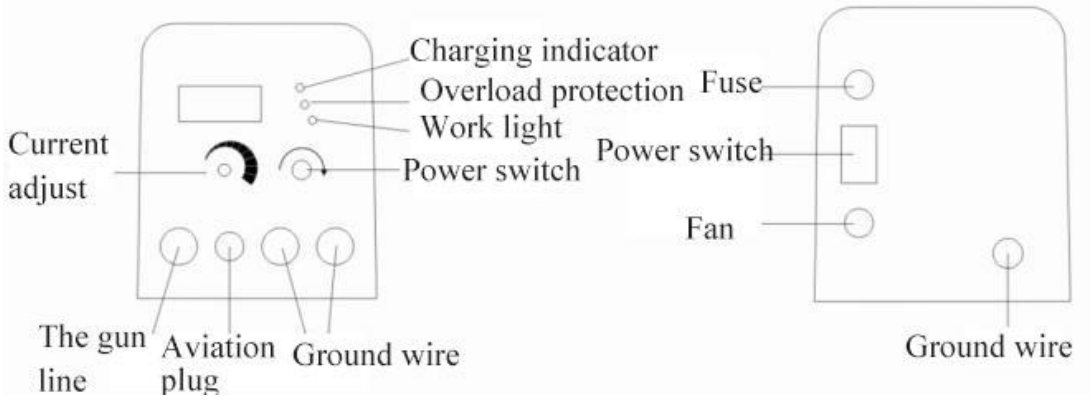


Figure 1

1. digital display show charger voltage 2. power supply light show power supply

3. light on show the voltage is full.

4. power switch, knob adjust, press for 3 seconds to starting up or shut off. Revote to adjust and setting voltage

5. output negative pole clamp

6. positive pole connect gun

7. control switch socket connect gun switch

6. Product Description

This series of machines with high performance, high reliability, easy operation; microprocessor controlled, ensure the normal work of the control system and imitate not easy; intelligent sophisticated instrument system, huge display system accurately display the key value; professional level instrument control panel to control various functions, The cumulative number of times of welding keeping in the counter, and the knob is switch, also is rotary switch of each function. By press a knob, turn to the next function, rotary knob can adjust current amount and time, is what called The Unified Regulator. It is a idea machine of aluminum body and carbon metal car collision repair machine.

7. Storage and transportation

This machine should be avoid rain and snow soaked attack during storage and transport. Avoid corrosive medium. The storage temperature is -25-+55 ℃
The machine is packed in carton, when it delivered to the user site, the user can use lift truck or crane to unpack after moving in place. In transit must be taken to avoid product tilt, fall or collision, so as to avoid injury of personnel or products.

8. Installation and commissioning

8.1 Open case inspection
Users receive the products and open the case, first should check the appearance of the product if have serious collision and fall injuries. Then check the integrity of the product of the number of the parts, accessories(see paragraph 13) according to described in manual. If as normal, please operate as follow requirements and standards.
8.2 Installation
8.2.1 Distribution and capacity requirements
The power of this product is 220V / 50Hz (in the Americas with 110V/60Hz) AC power. Users should have the appropriate power distribution devices such as power distribution boxes, etc., and should install the appropriate circuit breaker (air switch) or switch and fuse (fuse) and ground wire (protective earth). Grounding wire with plastic multi-core copper wire, all wiring must be firm and reliable and should be insulated. Specifications required parameters as Tables 8.2.1

Welder distributor, capacity, wire connection requirement tech data

Input Power Supply		Single phase 22V/50Hz (single phase 110V/60Hz
Min. distribution capacity(KVA)		2
Input protection	fuse(A)	8
	breaker(A)	10
distribution input and output min. section	Input side cable section（mm²）	4
	Output side cable section（mm²）	16 (positive and negative pole, copper）
	Ground connection side cable section（mm²）	4

8.2.2 place requirement

Attention	When place machine, please follow below notes
	★ Do not place heavy objects on the product, ★ Please place the product in dry, ventilated environment, ★ The product shell protection grade is IP21S, not suitable for use in the rain, ★ Please place the product at the environment no direct sunlight, wind and rain, ★ please place the product in leveled ground., ★ When the products placed in the tilt plane, should take to prevent the dumping, ★ Please place the product in ambient air temperature is -10 ~ +40 ℃ , ★ Product placement sites should be no violent vibrations and bumps, ★ Please place the product in ambient air in the dust, acids, corrosive gases or substances do not exceed normal levels, ★ Keep the appliance and the wall or other equipment to maintain spacing between the position in more than 30cm.

8.2.3 Connection and safety ground connection

Enforced	Machine power input earth wire and workpiece must be reliable ground.
Dangerous	For your safety of use electric and not electric shock, please follow below attention
 	Touching live parts can cause fatal electrical shock or serious burns. For the welding circuit is open, so when the machine is in working condition, both parts, electrode or the other workpiece, machine input circuit, and electric main circuit and control circuit are all in charged state. Installation not properly and not properly protected, "ground", can also lead to risk of electric shock.
★ Machine should be installed by professional electric technician according to Installation and Commissioning of this manual. Machine and workpiece must be reliable ground. ★ Must disconnected the input power in the distribution box during installation, maintenance and repair products , ★ If the construction site is wet , please install leakage circuit breakers; ★ Do not touch live parts; ★ Ensure reliable insulation of the cable connection parts, ★ Always check the power input cable for damage, if damaged replace it immediately; ★ Please cut off power supply when not use products.	

For machine connect please refer to distribution and capacity of wiring required specification provided in the tech data. before you connect, please cut off the power supply and checking whether the cable damaged or not, all connections must be firm and should be insulated. machine Input power ground wire and the workpiece must be reliable "ground"; welding cable connections must be solid and reliable firm, please check whether the standard welding wire and placed of machine is correct, if this meet the "9.2" article requests can be combined on the power distribution box power switch, make power supply to the product.

9. Use and operation

A. **How to repair aluminum plate car body:**

1. Aluminum metal plate repair:

The thickness of aluminum alloy plates are usually 1.5 to 2 times little than steel plates and melting point also lower the, easy to deform when heated. Collision deformed by the impact of work-hardening is difficult to second shape, crack and fracture will occur if force to repair the workpiece. Therefore, when injury of aluminum plate up to certain degree, should be assembly replaced or split replace damaged parts (the manufacturer does not recommend repair). Replace the aluminum structural parts, connection rarely used with steel body repair welding method, instead of using adhesive or adhesive, riveting common approach. As the replacement cost of aluminum alloy sheet is relatively high, so the maintenance technician on a number of minor injuries to the panel will take some of the methods of repair. However, the repair work should be fully informed of the basis of characteristics of aluminum, and operate carefully.

(1) The extensibility of aluminum is large, will be difficult to restore to its original shape and size after collision. Technicians can use the wooden hammer or a rubber hammer to grind dislocation percussion hammer to reduce the aluminum extension. If it is necessary to grind orthotopic hammer percussion, tapping many times, otherwise it will increase the damage of aluminum. Before repair dent part, should first check type of deformation. Use wood hammer or rubber hammer tap uplifts to release the stress impact, this would reduce the possibility of a hard bend breakage. Do not repair the depressed region to rise too much time, tensile aluminum should be avoided. When repair of the aluminum plate, can use aluminum collision repair machine to alignment the collision part, then use special tools to cut off meson welding screw, grinding can be flat. Saying the steel car body, when the plate and the inner structure deformed simultaneous, that can adopt occlusion repair methods that repair separately inside and outside layer of collision part. Aluminum body repair are not adopt this methods. Or will lead to crack and fracture due to the tenacity of aluminum is small.

(2) Before rectify, should first appropriately heat the aluminum plate, which is obvious difference with traditional steel repair. Rectify steel plate should generally try to avoid heating, so as not to reduce the strength of steel. While repair of aluminum plate, should heating first to increase its plasticity. If not heated, rectify strength applied will cause cracking of aluminum. However, the melting point of aluminum is low (660 ℃), excessive heat can cause distortion or aluminum plate. Therefore, when heating of the aluminum plate, should use thermal coating material at 120 ℃ or thermal "pen" painting around the injury site, mark a radius of 20 ~ 30mm. by this methods, can real time monitoring the temperature by recognize the change of color.

(3) if the aluminum plate extension occur, can adopts heat shrink methods to deal with. Should slowly cooling the shrink part, make it not sharp cooling that can avoid excessive shrink lead to deformation of plate. In addition, aluminum repair should prohibit the use of hammer which used in steel body repair steel used in body repair, to avoid cracking of repair parts.

2. Aluminum alloy sheet welding

welding of aluminum alloy is use inet gas under normal circumstance. However, due to the annealing effect during the welding process, welding strength losses is big. After repair, the vehicle vibration and bumps will cause weld cracks. Therefore, welding methods rarely adopts in aluminum car body repair (only a few manufacturers allows welding method), but usually by adhesive or adhesive, riveting methods. Nevertheless, the repair welding in aluminum alloy body is also existed. Replace structural parts, usually adopts welding methods among structural parts to enhance the vehicle's integrity and electrical conductivity. Please pay attention to below point to ensure the final repair quality.

(1) Making aluminum welding, should make body’s protection work as operating specifications, also should be careful the magnesium or aluminum-magnesium alloy can not be welded. Because the metal are combustible, fire extinguisher in case of combustion can not be extinguished, but only using a special chemical agents. Therefore, in the aluminum car body repair, should view the relevant information to confirm the plate's composition, and in strict accordance with the requirements of manufacturers repair operation, the site should not be welded can not be welded.

(2) Wax or grease should be use to make clean welding area before operate welding work. If the surface has coating, should used with the grinder wheel in number 80 grading around the coating to wore off, until the metal surface exposed out in order to ensure quality of welding.

(3) in accordance with the instructions to adjust welding voltage and wire feed speed, but the general manual on just about given numerical values, technicians should be operate based on their experiences and circumstances to make the appropriate adjustments. For welding steel body, voltage and wire feed speed adjustment to normal value, the welding area will has a smooth crisp "creak" sound, but when given a smooth aluminum welding will has "buzzing" sound.

4) Making aluminum alloy plate welding, should use aluminum welding wire and 100% argon gas, gas flow rate should be increased by 50% compare to weld steel body. Welding gun and welding parts should be close to vertical, adopts forward direction welding method (left welding methods), can not reverse in the aluminum plate welding (welding push forward), so as not to collapse or breakdown caused by hot melting. When making vertical position welding, should work from bottom to up.

3. Plates replacement

When the aluminum body plates cannot be recovered after collision, should take partial or total replacement method to make repair, especially if the hardened aluminum alloy plate, the injury part has cracks or breakage. Replacement of aluminum alloy plates are common method of aluminum alloy body repair.

(1) separation of aluminum alloy plates, they can use the cutting saw, cutting wheels, chisel and other tools, no much difference compare with the steel body plates separation. but is not allowed if the acetylene - oxygen cutting in aluminum alloy plates separation. In addition, because rivet on

aluminum body is usually made by high-strength special alloy material (such as boron steel), the rivets so are cannot removed by the traditional methods such as drill. The correct way is to use dedicated welder meson pin(not re-use) on top of rivet, then drawing the rivets by special drawing tool. Before welding meson pin, should first polish the painting of the top of rivets, when in the drawing, the special tools and rivets should be on vertical state.

(2) Mechanial fastening and welding are the two main traditional connectional methods on car body. But most of the aluminum body components are bonding by spice or together of splice and riveting. therefore, the replacement of aluminum alloy plates should be strictly in accordance with the manufacturer's technical requirements, use original parts or assemblies provided by the right choice of cut location and connection access. the common connection methods during steel car body repair, has three ways , is flush joint, flat insert and lap joint. When replacing the aluminum alloy plates, this three methods also work, but only a few manufacturers allow use of flush joint (welding) method. Aluminum alloy plates are used more flat inset and lap joint methods. When connected adopts flat inserts method(such as the first longitudinal beam, beam below, door stand column), generally can be divided into two methods. One is the separation of the plates, gently input the insert part(factory provided or self made), after the precise location of the replacement parts, drilled on both sides of the cut line match with the rivet hole, then get out the part, deburring, clean, dehumidify, ,

use special glue gun and lateral spread special adhesive evenly, once again put the insert part in. after measurement and according to the hole punched, use special rivet to make draw rivet. Another method is interval drill spare holes on the straight line which for cutting, and then be cut along the straight line. Put insert part into and fix the replaced plates. Re-drill on the position of hole has punched, take out the insert part. Make glue after finish all repair work, reinsert the insert part, fix position then draw rivet. When replace plate adopts has been drilling in good position to re-drill hole, When using lap joint method to replace plate, except conventional methods, sometimes in order to obtain sufficient strength and satisfaction of the visual effects, especially in certain position not appropriate to use flush joint, can use the spare parts factory provided to make lap joint. This method are common use at appearance parts. such as the rear fender of car, and etc.

(3)Compare to the steel car body repair, fixed position of aluminum body plates is more important. Bond of aluminum body plate require a longer cure time (25 ℃ need 36h). If shift or changes occur after glue cured body, this is a disastrous. Therefore, must use fixed clamp or universal fixturing to fix the replace part after measurement. In the repair of aluminum alloy body, there have many precautions should attention, such as some special color bolts on aluminum alloy car body, should be replaced in accordance with the requirements of manufacturers, must not be reused. Replace of plates, should also has comprehensive understanding of performance, notes and operation methods of adhesive glue and variety of special tools. In brief, people engaged in aluminum alloy body repair work must take specialized training, this is the only way to guarantee quality of aluminum alloy body repair.

B． Stud: setting the welding voltage at 130V-170V, according to the thickness of the workpiece. Plug in stud welding gun.

Ensure that the installation is completed, starting: open power switch behind the host machine, press knob for 3 seconds, the machine will starting up. Shutdown: Press knob for 3 seconds, you can shut

down. Shutdown and cut off power supply.

1. Contact the convex plate of the stud boss with workpiece, (see Figure 2a)
2. press the gun switch after the indicator light on show has filled, the capacitor in the tremendous energy released by a small convex plate, convex plate melt, and generate arc, under the pressure of the spring of gun, stud move downward(see Figure 2b)
3. Arc hot melting the entire face and the corresponding surface of stud, while stud continued move downward(see Figure 2c)
4. Insert stud to melting pool, the arc extinguished (see Figure 2d)
5. welding process of stud completed (see Figure 2e)
6. Screw the inner sleeve in the studs, then hook round hole with hammer and pull out.

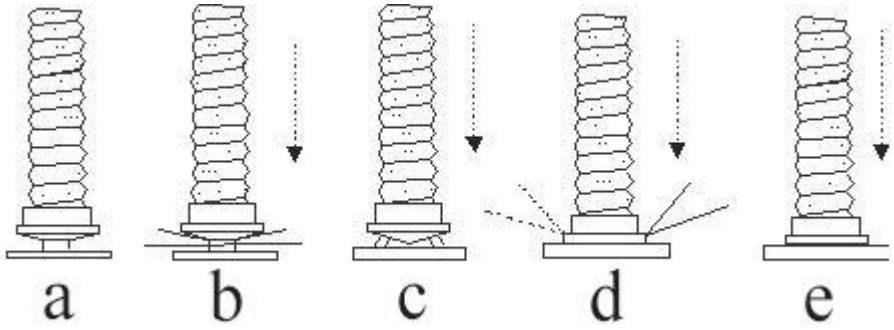


Figure 2

C. pentagonal flat washers: setting the welding voltage at 70V-90V, according to the thickness of workpiece. Plug flat pad welding gun.

plug the Pentagon flat washer into the gun openings, and flat pad angle close to the workpiece, pressing the switch, that is, to complete a plant. (Figure 3 left)

Then hook Pentagon flat washer with pulling hammer, then hold hammer, strike outside of the car with hammer along the axial tension, sometimes repeated several times, to recovery the car dent. If the dent area is large, should melting more pentagonal flat washers, when repair work finished, can dismount the washer just by gently remove the hammer. (Figure 3 right)

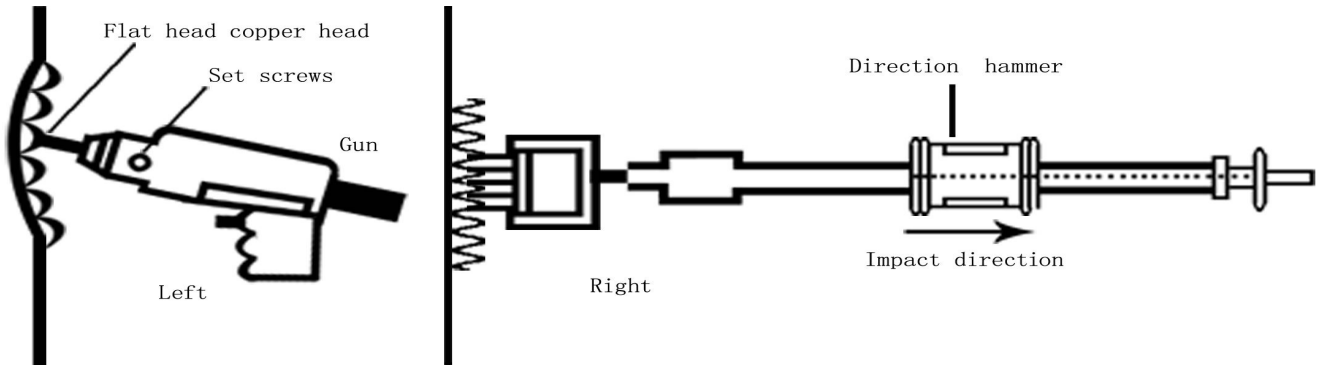


Figure 3

Note: please do not touch live parts when the machine in power state, for the machine has storing a large amount of power, the machine will automatically discharge after cut off power.

10 Care and Maintenance

For your safe and efficient use this product, please maintain it regularly. Please first cut off the power supply if you want to maintain the machine. product maintenance and electrical maintenance should operate by professional personnel.

10.1 Users should always check the ground cable is connected securely.
10.2 check and clean the machine every three to six months. Clear away the dust inside of the machine with dry compressed air. The control circuit board need special treatment.
10.3 if machine have been sit idle, should be empty running not less than 2 hours every three months.
10.4 Check if the connector is loose or corroded regularly.
10.5 Check if the welding cables, products power input cable and grounding cable is old or damaged, if the insulation lower to avoid causing injury or product damage.
10.6 users must strict operate machine accordance with the provisions of this manual, Product warranty one year from the date of delivery on the basis of proper installation and operation.

11Commom fault and shooting methods

Fault symptom	Cause of failure and Shooting methods
Connect power, power indicate light not work	Power supply lacking phase or switch damaged check power supply, replace switch.
Voltage cannot adjusted with rotate of the knob Voltmeter is always indicated on the smallest, can not transfer large when voltage to a voltage value, the size can not be adjusted when open power switch, voltage meter rush to maximum value, can not transfer to small	Voltage regulation (including rough tuning and fine-tuning) knob damaged, check and replace. Voltage meter is damaged, check and replace, Control panel component failure, replace the control board The main circuit used to control the charging of silicon damage (100A/1600V), check and replace.
Machine not work after press the gun	switch of gun damaged or the control wire broke. control board broken Control transformer broken check control wire and replace switch. replace control board. replace control transformer（500A/1600V）
Not press gun switch, stud discharge as contact workpiece.	Main control silicon short circuit to breakdown(500A/1600V), check and replace, Welding gun switch is short circuit, check and replace, Main control board damaged, check and replace.
Stud welding not firm	Voltage adjusts too low, adjust charging voltage accordingly and retest, if the stud is appropriate or not. Welding cable not fix connect with earth wire, or other wire loosed, Part of capacity damaged, discharge capacity not enough,

	Outer diameter of stud not appropriate, or it not fit with aperture of chuck. Pressure of spring on gun not enough
Stud tilt	Welding operation not right, stud welding gun not vertical with the surface of welding workpiece.
When the switch on panel cut off, charging voltage cannot drop to zero.	Power supply switch damaged, check and replace, Discharging resistance(5/50W) damaged, check and replace.
 Attention	If meet any problems not clear or exclusive, should cut off the machine and inform failure to technician, nonprofessional electrician not allowed disassembling this machine.