



CORROSION CONTROL



**Operation Manual**  
*Welding Generator/Invertor Compatible*  
*Pin Brazing Guns*

**Standard Pin Brazing Gun Part # 273 199 0240**



**Extended Pin Brazing Gun Part # 273 199 5230**



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## 1.0 INTRODUCTION

Thank you for choosing the Easybond Generator (Inverter) Pin Brazing Gun, if operated and maintained as recommended your equipment should give you many years of reliable use.

Pin brazing is an easy, metallurgical safe method of making electrical connections to steel and ductile iron pipelines, as well as other metallic substrate that are to be cathodically protected, electrically earthed or electrically bonded.

The Easybond Generator (Inverter) Pin Brazing Gun is designed to run off a Welding Generator Inverter and is ideal for attaching bracelet anode cables to steel inserts and pipelines at pipe coating terminals, lay barges and workshops where a large number of brazes are required in a short period of time at a static location.



**It is important that you carefully read and understand this manual and take time to watch the training video supplied with your equipment prior to operating your equipment.**

## 2.0 SAFETY

### 2.1 SYMBOLS USED

	Read all manuals before using equipment
	Wear overalls during operation
	Wear safety boots during operation
	An exposed surface is very hot and therefore dangerous
	Wear safety gloves during operation
	Wear eye protection during operation
	Wear dust mask during operation
	Wear ear defenders during operation
	Observe the instructions in the text or graphic opposite
	Worn out electrical products that should be sorted for recycling
	Possible dangerous situation that could cause severe or fatal injury



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## 2.2 SAFETY REGULATIONS

The safety of staff must be of prime consideration every time that pin brazing work is carried out on the site and a full and comprehensive risk assessment must be completed prior to any pin brazing being undertaken. Pin brazing operators must comply with all current safety legislation and the specific safety requirements procedures of the site and plant owners.

## 2.3 GENERAL SAFETY WARNINGS

Under no circumstances should the pin brazing equipment and its accessories be operated in explosive atmospheres, such as in the presence of flammable liquids, gases, or dust. The equipment will create sparks that may ignite dust or fumes.

Always ensure that the equipment is well maintained and never make any modifications to the equipment or use spare parts and consumables not manufactured or recommended by BAC.

Never operate the equipment when tired, after drinking alcohol, taking drugs, or taking medication that may make you drowsy.

Keep bystanders away whilst operating the equipment.

Do not abuse the cables and connectors and never use the cables for carrying or pulling the equipment. Always use the optional extension cables when required.

## 2.4 OPERATOR COMPETENCY

It is highly recommended that operatives undertaking pin brazing for any form of attachment should have attended a BAC approved training course in the pin brazing technique and hold a current certificate of competency

## 2.5 PERSONAL PROTECTIVE EQUIPMENT (PPE)

The following personal protective equipment is recommended whilst using the Easybond equipment:



Overalls – conforming to EN ISO 11612:2008 or equivalent.



Safety Footwear – conforming to EN ISO 20345: 2011 S3 or equivalent.



Protective Gloves - conforming to EN12477:2001/A1:2005 Type B or equivalent.



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Eye Protection - conforming to EN175:1997/166:1995/169:1992 or equivalent.



Dust/Fume respirator – conforming to FFP3 to EN149:2001 or equivalent.



**Note: that when using the optional 18V grinder (part #273 199 0685) you must carefully read the specific instruction manuals for this equipment. The manuals detail the safe operation of the equipment and the PPE required during their use.**

### 3.0 PARTS

Parts that are damaged or defective in any way should be replaced. Experience has shown that it is uneconomical to replace single parts. The package system is designed to replace complete sets of parts to ensure effective repair and reliable operation.

### 3.1 SPARE PARTS

A full set of spare parts for pin brazing equipment is available off the shelf for immediate despatch.

We offer a fast and efficient equipment refurbishment / repair service using genuine spare parts fitted by expert technicians. Most repairs can be completed within a few days, keeping expensive downtime to a minimum.



If you are offered any pin brazing consumables or parts from sources other than from BAC directly or a local BAC appointed Distributor/Agent then we strongly advise that you do not use those consumables with BAC pin brazing equipment to avoid any serious risk to people, pipelines and BAC pin brazing equipment. If in doubt contact BAC.

**All BAC products are manufactured to the highest standards under our ISO 9001:2008 procedures. If the use of non BAC pin brazing products and consumables is evident then warranties will be void. All BAC pin brazing supplies now carry the following notice:**



**Always use genuine**



**Pin brazing consumables and components** to avoid any risk to people, pipelines and BAC pin brazing equipment.



#### 4.0 PINBRAZING USING A WELDING GENERATOR AS A POWER SOURCE

When a welding generator is to be used in place of the battery pack it must be "calibrated" to the pin brazing gun and must conform to the following specification:



- Power output 300 amps DC minimum
- Negative earth
- Output voltage adjustable (max 45v)
- Capable of fine adjustment

#### 4.1 SETTING UP THE WELDING GENERATOR

The current and voltage of the welding generator will require adjusting in order to achieve the optimum braze as indicated in section 6.0 Fig 7.

In order for the brazing gun to operate satisfactorily the minimum required welding generator output is 240A 36V DC, however due to variables such as cable lengths and other factors that may introduce a resistance it will be necessary to make some trial brazes and adjust the welding generator output until the set output is achieving an acceptable pin braze. A note of the settings should be made for future reference.



- Initially adjust the current output to 240A DC negative earth\*.
- Adjust the output voltage to 40V DC\*.
- Load the brazing gun as detailed in section 5.1 Fig 2.
- Adjust the brazing gun as detailed in section 5.2.
- Make a series of test brazes and adjustments as necessary until and acceptable braze as detailed in section 6.0.
- Make a note of the Generator (Inverter) settings.

*\*Or as close as is practical.*

#### 5.0 PREPARATION OF THE SURFACE

It is crucial in order to achieve a successful pin braze, the area of connection onto the pipeline (or other metal substrate) has a clean bright metal finish. In order to achieve this some degree of surface preparation will be required.

Pipeline and plant owners often have their own procedures for surface preparation and you should fully familiarise yourself with these procedures prior to any surface preparation works.



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## STEP ONE

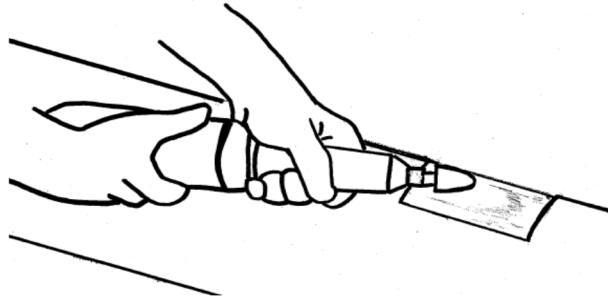


Figure 1

If necessary, the surface encompassing the pin braze area and adjacent earth connection shall be degreased with a suitable solvent before any grinding operation.

Scrape and clean the steel and clean an area for the earth device as near as possible to the braze area as illustrated in [STEP ONE - figure 1](#)

The metal surface must then be prepared to a bright clean finish to ensure a sound electrical connection between the earth device and the substrate. Never continuously work the metal such that any wall thickness is reduced. If in doubt use an Ultrasonic wall thickness measurement instrument to type test and validate the pipe cleaning procedure.

An area sufficient to accommodate the brazing pin and cable lug must be correctly located and cleaned to a bright metal finish.

There are many stone and coated abrasive disks available that are suited to pipe surface preparation and that also minimise metal loss.

To prevent the cleaned metal surface re-oxidising, we recommend that pin brazing must take place as soon as possible after surface preparation, i.e. not more than 15 minutes delay.

Note that when using the optional 18V grinder (part #273 199 0685) you must carefully read the specific instruction manuals for this equipment. The manuals detail the safe operation of the equipment and the PPE required during their use.



### IMPORTANT:

When using the Pin Brazing cable lug never grind, file or abrade the pipe side of the lug as there is a stand off nipple that allows the molten braze material to seep under the lug. Removing this may compromise the bond quality.



## 5.1 LOADING THE PIN INTO THE BRAZING GUN

Load the gun with a brazing pin and ceramic ferrule individually by hand. Ensure that they are both back fully inserted and tight with the palm of your hand, as illustrated in [STEP TWO – figure 2.](#)

### STEP TWO

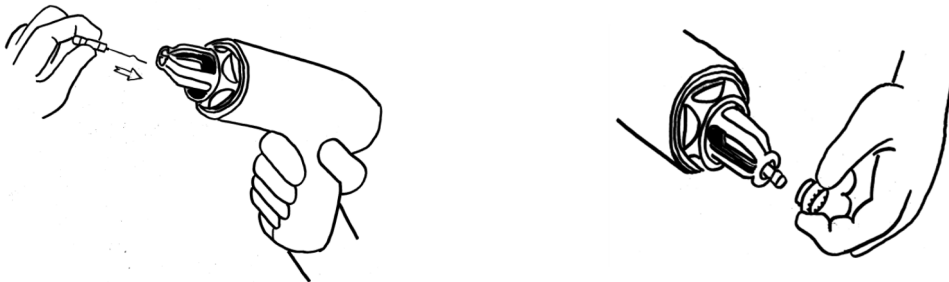


Figure 2



#### **DO NOT STRAIGHTEN THE KINKED END OF THE PIN FUSE WIRE.**

The legs of the pin holder must be adjusted as necessary to ensure a firm grip of the pin while maintaining concentricity with the ferrule holder.



#### **Important:**

**Under no circumstances should a brazing pin which has been inserted and then removed from the gun be re-inserted and used for brazing without checking the kinked end profile and fuse wire connection to pin.**

## 5.2 ADJUSTING THE BRAZING GUN



Before connecting the earth clamp to the steel, adjust the brazing pin "lift height" as follows:

Hold the copper cable lug flat on the steel surface. Insert a loaded brazing pin into the hole in the cable lug and press the gun/ferrule against the surface of the lug evenly overcoming the internal spring. Rotate the ferrule holder until the white adjustment indicator tube is flush with the gun's rear face. The brazing gun should now be correctly set.

When using threaded brazing pins, i.e. M8 brazing pin, the ceramic ferrule must be flat against the steel surface when checking the white adjustment indicator tube.



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See figure 3 below.

### STEP THREE

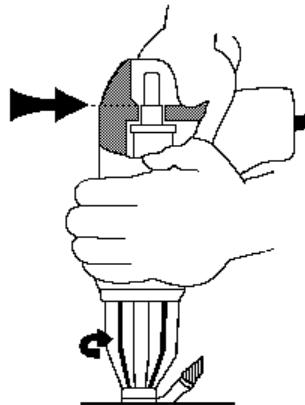


Fig. 3

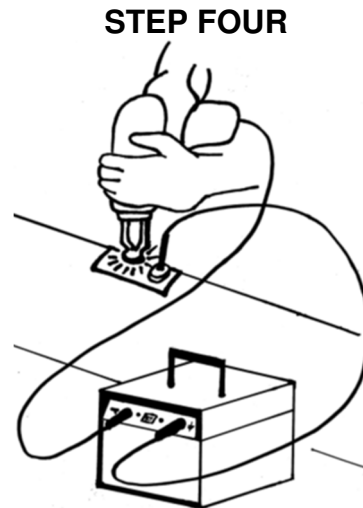
Note: Pin, ferrule and cable lug must be in position during adjustment!

### 5.3 LOCATION OF CONNECTIONS

The desired position of the required pin braze area should be accurately marked on the steel. Do not use any oil based marker e.g. spray paint, as this will contaminate the grinding burr.

When pin brazing onto a coated pipeline then sufficient coating needs to be removed in order to accommodate both the earth device and area of the pin braze, this would be a minimum of 14 cm x 4 cm using the standard earth device. If the earth device is placed on a separate earth point on the pipe then the area required at the pin braze point will be a minimum of 4 cm x 4 cm.

## 5.4 MAKING A PIN BRAZE



**Fig 4**

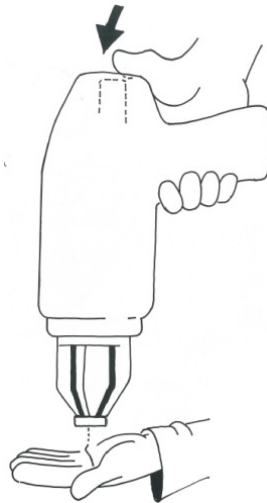
- The earth lead attachment must be applied to the cleaned surface to ensure a sound electrical circuit.
- The brazing gun must be correctly adjusted with the correct pin and ferrule fitted.
- Locate the brazing pin so that the pin is in the centre of the hole in the cable lug. For vertical surfaces, the pin must be at the upper part of the hole in the cable lug.
- Apply sufficient pressure on the brazing gun so that you are overcoming and fully compressing the internal spring and that full contact is made between the ferrule, the brazing pin and cable lug onto the substrate. For threaded pins it will be the ferrule and the brazing pin.
- When the operator is ready to braze he should look well to one side to protect his eyes from glare. The operator's stance should be stable enough to enable this movement to be made without altering the critical positioning of the gun. The operator should advise any other nearby personnel that he is about to braze.
- Hold the gun firmly and close the circuit by squeezing the trigger.



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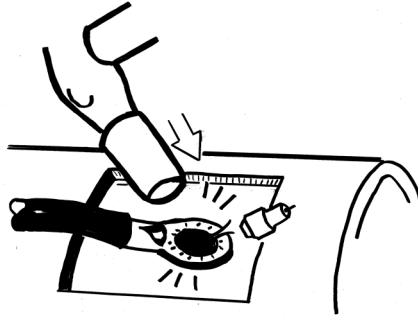
**KEEP THE TRIGGER DEPRESSED UNTIL THE BRAZE IS COMPLETED.**

- After about 1½ to 2 seconds the fuse wire should rupture, disconnecting the circuit. The arc will extinguish and the pin will be shot forward into the molten braze filler.
- ! In the event of a fuse not rupturing after the normal time, the gun must be withdrawn completely from the work keeping the trigger depressed.
- ! After the fuse has ruptured, the gun must be held in place for at least a further 3 seconds to allow the braze to set.
- Remove the gun by pulling straight off the pipe or substrate in line with the brazed pin, then break out the ferrule if this is remaining in the ferrule holder. This can be achieved by levering against a suitable edge. Beware, it may be hot.
- ! **Hold the gun in a vertical position then depress the ejector button to expel the remaining fuse wire. Catch the wire in your hand to ensure it has been ejected, as illustrated in Fig 5**



**Fig 5**

## 6.0 TESTING A COMPLETED BRAZE



**Fig 6**

The shank of the 8mm brazing pin must be carefully broken off with a hammer, taking care not to damage the lug Refer to Fig 6. This must be done before another pin braze is made to the bond. Compare the completed braze with the figures 7, 8 & 9.

Figure 7. is the correct power setting for the generator.

Figure 8. indicates that too much current is being drawn. Therefore, adjust the generator output down in 10 amp increments and make test brazes until the result is as figure 3. However, if the acceptance criteria is achieved as detailed is 6.1 then the connection may be acceptable, provided it is not continually repeated.

Figure 9. indicates that too little current is being drawn. Therefore, adjust the generator output up in 10 amp increments and make test brazes until the result is as figure 3. However, if the acceptance criteria is achieved as detailed is 6.1 then the connection may be acceptable, provided it is not continually repeated.



**Fig. 7**



**Fig. 8**



**Fig. 9**



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For threaded pins the brazing time is the only guideline and this should be set as close to one and a half second as is reasonably practical. An even fillet of solder around the base of the pin indicates correct conditions.

When the correct result has been achieved note the position of the power dial on the generator for future use. This may not necessarily be near the original 40V 240A setting.

Regularly check the gun lift height as detailed in section 5.2, as repeated use can gradually cause the gun to go out of adjustment.

If the ferrule is not held evenly against the copper lug and is in partial contact then the arc can escape out of the gap and this will result in the side of the copper lug burning away.

### 6.1 ACCEPTANCE CRITERIA OF COMPLETED PIN BRAZE

#### 6.1.1 8mm direct brazing pin and cable lug

- **Mechanical Strength**

When the pin braze is completed it should be tested by firmly hitting the connection twice with a 1KG hammer (do not hit the shank of the cable lug where the cable is crimped). If there is no movement of the cable lug at the connection point then the mechanical integrity can be deemed acceptable. Should there be any movement whatsoever then the connection should be rejected.

- **Electrical Integrity**

Using an Ohm meter with a 4 digit resolution, measure the resistance of the pin braze connection from the cable lug to the pipe. The acceptance criterion is  $\leq 0.010 \Omega$ . Note that the test lead resistance should be measured first and deducted from the absolute resistance measurement.

#### 6.1.2 M8, M10 & M12 threaded brazing pin

- **Mechanical Strength**

Threaded pin attachments should be tested by a torque device. For an M8 pin the torque device should be set to 10 Nm. The threads will fail at 25 Nm, so do not use excessive force. If there is any movement of the pin up to 10 Nm then the connection should be rejected.



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- **Electrical Integrity**

Using an Ohm meter with a 4 digit resolution measure the resistance of the pin braze connection from the threaded stud to the pipe. The acceptance criterion is  $\leq 0.010 \Omega$ . Note that the test lead resistance should be measured first and deducted from the absolute resistance measurement.

Warning: Repeated pin braze attempts must not be made at the same position as this may cause structural/metallurgical damage to the base steel.

### 7.0 EQUIPMENT CHECK

When the equipment is in use, time must be allowed during a working period to carry out the necessary checks and servicing required. Carrying out these procedures will prevent time wasted on site, when work is aborted due to faulty equipment.

Time and personnel must also be allocated to the general servicing of equipment on a routine basis.

If the servicing procedures have been correctly carried out and a problem still exists contact the Technical Service Engineer. If it is necessary to return the equipment for repair, ensure that the complete pin brazing set, including all ancillary equipment, is despatched to permit full functional testing.

### 8.0 ROUTINE MAINTENANCE

#### 8.1 SERVICE SCHEDULE

(numbers in brackets are from [Figure 13](#))

##### Daily

1. Check that the pin and ferrule holders are undamaged and hold the brazing pin and ferrule centrally and securely.

##### Weekly

1. Check and clean the contacts [\(26\)](#) using emery cloth.

## 8.2 REPLACEMENT OF THE CONTACT SET

[Figure 10 Sequence](#) (numbers in brackets are from [Figure 12](#))

### 8.2.1 Dismantling the contact set (26) – 1 & 2 [Figure 10](#)

Open the gun handle plate using the provided allen key (31) to remove screws.

1. Unscrew the flat contact with the spanner (30) and remove the gun cable (27), ensure the spring washer is removed.
2. Unscrew the domed contact and remove from the contact arm (25), ensure the spring washer is removed.

### 8.2.2 Re-assembly

1. Screw the domed contact into the spring bracket (23). Ensure that the spring washer is located correctly in the groove in the contact before tightening. Do not over tighten the contacts.
2. Place the flat contact through the hole in the gun cable lug (27) and offer both up to the location. Use the screwdriver between both contacts to assist with tightening. Do not over tighten the contacts. Replace gun handle plate and screws.

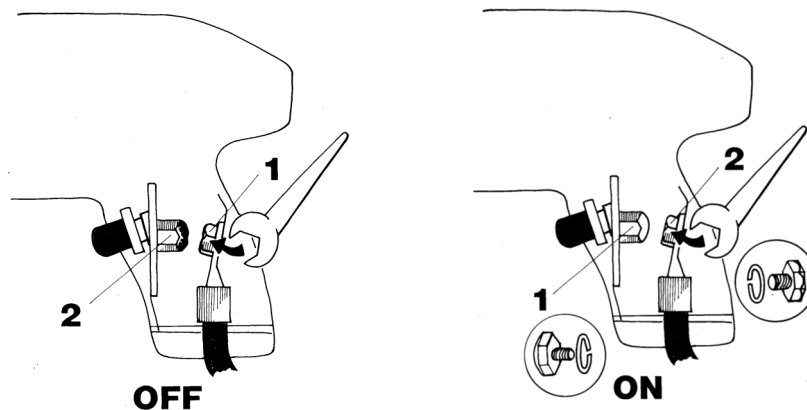


Figure 10



### 8.3 REPLACEMENT OF CONTACT NIPPLE AND CERAMIC WASHER (7)

This section can also be used for the removal/replacement of ferrule holder (1), pin holder (5) and plastic spark shield (6)

[Figure 11 Sequence](#) (numbers in brackets are from [Figure 13](#)):

1. Unscrew by hand the ferrule holder (1).
2. Place allen key (31) in the hole of the front piece silver locking ring (2) and the hole in the front centre piece (10) (turn pin holder if necessary). This will lock in place the centre piece to allow removal of the pin holder (5).
3. Unscrew by the pin holder (5).
4. Remove plastic spark shield (6).
5. Remove ceramic washer (8).
- 6 Using the peg spanner (29) remove and replace the new contact nipple (9). The nipple should be a tight fit and screwed down fully. The nipple should be flush or no more than 0.2mm below the front face. Replace the ceramic washer at the same time (8).

When re-installing the plastic spark shield (6) ensure that the three indentations are correctly seated onto the three legs of the pin holder (5).

Reassemble using reverse procedure and removing allen key before replacing the ferrule holder by hand, lightly grease the thread on the to avoid cross threading. .

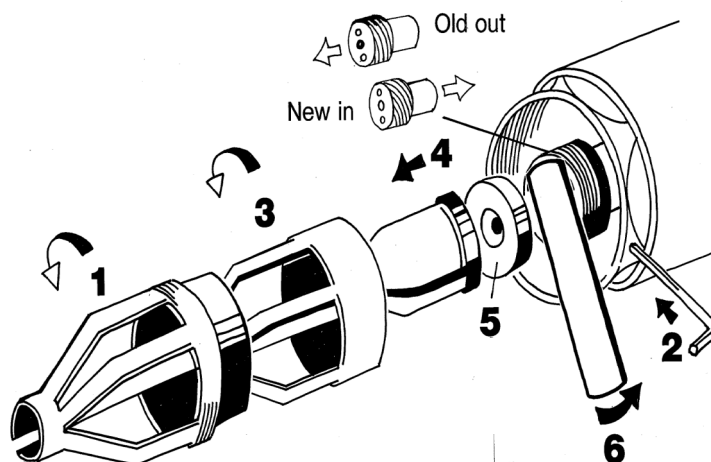


Figure 11



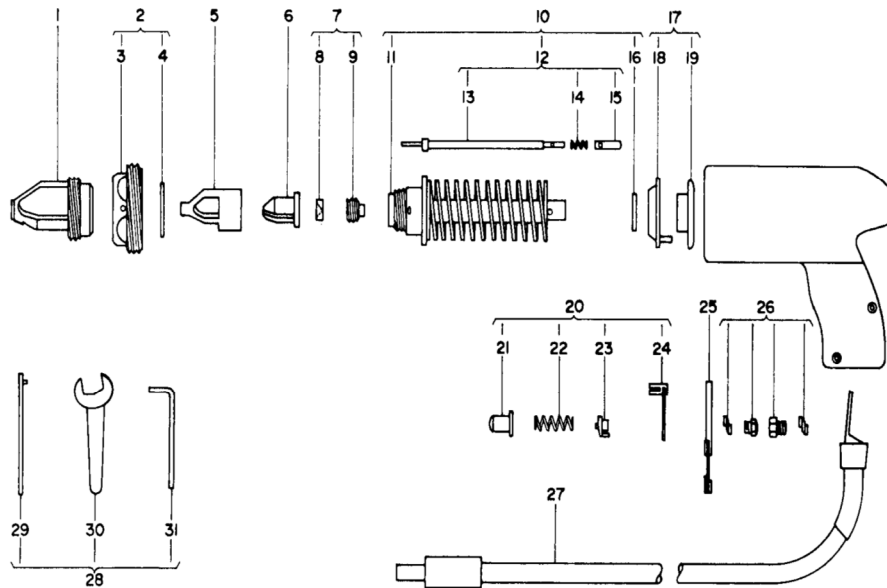
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## 9.0 FAULT DIAGNOSIS OF UNSATISFACTORY BRAZE PIN CONNECTION

Some common problems can be experienced by operators when first using the equipment. Listed below are a series of faults together with the most likely cause and effective solutions. In the event of persistent problems or faults, contact the Service Engineer for advice or repair.

PROBLEM	CAUSE	REMEDY
No arc	Circuit not complete  Generator switched off  Worn Contacts  Trigger malfunction	<ul style="list-style-type: none"><li>• Check fuse wire on pin is engaged</li><li>• Check earth lead is connected</li><li>• Switch on generator</li> <li>• Replace Contacts</li> <li>• Check and repair or replace trigger assembly</li></ul>
Arc time too short (fig.4)	Excessive current drawn  Poor earth connection	<ul style="list-style-type: none"><li>• Adjust generator power down</li><li>• Check setting of gun</li><li>• Improve earth connection</li></ul>
Arc time too long (fig.5)	Insufficient current drawn	<ul style="list-style-type: none"><li>• Adjust generator power up</li><li>• Check setting of gun</li></ul>
Bond falls off when tested	Too short brazing time Base metal not clean enough	<ul style="list-style-type: none"><li>• See above</li><li>• Clean area to be brazed properly</li></ul>
Fuse wire stuck in contact nipple	Pin loose in holder Failure to eject previous fuse wire	<ul style="list-style-type: none"><li>• Tighten fit of pin</li><li>• Replace contact nipple (see manual)</li></ul>

## 10.0. LIST OF PARTS



**Fig. 12**

Item No	Part No	Description
	273 199 5230	Extended Brazing Gun BB1/Easybond
1	270 088 7580	Ferrule Holder for 8mm direct brazing pins
	273 100 1900	Ferrule Holder for M8 threaded brazing pins
	273 088 7730	Ferrule Holder for M10/M12 threaded brazing pins
2	273 190 0560	Front Piece complete with locking ring
4	270 074 8160	Locking Ring
5	270 071 5600	Pin Holder for 8mm direct brazing pins
	273 100 0550	Pin Holder for M8 threaded brazing pins
	273 100 3870	Pin Holder for M10 threaded brazing pins
	273 100 1230	Pin Holder for M12 threaded brazing pins
6	270 071 5610	Spark Shield
	273 190 4801	Magnetic Earth Device with Generator Plug

Item No	Part No	Description
7	273 190 0570	Contact Nipple and Washer (5 pack)
10	273 074 8220	Centre Piece Complete (For Standard Gun)
10	270 088 7590	Extended Centre Piece Complete (For Extended Gun)
12	273 190 0580	Ejector Rod Complete (For Standard Gun)
12	273 190 4580	Extended Ejector Rod Complete (For Extended Gun)
16	270 071 5340	Remanence Washer
17	273 190 0590	Conductor Ring and Insulating Ring
20	273 190 0600	Trigger Assembly
25	270 071 5700	Contact Arm
26	273 190 0110	Contact Set Complete
27	273 190 4599	Cable 35mm sq. 2.7m long
28	273 190 0610	Tool Kit



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## 11.0 WEEE



This product is marked according to the European Directive (2002/96/EC) on Waste Electrical and Electronic Equipment (WEEE)

This symbol appearing on the product, on the product accessories or on the product packaging means that the product must not be disposed of as household waste. When the product / batteries durability is over, please, deliver the product or batteries to the respective collection point, where the electrical appliance or batteries will be recycled. The places, where the used electrical appliances are collected, exist in the European Union and in other European countries as well. By proper disposal of the product you can prevent possible negative impact on the environment and human health, which might otherwise occur as a consequence of improper manipulation with the product or batteries. Recycling of materials contributes to the protection of natural resources.

For further information contact

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BAC Corrosion Control Ltd. EEE producer registration number WEE/DC203WX



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NOTES



NOTES

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A large, empty rectangular box with a thin black border, intended for handwritten notes.



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