

# Weldability®

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Peters House, The Orbital Centre, Icknield Way, Letchworth Garden City, Hertfordshire. SG6 1ET. United Kingdom  
UK sales tel : 0845 130 7757 | int'l tel : +44 (0) 1462 482200 | UK sales fax : 0800 970 7757 | int'l fax : +44 (0) 1462 482202  
web: [www.weldability-sif.com](http://www.weldability-sif.com) email: [sales@weldability-sif.com](mailto:sales@weldability-sif.com)

*Only The Best From...* 

## PIPE CUTTING MACHINE

### BCG30PCM

### USER MANUAL

## PARTS LIST AND SPARE PART PRODUCT LISTING



Registered in England No. 1684362  
Registered Office: as above

## **INTRODUCTION**

Read this instruction manual thoroughly to ensure correct, safe and effective use of the machine.

## **SAFETY PRECAUTIONS**

This product is designed to be safe, but it can cause serious accidents if not operated correctly. Those who intend to operate or repair this machine must read the manual thoroughly before use. Keep the manual near the machine so that anyone operating the machine can refer to it as necessary.

- Do not use the machine without following the instructions in the manual.
- Use the machine **only** after you have read and completely understood the contents of the manual.
- Keep the manual to hand at all times and read it as many times as necessary for a complete understanding.
- If the manual becomes lost or damaged, please contact our sales office for a replacement, or your local distributor.
- When transferring the machine to a new owner, be sure to hand over this instruction manual.

## **MACHINE OPERATOR KNOWLEDGE**

Operators and repair staff of this machine must completely understand the contents of the instruction manual and have completed a training course in gas welding.

# **1. SAFETY INFORMATION**



Many accidents are caused due to a disregard of the basic safety rules during operation, inspection and maintenance. Carefully read, understand and master the safety measures and precautions outlined in this instruction manual and on the machine before operating, inspecting and maintaining the machine.

## **WARNING**

This word has been used as a warning to the user at places on the machine that could cause injury or lead to a serious accident.



## **CAUTION**

This word has been used to draw the attention of the user, in the form of a message and a caution label located in places that could cause slight injury or damage to the machine. They are also used as a caution to warn against frequent dangerous actions.



## **NOTICE SIGNS**

This sign shows the machine operators and maintenance engineers items that relate directly to the damage of machines and surrounding facilities and equipment.

## **GENERAL MACHINE SAFETY PRECAUTIONS**

Read and fully understand the following important safety information:

### **1.1.1 MACHINE SAFETY**

1. The machine casing is mainly made of aluminium alloy to reduce weight. For this reason, be careful not to drop heavy items on the machine, or drop the machine when carrying it as the alloy is not designed to withstand such impact.
2. When attaching hoses to the torch and distributor, tighten the nut with the attached wrench. After attaching, be sure to check there is no gas leak with a detection spray. If a gas leak is found, retighten the nut firmly, and re-check for a leak.
3. When fixing a tip to the torch, tighten the nut with the two wrenches. In addition, avoid damaging the taper of the tip as this may cause backfire.
4. Never tamper with the machine other than during maintenance and inspection as the machine may malfunction.
5. Never remodel the machine. Remodelling is very dangerous.

### **1.1.2 SAFETY CLOTHING**

1. Be sure to wear protective clothing – (gauntlets, goggles, helmets and safety shoes) during operation.

### **1.1.3 OPERATION AND HANDLING SAFETY PRECAUTIONS**

1. Read this instruction manual before operating the machine.
2. Mount and centre the machine correctly and confirm correct direction before operation.
3. Prior to operating the machine, check the safety of the surroundings to avoid accidents.
4. Never move the machine while the preheat flame is on.
5. Take great care of spatters when operating the machine at an elevated position as this may cause injury to people below.
6. Ensure there is no obstruction (foreign bodies) on the pipe which could cause the unit to cease rotating.
7. Weak chain tension will result in the machine slipping. Set the appropriate tension on the chain.
8. Be careful not to get your hand caught between the upper plate and slide bracket.
9. When stretching the chain, be careful not to get your hand caught in the wing bolt.
10. Do not insert your hand into rotary sections (sprocket and wheel).
11. Be careful not to drop the machine when changing the chain.
12. Do not use deformed or rusted chains; otherwise the chain may be disengaged.
13. Do not mistake the top and bottom sides of the chain.
14. The number of chains must match the pipes.
15. Do not place the machine on pipes when it is unused.
16. Be careful not to damage the wheels as the machine will not cut in a straight line.

#### **4.4.4 MAINTENANCE AND INSPECTION PRECAUTIONS**



1. Ask a qualified electrician to perform repairs and inspection service.
2. Maintain the machine periodically

#### **4.1 GAS CUTTING SAFETY PRECAUTIONS**

Strictly observe the safety rules and precautions to ensure the safety of gas cutting operations. Operators and supervisors MUST keep safety in mind.

##### **1.2.1 PREVENTION OF EXPLOSION**



1. Never cut pressurised cylinders or hermetically sealed containers
2. Ensure sufficient ventilation for gas cutting.

##### **1.2.2 PRESSURE REGULATOR SAFETY PRECAUTIONS**



1. Before starting operation, check that all pressure regulators are operating correctly.
2. Ask a skilled repair engineer to perform maintenance and inspection service.
3. Do not use pressure regulators from which gas is leaking, nor malfunctioning pressure regulators.
4. Do not use pressure regulators smeared with oil or grease.



##### **1.2.3 HIGH-PRESSURE GAS CYLINDER SAFETY PRECAUTIONS**

1. Never use broken cylinders or cylinders from which gas is leaking.
  2. Install cylinders upright and take measures to prevent them from falling.
  3. Use cylinders only for specified purposes.
  4. Do not smear cylinder valves with oil or grease.
  5. Install cylinders in a place free from heat, sparks, slag and naked flame.
  6. Contact the distributor if the cylinder valves will not open.
- Never use a hammer, wrench or other tools to force open container valves.

## **1.2.4 SAFETY PRECAUTIONS FOR HOSES**



1. Use the oxygen hose for oxygen gas only.
2. Replace cracked hoses or other hoses damaged by sparks, heat, unshielded fire etc.
3. Install hoses without kinking.
4. To prevent breakage of hoses, take great care during operation and transportation.
5. Do not hold the hoses when moving the machine
6. Periodically check the hoses for damage, leakage, fatigue, loose joints etc. to ensure safety.
7. Cut hoses to the minimum possible length. Short hoses reduce hose damage and pressure drop, as well as reduce the flow resistance.

## **1.2.5. SAFETY PRECAUTIONS FOR FIRE**



Take safety precautions to prevent fire prior to gas cutting.

Ignoring hot metal, sparks and slag could cause a fire.

1. Keep a fire extinguisher, fire extinguishing sand, bucket of water etc ready on the site where gas cutting is performed.
- 2.** Keep flammables away from the cutting area to avoid exposure to sparks. Always allow steel plates to cool that have become hot after cutting, as well as hot cut parts of scrap, before bringing them close to flammable materials.
3. Never cut containers to which flammable materials are stuck.



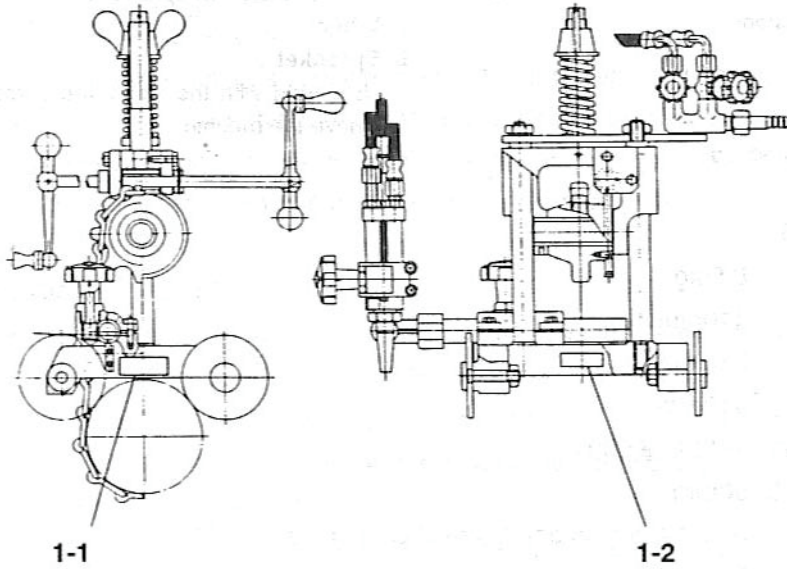
## **1.2.6 SAFETY PRECAUTIONS FOR SKIN BURNS**

Observe the safety precautions to prevent skin burns. Ignoring heat, spatter and sparks during operation could cause a fire or burn the skin.

1. Do not perform cutting near flammable items. (Move flammable items well away from the sparks.)
2. Do not cut containers filled with flammable materials.
3. Do not keep lighters, matches and other flammable items nearby.
4. Flames from the torch will burn skin. Keep your body away from the torch and tip, do safety checks before operating the switches and valves.
5. Wear the correct eye, hand and body protection.
6. Correctly tighten the tip to prevent backfire.
  - When fixing a tip to the torch, tighten the nut with the two wrenches.
  - If the tip is tightened excessively, it will be heated during cutting and become tighter, making it difficult to remove the tip.
  - Avoid damaging the taper of the tip since this may cause backfire.
7. Check with leak detector for any leakage of gas from the connection part of the distributor, hose and torch. Never use oil or grease on the connection of the oxygen pipe to avoid backfire which may lead to an explosion.
8. Be sure to check the following when igniting:
  - Place the torch on the torch holder before igniting.
  - Always wear the required safety protection (gauntlets, goggles, helmets etc)
  - Check for any obstacles, dangerous materials and flammables near or in the direction of cut.
  - Determine the gas pressure. The gas pressure must be within the appropriate range. (For the gas pressure, refer to the Cutting Data).
9. The torch, tip and heat shield are heated to very high temperatures. Always wear gauntlets when handling them. The surface after cutting will be very hot, so do not touch it even whilst wearing gauntlets.
10. Never move the machine while the preheat flame is on.

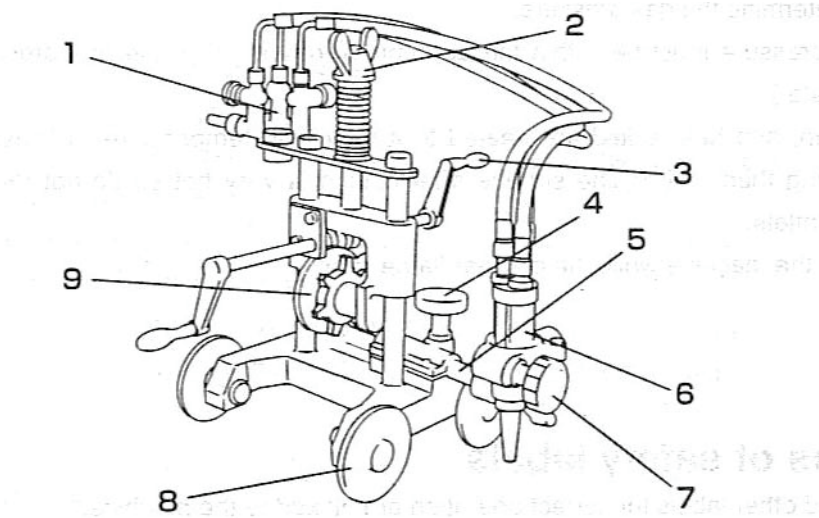
## 2. LOCATIONS OF SAFETY LABELS

Safety labels and other labels for the correct operation are affixed to the machine. Carefully read the labels and follow the instructions on them when operating the machine. Never remove the labels. Keep them clean and legible at all times.





### 3.2 NAME AND FUNCTION OF EACH SECTION



**1. Gas distributor**

Controls the flow of preheating oxygen, fuel gas and cutting oxygen, forming a cutting flame.

**2. Wing nut**

Controls the chain tension.

**3. Handle**

Drives the machine.

**4. Torch slide handle**

Moves the torch right and left.

**5. Lateral bar**

**6. Torch**

**7. Height adjustment handle**

Adjusts the height of the torch.

**8. Wheel**

**9. Sprocket**

Engaged with the chain, the sprocket rotates to move the machine.

### **3.3 SPECIFICATIONS**

Weight:	13kg
Length:	420mm
Wheel width:	280mm
Height:	450mm
Thickness of pipe to be cut:	Ø 114~Ø 600
Cutting shape:	I-shape cutting and v-bevel cutting (up to 45°)
Drive system:	Manual
Range of vertical torch movement:	50mm
Range of lateral torch movement:	100mm

#### **Accessories**

ANM-L	Qty 1
Tip cleaning needle:	1 set
Chain (80 links)	1 set

### **4. PREPARATION FOR OPERATION**

#### **4.1 CONTENTS OF PACKAGE**

The contents of the standard package are shown below. Check them carefully before assembling the machine.

- Body	1 set
- Gas distributor	1 set
- Torch holder	1 set
- Torch	1 pc
- Hose	

Distribution hose (3pcs set: 560L biased bend)	1 set
- ANM-L	1/32
- Nozzle cleaners:	1 set
- Chain (80 links):	1 set
- Spanners	2

#### **4.2 MACHINE ASSEMBLY**

1. Carefully take the machine out of its case.
2. Carefully check that the torch holder, gas distributor, torch etc are in position.
3. Attach the primary hose to the gas distributor.

Oxygen

Gas hose

## 4.3 PREPARATION FOR OPERATION



### 4.3.1 GAS SUPPLY HOSE CONNECTION

1. Connect the respective gas supply hoses to the torch and distributor.
2. Check that hoses are connected correctly and there is no gas leakage.
3. Carefully check the cutting oxygen (JO), preheating oxygen (PO), preheating gas and respective marking before connecting hoses to the torch and distributor.

### 4.3.2. CONNECTING THE TIP

1. Select a proper tip according to the thickness of the steel plate and attach it to the torch.  
(To select a tip, refer to the table of cutting data).
- When fixing a tip to the torch, tighten the nut with the two wrenches.
  - If the tip is tightened excessively, it will be heated during cutting and become tighter, making it difficult to remove the tip.
  - In addition, avoid damaging the taper of the tip since this may cause backfire.

### 4.3.3 DETERMINATION OF NUMBER OF CHAIN LINKS

The relationship between the pipe O.D. and the number of chain links is as follows:  $y = x + 11$

Where,

y = The number of chain links

X = Pipe O.D. (Unit: cm: Round off the value in mm to the next value in cm.)

For example, pipe O.D. 114.3mm      11.43cm      12

$$Y = x + 11$$

$$= 12 + 11$$

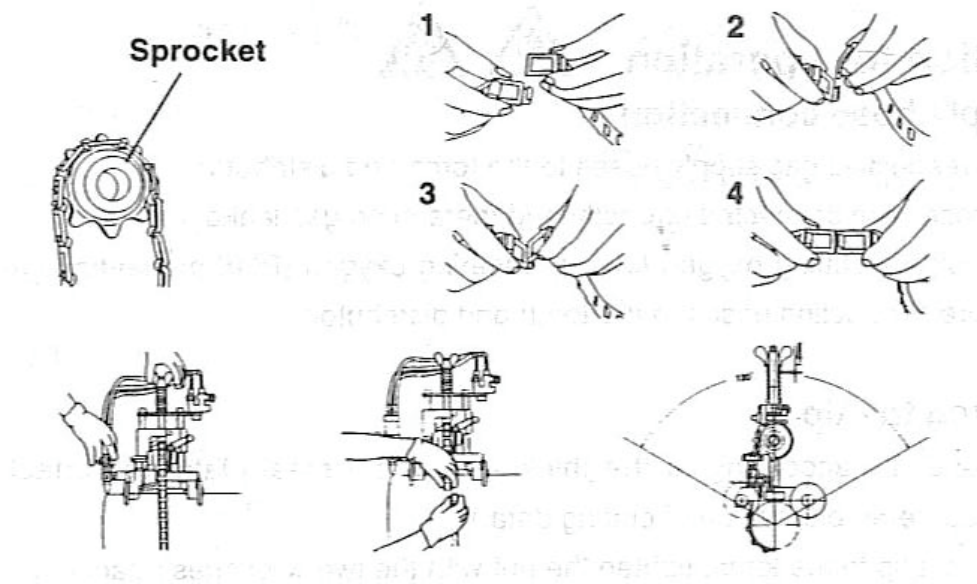
$$= 23$$

Therefore, about 23 links are necessary.

The chain is sold in 2.4 mtr lengths which = 83 links.

## 4.4 SECURING MACHINE TO PIPE

1. Calculate the necessary number of chain links, place the main unit on the pipe to cut and turn the tightening handle anti-clockwise to lower the slide bracket.
2. Engage the chain with the sprocket and attach the chain as shown in the figure to connect it to the pipe. Ensure the chain is linked on its correct side.
3. Turn the tightening handle clockwise and fix the main unit to the pipe. When turning the tightening handle, exercise care so that the spring will not be in close contact, leaving a clearance of 1-2mm.
4. To avoid a chain engagement error or chain loosening, hold the machine by hand and turn the handle to the right and left within the range of approx. 120 degree (1/3 rd of the pipe circumference approx.) two or three times, tensioning the chain gradually.
5. After setting, turn the handle by one rotation and check to see if the hose length is sufficient and the nozzle returns to the original position.



## 5. CUTTING OPERATION



### 5.1 SAFETY MEASURES PRIOR TO OPERATION

#### 5.1.1 SELECTION OF TIP

Referring to the Cutting Data, select the suitable tip according to the plate thickness. For a heavily rusted plate or for a bevel cutting angle of more than 20°, select the tip one grade higher than one shown in the Cutting Data.

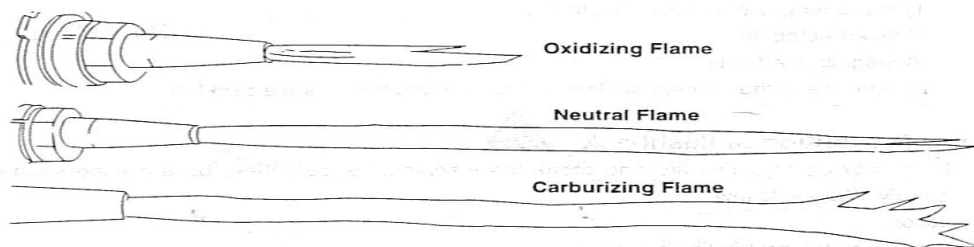
### 5.2 IGNITION AND FLAME ADJUSTMENT

- Adjust the gas pressure according to the Cutting Data. The data shows the pressure when all the valves are open. Re-adjust the pressure after ignition.

#### **Flame adjustment method**

1. Open the fuel gas valve  $\frac{1}{4}$  to  $\frac{1}{2}$  a turn and light the torch with an igniter.
2. Then, open the preheating oxygen valve gradually until a white cone of the standard flame has been obtained. (The incandescent area should be uniform and about 5-6 mm (3/16-1/4") in length)
3. Open the jet oxygen valve fully, re-adjust the flame if its condition has changed. A disorderly flow of the jet oxygen will adversely affect the quality of the cutting surface. In such cases clean the tip with a suitable tip cleaner while the jet oxygen is flowing but the flame is out.
4. Appropriate distance between the tip end and cutting surface.
  - Acetylene gas      8-10 mm
  - LPG gas            5-8 mm

Neutral flame ensures quality cutting surface. (Oxidized flames may be used for bevel cutting.) The oxidized flame shortens the cutting oxygen flow, causing slag deposition or melting the upper edge of the cut surface. Excessively high cutting oxygen pressure will cause the same effect.



### **5.3 CUTTING AND PIERCING METHOD**

1. Cut in from the end of steel plate.
2. Pierce steel plate before cutting
3. Drill a hole before cutting.

#### **Piercing method**

1. Ignite and adjust the flame.
2. Thoroughly preheat the cut-in point until it is white hot.
3. Open the cutting oxygen valve to pierce the steel plate. The tip should be about 15-20mm from the plate to prevent slag from splashing onto the tip and adhering there, which will shorten the working life of the tip.

### **5.4 PROCEDURES FOR STARTING CUTTING OPERATION AND EXTINGUISHING THE FLAME**

1. Align the tip with the cutting start point, ignite and then adjust the flame.
2. Sufficiently preheat the cutting start point.
3. After heating, supply cutting oxygen and turn the handle simultaneously to begin cutting.
4. Carefully check the cut condition and turn the handle to set an optimum cutting speed. Refer to the Cutting Data.
5. Extinguish the flame after cutting as follows:
  1. Stop turning the handle.
  2. Close the cutting oxygen valve.
  3. Close the preheating oxygen valve.
  4. Close the fuel gas valve.

### **5.5 SAFETY MEASURES AGAINST BACKFIRE AND FLASHBACK**



#### **5.5.1 PREVENTION OF BACKFIRE**



Backfires may cause serious accidents or fires. Be careful to prevent such a disaster. When a backfire occurs, find the cause, inspect and maintain the machine correctly before using the machine again.

The following are causes of backfire:

1. Improper gas pressure adjustment.
2. Overheated tip.
3. Slag clogged in tip.
4. Damage to the tapered section of the tip or torch will cause backfire.



## **5.5.2 PREVENTION OF FLASHBACK**

Flashback could cause fire and break the machine. Should there be a hissing sound in the torch, quickly take the following action:

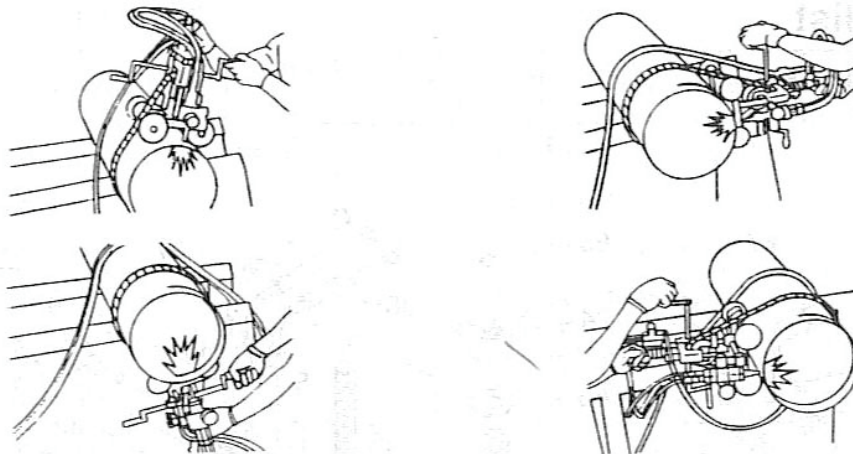
1. Close the preheating oxygen valve.
2. Close the fuel gas valve.
3. Close the cutting oxygen valve.

Should a flashback occur, find the cause and take the appropriate action before using the machine again.

## **5.6 CUTTING OPERATION**

1. Place the tip at the cutting start point.
  2. Ignite the tip and ensure sufficient preheating.
  3. Open the cutting oxygen valve and turn the handle simultaneously to begin cutting.
  4. While observing the cutting conditions, turn the handle to set the optimum cutting speed.
  5. After cutting, stop the handle and close the cutting oxygen valve, fuel gas valve and preheating oxygen valve in this order.
- \* Thereafter, repeat the operations from the beginning (item 1).

During the cutting, hold the wing nut with the right or left hand as shown in the figure. When the machine moves down, support the machine from the bottom and when the machine moves up, lift the machine.



## 6. MAINTENANCE AND INSPECTION

Refer to the following for inspection and maintenance of the machine and use the machine under the best operating conditions at all times.

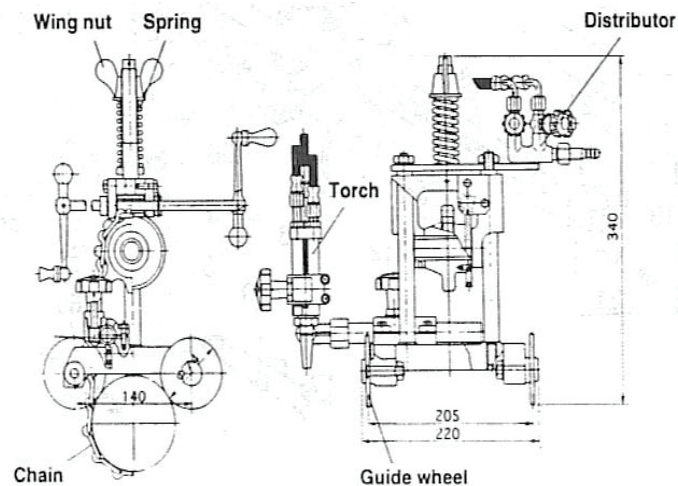
### 6.1 WEEKLY INSPECTION

1. Oil the rotary section of the machine (wheel, sprocket, worm gear, worm wheel, handle and worm bearing), as well as the wing nut, lift shaft and sliding sections once a week.

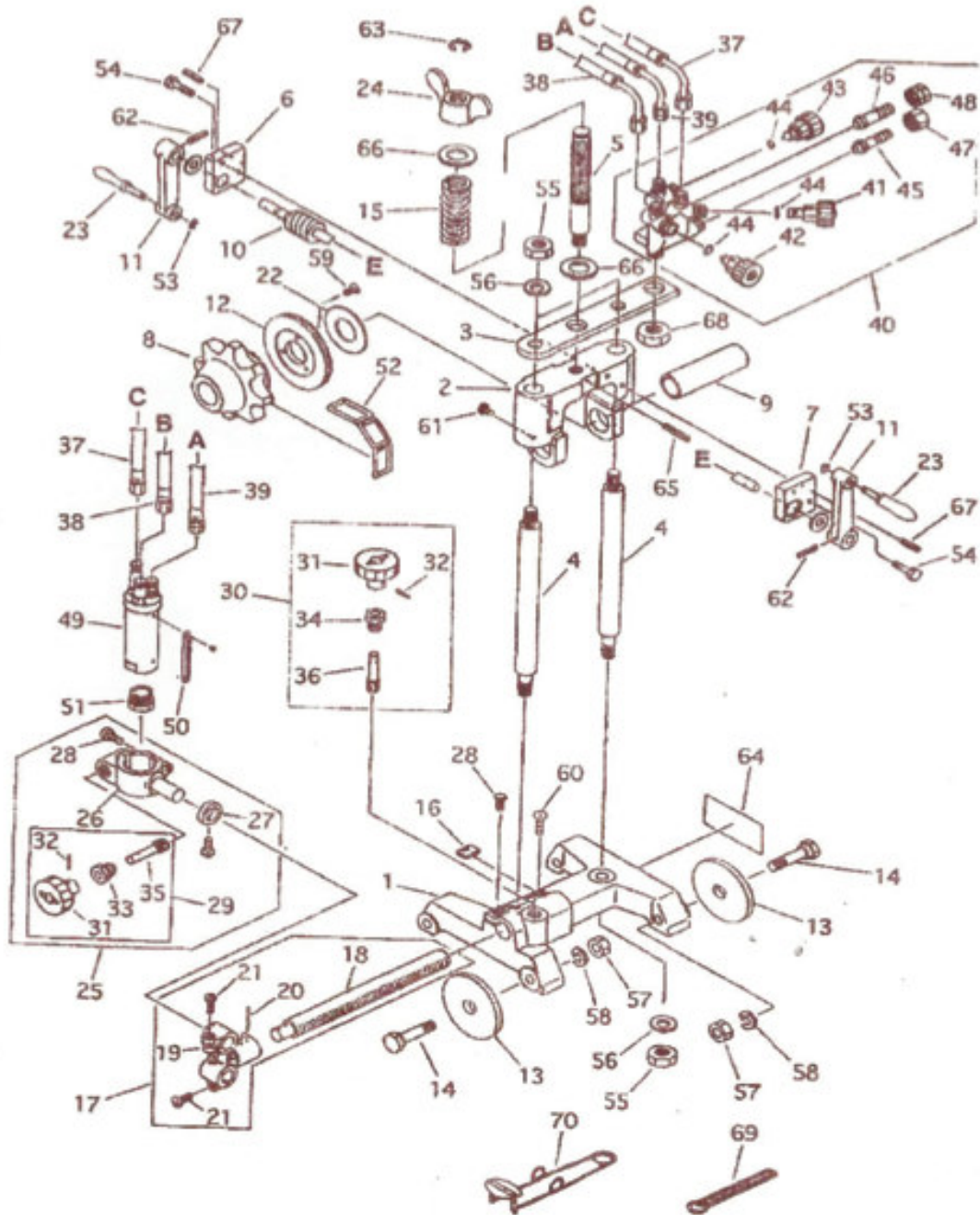
## 7. TROUBLESHOOTING

TROUBLE	CAUSE	REMEDY
Machine does not run	1. Chain tension is too firm	Adjust
	2. Worn worm gear	Replace
	3. Wheel does not rotate	Lubricate or replace
Defective surface	1. Bad tip	Clean or replace
	2. Unsuitable gas pressure and cutting speed	Re-adjust

## 8. SKETCH DRAWING







Ref No.	Description	Part No.	Ref No.	Description	Part No.
1	Base	BCG30PCM01	14	Wheel Axle	BCG30PCM14
2	Slide Bracket	BCG30PCM02	15	Spring	BCG30PCM15
3	Upper Plate	BCG30PCM03	16	Key	BCG30PCM16
4	Slide Shaft	BCG30PCM04	17	Torch Holder Support Assembly	BCG30PCM17
5	Lift Shaft	BCG30PCM05	18	Rack Bar	BCG30PCM18
6	Worm Plate Left	BCG30PCM06	19	Torch Holder Base	BCG30PCM19
7	Worm Plate Right	BCG30PCM07	20	Spring Pin PR-3x25	BCG30PCM20
8	Sprocket	BCG30PCM08	21	Screw SP-6x16	BCG30PCM21
9	Sprocket Shaft	BCG30PCM09	22	Collar	BCG30PCM22
10	Worm Shaft	BCG30PCM10	23	Crank Arm Handle	BCG30PCM23
11	Crank Arm	BCG30PCM11	24	Wing Nut	BCG30PCM24
12	Drive Wheel	BCG30PCM12	25	Torch Holder Assembly	BCG30PCM25
13	Wheel	BCG30PCM13	26	Torch Holder	BCG30PCM26

27	Angle Graduation Ring	BCG30PCM27	50	Torch Rack	BCG30PCM50
28	Screw SP-6x16	BCG30PCM28	51	Headnut	BCG30PCM51
29	Up/Down Handle Assembly	BCG30PCM29	52	Chain 2.4M	BCG30PCMCHN
30	Crossfeed Handle Assembly	BCG30PCM30	53	Stop ring	BCG30PCM53
31	Handle (Ø 40)	BCG30PCM31	54	Hexagon Bolt BH-6.25	BCG30PCM54
32	Spring Pin PR-2.5x16	BCG30PCM32	55	Hexagon Nut NH-12	BCG30PCM55
33	Up/Down Pinion Support	BCG30PCM33	56	Washer WF-12	BCG30PCM56
34	Crossfeed Pinion Support	BCG30PCM34	57	Hexagon Nut NH-10	BCG30PCM57
35	Up/Down Pinion	BCG30PCM35	58	Washer WS-10	BCG30PCM58
36	Crossfeed Pinion	BCG30PCM36	59	Screw SF 5x10	BCG30PCM59
37	Hose Assembly for Jet Oxy	BCG30PCM37	60	Screw SP 3x15	BCG30PCM60
38	Hose Assembly for Preheat Oxy	BCG30PCM38	61	Screw SP 5x12	BCG30PCM61
39	Hose assembly for Fuel Gas	BCG30PCM39	62	Spring Pin PR-2.5x20	BCG30PCM62
40	Mixer Unit	BCG30PCMIX	63	Circlip	BCG30PCM63
41	Valve for Jet Oxygen	BCG30PCM41	64	Name Plate	BCG30PCM64
42	Valve for Preheat Oxygen	BCG30PCM42	65	Spring Pin PR-3x32	BCG30PCM65
43	Valve for Fuel Gas	BCG30PCM43	66	Washer WF-18	BCG30PCM66
44	O Ring	BCG30PCM44	67	Screw SP 5x12	BCG30PCM67
45	Hose Connector- Oxygen	BCG30PCM45	68	Hexagon Nut NH-16	BCG30PCM68
46	Hose Connector- Fuel Gas	BCG30PCM46	69	Tip Cleaner	BCG30PCM69
47	Nut for Oxygen	BCG30PCM47	70	Lighter	BCG30PCM70
48	Nut for Fuel Gas	BCG30PCM48	Special	Hose Set	BCG30PCMH
49	Torch Assembly	BCG30PCM49	Special	Stainless Steel Guide Band for Pipes beyond 16" diameter	BCGPBAND

## **10. CUTTING DATA**

Standard speed for acetylene

### **Metric System**

PLATE THICKNESS (mm)	TIP SIZE		OXYGEN PRESSURE (kg/cm <sup>2</sup> ) / (Mpa)		FUEL GAS PRESSURE (kg/cm <sup>2</sup> ) / (Mpa)	KERF WIDTH (mm)
			CUTTING	PRE-HEAT		
3	00	680	1.5/0.15	1.5/0.15	0.2/0.02	1.0
6	0	610	2.0/0.2	2.0/0.2	0.2/0.02	1.3
10	0	560	2.0/0.2	2.0/0.2	0.2/0.02	1.5
12.5	1	530	2.5/0.25	2.5/0.25	0.2/0.02	1.8
19	2	460	3.0/0.3	3.0/0.3	0.25/0.025	2.0
25	2	430	3.0/0.3	3.0/0.3	0.25/0.025	2.0
38	3	355	3.0/0.3	3.0/0.3	0.25/0.025	2.3
50	4	320	3.0/0.3	3.0/0.3	0.25/0.025	2.8
60	5	280	4.0/0.4	4.0/0.4	0.3/0.03	3.0
75	5	250	4.0/0.4	4.0/0.4	0.3/0.03	3.0
100	6	200	4.0/0.4	4.0/0.4	0.3/0.03	3.6
125	6	180	4.0/0.4	4.0/0.4	0.4/0.04	3.6
150	7	150	4.5/0.45	4.5/0.45	0.4/0.04	4.1
200	7	130	4.5/0.45	4.5/0.45	0.4/0.04	4.3
250	8	80	4.5/0.45	4.5/0.45	0.4/0.04	5.6
300	8	50	4.5/0.45	4.5/0.45	0.4/0.04	6.6

## Imperial System

PLATE	TIP SIZE		OXYGEN P.S.I.G (kg/cm <sup>2</sup> ) / (Mpa)		FUEL GAS P.S.I.G	KERF WIDTH (inches)
			CUTTING	PRE-HEAT		
1/8	00	27	20	20	2.8	0.04
1/4	0	24	30	30	2.8	0.05
3/8	0	22	30	30	2.8	0.06
1/2	1	21	40	40	2.8	0.07
3/4	2	18	45	45	3.6	0.08
1	2	17	45	45	3.6	0.08
1-1/2	3	14	45	45	3.6	0.09
2	4	12.5	45	45	4.3	0.11
2-1/2	5	11	55	55	4.3	0.12
3	5	10	55	55	4.3	0.12
4	6	8	55	55	5.7	0.14
5	6	7	55	55	5.7	0.14
6	7	6	65	65	5.7	0.16
8	7	5	65	65	5.7	0.17
10	8	3	65	65	5.7	0.23
12	8	2	65	65	5.7	0.27

Standard speed for propane

## Metric System

PLATE THICKNESS (mm)	TIP SIZE		OXYGEN PRESSURE (kg/cm <sup>2</sup> ) / (Mpa)		FUEL GAS PRESSURE (kg/cm <sup>2</sup> ) / (Mpa)	KERF WIDTH (mm)
			CUTTING	PRE-HEAT		
3	00	680	1.5/0.15	1.5/0.15	0.2/0.02	1.0
6	0	610	2.0/0.2	2.0/0.2	0.2/0.02	1.3
10	0	560	2.0/0.2	2.0/0.2	0.2/0.02	1.5
12.5	1	530	2.5/0.25	2.5/0.25	0.2/0.02	1.8
19	2	460	3.0/0.3	3.0/0.3	0.2/0.02	2.0
25	2	430	3.0/0.3	3.0/0.3	0.2/0.02	2.0
38	3	355	3.0/0.3	3.0/0.3	0.2/0.02	2.3
50	4	320	3.0/0.3	3.0/0.3	0.25/0.025	2.8
60	5	280	4.0/0.4	4.0/0.4	0.3/0.03	3.0
75	5	250	4.0/0.4	4.0/0.4	0.3/0.03	3.0
100	6	200	4.0/0.4	4.0/0.4	0.35/0.035	3.6
125	6	180	4.0/0.4	4.0/0.4	0.35/0.035	3.6
150	7	150	4.5/0.45	4.5/0.45	0.4/0.04	4.1
200	7	130	4.5/0.45	4.5/0.45	0.4/0.04	4.3
250	8	80	4.5/0.45	4.5/0.45	0.4/0.04	5.6
300	8	50	4.5/0.45	4.5/0.45	0.4/0.04	6.6