

INSTRUCTION MANUAL

# OXY-200

# GAS CUTTING MACHINE



## **SEC Machines**

**Welding and Cutting Support Machines Mfrs.**

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## Introduction

This manual gives the necessary information on the safe operation and upkeep of the machine.

**Caution** : Please carefully read and understand this manual completely before starting the machine.

Oxy 200 is a versatile, lightweight and rugged portable gas cutting machine. It is a power driven tool which can cut steel plate upto 200mm thickness. It can vertical cuts as well as bevel cuts upto 45 degrees. The cuts on this machine can be made by the following methods:

1. Straight line cuts of any length with the machine running on an aluminum track available in length of 1.8 mtrs. and multiples.
2. Circle from 75mm to 1200mm. diameter when using the circle cutting attachment.
3. Freehand cutting of simple curves by hand steering (vertical cuts only).

The machine mounted cutting torch is designed on the injector suction principle and is suitable for use with Acetylene/Propane as fuel gas and two seat swaged nozzles, only original SEC. nozzles should be used for excellent performance.

Machining or other finishing may not be required as post cutting if the correct gas pressure and speed of the cutter movement is set correctly for cutting. High degree of accuracy can be obtained in this process of thermal cutting by correctly synchronizing the gas flow rate and speed of the cutting torch.



## Packing List

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Main Machine - Oxy 200...1 no.

Aluminum Rail - 1no.

Fuses - 2 nos.

Non Return Valves - 2nos.

Spanners - 2nos.

Nozzle Cleaner - 1set

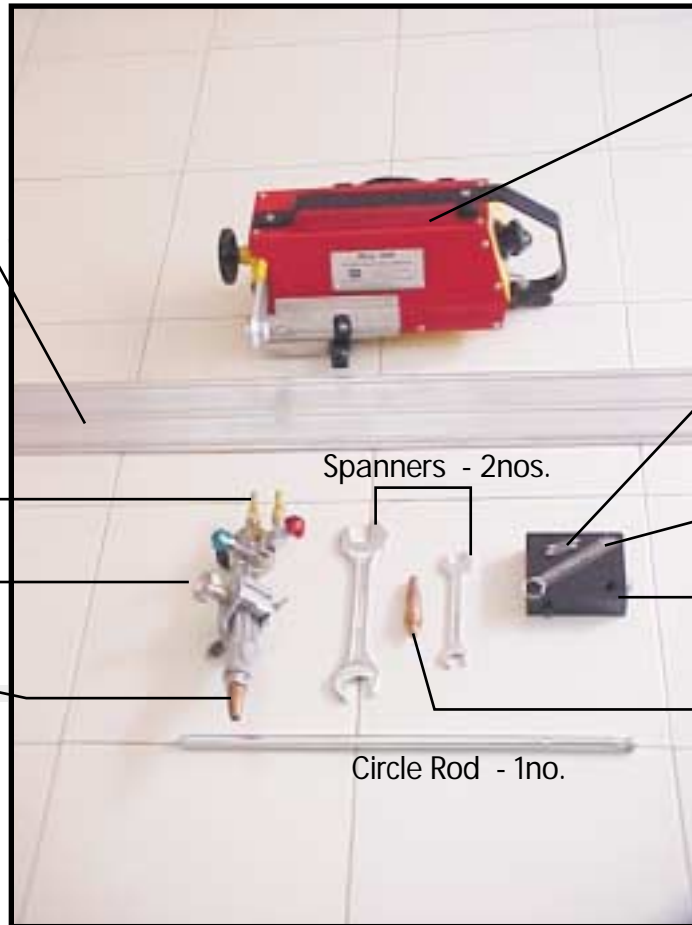
Cutting torch with Holder - 1 set.

Circle Weight Block - 1no.

Nozzle - 1no.

Extra Nozzle - 1no.

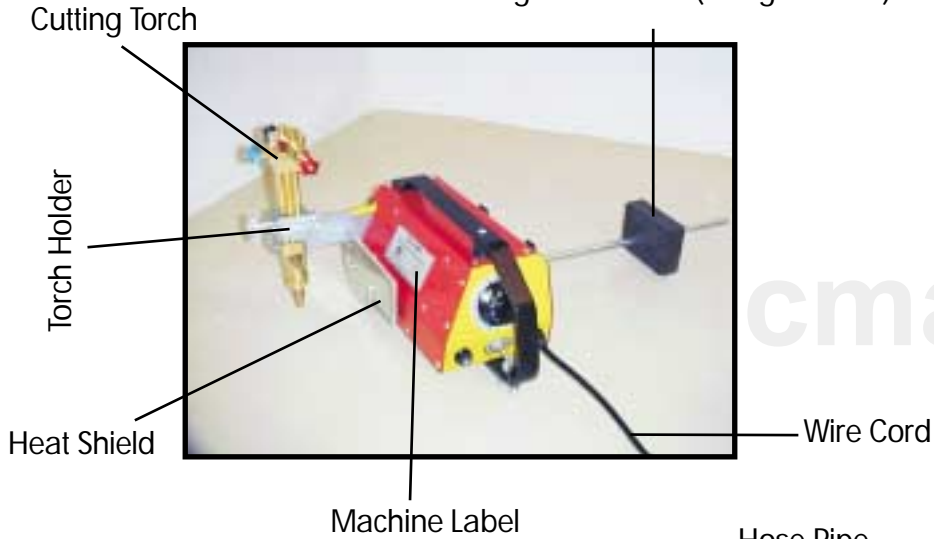
Circle Rod - 1no.



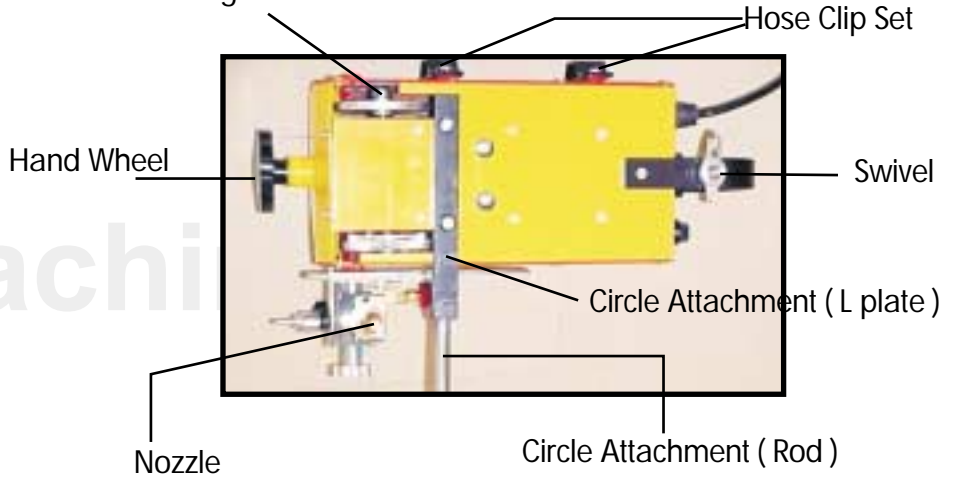
External Parts

3

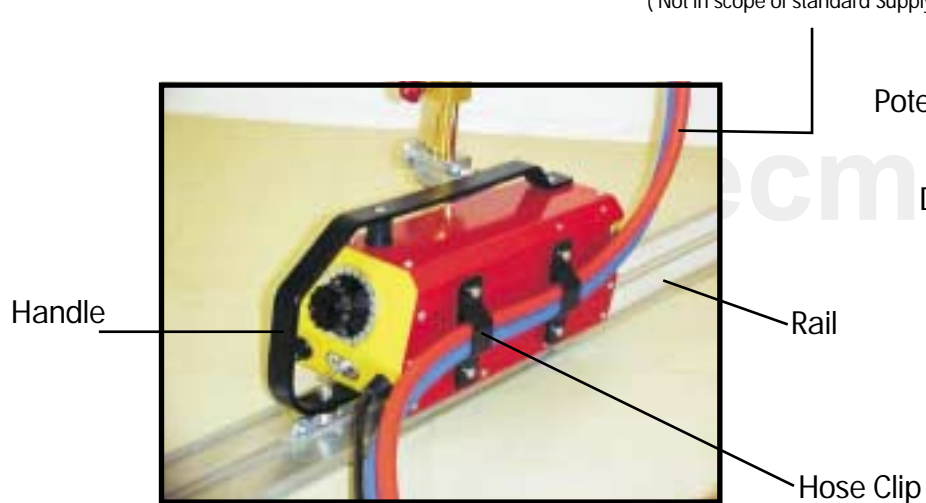
Circle Cutting Attachment ( Weight Block )



Driving wheel Set



Hose Pipe  
( Not in scope of standard Supply )

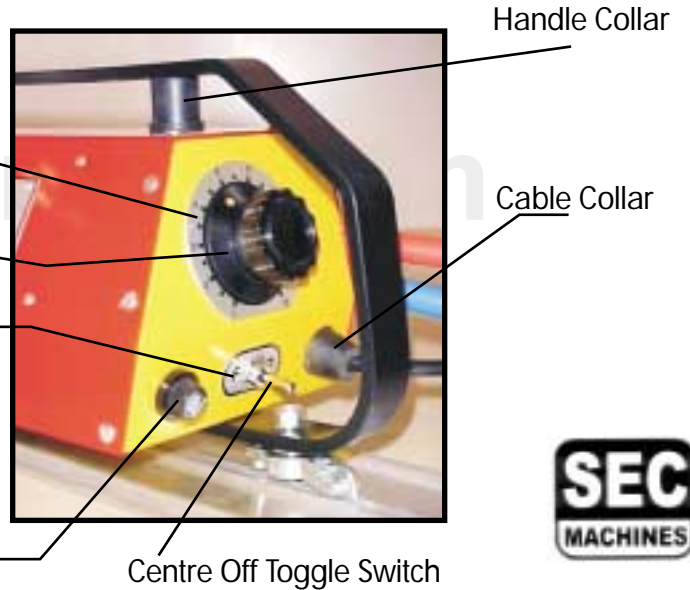


Potentiometer Label

Disk Knob

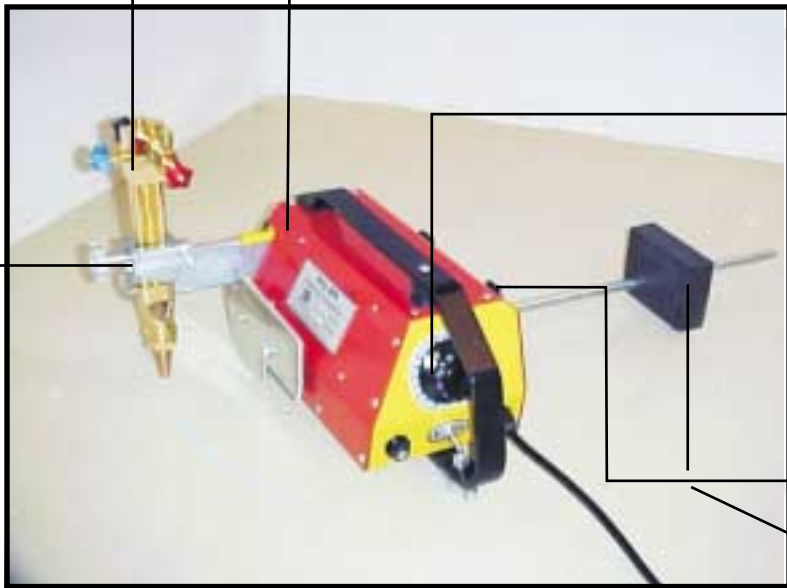
Switch Label

Fuse Holder



# Features

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**BODY:** The body of the carriage unit is of thick gauge pressed steel, and is painted by a special treatment. It is internally asbestos lined making OXY-200 more heat resistant and durable. It is fitted with precision and durable components for trouble free service.

**DRIVE :** The drive consist of a high performance universal type 1/20 HP, AC/DC motor for 220/240 volts, 50 Hz of electric supply. The motor is mounted with a compact gear box of ratio 1:576. It has a facility of forward and reverse operation. The motor is dynamically balanced, fibre glass taped, and its wires are fibre glass insulated.

**CONTROL:** The control circuit is also fibre glass insulated. The speed can be varied from 50 mm /min to 600 mm/min. Speed-Pressure-Nozzle selection and control data for various plate thickness is printed on the machine itself for quick reference.

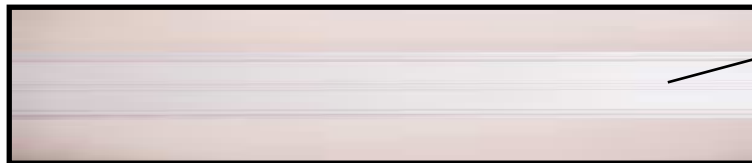
**TORCH:** Specially designed heavy duty Injector type cutting torch. It works on oxygen and acetylene/LPG with appropriate nozzles.

**TORCH HOLDER ASSEMBLY:** This enables vertical and horizontal movement of the torch. Adjustment for bevel cutting from 0 to 45 degrees can also be made easily. The system is simple and convenient. The adjustments can also be made while the machine is in motion.

**HOSE CLAMP:** This feature reduces hose dragging, and keeps hoses and cable in line with motion of the machine.

**CIRCLE CUTTING ATTACHMENT:** It consist of a radius bar, and weight block with a centre. It can be fixed from either side of the machine. For circle cutting the swivel wheel has to be unlocked. The machine can cut upto 1200 mm diameter.

**RAIL TRACK:** The machine runs on an extruded aluminum track of 1.8 metres Length.



## Specification

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- Cutting Capacity : 5 mm to 200 mm.
- Bevel Cuts : 0 to 45 degrees .
- Straight Cuts : 1.8 meters and multiples.
- Circle Cutting : 75 mm dia to 1200 mm dia.
- Cutting Speed : 50 mm/min to 600 mm/min [variable]
- Torch Adjustment : Vertical-70 mm Horizontal-85 mm
- Voltage : 220/250 Volts, AC/DC,50 Hz.
- Maximum Current : 0.35 Amperes.
- Fuse : Bottle type - 1 Amp..
- Dimensions : 480 mm x 250 mm x 220 mm.
- Weight : 12 kgs
- Hose Connections : 1/4 " G [Fuel gas LH & Oxygen RH]

## Gas Cutting

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Flame cutting, commonly known as "Oxy Acetylene" or Gas cutting is a thermal cutting process. In this process, the metal is preheated to ignition temperature by heating flame before the jet of cutting oxygen with purity of 99.5% minimum, commences its combustion. This rapid and continuous process of preheating and combustion of the metal produces a uniform cut in the work piece. The travel speed of the torch is selected depending upon the cutting thickness. The slag produced during combustion is blown off by the force of the cutting oxygen jet.



An Oxy Acetylene flame can cut all structural steels, mild steels and low alloy steel which can satisfy the following:

1. The melting point of the metal must be well above its ignition temperature in oxygen.
2. The preheated metal must be combustible in Oxygen jet.
3. The combustion temperature must be higher than the melting point of the oxide formed which can be ejected by cutting oxygen stream.
4. The metal must oxidize rapidly at a temperature well below its melting point.
5. The oxide of the metal must have a melting point lower than that of the metal itself.
6. During combustion, the oxide formed must be fluid, so that it can run off without interruption to Further cutting.



Stainless steel , brass , aluminum and its alloys form refractory oxides during combustion, and therefore cannot be cut with the oxy acetylene flame. For these metals the most suitable process is Plasma Arc Cutting.

The cutting torch works on a combination of oxygen and acetylene/propane with appropriate cutting nozzles. With correct settings of gas pressures, cutting speed and cutting nozzles, clean, smooth and accurate cuts are achieved. The purer the oxygen (99.5%) the better is the finish of the cut surface. Acetylene can be replaced with LPG/Propane/Mapp, but then the cutting nozzles and parameters will have to be suitably changed.

# Safety Precautions - 1

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## GENERAL

As with other industrial processes, gas cutting requires safety precautions to be adopted to avoid risk to personnel.

## FUMES

Fumes from gas cutting are not considered to be dangerous provided there is adequate ventilation.

## GASES

A variety of combustible gases can be used for the cutting process, all of which should be considered a potential explosion hazard. No naked flames should be near cutting blowpipes when purging hoses or making preliminary / flow adjustments to blowpipes. Keep open flames away from storage areas of cylinders and hoses. Acetylene pipelines and bottles must never be exposed to temperature exceeding 54° (130°F).

Oxygen itself is not inflammable but in its presence combustible material burn more readily.

Great caution must be exercised in preventing oxygen enrichment of the atmosphere, particularly in confined space situations.

Oxygen in contact with oil, grease or other hydrocarbons can cause spontaneous ignition resulting in fires or explosions.

Oxygen must not be used to clear hoses or dust. However, all new hose must be purged before bringing into service and this may be done with oil free, -AIR, NITROGEN, CARBON DIOXIDE.

## BLOW PIPES

Use a friction lighter or pilot flame as source of ignition. Do not use matches or hot metal to light blowpipes.

Always light and extinguish by the correct sequence:

### To Start:

1st..... Fuel gas on  
Next..... Heating oxygen on  
Last.....Cutting oxygen on

### To Shut:

1st.....Cutting oxygen off  
Next.....Fuel gas off  
Last.....Heating oxygen off

**USE ONLY APPROVED BLOWPIPES AND NOZZLES FOR THE PROCESS.**

## REGULATORS AND GAUGES

All sources from which gas supplies are taken must be fitted with regulators capable of controlling the source outlet pressures to those recommended in the relevant cutting data for the equipment. Never use a regulator with other than the gas for which it is designed. Release the control pressure when shutting down, after the pressure in the hose has been released.

Treat regulators and gauges as precision instruments. Do not subject them to sudden pressure surges caused by the rapid opening of supply valves.

Regulators that creep, which passes gas when the pressure regulating screw is released or builds up pressure on the low pressure side when the blowpipe trimming valve is shut, should be replaced.

Regulators, valves and pipe work must be kept clean and free from oil grease.



## Safety Precautions - 2

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### PROTECTIVE CLOTHING

For the best protection cotton overalls should be worn when cuttings, and feet should be protected from slats and falling of cuts. Leather gloves should be worn at all times.

Goggles with suitable filters to guide best viewing of flame should be used. The equipment should be installed and maintained in accordance with the current issue of the Regulation for the 'Safety in welding and Cutting'.

### ELECTRICAL EQUIPMENT

Servicing or maintenance must not be carried out unless the apparatus is disconnected from the electrical supply.

### LEAKAGES

Gas leaks at valve glands, joints and hoses can be detected by application of soap water and remedied by tightening of gland nuts and joints.

Do not test leakages with a flame Particular care should be observed when changing nozzles, by making gas tight joints by ensuring that seatings are clean.

### HOSES

Do not expose hoses to heat, slag, sparks, oil or grease. Faulty hoses should be replaced or repaired by cutting out a faulty section of hose and inserting an approved coupling.

### DO NOT USE WIRE TO SECURE HOSES. USE APPROVED HOSE CLIPS ONLY.

When acetylene gas is employed as the fuel, do not use copper tubing to connect hose. Hoses must not be kinked or nipped in order to cut off gas supply temporarily.

### FLASHBACK

Flashback can be serious and may damage hose and regulators. In severe cases, the operator could be at risk. It can be avoided by adherence to recommended operating procedures.

Should a flashback occur, switch off the electrical supply at the control cabinet, and shut off the gas services as quickly as possible.

A detailed inspection should be made of the equipment to ascertain the cause as soon as it is safe to do so. The most probable cause are loose connection(s), faulty seating in blowpipe block, a dirty or faulty nozzle, incorrect pressures, or ignition has been applied before the flow of fuel gas is properly established.

A maintenance check should also be carried out covering the items from the nozzle(s) to the supply sources, such as nozzle, nozzle block hoses, manifolds, regulators, solenoid valves and pressure gauges.

Purge the hoses as the normal practice prior to lighting the blowpipe(s), having first ensured that there are no naked flames in the vicinity. Adjust the pressure to those required and relight the blowpipe(s)

### NOTE

Purging of hoses should always be carried out before operating machine.

### FURTHER INFORMATION

More detailed information can be obtained from the following publication. It should be noted that this publication is subject to periodical revision and care should be taken to use the latest edition. "Safety in welding and cutting American National Standard, 249.1. ANSI, NEWYORK



# Installation

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Place the machine on a piece of steel plate and connect the 3 pin socket to 220 volts, 1 phase, 50Hz, AC supply line. An isolator should be used in the main line.

Now connect the 3-core cable with the supply line and switch "ON" main switch, check the running of the machine by operating forward/Off/reverse switch and speed control knob. "

Do not push the machine by hand unless the front left hand driving wheel is lifted above the surface."



Connect oxygen and acetylene hoses to the cutting torch. Connect the other ends of hoses to the oxygen and acetylene supply line through the regulators.

WARNING: DO NOT USE OIL OR GREASE ON OXYGEN CONNECTIONS

Refer to the nozzle data and ensure to fit proper nozzle to the cutting torch.

ALWAYS USE TWO SPANNERS WHILE TIGHTENING OR LOOSENING THE NOZZLE NUT, THIS WILL PREVENT DAMAGE OR DISTORTION TO THE CUTTING TORCH.



Nozzle seats and the mating seats in the cutting torch are manufactured to high degree of surface finish and close tolerances. Hence clean properly before assembling otherwise gas leakage and backfire may occur during working.



## Machine Operation-1

**Check List** : Before Starting the machine .

1. Always check that the cutting torch is absolutely vertical before commencing the cut.
2. Ensure that the work is correctly supported. No support should, however, foul the line of cut.
3. Remove all scales, dirt and rust from the path of cut. This may be done by moving the cutting torch along the line of cut with the preheat flames alight thereafter brushing the plate with a wire brush.
4. If possible, start the cut at the edge of the plate. Try to arrange the template so that at least one point is close to the edge of the plate and then start cutting from this point.
5. If the cut cannot be started at the edge of the plate, a 12.7 mm diameter hole in the plate greatly facilitates starting.
6. In thinner sections, a hole may be made by piercing the plate with the flame. Bring the plate to the point of incandescence and gradually open the cutting jet. A light rotary movement with the cutting torch will be found useful during this operation.
7. When starting a cut at the edge of the plate set approximately half the nozzle diameter over the plate edge.
8. Insert wedges in the 'kerf' as the cut proceeds to avoid distortion.



**Before starting the cutting operation, the following guideline should be followed :**

1. Ascertain that the three gas valves on the cutting torch are closed.
2. Open the oxygen and acetylene cylinder valves making certain that the pressure adjusting screws on the oxygen and acetylene regulators are released.
3. Open acetylene valve (red) on the cutter and adjust the required acetylene pressure on the regulator.
4. Open the heating oxygen valve (black) and cutting oxygen valve (green) and adjust the oxygen pressure as per the operating data.
5. Shut all the valves on the cutting torch.
6. Open the acetylene valve (red) on the cutter little and ignite the nozzle.
7. Adjust the acetylene valve (red) according to the required flame.
8. Open heating oxygen valve (black) and adjust both valves until correct flame conditions are obtained as explained earlier.
9. Now open cutting oxygen valve (green) and observe that a stream of cutting oxygen passes from the nozzle center through the heating flame.
10. Set cutter either in the vertical or angular position for the bevel required using the graduated scale on cutting holder.
11. Set speed control knob for movement of the equipment (A guideline can be obtained from the nozzle selection data.)  
The machine is now ready for cutting.

## Nozzle and Cutting Data

MATERIAL		NOZZLE		OXYGEN PRESSURE		ACETYLENE PRESSURE		CUTTING SPEED		KERF WIDTH		
MM	INCH	MM	INCH	Kg/cm2	Lb/in2	Kg/cm2	Lb/in2	mm/min	inch/hr	mm		Inch
		A - Type	A - Type									
6	1/4	0.8	1/32	1.8	25.2	0.15	2.1	660 - 550	26 -- 22	0.1	1.5	0.04 - 0.06
6 -- 12	1/4 -- 1/2	1.2	3/64	2.2	30.8	0.15	2.1	550 - 490	22 -- 19	1.5	2	0.06 - 0.08
12 -- 25	1/2 -- 1	1.6	1/16	2.6	36.4	0.15	2.1	490 - 450	19 -- 18	2	2.5	0.08 - 0.10
25 -- 50	1 -- 2	1.6	1/16	3.3	46.2	0.15	2.1	450 - 360	18 -- 14	2.2	3	0.09 - 0.12
50 -- 75	2 -- 3	2	5/64	3.7	51.8	0.15	2.1	360 - 280	14 -- 11	3.5	4	0.14 - 0.16
75 -- 100	3 -- 4	2	5/64	4.4	61.6	0.15	2.1	280 - 200	11 -- 8	3.8	4.2	0.15 - 0.17
100 -- 150	4 -- 6	2.4	3/32	4.8	67.2	0.15	2.1	200 - 150	8 -- 6	4	4.5	0.16 - 0.18
150 -- 200	6 -- 8	2.4	3/32	5.2	72.8	0.15	2.1	150 - 100	6 -- 4	4.3	5	0.17 - 0.20

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### NOTE

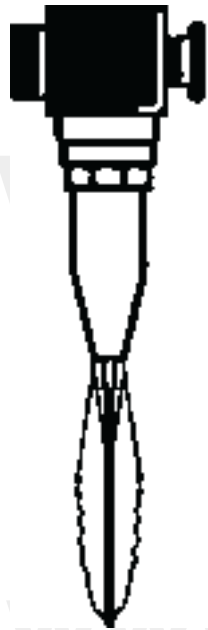
The figures given are intended as a guide, and may vary according to local conditions such as flame setting, conditions of material, experience of operator, length of hose used etc.

The speed control dial is graduated 1 to 10 and is stepless. With variation in operating condition and voltage fluctuation the speed may vary to certain extent.

For Bevel cutting determine the exact surface thickness being cut, and follow the chart accordingly.

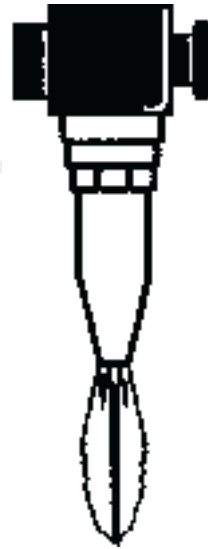


## Flame Setting



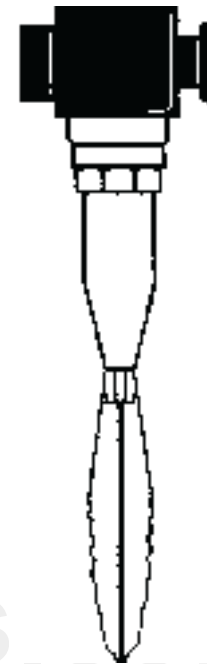
### EXCESS ACETYLENE

The inner cone is long without a distinct outline.  
If used, the top edges of cut will be badly melted.



### EXCESS OXYGEN

The inner cone has the peculiar shape as shown and the whole flame is short.  
Liable to backfire. This type of flame may also be the result of the dirty nozzle.

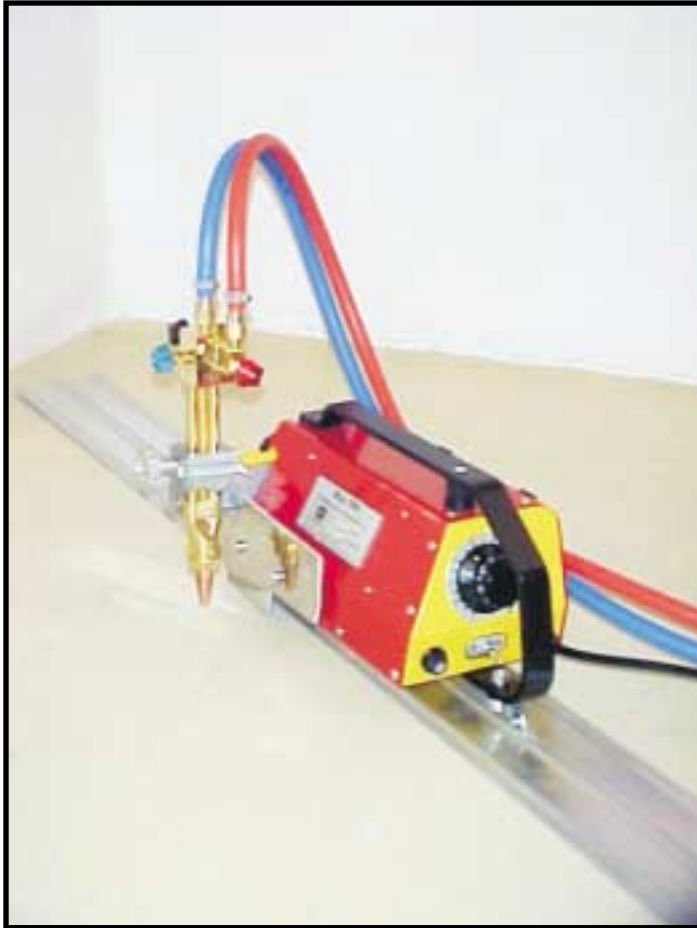


### CORRECT ADJUSTMENT

The inner cone is from 2.4 mm to 6.3 mm long.  
According to pressure and thickness of steel being cut,  
And has a sharply defined outline.



## Straight Line Cutting



### Straight Line Cutting with Track

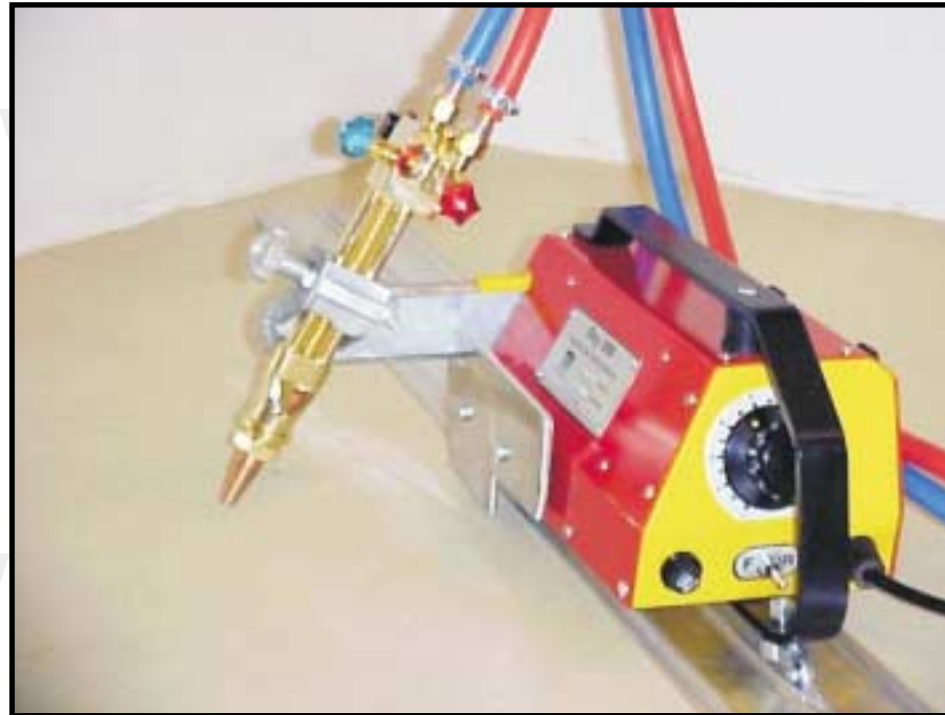
Place track on the plate to be cut, 75/100 mm. away from and parallel to the line of cut. Lock swivel wheel assembly with lock screw and place the machine on track ensuring that all three wheels are located in their respective track guides.

Adjust nozzle height with hand wheel for vertical adjustment and its position over the line of cut with hand wheel for horizontal adjustments.

Position machine so that the cutting oxygen orifice of the nozzle is just clear of the plate edge, light up heating flame to pre-heat plate edge. Open cutting oxygen valve to its full extent and simultaneously switch on drive motor.

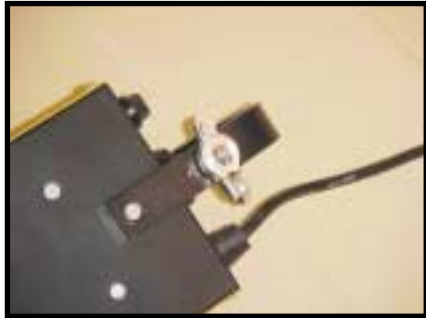
## Bevel Cutting

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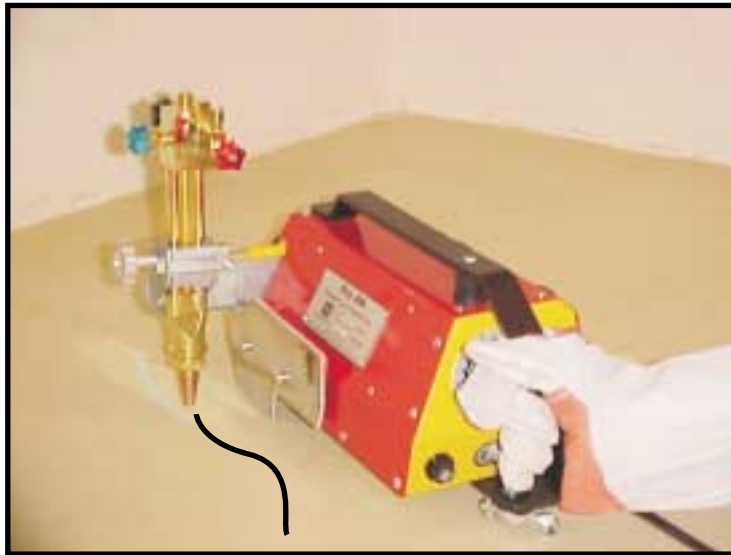
## Free Hand Cutting

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### Free Hand Cutting

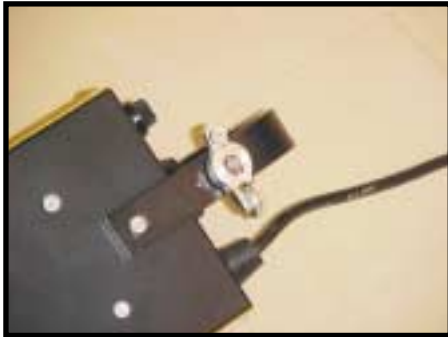
When free hand cutting simple curves, the machine is steered round the outline of the shape to be cut. Do not push the machine. The castor wheel must be free to swivel and all three wheels should be in contact with the plate.



To start cutting from a plate edge, hold the machine by its handle with the front wheels just resting on the plate. When cutting has proceeded a sufficient distance, steer the machine on the outline of the shape to be cut.

## Circle Cutting - Larger Diameters

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### Circle Cutting

Circle Cutting Rod should be assembled with the machine base.

For cutting circles 510mm. to 1200mm. diameter, the trammel bar should be positioned as on next page. For circles 75mm. to 600mm diameter, assemble the circle rod on the cutter side of the machine using the same fixing holes. Unlock swivel wheel so that it is free.

Circle Cutting Rod must be assembled on the Circle Weight Block as shown in the figure.

Set out the circle to be cut, making due allowance for kerf and at its center make a punch mark about 1.5mm. deep. Adjust the distance between the cutting nozzle and steel center in the circle block approximately to the radius of the circle to be cut. Position the machine on plate with the circle attachment center in the center punch mark and make final adjustment of nozzle height and position with hand wheels.

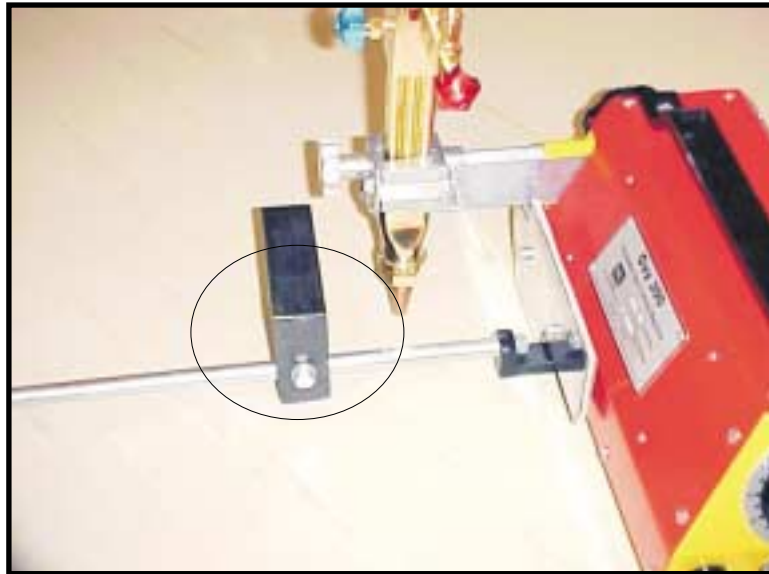
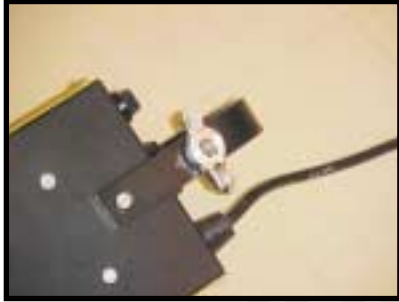
**Note** When cutting circles, the gas hoses and motor cable must be looped or supported properly to avoid fouling or excessive drag.

**Cont.**.....next page



## Circle Cutting - Smaller Diameters

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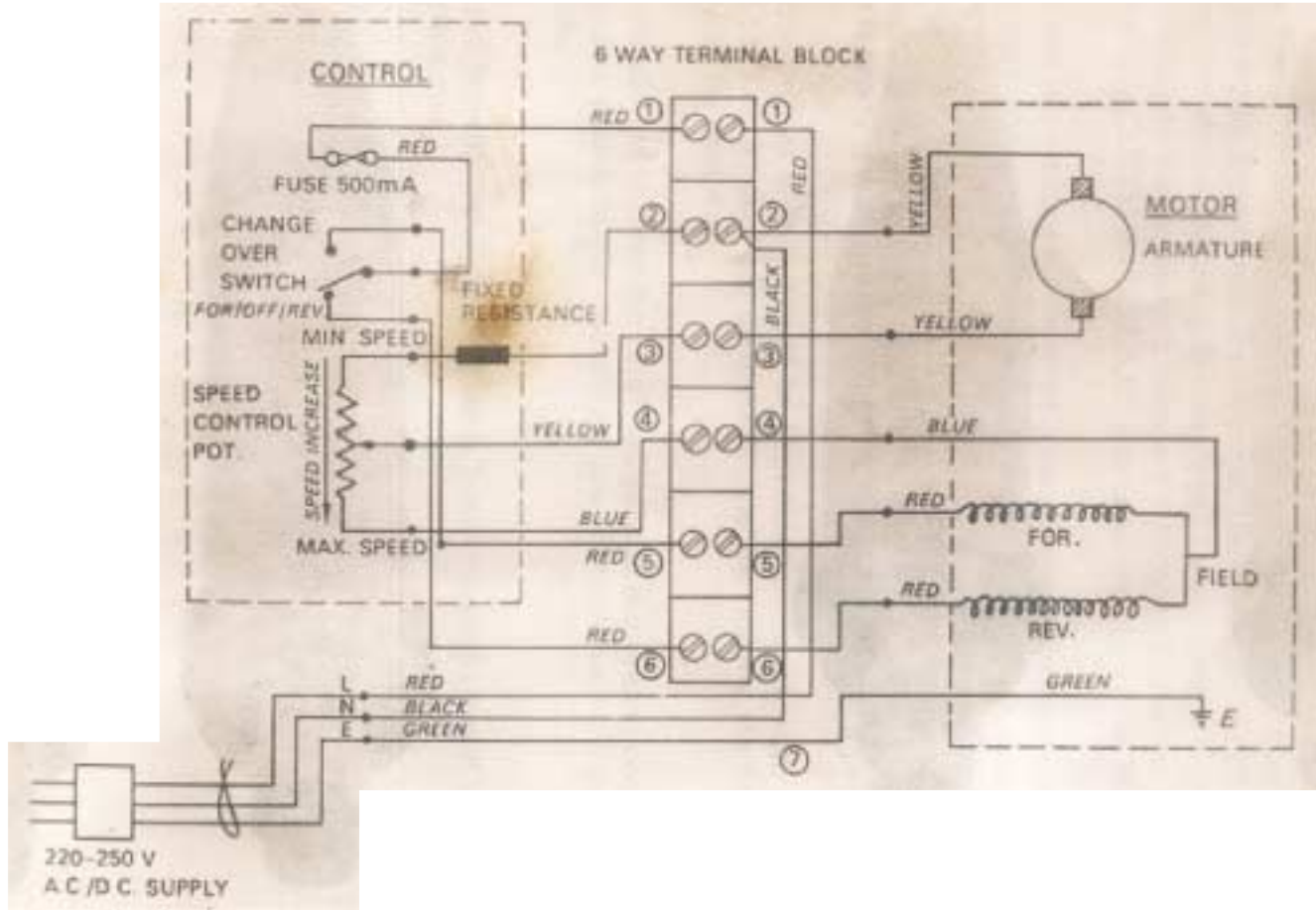


The following methods may be used for cutting circles

1. Drill a hole 12.5mm. diameter or more in the scrap portion of plate so that a point on its circumference coincides with the circumference of the circle to be cut .The edge of this holes can be used as a starting point for preheat and subsequent cutting.
2. Position nozzle over line of cut, preheat plate and open cutting oxygen valve. When the oxygen jet has pierced the plate, switch on drive motor. Where piercing takes place, there will be a scar on the cut edge of the material.
3. Move the cutter by means of hand wheel away from the line of cut approximately 12.5mm. into scrap portion of plate pierce the plate and move the cutter back to the line of cut, again by hand wheel. When the periphery of the circle to be cut is reached, switched on drive motor and allow the machine to take over cutting.

When moving the cutter back to the circle periphery, it should be at a speed approximately the same as circle cutting.

# Electrical Circuit



### MAINTENANCE

The machine has been designed in such a simple fashion that maintenance work required for efficient operation of the machine has been cut to a minimum.

The machine should always be kept clean. Dirt, slag or grit accumulated on any part of the machine should be removed.

All oxygen and acetylene gas hoses should be inspected frequently to ensure that they are in good condition.

### DAILY MAINTENANCE:

Wipe over the machine to remove any oxide dust. Lightly oil the flanged bushes of the wheels and the castor wheel pin.

Examine hoses and power lead for damages.

### MONTHLY MAINTENANCE:

1. Clean the machine external parts, and free the machine from oxide and metallic dust, or oil etc.
2. Check for gas tightness of all hose connections and check the spindles and gland nuts of valve block with soap water for leakages. Particular care should be taken that soap or teepol solution used for leak testing of valve block do not enter into the electrical control panel underneath. In case of leakage from hose connections-tighten hose clip or nuts as necessary.
3. Lightly Oil bushes and related moving parts, the oil should never drip. Be careful that oil does not enter in the electrical chamber, or towards the cutting torch.
4. Open the machine handle, heat shield and machine tin sheet cover. Blow 0.7 Kg/cmsqr air through motor ventilator holes from gearbox end. Also blow air around the machine to blow of the dust, please do not blow excessive pressure air as this can damage the wiring connections.
5. Open the gearbox front cover and check if gear grub screw are tight, tighten the loose ones if any. Change the grease if not thick.
6. Set the cutting torch holder's setting screws for correct movement pressure.
7. Blow air forcefully out of torch after removing the nozzle to clean the dust particles if any in the cutting torch.

**DO NOT USE OXYGEN FOR CLEANING**



### ELECTRICAL MAINTENANCE :

Due to its modular design not much of maintenance work will be necessary on the electrical portion. In case of any electrical fault, check for short circuits and insulation strength.

### MAINTENANCE OF NOZZLES :

Cutting nozzles should be treated with care. This will be amply repaid by the length of satisfactory service which these are expected to give if carefully handled.

If when lighting the cutter, a number of "pops" and "crackles" are produced, this indicates a leak in the nozzle seat at the head. The nozzle should be taken out and inspected to see if a piece of dirt or a damaged seat is the cause. The two seats on the nozzle which are located in the cutting torch head make individual gas tight passages for the acetylene and oxygen gas mixture and cutting oxygen supplies to the nozzle orifices. Any damage to the nozzle seats or on the mating seatings in the cutter will result in bad flame conditions, back firing etc. Never leave a nozzle lying around where it can be damaged, always replace in the carton in which it is supplied.

Nozzle orifices should always be kept clean. Cleaning of the nozzle orifices should be done with the nozzle cleaner set only, in no case any hard material be used for such cleaning.

The small ports at the seating end of the nozzle must not be touched.

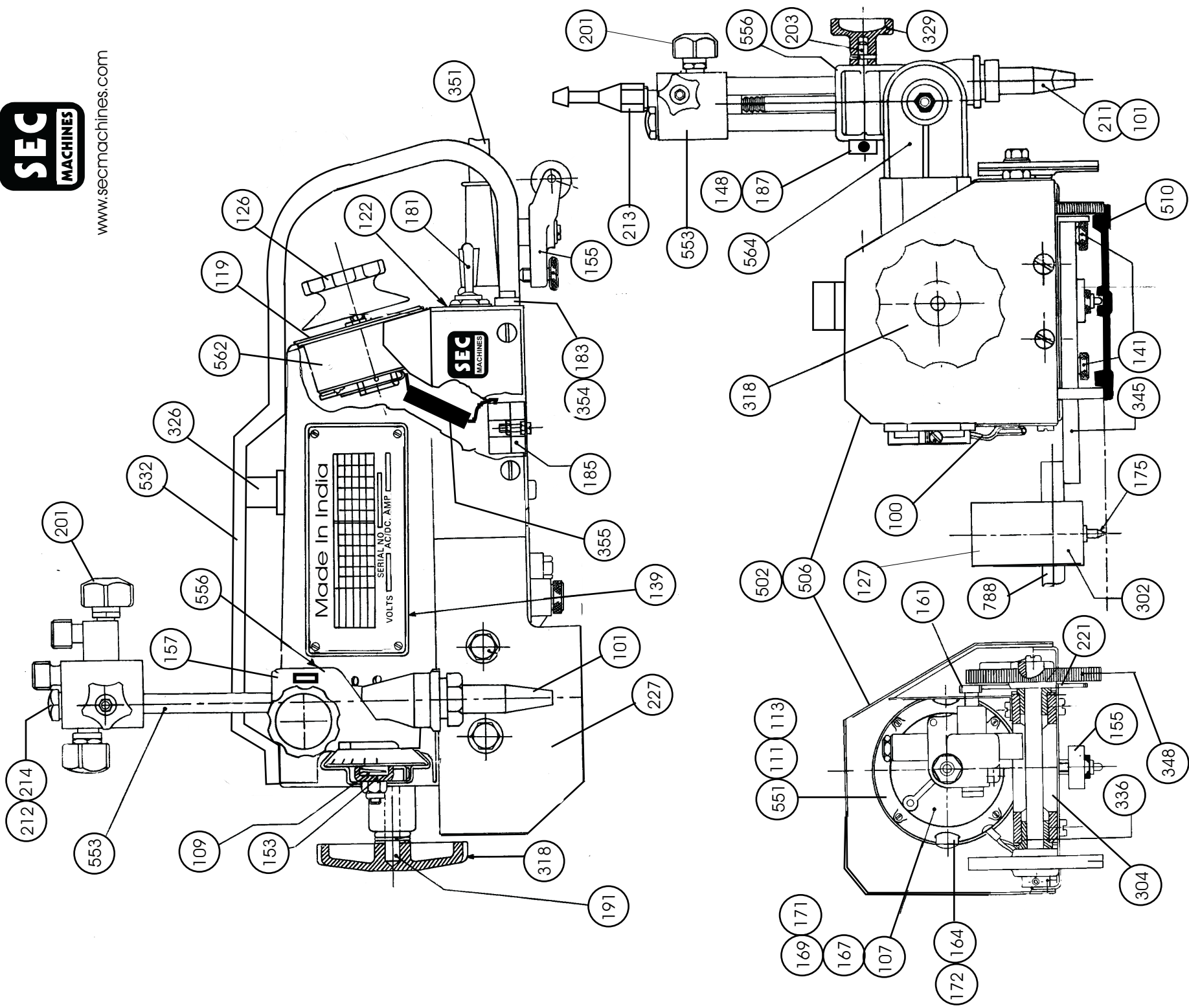
Any damage to the flame orifices of acetylene nozzle may be corrected by filling away the damaged portion and then polishing with smooth emery powder laid on a piece of glass sheet followed by removing any burrs with a copper poker.

The nozzle face must be kept square with the nozzle body.

Complete nozzle maintenance instructions are included with each nozzle.

**WARNING :** No oil or grease of any kind must be allowed to come into contact with high pressure oxygen.  
Oxygen is not inflammable, but in its presence with combustible materials burn much more readily and fiercely than in air.





Oxy 200 Spares' General Arrangement Drawing

# Spares List

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100 Hose clip set	1 set			212 Injector Nut	1pc
101 Nozzle	1 pc			213 Non Return Valves ¼	2 pcs
107 Gearbox Unit	1 set			214 Injector	1 pc
109 Spring Big	1 pc			221 Wheel Gear	1pc
111 Field Coil	1 pc			227 Heat Shield Sandwich	1set
113 Armiture	1 pc			302 Weight circle cutting	1pc
119 Regulator Label	1 pc			304 Chasis Small	1pc
122 FOR Label	1 pc			318 Hand wheel Knob	1pc
126 Disk Knob	1 pc			326 Handle collar	1pc
127 Circle Cutting Attachment	1 pc			329 Torch Holder knob Small	1pc
139 Label Oxy 1 Main	1 pc	191 Hand wheel Pinion small	1set	336 Chasis Bushes Small	1 set
141 L Plate Bolts	1 set	201 Cutter Knobs Small	3 pcs	345 L Plate	1 pc
148 Gutka	1 pc	203 Brass Pinion	1 pc	348 Wheel Set Small	1 set
153 Spring Cap	1 pc	211 Head Nut Small	1pc	351 Cable 4 mtr	4 mtrs
155 Swivel wheel assembly	1 set			354 Fuse 0.5	1 pc
157 Strip	1 pc			355 Resistor 10 W	1 pc
161 Output Gear Motor	1 pc			506 Tin Body	1 set
164 Carbon Brush Set	1 set			510 Aluminum Railing	1 pc
167 Single Start Worm	1 pc			532 Handle	1 pc
169 Brass Gear Gear Box	1 pc			551 Motor	1 set
171 Fibre Gear Gear Box	1 pc			553 Cutting Torch	1 pc
172 Carbon Holder With Cap	1 set			556 Torch Holder Unit	1 set
175 Pointer	1 pc			562 Regulator	1 pc
181 Centre Off Switch	1 pc			564 Sliding Zinc Plate	1 pc
183 Fuse Holder	1 pc			788 MS Rod Circle Cutting	1 pc
185 Connector Small	1 pc				



