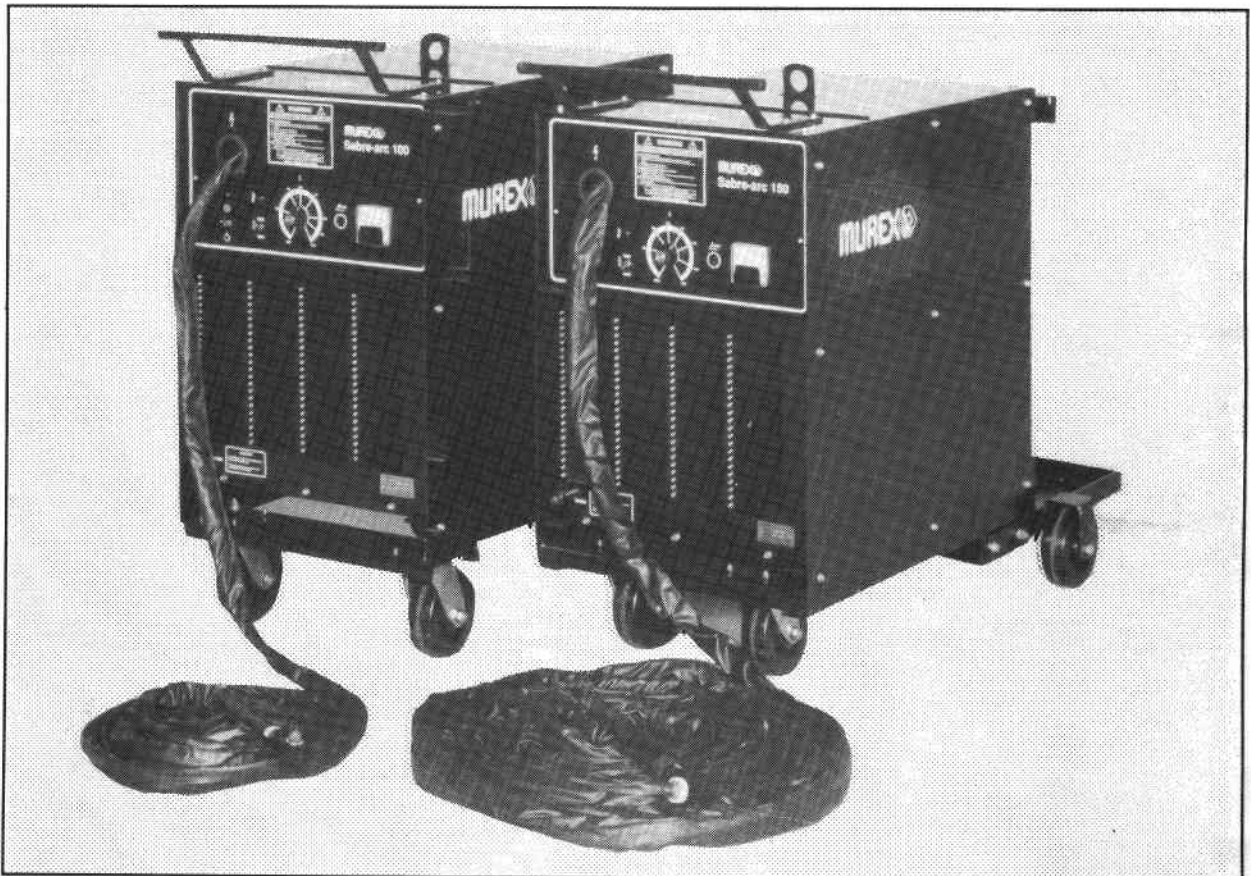


# Sabre-arc 150 PT - 150

## Plasma Cutting & Gouging System



**Please ensure that this  
Instruction Manual  
is made available  
to the user  
of the equipment.**



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## **WARNING**

*This equipment has been designed, manufactured and tested to the highest quality standards to ensure long and trouble free life. However, regular maintenance is an essential part of keeping the machine operating in a reliable and safe manner and your attention is drawn to any maintenance instructions that are contained in this manual.*

*In general, all welding or cutting equipment should be thoroughly inspected, tested and serviced at least annually. More frequent checking will be required when the equipment is heavily used.*

*Wear and tear, particularly in electro-mechanical and moving components, are gradual processes. Caught in time, repair costs are small and the benefits in performance, reliability and safety are significant. Left alone, they can put the equipment, and you, at risk.*

*Have this equipment regularly inspected and maintained by an approved service centre.*

## **WARNING**

**ARC WELDING/CUTTING CAN BE INJURIOUS TO YOURSELF AND OTHERS. TAKE PRECAUTIONS WHEN WELDING. ASK FOR YOUR EMPLOYER'S SAFETY PRACTICES WHICH SHOULD BE BASED ON MANUFACTURERS' HAZARD DATA.**

### **ELECTRIC SHOCK - Can Kill**

- Install and earth the welding unit in accordance with applicable standards.
- Do not touch live electrical parts or electrodes with bare skin, wet gloves, or wet clothing.
- Insulate yourself from earth and work.
- Ensure your working position is secure.

### **FUMES AND GASES - Can be Dangerous to Health**

- Keep your head out of the fumes.
- Use ventilation, extraction at the arc, or both, to keep fumes and gases from your breathing zone and general area.

### **ARC RAYS - Can Injure Eyes and Burn Skin**

- Protect your eyes and body. Use correct welding screen and filter lens and wear protective clothing.
- Protect bystanders with suitable screens or curtains.

**READ AND UNDERSTAND THIS INSTRUCTION MANUAL  
BEFORE INSTALLING OR OPERATING AND SEE WMA PUBLICATION 237  
'The arc welder at work' AVAILABLE FROM THE MANUFACTURER.**

**PROTECT YOURSELF AND OTHERS**

## SAFETY

In any plasma cutting or gouging operation, it is the responsibility of the user to observe certain safety rules to ensure his personal safety and to protect those working near him.

Read all safety articles relevant to plasma cutting published by the WMA. Pay particular attention to any CAUTION or WARNING Notes Included In this manual. CAUTION indicates possible equipment damage. WARNING indicates possible hazard to life.

### ⚠ WARNING ⚠

The ON/OFF switch on this equipment does not isolate the unit from the mains electrical supply. **AC POWER IS PRESENT ON THE ON/OFF SWITCH TERMINALS.**

The On/Off lamp is an indication that the supply is switched on and does not imply that the unit is isolated from the supply. **BEFORE REMOVING THE COVERS FOR MAINTENANCE, ISOLATE THE UNIT FROM THE MAINS ELECTRICAL SUPPLY.**

### 1. Electrical

- ⚠ Treat electricity with respect. The open circuit voltage of this equipment is a high dc voltage therefore contact with any live parts of the torch can be dangerous. Adjustments to the torch or replacement of torch parts should be undertaken with the mains supply isolated from the unit. If damaged torch cables or torch components are found, the unit must be disconnected from mains and defective parts must be replaced using only Murex spare parts.
- ⚠ Do not work on live circuits or cables. Disconnect the main power supply before checking the machine or performing any maintenance operation.
- ⚠ Be sure the case of the welding machine is properly connected to a good electrical earth.
- ⚠ Have the wiring for the welding machine installed by a qualified electrician. All connections must be made according to specifications in force and to general safety standards.
- ⚠ Do not stand in water or on damp floors while using an arc welder or cutter. Do not cut in the rain.
- ⚠ Do not operate with worn or poorly connected cables. Inspect all cables frequently for insulation failure, exposed wires and loose connections.
- ⚠ Do not overload cables or continue to operate with overheating cables. Cables which are too small for the current carried will overheat, causing rapid deterioration of the insulation.
- ⚠ Pay attention that live parts of the torch do not touch any metal which is connected to the earth cable. Fix an insulated hook to hang the torch on when it is not in use.

- ⚠ Switch off and isolate from the mains whilst changing cutting tips and electrodes.

### 2. Ventilation

- ⚠ Do not weld or cut on containers which have held combustible or flammable materials, or materials which give off flammable or toxic vapours when heated, without proper cleaning.
- ⚠ Locate the welding/cutting operation far enough from any vapour-type degreaser using trichlorethylene or other chlorinated hydrocarbons as solvents. The ultraviolet light from the arc can decompose these vapours into toxic gases at a considerable distance from the arc, even though the concentration of the gases is low enough to be undetectable by smell.
- ⚠ Be sure to provide adequate ventilation for removal and dilution of fume and gases. Fume exhaust facilities near the arc, or a ventilated helmet should be used when cutting in confined spaces or on toxic material.

### 3. Glare

- ⚠ Never look at the arc without wearing eye protection.
- ⚠ Always use the proper protective clothing, filter glasses, and gloves. Be careful to avoid exposed skin areas. Do not use cracked or defective helmets or shields.
- ⚠ Never strike an arc when there is someone near who is not protected from the strong light of the arc.
- ⚠ Warn bystanders who are not aware of the dangers of ultra-violet light.

### 4. General

- ⚠ Take care when lifting the unit.
- ⚠ Ensure that cylinders are secured by chains.
- ⚠ Locate the unit so that there is adequate air flow to the ventilation louvres.
- ⚠ Always dress correctly to protect against glare, radiation and spatter.

### 5. Fire

- ⚠ Ensure that the correct type of fire extinguisher is available in the cutting area.
- ⚠ Do not cut near flammable materials or liquids, in or near explosive atmospheres, or on pipes carrying explosive gases.

### 6. Vehicle Electrics

- ⚠ When working on motor vehicles, remove the battery and any circuitry which may be damaged by the arc.
- ⚠ Whilst cutting be aware of the possibility of 'hidden wires' behind panels or bulkheads.

## INTRODUCTION

The Murex Sabre-arc 150 power source with the PT-150 plasma torch is a high power, high duty cutting or gouging equipment for industrial applications. Utilising two separate gas supplies one for the plasma (cutting) gas, the other for the cooling (secondary) gas see below, the system will cut a wide range of ferrous and non-ferrous materials up to 40mm (1.5") thick. In addition high quality gouges can be made for reclamation and repair work.

### 1. Sabre-arc 150 Power Source

The Sabre-arc 150 power source operates from 3 phase 220/380/415V industrial supplies and incorporates power factor correction. Utilising electronic feedback control and thyristor technology the machine features continuous adjustment of cutting current, built in ammeter, pilot arc and High Frequency arc initiation. Although used with separate plasma and cooling gases with the Murex PT - 150 torch, optionally the Sabre-arc 150 power source can be used with a single supply of compressed air and the PT - 100 torch (up to 100A) providing a lower cost alternative particularly for carbon steels. Separate gas inputs, each of which incorporate solenoid control, pressure and flow monitoring, are available on the rear panel.

### 2. PT - 150 Plasma Cutting Torch

The Murex PT - 150 torch is designed for operation using separate plasma and cooling gases. The choice of gases depends on the cutting or gouging application, the mate-

rial, thickness etc., and on the quality of cut/gouge face required. The Gas Requirements section, see page 7, deals in detail with this subject.

Rated at 150A at 100% duty (cutting) the torch uses heavy duty front end parts which can be simply interchanged to match the cutting or gouging application, current and plasma gas. A unique feature is the extended front end system giving greater visibility and access whilst cutting or gouging.

The PT - 150 torch is compact and light in weight and incorporates a 75° head angle for good visibility and handling, see Fig. 1. As standard with the Sabre-arc 150 the torch is supplied with a 15m (50') cable but further 7.6m (25') extensions are also available.

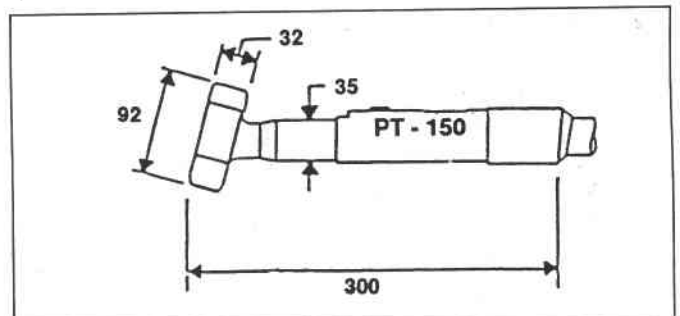


Fig. 1 PT - 150 Torch

## SPECIFICATION

### Sabre-arc 150 Power Source

#### Output:

Open Circuit Voltage	370V dc max.
Current Range	25-150A
	continuously variable
Output Rating 100%	125A/120V
Volt Ampere characteristics	See Fig. 2

#### Input:

Mains Voltage	220/380/415V
Frequency	50 Hz
Phases	3
Input Current	121/70/60A
Power Factor	54%
Fuse Rating at 415V	90A slow

#### Gas Requirements:

Plasma (cutting) gas	N <sub>2</sub> or Ar/H <sub>2</sub> mix or Air
Cooling (secondary) gas	Air or N <sub>2</sub> or CO <sub>2</sub> or O <sub>2</sub> or Ar
	(Usage depends on torch fitted)

#### Dimensions:

Length	813mm	} Excluding undergear
Width	554mm	
Height	788mm	
Weight	290kg	

### PT - 150 Torch

Rating	150A at 100% duty
Plasma (Cutting) gas	N <sub>2</sub> or Ar/H <sub>2</sub> mix
Cooling (secondary) gas	Air or N <sub>2</sub> or CO <sub>2</sub> or O <sub>2</sub> or Ar
Cable Length	15m
Gas Requirements	See page 7
Dimensions	See Fig. 1

*Cutting thickness up to 1.5" (40mm)*

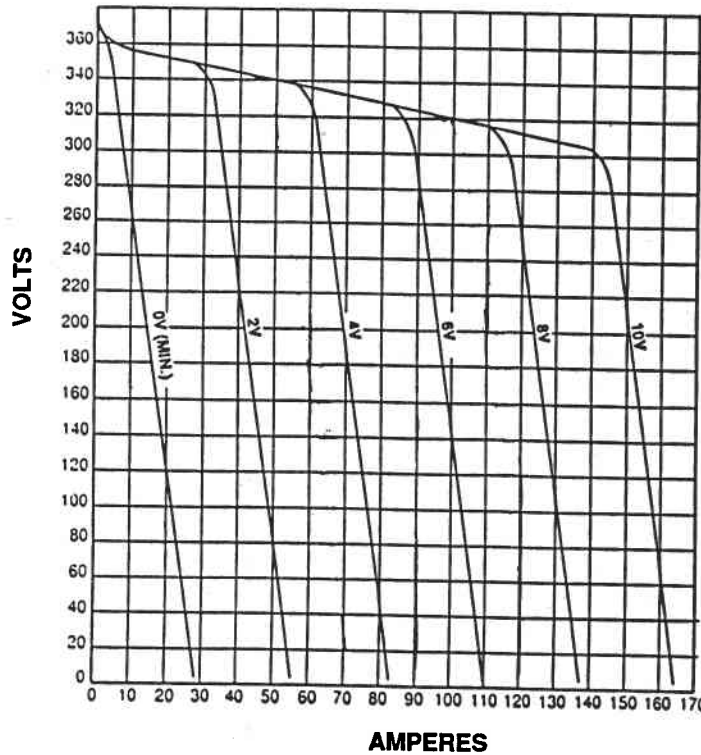


Fig. 2 Sabre-arc 150 Volt Ampere Characteristics

## EQUIPMENT SUPPLIED

The Murex Sabre-arc 150/PT-150 package (Pt.No. 1414300) includes the following items:

Pt. No.	Description
1414301	Sabre-arc 150 Power Source (includes primary cable and undergear)
1414302	PT - 150 Torch with 15m lead
1414304	Work return lead and clamp 15m long
1414272	Plasma gas hose 2m
1414305	Cooling gas hose 2m
1414303	Torch spare parts kit

PT - 150 Torch Spare Parts Kit - Pt. No. 1414303 comprises:-

Qty	Description	Part No.
1	Torch Cap	1414322
2	O - Ring	1414325
2	Collet H D	1414312
1	O - Ring	1414323
2	Baffle Std.	1414320
5	O - Ring	1414324
3	Heat Shield Std.	1414313
2	Heat Shield Long	1414314
2	Heat Shield Drag	1414315
5	Cutting Tip 1.4	1414307
5	Cutting Tip 1.2	1414308
5	Cutting Tip 0.8	1414309
5	Cutting Tip 1.6	1414306
1	Insert Front Body	1414316
1	Insert Front Body Long	1414317
5	Electrode Std.	1414310
2	Electrode Long	1414311
2	Spacer	1414321
2	Centering Tool	1414326
2	Wrench	1414327
1	Lubricant Silicone	1414217
1	High Current Insert	1414318
2	High Current Baffle	1414319
2	Gouging Tip 150A	1414328
2	Gouging Nozzle	1414329

## GAS REQUIREMENTS

The Murex PT - 150 torch requires separate plasma and cooling gas supplies. The choice of gases depends on the cutting or gouging application, material, thickness etc., and on the quality of the cut/gouge face required. See Fig. 3 for general comments and Figs. 4 & 5 for specific data.

### Plasma (Cutting) Gas

Nitrogen is the most commonly used gas for general cutting applications offering greatest economy. However for the highest quality cuts in aluminium or thick steels, stainless & mild, an Argon Hydrogen mixture (65%Ar, 35% Hydrogen) is the best choice offering greater thickness capability, higher cutting speeds and no Nitrogen entrainment problems. For plasma gouging 65% Argon/35% Hydrogen is the required plasma gas.

### Cooling (Secondary) Gas

Nitrogen, Carbon Dioxide, Oxygen or Air can be used as cooling gases, see Figs. 3, 4 & 5. 250cfh (120 lpm) of Air, Oxygen or Nitrogen at 50psi (3.5 bar) is required to cool the torch. Alternatively using CO<sub>2</sub>, 210 cfh (100 lpm) at 50 psi is needed. The use of Air or Carbon Dioxide will produce less bottom dross on stainless plate than Nitrogen.

For plasma gouging Argon, Air or Nitrogen can be used as the cooling (secondary) gas but pure Argon is generally recommended for the highest quality gouges with least fume production. Cooling gas pressure for gouging should be set to 50psi (3.5 bar)

#### Note

*Air must not be used as the plasma gas with the PT - 150 torch*

Tip Size & Pt.No.	Plate Thickness	Mild Steel				Stainless Steel				Aluminium				Current used with				
		N <sub>2</sub> Plasma Gas (25psi)		65Ar/35H <sub>2</sub> Plasma Gas (65psi)		N <sub>2</sub> Plasma Gas (25psi)		65Ar/35H <sub>2</sub> Plasma Gas (65psi)		N <sub>2</sub> Plasma Gas (25psi)		65Ar/35H <sub>2</sub> Plasma Gas (65psi)						
		Cooling Gas (50psi)				Cooling Gas (50psi)				Cooling Gas (50psi)								
		O <sub>2</sub>	N <sub>2</sub>	CO <sub>2</sub>	Air	O <sub>2</sub>	N <sub>2</sub>	CO <sub>2</sub>	Air	O <sub>2</sub>	N <sub>2</sub>	CO <sub>2</sub>	Air			N <sub>2</sub>	65Ar/35H <sub>2</sub>	
0.8mm 1414309	0.8	1G	4S	3F	2F													
	1.6	1G	4F	1G	3G													
	3	4S	3F	1G	2G													
1.20mm 1414308	0.8	1E	3G	2E	4G													
	1.6	1G	2G	3G	4F													
	3	1G	4F	2G	3G													
	4.5	4S	3F	2G	1G													
1.40mm 1414307	6	4S	3F	1F	2F													
	1.6	G1	F4	G2	G3	S5												
	6	G1	F4	G2	G3	F5												
1.60mm 1414306	12	G1	F4	F2	F3	F3												
	18	G1	F5	F2	F4	F2												
	25	G1	S5	F3	F4	F2												
30	NR	NR	NR	NR	NR	F1												
	37	NR	NR	NR	NR	F1												

Numbers indicate order of cooling gas preferred for a particular material and thickness.

- E (Excellent) - Essentially no bottom dross; excellent cut face.
- G (Good) - Moderate to no bottom dross; good cut face.
- F (Fair) - Moderate bottom dross, fair cut face.
- S (Sever) - Heavy tenacious dross; poor cut face.
- NR - Not recommended.

Fig. 3 PT - 150 Gas Selection Chart

Tip Size & Pt. No.	Pressure Settings		Tip to Work Distance mm	Current	Material Thickness mm	Speed Range m/min		
	Plasma Gas	Cooling Gas				Mild Steel	Stainless Steel	Aluminium
0.80mm 1414309	N <sub>2</sub> @ 35psi (25cfh)	N <sub>2</sub> , O <sub>2</sub> , CO <sub>2</sub> & Air @ 50psi (N <sub>2</sub> , O <sub>2</sub> , Air-200cfh) (CO <sub>2</sub> - 160cfh)	3	30 amps	0.8	2.5 - 5	4 - 5	5 - 7
					1.6	2 - 2.5	2 - 2.5	3.5 - 4
					3	0.6 - 1	0.6 - 1	1.7 - 2
1.20mm 1414308	N <sub>2</sub> @ 25 to 30psi (30cfh)	N <sub>2</sub> , O <sub>2</sub> , CO <sub>2</sub> & Air @ 50psi (N <sub>2</sub> , O <sub>2</sub> , Air-200cfh) (CO <sub>2</sub> - 160cfh)	6	55amps	0.8	5 - 7.5	5 - 9	6.5 - 9
					1.6	2 - 3.5	2 - 5	3 - 7
					3	0.6 - 1.3	1.3 - 2	1.3 - 2.5
					4.5	0.5 - 0.75	0.75 - 1	1 - 1.5
					6	0.4 - 0.6	0.4 - 0.6	0.5 - 0.9
1.40mm 1414307	N <sub>2</sub> @ 20 to 25psi (25 cfh)	N <sub>2</sub> , O <sub>2</sub> , CO <sub>2</sub> & Air @ 50psi (Air, N <sub>2</sub> , O <sub>2</sub> -340cfh) (CO <sub>2</sub> - 270cfh)	10	110 amps	1.6	5 - 9	7 - 11	7 - 11
					3	1.3 - 4	1.5 - 5	4 - 6.5
					6	1.3 - 1.8	1 - 2.5	1.8 - 2.5
					10	0.4 - 0.9	0.5 - 1	0.9 - 1.5
					12	0.4 - 0.5	0.4 - 0.6	0.5 - 1
					18	0.2 - 0.3	0.2 - 0.3	0.2 - 0.4
1.60mm* 1414306	N <sub>2</sub> @ 20 to 25psi (75cfh)	N <sub>2</sub> , O <sub>2</sub> , CO <sub>2</sub> & Air @ 50psi (N <sub>2</sub> , O <sub>2</sub> , Air-290cfh) (CO <sub>2</sub> - 230cfh)	10	150amps (70% Duty Cycle)	6	1.3 - 2	1.3 - 2.5	2 - 3
					10	0.5 - 1.2	0.6 - 1.3	1 - 1.8
					12	0.5 - 0.9	0.5 - 0.9	0.6 - 1.5
					18	0.2 - 0.5	0.4 - 0.5	0.4 - 0.6
					25	0.2 - 0.3	0.15 - 0.2	0.2 - 0.4

\* Use only the high-current torch parts

Fig. 4 Sabre-arc 150/PT - 150 Conditions for Nitrogen Plasma Gas

Tip Size & Pt. No.	Pressure Settings		Tip to Work Distance mm	Current	Material Thickness mm	Speed Range m/min		
	Plasma Gas	Cooling Gas				Mild Steel	Stainless Steel	Aluminium
1.40mm 1414307	65Ar/35H <sub>2</sub> @ 65psi (75cfh)	Air, CO <sub>2</sub> or N <sub>2</sub> @ 50psi (340 cfh)	10	110A	6	1.1	2	4
					12	0.6	0.6	1.4
1.40mm 1414307			10	135A	12	0.8	0.8	2
					18	0.4	0.4	1
					25	0.15	0.15	0.6
					30	-	-	0.4
1.60mm 1414306			12	150A	18	0.5	0.5	1
					25	0.25	0.3	0.6
					30	0.15	0.2	0.4
					37	0.1	0.15	0.25

**Note:** The speed ranges given are for best quality cuts with the particular combination of gases. Results will vary depending on material composition, surface conditions, operator technique, etc., Also see Gas Selection Chart for additional reference. If cutting is too fast, you may lose the cut. On slow speeds, dross may accumulate. If speed is too slow (depending on material and thickness), cutting arc may go out. Use of air or CO<sub>2</sub> will produce less bottom dross on stainless steel plate than nitrogen.

Fig. 5 Sabre-arc 150/PT - 150 Conditions for 65Ar/35H<sub>2</sub> Plasma Gas

## INSTALLATION

### Warning

*Installation should only be undertaken by a qualified electrician or trained individual.*

Correct installation is important for the satisfactory and safe operation of the equipment. Before continuing carry out the following checks:

1. Having unpacked the equipment, see EQUIPMENT SUPPLIED section, inspect for evidence of damage or missing items. Notify the carrier or your Murex distributor immediately.
2. Check the air intake and exhaust louvres in the front and rear of the machine for any packing materials that might obstruct the air flow.
3. Locate the power source in a safe area. Leave at least 0.5m clearance around the unit to allow air to circulate freely. The position should be relatively free from dust, fumes and heat. See SAFETY SECTION at the front of this manual.

### Connection to Mains Supply

#### WARNING

*Before making electrical input connections to the unit, use 'machinery lockout procedures'. If the connection is to be made from a mains disconnect switch, the switch should be padlocked in the off position. If the connection is made from a fuse box, remove the fuses from the box and padlock the cover in the closed position. If locking facilities are not available, attach a red tag to the mains disconnect switch (or fuse) to warn others that the circuit is being worked on.*

*Placing the machine unit power switch in the 'Off' position does not shut off all power within the equipment.*

*Comply with local ordinances and electrical authorities.*

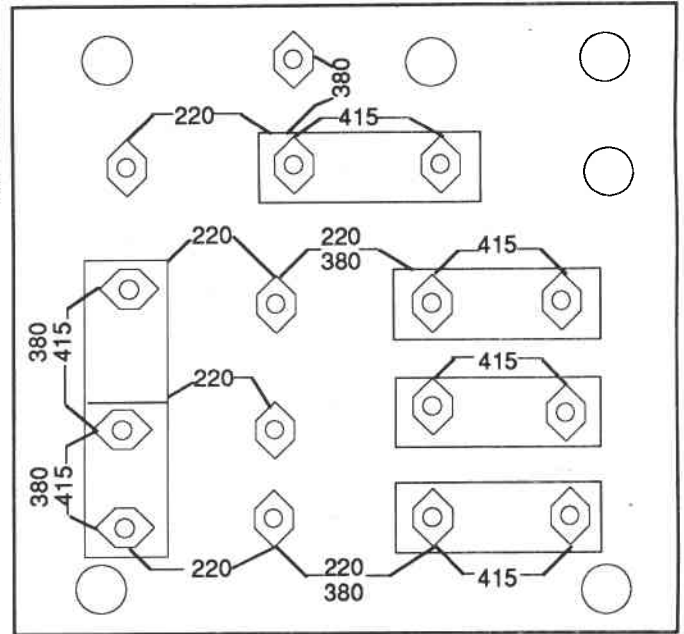
The Murex Sabre-arc 150 power source requires industrial 3 phase 50 Hz mains power of the proper voltage, 220, 380 or 415V, see SPECIFICATION section.

#### WARNING

*From the factory the machine is set for 415V use and the fitted primary cable is suitable for use with 380 or 415V supplies only.*

Ensure the machine is connected for the correct supply voltage.

Access to the primary reconnection panel, see Fig. 6, is via the hinged access door in the LHS panel.



**Fig. 6 Primary Reconnection Panel**  
Position the links as shown for the appropriate mains input voltage.

The power source should be connected to a separately fused circuit including a switched isolator. Fuse information is provided in the SPECIFICATION Section. Ensure the Green/Yellow ground cable is securely connected both to the supply ground system and the machine chassis.

### Gas Input Connections - see Fig. 7.

1. Using the correct two stage regulators (not supplied), connect the cutting and cooling gas supplies. 2 gas hoses are provided with the Sabre-arc 150/PT-150 package. The gas cylinders can be mounted on the cylinder tray if required.

#### WARNING

*Ensure gas cylinder retaining chains are properly fitted*

2. Connect the gas hoses to the regulators and to the relevant fittings on the Sabre-arc rear panel, see Fig. 7. The top two inlets are for the plasma (cutting) gas, Ar/H<sub>2</sub> mixtures upper and N<sub>2</sub> or Air lower. Note do not use air as the plasma gas with the PT-150 torch. The bottom pair of fittings are for the cooling (secondary) gas, Air, N<sub>2</sub> or CO<sub>2</sub> upper or O<sub>2</sub> lower.

#### WARNING

*If oxygen is to be used for the cooling gas after previously using air, all contamination from the air supply must first be removed by flushing and purging the gas lines, see MAINTENANCE.*

**FAILURE TO DO THIS MAY RESULT IN AN EXPLOSION.**

3. If it is desired to use Air as the secondary (cooling) gas an Air Filter Regulator and special gas hose is available, see Optional Extras.

4. Ensure all connections are secure.

**Output Connections - See Fig. 7.**

**WARNING**  
*Placing the power switch in the off position does not remove power from all internal circuitry. Completely isolate all electrical power to the power source by employing 'machinery lockout procedures' before attempting any inspection work on the inside of the unit. If the power source is connected to a disconnect switch, padlock the switch in an open position. If connected to a fuse box, remove the fuses and padlock the cover in the closed position. If the unit is connected to a circuit breaker, or other disconnecting device without locking facilities, attach a red tag to the device to warn others that circuit is being worked on.*

1. Remove the 3 screws and lift the hinged front top cover of the Sabre-arc 150 to access the torch connections.

2. Thread the back end of the PT-150 torch cable through the bushing in the front panel and connect the gas, power and torch switch plug to the relevant fittings on the terminal panel.

3. Ensure all connections are secure before closing the top cover and replacing the 3 screws.

4. Connect the work return lead to the dinse connector on the lower front panel and fix the earth clamp to the work piece. Ensure the workpiece connection point is clean and free from rust, paint or scale.

**WARNING**  
*Failure to properly connect the work cable to the work-piece can risk electric shock.*

5. Ensure the work is connected to an approved mains earth ground using a cable of cross-sectional area not less than that of the input mains earth in the primary cable (16mm<sup>2</sup> at 415V).

**WARNING**  
*The Sabre-arc 150 power source contains a unique ground fault protection circuit which monitors for voltages between the work return cable and mains earth ground. Should a potentially dangerous voltage exist, usually caused by missing or inadequate connection of the work return, the circuit breaker (located under the hinged top cover) will trip. Should an even more significant hazard situation occur fuse FS3 will also blow.*

*Do not operate the equipment until the cause of the high voltage is eliminated. If the work cable was correctly connected to the work then either the work-piece was not connected to mains earth ground or the main machine chassis earth was missing.*

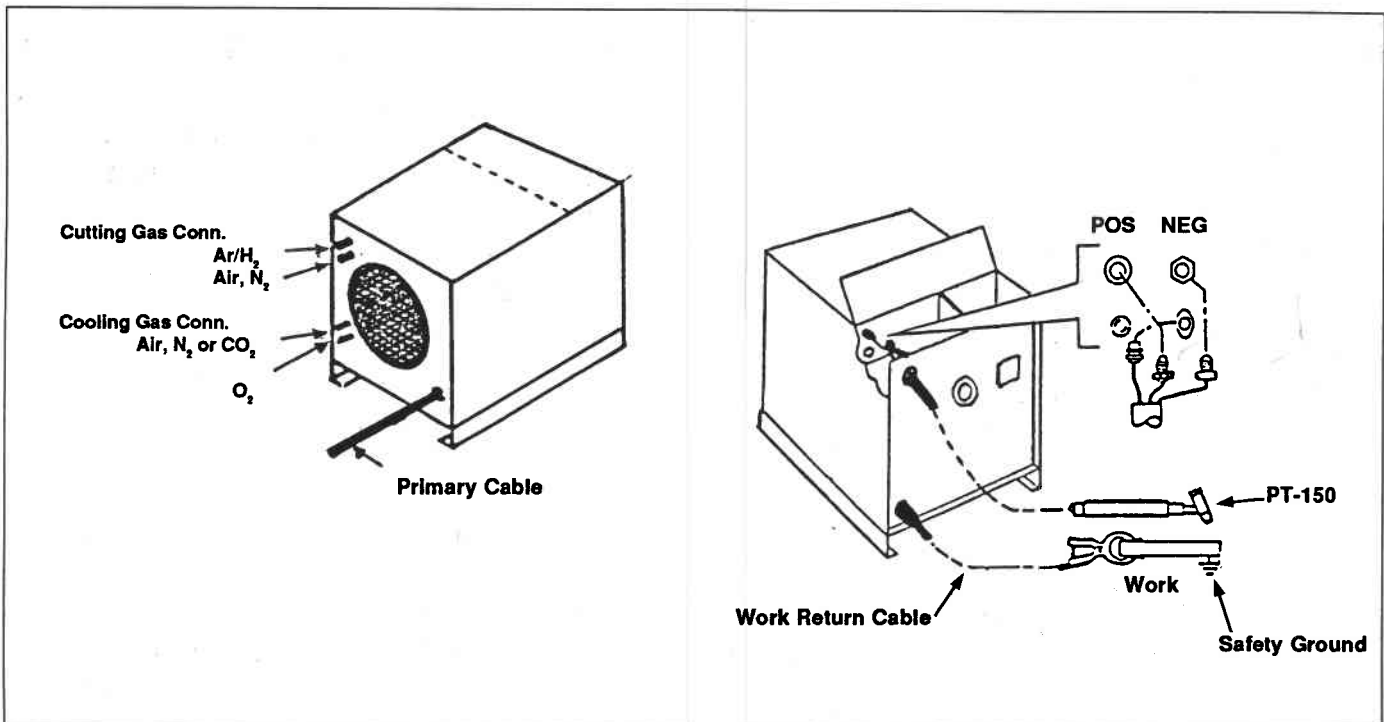


Fig. 7 PT - 150 Connection

## PT - 150 TORCH & CONSUMABLES

### WARNING

*Always ensure the power source is off before examining or installing consumables in the torch head.*

The Murex PT-150 plasma torch operates with separate plasma (cutting) gases and secondary (cooling) gases. A wide range of consumable parts, see EQUIPMENT SUPPLIED, providing either standard (short) or extended (long) front end operation are supplied in the spare parts kit. Depending on whether the application is cutting or gouging, on the plasma gas chosen and on the current used, the right torch parts must be installed for correct operation.

Fig. 8, 9 & 10 show the torch front end detail, consumable parts identification and recommended usage. In addition Fig. A in the Parts Section shows the complete PT-150 torch assembly.

The tungsten electrode must be accurately positioned and centred in the torch for proper operation and long parts life. To this end the tungsten is mounted in a "swivel" collet and a special centering tool is provided with the spare parts kit.

Various heatshields are provided. Standard length heatshields are supplied for both stand-off and drag cutting applications. The drag (or slotted) heatshield (1414315) provides a fixed 10mm stand-off throughout the cut and enables the torch head to be simply rested on the work surface. In addition long heatshields are supplied for both cutting (1414314) and gouging (1414329) operations. Note long heatshields must be used with the long insert (1414317).

### To Install Torch Consumables

1. Ensure the torch head is fitted with the correct insert, baffle and spacer (if required) for the application. Check the 'O' ring (1414324) is properly seated in the insert before screwing it into the torch head. Periodic lubrication

of the 'O' ring using the silicon grease provided is recommended. Note the baffle and spacer (if required) fit into the back of the insert before it is screwed into the torch head.

2. Unscrew and remove the torch cap (1414322)
3. Insert either end of the double-pointed electrode (std. or long depending on insert fitted) into the torch head so it passes through the collet (1414312) and extends past the front end slightly, see Fig. 11.

*Note: Ensure the ball end of the collet is nearest the torch cap and the stem of the collet is "down".*

4. Check that the 'O' ring (1414325) is correctly in position and refit the torch cap loosely to the torch head just sufficient to retain, but not lock, the electrode in position.
5. With the electrode extending slightly at the front end, fit the electrode centre adjusting tool (1414326) finger tight as if it were the cutting tip.
6. Push the torch down on a smooth hard surface allowing the electrode to slide back into the head until the centring tool (and electrode tip) are butted-up against the surface, see Fig. 11.
7. Fully loosen the collet's grip on the electrode by unscrewing the torch cap 1/4 turn. Then tighten the torch cap to lock the electrode in position.
8. Unscrew and remove the centre adjusting tool carefully ensuring that it does not "grab" or "drag" on the electrode.
9. Install the correct cutting/gouging tip tightening it with the tool supplied (1414327)
10. Apply a thin film of silicon grease on the heatshield retaining 'O' rings (1414323) and carefully slide the correct heatshield in place.

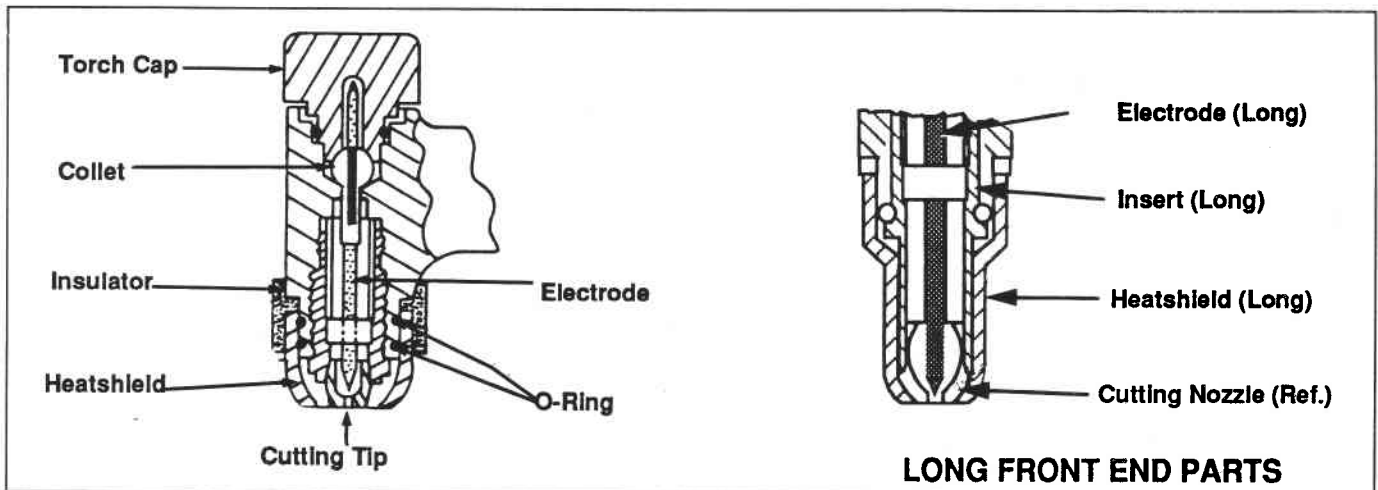
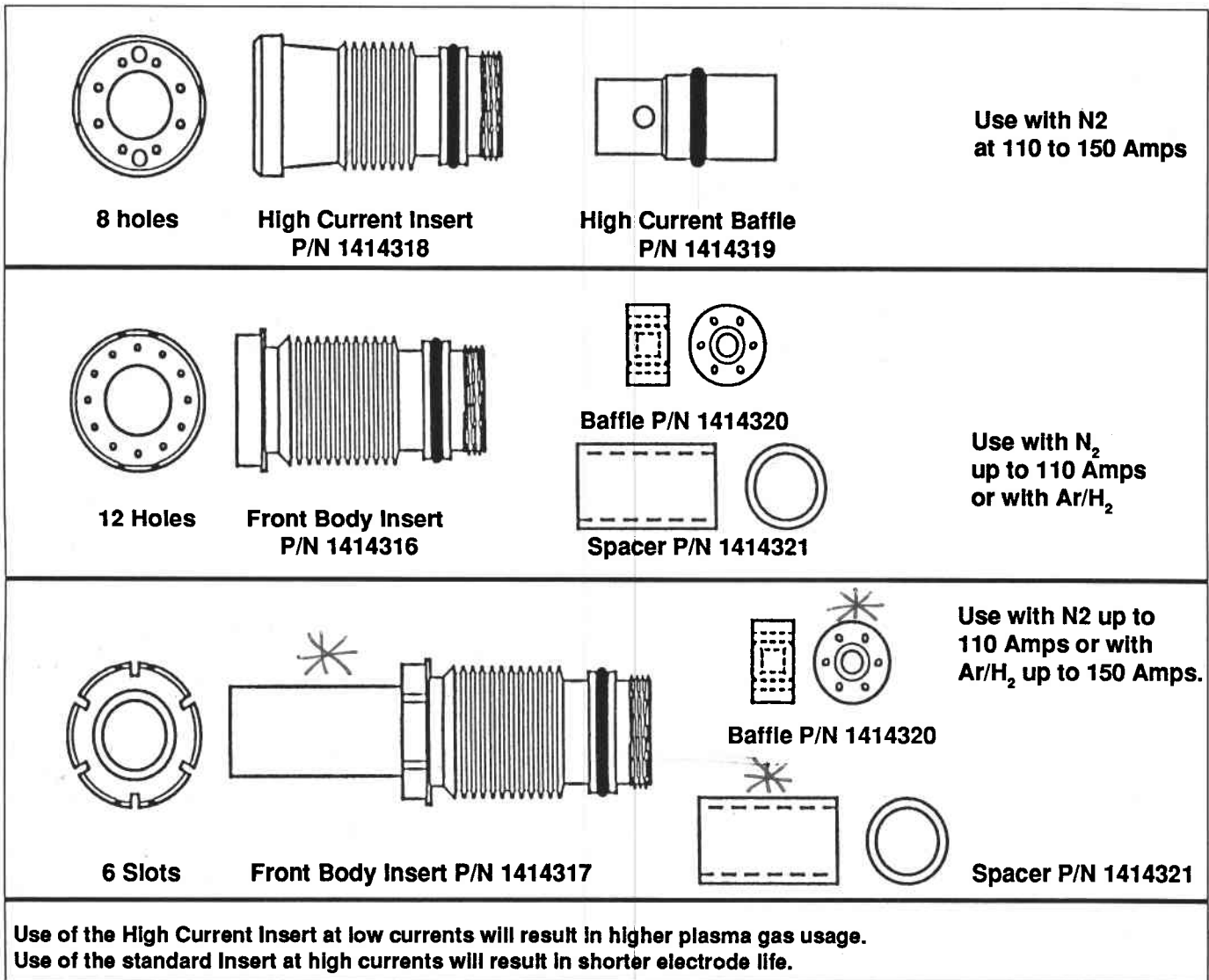


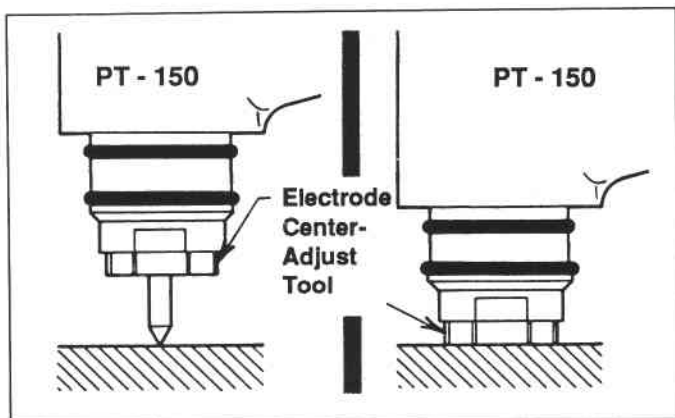
Fig. 8 PT-150 Front End Assembly



**Fig. 9 PT-150 Front End Parts**

PROCESS	CUTTING					GOUGING
Current	110-150A	Up to 110A	Up to 150A	Up to 115A	Up to 150A	Up to 150A
Front End	Std	Std	Std	Long	Long	Long
Plasma Gas	N <sub>2</sub> @ 20-25psi	(1) N <sub>2</sub> @ 20-35psi	(2) Ar/H <sub>2</sub> @65psi	(1) N <sub>2</sub> @ 20-35psi	(2) Ar/H <sub>2</sub> @ 65psi	(2) Ar/H <sub>2</sub> @ 15-25psi
Cooling Gas	←	N <sub>2</sub> , O <sub>2</sub> , CO <sub>2</sub> , Air @ 50psi			→	(3) Ar, N <sub>2</sub> or Air @ 50psi
Collet	1414312	1414312	1414312	1414312	1414312	1414312
Electrode	1414310	1414310	1414310	1414311(Long)	1414311(Long)	1414311(Long)
Insert	1414318(8H)	1414316(12H)	1414316(12H)	1414317(Long)	1414317(Long)	1414317(Long)
Baffle	1414319	1414320	1414320	1414320	1414320	1414319 or 1414320
Spacer	NA	1414321	1414321	1414321	1414321	1414321
Cutting Tip	1414306(150A)	1414307(110A) 1414308 (55A) 1414309(30A)	1414306(150A) 1414307(135A)	1414307(115A) 1414308(55A) 1414309(30A)	1414306(150A) 1414307(135A)	1414328(150A)
Heatshield	1414313(Std) 1414315(Drag)	1414313(Std) 1414315(Drag)	1414313(Std) 1414315(Drag)	1414314(Long)	1414314(Long)	1414329(Gouging HD)
<b>Note:</b>	(1) 20 - 25psi @ 100A 30 - 35psi @ 35A		(2) Argon 65% Hydrogen 35%	(3) Argon recommended for highest quality		


**Fig. 10 PCT - 150 Recommended Parts Usage**



**Fig. 11 Use of Electrode Centering Tool**

## OPERATION

### Setting Gas Supplies

1. Slowly open the gas cylinder valves.
2. Place the primary (wall) switch in the ON position.
3. Place the Sabre-arc 150 power ON/OFF switch in the  ON position (up). The fan should run and the power light should illuminate.
4. Place the gas RUN/TEST switch in the TEST position. The gas solenoid valve(s) should energise.
5. Adjust the plasma (cutting) gas and secondary (cooling) gas regulators to the correct pressure settings.
6. Place the RUN/TEST switch in the RUN position, this will shut off the gas flow.
7. Adjust the current control to the required setting.

### Cutting

#### WARNING

*Before attempting cutting operation read and comply with the safety notes at the front of this manual.*

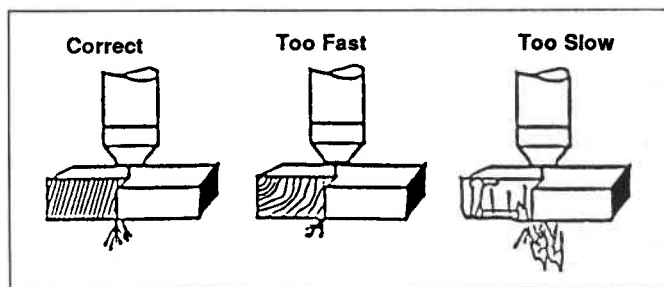
#### PROTECT YOURSELF AND OTHERS

*Never touch any parts forward of the torch handle (electrode, tip, heatshield etc.) unless the power switch is in the OFF position.*

1. Position the torch over the workpiece edge where cutting is to commence. If a drag slotted heatshield is fitted the torch head can be rested on the work, otherwise an initial tip to work distance of roughly 3mm should be held.
2. Press the torch switch. The pilot arc contactor will close, High Frequency will come on and gas will flow. Two seconds later the cutting arc should transfer to the workpiece.

**Note:** If the cutting arc does not initiate within 6 seconds, the pilot arc will shut off. Release the torch switch and check the gas pressures are correct, that the work return is properly connected and that the torch tip was approximately 3-6mm from the work. Then start from step 1. again.

3. For manual cutting, maintain a stand-off (tip to work) distance of 10mm, the drag type heatshield makes this easy. Keeping the head vertical the torch should be moved at a speed that produces the required cut quality. The cutting arc should produce a fine straight spray of molten metal emitting from beneath the workpiece as shown in Fig. 12. See Figs. 4 & 5 for recommended cutting speeds.
4. If the cutting arc goes out during the cut, the pilot arc will immediately reignite as long as the torch switch is pressed. Note that the pilot will only remain energised for about 6 seconds.
5. The cutting arc will automatically stop at the end of the cut, however the torch switch should be released to prevent the pilot arc from restarting.
6. When cutting is finished, wait a few minutes before turning the power switch OFF. This allows the cooling fan to extract heat from the Sabre-arc power source.



**Fig. 12 Correct Cutting Operation**

## Gouging

**Note:** Ensure the PT-150 torch is correctly set up for gouging use and that the right plasma and cutting gases are connected.

1. Hold the torch head at 35 to 40° to the vertical in the direction of the line to be gouged see Fig. 13, with the tip approximately 50mm above the work.
2. Press the torch switch to initiate the pilot arc.
3. Slowly lower the torch head until the main arc transfers.
4. Simultaneously start moving the torch forward. The vertical tip to work distance should be 10-15mm approximately. The actual arc length can be varied over a very wide range, 15-40mm typically.
5. A smooth steady forward movement of the torch will produce a smooth, ripple free "U" groove. Do not try to travel more than 200-300mm at one time without repositioning the hands. Do not try to remove more than 6-7mm depth of metal in one pass.

### WARNING

Avoid molten metal falling on shoes or clothes.

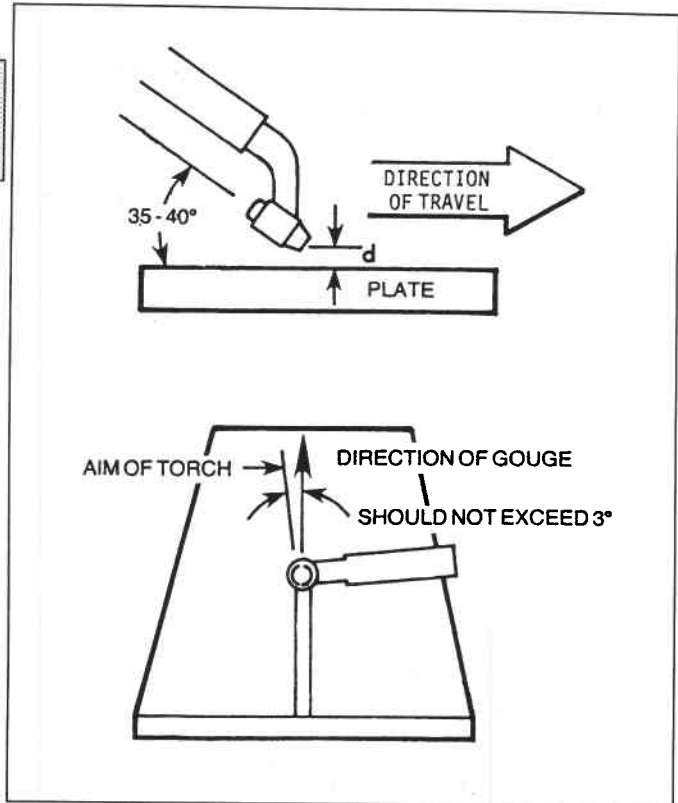


Fig. 13 Plasma Gouging Technique

## COMMON CUTTING FAULTS

Listed below are common cutting problems followed by the most probable causes of each. If problems are suspected with the Sabre-arc power source, refer to the MAINTENANCE and TROUBLESHOOTING sections.

Problem	Probable Cause
1. <b>Main arc does not transfer</b>	<ul style="list-style-type: none"> <li>• Work cable not connected, see INSTALLATION section.</li> <li>• Excessive stand-off distance</li> <li>• Torch not over work</li> <li>• Torch not set up correctly</li> </ul>
2. <b>Main arc extinguishes</b>	<ul style="list-style-type: none"> <li>• Cutting speed too slow</li> <li>• Arc length too long</li> </ul>
3. <b>Excessive Dross</b> (Note in some materials and thicknesses dross-free cuts may not be obtainable)	<ul style="list-style-type: none"> <li>• Cutting speed too fast or slow</li> <li>• Gas pressure incorrect</li> <li>• Current incorrect</li> <li>• Faulty tip or electrode</li> </ul>
4. <b>Double Arcing</b> (damaged hole in tip)	<ul style="list-style-type: none"> <li>• Low gas pressure</li> <li>• Worn cutting tip</li> <li>• Loose cutting tip</li> <li>• Incorrect electrode positioning</li> <li>• Contact with work</li> <li>• Heavy spatter</li> <li>• Cutting current too high</li> </ul>
5. <b>Uneven Arc</b>	<ul style="list-style-type: none"> <li>• Incorrect electrode positioning</li> <li>• Worn or damaged cutting tip</li> <li>• Electrode not centred</li> <li>• Blocked holes in insert in torch</li> </ul>
6. <b>Unstable Cutting Conditions</b>	<ul style="list-style-type: none"> <li>• Uneven cutting speed</li> <li>• Loose connections or hoses</li> <li>• Electrode or cutting tip worn</li> <li>• Incorrect electrode positioning</li> </ul>
7. <b>Insufficient Penetration</b>	<ul style="list-style-type: none"> <li>• Cutting speed too fast</li> <li>• Damaged cutting tip</li> <li>• Wrong gas pressure</li> </ul>
8. <b>Poor Consumable Life</b>	<ul style="list-style-type: none"> <li>• Wrong gas pressure</li> <li>• Incorrect electrode positioning</li> <li>• Check 'O' ring in torch insert</li> </ul>