DHC 2000

OPERATING INSTRUCTIONS

DETROIT TORCH AND MFG. CO.

PLEASE NOTE: Important safety instructions are located on the following page. Please read them carefully before using this product and associated attachments.

MAINTENANCE INSTRUCTIONS ARE LOCATED ON PAGE 16.

INDEX ..... Page No.

Introducing the DHC 2000 Torch

Manufactured by Cobra Torches, Inc.

INTRODUCTION

The DHC 2000 Torch has been developed over a period of thirty years. It is manufactured to exacting specifications to achieve the required characteristics.

To obtain optimum performance of the unit these instructions should be read and thoroughly understood. For those already experienced with similar type equipment, some minor and simple changes to operator technique are required and this will be emphasized throughout these instructions.

These instructions are intended for experienced operators and / or those working under the close supervision of skilled welders. Operation and maintenance of welding and cutting equipment should conform to the provisions of American National Standard Z49.1, "Safety in Welding and Cutting". American Welding Society Manual C4.2-78, "Operator's Manual For Oxy-Fuel Gas Cutting", also deserves careful study.

REFERENCE PUBLICATIONS

AWS C4.2-78 - "Operator Manual for Oxy-Fuel Gas Cutting" - American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126

ANSI Z49.1 - "Safety in Welding and Cutting" - American National Standards Institute, 1430 Broadway, New York, NY 10018

Compressed Gas Association (CGA)
1235 Jefferson Davis Highway, Arlington, VA 22202

- Safety Bulletin SB.8 - "Use of Oxy-Fuel Gas Welding and Cutting Apparatus"
- Pamphlet E-1 - "Standard Connections for Regulator Outlets"
- CGA Standard V-1 - "Compressed Cylinder Valve Inlet and Outlet Connections"

SAFETY INSTRUCTIONS

Warning: When using welding and cutting torches, basic safety precautions must always be followed to reduce the risk of fire and personal injury. Some general precautions are as follows:

1. **Wear protective attire.** Always wear welding goggles to protect eyes from sparks and light rays. Use appropriate gloves and wear protective clothing. Watch for sparks in cuffs. Do not wear oily gloves.
2. **Handle gas cylinders with care**. Chain or otherwise secure cylinders to a permanent fixture. Take care when moving. To transport cylinders, remove regulators and replace with valve cap. Never use any cylinder in other than an upright position.
3. **Use "good housekeeping" in the work area**. Keep sparks and flame away from combustibles. Prepare your work area before welding or cutting.
4. **Do not oil or grease equipment**. The equipment does not require lubrication. Oil or grease is easily ignited and burns violently in the presence of oxygen.
5. "**Crack" oxygen cylinder valve before installing regulator**. Open valve slightly and then close. This will clear valve of dust or dirt, which may be carried into the regulator and cause damage or accident. Do not discharge flow of gas at any person or flammable material.
6. **Use check valves**. Check valves must be fitted to the torch hand piece to prevent back flow of gasses. Test check valves for correct function frequently, at least every six months or in the event of a flashback or backfire. The use of flashback arrestors is also strongly recommended.
7. **Be sure all connections are tight**. Do not force connections. Never test for leaks with a flame. Use a soapy water solution and check for bubbles.
8. **Purge oxygen and fuel gas passages separately before lighting torch**. This will aid in preventing improper mixes of gases.
9. **Use recommended pressure settings**. Improper pressures are wasteful. Extreme pressure build up in regulators is a warning they need repair.
10. **Never use oxygen to blow off work or clothing**. Oxygen supports combustion, spark can ignite oxygen-saturated clothing.
11. **Purge system after use**. When shutting down; close cylinder valves then bleed system by emptying both hoses independently. First, open torch oxygen "OX" needle valve, drain line until pressure is zero, then close oxygen needle valve. Repeat process with torch fuel "GAS" needle valve.
12. **Do not work with damaged or leaking equipment**. Use soapy water when checking for leaks. Do not use frayed or damaged hose. Never use torch as a hammer or to knock slag from work.
13. **Handle equipment with care**. Continued good service and your safety depend on it.
14. **Keep work area well ventilated**. Flammable materials burn violently in an oxygen atmosphere. Flames and glowing materials (smoking) must be avoided when using oxygen. See American National Standard Z49.1, paragraph 8.1.2.
15. **When working with acetylene**, never use at pressures over 15 PSIG (Pounds per Square Inch Gage).
16. **Do not force connectors and threads**. The differences are intentional for the various gases.
17. **Should you experience a backfire or flashback** immediately close the oxygen valves on your torch and tank, followed by the acetylene valves. Refer to page 19 of this manual for further instruction.

DANGER!!! DO NOT ALLOW FUEL TANK OR OXYGEN CYLINDER TO BECOME COMPLETELY EMPTY WHILE IN USE. Doing so could lead to unbalanced pressures and/or reverse flow of gasses which in turn can lead to backfire and/or flashback.

WARNING!!! Each Oxy-fuel process will require a certain amount of gas flow (measured in SCFH) – see Flow Rate table on page 19. The Withdrawal rate of an individual acetylene cylinder must not exceed 1/7 of the tank contents per hour. To calculate the withdrawal rate identify the SCFH requirement of the tip used and multiple that number by 7. For example, If you are using the number 2 tip your equation would be 7 x 7 = 49. In order to safely use that tip your cylinder must have a capacity that meets or exceeds 49 cubic feet.

PURGING

Always purge system before using. Read all steps and fully understand this procedure prior to doing it.

Warning: Purge only in a well ventilated area. Do not direct flow of gas towards any person or any flammable materials. Do not purge near open flames or any source of ignition.

1. With both valves on the torch body closed and the trigger button locked in the off position, slowly open supply valve on the Oxygen cylinder, then adjust regulator to 4 psi or until the oxygen gauge shows a reading.
2. Open the Oxygen (blue) torch valve and allow gas to flow about one second for each ten feet of hose length. Close torch valve.
3. Slowly open supply valve on the Acetylene cylinder not more than one full turn, then adjust regulator to 4 psi .5 Bar pressure.
4. Open the Acetylene (red) torch valve and allow gas to flow for about one second for each ten feet of hose length. Close torch valve.
5. The torch is now purged.

PRESSURE SETTING

Note: All pressure settings assume (should be set in) a “flow” condition. Please see glossary for further detail.

Method 1: Pressures are set at 4psi .5 Bar using gauges on regulators.

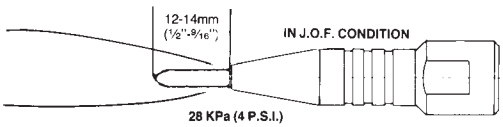
This first method requires that you have pressure gauges fitted to your oxygen and acetylene cylinders that can reliably indicate as low as 4 psi .5 Bar. If your gauges are not capable of establishing 4 P.S.I. .5 Bar use Method 2 to set up correct pressures.

Method 2: Setting Pressures using flame characteristics.

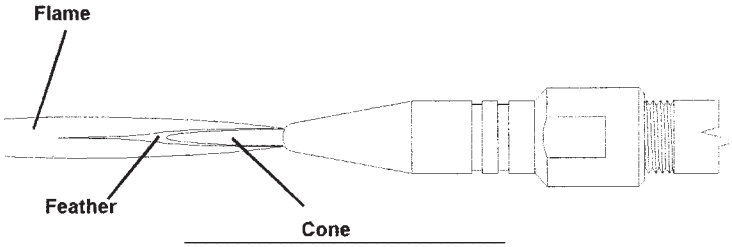
This method is used if you do not have a pressure gauge fitted to your oxygen or acetylene cylinder that can reliably indicate as low as 4 psi.

Read all steps and fully understand this procedure prior to doing it.

1. Fit the No. 3 tip (3 grooves) to the shank. Ensure that the shank is firmly tightened within the barrel.
2. With both valves on the torch body closed, slowly open supply valve on the Oxygen cylinder. Be sure valve is completely open to prevent leakage.
3. Slowly open supply valve on the Acetylene cylinder not more than one full turn, then adjust regulator to 4 psi .5 Bar pressure.
4. Open the Acetylene (red) torch valve 1/2 turn and light the flame.
5. Now fully open (at least two turns) the Acetylene (red) valve. A bright full flame will result.
6. Slowly open the oxygen (blue) torch valve until fully open, at least two turns.
7. Slowly open the Oxygen regulator until you get a neutral flame. (Usually there will be no pressure reading on the Oxygen gauge).
8. The unit is now set at approximately 4 psi .5 Bar. (28 Kpa) for both Oxygen and Acetylene. Once this pressure setting is achieved any size tip can be used with the gas flow now being controlled at the valves on the torch.
9. Flame Cone should be 1/2” long, if not adjust until this dimension is obtained. (See Fig. 6 below)



FLAME CHARACTERISTICS

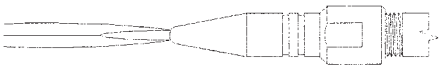


FLAME DETAIL FIG. 1

FLAME SETTING

OFF FEATHER (J.O.F.)
Equal Oxygen and Acetylene
FIG. 2

RIGHT



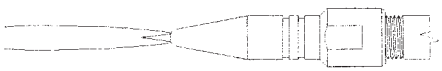
CARBURIZING
Excess Acetylene
FIG. 3

Use carburizing flame with inner cone to weld stainless steel or stainless to other metal.

RIGHT (Stainless)

OXIDIZING
Excess Oxygen
FIG. 4

WRONG



The performance of the DHC 2000 is **TOTALLY** dependent on the correct flame setting. Regardless of tip size, the flame MUST be set in the **"JUST OFF FEATHER" (J.O.F.)** condition. The only exception to this is when welding stainless steel, where a carburizing flame is used. To obtain a **J.O.F.** flame, start with a carburizing flame and gradually increase the Oxygen or decrease the Acetylene until the feather has **JUST** disappeared.

When **J.O.F.** has been obtained a dark neutral streak or shadow will appear to run from the tip of the cone. If the cone is taken beyond this point, by increasing the oxygen, the neutral streak will disappear. This is now an oxidizing flame.

USE CARBURIZING FLAME WITH INNER CONE TO WELD STAINLESS STEEL OR STAINLESS TO OTHER METAL.

EXTINGUISH FLAME

To extinguish the flame, the normal method is to turn off the oxygen control valve before turning off the acetylene control valve.

TIP CLEANING

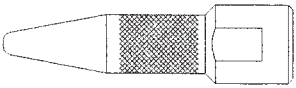
Always use the wire tip cleaners provided as part of your torch kit..

TIP SELECTION

A range of eight (8) tips are used to cover normal welding. An additional ninth tip is used for cutting only.

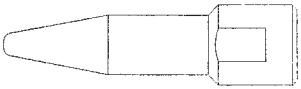
APPROXIMATE GUIDE TO USE OF TIPS - FIG. 5

No. 00 Tip. *(Identified by diamond knurl on barrel) (optional tip)*



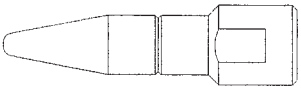
Used for very fine work requiring the smallest possible flame. Jewelry & 24-28 gage steel.

No. 0 Tip. *(Identified by smooth barrel)**



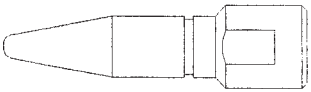
For use in welding materials up to 1.5mm (1/16"). 20-22 gage steel.

No. 0.5 Tip *(Identified by single V groove on barrel)* (optional tip)*



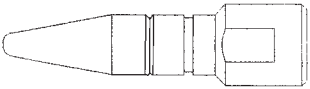
**This tip is ideal for use in extensive welding of 20 ga.- 1/16 material.*

No. 1 Tip *(Identified by single groove on barrel)*



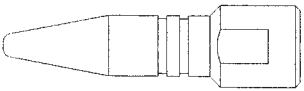
For use in welding materials of 1.5mm to 3.0mm (1/16" to 1/8").

No. 1.5 Tip *(Identified by one full groove & 1 partial groove (optional tip)*



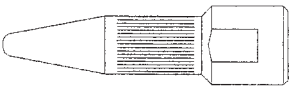
For use in welding materials at 1/8" to 3/16"

No. 2 Tip *(identified by two square grooves on barrel)*



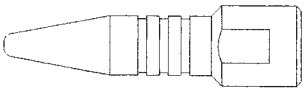
For use in welding materials of 3mm to 6mm and (3/16" to 1/4")

No. 2.5 Tip *(Identified by straight lines on barrel)* (optional tip)*



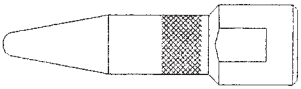
**This tip is useful for heavy steel, cast iron, & aluminum welding over 1/4".*

No. 3 Tip *(Identified by three square grooves on barrel)*



*For use as a heating tip and set up purposes.

Copper Cutting Tip *(Identified by color and diamond knurl on barrel)*



For use only when cutting.

WELDING

STRIVE FOR EXCELLENCE THROUGH PRACTICE, PRACTICE, AND MORE PRACTICE.

The DHC 2000 TORCH shown assembled for Welding.

SAFETY CHECK VALVES MUST BE INSTALLED BEFORE USE!

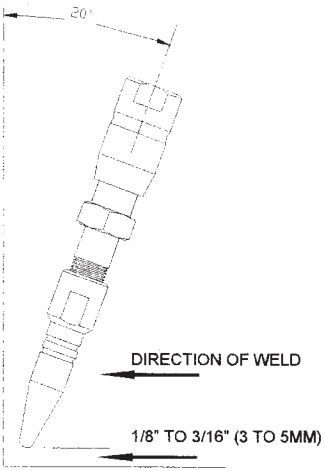
GAS PRESSURES

For all welding the DHC 2000 Torch functions on equal pressures and equal volumes of oxygen and acetylene.

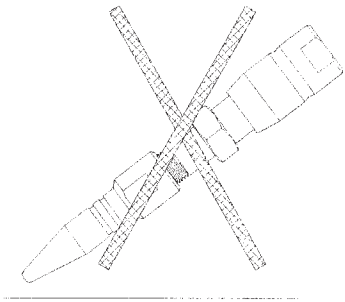
OXYGEN	**4 psi (28 Kpa) .5 Bar**
ACETYLENE	**4 psi (28 Kpa) .5 Bar**

WELDING POSITION

For all welding, the unit should be approximately 10∞ to 20∞ off the perpendicular (or 70∞ to 80∞ from the material being welded.)



CORRECT WELDING POSITION
WELDING POSITION
FIG. 6



INCORRECT

FIG. 7

THIS IS AN IMPORTANT TECHNIQUE CHANGE. QUALITY WELDING WILL NOT BE OBTAINED UNLESS FOLLOWED.

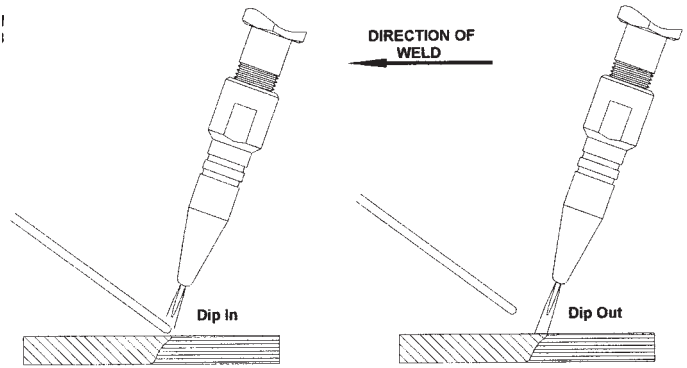
The greatest heat source is between 3mm to 5mm (1/8"-3/16") from the tip of the cone.

WELDING TECHNIQUE

Due to the unique characteristics of the DHC 2000 flame, the cleaning of material to be welded and the use of flux is in many cases unnecessary.

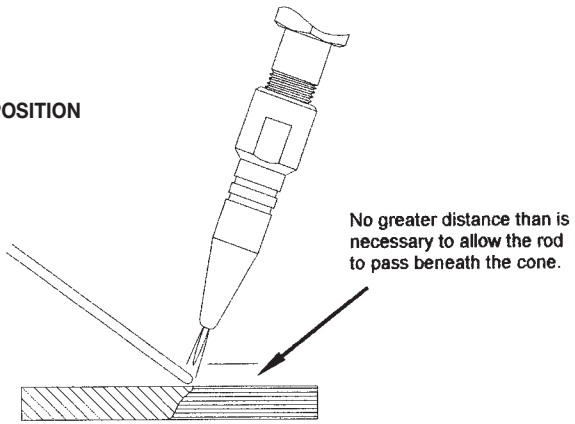
A DIP IN - DIP OUT ACTION should be adopted.

DIP IN - DIP OUT
FIG 8



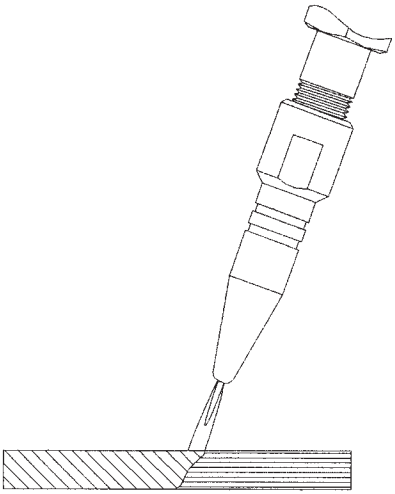
FEED THE WELDING ROD UNDER AND BEHIND THE TIP OF THE FLAME CONE.

ROD POSITION
FIG. 9



IT IS IMPORTANT FOR THE FLAME TO BE IN FRONT OF THE WELDING PROCESS as the molten metal will follow the flame (frequently referred to as a capillary action).

METAL FLOW
FIG. 10

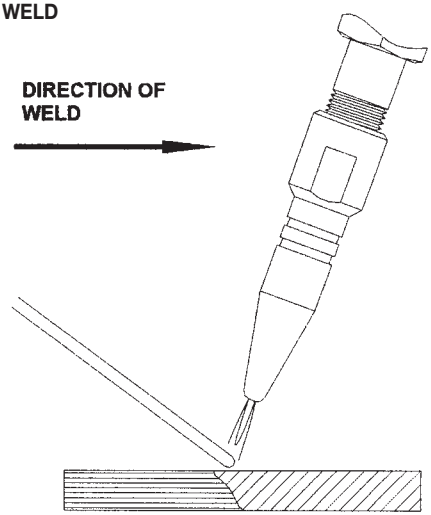


DO NOT push the molten metal forward with the flame (face feeding). Keep the flame moving forward as fast as the welding process will allow, if the flame is stationary the molten deposit will build up behind the flame.

BACKHAND WELDING

Backhand welding is a normal process which can be simply achieved using the DHC 2000 Torch. It is usually recommended for steel plate exceeding 5mm (3/16") thickness.

BACKHAND WELD
FIG. 11



TEMPERATURE

It should be noted an increase in gas pressure will NOT increase the temperature rating of the flame, as the unit is designed to operate at maximum efficiency at 4 psi .5 Bar (28 Kpa) If a greater volume of heat is required, increase the size of the flame or change to a larger tip.

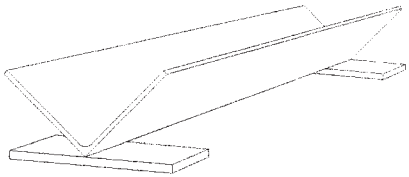
FLUXES

In all instances where fluxes are used, minimal quantities are required. There are frequent occasions where no flux is required.

DO NOT use heavy coatings of flux.

SUGGESTED METHOD OF FLUXING

A method of fluxing a welding or brazing rod, to minimize the amount of flux used, is to put the flux into a fluxing stand, then wipe of the excess with a piece of scrap wood or similar, back into the flux container, leaving a residue in the flux stand. Heat the rod for about 8" (200 mm) of its length and place in the vee area. Do not twist the rod as enough flux will adhere to facilitate the weld or braze. For mixing ratios refer to manufacturers label.



FLUXING STAND
FIG. 12

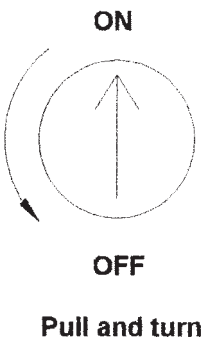
PREPARATION -CLEANING

The cleaning of the area to be welded is, in most cases, unnecessary.

Salt, sand and carbon deposits should be removed.

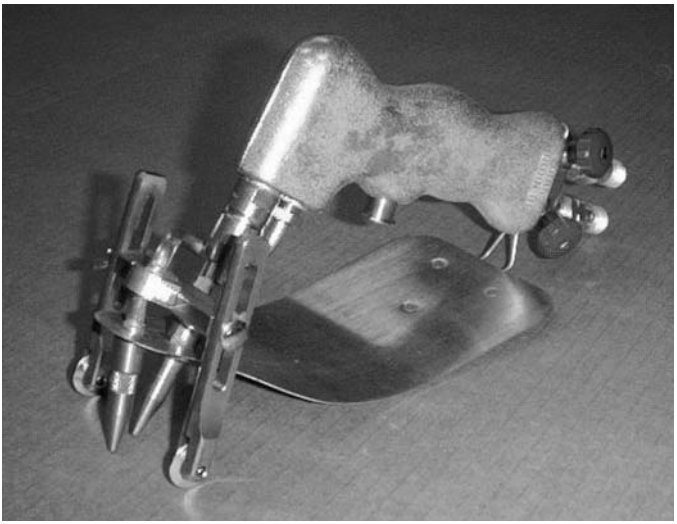
TRIGGER

The trigger button is located on the body of the torch and Is in the 'ON' (unlocked) position when the arrow is pointing upwards as in FIG. 13. To lock 'OFF', pull out and turn to left or right as in FIG. 13. It is recommended to have the trigger in the 'OFF' position when welding, but it must be in the 'ON' position when cutting.



CAUTION: Prolong use or over heating of brass tips during cutting will damage brass tip. Use copper cutting tip when ever possible.

CUTTING

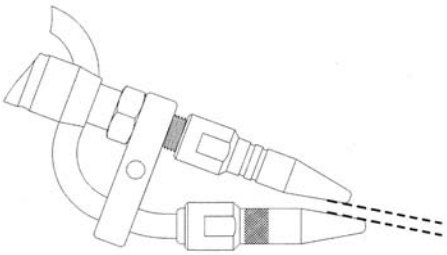


Cutting with the DHC 2000 Torch requires a different technique to that of conventional equipment – in part due to separate delivery points for the oxygen and acetylene. Attention should be given to all details set out in this section.

CHECK THE DISTANCE BETWEEN TIPS

After attaching the cutting attachment to the torch (see Assembly) double check the distance between the tips. Use the wrench from kit to gage distance between tips (see diagram below) If distance is not correct please contact Cobra Torches, INC. This is important in that if the distance is too narrow the cutting tip may become melted by the heating tip.

Note: In this manual, the term *"cutting tip"* refers to the tip through which only oxygen passes and will be affixed to one of two possible cutting attachments. The term *"heating tip"* refers to the tip through which a mixture of fuel and oxygen pass, this will be the tip secured directly upon the shank of the torch.



Distance between these two lines should be approximately 5/32" (4mm) or the thickness of the wrench provided in kit.

CUTTING - THICK STEEL

Fig 13. The DHC 2000 Torch shown assembled for cutting thick steel using the over cutter, complete with guide wheels and optional heat shield.

The following table describes the recommended pressure settings and tips to use when cutting mild steel of various thicknesses. Please note that, regardless of material thickness, the **acetylene is always maintained at 4 psi (28Kpa)**

Thick Steel Table

Material Thickness	Oxygen Pressure Setting	Heating Tip	Cutting Tip
3/16"	6-8 PSI	#1	Copper Tip
1/4"	8-12 PSI	#2	Copper Tip
1/2"	14-16 PSI	#2	Copper Tip
3/4"	18-20 PSI	#2	Copper Tip
1"	22-25 PSI	#2	Copper Tip

ASSEMBLY

Fit the overcutter to the DHC2000 Torch as shown in Fig. 13. This is accomplished by:

1. remove the 'body plug' from the cutting port,
2. then (without a heating tip fitted) slide the overcutter onto the shank while engaging the threaded fitting into the open cutting port.
3. Tighten the threaded fitting sufficiently to secure the overcutter in place and prevent oxygen leakage. Be careful not to over tighten.
4. Tighten the 'copper cutting tip' to the end of the overcutter, again, do not over tighten
5. Tighten the #2 (or #1, see table above) to the shank for heating.

Note: The use of the guide wheel assembly is optional.

SETTING THE FLAME FOR CUTTING

When using your torch for cutting steel it is important to note that the oxygen supply to the torch is shared between the heating flame and the cutting flame. Thus when the cutting trigger is squeezed the heating flame may become acetylene rich (carburizing). The heating flame must be adjusted to be correct while oxygen is flowing to the cutting tip as described below.

1. Light the torch and establish a flame as described in FLAME DETAIL Fig.1.
2. Squeeze the trigger to allow oxygen to flow through the cutting tip.
3. With the trigger still depressed, adjust the flame to the desired size in Just Off Feather condition
4. Release the trigger

PROCEDURE

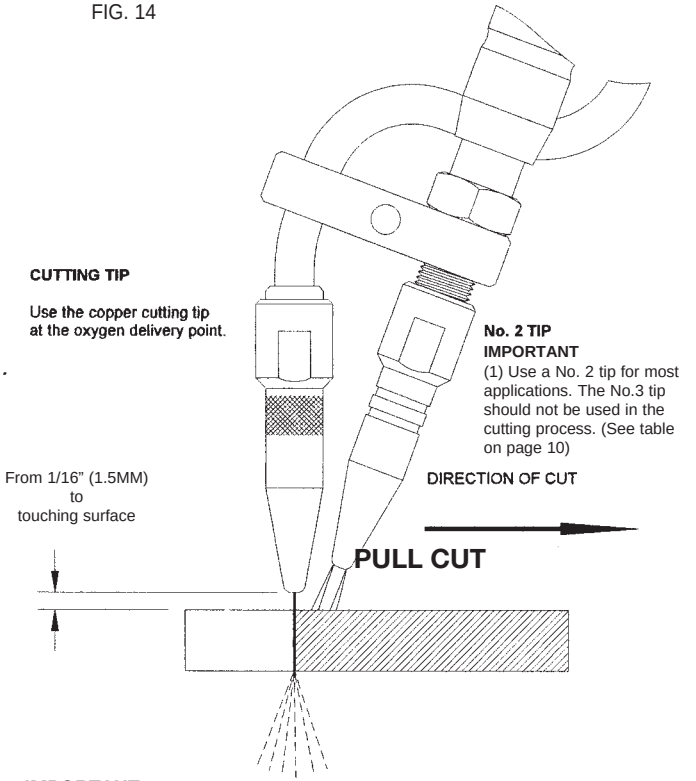
Heat the edge of the steel to a bright cherry red, depress the trigger and move the oxygen delivery point over the heated edge - cutting will commence.

Beveling can be carried out by angling the handpiece in the direction the beveled angle is required.

IMPORTANT - AT ALL TIMES WATCH THE OXYGEN DELIVERY POINT, NOT THE FLAME to ensure the correct distance from the material is maintained.

TIP POSITION - CUTTING STEEL PLATE.

FIG. 14



IMPORTANT:

The oxygen delivery point (cutting tip) must be just out of the flame area. The flame size can vary for thickness of material being cut and operator technique

For any oxygen and acetylene cutting, whether the unit is used manually or a wheel guide is used, the unit is held with the oxygen delivery point perpendicular (90 degrees) to the surface of the material being cut..

The oxygen delivery point should be maintained approximately 1/16" (1.5mm) from the surface to be cut.

Piercing holes is achieved using the normal method i.e. after bringing the surface to a very bright red, raise the oxygen delivery point to approximately 12mm (1/2") before introducing the oxygen. Once the plate is penetrated, return to the normal height 1.5mm (1/16") above work and proceed to cut the hole.

For optimum cutting, the oxygen delivery point should follow immediately behind the heating point.

CUTTING - SHEET STEEL

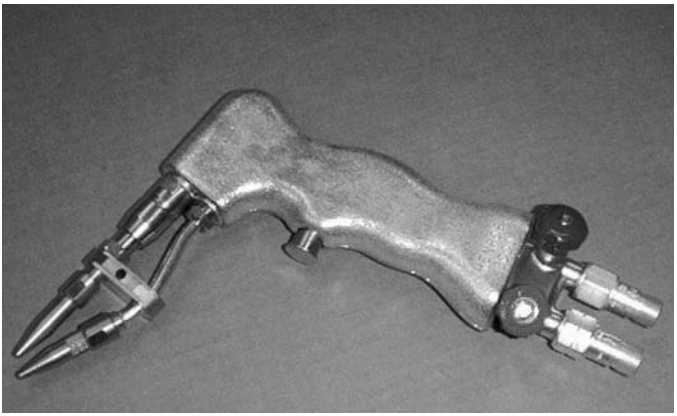


FIG. 15 The DHC 2000 Torch shown assembled for cutting sheet steel using the under cutter.

The following table describes the recommended pressure settings and tips to use when cutting sheet steel of various thicknesses. Please note that, regardless of material thickness, **the acetylene is always maintained at 4 psi (28Kpa)**

Sheet Steel Table

Material Thickness	Oxygen Pressure Setting	Heating Tip	Cutting Tip
.010 - .025	4-5 PSI	#0	#00
.030 - .065	4-5 PSI	.5	#0
.075 - 1/8"	4-5 PSI	.5	#0

ASSEMBLY

Fit the undercutter to the DHC2000 Torch as shown in Fig. 13. This is accomplished by:

1. remove the 'body plug' from the cutting port,
2. then (without a heating tip fitted) slide the undercutter onto the shank while engaging the threaded fitting into the open cutting port.
3. Tighten the threaded fitting sufficiently to secure the undercutter in place and prevent oxygen leakage.
4. Tighten the desired "cutting tip" (see table above) to the end of the undercutter,
5. Tighten the desired "heating tip" (see table above) to the shank for heating.

Note: The use of the guide wheel assembly is optional.

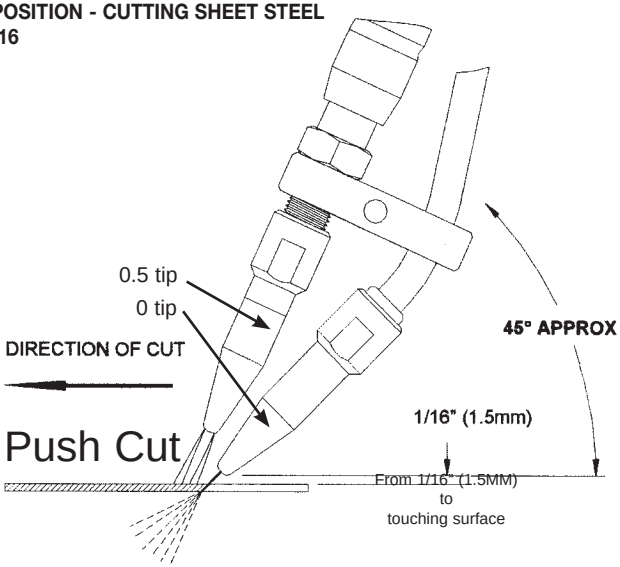
CAUTION: Prolong use or over heating of brass tips during cutting will damage brass tip. Use copper cutting tip when ever possible.

SETTING THE FLAME FOR CUTTING SHEET STEEL

When using your torch for cutting steel it is important to note that the oxygen supply to the torch is shared between the heating flame and the cutting flame. Thus when the cutting trigger is squeezed the heating flame may become acetylene rich (carburizing). The heating flame must be adjusted to be correct while oxygen is flowing to the cutting tip as described below.

1. Light the torch and establish a flame as described in Section 16.
2. Squeeze the trigger to allow oxygen to flow through the cutting tip.
3. With the trigger still depressed, adjust the flame to the desired size in Just Off Feather condition (Approx. 3 to 4mm - 1/8" to 3/16")
4. Release the trigger

TIP POSITION - CUTTING SHEET STEEL
FIG. 16



PROCEDURE

Heat the edge of the steel to a bright red, depress the trigger and move the oxygen delivery point over the heated edge - cutting will commence.

The flame size can vary for thickness of plate and operator technique.

Position the oxygen delivery point (cutting tip) should be at approximately 45° from the surface of the material being cut. The operator may wish to slightly vary this angle to suit individual style.

IMPORTANT - AT ALL TIMES, WATCH THE OXYGEN DELIVERY POINT (NOT THE FLAME) and maintain the cutting tip no more than 1.5mm (1/16") from the surface being cut. The cutting tip can be allowed to touch the surface although this will slightly reduce tip life.

ROSEBUD HEATING TIP (OPTIONAL FEATURE)

Our rosebud heating tip is designed to run efficiently on 4lb of acetylene and 4lb of oxygen.

Rosebuds require a good amount of fuel. So, be sure that your fuel tank capacity is large enough to support consumption requirements (see Fuel Consumption chart on p19). If your tank is too small or the fuel level in it is too low then you will risk starving the heating tip or drawing acetone out of your tank.

ASSEMBLY

Remove shank form the barrel and insert Rosebud heating tip. Tighten with wrench – DO NOT over tighten.

LIGHTING PROCEDURE

Set regulator pressures at 5 and 5 (psi). Note: Setting at 5 and 5 will account for line drop of a 12' hose so that when the fuel mixture is in a "flow" condition the gauges should read 4psi.

Open acetylene valve and light at tip.

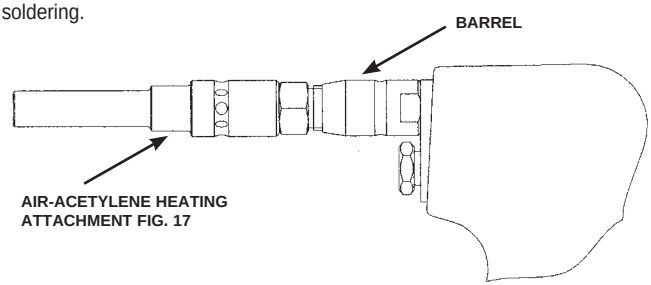
Slowly open oxygen valve until a neutral flame condition is obtained.
Note: If you are having difficulty lighting verify that the fuel and oxygen gauges still read 4psi when the valves are open. If not, incrementally adjust the regulator knobs until the proper pressure settings are established for the "flow condition.

SHUTDOWN PROCEDURE

Close the Oxygen valve on the torch, followed by the acetylene valve.

AIR ACETYLENE HEATING ATTACHMENT (OPTIONAL FEATURE)

For soft soldering, leading, tinning, silver soldering and general light heating without the oxidizing of materials. The acetylene and air tip can be used in many instances. A soldering bit can be fitted for continued heating in soft soldering.



AIR-ACETYLENE HEATING ATTACHMENT FIG. 17

ASSEMBLY

Remove tip and shank from barrel and insert air acetylene tip to barrel as shown in Fig. 17. Tighten with wrench provided. Do not over tighten. The acetylene setting is 4 psi (21-28 Kpa)

IMPORTANT OXYGEN MUST NEVER BE USED WITH THE AIR-ACETYLENE HEATING ATTACHMENT.

PROCEDURE

With the acetylene cylinder supply valve open a maximum of one turn and regulator set at 4 psi, open the acetylene valve on the torch body and light the flame at the end of the Air-Acetylene attachment. A cone condition will form in all instances regardless of low settings at the torch body valve. Too high a flow or pressure will extinguish the flame when the handpiece control valve is fully open.

Should a burning occur at the holes of the air-acetylene attachment (this can occur if the acetylene pressure is very low), an increase of acetylene will immediately allow the cone to 'fix' at the tip.

MAINTENANCE INSTRUCTIONS

Check Valves

Leak test Check Valves at least every six months, as follows:

1. Shut off fuel gas supply and disconnect hose from check valve.
2. Set oxygen regulator to 5 P.S.I., open all gas valves on torch or cutting attachment.
3. Plug tip and check for reverse flow to fuel gas check valve. Use soapy water or immerse in water to check for leaks. Set pressure to zero after test.
4. Reconnect fuel gas hose and disconnect oxygen hose.
5. Repeat steps 2 and 3 using fuel gas regulator as pressure source.
6. Reconnect hoses and purge system before use.

Regulator Test

A leak test of the regulators may be made as follows: (also see your regulator instruction manual)

1. Shut off acetylene gas regulator by turning counter-clockwise until loose.
2. Close fuel acetylene cylinder valve.
3. Close acetylene (red) torch valve.

NOTE:

- Watch acetylene cylinder pressure gage for several minutes. A pressure drop indicates a leak in the inlet side. Tighten connection and recheck.
- Also watch the delivery pressure gauge. A rise in pressure indicates a leak in the regulator valve.
- If leak cannot be stopped, DO NOT USE THE REGULATOR!
- All gauges should read zero when the pressure is removed. If they do not, the gauges may be damaged. If damaged, check system for cause of damaged gauges. Have the damage repaired by a qualified repairman or replace the damaged gauges.
- Repeat procedure shown above for the oxygen regulator.

CLEANING GAUGES

The gauge crystals are typically made of Lexan. Use only soapy water to clean, then wipe dry using soft cloths. Do not use solvents. ® General Electric Company

CHANGING CYLINDERS

A cylinder is depleted and is considered empty when it is unable to deliver fuel gas or oxygen to the torch tip at the set pressure.

1. Close supply valve of depleted cylinder and bleed off all gas in depleted line at torch. Close torch valve.
2. Disconnect hose and regulator from depleted cylinder.
3. Screw Valve Protection Cap onto cylinder, mark "EMPTY", and remove.
4. Follow the procedure under set-up instructions provided with the new cylinder.
5. Purge system (see below)

TORCHES AND CUTTING ATTACHMENTS

1. Periodically check for leaks using a leak test solution or by immersing in water and checking for bubbles.
2. Tighten connections and packing nuts to stop leaks. Do not use excessive force.

STORAGE

When not in use, store equipment in a clean and safe, clean, and dry place.

FAULT FINDING

WELDING

PROBLEM	POSSIBLE CAUSE	REMEDY
Handpiece getting hot		
	1. Incorrect pressure	Pressure setting, page 3
	2. Incorrect flame setting	Flame setting, page 4
	3. Reflected heat from job	Use heat shield
Tip backfiring		
	1. Tip too large for job	Tip selection, page 5
	2. Flame setting too low for tip size	Tip selection, page 4
	3. Flame cone forced into molten metal	Welding technique, page 8
Unsatisfactory weld		
	1. Incorrect flame setting	Flame setting, page 4
	2. Torch held at wrong angle	Welding position, page 7
	3. Rod not being used correctly	Welding technique, page 8
Fluctuating flame		
	1. Oxygen or acetylene regulator diaphragm faulty	Have regulators serviced.

CUTTING

PROBLEM	POSSIBLE CAUSE	REMEDY
Wide cut, excessive Slag		
	1. Oxygen delivery point too far from surface being cut	Position (Cutting), page 13
	2. Insufficient pressure	Pressures (Cutting), page 12
Melting end of cutting tip		
	1. Tip inside flame area	Flame setting (Cutting), page 12
Oxygen delivery tip		
	1. Tip allowed into molten metal	Position (Cutting), page 13

ADDITIONAL NOTES ON SAFETY BACKFIRE AND FLASHBACK

CAUTION!!! A Backfire is where the flame goes out followed by a loud pop. A backfire is more of a nuisance than a danger but if the conditions that lead to it remain uncorrected a more serious condition (i.e. flashback) may arise. Backfires may derive from any one of the following: overheating the tip, pressure setting too low, touching tip against work or otherwise blocking the tip orifice.

DANGER!!! A Flashback is a condition where the mixed gases are burning inside the torch tip - it is accompanied by a shrill hissing/squealing sound and lack a visible flame. [Note: a partially blocked tip may also result in a hissing or whistle type sound but the flame will still be visible]
If allowed to persist, a flashback may continue to burn back through the system (torch, hose, etc.) resulting in damage to equipment and possible explosion. For this reason it is recommended that flashback arrestors be installed in your system.

If you encounter this immediately shut off the oxygen valve on your torch followed by the oxygen valve on your tank, then the fuel both valves. Before further use, Identify the cause of the flashback, remediate as necessary, and inspect all equipment. A flashback derives from starvation which in turn may be caused by any of the following:

- Some of the same conditions that can lead to a backfire, restrictions in gas line or extreme length of small diameter hose,
- Insufficient gas supply, improper pressure settings
- Damaged or mishandled needle valve on fuel tank or oxygen cylinder
- Low gas levels in tank/cylinder.

FLOW RATES

Tip Size	Dia (in)	Oxygen (psig)	Acetylene (psig)	Acetylene Flow Rate (SCFH)
{00}	0.0145	4	4	0.5
0	0.021	4	4	1
0.5	0.026	4	4	2
1	0.035	4	4	3
1.5	0.044	4	4	5
2	0.052	4	4	7
2.5	0.074	4	4	14
3	0.095	4	4	23
Copper Cutting	0.052	4	4	7

Rose-bud					BTU/cf
Heating Tip	-	4	4	6	1470

WELDING ROD and FLUX SELECTION

DESCRIPTION OF APPLICATION	SUGGESTED ROD	SUGGESTED FLUX
Aluminum - Soft (For Car Bodies)	1100	Cobra High-temp Alum welding flux
Aluminum - Hard	4043 or 5356 Series & T-6	
Brass	Bare Brass Rod	
Cast Iron	Cast Iron Rod – Cobra brand 100% cast iron rod	Cobra High-temp Cast Iron welding flux
Chromoly	Steel or Copper coated Mild Steel Rod	
Copper	Copper Wire or #14 (Romex) house wire	
Galvanize	Everdue or Silicone Bronze or Steel	Not required
Magnesium	Magnesium Rod	Magnesium Flux
Stainless	316 or 308	Not required
Stainless (joining to Steel)	309	Not required
Stainless (For Aircraft)	347 or 321	Not required
Steel	Copper coated Mild Steel or Steel Rod – E70S-2 or 6	Not required

ADDITIONAL NOTES REGARDING ROD AND FLUX

- Use ø1/16" rod for light gauge metal
- Use ø .023 - .045 rod for very thin metal (less than .045 thick; Mig wire is fine)
- Use ø3/32" to ø1/8" rod for 5/32" metal & above
- For welding over 1/8" metal (steel) – Bevel Edges – Get metal red before welding.
- You can also knock the flux off of stick electrodes and use on heavier (steel) plate.
- Pre-heat all thick aluminum (including sheets) before welding.

GLOSSARY OF TERMS

Bead – The fused metal deposited over the seam where two metals are welded together. It will look like a series of tight, overlapping ovals.

Delivery Point – the point where a gas exits the cutting or heating tip.

Ferrous Metals – Metals, such as wrought and cast iron, steel and cast steel, that combine iron and other elements in their makeup. Magnets attach to these types of metals easily.

Filler Metal – The additional metal most weld-seams require, filler metal is added by melting filler rod or wire in to the weld-joint.

Flow Condition – refers to the condition or state of a pressurized gas. For example, when a gas moves uninterrupted (from the tank, through the hose, and out of the tip) it is said to be in a "flow" condition. (see also *Static Condition*)

Flux – A chemical coating applied to metal to prevent oxidation during the joining operations; to promote the flow of the alloy and to facilitate the bonding action between the metal and the deposited (filler) metal.

Heat Affected Zone – The area, running along either side of a weld affected by heat. A visible discoloration will occur on welded ferrous metals.

Malleability – The formability, or responsiveness, of heated metal when being shaped

Mild Steel – Same as low-carbon steel. Common throughout the world, it is highly malleable.

Non-Ferrous Metals – Metals that contain no iron: such as aluminum, brass, bronze, copper, magnesium and nickel.

Out of Position Welding – Any welding operation, such as vertical or overhead welding, in which the parts are not laid out flat in front of the operator.

Penetration – Describes the extent of the depth into each piece of metal the welding fusion penetrates: The deeper the penetration, the stronger the joint.

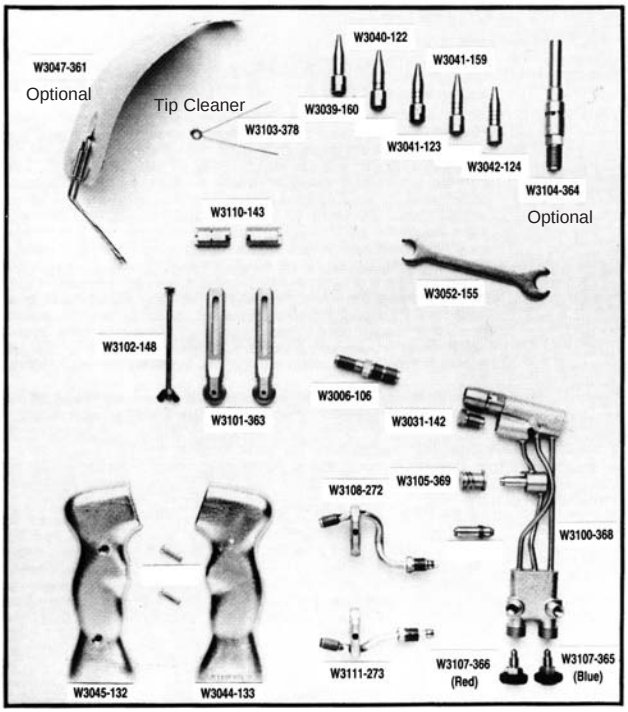
Puddle – The active welding bead melting the heated parent metal and the filler rod together. The finished weld is a hardened row of overlapping puddles.

Rod – The consumable filler steel used to weld metals. In stick welding the rod is coated with shielding flux and often called an electrode. In gas and TIG welding it is usually uncoated.

Sheet Metal – Thin metals, generally between 12 and 24 gauge, used in auto bodies, household appliances and HVAC applications.

Static Condition – refers to the condition or state of a pressurized gas. For example, when a gas is under pressure but interrupted (e.g. by a closed valve) it is said to be in a "static" or non-moving condition. (see also *Static Condition*)

Tack Weld – Small, preliminary welds located at both ends and the middle of a seam meant simply to align and secure metal work-pieces before the final weld is begun. This is a precautionary measure. Tack welds are easily broken when design alterations become apparent.



PARTS LIST

W3006-106	Shank	W3103-378	Tip Cleaner Set
W3031-142	Body Plug	W3105-369	Trigger Button Assembly
W3039-160	#0 Tip	W3107-365	Oxygen Valve
W3040-122	#1 Tip	W3107-366	Acetylene Valve
W3041-123	#2 Tip	W3108-272	Cutting Attachment
W3041-159	Copper Cutting Tip	W3111-273	Sheet Metal Cutter
W3042-124	#3 Tip	W3110-143	Brackets
W3045-132	Handle - Right	W3102-148	Nut / Bolt
W3044-133	Handle - Left	W3101-363	Guide Rails
W3052-155	Wrench	W3100-368	Torch Body

OPTIONAL ACCESSORIES

W3038-176	#00	W3047-361	Shield
W3039-161	#0.5 Tip	W3005-000	Curved Extension
W3040-132	#1.5 Tip	W3004-000	Straight Extension
W3043-177	#2.5 Tip	W3104-364	Air / Acetylene Tip
		W3104-500	Rose Bud

For additional products and information call us or visit our website. Contact information on the back of this manual.

We believe the two main ingredients for successful welding are observation on the part of the welder and the use of the DHC 2000 Torch.

TO BE RETAINED BY CUSTOMER

Serial No. | C | | | | | |

Fill in the number stamped on valve body opposite control valves.

COBRA: LIfetime Limited Warranty

The DHC 2000 Welding & Cutting handpiece is guaranteed for the lifetime of the original purchaser against any defect due to faulty material or workmanship, excluding tips. Upon the discretion of the manufacturer you will receive free of charge, a replacement unit or the free repair and replacement of faulty parts. Please note that, unless otherwise stated by a representative of Cobra, the customer is responsible for all shipping costs. Cobra Torch, Inc. accepts no responsibility for defects, damage or faulty performances caused by misuse, careless handling or where repairs have been made or attempted by unauthorized persons. No other guarantees, written or verbal, are authorized to be made on the behalf of Cobra Torch, Inc. All other conditions and warranties whether expressed or implied are, to the extent permitted by law, hereby excluded. Complete Warranty **Registration online at www.detroittorch.com**.

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Manufacturer of the DHC2000