



OM-280758A

2018-01

Processes



Oxy-Fuel

Welding/Cutting

## Torch And Cutting Accessories



### OWNER'S MANUAL

File: Accessory



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# SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

OXY FUEL 2018-01

-  Protect yourself and others from injury — read, follow, and save these important safety precautions and operating instructions.

## 1-1. Symbol Usage

-  **DANGER!** – Indicates a hazardous situation which, if not avoided, will result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

-  Indicates a hazardous situation which, if not avoided, could result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

**NOTICE** – Indicates statements not related to personal injury.


 Indicates special instructions.




This group of symbols means Warning! Watch Out! **ELECTRIC SHOCK**, **MOVING PARTS**, and **HOT PARTS** hazards. Consult


symbols and related instructions below for necessary actions to avoid the hazards.


## 1-2. Welding, Cutting, Brazing, Heating Hazards

-  The symbols shown in this section are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-4. Read and follow all Safety Standards.

-  Only qualified persons should install, operate, maintain, and repair this equipment. A qualified person is defined as one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated ability to solve or resolve problems relating to the subject matter, the work, or the project and has received safety training to recognize and avoid the hazards involved.

-  During operation, keep everybody, especially children, away.

-  Do not use this equipment unless you are trained in its proper use or are under competent supervision. Follow the procedures described in this booklet every time you use the equipment. Failure to follow these instructions can cause fire, explosion, asphyxiation, property damage, or personal injury. This equipment must be used in accordance with all Federal, State, and local regulations as well as DOT (Department of Transportation) and CGA (Compressed Gas Association) regulations. Contact your gas supplier for more information on the proper use of compressed gases.

 In this document, the phrase “welding and cutting” also refers to other oxy-fuel operations like brazing and heating.



## READ INSTRUCTIONS.

- Read and follow all labels and the Owner’s Manual carefully before installing, operating, or servicing equipment. Read the safety information at the beginning of the manual and in each section.
- Use only genuine replacement parts from the manufacturer.
- Perform installation, maintenance, and service according to the Owner’s Manuals, industry standards, and national, state, and local codes.



## HOT PARTS can burn.

- Do not touch hot parts bare handed.
- Allow cooling period before working on equipment.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.



## FUMES AND GASES can be hazardous.

Welding and cutting produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- Ventilate the work area and/or use local forced ventilation at the flame to remove welding and cutting fumes and gases. Some gases (natural gas and acetylene) are lighter than air and will collect in high areas. Other gases (propane and butane) are heavier than air and will collect in low areas. Heavier-than-air gases are more difficult to diffuse and are more likely to accumulate. The recommended way to determine adequate ventilation is to sample for the composition and quantity of fumes and gases to which personnel are exposed.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Safety Data Sheets (SDSs) and the manufacturer’s instructions for adhesives, coatings, cleaners, consumables, coatings, cleaners, degreasers, fluxes, and metals.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watch-person nearby. Welding and cutting fumes and gases can displace air and lower the oxygen level, causing injury or death. Be sure the breathing air is safe. Test atmospheres in confined areas for explosive and toxic gases before using oxy-fuel equipment.
- Do not weld or cut in locations near degreasing, cleaning, or spraying operations. The heat from welding or cutting flame can react with vapors to form highly toxic and irritating gases.
- Do not weld or cut on coated metals, such as galvanized, lead, or cadmium-plated steel unless the coating is removed from the affected area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded or cut.
- Do not weld or cut on sealed air conditioning or refrigeration systems unless all refrigerants have been removed from the system.



## **BUILDUP OF GAS can injure or kill.**

- Shut off compressed gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.



## **LIGHT RAYS can burn eyes and skin.**

Light rays from the welding and cutting process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

- Wear approved face protection fitted with a proper shade of filter lenses to protect your face and eyes from light rays and sparks when welding, cutting, or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear welding goggles, or wear welding helmet/welding face-shield over approved goggles/safety glasses with side shields.
- Use protective screens or barriers to protect others from flash, glare and sparks; warn others not to watch the welding or cutting.
- Wear body protection made from durable, flame-resistant material (leather, heavy cotton, wool). Body protection includes oil-free clothing such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.



## **WELDING AND CUTTING can cause fire or explosion.**

Welding and cutting on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding or cutting operations. The torch flame, flying sparks, hot workpiece, and hot equipment can cause fires and burns. Check and be sure the area is safe before doing any welding or cutting.

- Do not use this welding and cutting equipment with gases and pressures other than those for which it is intended. Oxygen is not flammable; however, the presence of pure oxygen will drastically increase the speed and force with which burning takes place. Oxygen must never be allowed to contact grease, oil, or other petroleum-based substances; therefore, be sure there is no oil or grease on the regulator, cylinder, valves, or equipment. Do not use petroleum-based pipe sealants. Do not use or store near excessive heat (above 125° F/51.5° C) or open flame. Do not refer to oxygen as air and do not use oxygen as a substitute for compressed air. Do not use oxygen to clean clothes or work area, for ventilation, or to operate pneumatic tools. Open oxygen cylinder valves slowly. Be sure regulator adjusting handle is in the full out (off) position before opening oxygen cylinder valve.
- Inspect all equipment before use. Do not use damaged, defective, or improperly adjusted welding and cutting equipment. Make sure levers and valves work properly, threads on equipment are clean (no grease or oil) and not deformed, gauges are intact and easy to read, regulator is clean and free of oil or dirt, and fittings are properly sized for the cylinder. Make sure hoses are clean (no grease or oil) and ferrules are properly installed so the fitting does not slip inside the hose. Be sure all connections are tight.

- It is recommended that a reverse-flow check valve or a flashback arrestor be installed between the torch handle and the regulator. Check valves do not prevent the propagation of a flame upstream (flashback) but are designed to prevent the unintentional backflow of gases into the cutting attachment, torch, hoses, or regulator which could cause an explosion or fire. A flashback arrestor can be installed on the torch handle instead of a check valve. Miller flashback arrestors have a reverse flow check valve and prevent the propagation of a flame upstream. If a flashback arrestor is installed, a check valve is not necessary. Using a flashback arrestor and a check valve can reduce gas flow and affect torch operation. To help prevent the reverse flow of gases, be sure the cylinders contain enough gas to complete the work.
- Perform work only in an area with a fireproof floor (concrete). Do not heat concrete because it can expand and explode violently.
- Perform work on a fireproof surface. Use heat resistant shields to protect nearby walls and flooring.
- Do not use if grease or oil is present on equipment or if equipment is damaged. Have equipment cleaned/repared by a qualified person.
- Do not open a cylinder valve quickly or the regulator can be damaged and cause a fire.
- Do not open acetylene cylinder valve more than 3/4 turn. (For all gases except acetylene, open cylinder valve fully to backseat the cylinder valve.) Keep cylinder wrench on the cylinder for quick shut-off.
- Do not slightly open or “crack” fuel cylinder valve to blow debris from the valve outlet. Remove the debris using nitrogen, air, or a clean, oil-free rag.
- Always purge gas from the system before lighting torch. Purge gas in a well-ventilated area and away from flame or sparks.
- Keep torch flame or sparks away from cylinder, regulator, and gas hose.
- Use only the gases recommended by the manufacturer of the oxy-fuel equipment being used.
- Never light a torch with matches or a lighter. Always use a striker.
- Do not use acetylene above 15 psi (103 kPa) flowing. It is acceptable to use acetylene regulators that indicate a static pressure up to 22 psi (151 kPa).
- Do not withdraw acetylene from a cylinder at a rate exceeding 1/7 of the cylinder capacity per hour.
- Do not use torch if you smell gas. Check oxy-fuel system for leaks with an approved leak detection solution or leak detector. Never test for gas leaks with a flame.
- Remove all flammables within 35 ft (10.7 m) of the welding or cutting operation. If this is not possible, tightly cover them with approved covers.
- Do not weld or cut where flying sparks can strike flammable material.
- Protect yourself and others from flying sparks and hot metal.
- Be alert that welding and cutting sparks and hot materials from welding and cutting can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding or cutting on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not cut or weld on tire rims or wheels. Tires can explode if heated. Repaired rims and wheels can fail. See OSHA 29 CFR 1910.177 listed in Safety Standards.

- Do not weld or cut on containers that have held combustibles, or on closed containers such as tanks, drums, or pipes unless they are properly prepared according to AWS F4.1 and AWS A6.0 (see Safety Standards).
- Do not weld or cut where the atmosphere can contain flammable dust, gas, or liquid vapors (such as gasoline).
- Wear body protection made from durable, flame-resistant material (leather, heavy cotton, wool). Body protection includes oil-free clothing such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Do not use fuel gases to clean clothes or work area.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding or cutting.
- After completion of work, inspect area to ensure it is free of sparks, glowing embers, and flames.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.



### **CYLINDERS can explode if damaged.**

Compressed gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding or cutting process, be sure to treat them carefully.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flames, and sparks.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping. Do not lay acetylene cylinders on their sides or acetone will flow out of the cylinder and damage the equipment.
- Keep cylinders away from any arc welding, cutting, or other electrical circuits.
- Never drape a welding or cutting torch over a gas cylinder.
- Never weld or cut on a pressurized cylinder – explosion will result.
- Use only correct compressed gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition. Do not use compressed gas cylinder unless an approved gas regulator is attached to the gas valve.
- Turn face away from valve outlet when opening cylinder valve. Do not stand in front of or behind the regulator when opening the valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Use the proper equipment, correct procedures, and sufficient number of persons to lift, move, and transport cylinders.
- Store compressed gas and oxygen cylinders in separate locations.
- Store empty cylinders with valves closed and caps in place.
- Do not modify or repair cylinders or valves. Store leaking acetylene cylinders outdoors in a safe area. Identify leaking cylinders and return them to the supplier.
- Dispose of used disposable cylinders according to the manufacturer's recommendations. Do not throw cylinders in fire.
- Follow instructions provided by the gas supplier and on compressed gas cylinders, associated equipment, and in Compressed Gas Association (CGA) publication P-1 listed in Safety Standards.



## FLYING METAL or DIRT can injure eyes.

- Welding, cutting, chipping, wire brushing, and grinding cause sparks and flying metal.
- Wear welding goggles, or wear welding helmet/welding face-shield over approved goggles/safety glasses with side shields.

### 1-3. California Proposition 65 Warnings



**WARNING: This product can expose you to chemicals including lead, which are known to the state of California to cause cancer and birth defects or other reproductive harm.**

For more information, go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

### 1-4. Principal Safety Standards

*Safety in Welding, Cutting, and Allied Processes*, ANSI Standard Z49.1, is available as a free download from the American Welding Society at <http://www.aws.org> or purchased from Global Engineering Documents (phone: 1-877-413-5184, website: [www.global.ihs.com](http://www.global.ihs.com)).

*Safe Practices for the Preparation of Containers and Piping for Welding and Cutting*, American Welding Society Standard AWS F4.1, from Global Engineering Documents (phone: 1-877-413-5184, website: [www.global.ihs.com](http://www.global.ihs.com)).

*Safe Practices for Welding and Cutting Containers that have Held Combustibles*, American Welding Society Standard AWS A6.0, from Global Engineering Documents (phone: 1-877-413-5184, website: [www.global.ihs.com](http://www.global.ihs.com)).

*Safe Handling of Compressed Gases in Cylinders*, CGA Pamphlet P-1, from Compressed Gas Association, 14501 George Carter Way, Suite 103, Chantilly, VA 20151 (phone: 703-788-2700, website: [www.cganet.com](http://www.cganet.com)).

*Acetylene*, CGA Pamphlet G-1, from Compressed Gas Association, 14501 George Carter Way, Suite 103, Chantilly, VA 20151 (phone: 703-788-2700, website: [www.cganet.com](http://www.cganet.com)).

*Safety in Welding, Cutting, and Allied Processes*, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N5 (phone: 800-463-6727, website: [www.csagroup.org](http://www.csagroup.org)).

*Safe Practice For Occupational And Educational Eye And Face Protection*, ANSI Standard Z87.1, from American National Standards Institute, 25 West 43rd Street, New York, NY 10036 (phone: 212-642-4900, website: [www.ansi.org](http://www.ansi.org)).

*Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, NFPA Standard 51B, from National Fire Protection Association, Quincy, MA 02169 (phone: 1-800-344-3555, website: [www.nfpa.org](http://www.nfpa.org)).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910.177 Subpart N, Part 1910 Subpart Q, and Part 1926, Subpart J, from U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 (phone: 1-866-512-1800) (there are 10 OSHA Regional Offices—phone for Region 5, Chicago, is 312-353-2220, website: [www.osha.gov](http://www.osha.gov)).



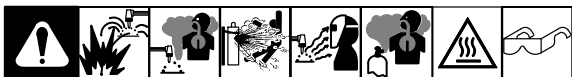
## SECTION 2 – INTRODUCTION



- ⚠** Inspect all equipment before use. Do not use damaged, defective, or improperly adjusted welding and cutting equipment. Make sure levers and valves work properly, threads on equipment are clean (no grease or oil) and not deformed, gauges are intact and easy to read, regulator is clean and free of oil or dirt, and fittings are properly sized for the cylinder. Make sure hoses are clean (no grease or oil) and ferrules are properly installed so the fitting does not slip inside the hose. Be sure all connections are tight and there are no leaks in the system.

We ask you to work like a pro – and pros weld and cut safely. Please read and comply with the sample safety procedures outlined in this booklet and the equipment Owner's Manual.

## SECTION 3 – HAZARDOUS EVENTS



The following events are very hazardous and can occur in any oxy-fuel system. It is important to understand these hazards and know how to prevent them.

**Backfire:** The return of the flame into the torch, usually accompanied by a popping sound. The flame may be extinguished or it may re-appear at the tip end.

**Sustained Backfire:** The return of the flame into the torch that continues to burn inside the torch with a hissing or squealing sound.

**Flashback:** The return of a flame into and through the torch or into the hose. In some instances it can reach the regulator and even enter the cylinder. This is generally caused by the mixing of the oxygen and fuel gas in the system. This is a very dangerous situation that can cause an explosion anywhere in the system. This is why purging is so important (see Section 6-1).

## SECTION 4 – ASSOCIATED HAZARDS OF RECOMPRESSING PURE OXYGEN



- ⚠** Open oxygen cylinder valves slowly. Opening an oxygen cylinder valve quickly can cause a fire or explosion. Be sure regulator adjusting handle is in the full out (off) position before opening an oxygen cylinder valve.

Recompressing high pressure oxygen in a low pressure cavity may create heat, resulting in combustion. For combustion to occur, oxygen, fuel, and kindling temperatures must be present. All of these components may be present when oxygen is recompressed by opening the tank valve too quickly.

**Oxygen:** High purity oxygen accelerates the rate of combustion, increases heat output, and lowers the combustible point at which various materials will burn.

**Fuel:** The fuel for combustion may be the regulator itself if enough heat is produced to reach the kindling temperature of the regulator's components.

**Kindling Temperatures:** Enough heat may be generated to ignite the regulator components by the friction created when recompressing high-pressure oxygen. This heat is known as the heat of recompression.

**⚠** If an internal fire or flashback occurs (indicated by a whistling sound or inverted flame), do the following:

- Turn off the torch oxygen valve immediately.
- Turn off the torch fuel valve.
- Turn off the oxygen cylinder valve.
- Turn off the fuel gas cylinder valve.

Do not relight the torch until the equipment has cooled to the touch and the flashback cause has been determined and corrected.

## SECTION 5 – EQUIPMENT SET UP



Follow these steps to set up oxy-fuel equipment.

### 5-1. Installing Cylinders

**⚠** Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping. Maintain a clear path from the cylinders to the work area.

**⚠** Inspect equipment before use. Do not use if grease or oil is present on equipment or if equipment is damaged. Have equipment cleaned/repared by a qualified person.

**⚠** Do not slightly open or “crack” acetylene cylinder valve to blow debris from the valve outlet. Remove the debris using nitrogen, air, or a clean, oil-free rag.

1. Remove the protective cap from the cylinder valve.
2. For all cylinders except acetylene: Stand to one side or behind the valve. Open the cylinder valve slightly (cracking) for an instant and then close the valve. This will help clear the valve of any dust or dirt that may have collected. These particles can damage regulators or cause a fire or explosion. Direct the flow of gas away from people.

### 5-2. Installing Regulators On Cylinder Valves

**⚠** Inspect equipment before use. Do not use if grease or oil is present on equipment or if equipment is damaged. Have equipment cleaned/repared by a qualified person.

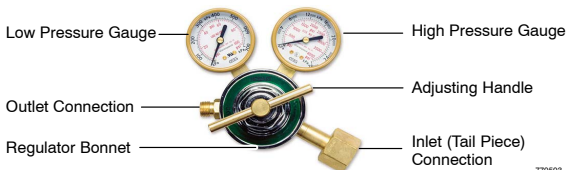
**⚠** Do not handle oxygen regulators with oily hands and never apply oil to any part of an oxygen regulator.

**⚠** Do not use lubricant or thread tape on cylinder fittings.

**NOTICE** – Do not use cylinder adaptors to connect regulators to cylinders. Regulators have CGA connections (manufactured to standards of the Compressed Gas Association) which allow the regulator to only be installed on the appropriate cylinder valve for the intended gas.

Pressure regulators are control devices used to reduce high pressure to desired working pressure. There are two types of pressure regulators

used for oxy-fuel applications. One type is for use on cylinders and the other type is used for connection to a gas piping system, or station regulator. The service temperature range for these regulators is 0° F to 140° F (18° C – 60° C). Shown below is a cylinder regulator.



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1. Examine the pressure reducing regulators that will be connected to the cylinders. Make sure that the regulator is clean and the inlet filter is clean and installed properly.
2. Connect the oxygen regulator to the cylinder valve, using the appropriate cylinder wrench to tighten the inlet nut. Connect the fuel gas regulator to the fuel gas cylinder.
3. When replacing a pressure gauge, use only a UL-listed gauge. PTFE thread tape is the only thread sealant approved for use on oxygen regulators.

### 5-3. Installing Hoses On Regulators

**⚠️ Replace hoses at the first sign of any defects, flaws, or damage. The hoses should otherwise be replaced every four years. Inspect hoses for damage or leaks before each operation. Do not allow hoses to come in contact with hot metal, molten solder, or corrosive chemicals. Do not expose hoses to fluxing agents as these agents will deteriorate the hose materials and cause them to leak.**

**⚠️ Do not splice or use damaged oxy-fuel hoses.**

Use only industrial grade welding hose for welding, brazing, cutting, and heating with oxy-fuel equipment. These hoses are generally color coded green for oxygen and have a right hand threaded connection; fuel hoses are red in color and have a left hand threaded connection with a groove around the nut. Use grade R and RM hoses only for acetylene. T grade hose can be used for acetylene and must be used for other fuel gases.

1. Connect the oxygen hose to the oxygen regulator and tighten firmly with a wrench.
2. Connect the fuel hose to the fuel regulator and tighten firmly with a wrench.
3. Make sure the regulator adjusting handles are turned counterclockwise to the off position and there is no resistance on the adjusting handles.

### 5-4. Check Valves (Already Installed On Torch Handle)



Check valves are designed to provide some protection against the reverse flow of one gas into the hose and regulator of the other gas when there is a sudden loss of pressure of one of the gases. Check valves do not stop a flashback. Check valves do restrict flow. Do not use check valves with large heating and cutting tips.

Check valves should be tested or replaced at regularly scheduled intervals as any debris may cause them to malfunction.

Check valves are designed for installation between the regulator outlet fittings and the hoses, or between the torch butt and the hoses.

### 5-5. Installing Flashback Arrestors

**NOTICE** – When using add-on flashback arrestors, make sure the unit can supply enough gas flow to support the tip being used. Insufficient gas flow can cause equipment failure.



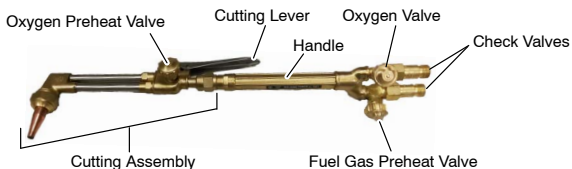
Flashback arrestors are designed to stop a flashback from going beyond the point where they are installed.

There are several types and styles available. Flashback arrestors are recommended in all oxy-fuel welding, cutting, brazing, and heating applications. Ideally, these units should be mounted on the welding handles.

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### 5-6. Combination Torch Components

A combination torch consists of a welding handle and cutting attachment. When equipped with the proper tips, these torches are used for welding, cutting, and heating.



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### 5-7. Installing Hoses On Torch Handle

**⚠ Inspect equipment before use. Do not use if grease or oil is present on equipment or if equipment is damaged. Have equipment cleaned/repaired by a qualified person.**

Torch handles are used in conjunction with welding tips, heating tips, and cutting attachments. The illustration above shows a torch handle with a cutting attachment.

1. Attach the green oxygen hose to the oxygen inlet fitting of the welding handle (right hand threads) and tighten firmly with a wrench. If a check valve or flashback arrestor is being used at the torch, attach the hose to the inlet of these devices (see Sections 5-4 and 5-5).
2. Attach the red fuel hose to the fuel inlet fitting of the welding handle (left hand threads) and tighten firmly with a wrench. If a check valve or flashback arrestor is being used at the torch, attach the hose to the inlet of these devices.

### 5-8. Installing Cutting Attachment

**⚠ Do not use cutting attachment if the o-rings are missing or damaged.**

**⚠ Inspect equipment before use. Do not use if grease or oil is present on equipment or if equipment is damaged. Have equipment cleaned/repaired by a qualified person.**

Cutting attachments are used in conjunction with welding handles to perform oxy-fuel cutting of ferrous metals. See illustration of combination torch in Section 5-6.

## 5-9. Installing Cutting Tips



Acetylene Cutting Tip



Alternative-Fuel Cutting Tip

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Cutting tips are available in many styles and sizes depending on the metal thickness and fuel gas being used. Refer to the tables in Section 8-5 for tip selection and operating specifications. Prior to use, inspect cutting tips for damage and to ensure that the cutting orifice and preheat holes are not blocked with dirt or slag. Insert tip into the torch head and tighten the tip nut.

## 5-10. Installing Welding Tips



Welding tips consist of a mixer and a copper tip. These tips are available in different sizes to weld various metal thicknesses. Refer to the table in Section 8-5 for operating specifications.

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Inspect o-rings for damage and replace if necessary. Insert the welding tip into the torch handle by exerting light pressure on the welding tip with a twisting motion until seated. Position the tip and hand tighten the tip nut into the torch handle.

## 5-11. Installing Multi-Flame Heating Tips



Heating tips have several flame orifices in the end. The tips consist of a mixer, heating tube, and head, and are available for use with several types of gas. Refer to the table in Section 8-5 for operating specifications.

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## 5-12. Testing The Equipment For Leaks

After the correct tip has been installed in the handle, cutting attachment, or cutting torch, perform a leak test on the system before lighting the torch. Follow this process every time the system is set-up and when a cylinder is changed.

- ⚠ Use an approved oil-free leak detection fluid to locate possible leaks.**
  - ⚠ Do not stand in front of or behind the regulator when opening the cylinder valve. Never open a cylinder valve suddenly as this can damage a regulator or cause an oxygen regulator fire.**
1. Verify that both regulator adjusting handles are turned counter-clockwise to the off position.
  2. Close both the fuel and oxygen valves on the torch handle.
  3. While standing to the side of the regulator slowly open oxygen cylinder valve. Open the oxygen cylinder valve completely.
  4. Adjust regulator by turning in the adjusting handle to deliver 20 psig (138 kPa).
  5. When using acetylene, do not open the fuel cylinder valve more than 1/2–3/4 turn. If the cylinder has a wrench, leave it in place so the cylinder can be quickly shut off if needed.
  6. Adjust regulator by turning the adjusting handle clockwise to deliver 15 psig (103 kPa).

7. Check every connection and joint from the cylinder valve to the torch tip with an approved leak detection solution. If leaks are detected, eliminate them before proceeding. If leaks cannot be eliminated, do not put the equipment into service until it has been repaired or replaced.

## SECTION 6 – WELDING TIP ADJUSTMENTS AND LIGHTING INSTRUCTIONS



- ⚠ Inspect all equipment before use. Do not use damaged, defective, or improperly adjusted welding and cutting equipment. Make sure levers and valves work properly, threads on equipment are clean (no grease or oil) and not deformed, gauges are intact and easy to read, regulator is clean and free of oil or dirt, and fittings are properly sized for the cylinder. Make sure hoses are clean (no grease or oil). Be sure all connections are tight and there are no leaks in the system.**

Select the proper size welding tip required for the work being performed. Refer to the tables in this manual for tip selection and operating specifications.

### 6-1. Purging The System

- ⚠ Always purge gas from the system before lighting torch to prevent a possible mixed-gas explosion. Purge gas in a well ventilated area and away from flame or sparks.**
1. Purge the oxygen from the system by opening the oxygen torch valve 1/4 turn, allowing oxygen to pass through the torch for 3–5 seconds for every 25 ft (8 m) of hose, and then closing the valve. With the oxygen flowing, set the recommended pressure on the oxygen regulator.
  2. Close the oxygen valve on the torch handle.
  3. Purge the fuel gas by opening the fuel valve 1/4 turn, allowing fuel to pass through the torch for 3–5 seconds for every 25 ft (8 m) of hose, and then closing the valve. Set the fuel regulator while the gas is flowing to the recommended pressure (see Section 8-5).
  4. Close the fuel valve on the torch handle.
  5. The system is now purged and ready for operation.

## 6-2. Lighting And Adjusting Acetylene/Oxygen Welding Tips

Follow the set-up instructions explained in Section 5 before lighting the torch.

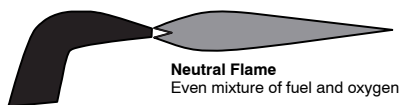
1. Purge the hoses (see Section 6-1).
2. Open the torch fuel valve 1/8 turn and ignite the acetylene using an approved friction spark lighter.

**⚠ Do not use matches or a cigarette lighter to ignite the gas.**

3. Increase the acetylene gas flow until the flame is no longer producing (soot) smoke.

**⚠ Failure to force a sufficient amount of fuel gas through the tip will cause the tip to overheat and may cause a flashback or backfire.**

4. Open the torch oxygen valve until you achieve a neutral flame.



## 6-3. LP Fuel Gas/Oxygen Tips (Other Than Acetylene)

Follow these steps for lighting and adjusting alternate fuel gas tips. These tips require a different procedure be followed than for acetylene tips to ensure proper performance. Follow the set-up instructions explained in Section 5 before lighting the torch.

1. Purge the hoses (see Section 6-1).
2. Open the fuel gas valve 1/8 turn and ignite the gas using an approved friction spark lighter.

**⚠ Do not use matches or a cigarette lighter to ignite the gas.**

3. Slowly open the torch oxygen valve until the flame is neutralized.
4. Increase the fuel gas another 1/8 turn.
5. Increase the oxygen flow until the flame is neutralized.
6. Repeat this procedure until the maximum volume of fuel is used and the desired flame is achieved. This is important to obtain the most efficient flame and to cool the tip during operation.

**⚠ Failure to force a sufficient amount of fuel gas through the tip will cause the tip to overheat and may cause a flashback or backfire.**

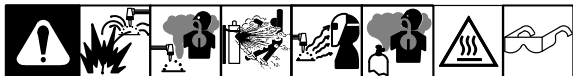
## 6-4. Extinguishing The Torch Flame

1. Turn torch oxygen gas valve clockwise to the closed position.
2. Turn the torch fuel gas valve clockwise to the closed position.

## 6-5. System Shut Down

1. Turn the oxygen and fuel gas cylinder valves clockwise to the closed position.
2. Open the torch oxygen valves 1/2 turn and allow the gas to flow out of the torch until both gauges indicate zero (0) pressure.
3. Close the torch oxygen valve and turn the regulator adjusting handle counterclockwise to the off position.
4. Open the torch fuel valves 1/2 turn and allow the gas to flow out of the torch until both gauges indicate zero (0) pressure. Close the torch fuel valve and turn the regulator adjusting handle counterclockwise to the off position.

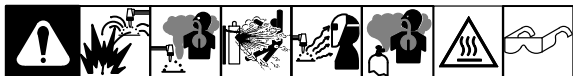
## SECTION 7 – MULTI-FLAME HEATING TIP ADJUSTMENT AND LIGHTING INSTRUCTIONS



Heating tips are set up and adjusted the same as welding tips. Follow the safety and operating instructions explained in Section 6.

- ⚠ Be sure to force the gases through the heating tips to eliminate the possibility of gas starvation, which can result in overheating the tip and the possibility of backfire, sustained backfire, or flashback.**

## SECTION 8 – CUTTING ATTACHMENT ADJUSTMENT AND LIGHTING INSTRUCTIONS



Cutting attachments are used in conjunction with torch handles to perform oxy-fuel cutting of ferrous metals.

### 8-1. Setting Up Cutting Attachment

- ⚠ Inspect equipment before use. Do not use if grease or oil is present on equipment or if equipment is damaged. Have equipment cleaned/repared by a qualified person.**
  - ⚠ Do not use cutting attachment if the o-rings are missing or damaged.**
  - ⚠ Always purge gas from the system before lighting torch to prevent a possible mixed-gas explosion. Purge gas in a well ventilated area and away from flame or sparks.**
1. Insert the cutting attachment into the torch handle and hand tighten the connection nut.
  2. Select the proper cutting tip for the application (see tip tables in this manual).
  3. If inserting a new cutting tip into the cutting assembly, use a wrench to tighten tip 1/8–1/4 turn. Tips that have been set to the torch can be tightened firmly with a wrench.
  4. Adjust the oxygen regulator to the recommended pressure setting (from the tip table) by turning the regulator adjusting handle clockwise. Open the oxygen valve on the torch handle completely so flow to the cutting attachment is not restricted.
  5. Adjust the fuel regulator to the recommended pressure setting (from the tip table) by turning in the regulator adjusting handle clockwise.
  6. Purge the fuel gas by opening the preheat valve on the torch handle, allowing gas to flow for 3–5 seconds for every 25 ft (8 m) length of hose, and then closing the fuel gas valve.
  7. Purge the oxygen by opening the preheat valve on the cutting attachment, allowing gas to flow for 3–5 seconds for every 25 ft (8 m) length of hose, then closing the oxygen valve.

## 8-2. Adjusting The Acetylene Cutting Tip Flame (Cutting Assembly)

This procedure is for use with acetylene cutting tips. Make sure the system has been set-up and purged according to Section 8-1.

1. Open the fuel valves on the torch handle 1/8 turn and light the fuel gas using a friction lighter.

 **Do not use matches or a cigarette lighter to ignite the gas.**

2. Continue to open the acetylene torch valve until the sooty smoke produced by the flame completely disappears or the flame just begins to separate from the end of the tip.
3. Slowly open the preheat oxygen valve on the cutting attachment; a long white flame will appear; this is known as the acetylene feather. Continue to add oxygen and reduce the feather until it just disappears into the small, bright, inner cones at the end of the tip. This will produce what is known as a neutral flame.
4. Preheat the metal by positioning the bright inner cones approximately 1/8–1/4 in. (3–6 mm) away from the steel surface.
5. When the metal turns bright red (approx. 1500° F/816° C), slowly depress the cutting lever until the metal is pierced. While holding the lever down completely, slowly move the torch in the direction to be cut.

## 8-3. Adjusting Alternate Fuel Gas Cutting Tip Flame (Other Than Acetylene)

This procedure is for use with alternate fuel gas tips such as propane, propylene, and natural gas cutting tips. Make sure the system has been set-up and purged as described in Section 8-1).

1. Open the fuel valves on the torch handle 1/8 turn and light the fuel gas using a friction lighter.

 **Do not use matches or a cigarette lighter to ignite the gas.**

2. Continue to open the torch fuel valve until the flame is about to leave the tip.
3. Slowly open the preheat oxygen valve on the cutting attachment until the bright preheat cones are reduced to their shortest length.
4. Continue to readjust the fuel valve until the preheat flame is about to leave the tip.
5. Slowly open the preheat oxygen valve until the preheat cones are at the shortest length.
6. Repeat this process until the fuel valve is nearly or completely open.
7. Preheat the metal by positioning the bright inner cones approximately 1/2–3/4 in. (13–19 mm) away from the steel surface.
8. When the metal turns bright red (approx. 1500° F/816° C), slowly depress the cutting lever until the metal is pierced. While holding the lever down completely, slowly move the torch in the direction to be cut.

## 8-4. Extinguishing The Torch Flame

Follow this procedure to shut down the system when finished cutting.

1. Turn the oxygen preheat valve clockwise to the closed position.
2. Turn the torch fuel valve clockwise to the closed position.
3. Turn the oxygen and fuel cylinder valves clockwise to the closed position.
4. Open the torch fuel valves 1/2 turn and allow the gas to flow out of the torch until both gauges indicate zero (0) pressure. Close the torch fuel valve and turn the fuel regulator adjusting handle counter-clockwise to the off position.



## 8-5. Tip Selection And Recommended Working Pressures Of Regulators

Table A. Welding Tips

Metal Thickness	Tip Size	Pressure – psig				Consumption – scfh			
		Oxygen		Acetylene		Oxygen		Acetylene	
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
1/64–3/64 in.	00	3	5	3	5	1.7	3.3	1.5	3
1/32–5/64 in.	0	3	5	3	5	2.2	4.4	2	4
3/64–3/32 in.	1	3	5	3	5	3.3	6.6	3	6
1/16–1/8 in.	2	3	5	3	5	5.5	11	5	10

Table B. Oxy–Acetylene Multi–Flame Heating Tip

Tip Size	Pressure – psig				Consumption – scfh			
	Oxygen		Acetylene		Oxygen		Acetylene	
	Min.	Max	Min.	Max.	Min.	Max	Min.	Max.
6	10	15	8	12	15	44	14	40

**Table C. Oxy-Acetylene Cutting Tips**

Metal Thickness	Tip Size	Pressure - psig						Consumption - scfh					
		Cutting Oxygen		Preheat Oxygen		Acetylene		Cutting Oxygen		Oxygen		Acetylene	
		Min.	Max	Min.	Max	Min.	Max	Min.	Max.	Min.	Max.	Min.	Max.
1/2 in.	0	30	35	3	6	3	5	60	65	7	11	6	10
3/4 in.	1	30	35	4	7	3	5	80	85	9	14	8	13

**Table D. Oxy-Propane Cutting Tip**

Metal Thickness	Tip Size	Pressure - psig						Consumption - scfh					
		Cutting Oxygen		Preheat Oxygen		Propane		Cutting Oxygen		Oxygen		Propane	
		Min.	Max	Min.	Max	Min.	Max	Min.	Max.	Min.	Max.	Min.	Max.
1 in.	2	35	40	30	35	4	8	115	125	23	108	12	15

## SECTION 9 – WARRANTY

**Effective January 1, 2018**

**Warranty applies to all Hobart welding equipment with a serial number preface of MJ or newer.**

**This limited warranty supersedes all previous Hobart warranties and is exclusive with no other guarantees or warranties expressed or implied. Hobart products are serviced by Hobart or Miller Authorized Service Agencies.**

LIMITED WARRANTY – Subject to the terms and conditions below, Miller Electric Mfg. LLC, dba Hobart Welding Products, Appleton, Wisconsin, warrants to its original retail purchaser that new Hobart equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

Within the warranty periods listed below, Hobart/Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Hobart/Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Hobart/Miller will provide instructions on the warranty claim procedures to be followed. If notification is submitted as an online warranty claim, the claim must include a detailed description of the fault and the troubleshooting steps taken to identify failed components and the cause of their failure.

Hobart/Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the delivery date of the equipment to the original retail purchaser, and not to exceed twelve months after the equipment is shipped to a North American distributor or twelve months after the equipment is shipped to an International distributor.

3 Years — Parts (No Labor)

\* Oxy–Fuel Regulators

1 Year — Parts (No Labor)

(90 days for industrial use)

\* Oxy–Fuel Torches

\* Oxy–Fuel Replacement Gauges

Hobart's warranty shall not apply to:

Equipment that has been modified by any party other than Hobart/Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

HOBERT PRODUCTS ARE INTENDED FOR COMMERCIAL AND INDUSTRIAL USERS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

The exclusive remedies for warranty claims are, at Hobart's/Miller's option, either: (1) repair; or (2) replacement; or, if approved in writing by Hobart/Miller, (3) the pre-approved cost of repair or replacement at an authorized Hobart/Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon use). Products may not be returned without Hobart's/Miller's written approval. Return shipment shall be at customer's risk and expense.

The above remedies are F.O.B. Appleton, WI, or Hobart's/Miller's authorized service facility. Transportation and freight are the customer's responsibility. TO THE EXTENT PERMITTED BY LAW, THE REMEDIES HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES REGARDLESS OF THE LEGAL THEORY. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT) REGARDLESS OF THE LEGAL THEORY. ANY WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY, OR REPRESENTATION, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, ARE EXCLUDED AND DISCLAIMED BY HOBART/MILLER.

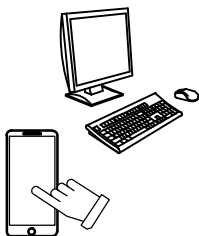
Some US states do not allow limiting the duration of an implied warranty or the exclusion of certain damages, so the above limitations may not apply to you. This warranty provides specific legal rights, and other rights may be available depending on your state. In Canada, some provinces provide additional warranties or remedies, and to the extent the law prohibits their waiver, the limitations set out above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary by province.

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