

OPERATING INSTRUCTIONS
AND
TECHNICAL MANUAL
FOR

BROCO[®]



PRIME-CUT
ULTRATHERMIC CUTTING SYSTEM

**READ THIS MANUAL
BEFORE OPERATING**

**USMC EXOTHERMIC CUTTER PC/A-5V2HR
(RESCUE & RECOVERY TORCH) REV 03/09**

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CHAPTER 1

GENERAL INFORMATION AND SAFETY PRECAUTIONS

Section I. INTRODUCTION

Ultrathermic/Exothermic torches were originally conceived and configured for equipment maintenance applications involving the rapid cutting of thick metal, or unusual metal alloys. It was this capability which eventually led to the use of ultrathermic/exothermic torches for the removal of battle damaged vehicle, components, track and metal barriers by military recovery and rescue personnel.





1-1. THERMAL CUTTING. Thermal torch cutting involves the use of devices, tools, and materials that produce extremely high temperatures to melt, burn through, or vaporize metal objects and mechanisms to remove parts from damaged vehicles, equipment and facilities. The use of thermal torches is an expedient alternative when other methods are inappropriate for technical or tactical reasons. This torch cutting method has certain characteristics which must be considered during planning including oxygen availability and consumption and spark signature. This manual will describe general warnings, safety precautions and operating techniques to enable the user to make the best decisions concerning the deployment of thermal cutting equipment and its subsequent use.

1-2. PRIME-CUT RESCUE and RECOVERY TORCH KIT. Broco is the leading manufacturer of self contained lightweight exothermic systems for emergency rescue and salvage operations. These kits have the capability of quickly burning, melting, or vaporizing nearly any metallic, non-metallic, or composite material.

The PC/A-5V2HR Recovery & Rescue torch is the most recent evolution of the Prime Cut industrial backpacked torch. It meets the requirements of USAR teams for both confined space and extended cutting operations. Torch is setup with 5' hose and cable. Included in the kit is the 25' heavy rescue extension set. Attach the quick connect battery clamps to utilize a standard auto type 12 volt battery, bring up a shop sized oxygen cylinder and it is ready to do a lot of heavy cutting. A NATO Slave plug is available to operate the PC/A-5V2HR directly from a military vehicle's battery system.

PC/A-5V2HR also includes a 16" rod extender for extra reach (or standoff) and a medical oxygen adapter so D & E cylinders with the post valves can be used with the torch. Everything fits in a Pelican 1650 case (included).



SYMBOL	LEVEL OR DEGREE OF HAZARD
 NOTE	Calls attention to a critical step or procedure which, if improperly performed, may adversely affect the function of the product or overall quality.
 CAUTION	Indicates a potentially hazardous situation, which, if not avoided, may result in moderate injury. Used to warn against unsafe practices.
 WARNING	Indicates a potentially hazardous situation which, if not avoided, may result in death or serious injury.
 DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Limited to the most extreme situations.

1-3. WARNINGS.

WARNING

To avoid serious injury or death, all personnel shall heed these warnings.

- a. Never point the torch at anybody.
- b. Never use the equipment unless you are familiar with acceptable industrial welding and cutting procedures and practices.
- c. Always use this equipment following generally accepted industrial safety procedures and practices.
- d. Always apply and adhere to ANSI/ASC Z49.1-88 Safety in Welding and Cutting standards, or similar locally prevailing standards when using this equipment.
- e. Never remove, cover, or alter the warning labels attached to this equipment.
- f. All users and their supervisory personnel must read and be thoroughly familiar with these operating instructions prior to using this equipment.
- g. Never modify this equipment in any manner or use it in any way not specified in this manual.

1-4. SAFETY PRECAUTIONS.

WARNING

Failure to heed these safety precautions may result in death, severe bodily injury, or severe property damage. Protect yourself and others. Fumes and gases developed may be dangerous to your health. Ultra-violet rays and splatter can injure eyes and exposed skin. Electric shock can kill. Oxygen reacts explosively when mixed with oil or grease.

- a. Always clear the work area of flammable materials.
- b. Always clear the work area of bystanders.
- c. The operator and all bystanders must always wear adequate protective (flame and/or spark resistant) clothing, footwear, and gloves when using this system.
- d. Never operate this equipment without proper face and eye protection. Always use a number 5 or 6 shade filter.

- e. Always use the Leather Shield to protect yourself from sparks and splatter.
- f. Always remove all personal metal items (i.e., rings, watches, etc.) when working with the torch as they can trap sparks and slag causing a severe burn and damage to the item.
- g. Always keep your head away from the fume plume.
- h. Always use adequate ventilation and exhaust at the arc point to keep fumes and gases from your breathing zone as well as the general area. Special breathing apparatus must be used when welding or cutting galvanized, cadmium plated (or other heavy metal plated), or painted parts to avoid inhalation of toxic fumes and gases.
- i. Always keep the ignited tip of the cutting rod away from the oxygen cylinder, battery, and oxygen hoses.
- j. Always use extreme caution when operating the torch in windy or other adverse conditions.
- k. Never allow falling sparks or molten metal to contact any part of the torch kit. Damage may result which could render the equipment unsafe to operate.
- l. Always use caution when cutting overhead to avoid falling sparks, molten material, and falling objects.
- m. Always keep oil and grease away from the torch, oxygen cylinders, valves, regulators, hoses, and fittings. Never use compressed air, oil, solvents, or other material to clean any part of the oxygen system. Oxygen reacts explosively when mixed with oil or grease.
- n. Never clean any internal part of the oxygen system. Never use compressed air, oil, solvents, or any other material to clean the oxygen system. The oxygen system could become contaminated and cause internal burning in the torch or hose. All service on oxygen delivery parts must be performed by a qualified and knowledgeable technician.
- o. Never use a high pressure gas cylinder that does not comply with current inspection and testing requirements. Always ensure the cylinder is marked with a sticker showing a valid inspection certification.
- p. Never drop a high pressure gas cylinder. Never leave a high pressure gas cylinder in direct sunlight for prolonged periods. Never expose a high pressure gas cylinder to fire or extreme heat. High pressure gas cylinders can be dangerous. Use with caution.
- q. Always ensure the correct over pressure safety relief device is installed in the high pressure cylinder valve. Never use a safety relief device whose burst pressure is higher than that recommended by the cylinder manufacturer.
- r. Never leave the torch unattended while the oxygen cylinder valve is open and/or there is pressure in the hose.
- s. Always use a 12-volt or 24-volt DC ignition system. Never use this equipment in conjunction with a welding machine or with any power source. A 12-volt power source is desirable, but 24-VDC ignition system may also be used.
- t. Never touch live electrical parts. Always wear welder's gloves when inserting or removing the rod into/from the torch and/or extender. Never let the rod touch any unprotected part of the body.
- u. Always know the composition of the target material.
- v. Always know what is behind the target material.
- w. Always ensure that all parts of the torch system are in good working order prior to use to avoid potential malfunction.

See: American National Standard Z49.1-88 Safety in Welding and Cutting published by the American Welding Society, 550 N.W. LeJeune Road; Miami, FL 33126.

OSHA Safety and Health Standards 29 CFR 1910 available from the U.S. Department of Labor; Washington, D.C. 20210.

CHAPTER 1- GENERAL INFORMATION AND SAFETY PRECAUTIONS (cont.)

Section II. EQUIPMENT DESCRIPTION

1-5. PC/A-5V2HR RESCUE & RECOVERY CUTTING TORCH SYSTEM. A

combination of light weight and great cutting capability make this back-packed torch system ideal for confined space and remote operations. Hand-tight fittings and quick connects facilitate assembly and disassembly without the use of tools. Everything required for field deployment or stationary cutting training is included.

- a. **Torch Assembly.** The torch assembly consists of several parts. The torch body is a combination of handle, oxygen plug valve, and rod holder. The oxygen control lever allows the operator to throttle the oxygen flow through the cutting rod. It also includes quick connect fittings, a collet, a collet washer, and a collet nut. The integral plug valve allows the oxygen cylinder to be opened without the oxygen flow entering the torch handle and facilitates the use of the RapidFire cutting rod igniters. The torch comes with one 1/4" and one 3/8" collet.



PC/T-5 TORCH W/ CABLE & HOSE



PCRP-305B 3/8" COLLET KIT; PCRP-305A 1/4" COLLET KIT; & PCRP-305C 1/2" COLLET KIT



PCRP-303 TORCH COLLET NUT

- b. **Cutting Rod.** The kit is designed to use either 1/4" or 3/8" cutting rods. Standard rod length is 18 inches. 36" rod length is also available. (1/2" x 48" cutting rods are also available from Broco but are only appropriate when working from a large cylinder of oxygen.)



3836PC-25 3/8" X 36" CUTTING RODS



3818PC-SPS 3/8" X 18" CUTTING RODS, STIX PAK (6 RODS);
1418PC-SPS 1/4" X 18" CUTTING RODS, STIX PAK (9 RODS)

- c. **Leather Shield.** The flexible leather shield acts as a hand guard and a splatter shield. It attaches to the torch over the collet nut and is six inch by ten inches.



PC/LS LEATHER SHIELD

- d. **Oxygen Supply System.** The oxygen (O₂) supply system consists of the following component parts:



**PC/TAC-R-B INDUSTRIAL REGULATOR, PRESET,
W/OXYGEN QUICK CONNECT AND HAND-TIGHTEN
CGA 540 INLET FITTING**

- 1) **Oxygen Regulator.** The oxygen regulator has a hand-tighten cylinder connection (CGA 540) and a quick connect coupler outlet fitting. The PC/TAC-R-B single stage industrial regulator is preset to 65 psig outlet pressure to balance performance with oxygen consumption for most applications. The regulator can be submerged in water for cutting to a depth of 30 feet. Beyond this depth performance drops off as the ambient pressure increases.

⚠ WARNING

Never use a SCUBA or other compressed air application pressure gauge as they contain oil.

Do not use compressed air to test the pressure gauge, hose or any other component of the oxygen supply system as oil contamination may result.

- 2) **Oxygen Cylinder.** The all metal aluminum oxygen cylinder is a seamless aluminum compressed gas cylinder with a 45 cubic foot (cu ft) capacity at 2200 psi. The cylinder is manufactured in compliance with U.S. Department of Transportation (DOT) specifications. It has a standard oxygen valve (CGA 540) for ease of filling and attachment to a regulator. The cylinder must be recertified (hydrostatic testing) every five years.
- 3) **Oxygen Hose & Cable Extension Set.** The PC/A-5V2HR contains a 25 foot long hose and cable extension set (PC/EX-25). Hose is fitted with brass quick-connect ends. The cable extensions have Cam-Lok electrical quick connect fittings. The extension is used with vehicle mounted oxygen and power.



**BOC-N045 OXYGEN CYLINDER, ALUMINUM,
45 CUBIC FOOT CAPACITY AT 2216 PSI**



PC/EX-25 EXTENSION SET, HOSE & CABLE, 25'

e. **Battery Ignition Components.** The battery ignition components are used to ignite the cutting rod by means of an electric arc.

- 1) **Lightweight Battery.** The lightweight battery (PC/BISLW) contains a rechargeable 12-volt, sealed, lead acid (gel-type) battery. The battery provides DC power (through AWG #6 welding cables) to both the torch and the striker plate assembly. The battery has sufficient power to facilitate 12 – 15 rod ignitions when fully charged. A 110v input battery charger is provided.



PC/BISLW LIGHTWEIGHT BATTERY w/CHARGER

- 2) **Striker Plate Assembly.** The striker plate assembly (PC/SP-5), shown with leather sheath (PC/LSH), consists of a replaceable insulated copper grounding plate with battery cable. The 5' long cable is fitted with a male Cam-Lok electrical quick-connect. Spare parts are available.



PC/SP-5 STRIKER PLATE



PC/LSH AND LEATHER STRIKER HOLDER

- 3) **Battery Clamps.** The battery clamps (PC/BAK) attach to the end of the striker plate cable and torch power cable by means of quick-connect fittings allowing the use of standard 12 and 24-volt batteries for higher duration cutting.
- 4) **Slave Receptacle.** The torch can be operated from a vehicle's Slave connection using the optional accessory (P/N 600143) Slave Receptacle. Attach to the striker plate and torch power cable extensions by means of Cam-Lok quick-connect fittings for high duration cutting.



PC/BAK BATTERY CLAMPS



**600143 SLAVE RECEPTACLE W/
CAM-LOK QUICK CONNECTS
(OPTIONAL ACCESSORY ITEM)**

- f. **Backpack Assembly.** (PC/ARC-BP-BK) The back harness assembly features a comfortable backpack Molle platform with cylinder support enclosures, battery bag, rod extender and cutting rod holders, pouches for mask, hoses, cable, and keeper clips.

The oxygen cylinder bag has internal compartments on the sides and back to hold (user provided) ballistic protection material.



PC/ARC-BP-BK BACKPACK SET



OXYGEN CYLINDER ENCLOSURE; GEAR POUCH & BATTERY BAG; CUTTING ROD & EXTENDER HOLDERS

- g. **Quivers.** Components of the backpack assembly, the quivers are for holding the cutting rods and the rod extender. Cutting rod holder is adjustable to accommodate either 18 inch or 36 inch rods. Molle straps make for easy attachment to the backpack assembly or other vests or load bearing gear
- h. **Extender.** The cutting rod extender (PC/TACXT16) included in the torch set extends the reach of the rod 16 inches and is used to enable the operator to gain reach or standoff, employ the torch in otherwise inaccessible places and or make best use of available cover. A 36" long extender is available from Broco as an optional accessory.



PC/TACXT16 CUTTING ROD EXTENDER

- i. **Safety Equipment.** The safety equipment included with each kit consists of welder's gloves and one pair of safety goggles with number 5 shade lense.



PC/TSG PROTECTIVE GOGGLES, SHADE 5



PC/WG WELDER'S GLOVES

⚠ WARNING

Never operate this equipment without proper face and eye protection. Always use a number 5 or 6 shade filter lens.

- h. **Transfill Hose Assembly.** The Transfill hose assembly with bleed valve (PC/TFHBL) is used to transfer oxygen from a larger cylinder to the oxygen cylinder included in the torch kit.



PC/TFHBL TRANSFILL HOSE ASSEMBLY

- i. **Medical Oxygen Adapter.** The medical oxygen adapter (M87-1) is used with oxygen cylinders having post type medical valves to provide a CGA 540 industrial oxygen outlet thread.



M87-1 MEDICAL OXYGEN ADAPTER

- j. **Component Case.** The plastic Pelican™ case (PC/C-1650) is foam lined with internal nylon straps to secure the hardware and absorb shock. There is a manual pressure relief valve on the front under the handle.



**PC/C-1650 PELICAN CASE W/
STRAPS & FOAM**

Available Separately:

- k. **Rod Igniter. (PC/RFC-10)** The RapidFire™ cutting rod ignition cartridges are an alternative means of lighting the torch, eliminating the weight and bulk of the battery, striker plate and related cables.



**PC/RFC CUTTING ROD
IGNITION CARTRIDGE**

CHAPTER 2

PREPARATION

Section I. SETUP PROCEDURES

2-1. PREPARING THE WORK AREA.

⚠ WARNING

Never operate the torch in explosive or flammable environments.

Never cut into unknown material.

Never operate the torch with other personnel or bystanders in front of the torch or in the immediate work area.

Some plastics, paints, and plated parts give off toxic fumes. Organic materials may be combustible. Exotic metals may ignite. Glass and thin porcelain may shatter. Rock and minerals may spall.

- a. Clear the work area of bystanders/non-essential personnel.
- b. Place the oxygen supply and battery in a location away from the immediate work area.
- c. Know the composition of the target material. Some metals burn violently. Concrete will spall.
- d. Know what is beyond the target material. Never cut near power cables, pipes, or flammable objects.
- e. When the target material is a container or pipe, know the material previously contained therein. Always thoroughly purge pipelines and containers with an inert gas (such as nitrogen or argon) prior to cutting.
- f. Ensure that falling material (molten metal, sparks, or severed pieces of target material) will not cause injury to operator or bystanders or cause damage to property.

2-2. PRE-ASSEMBLY INSPECTION.

⚠ WARNING

Never use any equipment which is unsafe or appears to be unsafe. Always replace damaged or worn components to reduce the risk of injury. Never operate the torch without the flash arrestor and flash arrestor screen in place.

Never operate the torch without ensuring the collet washer is in good condition and in place. Always check the collet washer before using the torch. A damaged collet washer can contribute to oxygen leak and serious burn injury.

- a. Always inspect the oxygen hose(s), power cables, oxygen quick-connects and electrical connectors for damage or wear prior to and immediately following each use of the cutting torch.
- b. Always inspect the torch assembly, the collet, collet washer, flash arrestor, and flash arrestor screen for damage or wear prior to and immediately following each use.
- c. Check the battery for leaks. Never use a leaking battery as gases may be toxic and/or combustible. Seepage may be caustic, harming skin and eyes.

CHAPTER 2-PREPARATION (cont.)

Section II. ASSEMBLY PROCEDURES

2-3. OXYGEN SYSTEM.

⚠ WARNING

To reduce the risk of injury in the event of regulator failure, never stand directly in front of or directly behind the oxygen regulator while opening the oxygen cylinder valve.

Always keep oil and grease away from the torch, oxygen cylinders, valves, regulators, hoses, and fittings. Never use compressed air, oil, solvents, or other material to clean any part of the oxygen system. Oxygen reacts explosively when mixed with oil or grease.

Always make sure the oxygen cylinder is a safe distance from the immediate work area. Never let sparks or molten material come into contact with the oxygen cylinder.

The Broco Prime-Cut torch utilizes a D.O.T. compliant high pressure oxygen cylinder. Never use a cylinder that appears damaged or unsafe. Always have a licensed test facility inspect questionable cylinders.

Do not use a torch if there is an oxygen leak.

- a. General. The oxygen cylinders included with the Prime-Cut cutting torch kits are manufactured in compliance with all applicable US Department of Transportation requirements for high pressure compressed gas cylinders. The cylinder valve outlet fitting is to the Compressed Gas Association (CGA) specification 540, the common US industrial oxygen outlet.

High pressure gas cylinders are required to comply with current inspection and testing requirements. Cylinders must undergo internal visual inspection annually and pass hydrostatic testing every three years (composite) or five years (all metal). Always ensure the cylinder to be used is stamped or marked with a sticker showing a valid inspection certification.

- b. Export kits. The US standard oxygen outlet fitting (CGA 540) is used in many parts of the world. For those countries where it is not accepted, Broco offers export versions of the cutting sets that utilize the British standard for oxygen cylinder valve and regulator inlet fittings. Oxygen cylinders and oxygen cylinder valves are certified to EN standards and marked accordingly.
- c. Broco also has oxygen adapters available to facilitate use of U.S. type components with British Standard components. These adapters are not included in the kits but are available as accessory items.
 - 1) BR-540 adapter allows the US standard regulators supplied in the tactical torch kits to be used with British standard oxygen cylinders. This facilitates the use of larger, locally obtained oxygen cylinders when practicing cutting technique (as opposed to Method Of Entry training).
 - a) Thread the BR-540 adapter onto the British standard oxygen valve outlet fitting. Tighten with a wrench.
 - b) Attach the regulator to the other side of the BR-540 adapter.
 - 2) BR-541 adapter enables the filling of the oxygen cylinders included in the tactical torch kits by gas suppliers with British standard fill hose end connections. BR-541 adapter can also be used to fit a British standard oxygen regulator to a US standard oxygen cylinder.

- a) Thread the BR-541 onto the US CGA 540 standard oxygen cylinder valve outlet connection. Tighten with a wrench.
 - b) Attach the fill hose (or British standard regulator) to the other side of the BR-541 adapter.
- 3) BR-540 adapter can also be used with a US standard transfill hose assembly to transfer oxygen between a US standard cylinder and a British standard cylinder.
- a) Thread the BR-540 onto the British standard oxygen cylinder valve outlet connection. Tighten with a wrench.
 - b) Thread one end of the transfill hose assembly onto the other end of the BR-540.
 - c) Attach the other end of the transfill hose assembly to the US standard oxygen cylinder valve outlet connection.
 - d) Follow transfill instructions detailed elsewhere in this manual.
- d. Inspect and wipe clean with a clean dry cloth all fittings, hoses, and cables. Ensure there is no grease, oil, or other contaminant on these items.
- e. Ensuring that the oxygen is turned off, place the oxygen cylinder into the backpack assembly:
- 1) Mount the cylinder so the oxygen cylinder will be in an up-right position.
 - 2) Position the cylinder so the oxygen outlet shall be on the operators left side (when wearing the rig).
 - 3) Secure the cylinder inside the cylinder carrying bag by tightening the straps before zipping the cover closed..



TORCH SETUP- OXYGEN SYSTEM

⚠ CAUTION

Do not use a wrench to tighten the regulator inlet nipple as damage to the nipple may occur.

- f. Connect the oxygen regulator to the oxygen cylinder ensuring that the regulator quick connect fitting for the oxygen hose is pointed straight down and is parallel to the oxygen cylinder. Note that the regulator inlet is fitted with a hand-tight nut and Teflon tipped or o-ringed inlet nipple. A complete seal can be achieved by hand tightening.
 - 1) Purge the oxygen cylinder valve to remove debris by quickly opening then closing the oxygen cylinder valve.
 - 2) Check to ensure the regulator inlet stem seat (either Teflon tip or o-ring style) is present and in good condition.
 - 3) Orient the regulator so the output quick-disconnect coupler points down.
 - 4) Oxygen regulator utilizes hand-tighten inlet nut. Do not use a wrench to tighten. Do not over-tighten as damage to the inlet stem seat can occur.
- g. Connect the five foot oxygen hose to the oxygen regulator by pushing the plug end oxygen quick connect on the hose into the oxygen quick connect coupler on the regulator. Route the oxygen hose down along the oxygen cylinder bag. Use a keeper clip to
- h. Attach the torch assembly to the oxygen hose by pushing the plug end oxygen quick connect on the torch into the oxygen quick connect coupler on the hose. Turn the plug valve to the open position.

⚠ WARNING

Regulators may fail when pressurized. Never stand directly in front of the regulator while opening the oxygen cylinder valve. Always stand to the side of a regulator when opening the oxygen cylinder valve.

Always open the oxygen cylinder valve slowly. Do not allow rapid pressurization of the regulator. Regulator failure may occur, injuring the operator or bystanders.

- i. Standing on the opposite side of the oxygen cylinder from the oxygen regulator, slowly open the oxygen cylinder valve to start the flow of oxygen. Open the valve all the way to the stop. Do not over tighten. Check the pressure gauge on the oxygen regulator to ensure that the oxygen cylinder is full.
- j. Check all connections for oxygen leaks by listening for escaping gas. Depress the oxygen control lever on the torch assembly to verify proper functioning (i.e. not sticking, no obstructions, etc.). Close the plug valve.

2-4. IGNITION SYSTEM.

- CHARGE A NEW BATTERY BEFORE USING.
- CHARGE IMMEDIATELY AFTER EACH SUBSEQUENT USE.
- THE BROCO BATTERY MODEL PC/BISLW MAY TAKE UP TO 16 HOURS TO FULLY CHARGE IF COMMENCING FROM A FULLY DISCHARGED STATE.
- DO NOT STORE A RECHARGEABLE BATTERY IN A FULLY OR PARTIALLY DISCHARGED STATE.
- NOTE- BATTERIES MAY LOSE UP TO 3% OF THEIR CHARGE PER MONTH DURING STORAGE.

⚠ WARNING

Always use a 12 OR 24-volt DC ignition system.

Lead-acid batteries generate explosive gases during normal battery operation. Never smoke or allow spark or flame in the near vicinity of the battery. Always make sure the battery is safely positioned away from the immediate work area and adequately ventilated. Never let sparks or molten material come into contact with the battery.

Always wear eye protection and protective clothing. If battery acid makes contact with skin/clothing, promptly wash with soap and water. If acid makes contact with eyes, flood immediately with running cold water for at least ten minutes and seek immediate medical attention.

Remove all personal metal items (i.e., rings, watches, etc.) when working with lead-acid batteries as they can produce a short-circuit current high enough to weld a ring or other like item to metal causing a severe burn.

Never use the battery while the battery charger is plugged into an AC outlet. Always unplug the battery charger before attaching the ignition power cables to the battery.

Never let the striker plate accidentally contact the torch, rods, or work area. Electrical shock and sparks may result.

Do not submerge the battery in water.

⚠ CAUTION

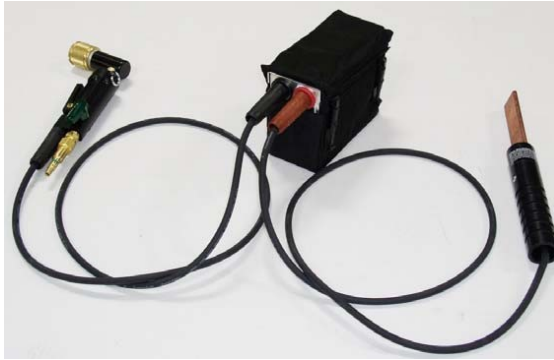
The battery can discharge if the striker plate continuously contacts the work area. Exercise caution to prevent complete discharge of the battery.

The battery should never be left in a total discharged state for an extended period of time. Damage could be permanent with poor performance as a result. When not in use, recharge at least every two months.

2-4-1. Lightweight Battery. The Lightweight Battery (PC/BISLW) contains a rechargeable 12-volt, sealed, lead acid (gel-type) battery. It can be stored in any position. The battery provides DC power (through AWG #6 welding cables) to the torch and striker plate. A short circuit spark is all that is necessary for igniting the cutting rod.

- a. Attach the Lightweight Battery to the Back Harness Assembly waist strap using the metal clips on the lightweight battery's nylon cover.
- b. Unsnap and lift the front tab of the battery cover, exposing the two electrical quick connect receptacles.
- c. Separate the torch power cable into two segments. Connect the 5 foot power cable to the torch by firmly seating the black plug in the hole in the back of the torch assembly then twisting 1/4 turn to lock in place.

- d. Connect the other end of the 5 foot power cable to the battery. Firmly seat the black plug into the black receptacle then twist 1/4 turn to lock in place.
- e. Separate the striker plate cable into two segments. Connect the striker plate cable to the battery by firmly seating the red plug into the red receptacle then twisting 1/4 turn to lock it in place.



TORCH SETUP- IGNITION SYSTEM

⚠ NOTE

There may be times when the backpack need not be used (e.g. training). At these times it may also be advantageous to use oxygen from a larger cylinder (more cutting duration) and a larger capacity battery. In these instances leave the torch power cable and striker plate cable at 15 feet. Also join the 10 foot long oxygen hose to the 5 foot hose for a total of 15 feet.

2-4-2. Battery Adapter Clamps. The battery adapter clamps are employed when using any 12- or 24-volt (DC) power source other than the Lightweight Battery.



PC/BAK BATTERY CLAMPS ADAPT TORCH AND STRIKER POWER CABLES TO 12 or 24 VOLT BATTERIES.

⚠ WARNING

Never use a battery for ignition that is connected to a battery charger.

Always unplug the battery charger before attaching the ignition power cables to the battery.

Never let the striker plate accidentally contact the torch, rods, or work area. Electrical shock and sparks may result.

⚠ CAUTION

The battery can discharge if the striker plate continuously contacts the work area. Exercise caution to prevent complete discharge of the battery.

⚠ NOTE

Polarity does not matter for ignition since only a direct short is required to ignite the rod.

- a. Connect the 15 foot power cable to the torch by firmly seating the black plug in the hole in the back of the torch assembly then twisting 1/4 turn to lock in place.
- b. Connect the other end of the 15 foot power cable to the black battery adapter clamp. Firmly seat the black plug into the receptacle then twist 1/4 turn to lock in place.
- c. Connect the 15 foot striker plate cable to the red battery clamp by firmly seating the red plug into the receptacle then twisting 1/4 turn to lock it in place.
- d. Connect the battery adapter clamps and to the terminals on the 12- or 24-volt DC power source.

CHAPTER 2-PREPARATION (cont.)

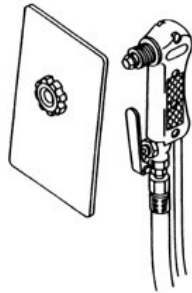
Section IV. ACCESSORY EQUIPMENT

2-5. LEATHER SHIELD. The leather shield is intended to reduce the sparks and spatter coming back at the operator's hand. Always use the leather shield when piercing.

⚠ WARNING

Always use the leather shield designed for the Prime-Cut torch (in conjunction with protective outer wear and gloves) to protect yourself from spark and splatter burns.

- a. Remove the collet nut and collet from the torch assembly.
- b. With the smooth finished side of the leather shield facing away from the torch assembly, work the leather shield over the threads and onto the torch.
- c. Re-insert the collet and screw the collet nut back onto the torch assembly.



INSTALLING THE LEATHER SHIELD

2-6. ROD EXTENDER. The rod extender is used to enable the operator to reach otherwise inaccessible places; make better use of existing cover; or create a stand-off between the torch and the burning rod to avoid excessive splatter when cutting aluminum or piercing.

- a. Ensure the collet washer and 3/8" collet is in the torch assembly.
- b. Loosen the collet nut one-half turn.
- c. Insert the end of the rod extender into the collet until it is firmly seated against the collet washer.
- d. Tighten the collet nut to lock the rod extender in place.
- e. Check for oxygen leaks at the collet nut. If a leak exists:
 - 1) Make sure rod extender is firmly seated on the collet washer.
 - 2) Inspect the rod extender for damage.

- 3) Inspect the collet washer for damage and replace if necessary.



ROD EXTENDER INSTALLATION

- f. Insert the cutting rod into the rod extender as follows:
 - 1) Check to see that the collet in the rod extender is the appropriate size to properly fit the rod being used and that the collet washer is present and in good condition. To replace the collet, remove the collet nut and collet from the rod extender. Make sure the appropriate size collet washer is in place. Insert the desired collet and replace the collet nut.
 - 2) Loosen the collet nut one-half turn.
 - 3) Insert the end of the rod that has the recessed internal rods into the collet until it is firmly seated against the collet washer.
 - 4) Tighten the collet nut to lock the rod in place.
 - 5) Check for oxygen leaks at the collet nut. If a leak exists:
 - (a) Make sure the rod is firmly seated on the collet washer.
 - (b) Ensure the collet nut assembly is tightened.
 - (c) Inspect the rod for damage.
 - (d) Inspect the collet washer for damage and replace if needed.
 - (e) If the collet nut still leaks, remove the rod extender from service and turn in for repair.

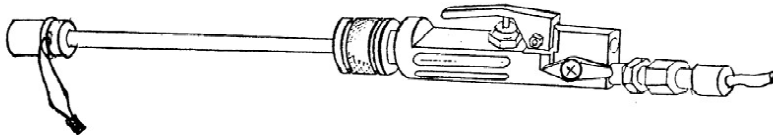
2-7. RAPIDFIRE™ CUTTING ROD IGNITERS. RapidFire™ cutting rod ignition cartridges are used to light the cutting rods without the need for a battery, striker plate, and related cables. RapidFire™ cutting rod ignition cartridges contain a material which when exposed to pure oxygen near instantaneously heats to incandescence, in turn causing the cutting rod tip to quickly ignite.

⚠ WARNING

The rod igniters utilized with the Prime-Cut torch contain oxygen reactive material, a pyrophoric / self-heating solid / combustible in air. Combustion is achieved through rapid oxidation. Exposure to high concentrations of oxygen will cause material to super heat into a molten state. Hazard Class: 4.2/ID #UN1383/DOT Label: Spontaneously Combustible. (Small quantities – 5 boxes or less- Hazard Class 9/UN3363/Dangerous Goods in Apparatus.)

- a. **General.** The rod igniter, utilized with the BROCO torch kits, contains an oxygen reactive material that is enclosed in a small, airtight, hermetically sealed glass vial housed within a steel cylinder. The reactive material is pyrophoric/self-heating/combustible in air. Combustion is achieved through rapid oxidation. Exposure to high concentrations of oxygen will cause the material to convert to a molten state. Should the activated material be exposed to air, the strips can be inerted by the application of water, carbon dioxide (CO₂), or foam. Material will self-inert in air over a time of approximately 30-45 minutes.

- b. **Packaging.** RapidFire™ cutting rod igniters are sold in units of ten pieces. Five igniters are sealed in an airtight, aluminized pouch. Two pouches are then packed in a cardboard box. The cardboard boxes, each containing ten (10) rod igniters, are securely packed and shipped in a UN 1A2 steel pail (drum).
- c. **Transportation.** Current regulations prohibit the shipping of the cutting rod igniters by commercial air carriers. They must be transported by truck or vessel. Small quantities (5 boxes or less) of cutting rod igniters may be shipped as Class 9 materials via UPS. Igniters can not be shipped via post, Federal Express, or DHL. Contact Broco for specific information about shipping RapidFire cutting rod igniters.
- d. **Storage.** Cutting rod igniters should be stored in the metal pails they are shipped in until they are needed for use. Do not store the cutting rod igniters next to flammable liquid.
- e. **Disposal.** The reactive material should be exposed to the air prior to disposal. The material will oxidize and become deactivated. The remaining residue is not hazardous and may be discarded.
- f. **Shelf Life.** The current shelf life is estimated at three years inside the sealed foil pouch.



PC/RFC IGNITER SHOWN IN PLACE ON CUTTING ROD

CHAPTER 3

OPERATING INSTRUCTIONS

Section I. INTRODUCTION

WARNING

Never operate the torch without protective safety gear nor without the leather shield in place. Always protect yourself from spark and splatter burns.

Prime-Cut torch kits operate at a temperature of approximately 10,000 degrees Fahrenheit, enabling them to cut or melt almost any known material. Sparks, splatter, and molten material generated by this process can cause fire, severe property damage, bodily injury, or death.

3-1. TORCH OPERATION. The torch operates on the following principle. A regulated oxygen flow is fed through a consumable cutting rod consisting of a tube and alloy fuel wires. The cutting rod is ignited by arcing the end of that rod on a battery powered striker plate or by rapidly heating the rod with the near-instantaneous reactive igniter. The resulting flame is fed by the oxygen and consumes the alloy rod for fuel. When the tip of the burning rod is held on or in close proximity to the target material and the appropriate technique is applied, a cut or pierce will result.

Section II. OPERATING PROCEDURES

WARNING

Never operate the Prime-Cut torch without proper eye protection. Either a helmet with #5 face shield or #5 safety glasses shall be worn when using the tactical torch kits. Ultraviolet rays can cause burns, potentially damaging the eyes.

Remove all personal jewelry (i.e., rings, watches, etc.) before operating the torch. Slag and splatter can become trapped between the worn item and the skin causing severe burns and damage to the item.

Always wear welding gloves when inserting cutting rods into and/or removing cutting rods from the torch.

Always insert the correct end of the cutting rod into the torch.

Never use a damaged cutting rod.

CAUTION

Always use Prime-Cut ultrathermic cutting rods with Prime-Cut torch kits. Prime-Cut rods are specially designed to fit with the collets used in Prime-Cut torches. Never use any other rods as hazardous backflashes or internal burning may result.

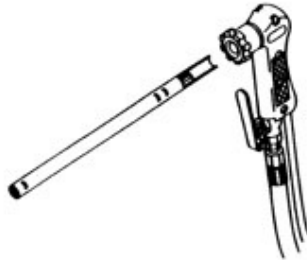
CHAPTER 3- OPERATING INSTRUCTIONS (cont.)

NOTE

Refer to the table to determine the correct cutting rod size for the target material and type of work being performed.

3-2. ROD INSERTION.

- a. Check to see that the collet in the torch assembly is the appropriate size to properly fit the rod being used. To replace the collet, remove the collet nut and collet from the torch assembly. Make sure the neoprene collet washer is in place and sized appropriately for the collet. Insert the desired collet and replace the collet nut.
 - 1) 3/16" collet is used with red washer.
 - 2) 1/4" and 3/8" collets are used with black washer.
 - 3) 1/2" collet is used with either white washer or black washer.
- b. Ensure the plug valve is closed. Loosen the collet nut one-half turn. Do not remove the collet nut.
- c. Insert the end of the cutting rod that has the recessed internal wires into the collet until it is firmly seated against the collet washer.
- d. While maintaining slight pressure, tighten the collet nut to lock the rod in place.



CUTTING ROD INSERTION

- e. Open the plug valve fully.
- f. Depress the oxygen control lever to start the flow of oxygen. Check for leaks at the collet nut by listening for escaping oxygen. If any leaks are encountered:
 - 1) Make sure the cutting rod is firmly seated on the collet washer.
 - 2) Re-tighten the collet nut assembly.
 - 3) Inspect the cutting rod for damage.
 - 4) Make sure correct size collet washer is being used. Inspect for damage and replace if necessary.

5) If none of the preceding remedy the leak, remove the torch from service and contact Broco customer service or another qualified person for inspection and repair.

g. Fully close the plug valve until ready to use the torch.

Table 3.1. Cutting rod size selection chart.

ROD SIZE					APPLICATION
3/16"	1/4"	3/8"x 18"	3/8"x 36"	1/2"	
X	X	X	X	X	CUTTING Lock hasps and shanks Reinforcement bar in concrete (re-bar) All steel plate (mild and high strength) to 1/2" thick All steel plate (mild and high strength) over 1/2" thick, to 2" thick All steel plate (mild and high strength) over 2" thick Aluminum, titanium, magnesium alloys and other volatile alloys*
X	X	X	X	X	
					PIERCING Broken bolts to 3/4" diameter Pins and broken bolts 3/4" diameter to 1 1/4" diameter Steel plate less than 6" thick Steel plate greater than 6" deep* Concrete to 4" thick* Concrete over 4" thick*
					GOUGING Gouge cutting steel composite barriers to 2" thick Gouge cutting steel composite barriers over 2" thick * Use the accessory cutting rod extender

3-3. IGNITING THE CUTTING ROD.

3-3-1. Ignition using the striker plate.

⚠ WARNING

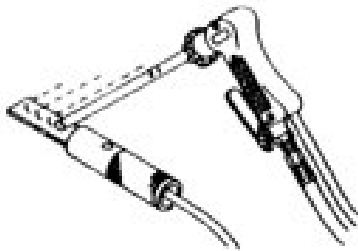
Always hold the striker plate by the plastic handle to avoid electric shock. Never touch the copper plate.

Avoid prolonged contact between the cutting rod and the striker plate. Damage to the battery may result.

⚠ NOTE

Only a light flow of oxygen is required for rod ignition. Too much oxygen will make the rod more difficult to ignite and create excessive sparks.

- a. With the plug valve closed, fully depress the oxygen control lever on the torch assembly. Slowly open the plug valve until a light flow of oxygen is heard. Release the oxygen control lever.
- b. Point the rod away from your body. Never point the rod at bystanders.
- c. Start the flow of oxygen by lightly squeezing the oxygen control lever on the torch assembly.
- d. Bring the striker plate (2) into contact with the end of the rod (3).
- e. While holding the rod at a 45 to 90 degree angle to the striker plate, slowly and lightly pull the rod across the striker plate surface (using a slight back and-forth motion). The resulting arc will ignite the tip of the rod.
- f. Rod sparking indicates ignition. Approximately 2- 4 seconds of contact is required for ignition.
- g. Maintain light pressure on the oxygen control lever to ensure complete ignition.
- h. Once ignited, immediately remove the rod from the striker plate and bring it to the target material.
- i. Place the striker plate in a safe location away from the work area.
- j. Keeping the oxygen control lever depressed, open the plug valve. Commence cutting, piercing, or gouging according to the directions outlined in "Operating Techniques" of this Manual.



ROD IGNITION USING THE STRIKER PLATE. SLOWLY PULL AND ROCK ACROSS SURFACE TO ARC.

3-3-2. Ignition using RapidFire™ cutting rod igniter - Land Environment.

⚠ WARNING

Do not attempt to break the cutting rod igniter internal seal while the cutting rod is in the torch. Damage to the collet washer may result which could contribute to an oxygen leak and subsequent injury to the operator or damage to the equipment. (Dry land only.)

Do not depress the oxygen control lever until the internal igniter seal has been penetrated by the rod (when on dry land).

Do not apply too much oxygen or excessive sparks and/or spray may result.

Do not remove the safety clip from the rod igniter until the operator is ready to initiate cutting.

Always wear eye protection, gloves and appropriate safety clothing. Keep face well back from line of spray to reduce risk of injury.

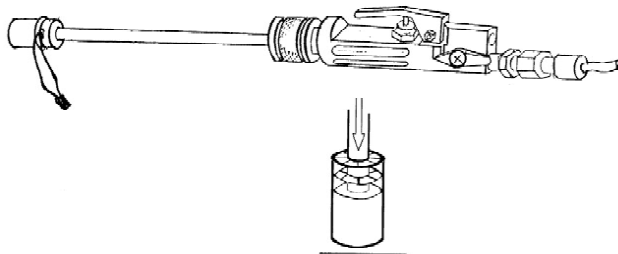
⚠ NOTE

Although a self-heating material, the ingredients within the rod igniter are not violently reactive with air. A strong oxidizer is required to achieve good combustion. Water will render the material inert.

Place the igniter on the rod and break the seal before putting the cutting rod into the torch. This makes it easier to impact the igniter against a hard surface (to break the internal seal) without bending the rod or damaging the collet washer.

Do not raise the rod from the ignition point until complete ignition has been achieved. Ignition is more efficient if a molten puddle is allowed to form around the tip of the rod.

- a. Remove the safety clip by pulling on the attached cord.
- b. Place the cutting rod igniter on the cutting rod and press gently until the rod is seated within both igniter alignment bushings.
- c. Tap the bottom of the rod igniter hard against the ground (or other hard surface) to break the internal seal.
- d. Insert the cutting rod into the torch as per section 3-2. Do not perform oxygen leak check with igniter on the end of the rod.



CUTTING ROD IGNITION USING RAPIDFIRE IGNITER .

- e. Place the igniter against the ground or other surface. Angle the torch away so spray will not come back at the operator's face or body.
- f. With the plug valve closed, fully depress the oxygen control lever on the torch assembly.
- g. Slowly open the plug valve until a light flow of oxygen is heard.
- h. Press down on the torch assembly to bury the rod tip in the reactive material.
- i. Hold the rod tip in the molten puddle which forms (approximately 4-5 seconds). Sparkling indicates rod ignition.
- j. Keeping the oxygen control lever depressed, raise the rod to the work piece/target material and fully open the plug valve to commence cutting.

3-3-3. Ignition using RapidFire™ cutting rod igniter - Underwater.

General. The Broco Prime-Cut PC/A-5V2HR torch can be used to conduct underwater cutting at depths to 30 fsw (with the industrial oxygen regulator). As the lightweight battery cannot be submersed, and cutting frequently must be performed where surface support (oxygen source and a power supply) is not practical, RapidFire cutting rod ignition cartridges are used to ignite cutting rods underwater.

WARNING

Do not remove the safety clip from the rod igniter until the operator is ready to initiate cutting.

NOTE

Although a self-heating material, the ingredients within the rod igniter are not violently reactive with air. A strong oxidizer is required to achieve good combustion. Prolonged contact with water will cause the material within the igniter to become inert.

Do not raise the rod from the ignition point until ignition has been achieved. Ignition is more efficient if a molten puddle is allowed to form around the tip of the rod.

When using a RapidFire™ cutting rod ignition cartridge to ignite a cutting rod underwater, the oxygen must be flowing before the internal seal is broken, unlike the preceding land environment procedure which requires the seal to be broken prior to oxygen being introduced.

- a. With the plug valve closed, fully depress the oxygen control lever on the torch assembly. Slowly open the plug valve until a moderate flow of oxygen is detected (approximately 1/3 opened, 1"-3" jet observed issuing from the cutting rod tip). Release the oxygen control lever.
- b. Remove the safety clip by pulling on the attached cord.
- c. Place the cutting rod igniter on the cutting rod and press gently until the rod is seated within both igniter alignment bushings and is against the glass vial.
- d. Place the bottom of the igniter against a hard surface.
- e. Depress the oxygen control lever allowing the moderate oxygen flow into the cutting rod igniter.

NOTE

By introducing the oxygen into the rod igniter PRIOR to breaking the internal seal, the water is displaced to allow for proper oxidation and combustion.

- f. Tap (hard) the bottom of the rod igniter against the hard surface to break the internal seal. Press down on the torch assembly to bury the rod tip in the reactive material.

- g. Hold the rod tip in the molten puddle which forms (approximately 4- 5 seconds). Sparkling indicates rod ignition.
- h. Keeping the oxygen control lever depressed, fully open the plug valve. Raise the cutting rod to the work piece/target material and commence cutting.

3-4. OPERATING TECHNIQUES.

⚠ WARNING

Never let the cutting rod burn down into the torch.

Always release the torch oxygen control lever to extinguish the torch while there is at least two inches of rod remaining.

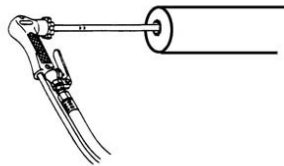
3-4-1. Piercing. A pierce is accomplished by holding the torch with the rod at a 90 degree angle (perpendicular) to the pierce point. The burning rod is slowly pushed into the point and a swirling motion is applied to widen the hole. The pushing and swirling motions are continued until the proper depth or burn-through is achieved. Comply with the following steps.

⚠ WARNING

Always wear adequate protective clothing and full face shield. Always use the leather shield during piercing operations. Blowback is greater when piercing. Exercise extreme caution.

Never touch a used rod, the target material, or the work surface with a bare hand until it has cooled. Always wear welding gloves.

- a. With the oxygen control lever slightly depressed (light flow of oxygen), press the burning tip of the rod against the target material at a 90 degree angle, allowing it to melt a 1/4 inch deep hole.
- b. Insert the rod tip into the depression.
- c. Keeping the tip of the rod in the hole, increase the oxygen flow to increase penetration by slowly depressing the oxygen control lever.
- d. As the target material melts and flows back out of the hole, move the rod in and out and around to enlarge the hole and to allow the oxygen pressure to wash away molten material. Continue to push the rod into the hole, applying low to moderate force for about two seconds, then pull back. Repeat this process until target material is pierced.



PRESS TO PIERCE.

⚠ CAUTION

Remove the rod from the pierced hole before releasing the oxygen control lever. Oxygen must not be shut off while cutting rod is inside a pierced hole or else the rod may seal itself shut or weld itself to the target material.

- e. When piercing is completed, first, remove the rod from the pierced hole. Secondly, release the oxygen control lever to extinguish the torch assembly. The rod will continue to burn only as long as oxygen is supplied.

HELPFUL HINTS:

- ◆ Disrupting the oxygen flow may cause the rod to become lodged in the hole. If the cutting rod goes out while piercing, the rod should be extracted immediately, if possible. The still hot rod can be re-ignited. If the rod becomes lodged in the hole, release the torch oxygen control lever and remove the torch from the cutting rod. The stuck rod can then be extracted by a gloved hand or pliers, or cut free with a new rod inserted in the torch.
- ◆ To avoid excessive blowback when starting a pierce, use the oxygen control lever to limit the oxygen pressure to a moderate flow. When the penetration is approximately 1.5 to 2 inches deep, depress the oxygen control lever fully to increase the oxygen pressure to maximum flow.
- ◆ When piercing a hole deeper than 5 inches, it is best to use a 3/8 inch diameter rod.

3-4-2. Cutting. Normal cutting is done by using a drag or pull technique. Push cutting (**see gouging section below**) may be performed on thinner materials (same as diameter of cutting rod being used). Following the ignition of a cutting rod, it is brought to the work surface that is to be cut. The rod is dragged or pulled along the surface in the direction of the desired cut. The operator should strive for a proper balance between the speed of the cut and rod consumption. When the operator cannot see through the kerf (groove or notch made by a cutting tool), the speed of the cut is too fast. (A sawing motion is used on materials thicker than 1-1/2 to 2 inches to ensure a complete melt through.) When there are no other items to be cut, the oxygen control lever is released to extinguish the rod. Comply with the following steps.

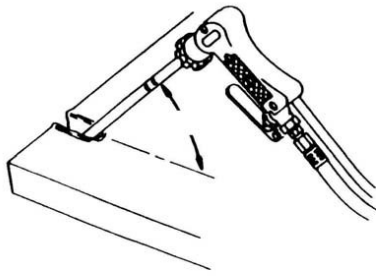
⚠ WARNING

Always wear adequate protective clothing and eye and face protection. Exercise extreme caution.

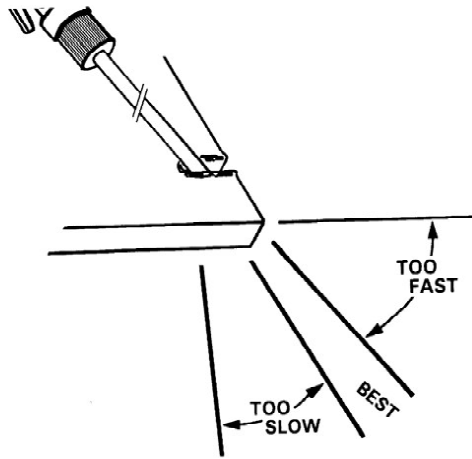
⚠ NOTE

Keep the burning tip of the rod in direct contact with target material.

- a. Place the burning tip of the rod against the target material at a 45 to 90 degree angle. (A position just off of perpendicular is preferred as the cross-sectional thickness is minimized.)
- b. Increase oxygen flow by slowly depressing the oxygen control lever.
- c. Keep the rod in the cut.
- d. Pull the rod in the direction of the intended cut. Be sure that the molten material is blown forward through the cut and does not splash backwards. The operator should look through the cut in order to observe the spray. If the spray deflects substantially, the operator is moving too quickly.
- e. After completing the cut, release the oxygen control lever to extinguish the torch assembly. The rod will continue to burn only as long as oxygen is supplied.



PULL TO CUT. MAINTAIN CONTACT
BETWEEN ROD AND TARGET (DRAG).

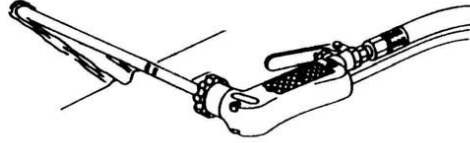


SLAG SPRAY ANGLE DURING CUTTING.

3-4-3. Gouging/Push Cutting. Gouging is conducted by holding the rod at a very slight angle to the target material and pushing into the direction of the desired gouge. It is the recommended cutting method when the target material is the same as the cutting rod diameter or thinner or if the target material is backed by concrete or another hard substance. Comply with the following steps.

⚠ WARNING

Always wear adequate protective clothing and eye and face protection. Exercise extreme caution.



PUSH TO GOUGE. CUTTING ROD IS NEARLY FLAT AGAINST TARGET.

- a. With the oxygen control lever slightly depressed (light flow of oxygen), lay the rod flat on the work piece with the burning tip of the rod against the target material.
- b. Increase the oxygen flow by slowly depressing the oxygen control lever.
- c. The target material will puddle in approximately 1 to 2 seconds. Keep the rod at a very slight angle to the work piece and the tip of the rod in the puddle.
- d. With the oxygen control lever fully depressed, push the rod in the direction of the desired gouge. Ensure the tip of the rod does not hang up and burrow into the target material as blowback of sparks/splatter will occur.
- e. When the gouge is complete, lift the rod tip from the target material.
- f. Release the oxygen control lever to extinguish the torch assembly. The rod will continue to burn only as long as oxygen is supplied.

HELPFUL HINTS:

Gouging is a good technique to use when steel is backed some other material which is either not readily burnable (ex. dirt) or exhibits a volatile reaction when burned or exposed to prolonged high heat (e.g. concrete, high percentage of aluminum or magnesium alloys). Use one or more passes to remove material until left with between 1/8" and 1/4" thickness. Then cut or gouge away remaining material in one final quick pass.

3-5. RESTART PROCEDURES.

- a. If at any time the cutting rod goes out while in use, move the torch away from the cutting surface. Check the oxygen flow and pressure and then re-ignite the rod as previously explained. If re-ignition fails or the rod continues to go out, insert a new rod and ignite the rod as previously explained.

⚠ CAUTION

Cutting rod is considered consumed when less than two inches long. Never allow a cutting rod to burn into the torch. Never use a damaged cutting rod.

- b. Cutting rods may also seal shut during use, especially if the oxygen flow is stopped before removing the rod from the work piece. To clear a sealed rod when using a striker plate and battery, touch the rod tip to the striker plate and depress the oxygen control lever when the arcing begins. This procedure may have to be repeated to completely clear the rod.
- c. If a rod becomes sealed when using the RapidFire™ cutting rod igniters, a new rod must be inserted and ignited with the rod igniter as previously explained.

3-6. SHUTDOWN PROCEDURES.

- a. Release the oxygen control lever to stop the rod from burning.
- b. Loosen the collet nut and remove the rod from the torch assembly then close the oxygen cylinder valve.
- c. Depress the oxygen control lever to relieve any pressure from the oxygen hose and the pressure gauge/hose.

⚠ CAUTION

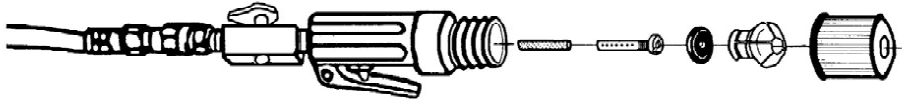
Always place a protective cap or piece of tape over the open end of the oxygen hose to prevent dirt or foreign objects from entering during storage.

- d. Disconnect and remove the oxygen hose from the regulator at the quick disconnect fitting.
- e. Unsnap the snap tabs on the back harness assembly and remove the regulator and pressure gauge/hose from the oxygen cylinder. Inspect the inlet nipple on the regulator (not shown) for damage and/or wear.
- f. Disconnect and remove the black power cable electrical connector from the lightweight battery.
- g. Disconnect and remove the red striker plate electrical connector from the lightweight battery.
- h. Wipe down the torch assembly and striker plate assembly with a clean, oil-free cloth.
- i. Remove the collet nut, collet, collet washer, flash arrestor, and flash arrestor screen from the torch. Inspect for damage and/or wear. Clean and reassemble.

⚠ NOTE

Always replace any damaged or worn parts with factory replacement parts.

- l. Always inspect the cables and hoses for cuts, burns, or any other signs of damage or wear.
- m. Charge the lightweight battery.
- n. Store the cutting torch kit in a clean, dry place.



INSPECT FLASH ARRESTOR AND SCREEN.

3-7. BATTERY CHARGING INSTRUCTIONS.

3-7-1. Charging the Lightweight Battery.

- CHARGE A NEW BATTERY BEFORE USING.
- CHARGE AFTER EACH SUBSEQUENT USE.
- THE BROCO BATTERY MODEL PC/BISLW MAY TAKE UP TO 16 HOURS TO FULLY CHARGE IF COMMENCING FROM A FULLY DISCHARGED STATE.
- DO NOT STORE A RECHARGEABLE BATTERY IN A FULLY OR PARTIALLY DISCHARGED STATE.

NOTE- BATTERIES MAY LOSE UP TO 3% OF THEIR CHARGE PER MONTH DURING STORAGE.

⚠ CAUTION

Always disconnect power cables prior to charging the Lightweight Battery.

Working in vicinity of a lead-acid battery is dangerous. Batteries generate explosive gases during normal battery operation and there is a risk of these gases exploding. Never smoke or allow a spark or flame in the immediate vicinity of the battery to reduce the risk of battery explosion.

The Lightweight Battery should never be left in a total discharged state for an extended period of time. Damage could be permanent with poor performance as a result. When not in use, recharge at least every two months.

Do not leave the Lightweight Battery on charge for more than 72 hours unless supplied charger is marked as a “float” charger. Damage to the battery may result.

⚠ NOTE

Battery chargers supplied with Broco Prime-Cut cutting torch kits are 110 volt input. 220v to 110v low amperage converters are available from Broco. Ensure the proper charger setup is being used to suit local standards.

- a. Plug the black and red electrical connectors from the charger cord into the black and red electrical receptacles on the Lightweight Battery.
- b. Plug the battery charger into a standard household current wall receptacle.
- c. The Power/Float indicator light (green) on the back of the battery charger should go on when the charger is first plugged in and remain on while the battery is charging. The fast charge indicator (yellow) will be on during the first 95% of the battery charging. After which the light will turn green indicating the battery has gone into "float" mode. Leave the battery connected to the charger for at least three more hours to ensure a complete charge.
- d. Unplug the battery charger from the wall receptacle. Unplug the battery charger's black and red electrical connectors from the battery's receptacles.
- e. Replace the Lightweight Battery in the cutting kit..



CHARGING THE PC/BISLW.

3-7-2. Charging the 12-Volt/24-Volt Vehicle Battery.

⚠ WARNING

Always disconnect torch and striker plate power cables prior to charging the battery.

Working in vicinity of a lead-acid battery is dangerous. Batteries generate explosive gases during normal battery operation and there is a risk of these gases exploding. Never smoke or allow a spark or flame in the immediate vicinity of the battery to reduce the risk of battery explosion.

- a. Read and carefully follow the manufacturer's instructions for charging the vehicle battery(ies) being used.

3-8. TRANSFILLING OXYGEN CYLINDERS.

- a. **General.** Only personnel with the proper training and knowledge of safe oxygen handling should attempt to fill a high pressure oxygen cylinder. Do not attempt to fill or transfill an oxygen cylinder unless trained in cylinder handling, cylinder filling and oxygen safety procedures.

⚠ WARNING

Never let sparks or molten material come into contact with the oxygen cylinder.

Always keep oil and grease away from the torch, oxygen cylinders, valves, regulators, hoses, and fittings. Oxygen reacts explosively when mixed with oil or grease.

Never clean any internal part of the oxygen system. Never use compressed air, oil, solvents, or any other material to clean the oxygen system. The oxygen system could become contaminated and cause internal burning in the torch or hose. All service on oxygen delivery parts must be performed by a qualified and knowledgeable technician.

Always ensure the cylinder to be used is marked with a sticker showing a valid inspection certification. High pressure gas cylinders are required to comply with current inspection and testing requirements. Cylinders must undergo internal visual inspection annually and pass hydrostatic testing every three years (composite) or five years (all metal).

Never use a cylinder that appears damaged. Always have a licensed test facility inspect questionable cylinders.

Always open the oxygen cylinder valve slowly. Do not allow rapid pressurization of regulators, hoses or cylinders. Failure may occur, injuring the operator or bystanders.

Always check the manufacturer's working pressure of the cylinder to be filled, and the stamped safety device on the cylinder valve to ensure the cylinder will not be overfilled.



PC/TFHBL TRANSFILL HOSE ASSEMBLY WITH BLEED VALVE AND GAUGE

NOTE

b. Transfill procedures:

- 1) Ensure that the transfill hose, adapters, cylinder valves, tools and any other items to be used are clean and free from oil, grease or other contaminants.
- 2) Lay both cylinders on the ground (so they can't fall) and position them so as to allow the transfill hose to reach between them without putting a strain on the hose or any connections. If one cylinder must be upright (e.g. filling from a six-pack) support the other cylinder in such a manner that it can not fall and does not strain the transfill hose or any connections.
- 3) Purge both oxygen cylinder valves to remove debris by quickly opening then closing the oxygen cylinder valves.
- 4) Check to ensure the transfill hose inlet stem seats (either Teflon tip or o-ring style) are present and in good condition.
- 5) Connect the transfill hose to the source cylinder by threading one end of the hose on to the oxygen valve outlet fitting. Note that the transfill hose inlet is fitted with a hand-tight nut and Teflon tipped inlet nipple. A complete seal can be achieved by hand tightening.
- 6) Purge the transfill hose assembly to remove debris by quickly opening then closing the oxygen cylinder valve.
- 7) Attach the cylinder to be filled (target cylinder) to the other side of the transfill hose.

- 8) Ensure the transfill hose assembly bleed valve is closed by turning the knob clockwise until it stops.
- 9) Slowly open the valve on the target cylinder by turning the valve handle counter-clockwise, allowing the transfill hose to pressurize. Listen for oxygen leaks. Pause for 10 seconds then continue slowly opening the valve all the way until it stops.
- 10) Slowly open the valve on the source cylinder by turning the valve handle counter-clockwise until oxygen can be heard (and felt) to be leaving the cylinder. Immediately stop turning the cylinder valve handle.
- 11) Walk away for a few minutes to allow transference to take place.
- 12) When the sound of oxygen leaving the source cylinder can no longer be heard (or felt), slowly open the cylinder valve a little more until oxygen is heard to move again.
- 13) Walk away for a few minutes to allow transference to take place.
- 14) Repeat steps "10)" and "11)" as necessary until the oxygen pressure has equalized between the cylinders (when opening the valve further will not result in gas transferring).
- 15) Close the valve on the target cylinder by turning the handle clockwise until it stops.
- 16) Close the valve on the source cylinder by turning it clockwise until it stops.
- 17) Open the transfill hose assembly bleed valve by turning the knob counter-clockwise to relieve pressure from the hose.
- 18) Loosen the connection between the transfill hose and the target cylinder,. Remove the transfill hose from the target cylinder.
- 19) Remove the transfill hose from the source cylinder.
- 20) Check the pressure in each cylinder using the gauge attached to the regulator. Mark cylinder "E" (empty), "1/4", "1/2", or "3/4" with chalk, a sticker or a tag before storing cylinder.

3-9. OXYGEN REGULATOR ADJUSTMENT PROCEDURE

- a. **General.** Only personnel with the proper training and knowledge of safe oxygen handling should attempt to adjust the oxygen regulator. Do not attempt to work with an oxygen cylinder unless trained in cylinder handling and oxygen safety procedures.

WARNING

Set regulator output pressure using oxygen only. Never put compressed air or any other gas through any part of an oxygen system.

NOTE

Regulator output pressure adjustment requires the use of the optional accessory Regulator Adjusting Kit (part no. PC/RAK) which includes the regulator adjusting gauge assembly and wrenches.

Regulator output pressure has a direct correspondence to the pressure exerted on the regulator diaphragm (or piston) spring. Increasing tension on the spring (tightening the adjusting screw) will increase output pressure. Reducing tension on the spring (loosening the adjusting spring) will reduce output pressure.

- b. **Regulator adjustment procedures:**
 - 1) Attach the regulator to the oxygen cylinder.

- 2) Attach the regulator adjusting gauge assembly to the regulator outlet.
- 3) Attach the 5' long oxygen hose to the torch and to the regulator adjusting gauge assembly by pressing the quick connect plugs into the respective quick connect couplers.
- 4) Insert a 3/8" diameter cutting rod into the end of the torch, tighten collet nut to hold in place.
- 5) Slowly open the oxygen cylinder valve. Once pressure has equalized continue opening valve all the way.
- 6) While depressing the oxygen lever adjust the regulator output pressure by:
 - a) Submersible type regulator-
 - i) Use a medium to large blade standard screwdriver to turn the over-size adjusting screw at the back of the regulator body. Turn it clockwise to increase pressure and counter-clockwise to reduce pressure.
 - ii) Set the output pressure (read from the regulator adjusting gauge) to 60-65 psig.
 - iii) Release the oxygen lever to stop the flow of oxygen.
 - b) Industrial type regulator-
 - i) Use a 9/16" combination wrench to loosen the acorn nut at the back of the regulator body.
 - ii) Use hex head wrench to turn the socket head adjusting screw at the back of the regulator body. Turn it clockwise to increase pressure and counter-clockwise to reduce pressure.
 - iii) Set the output pressure (read from the regulator adjusting gauge) to 60-65 psig.
 - iv) Release the oxygen lever to stop the flow of oxygen.
 - v) Tighten the acorn nut to lock the adjusting screw in place.
- 7) Close the oxygen cylinder valve.
- 8) Depress the oxygen lever to bleed excess pressure from the system.
- 9) Remove the cutting rod from the torch, the torch from the hose, the hose from the regulator adjusting gauge assembly, the regulator adjusting assembly from the regulator and the regulator from the oxygen cylinder.
- 10) Replace system components into torch system case.

CHAPTER 4

SCHEDULED MAINTENANCE

Section I. INTRODUCTION

4-1. PREVENTIVE MAINTENANCE. Preventive maintenance is the responsibility of the equipment operator.

Preventive maintenance should be conducted in accordance with this Manual and consist of inspecting, servicing, and cleaning. Inspections will also reveal the need for repairs. Periodic Limited Technical Inspections (LTI) will be required to ensure the torch kit is safe and serviceable. Regulator repairs should only be performed by qualified technicians. Oxygen cylinder inspection and testing must only be conducted by certified technicians.

WARNING

Prior to conducting any maintenance, ensure proper shut down procedures are followed. Ensure oxygen cylinder is shut off and all oxygen hoses are disconnected.

Always disconnect the torch and striker plate power cables from the battery when the torch is not in use.

Always use a clean, dry, oil-free cloth to wipe any part of the torch kit. Mild soap and water may be used to wash components.

Never use compressed air to purge any part of the oxygen system as oil contamination may result. Always use oxygen.

CAUTION

Always replace any worn or damaged parts with authorized replacement parts.

Always use Viton o-rings only.

- a. After each use, wipe the torch assembly, striker plate assembly, battery, oxygen cylinder, and regulator with a clean, dry, oil-free cloth.
- b. Remove the collet nut, collet, collet washer, flash arrestor, and flash arrestor screen. Inspect for damage and wear. Clean, replace as necessary, and reassemble.
- c. Before and after each use, conduct a close inspection of the cables and hoses. Check for cuts, burns, or any other sign of damage or wear. After every use, wipe down all cables and hoses with a clean, oil-free cloth.
- d. If the torch assembly has been used and/or transported underwater, dip the torch in fresh water while depressing the valve lever to clean the exterior and flush the interior.
- e. If any rods have been taken into salt water, rinse with fresh water and let dry before returning to storage.
- f. If any rod igniters have been in salt water, rinse them with fresh water and dry before returning to storage.
- g. Any torch, rod or igniter which has become wet must be completely dry before being placed into long term storage. Flush the interior with oxygen, argon, or nitrogen gas to displace residual moisture.

- h. Preventive maintenance for the striker plate will include the following:

⚠ WARNING

Disconnect the striker plate power cable from the battery prior to cleaning the striker plate surface. Failure to do so could result in electric shock.

- 1) Repeated ignition will cause a build-up of slag deposits on the surface of the striker plate. This build-up is easily removed by scraping the striker plate across a rough surface or hard edge.
 - 2) After each use, wipe the striker plate cable assembly with a clean, dry, oil-free cloth. Inspect for damaged parts and replace or repair as necessary.
- i. Recharge the battery as needed.
- j. Oxygen cylinder maintenance:
- 1) Inspect and clean the oxygen cylinder. Look for damage to cylinder windings. Damaged windings can weaken the cylinder. Should damage be visible, take the cylinder to a certified technician for testing.
 - 2) Attach the regulator and check the cylinder pressure. If pressure is below minimum required for anticipated use, have the oxygen cylinder filled before returning it to the kit.
 - 3) Interior of cylinder must be visually inspected by qualified technician annually.
 - 4) Cylinder must be hydrostatically tested and recertified by an approved test facility every three years (composite) or five years (all metal). Check most recent test sticker or stamp or manufacturer's label for date of last test.

CHAPTER 4-SCHEDULED MAINTENANCE (cont.)

Section II. SCHEDULED MAINTENANCE

4-2. PREVENTIVE MAINTENANCE PROCEDURES. As soon as possible after each use, the torch kit should be cleaned and inspected as described in paragraph 4-1 of this Manual. In addition, preventive maintenance checks should be performed every 120 days (quarterly) to keep the kit ready for use. Table 4-1 outlines the procedures for the quarterly PMCS.

Table 4-1. Quarterly Preventive Maintenance Checks and Services

ITEM INSPECTED	PROCEDURE / ACTIONS
Oxygen Cylinder:	Wipe down with a clean, dry, oil-free cloth.
Cylinder	Check for any type of damage, i.e. burns, cracks, or (composite cylinders only) chips in the fiber wrap.
Oxygen Valve	Check for leaks. Ensure handle turns freely.
Teflon O-Ring (cylinder neck/valve interface)	When valve is removed, before reinstalling, always ensure a new Teflon o-ring is in place and is not damaged. Do not reuse cylinder valve o-rings.
Regulator:	Wipe all surfaces with oil-free cloth. Brush can be used on metal surfaces.
Regulator - Body / Fittings	Check for nicks, dents or other damage.
Soft Tip Nipple, O-Ring	Check for nicks, gouges, excessive wear, or other damage that may cause leaks.
Valve Nut	Ensure proper functioning. Hand tight only. Inspect for cracks, damaged threads, etc.
Female Quick Disconnect	Check for dents or other damage. Inspect for obstructions. Ensure hose will seat and lock in place.
High Pressure Gauge	Check gauge for visible damage. Pressurize and check movement.
Hose Assemblies, Oxygen:	Wipe all hose surfaces with an oil-free cloth. An oil-free brush can be used on metal surfaces/fittings.
Low Pressure Hose	Check for burns, cuts, abrasions, excess wear, other damage.
Hose Fittings / Connectors	Inspect for dents, bends, or other damage. Ensure proper seating/locking in regulator/torch.
Torch Assembly:	Wipe all surfaces with a clean, oil-free cloth. An oil-free brush can be used on metal surfaces.
Torch Body	Check for dents or other damage. Inspect serviceability of the threading.
Collet Nut	Check for dents or other damage. Inspect the serviceability of the threading.

Collet (3/16", 1/2", 3/8" and 1/4")	Ensure proper functioning. Test with rod to ensure proper fit. Inspect for cracks, bends, other damage. Replace as necessary.
Collet Washer	Inspect for cuts, excessive wear, or any other damage. Replace as required. Ensure correct size washer is being used to fit collet.
Flash Arrestor	Unscrew the flash arrestor from the torch body. Check for damage, wear, and/or clogging. Clean and/or replace as needed.
Flash Arrestor Screen	Remove from inside the flash arrestor by sliding it out the back. Inspect for damage, wear, corrosion, and/or clogging. If dirty, clean with warm soapy water, rinse with clean fresh water, and air dry. If damaged or corroded, replace with a new screen.
Oxygen Control Valve and Lever	Inspect the lever and valve stem for wear, damage, and leaks. Inspect the mating surface of the valve nut and valve body recess for damage or wear. Replace valve stem o-ring or neoprene seat if leaking or worn. Use caution when replacing valve nut so as not to damage threads. Do not over torque. Damage to valve nut o-ring may result.
Plug Valve	Check for proper functioning. Inspect for any type of damage. Replace o-rings or plug insert as necessary.
Male Quick Connect	Inspect for dents, bends, or other damage. Check for correct seating and locking with the oxygen hose assemblies.
Cable, Power w/ Connector:	Wipe all surfaces with an oil-free cloth. An oil-free brush can be used on metal surfaces.
CAMLOK, Black	Check for broken insulator, nicks, dents, bends, excessive wear, or other damage. Ensure proper seating and locking with the receptacles on the torch, battery and battery adapter clamp.
Striker Plate Assembly:	Wipe all surfaces with an oil-free cloth. An oil-free brush can be used on metal surfaces/fittings. Replace damaged/unserviceable items as necessary.
Striker Plate Handle	Check for burns, cracks, wear, or other damage.
Copper Plate	Inspect for signs of damage. Remove any slag build-up.
Wooden Insulator	Check for cracks, breaks, or other damage.
Wire Terminal Lug	Ensure proper connection. Inspect for any damage.
Cable	Check for burns, abrasions, excess wear, or other damage.
CAMLOK, Red	Check for broken insulator, nicks, dents, bends, excessive wear, or other damage. Ensure proper seating and locking with the receptacles on the battery and battery adapter clamp.
Lightweight Battery:	Clean with oil-free cloth and brushes. Inspect for cracks in the case, burns in the pouch and other damage. Ensure all connectors function properly. Check the charge, recharge as needed.
Battery Charger	Inspect for wear / damage.
Back Harness Assembly:	Clean with oil-free cloth/rags and oil-free brushes. If extremely dirty, clean with warm soapy water, rinse with clean fresh water, and air dry. Confirm the serviceability of the straps, buckles, and fasteners.

Backpack Harness	Ensure proper functioning of adjusters and snaps. Inspect for wear and/or other damage.
Tank Strap / Keeper Strap	Inspect for cuts, excessive wear, or any other damage. Ensure the serviceability of the buckle / tensioner.
Rod Extender, 16"	Ensure proper functioning. Inspect for bends, wear, and/or other damage. Check the serviceability of the collet, collet nut, and threading.
Case	Inspect for dents, cracks, holes, or other damage. Make sure all securing hasps/hardware functions properly.
Rod Quivers	Ensure functionality of all snaps, buckles, fasteners, and clips. Inspect the stitching, as well as for holes and other damage.
Leather Striker Holder	Check for wear and damage. Ensure the item is serviceable.
Leather Shield	Check for burns, holes, damage, and/or wear. Ensure the shield functions properly on torch. Replace as required.
Leather Gloves	Check for burns, tears, holes, and any other damage. Examine the stitching and inspect the overall serviceability.
Safety Glasses, #5 Lens	Inspect for cracks, scratches, or other damage. Check for overall serviceability.

CHAPTER 5

TROUBLESHOOTING

 **NOTE**

This guide is intended to assist in determining the probable causes of torch malfunctions and their associated repairs. For each potential problem identified a probable cause and recommended repair procedure is listed.

Section I. OXYGEN SYSTEM MALFUNCTIONS

5-1. OXYGEN LEAKS.

Table 5-1. Troubleshooting Oxygen Leaks

TYPE OF PROBLEM / MALFUNCTION	PROBABLE CAUSE	RECOMMENDED REPAIR PROCEDURES
1. OXYGEN LEAKS AT THE COLLET NUT.	<ul style="list-style-type: none"> a. The cutting rod not seated against the neoprene washer. <li style="text-align: center;">OR b. The collet washer may be dirty, worn, damaged, or missing. 	<p>Loosen the collet nut 1/2 turn CCW. Firmly seat the rod and tighten the collet nut. If the leak persists, remove the collet nut, collet, and collet washer. Clean or replace the collet washer. If the collet washer is worn and a new one is not available, and only as a temporary/expedient remedy, turn the washer over and replace with the unworn face exposed.</p>
2. OXYGEN LEAKS AT THE CONTROL VALVE NUT.	<ul style="list-style-type: none"> a. The control valve nut is loose. b. The valve nut o-ring gasket is pinched or damaged. c. The control valve nut or valve body threads are damaged. 	<ul style="list-style-type: none"> a. Partially unscrew the control valve nut, then re-tighten as described in the control valve re-assembly procedures. b. Remove the valve nut. Remove the o-ring gasket from the valve nut, inspect and replace if necessary. c. Remove the control valve nut and inspect the threads. Inspect the control valve body threads. Replace parts as necessary.
3. THE OXYGEN VALVE DOES NOT SHUT OFF ALL THE WAY.	<ul style="list-style-type: none"> a. The rubber gasket is dirty or worn. b. The valve stem o-ring is dirty or worn. c. The valve stem washer is dirty or worn. d. The valve stem is worn. e. The valve stem washer 	<ul style="list-style-type: none"> a. Remove and clean or replace as needed. b. Follow control valve disassembly procedures to remove the valve stem. Clean or replace the o-ring as needed. c. Follow control valve disassembly procedures to remove the valve stem washer. Clean or replace as needed. d. Replace the valve stem and install a new o-ring.

	mating surface of the valve nut is dirty, worn or damaged.	e. Remove the valve nut. Inspect and clean or replace as needed.
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5-2. UNEVEN OXYGEN FLOW.

Table 5-2. Troubleshooting Uneven Oxygen Flow

TYPE OF PROBLEM / MALFUNCTION	PROBABLE CAUSE	RECOMMENDED REPAIR PROCEDURES
1. UNEVEN OXYGEN FLOW	<ul style="list-style-type: none"> a. The flash arrestor is dirty or worn. b. The flash arrestor screen is dirty or worn. c. The torch is dirty. 	<ul style="list-style-type: none"> a. Follow the flash arrestor inspection / replacement procedures to remove the flash arrestor. Clean or replace as needed. b. Remove the flash arrestor screen as described in the repair procedure. Clean or replace with a new screen as needed. c. Remove the flash arrestor and flash arrestor screen as described in the inspection / replacement procedure. With the torch connected to an oxygen source, depress and release the oxygen control valve lever three or four times to clear the oxygen path. Reinstall the flash arrestor and flash arrestor screen.

Section II. VALVE STEM MALFUNCTIONS

5-3. STICKING CONTROL VALVE.

Table 5-3. Troubleshooting Valve Stem Malfunctions

TYPE OF PROBLEM / MALFUNCTION	PROBABLE CAUSE	RECOMMENDED REPAIR PROCEDURES
1. THE VALVE STEM WILL NOT MOVE FREELY WHILE DEPRESSING AND RELEASING THE OXYGEN CONTROL LEVER	<p>a. The valve stem is bent.</p> <p>b. The valve stem spring is worn.</p> <p>c. The valve stem o-ring is worn.</p>	<p>a. Follow the oxygen control valve disassembly / reassembly procedures to remove and replace the valve stem.</p> <p style="text-align: center;">NOTE</p> <p>Always replace the valve stem O-Ring when the valve stem is replaced.</p> <p>b. Follow the oxygen control valve disassembly / reassembly procedures to remove and replace the valve stem spring.</p> <p>c. Follow the oxygen control valve disassembly / reassembly procedures to remove and replace the valve stem o-ring.</p>

Section III. CUTTING ROD MALFUNCTIONS

5-4. COLLET PROBLEMS.

Table 5-4. Troubleshooting Collet / Cutting Rod Malfunctions

TYPE OF PROBLEM / MALFUNCTION	PROBABLE CAUSE	RECOMMENDED REPAIR PROCEDURES
1. THE CUTTING ROD WILL NOT FIT INTO THE COLLET IN THE TORCH	<p>a. The wrong size collet is in the torch.</p> <p>b. The collet in the torch is damaged.</p>	<p>a. Inspect the collet in the torch to determine if it is the correct size for the cutting rod to be used. If incorrect, remove the collet and replace with the correct collet.</p> <p>b. Remove the collet from the torch and inspect for burrs or slag buildup. If found, remove, clean and reinstall the collet.</p> <p style="text-align: center;">OR</p> <p>c. Remove the collet from the torch. Use a standard slotted screwdriver to apply pressure in the collet slots to open up the collet. Replace the collet in the torch.</p>

CHAPTER 6

CORRECTIVE MAINTENANCE

Section I. INTRODUCTION

6-1. GENERAL. This chapter contains inspection, disassembly, and reassembly procedures required for corrective maintenance on the Broco Prime-Cut Tactical torch kits.

Section II. ADJUSTMENTS, ALIGNMENTS, AND REPAIRS

If you have any questions about the maintenance or repair of Broco Prime Cut torch systems CONTACT BROCO, INC. AT (800) 845-7259, (909) 483 3222, BY FAX (909) 483 3233, OR BY EMAIL Sales@Brocoinc.com BEFORE PROCEEDING.

⚠ WARNING

Regulator repairs shall be conducted only by qualified personnel trained and authorized to perform work on high pressure oxygen regulators.

Inspections and repairs of oxygen cylinders and oxygen cylinder valves shall only be conducted by qualified personnel trained and authorized to perform work on high pressure oxygen cylinders and oxygen cylinder valves.

The oxygen cylinders included with these kits must be inspected regularly and hydrostatic tested every five years.

Always use a clean, dry, oil-free cloth to wipe any part of the torch kit. Mild soap and water may be used to wash components.

Never use compressed air to purge any part of the oxygen system as oil contamination may result. Always use oxygen.

⚠ CAUTION

Always replace any worn or damaged parts with authorized replacement parts.

Always use Viton o-rings only.

6-2. FLASH ARRESTOR AND SCREEN.

⚠ WARNING

Do not operate the torch without a flash arrestor or screen. The flash arrestor and flash arrestor screen perform an important safety function by suppressing flashbacks that could otherwise cause serious injury to the operator or damage the equipment.

⚠ CAUTION

Always remove, clean, and/or replace the flash arrestor and flash arrestor screen after the torch has been submerged in water.

The flash arrestor and flash arrestor screen must be removed and inspected before and after each use to insure an unrestricted oxygen path.

a. Disassembly.

- 1) With the hands, unscrew the collet nut and remove the collet from the torch assembly .
- 2) Using a small tip screwdriver, lift and remove the collet washer from the torch assembly.
- 3) Using a flat tip screwdriver, engage the slot in the flash arrestor and turn counterclockwise. Remove the flash arrestor.
- 4) Pull out the flash arrestor screen from inside the back of the flash arrestor.

b. Inspection.

- 1) Inspect the collet nut, collet, torch assembly, and collet washer for damage and/or wear. Repair or replace as required.
- 2) Inspect the flash arrestor for damage, wear, and clogging of the ports. Clean (or replace) as required.
- 3) Inspect the flash arrestor screen for damage, wear, corrosion, and/or clogging. If dirty, clean the screen with warm soapy water, rinse with fresh water, and dry. If damaged or corroded, replace with a new screen.

c. Reassembly.

- 1) Place the flash arrestor screen inside the flash arrestor.
- 2) Place the flash arrestor into the torch assembly. Using a flat tip screwdriver to engage the slot in the flash arrestor, turn clockwise. Do not over tighten.
- 3) Place the collet washer into the torch assembly.
- 4) Place the appropriately sized collet into the torch assembly and screw the collet nut on to the torch hand-tight.



COLLET, WASHER, FLASH ARRESTOR & SCREEN