OM-201 872D 2007−03

Processes

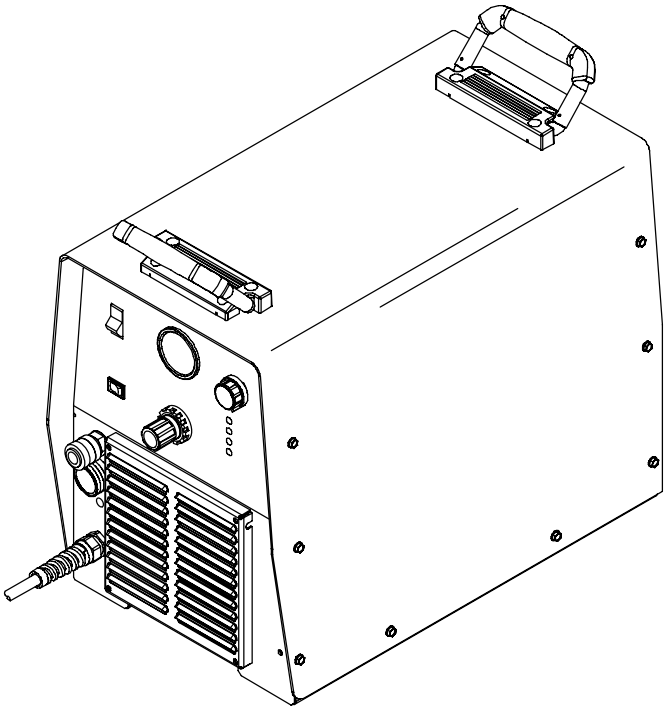
Air Plasma Cutting and Gouging

Description

3 Phase DC

Air Plasma Cutter

Spectrum® 1251 And ICE-100T/TM Torch



OWNER'S MANUAL

File: Plasma Cutters

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Thank you and *congratulations* on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.

That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite. We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide the exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

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Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001:2000 Quality System Standard.

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SECTION 1 − SAFETY PRECAUTIONS - READ BEFORE USING

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▲ **Warning: Protect yourself and others from injury — read and follow these precautions.**

1-1. Symbol Usage

Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ **Marks a special safety message.**

☞ *Means "Note"; not safety related.*

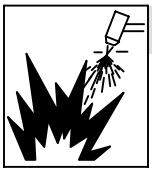
This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Plasma Arc Cutting Hazards

▲ **The symbols shown below 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 1-5. Read and follow all Safety Standards.**

▲ **Only qualified persons should install, operate, maintain, and repair this unit.**

▲ **During operation, keep everybody, especially children, away.**



CUTTING can cause fire or explosion.

Hot metal and sparks blow out from the cutting arc. The flying sparks and hot metal, hot workpiece, and hot equipment can cause fires and burns. Check and be sure the area is safe before doing any cutting.

- Remove all flammables within 35 ft (10.7 m) of the cutting arc. If this is not possible, tightly cover them with approved covers.
- Do not cut where flying sparks can strike flammable material.
- Protect yourself and others from flying sparks and hot metal.
- Be alert that sparks and hot materials from cutting can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that cutting on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not cut on closed containers such as tanks or drums.
- Connect work cable to the work as close to the cutting area as practical to prevent cutting current from traveling long, possibly unknown paths and causing electric shock, sparks, and fire hazards.
- Do not use plasma cutter to thaw frozen pipes.
- Never cut containers with potentially flammable materials inside − they must be emptied and properly cleaned first.
- Do not cut in atmospheres containing explosive dust or vapors.
- Do not cut pressurized cylinders, pipes, or vessels.
- Do not cut containers that have held combustibles.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Do not locate unit on or over combustible surfaces.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any cutting.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.

ELECTRIC SHOCK can kill.

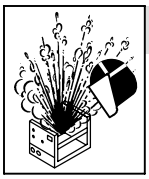
Touching live electrical parts can cause fatal shocks or severe burns. The torch and work circuit are electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. Plasma arc cutting requires higher voltages than welding to start and maintain the arc (200 to 400 volts dc are common), but also uses torches designed with safety interlock systems which turn off the machine when the shield cup is loosened or if tip touches electrode inside the nozzle. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not touch torch parts if in contact with the work or ground.
- Turn off power before checking, cleaning, or changing torch parts.
- Disconnect input power before installing or servicing this equipment. Lockout/tagout input power according to OSHA CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
- Check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet − always verify the supply ground.
- When making input connections, attach proper grounding conductor first.
- Frequently inspect input power cord for damage or bare wiring − replace cord immediately if damaged − bare wiring can kill.
- Turn off all equipment when not in use.
- Inspect and replace any worn or damaged torch cable leads.
- Do not wrap torch cable around your body.
- Ground the workpiece to a good electrical (earth) ground if required by codes.
- Use only well-maintained equipment. Repair or replace damaged parts at once.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Do not bypass or try to defeat the safety interlock systems.
- Use only torch(es) specified in Owner's Manual.
- Keep away from torch tip and pilot arc when trigger is pressed.
- Clamp work cable with good metal-to-metal contact to workpiece (not piece that will fall away) or worktable as near the cut as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.

ELECTRIC SHOCK can kill.

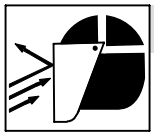
SIGNIFICANT DC VOLTAGE exists in inverter power sources AFTER the removal of input power.

- Turn Off unit, disconnect input power, check voltage on input capacitors, and be sure it is near zero (0) volts before touching any parts. Check capacitors according to instructions in Maintenance Section of Owner's Manual or Technical Manual before touching any parts.



EXPLODING PARTS can injure.

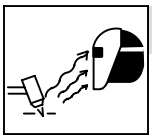
- On inverter power sources, failed parts can explode or cause other parts to explode when power is applied. Always wear a face shield and long sleeves when servicing inverters.



FLYING SPARKS can cause injury.

Sparks and hot metal blow out from the cutting arc. Chipping and grinding cause flying metal.

- Wear approved face shield or safety goggles with side shields.
- Wear proper body protection to protect skin.
- Wear flame-resistant ear plugs or ear muffs to prevent sparks from entering ears.



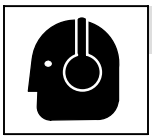
ARC RAYS can burn eyes and skin.

Arc rays from the cutting process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin.

- Wear face protection (helmet or shield) with a proper shade of filter lenses to protect your face and eyes when cutting or watching. ANSI Z49.1 (see Safety Standards) suggests a No. 9 shade (with No. 8 as minimum) for all cutting currents less than 300 amperes. Z49.1 adds that lighter filter shades may be used when the arc is hidden by the workpiece. As this is normally the case with low current cutting, the shades suggested in Table 1 are provided for the operator's convenience.
- Wear approved safety glasses with side shields under your helmet or shield.
- Use protective screens or barriers to protect others from flash, glare and sparks; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (leather, heavy cotton, or wool) and foot protection.

Table 1. Eye Protection For Plasma Arc Cutting

Current Level In Amperes			Minimum Shade Number
Below 20			#4
20 − 40			#5
40 − 60			#6
60 − 80			#8



NOISE can damage hearing.

Prolonged noise from some cutting applications can damage hearing if levels exceed limits specified by OSHA (see Safety Standards).

- Use approved ear plugs or ear muffs if noise level is high.
- Warn others nearby about noise hazard.

FUMES AND GASES can be hazardous.

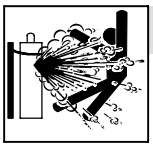
Cutting produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use local forced ventilation at the arc to remove cutting fumes and gases.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Material Safety Data Sheets (MSDSs) and the manufacturer's instruction for metals to be cut, coatings, and cleaners.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Fumes from cutting and oxygen depletion can alter air quality causing injury or death. Be sure the breathing air is safe.
- Do not cut in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not cut on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the cutting 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 when cut.
- Do not cut containers with toxic or reactive materials inside or containers that have held toxic or reactive materials − they must be emptied and properly cleaned first.

PLASMA ARC can cause injury.

The heat from the plasma arc can cause serious burns. The force of the arc adds greatly to the burn hazard. The intensely hot and powerful arc can quickly cut through gloves and tissue.

- Keep away from the torch tip.
- Do not grip material near the cutting path.
- The pilot arc can cause burns − keep away from torch tip when trigger is pressed.
- Wear proper flame-retardant clothing covering all exposed body areas.
- Point torch away from your body and toward work when pressing the torch trigger − pilot arc comes on immediately.
- Turn off power source and disconnect input power before disassembling torch or changing torch parts.
- Use only torch(es) specified in the Owner's Manual.



CYLINDERS can explode if damaged.

Gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of metalworking processes, be sure to treat them carefully.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flame, sparks, and arcs.
- Install and secure cylinders in an upright position by chaining them to a stationary support or equipment cylinder rack to prevent falling or tipping.
- Keep cylinders away from any cutting or other electrical circuits.
- Never allow electrical contact between a plasma arc torch and a cylinder.
- Never cut on a pressurized cylinder − explosion will result.
- Use only correct gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Use the right equipment, correct procedures, and sufficient number of persons to lift and move cylinders.
- Read and follow instructions on compressed gas cylinders, associated equipment, and Compressed Gas Association (CGA) publication P-1 listed in Safety Standards.

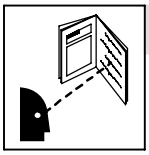
1-3. Additional Symbols For Installation, Operation, And Maintenance

HOT PARTS can cause severe burns.

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

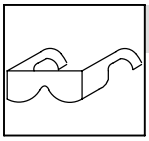
MOVING PARTS can cause injury.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Have only qualified persons remove doors, panels, covers, or guards for maintenance as necessary.
- Reinstall doors, panels, covers, or guards when maintenance is finished and before reconnecting input power.



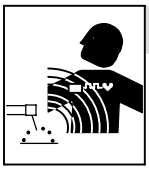
READ INSTRUCTIONS.

- Read Owner's Manual before using or servicing unit.
- Use only genuine Miller/Hobart replacement parts.



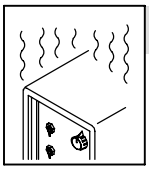
FLYING METAL can injure eyes.

- Wear safety glasses with side shields or face shield.



MAGNETIC FIELDS can affect pacemakers.

- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near plasma arc cutting operations.

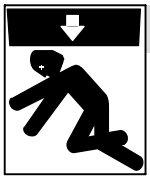


OVERUSE can cause OVERHEATING.

- Allow cooling period; follow rated duty cycle.
- Reduce amperage (thickness) or reduce duty cycle before starting to cut again.

EXPLODING HYDROGEN hazard.

- When cutting aluminum underwater or with the water touching the underside of the aluminum, free hydrogen gas may collect under the workpiece.
- See your cutting engineer and water table instructions for help.

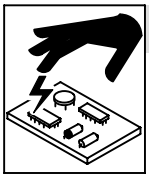


FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.

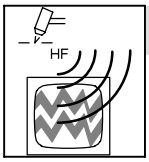
FIRE OR EXPLOSION hazard.

- Do not locate unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not overload building wiring − be sure power supply system is properly sized, rated, and protected to handle this unit.



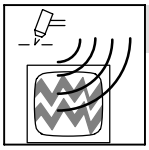
STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.



H.F. RADIATION can cause interference.

- High frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.



ARC CUTTING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- To reduce possible interference, keep cables as short as possible, close together, and down low, such as on the floor.
- Locate cutting operation 100 meters from any sensitive electronic equipment.
- Be sure this cutting power source is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the machine, using shielded cables, using line filters, or shielding the work area.

1-4. California Proposition 65 Warnings

▲ **Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)**

▲ **Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.**

For Gasoline Engines:

▲ **Engine exhaust contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.**

For Diesel Engines:

▲ **Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.**

1-5. Principal Safety Standards

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Recommended Practices for Plasma Arc Cutting, American Welding Society Standard AWS C5.2, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting And Welding Processes, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, from National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269−9101 (phone: 617−770−3000,website: www.nfpa.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), 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 (there are 10 Regional Offices−−phone for Region 5, Chicago, is 312−353−2220,website: www.osha.gov).

1-6. EMF Information

Considerations About Welding Or Cutting And The Effects Of Low Frequency Electric And Magnetic Fields

Welding or cutting current, as it flows through the welding or cutting cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: “The body of evidence, in the committee’s judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard.” However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep cutting power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the cut as possible.

About Pacemakers:

Pacemaker wearers consult your doctor before welding/cutting or going near welding/cutting operations. If cleared by your doctor, then following the above procedures is recommended.

SECTION 2 − CONSIGNES DE SÉCURITÉ − LIRE AVANT UTILISATION

▲ **Avertissement : se protéger et protéger les autres contre le risque de blessure — lire et respecter ces consignes.**

2-1. Signification des symboles

Signifie Mise en garde ! Soyez vigilant ! Cette procédure présente des risques de danger ! Ceux-ci sont identifiés par des symboles adjacents aux directives.

▲ **Identifie un message de sécurité particulier.**

☞ *Signifie NOTA ; n'est pas relatif à la sécurité.*

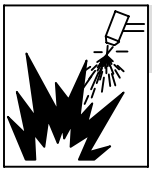
Ce groupe de symboles signifie Mise en garde ! Soyez vigilant ! Il y a des risques de danger reliés aux CHOCS ÉLECTRIQUES, aux PIÈCES EN MOUVEMENT et aux PIÈCES CHAUDES. Reportez-vous aux symboles et aux directives ci-dessous afin de connaître les mesures à prendre pour éviter tout danger.

2-2. Dangers liés au coupage à l'arc au plasma

▲ **Les symboles présentés ci-après sont utilisés tout au long du présent manuel pour attirer votre attention et identifier les risques de danger. Lorsque vous voyez un symbole, soyez vigilant et suivez les directives mentionnées afin d'éviter tout danger. Les consignes de sécurité présentées ci-après ne font que résumer l'information contenue dans les normes de sécurité énumérées à la section 2-4. Veuillez lire et respecter toutes ces normes de sécurité.**

▲ **L'installation, l'utilisation, l'entretien et les réparations ne doivent être confiés qu'à des personnes qualifiées.**

▲ **Au cours de l'utilisation, tenir toute personne à l'écart et plus particulièrement les enfants.**



LE COUPAGE présente un risque de feu ou d'explosion.

Des particules de métal chaud et des étincelles peuvent jaillir de la pièce au moment du coupage. Les étincelles et le métal chaud, la pièce à couper chauffée et l'équipement chaud peuvcnt causer un feu ou des brûlures. Avant de commencer à travailler, assurez-vous que l'endroit est sécuritaire.

- Déplacez toute matière inflammable se trouvant à l'intérieur d'un périmètre de 10,7 m (35 pi) de la pièce à couper. Si cela est impossible, vous devez les couvrir avec des housses approuvées et bien ajustées.
- Ne coupez pas dans un endroit où des étincelles pourraient atteindre des matières inflammables.
- Protégez−vous, ainsi que toute autre personne travaillant sur les lieux, contre les étincelles et le métal chaud.
- Assurez−vous qu'aucune étincelle ni particule de métal ne peut se glisser dans de petites fissures ou tomber dans d'autres pièces.
- Afin d'éliminer tout risque de feu, soyez vigilant et gardez toujours un extincteur à la portée de la main.
- Si vous coupez sur un plafond, un plancher ou une cloison, soyez conscient que cela peut entraîner un feu de l'autre côté.
- Ne coupez pas sur un contenant fermé tel qu'un réservoir ou un bidon.
- Fixez le câble de masse sur la pièce à couper, le plus près possible de la zone à couper afin de prévenir que le courant de coupage ne prenne une trajectoire inconnue ou longue et ne cause ainsi une décharge électrique, d'étincelles ou un feu.
- Ne pas utiliser le coupeur plasma pour dégeler des conduites gelées.
- Ne coupez jamais des contenants qui peuvent contenir des matières inflammables. Vous devez en premier lieu les vider et les nettoyer convenablement.
- Ne coupez pas dans un endroit où l'atmosphère risque de contenir de la poussière ou des vapeurs explosives.
- Ne coupez pas de bouteilles, de tuyaux ou de contenants pressurisés.
- Ne coupez pas de contenants qui ont déjà reçu des combustibles.
- Portez des vêtements de protection exempts d'huile tels que des gants en cuir, une veste résistante, des pantalons sans revers, des bottes et un casque.
- Ne placez pas le poste sur une surface combustible ou au−dessus de celle−ci.
- Avant le coupage, retirez tout combustible de vos poches, par exemple un briquet au butane ou des allumettes.
- Suivre les consignes de OSHA 1910.252 (a) (2) (iv) et de NFPA 51B pour travaux de soudage et prévoir un détecteur d'incendie et un extincteur à proximité.

UNE DÉCHARGE ÉLECTRIQUE peut entraîner la mort.

Le fait de toucher à une pièce électrique sous tension peut donner une décharge fatale ou entraîner des brûlures graves. Le chalumeau et le circuit de masse sont automatiquement actifs lorsque le poste est sous tension. L'alimentation d'entrée et les circuits internes de l'appareil le sont également. Le coupage au plasma d'arc exige des tensions plus élevées que le soudage pour amorcer et maintenir l'arc (souvent de 200 à 400 V CC), c'est pourquoi on fait appel à des chalumeaux conçus avec un système de verrouillage sécuritaire qui met l'appareil hors tension lorsque la capsule anti−feu est desserrée ou si le tube touche l'électrode à l'intérieur de la buse. Un poste incorrectement installé ou inadéquatement mis à la terre constitue un danger.

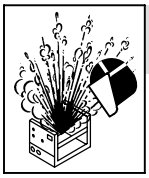
- Ne touchez pas aux pièces électriques sous tension.
- Portez des gants isolants et des vêtements de protection secs et sans trous.
- Isolez−vous de la pièce à couper et du sol en utilisant des housses ou des tapis assez grands afin d'éviter tout contact physique avec la pièce à couper ou le sol.
- Ne touchez pas aux pièces du chalumeau si vous êtes en contact avec la pièce à couper ou le sol.
- Mettez l'appareil hors tension avant d'effectuer la vérification, le nettoyage ou le changement d'une pièce du chalumeau.
- Coupez l'alimentation d'entrée avant d'installer l'appareil ou d'effectuer l'entretien. Verrouillez ou étiquetez la sortie d'alimentation selon la norme OSHA 29 CFR 1910.147 (reportez−vous aux Principales normes de sécurité).
- Installez le poste correctement et mettez-le à la terre convenablement selon les consignes du manuel de l'opérateur et les normes nationales, provinciales et locales.
- Assurez−vous que le fil de terre du cordon d'alimentation est correctement relié à la borne de terre dans la boîte de coupure ou que la fiche du cordon est branchée à une prise correctement mise à la terre − vous devez toujours vérifier la mise à la terre.
- Avant d'effectuer les connexions d'alimentation, vous devez relier le bon fil de terre.
- Vérifiez fréquemment le cordon d'alimentation afin de vous assurer qu'il n'est pas altéré ou à nu, remplacez−le immédiatement s'il l'est. Un fil à nu peut entraîner la mort.
- L'équipement doit être hors tension lorsqu'il n'est pas utilisé.
- Vérifiez et remplacez les cosses du câble du chalumeau si elles sont usées ou altérées.
- Le câble du chalumeau ne doit pas s'enrouler autour de votre corps.
- Si les normes le stipulent, la pièce à couper doit être mise à la terre.
- Utilisez uniquement de l'équipement en bonne condition. Réparez ou remplacez immédiatement toute pièce altérée.
- Portez un harnais de sécurité si vous devez travailler au−dessus du sol.
- Assurez−vous que tous les panneaux et couvercles sont correctement en place.
- N'essayez pas d'aller à l'encontre des systèmes de verrrouillage de sécurité ou de les contourner.
- Utilisez uniquement le ou les chalumeaux recommandés dans le manuel de l'opérateur.

- N’approchez pas le tube du chalumeau et l’arc pilote lorsque la gâchette est enfoncée.
- Le câble de masse doit être pincé correctement sur la pièce à couper, métal contre métal (et non de telle sorte qu’il puisse se détacher), ou sur la table de travail le plus près possible de la ligne de coupage.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.

DÉCHARGES ÉLECTRIQUES potentiellement mortelles.

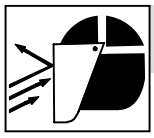
Il y a DES CHARGES DC SIGNIFICATIVES dans le poste de soudage inverseur même APRÈS coupure du courant d’alimentation.

- Mettre l’unité hors tension, mesurer la tension des condensateurs d’entrée et s’assurer qu’elle est pratiquement nulle avant de toucher à l’une quelconque des pièces. Mesurer cette tension conformément aux directives énoncées à la section Entretien du manuel de l’utilisateur ou du manuel technique avant de toucher à l’une quelconque des pièces.



Risque de blessure en cas D’EXPLOSION DES PIÈCES.

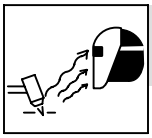
- Mise sous tension, toute pièce défectueuse des sources d’alimentation de l’inverseur peut exploser ou faire exploser d’autres pièces. Pour entretenir les inverseurs, toujours porter un masque protecteur et un vêtement à manches longues.



LES ÉTINCELLES VOLANTES risquent de provoquer des blessures.

Le coupage plasma produit des étincelles et projections de métal à très haute température. Lorsque la pièce refroidit, du laitier peut se former.

- Portez une visière ou des lunettes de sécurité avec des écrans latéraux approuvées.
- Portez des vêtements de protection adéquats afin de protéger votre peau.
- Ayez recours à des protège−tympans ou à un serre−tête ignifuges afin d’éviter que les étincelles n’entrent dans vos oreilles.



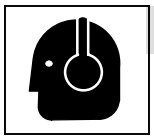
LES RAYONS D’ARC peuvent entraîner des brûlures aux yeux et à la peau.

Les rayons d’arc provenant du procédé de coupage produisent des rayons visibles et invisibles intenses (ultraviolets et infrarouges) qui peuvent entraîner des brûlures aux yeux et à la peau.

- Lorsque vous coupez ou regardez quelqu’un couper, portez un casque de soudage approuvé muni de verres filtrants approprié. La norme ANSI Z49.1 (reportez−vous aux Principales normes de sécurité) suggère d’utiliser un filtre de teinte n○ 9 (n○ 8 étant le minimum) pour tout travail de coupage faisant appel à un courant de moins de 300 A. On mentionne également dans la norme Z49.1 qu’un filtre plus faible peut être utilisé lorsque l’arc est caché par la pièce à couper. Comme cela est habituellement le cas pour les travaux de coupage à faible courant, les teintes énumérées au tableau 1 sont fournies à titre d’information pour l’opérateur.
- Porter des lunettes de sécurité à coques latérales sous votre casque ou écran facial.
- Ayez recours à des écrans protecteurs ou à des rideaux pour protéger les autres contre les rayonnements, les étincelles et les éblouissements; prévenez toute personne sur les lieux de ne pas regarder l’arc.
- Portez des vêtements confectionnés avec des matières résistantes et ignifuges (cuir, coton lourd ou laine) et des bottes de protection.

Tableau 1. Protection des yeux pour le coupage au plasma d’arc

Intensité de courant en ampères	Filtre de teinte (minimum)
Moins de 20	no. 4
20 − 40	no. 5
40 − 60	no. 6
60 − 80	no. 8



LE BRUIT peut endommager l’ouïe.

Certaines applications de coupage produisent un bruit constant, ce qui peut endommager l’ouïe si le niveau sonore dépasse les limites permises par l’OSHA (reportez−vous aux Principales normes de sécurité).

- Utilisez des protège−tympans ou un serre−tête antibruit si le niveau sonore est élevé.
- Prévenez toute personne sur les lieux du danger relié au bruit.

LES FUMÉES ET LES GAZ peuvent être dangereux.

Le coupage produit des vapeurs et des gaz. Respirer ces vapeurs et ces gaz peut être dangereux pour la santé.

- Ne mettez pas votre tête au−dessus des vapeurs. Ne respirez pas ces vapeurs.
- Si vous êtes à l’intérieur au moment du coupage, ventilez la pièce ou ayez recours à une ventilation aspirante installée près de l’arc pour évacuer les vapeurs et les gaz.
- Si la ventilation est médiocre, utilisez un respirateur anti−vapeurs approuvé.
- Lire et comprendre les spécifications de sécurité des matériaux (MSDS) et les instructions du fabricant concernant les métaux, les consommables, les revêtements, les nettoyants et les dégraisseurs.
- Travaillez dans un espace restreint uniquement s’il est bien ventilé ou si vous portez un respirateur anti−vapeurs. Les vapeurs causées par le coupage et l’épuisement de l’oxygène peuvent altérer la qualité de l’air et entraîner des blessures ou la mort. Assurez−vous que l’air ambiant est sain pour la santé.
- Ne coupez pas dans un endroit près d’opérations de décapage, de nettoyage ou de vaporisation. La chaleur et les rayons d’arc peuvent réagir avec les vapeurs et former des gaz hautement toxiques et irritants.
- Ne coupez pas des métaux enrobés tels que des métaux galvanisés, contenant du plomb ou de l’acier plaqué au cadmium, à moins que l’enrobage ne soit ôté de la surface du métal à couper, que l’endroit où vous travaillez ne soit bien ventilé, ou que vous ne portiez un respirateur anti−vapeurs. Les enrobages ou tous métaux qui contiennent ces éléments peuvent créer des vapeurs toxiques s’ils sont coupés.
- Ne coupez pas de contenants qui renferment ou ont renfermés des matières toxiques ou réactives − vous devez en premier lieu les vider et les nettoyer convenablement.

LE PLASMA D’ARC peut entraîner des blessures.

La chaleur dégagée par le plasma d’arc peut entraîner de sérieuses brûlures. La force de l’arc est un facteur qui s’ajoute au danger de brûlures. La chaleur intense et la puissance de l’arc peuvent rapidement passer au travers de gants et de tissus.

- N’approchez pas le tube du chalumeau.
- Ne saisissez pas la pièce à couper près de la ligne de coupage.
- L’arc pilote peut causer des brûlures − n’approchez pas le tube du chalumeau lorsque vous avez appuyé sur le gâchette.
- Portez des vêtements de protection adéquats qui recouvrent tout votre corps.
- Ne pointez pas le chalumeau en direction de votre corps ni de la pièce à couper lorsque vous appuyez sur la gâchette − l’arc pilote s’allume automatiquement.
- Mettez l’alimentation hors tension et débranchez le cordon d’alimentation avant de démonter le chalumeau ou de changer une pièce du chalumeau.
- Utilisez uniquement le ou les chalumeaux recommandés dans le manuel de l’opérateur.

LES BOUTEILLES peuvent exploser si elles sont endommagées.

Les bouteilles de gaz contiennent du gaz sous haute pression. Si une bouteille est endommagée, elle peut exploser. Puisque les bouteilles de gaz font habituellement partie d’un processus de travail des métaux, assurez−vous de les manipuler correctement.

- Protégez les bouteilles de gaz comprimé contre la chaleur excessive, les chocs mécaniques, des dommages physiques, le laitier, la flamme, les étincelles et l’arc.
- Installez et attachez les bouteilles dans la position verticale à l’aide d’une chaîne, sur un support stationnaire ou un châssis porte−bouteille afin de prévenir qu’elles ne tombent ou ne basculent.

- Les bouteilles ne doivent pas être près de la zone de coupage ni de tout autre circuit électrique.
- Un contact électrique ne doit jamais se produire entre un chalumeau de plasma d'arc et une bouteille.
- Ne coupez jamais sur une bouteille pressurisée − une explosion en résulterait.
- Utilisez uniquement des bouteilles de gaz, des détendeurs, des boyaux et des raccords conçus pour l'application déterminée. Gardez−les, ainsi que toute autre pièce associée, en bonne condition.
- Détournez votre visage du détendeur−régulateur lorsque vous ouvrez la soupape de la bouteille.
- Le couvercle du détendeur doit toujours être en place, sauf lorsque vous utilisez la bouteille ou qu'elle est reliée pour usage ultérieur.
- Utiliser les équipements corrects, les bonnes procédures et suffisamment de personnes pour soulever et déplacer les bouteilles.
- Lire et suivre les instructions sur les bouteilles de gaz comprimé, l'équipement connexe et le dépliant P-1 de la CGA (Compressed Gas Association) mentionné dans les principales normes de sécurité.

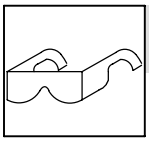
2-3. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance

DES PIECES CHAUDES peuvent provoquer des brûlures graves.

- Ne pas toucher des parties chaudes à mains nues.
- Laisser refroidir avant d'intervenir sur la torche.
- Ne pas toucher aux pièces chaudes, utiliser les outils recommandés et porter des gants de soudage et des vêtements épais pour éviter les brûlures.

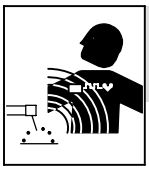
DES ORGANES MOBILES peuvent provoquer des blessures.

- S'abstenir de toucher des organes mobiles tels que des ventilateurs.
- Maintenir fermés et verrouillés les portes, panneaux, recouvrements et dispositifs de protection.
- Seules des personnes qualifiées sont autorisées à enlever les portes, panneaux, recouvrements ou dispositifs de protection pour l'entretien.
- Remettre les portes, panneaux, recouvrements ou dispositifs de protection quand l'entretien est terminé et avant de rebrancher l'alimentation électrique.



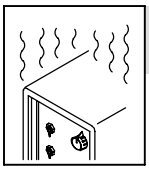
DES PARTICULES VOLANTES peuvent blesser les yeux.

- Porter des lunettes de sécurité avec protections latérales ou frontales.



LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs sont priés de consulter leur médecin avant d'approcher les opérations de coupage plasma.



L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- Prévoir une période de refroidissement; respecter le cycle opératoire nominal.
- Réduire l'ampérage (épaisseur) avant de continuer à couper ou réduire le facteur de marche.

Danger D'EXPLOSION D'HYDROGÈNE.

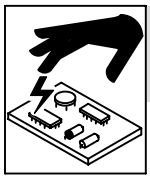
- Lors du coupage d'aluminium partiellement ou totalement immergé dans l'eau, de l'hydrogène libre peut s'accumuler sous la pièce.
- Consultez votre ingénieur de coupage et les instructions de la table de coupage.

LA CHUTE DE L'APPAREIL peut blesser.

- Utiliser l'anneau de levage uniquement pour soulever l'appareil, NON PAS les chariot, les bouteilles de gaz ou tout autre accessoire.
- Utiliser un engin d'une capacité appropriée pour soulever l'appareil.
- En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l'appareil.

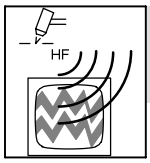
Risque D'INCENDIE OU D'EXPLOSION.

- Ne pas placer l'appareil sur, au-dessus ou à proximité de surfaces infllammables.
- Ne pas installer l'appareil à proximité de produits inflammables
- Ne pas surcharger l'installation électrique − s'assurer que l'alimentation est correctement dimensionné et protégé avant de mettre l'appareil en service.



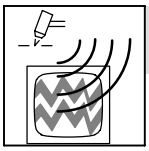
LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- Etablir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.
- Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes PC.



LE RAYONNEMENT HAUTE FRÉQUENCE (H.F.) risque de provoquer des interférences.

- Le Rayonnement haute frequence (H.F.) peut provoquer des interférences avec les équipements de radio−navigation et de communication, les services de sécurité et les ordinateurs.
- Demander seulement à des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l'installation.
- L'utilisateur est tenu de faire corriger rapidement par un électricien qualifié les interférences résultant de l'installation.
- Si le FCC signale des interférences, arrêter immédiatement l'appareil.
- Effectuer régulièrement le contrôle et l'entretien de l'installation.
- Maintenir soigneusement fermés les portes et les panneaux des sources de haute fréquence, maintenir les éclateurs à une distance correcte et utiliser une terre et et un blindage pour réduire les interférences éventuelles.



LE COUPAGE Ã L'ARC peut causer des interférence.

- L'énergie électromagnétique peut gêner le fonctionnement d'appareils électroniques comme des ordinateurs et des robots.
- Pour réduire la possibilité d'interférence, maintenir les câbles aussi courts que possible, les grouper, et les poser aussi bas que possible (ex. par terre).
- Veiller à couper à une distance de 100 mètres de tout équipement électronique sensible.
- S'assurer que la source de coupage est correctement branchée et mise à la terre.
- Si l'interférence persiste, l'utilisateur doit prendre des mesures supplémentaires comme écarter la machine, utiliser des câbles blindés de des filtres, ou boucler la zone de travail.

2-4. Principales normes de sécurité

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, de Global Engineering Documents (téléphone : 1-877-413-5184, site Internet : www.global.ihs.com).

Recommended Practices for Plasma Arc Cutting, American Welding Society Standard AWS C5.2, de Global Engineering Documents (téléphone : 1-877-413-5184, site Internet : www.global.ihs.com).

Recommended Safe Practice for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, norme AWS F4.1, de l'American Welding Society de Global Engineering Documents (téléphone : 1-877-413-5184, site Internet : www.global.ihs.com).

National Electrical Code, NFPA Standard 70, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, de la Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Règles de sécurité en soudage, coupage et procédés connexes, norme CSA W117.2, de l'Association canadienne de normalisation, vente de normes, 178 Rexdale Boulevard, Rexdale (Ontario) Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, norme ANSI Z87.1, de l'American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting and Welding Processes, norme NFPA 51B, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, de National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (téléphone : 617-770-3000, site Internet : www.nfpa.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, de U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250 (il y a 10 bureaux régionaux−−le téléphone de la région 5, Chicago, est 312-353-2220, site Internet : www.osha.gov).

2-5. Information sur les champs électromagnétiques

Données sur le soudage électrique et sur les effets, pour l'organisme, des champs magnétiques basse fréquence

Le courant de soudage ou de coupage passant dans les câbles de puissance crée des causera des champs électromagnétiques. Il y a eu et il y a encore un certain souci à propos de tels champs. Cependant, après avoir examiné plus de 500 études qui ont été faites pendant une période de recherche de 17 ans, un comité spécial ruban bleu du National Research Council a conclu: "L'accumulation de preuves, suivant le jugement du comité, n'a pas démontré que l'exposition aux champs magnétiques et champs électriques à haute fréquence représente un risque à la santé humaine". Toutefois, des études sont toujours en cours et les preuves continuent à être examinées. En attendant que les conclusions finales de la recherche soient établies, il vous serait souhaitable de réduire votre exposition aux champs électromagnétiques pendant le soudage ou le coupage.

Afin de réduire les champs électromagnétiques dans l'environnement de travail, respecter les consignes suivantes :

1 Garder les câbles ensembles en les torsadant ou en les attachant avec du ruban adhésif.

2 Mettre tous les câbles du côté opposé de l'opérateur.

3 Ne pas courber pas et ne pas entourer pas les câbles autour de vous.

4 Garder le poste de soudage et les câbles le plus loin possible de vous.

5 Relier la pince de masse le plus près possible de la zone de soudure.

Consignes relatives aux stimulateurs cardiaques :

Les porteurs de stimulateur cardiaque doivent consulter leur médecin avant de souder/couper ou d'approcher des opérations de soudage/couper. Si le médecin approuve, il est recommandé de suivre les procédures précédentes.

SECTION 3 − DEFINITIONS

3-1. Symbols And Definitions

A	Amperes		Plasma Arc Cutting (PAC)		Adjust Air/Gas Pressure		Low Air Pressure Light
V	Volts		Increase		No − Do Not Do This		Temperature
	Protective Earth (Ground)		Single Phase		Constant Current		Voltage Input
I	On	O	Off	%	Percent		Direct Current
U_0	Rated No Load Voltage (Average)	U_1	Primary Voltage	U_2	Conventional Load Voltage		Line Connection
I_{1max}	Rated Maximum Supply Current	I_2	Rated Welding Current	X	Duty Cycle		Single Phase Or Three Phase Static Frequency Converter-Transformer-Rectifier
IP	Degree Of Protection		Loose Shield Cup		Input	Hz	Hertz
I_{1eff}	Maximum Effective Supply Current	pf	power factor	S	Suitable for Some Hazardous Locations	S_1	Power Rating, Product Of Voltage And Current (KVA)

SECTION 4 − INSTALLATION

4-1. Specifications

Amperes Input at Rated Load Output 60 Hz, Three-Phase*						Rated Output	Type of Output	Plasma Gas	Rated Cutting Capacity	Maximum Open-Circuit Voltage DC
Duty Cycle										
40%	50%	80%	80%							
208 V	**230 V**	**460 V**	**575 V**	**KVA**	**KW**					
55	49	24	19	19.1	18.2	100 A @ 160 Volts DC	Direct Current, Straight Polarity (DCEN)	9.2 CFM (261 L/min) At 75 PSI (517 kPa) Air Or Nitrogen Only	1.25 in (32 mm) At 12 IPM (305 mm/min)	265

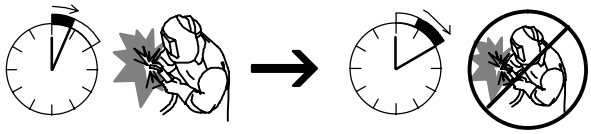
*Power light will flash if torch trigger is pressed when unit is connected to single-phase input power indicating an incorrect power condition.

Amperes Input at Rated Load Output 50 Hz, Three-Phase*			Rated Output	Type of Output	Plasma Gas	Rated Cutting Capacity	Maximum Open-Circuit Voltage DC
400 V	**KVA**	**KW**					
28	19.2	18.3	100 A @ 160 Volts DC, 80% Duty Cycle	Direct Current, Straight Polarity (DCEN)	9.2 CFM (261 L/min) At 75 PSI (517 kPa) Air Or Nitrogen Only	1.25 in (32 mm) At 12 IPM (305 mm/min)	265

*Power light will flash if torch trigger is pressed when unit is connected to single-phase input power indicating an incorrect power condition..

4-2. Duty Cycle and Overheating

208 Volts AC Three-Phase Input Power:
40% Duty Cycle



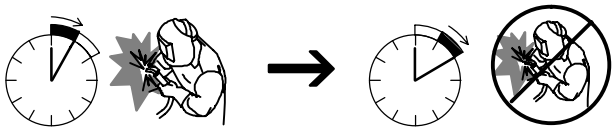
4 Minutes Cutting — 6 Minutes Resting

Duty Cycle is percentage of 10 minutes that unit can cut at rated load without overheating.

If unit overheats, output stops, and cooling fan runs. Wait fifteen minutes for unit to cool. Reduce amperage or duty cycle before cutting.

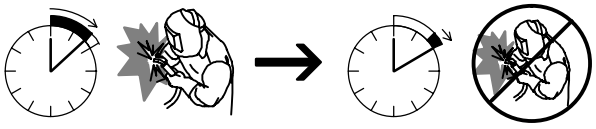
▲ **Exceeding duty cycle can damage unit and void warranty.**

230 Volts AC Three-Phase Input Power:
50% Duty Cycle



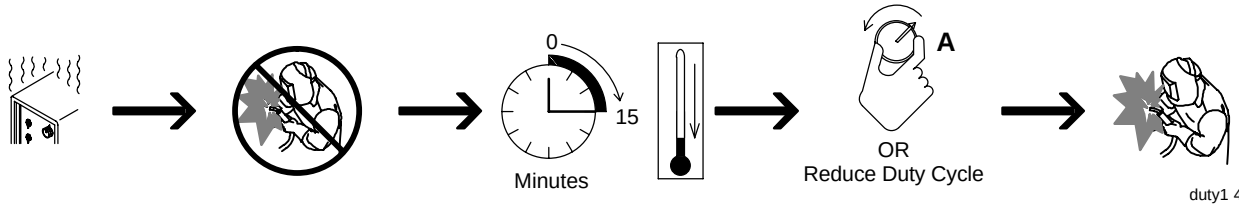
5 Minutes Cutting — 5 Minutes Resting

380-575 Volts AC Three-Phase Input Power:
80% Duty Cycle



8 Minutes Cutting — 2 Minutes Resting

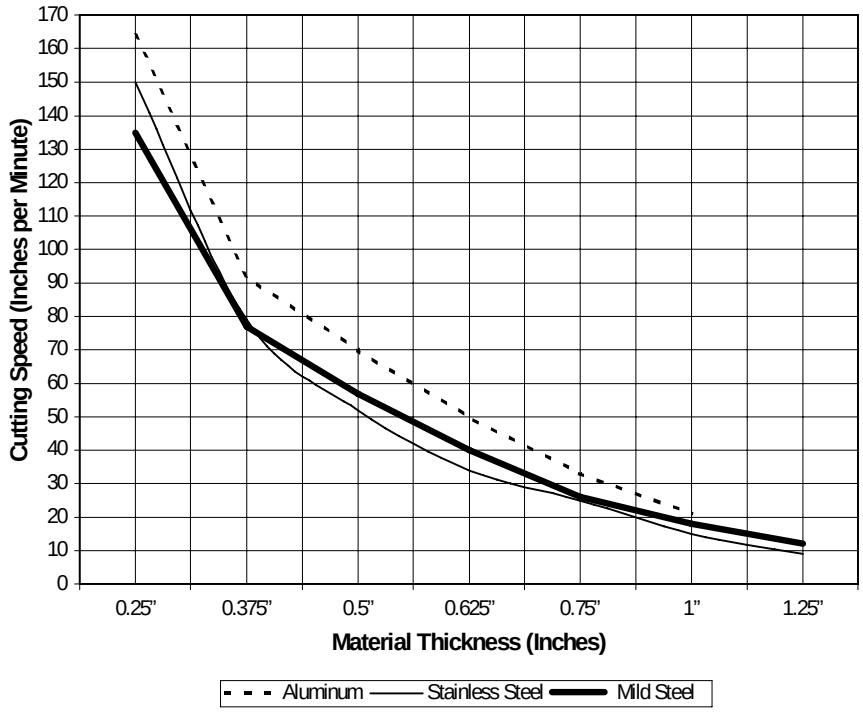
Overheating



duty1 4/95

4-3. Cutting Speed

Rated Cutting Speed vs Material Type & Thickness



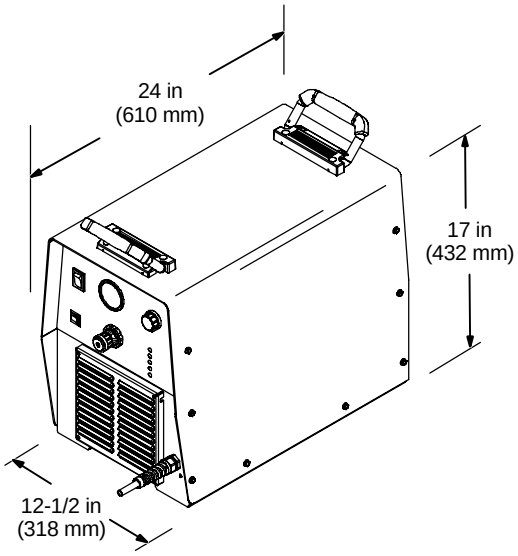
The cutting speed curve shows the rated cutting speed capabilities of the power source and torch for mild steel, stainless steel, and aluminum of various thicknesses.

▲ **Exceeding recommended cutting speeds will cause rapid erosion of the tip and electrode.**

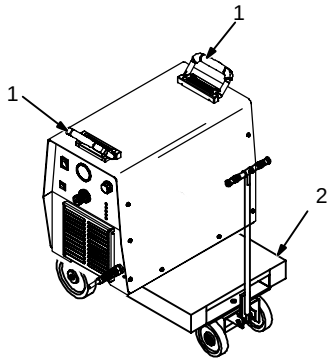
4-4. Selecting a Location

Dimensions And Weight

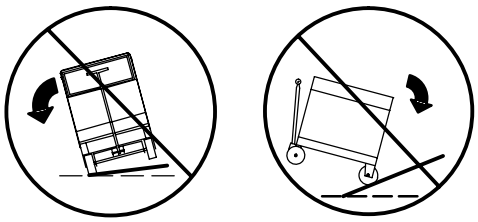
95 lb (43 kg) w/Torch



Movement



▲ **Do not move or operate unit where it could tip.**



1 Lifting Handles

Use handles to lift unit.

2 Hand Cart

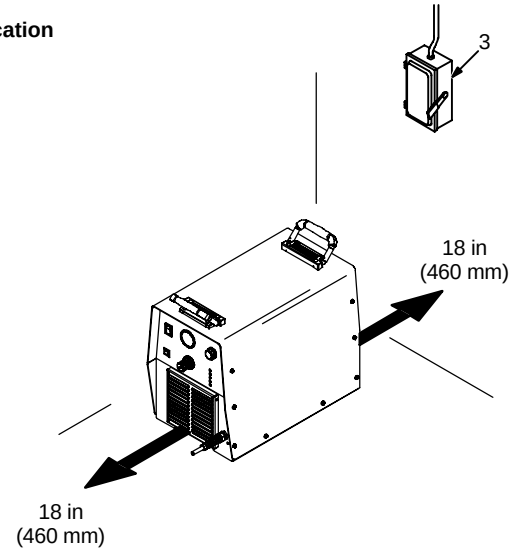
Use cart or similar device to move unit.

3 Line Disconnect Device

Locate unit near correct input power supply.

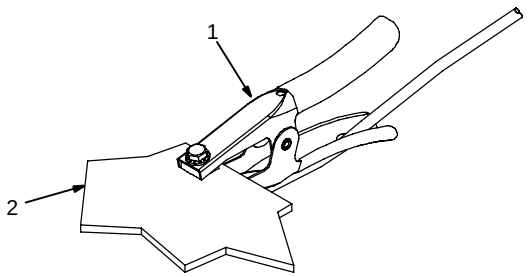
▲ **Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.**

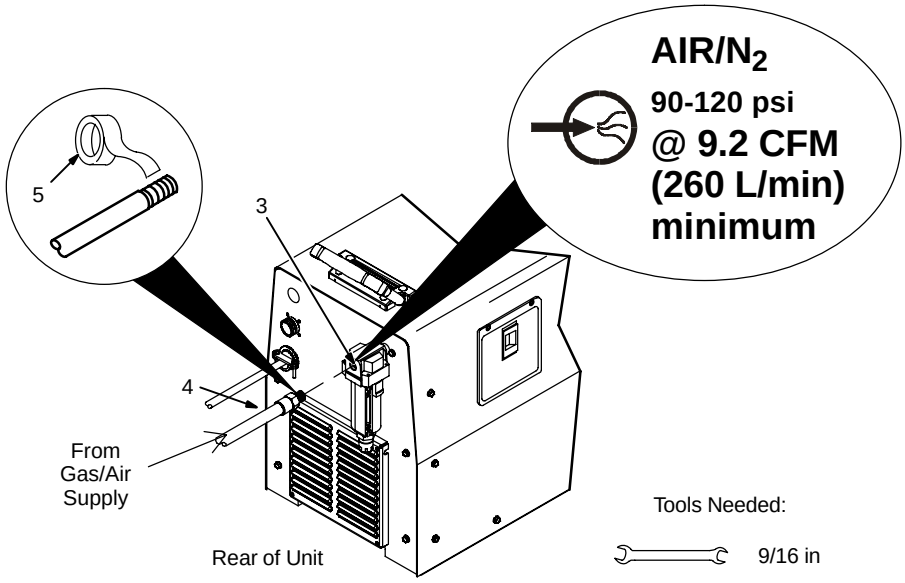
Location



loc_2 3/96 - Ref. 151 556 / 802 183

4-5. Connecting Work Clamp and Gas/Air Supply





Tools Needed:

9/16 in

1 Work Clamp

2 Workpiece

Connect work clamp to a clean, paint-free location on workpiece, as close to cutting area as possible.

☞ *Use only clean, dry air with 90 to 120 psi (621 to 827 kPa) pressure @ 9.2 CFM (260L/min) minimum.*

3 Gas/Air Filter Inlet Opening

4 Hose

☞ *Hose must have a minimum inside diameter of 3/8 in (9.5 mm).*

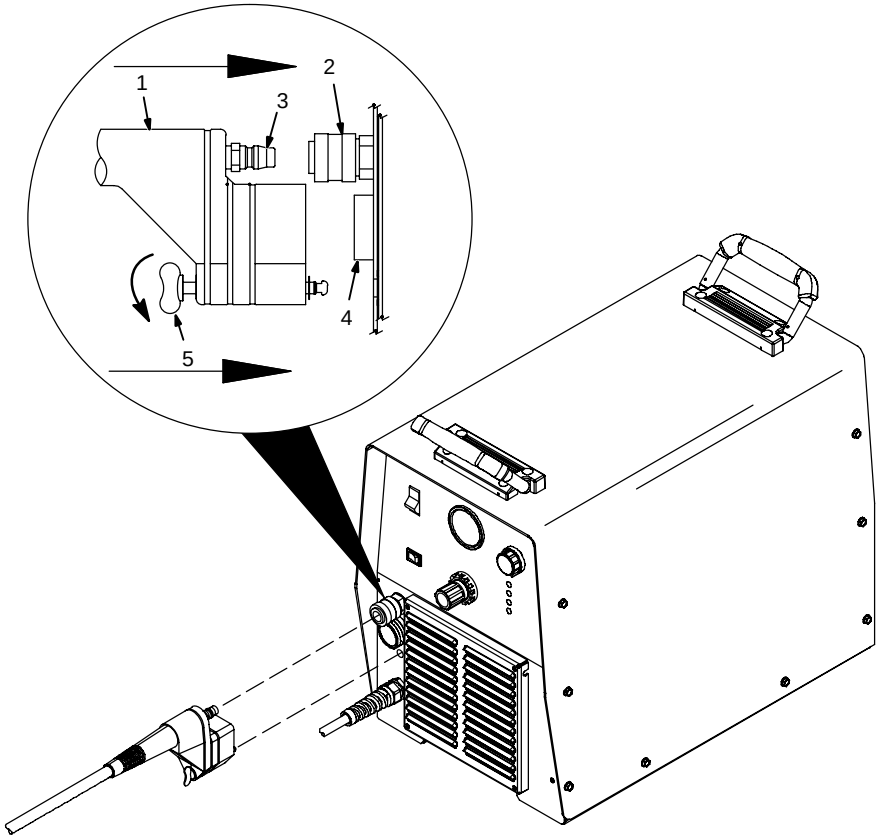
5 Teflon Tape

Obtain hose with 1/4 NPT right-hand thread fitting. Wrap threads with teflon tape (optional) or apply pipe sealant, and install fitting in opening. Route hose to gas/air supply.

Adjust gas/air pressure according to Section 5-2.

Ref. 803 640-A / Ref. 192 441 / Ref. 804 026-A

4-6. Connecting And Disconnecting Torch



▲ **Turn off power source and disconnect input power.**

1 Torch Connector

2 Quick Connect Collar

3 Nipple

4 Receptacle

5 Securing Pin

To connect torch:

Push torch connector onto receptacle and quick connect until collar secures nipple.

Rotate securing pin to lock connector to unit.

To disconnect torch:

Rotate securing pin to unlock connector from unit.

Push quick connect collar back towards unit to release nipple, and pull torch connector away from unit.

804 055-A

4-7. Electrical Service Guide

▲ CAUTION: INCORRECT INPUT POWER can damage this welding power source. This welding power source requires a CONTINUOUS supply of 50 or 60 Hz (±10%) power at +10% of 575V or −10% of 208V input voltage. Phase to ground voltage shall not exceed +10% of rated input voltage. Do not use a generator with automatic idle device (that idles engine when no load is sensed) to supply input power to this plasma power source.

	60 Hz Three Phase			
Input Voltage	208	230	460	575
Input Amperes At Rated Output	55	49	24	19
Max Recommended Standard Fuse Rating In Amperes [1]				
Time-Delay [2]	60	60	30	20
Normal Operating [3]	80	70	35	30
Min Input Conductor Size In AWG [4]	8	8	10	12
Max Recommended Input Conductor Length In Feet (Meters)	89 (27)	108 (33)	284 (87)	268 (82)
Min Grounding Conductor Size In AWG [4]	8	8	10	12

Reference: 2005 National Electrical Code (NEC) (including article 630)

1 Consult factory for circuit breaker applications.

2 “Time-Delay” fuses are UL class “RK5” .

3 “Normal Operating” (general purpose - no intentional delay) fuses are UL class “K5” (up to and including 60 amp), and UL class “H” (65 amp and above).

4 Conductor data in this section specifies conductor size (excluding flexible cord or cable) between the panelboard and the equipment per NEC Table 310.16. If a flexible cord or cable is used, minimum conductor size may increase. See NEC Table 400.5(A) for flexible cord and cable requirements.

	50 Hz Three Phase
Input Voltage	400
Input Amperes At Rated Output	28
Max Recommended Standard Fuse Rating In Amperes [1]	
Time-Delay [2]	25
Normal Operating [3]	35
Min Input Conductor Size In AWG [4]	12
Max Recommended Input Conductor Length In Feet (Meters)	155 (47)
Min Grounding Conductor Size In AWG [4]	12

Reference: 2005 National Electrical Code (NEC) (including article 630)

1 Consult factory for circuit breaker applications.

2 “Time-Delay” fuses are UL class “RK5” .

3 “Normal Operating” (general purpose - no intentional delay) fuses are UL class “K5” (up to and including 60 amp), and UL class “H” (65 amp and above).

4 Conductor data in this section specifies conductor size (excluding flexible cord or cable) between the panelboard and the equipment per NEC Table 310.16. If a flexible cord or cable is used, minimum conductor size may increase. See NEC Table 400.5(A) for flexible cord and cable requirements.

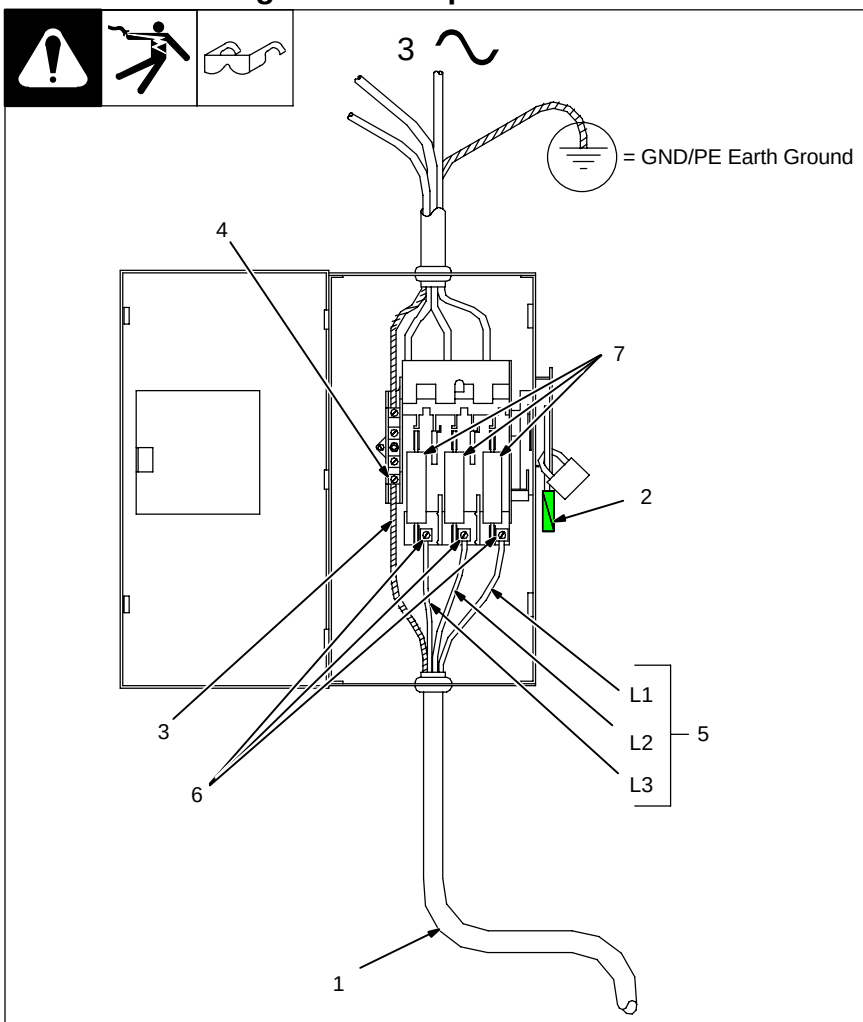
4-8. Extension Cord Data

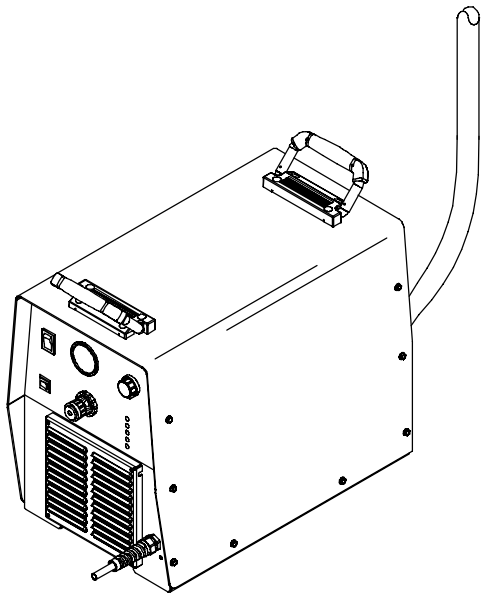
NOTE ☞ *When calculating max. cord length, remember to include conductor length from line disconnect device to input power receptacle.*

Input Voltage	Input Power Phase	Hertz	Fuse Size Or Circuit Breaker Rating		Conductor Size	Max. Cord Length
208 V	3	60	**Time-Delay** [2] **Normal Operating** [3]	60 A 80 A	8 AWG	89 ft (27 m)
230 V	3	60	**Time-Delay** [2] **Normal Operating** [3]	60 A 70 A	8 AWG	108 ft (33 m)
460 V	3	60	**Time-Delay** [2] **Normal Operating** [3]	30 A 35 A	10 AWG	284 ft (87 m)
575 V	3	60	**Time-Delay** [2] **Normal Operating** [3]	20 A 30 A	12 AWG	268 ft (82 m)
400 V	3	50	**Time-Delay** [2] **Normal Operating** [3]	25 A 35 A	12 AWG	155 ft (47 m)

2 “Time-Delay” fuses are UL class “RK5” .
3 “Normal Operating” (general purpose − no intentional delay) fuses are UL class “K5” (up to and including 60 amp), and UL class “H” (65 amp and above).

4-9. Connecting 3-Phase Input Power





▲ **Installation must meet all National and Local Codes − have only qualified persons make this installation.**

▲ **Disconnect and lockout/tagout input power before connecting input conductors from unit.**

▲ **Always connect green or green/yellow conductor to supply grounding terminal first, and never to a line terminal.**

☞ *The Auto-Line circuitry in this unit automatically adapts the power source to the primary voltage being applied. Check input voltage available at site. This unit can be connected to any input power between 208 and 575 VAC without removing cover to relink the power source.*

1 Input Power Cord.

2 Disconnect Device (switch shown in the OFF position)

3 Green Or Green/Yellow Grounding Conductor

4 Disconnect Device Grounding Terminal

5 Input Conductors (L1, L2 And L3)

6 Disconnect Device Line Terminals

Connect green or green/yellow grounding conductor to disconnect device grounding terminal first.

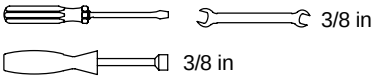
Connect input conductors L1, L2, and L3 to disconnect device line terminals.

7 Over-Current Protection

Select type and size of over-current protection using Section 4-7 (fused disconnect switch shown).

Close and secure door on disconnect device. Remove lockout/tagout device, and place switch in the On position.

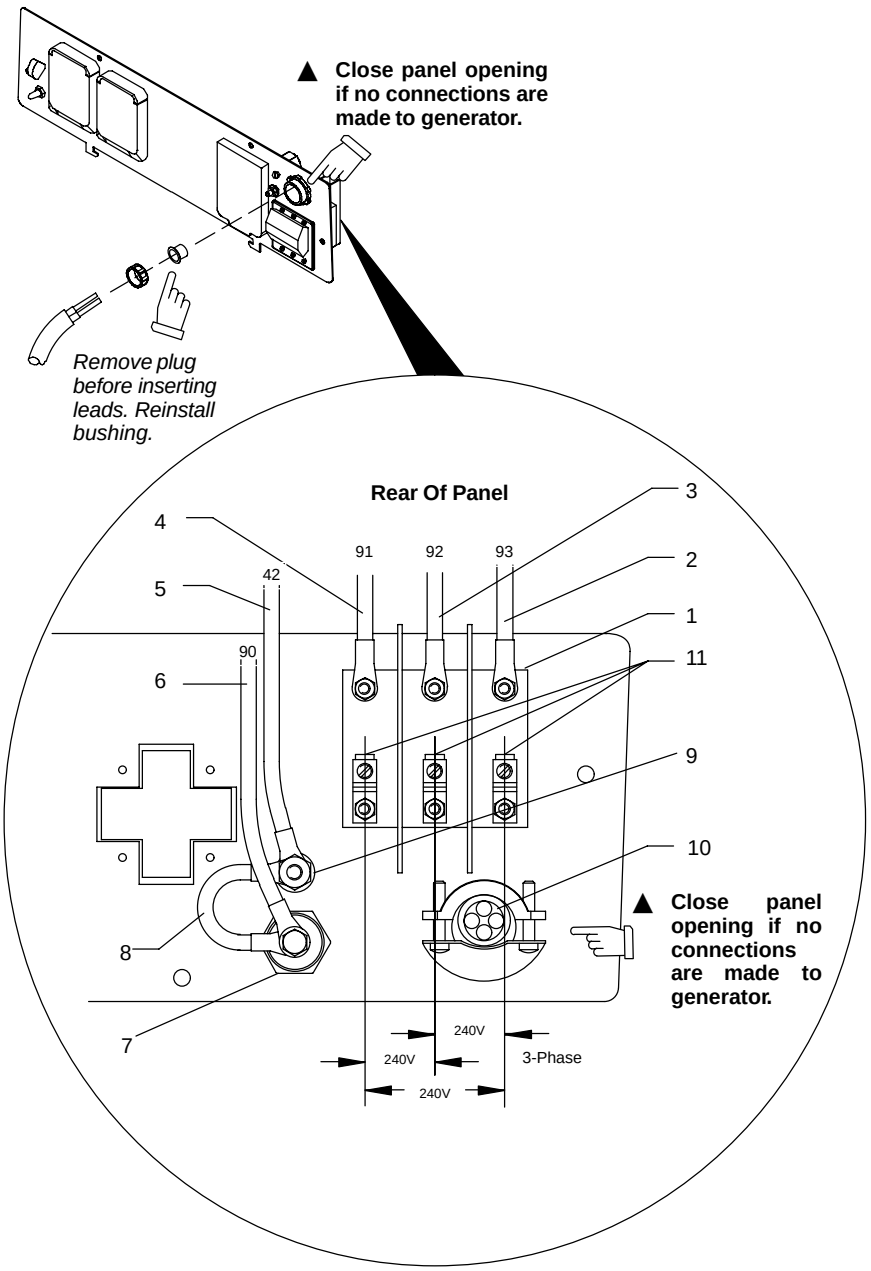
Tools Needed:



803 766-A / 802 183

4-10. Connecting To Miller Welder/Generator With A Three-Phase AC Power Plant

Three-Phase Power Connection



Three-Phase Generator Power

▲ **Stop engine.**

▲ **Power and weld outputs are live at the same time. Disconnect or insulate unused cables.**

☞ *Have qualified person install according to circuit diagram and Generator Power Guidelines (see generator Owner's Manual).*

Remove generator power panel mounting screws. Tilt panel forward.

1 Circuit Breaker CB7

2 Lead 93

3 Lead 92

4 Lead 91

5 Lead 42 (Circuit Grounding Lead)

6 Lead 90 (Neutral)

7 Isolated Neutral Terminal

8 Jumper Lead 42

9 Grounding Terminal

Jumper 42 is connected to lead 90 at factory. Jumper 42 may be disconnected from neutral to meet applicable electrical codes.

Lead 42 connects to front panel Ground stud.

10 Power Cord

11 Circuit Breaker CB7 User Terminals

☞ *Circuit breaker CB7 protects single-phase receptacle RC5 and the load wires from overload. If CB7 opens, all three-phase generator output stops and the receptacle does not work.*

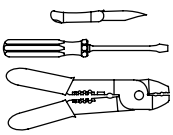
Connect user-supplied ring lug to green (ground) lead. Connect ring lug on end of green (ground) lead to grounding terminal (9).

Connect black, white, and red leads to circuit breaker CB7 user terminals (11).

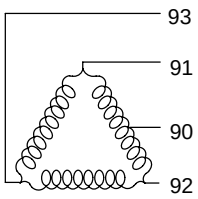
Reinstall power panel.

☞ *Engine control must be set to Run **NOT** Run/Idle to adequately power the plasma cutter.*

Tools Needed:



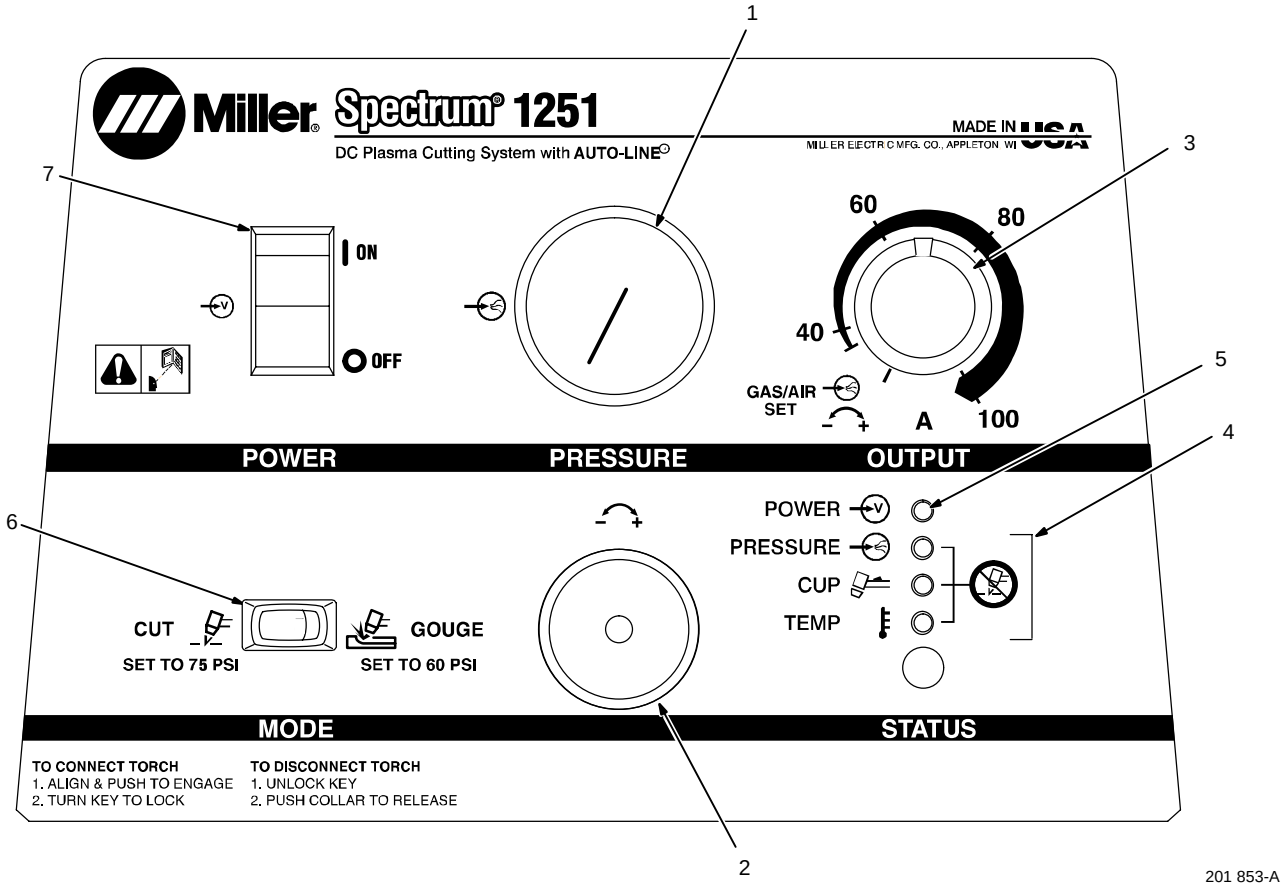
AC ∼ Output	Three Phase 3 ∼
Volts	240
Amps	48
KVA/KW	20
Frequency	60 Hz
Engine Speed	1850 RPM
Lead 42 connects to GROUND stud on front of unit. Jumper 42 is connected to 90 at factory.	



Ref. 197 399 / 802 332-B

SECTION 5 − OPERATION

5-1. Controls



1 Gas/Air Pressure Gauge

2 Gas/Air Pressure Control

3 Output Control

Use control to select cutting output in amperes. Gas/air automatically flows at the set pressure.

Use Gas/Air Set area of control range for setting gas/air pressure (see Section 5-2).

4 Trouble Lights (see Section 7-2)

5 Power Light

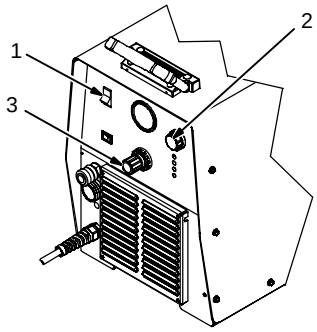
6 Cut/Gouge Switch

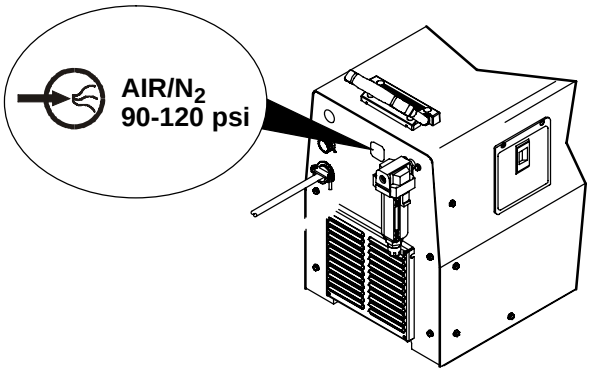
Set pressure as indicated on nameplate for appropriate switch position.

After the cutting arc goes out, the torch will automatically re-ignite the pilot arc if the trigger is held down.

7 Power Switch

5-2. Setting Gas/Air Pressure





Rear of Unit

Ref. 804 025-A / Ref. 804 026-A

Setting Gas/Air Pressure

Unit Requires 90-120 PSI (621-827 kPa) Supply At 9.2 CFM (260 L/min) Minimum Flow Rate

1 Power Switch

2 Output Control

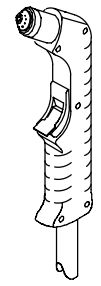
3 Gas/Air Pressure Adjustment Knob

Turn On Gas/Air Supply. → Power Switch On. → Place Output Control in Gas/Air Set Position. → Pull knob and turn, set pressure to 75 PSI (517 kPa). Push knob in to lock setting.

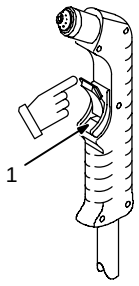
Select desired cutting output with Output Control.

5-3. Trigger Safety Lock

1 Trigger



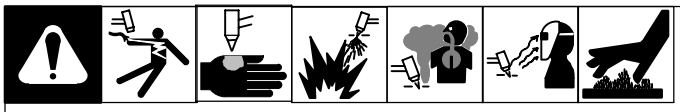
Trigger Locked



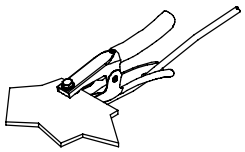
Trigger Unlocked

801 397-A

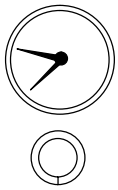
5-4. Plasma Cutting System Practices



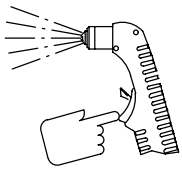
The pilot arc starts immediately when trigger is pressed.



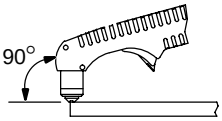
Always connect work clamp to a clean, paint-free location on metal workpiece, as close to cutting area as possible.



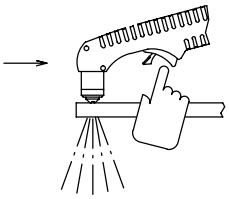
☞ *Set correct air pressure for process:*
***75 PSI** (517 kPa) for cutting,*
***60 PSI** (414 kPa) for gouging.*



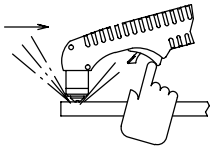
DO NOT start pilot arc without cutting or gouging as this shortens the service life of the nozzle and electrode.



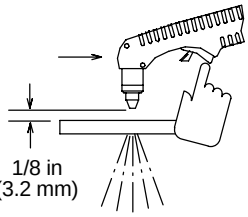
Maintain approximately a 90° angle to the workpiece surface for proper cutting results.



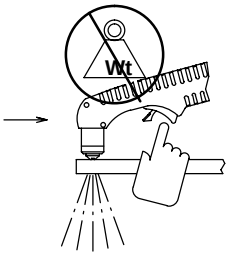
Sparks should pass through the workpiece and out the bottom when cutting.



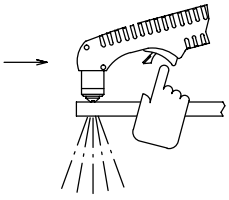
If sparks flare back from surface, this usually is an indication that either travel speed is too fast, amperage is set too low, or consumables are worn.



When doing non-shielded cutting, maintain approximately 1/8 in standoff between electrode and surface.



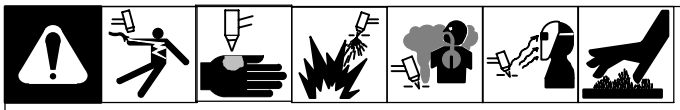
DO NOT put pressure on shield when **drag cutting**; instead, slide shield along the surface for proper cutting results.

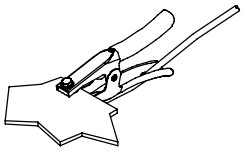


Pulling rather than pushing the torch makes cutting easier. Use a proper guide or template for accurate cutting operations.

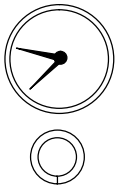
Ref. 803 640-A / 801 400-B / Ref. 802 878

5-5. Sequence Of Cutting Operation

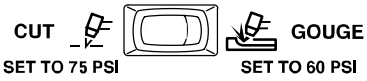




Connect work clamp to a clean, paint-free location on metal workpiece, as close to cutting area as possible.

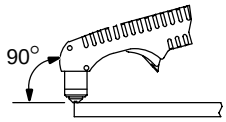


☞ *Set air pressure to **75 PSI** (517 kPa) for cutting.*

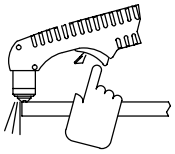


Set Mode switch to CUT.

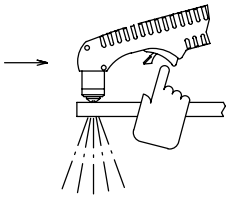
The pilot arc starts immediately when trigger is pressed.



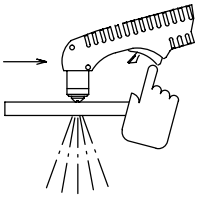
For standard (shielded) cutting, place drag shield on edge of metal. For non-shielded cutting, use 1/8 in (3.2 mm) standoff distance (dragging tip will reduce tip life).



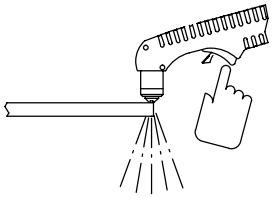
Raise trigger lock and press trigger. Pilot arc starts.



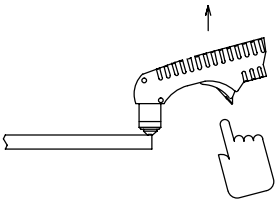
After cutting arc starts, slowly start moving torch across metal.



Adjust torch speed so sparks go thru metal and out bottom of cut.



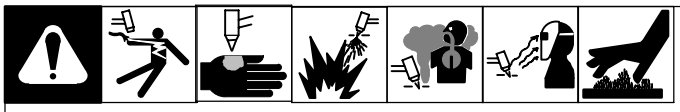
Pause briefly at end of cut before releasing trigger.

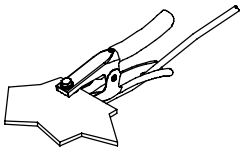


Postflow continues for approx. 20 seconds after releasing trigger; cutting arc can be instantly restarted during postflow by raising trigger lock and pressing trigger.

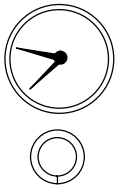
Ref. 803 640-A / 801 400-B

5-6. Sequence Of Gouging Operation

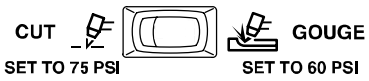




Connect work clamp to a clean, paint-free location on workpiece, as close to cutting area as possible.



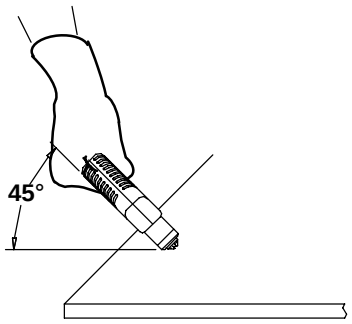
☞ *Set air pressure to **60 PSI** (414 kPa) for gouging.*



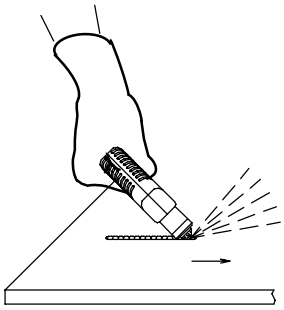
MODE

Set Mode switch to GOUGE.

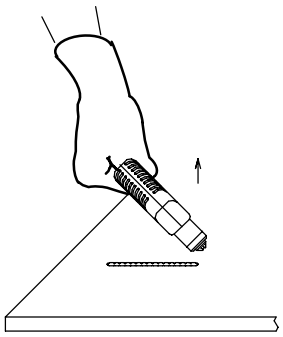
The pilot arc starts immediately when trigger is pressed.



Hold torch at approximately 45° angle to workpiece.



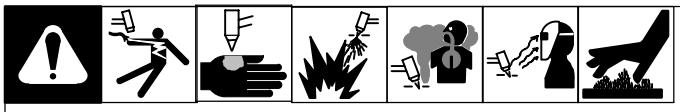
Raise trigger lock and press trigger. Pilot arc starts. Move tip to within approximately 3/16 in (4.8 mm). Start gouging across workpiece surface. Maintain approximately a 45° angle to surface.



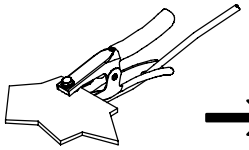
Release trigger. Postflow continues for approx. 20 seconds after releasing trigger; arc can be instantly restarted during postflow by raising trigger lock and pressing trigger.

Ref. 803 640-A / 801 400-B

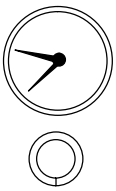
5-7. Sequence Of Piercing Operation



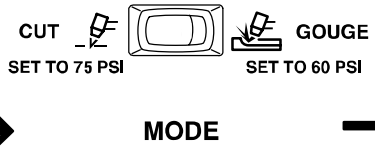
The pilot arc starts immediately when trigger is pressed.



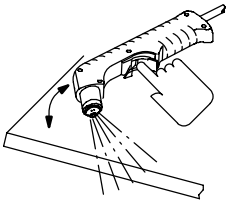
Connect work clamp to a clean, paint-free location on workpiece, as close to cutting area as possible.



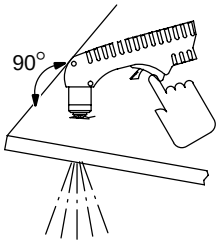
☞ *Set air pressure to **75 PSI** (517 kPa) for cutting.*



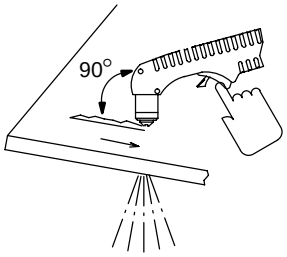
Set Mode switch to CUT.



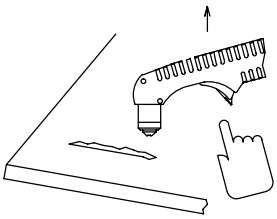
Hold torch at an angle to the workpiece. Raise trigger lock and press trigger. Pilot arc starts.



Rotate torch to upright position approximately 90° to surface. When arc has pierced through workpiece, start cutting.



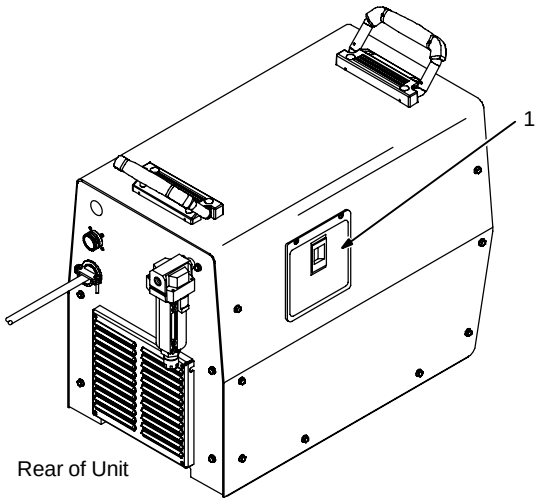
Maintain approximately 90° torch position to surface, and continue cutting.



Release trigger. Postflow continues for approx. 20 seconds after releasing trigger; arc can be instantly restarted during postflow by raising trigger lock and pressing trigger.

Ref. 803 640-A / 801 400-B

5-8. Consumables Storage Compartment



1 Consumables Storage Compartment

This compartment provides convenient access to consumables and parts.

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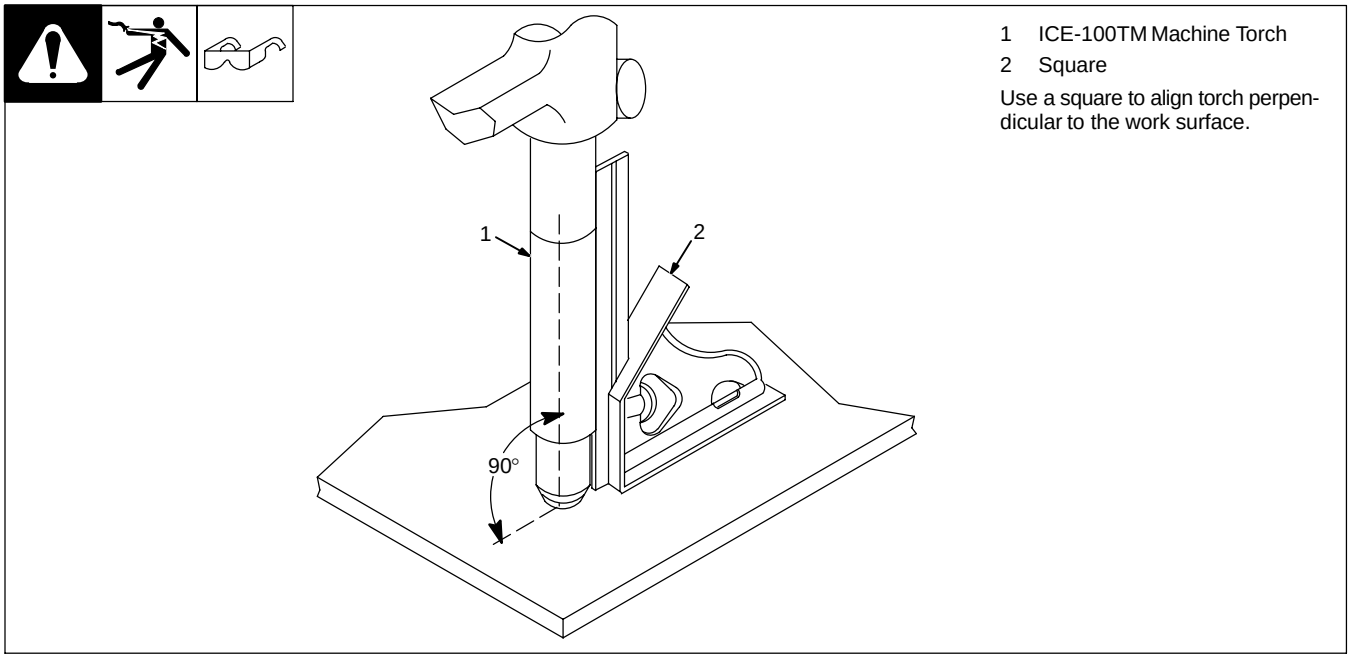
SECTION 6 − MECHANIZED OPERATION

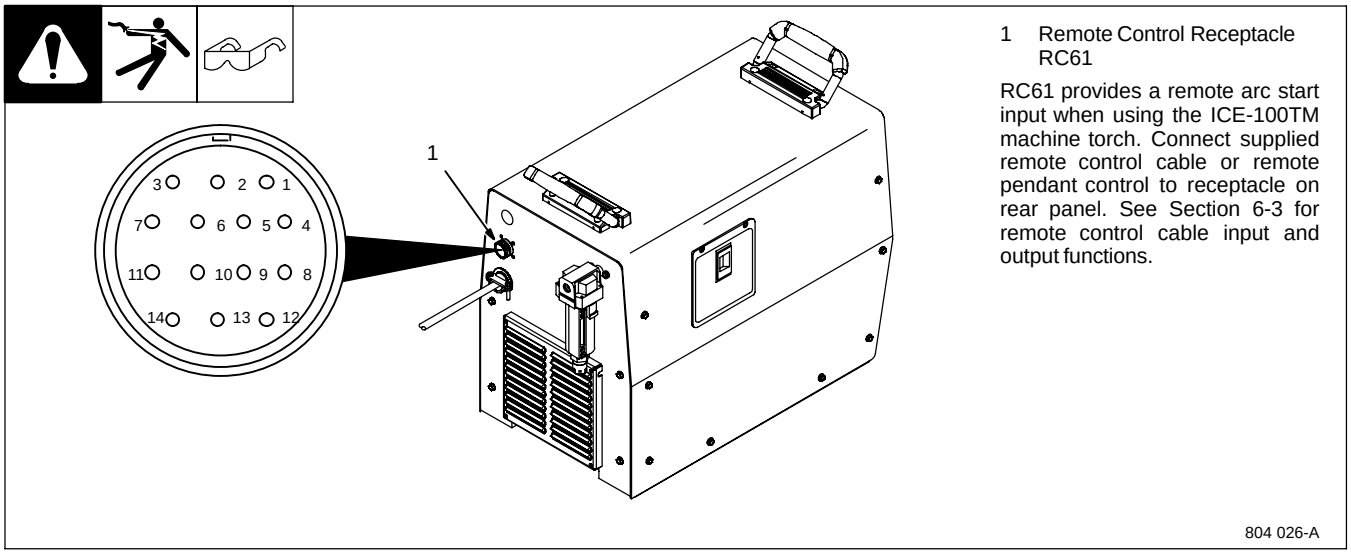
6-1. ICE-100TM Mounting Position



1 ICE-100TM Machine Torch
2 Square

Use a square to align torch perpendicular to the work surface.

6-2. Remote Control Receptacle



1 Remote Control Receptacle RC61

RC61 provides a remote arc start input when using the ICE-100TM machine torch. Connect supplied remote control cable or remote pendant control to receptacle on rear panel. See Section 6-3 for remote control cable input and output functions.

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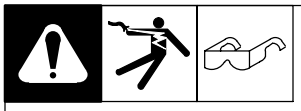
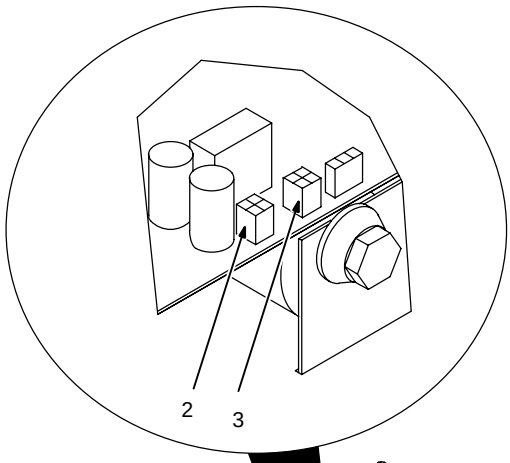
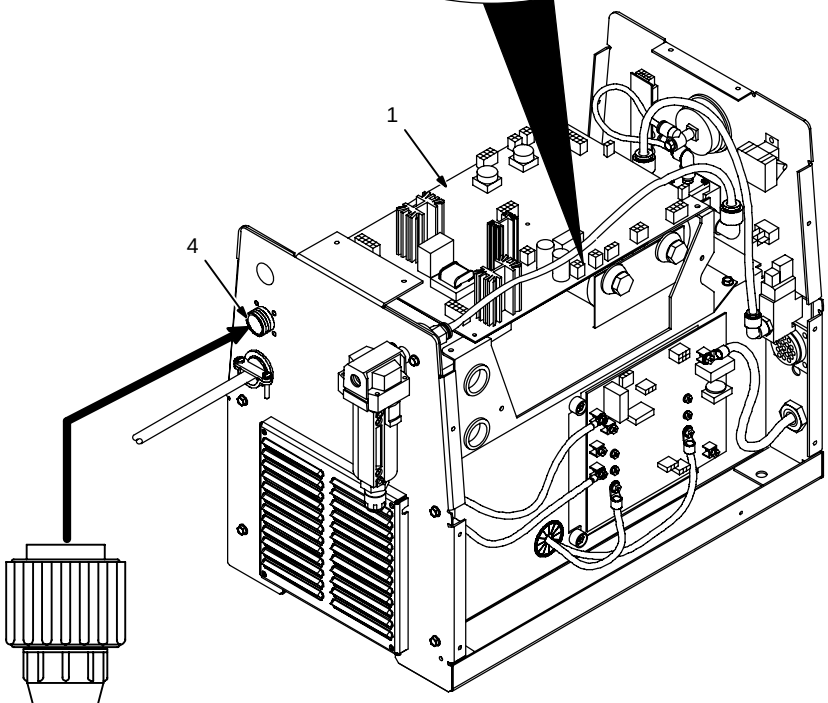
6-3. Remote Control Cable Functions

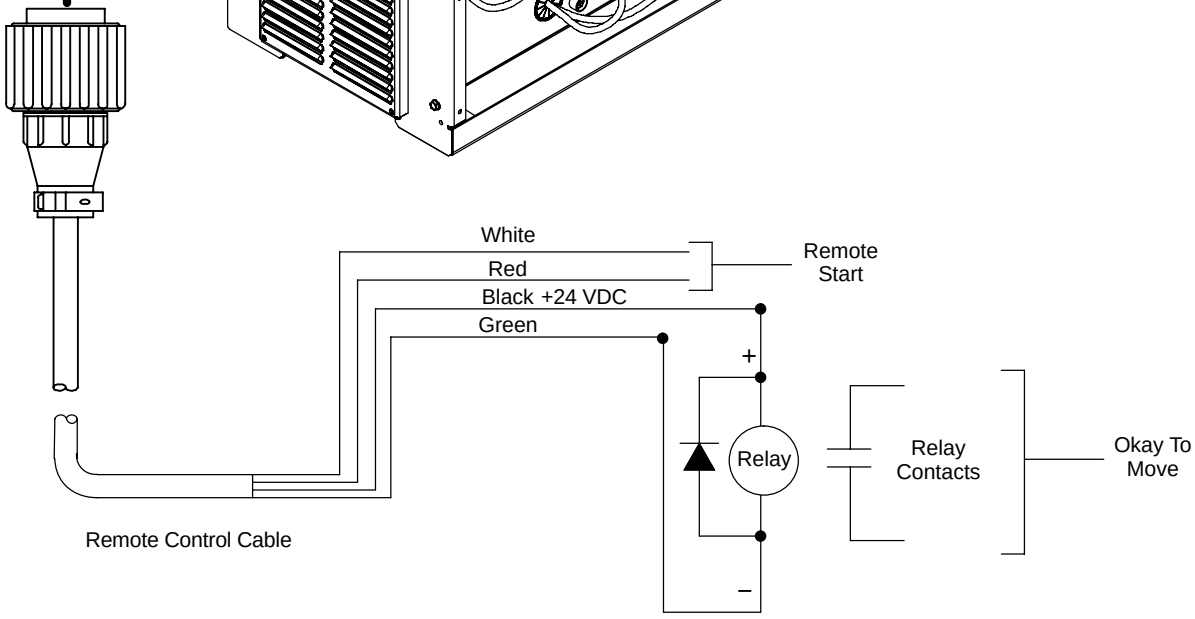
Function	Lead	Socket	Lead Information
Remote Start	White	1	White and red leads connect to a set of customer-supplied remote contacts to provide a remote trigger input signal to RC61 sockets 1 and 5 for the remote start function.
	Red	5	
Okay To Move	Black	2	Black and green leads connect to a customer-supplied machine torch drive device. Normally open contacts close after arc start to provide an output signal to begin machine torch movement. These contacts can be either dry (RMT1) or hot [RMT2 (+24 volts dc)] depending on plug position at RMT1 or RMT2 receptacle on Control board PC1. NOTE: The Spectrum 1251 is shipped from the factory with the plug connected to RMT1 (dry contacts). To power a relay or isolated input module with +24 volts dc on black lead (socket 2) and circuit common on green lead (socket 4), see Section 6-4 or 6-5.
	Green	4	
Noise Suppression	Shielding	3	Chassis ground.

6-4. +24 Volts DC Hot Contacts For Relay Operation









▲ **Turn off and disconnect input power.**

Control board PC1 can supply +24 volts dc from receptacle RMT2 to operate a customer-supplied relay for the Okay To Move signal.

1 Control Board PC1

2 Receptacle RMT1

3 Receptacle RMT2

4 Receptacle RC61

Move plug from RMT1 into receptacle RMT2 on PC1. Be sure remote control cable plug is connected to RC61 on rear of unit.

If voltage sensing is required, see Section 6-8.

Install wrapper on unit.

Required Items:

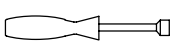
Customer-supplied 24 volts dc relay coil with resistance greater than 240 ohms.

Suppression diode (1A, 100V) such as type IN4002 through IN4004 across relay coil.

☞ *Plasma cutter is shipped from the factory with plug connected to receptacle RMT1 (dry contacts).*

☞ *+24 volts dc will activate relay coil after unit is triggered and the cutting arc is initiated.*

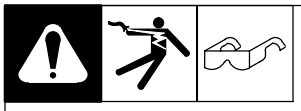
Tools Needed:

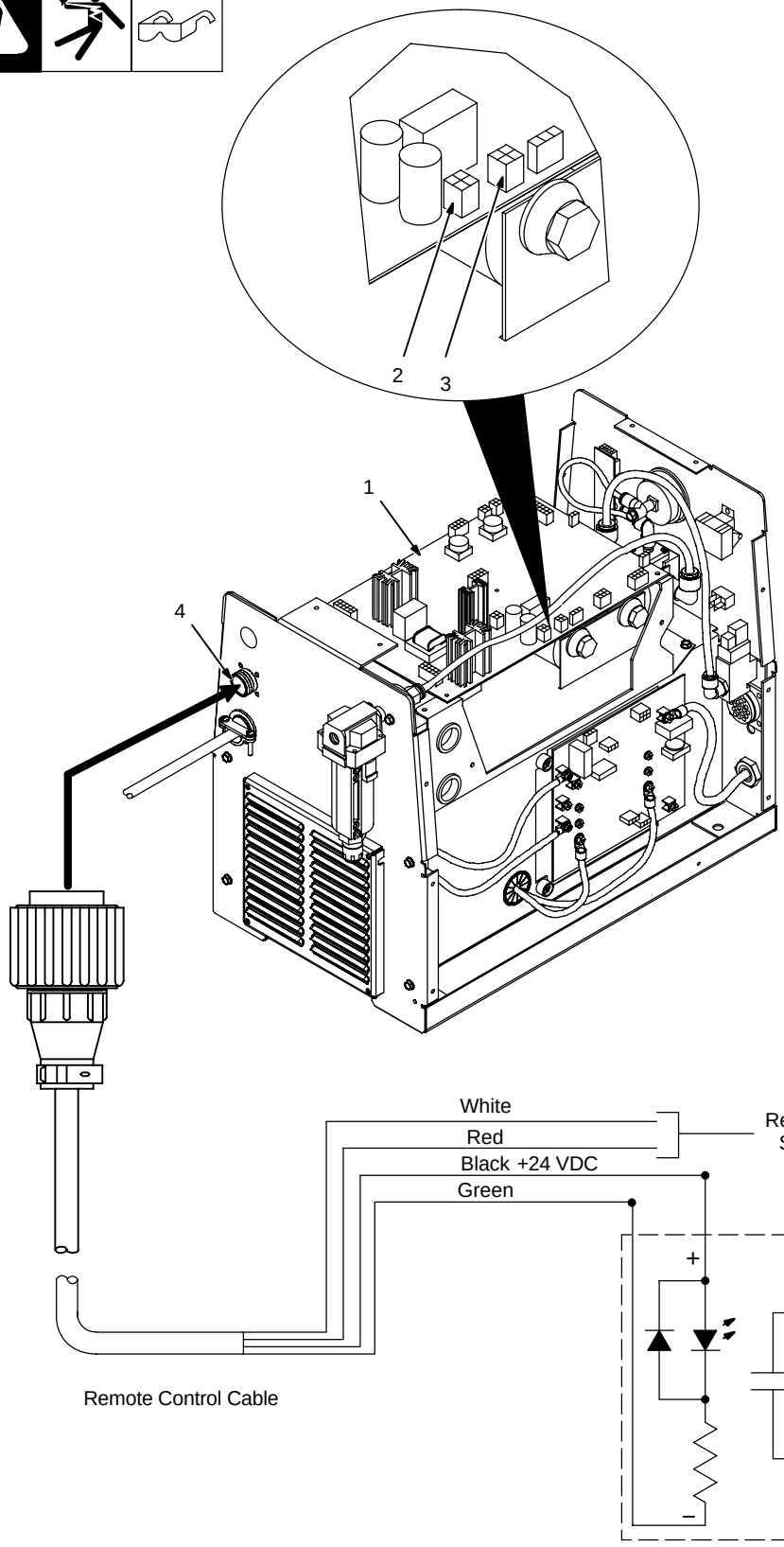


5/16 in

804 041-A

6-5. +24 Volts DC Hot Contacts For Isolated Input Module Operation





▲ **Turn off and disconnect input power.**

Control board PC1 can supply +24 volts dc from receptacle RMT2 to operate a customer-supplied isolated input module for the Okay To Move signal.

1 Control Board PC1

2 Receptacle RMT1

3 Receptacle RMT2

4 Receptacle RC61

Move plug from RMT1 into receptacle RMT2 on PC1. Be sure remote control cable plug is connected to RC61 on rear of unit.

If voltage sensing is required, see Section 6-8.

Install wrapper on unit.

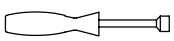
Required Items:

Customer-supplied isolated input module.

☞ *Plasma cutter is shipped from the factory with plug connected to receptacle RMT1 (dry contacts).*

☞ *+24 volts dc will activate relay coil after unit is triggered and the cutting arc is initiated.*

Tools Needed:



5/16 in

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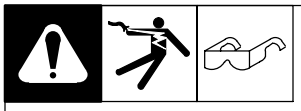
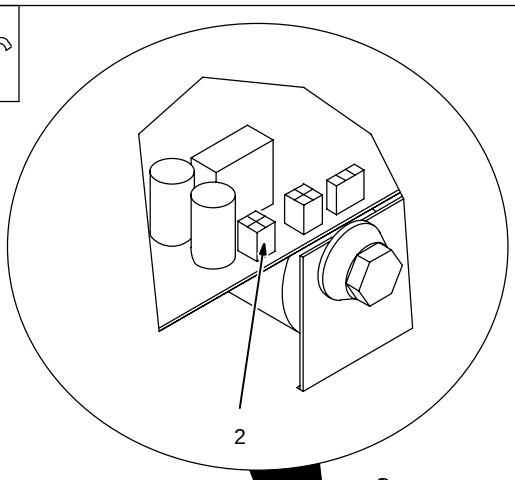
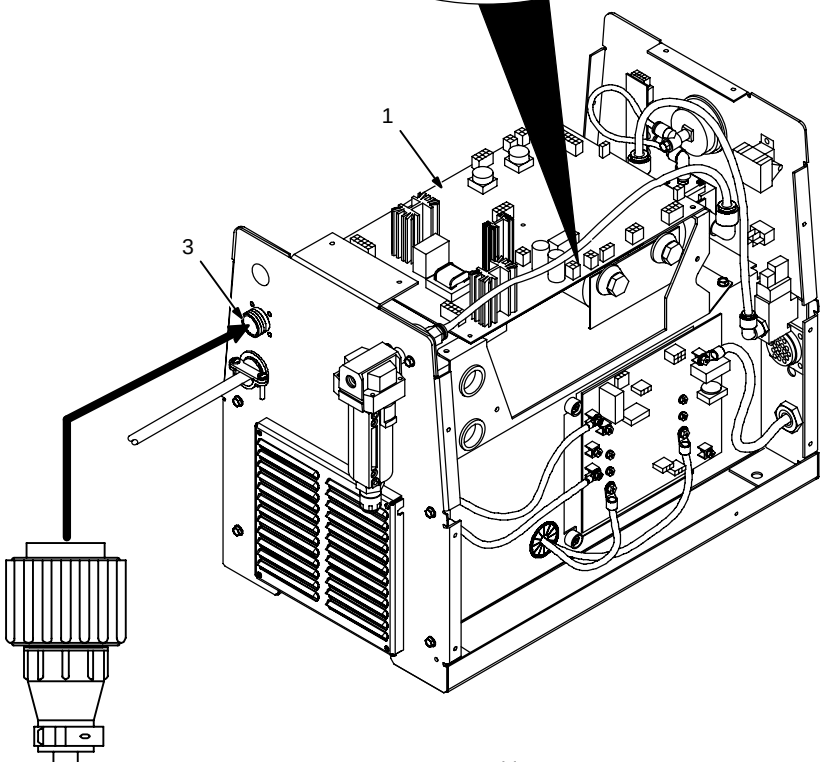
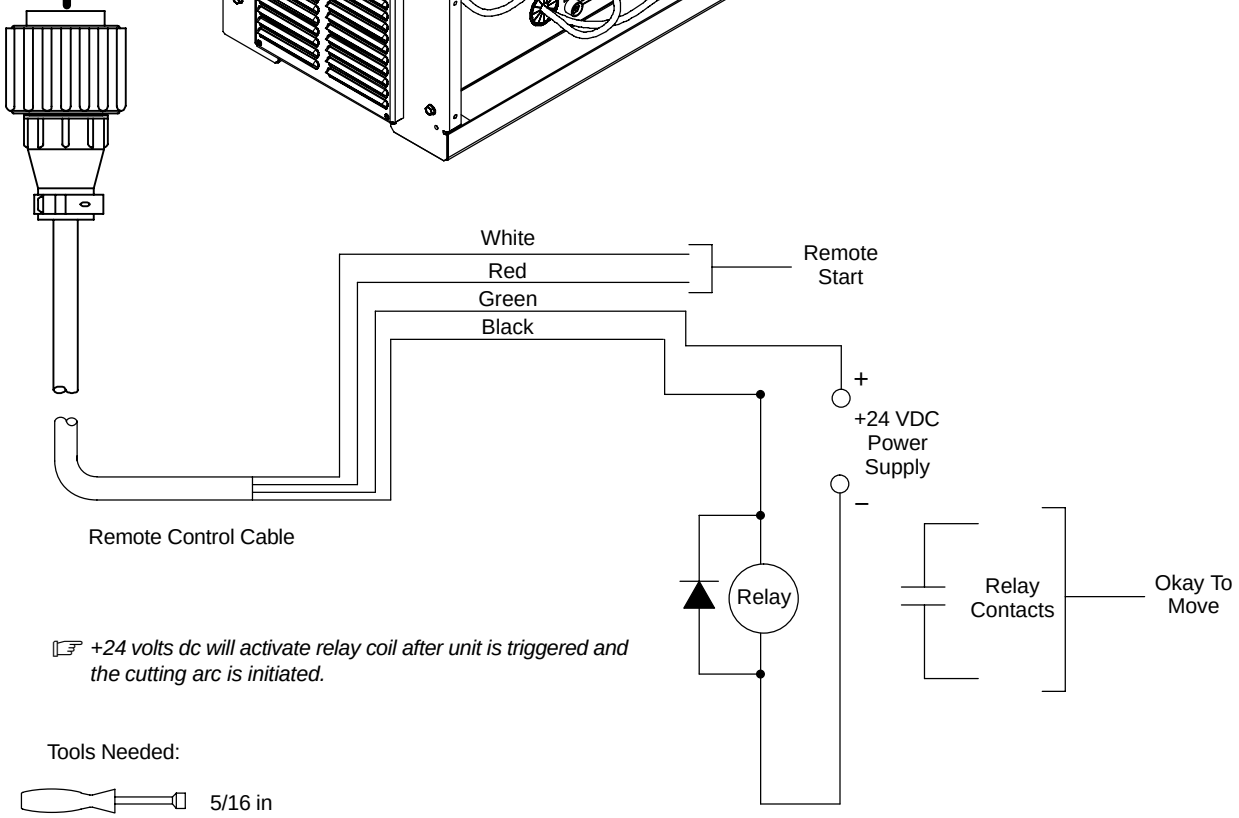
6-6. Dry Contacts Using An External Power Supply For Relay Operation









▲ **Turn off and disconnect input power.**

Control board PC1 can provide dry contacts from receptacle RMT1 to operate a customer-supplied relay using an external power supply for the Okay To Move signal.

1 Control Board PC1

2 Receptacle RMT1

3 Receptacle RC61

Unit is shipped from factory with plug connected to receptacle RMT1.

Be sure that remote control cable plug is connected to RC61 on rear of unit.

If voltage sensing is required, see Section 6-8.

Install wrapper on unit.

Required Items:

Customer-supplied +24 volts dc power supply.

24 volts dc relay coil with resistance greater than 240 ohms.

Suppression diode (1A, 100V) such as type IN4002 through IN4004 across relay coil.

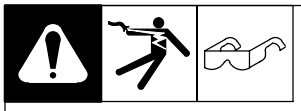
☞ *+24 volts dc will activate relay coil after unit is triggered and the cutting arc is initiated.*

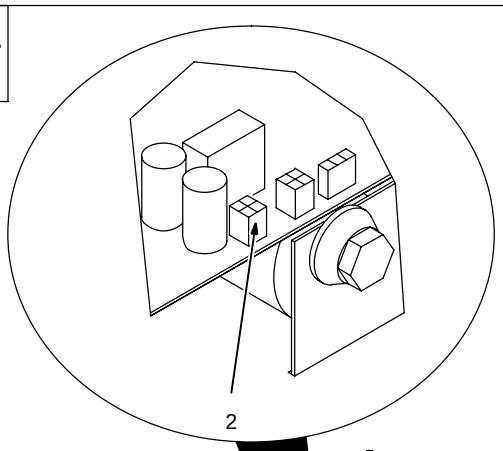
Tools Needed:

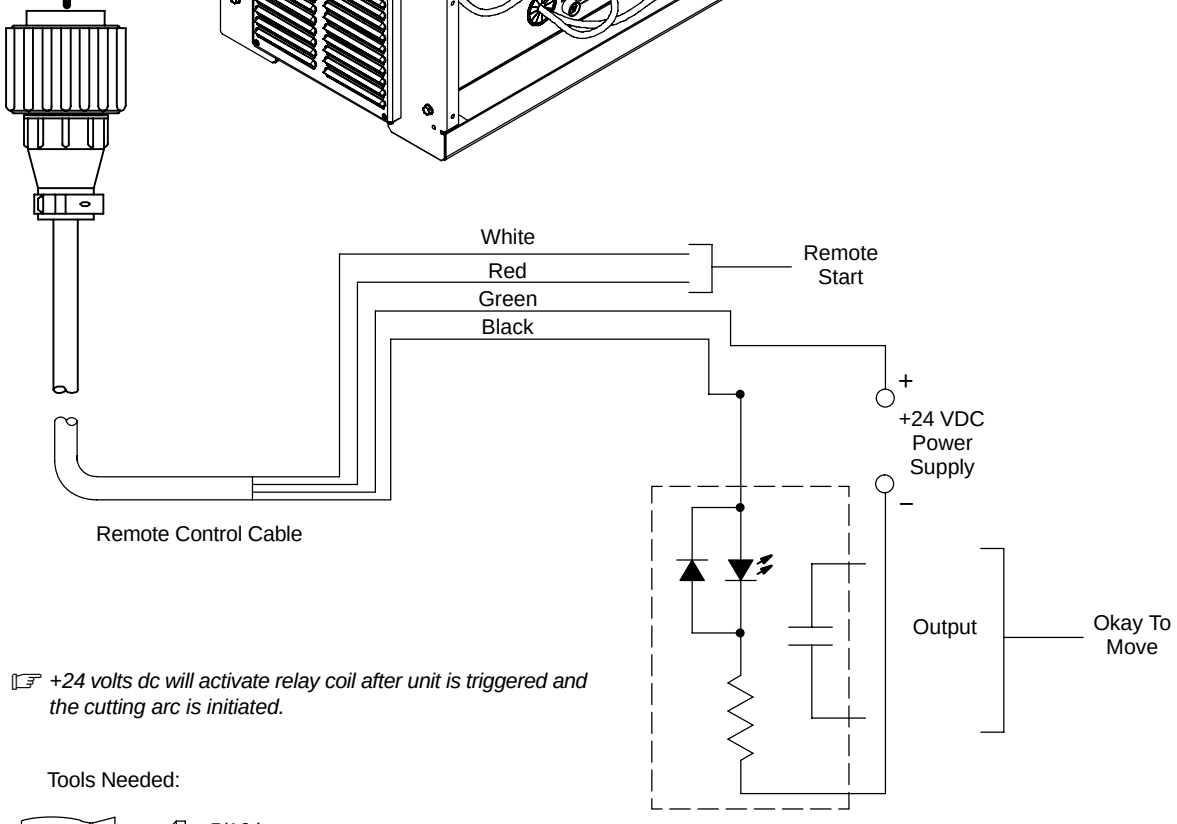
5/16 in

804 041-A

6-7. Dry Contacts Using An External Power Supply For Isolated Input Module Operation







▲ **Turn off and disconnect input power.**

Control board PC1 can provide dry contacts from receptacle RMT1 to operate a customer-supplied isolated input module using an external power supply for the Okay To Move signal.

1 Control Board PC1

2 Receptacle RMT2

3 Receptacle RC61

Unit is shipped from factory with plug connected to receptacle RMT1.

Be sure that remote control cable plug is connected to RC61 on rear of unit.

If voltage sensing is required, see Section 6-8.

Install wrapper on unit.

Required Items:

Customer-supplied +24 volts dc power supply.

Isolated input module.

☞ *+24 volts dc will activate relay coil after unit is triggered and the cutting arc is initiated.*

Tools Needed:

5/16 in

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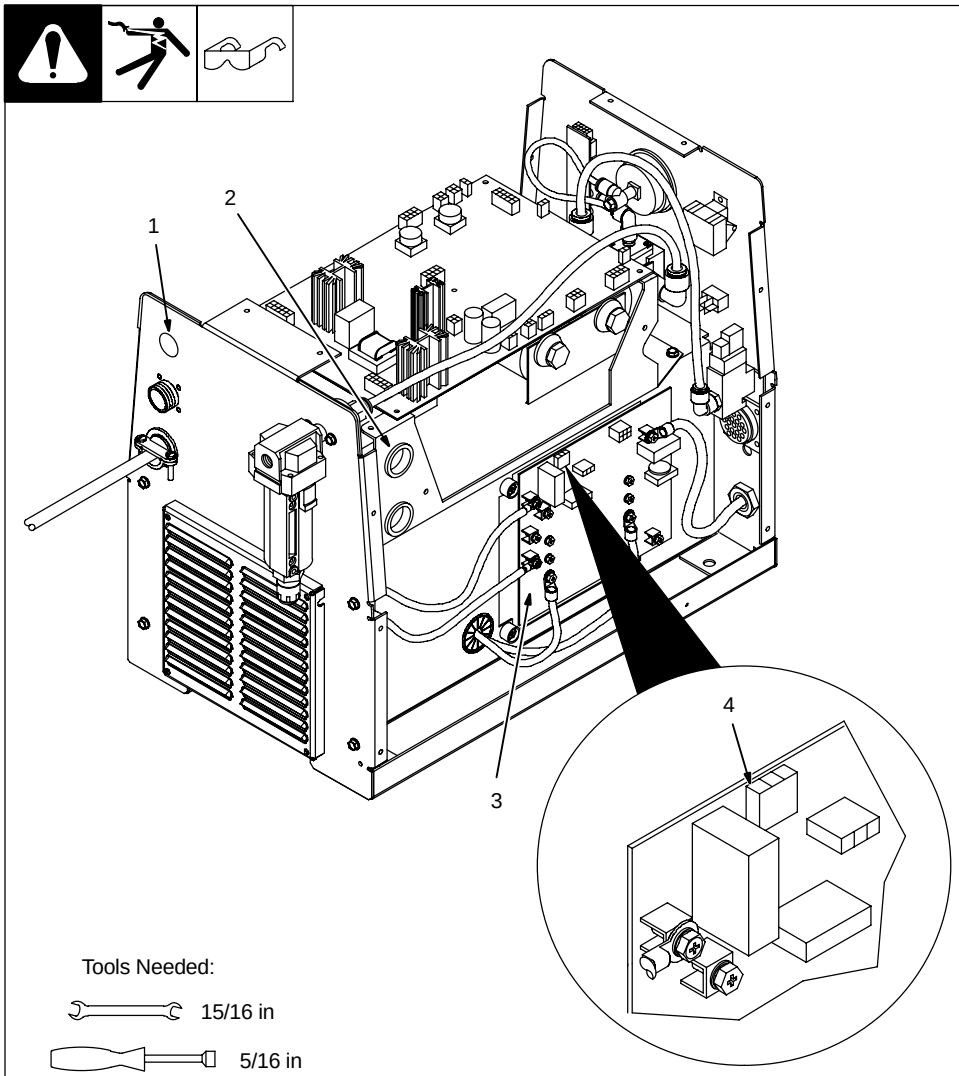
6-8. Remote Voltage Sense Connection



Tools Needed:

15/16 in

5/16 in

▲ **Turn off and disconnect input power.**

Remote voltage sense is an arc voltage output signal for automatic torch height adjustment.

1 Snap-in Blank

2 Nylon Bushing

3 Secondary Interconnect Board PC4

4 Receptacle RC48

Remove snap-in blank from rear panel.

Remove nut from strain relief, and route plug end of cable through opening in rear panel.

Slide nut over cable, and secure strain relief to rear panel.

Route plug end of cable through nylon bushing and over to PC4.

Connect plug to RC48 on PC4.

Install wrapper on unit.

Cut off crimped terminals on lead ends, and connect white lead to +volts dc and black lead to −volts dc on customer-supplied voltage sense device.

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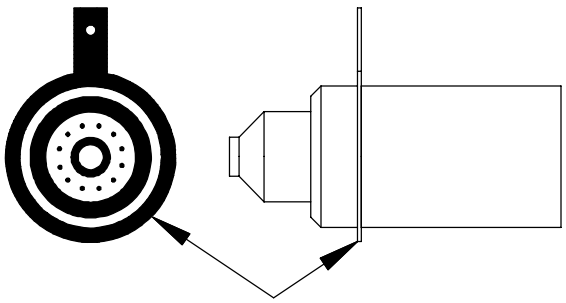
6-9. Shield Sense Tab



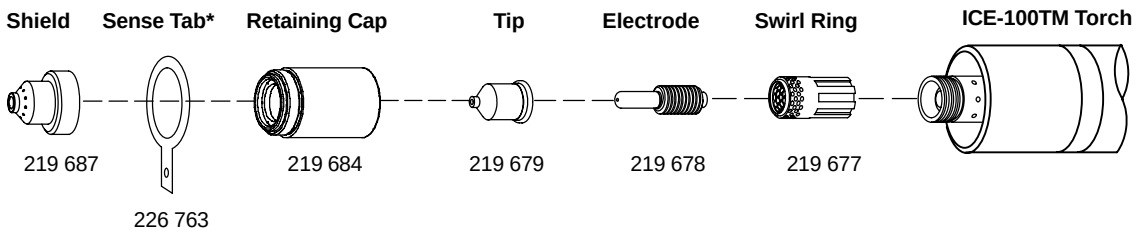
Shield sense tab provides feedback to a compatible torch height controller before starting the cutting process. Place the shield sense tab between the cup and shield.

☞ *Shield sense tab is located in the consumable storage box on left side of unit wrapper.*

6-10. Cut Charts

100 Amp Machine Torch Shielded Consumables

The following cut charts are based on a distance of 1/8 in (3.2 mm) between torch and workpiece for all cuts.



*Shield sense tab 226 763 provides feedback to a compatible torch height controller before starting the cutting process.

☞ *Shield sense tab is located in the consumable storage box on left side of unit wrapper.*

Mild Steel

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
100	152	0.5	1/4	6.4	208	5,283	135	3,429
	154	0.5	3/8	9.5	119	3,022	77	1,955
	157	1.0	1/2	12.7	88	2,235	57	1,447
	159	1.0	5/8	15.9	61	1,549	40	1,016
	162	1.5	3/4	19.0	47	1,193	26	660
	164	2.0	1	25.4	28	711	18	457
	166	2.5	1-1/4	31.8	19	482	12	305

Stainless

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
100	153	0.5	1/4	6.4	231	5,867	150	3,810
	157	0.5	3/8	9.5	122	3,099	79	2,006
	161	1.0	1/2	12.7	79	2,006	52	1,320
	162	1.0	5/8	15.9	52	1,320	34	863
	165	1.5	3/4	19.0	39	990	25	635
	166	2.0	1	25.4	23	584	15	381
	170	2.5	1-1/4	31.8	14	355	9	228

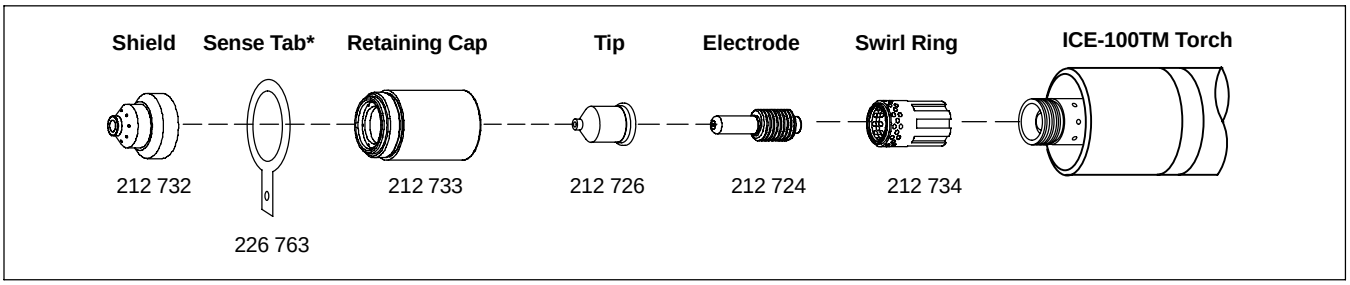
Aluminum

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
100	155	0.5	1/4	6.4	253	6,426	164	4,165
	157	0.5	3/8	9.5	142	3,606	92	2,336
	161	1.0	1/2	12.7	108	2,743	70	1,778
	162	1.0	5/8	15.9	77	1,955	50	1,270
	163	1.5	3/4	19.0	57	1,447	33	838
	165	2.0	1	25.4	33	838	21	533

Without concern for cut appearance, the fastest speed for cutting material is the maximum cut speed. For better cut angle, less dross, and cut surface appearance, use the optimum cut speed. The values in the cut charts are basic starting points and each application may require some adjustment to achieve the best cut characteristics.

80 Amp Machine Torch Shielded Consumables

The following cut charts are based on a distance of 1/16 in (1.6 mm) between torch and workpiece for all cuts.



*Shield sense tab 226 763 provides feedback to a compatible torch height controller before starting the cutting process.

☞ *Shield sense tab is located in the consumable storage box on left side of unit wrapper.*

Mild Steel

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
80	133	0.25	3/16	4.8	216	5,486	140	3,556
	134	0.5	1/4	6.4	161	4,089	105	2,667
	137	0.5	3/8	9.5	94	2,388	61	1,549
	141	0.5	1/2	12.7	60	1,524	39	991
	145	1.0	5/8	15.9	40	1,016	26	660
	148	N/A	3/4	19.0	31	787	20	508
	150	N/A	7/8	22.2	23	584	15	381
	156	N/A	1	25.4	16	406	10	254

Stainless

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
80	134	0.25	3/16	4.8	216	5,486	140	3,556
	136	0.5	1/4	6.4	158	4,013	103	2,616
	140	0.75	3/8	9.5	83	2,108	54	1,372
	142	0.75	1/2	12.7	50	1,270	33	838
	145	N/A	5/8	15.9	34	864	22	559
	150	N/A	3/4	19.0	24	610	16	406
	153	N/A	1	25.4	14	356	9	229

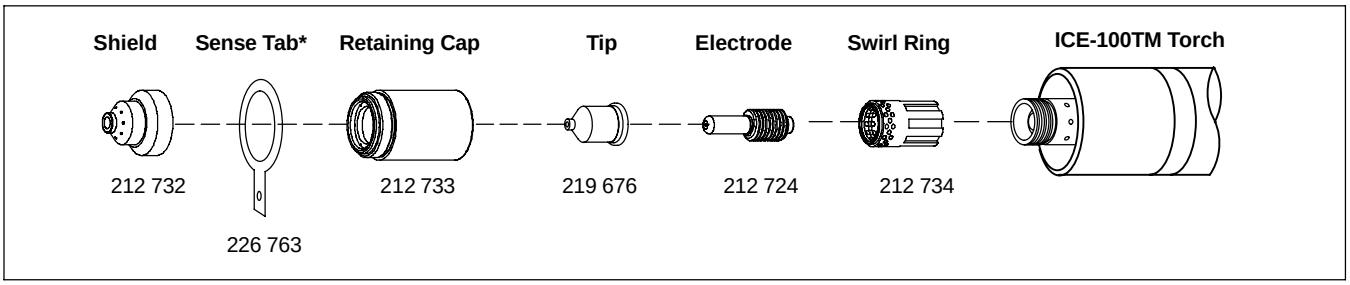
Aluminum

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
80	134	0.25	1/8	3.2	454	11,532	295	7,493
	139	0.25	1/4	6.4	176	4,470	114	2,896
	144	0.75	3/8	9.5	121	3,073	60	1,524
	146	0.75	1/2	12.7	75	1,905	37	940
	154	N/A	3/4	19.0	37	940	19	483

Without concern for cut appearance, the fastest speed for cutting material is the maximum cut speed. For better cut angle, less dross, and cut surface appearance, use the optimum cut speed. The values in the cut charts are basic starting points and each application may require some adjustment to achieve the best cut characteristics.

60 Amp Machine Torch Shielded Consumables

The following cut charts are based on a distance of 1/16 in (1.6 mm) between torch and workpiece for all cuts.



*Shield sense tab 226 763 provides feedback to a compatible torch height controller before starting the cutting process.

☞ *Shield sense tab is located in the consumable storage box on left side of unit wrapper.*

Mild Steel

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
60	134	0	16 ga	1.5	627	15,926	502	12,751
	134	0	10 ga	3.4	264	6,706	211	5,359
	138	0.25	1/4	6.4	132	3,353	86	2,184
	141	0.75	3/8	9.5	63	1,600	41	1,041
	142	1.5	1/2	12.7	42	1,067	27	686
	147	1.5	5/8	15.9	31	787	20	512
	153	1.5	3/4	19.0	22	559	14	363

Stainless

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
60	134	0	16 ga	1.5	625	15,875	406	10,312
	136	0.25	10 ga	3.4	244	6,198	159	4,039
	140	0.5	1/4	6.4	110	2,794	72	1,829
	145	0.75	3/8	9.5	53	1,346	34	864
	146	2	1/2	12.7	35	889	23	584
	149	2	5/8	15.9	26	660	17	429
	154	2	3/4	19.0	18	457	12	297

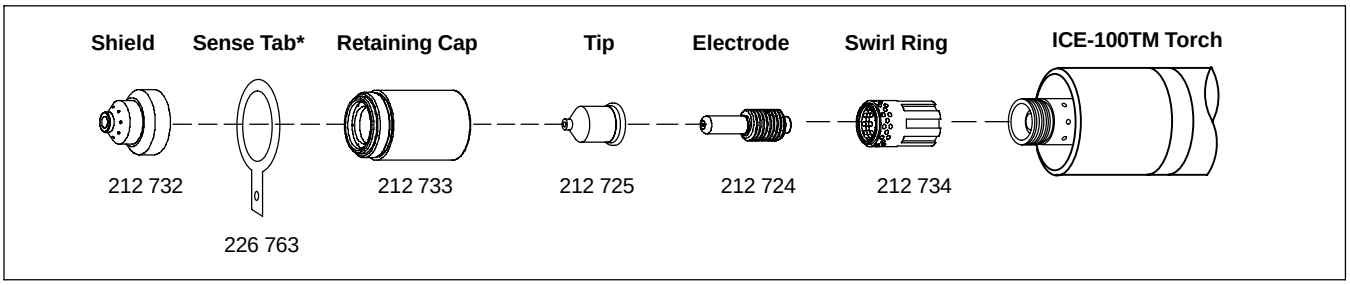
Aluminum

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
60	135	0	1/16	1.6	666	16,916	433	10,995
	138	0.25	1/8	3.2	400	10,160	260	6,604
	141	0.75	1/4	6.4	145	3,683	94	2,388
	146	1.5	3/8	9.5	74	1,880	48	1,219
	150	1.5	1/2	12.7	51	1,295	30	762
	153	1.5	5/8	15.9	33	838	21	545

Without concern for cut appearance, the fastest speed for cutting material is the maximum cut speed. For better cut angle, less dross, and cut surface appearance, use the optimum cut speed. The values in the cut charts are basic starting points and each application may require some adjustment to achieve the best cut characteristics.

40 Amp Machine Torch Shielded Consumables

The following cut charts are based on a distance of 1/16 in (1.6 mm) between torch and workpiece for all cuts.



*Shield sense tab 226 763 provides feedback to a compatible torch height controller before starting the cutting process.

☞ *Shield sense tab is located in the consumable storage box on left side of unit wrapper.*

Mild Steel

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
40	142	0.25	14 ga	1.9	640	16,256	221	5,613
	146	0.5	10 ga	3.4	151	3,835	98	2,489
	147	0.75	3/16	4.7	97	2,464	63	1,600
	149	1	1/4	6.4	74	1,880	48	1,219

Stainless

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
40	141	0.25	18 ga	1.3	592	15,037	335	8,509
	144	0.25	16 ga	1.5	374	9,500	243	6,172
	144	0.25	14 ga	1.9	221	5,613	144	3,658
	147	0.5	10 ga	3.4	107	2,718	70	1,778
	149	0.75	3/16	4.7	67	1,702	44	1,118
	149	1	1/4	6.4	47	1,194	31	787

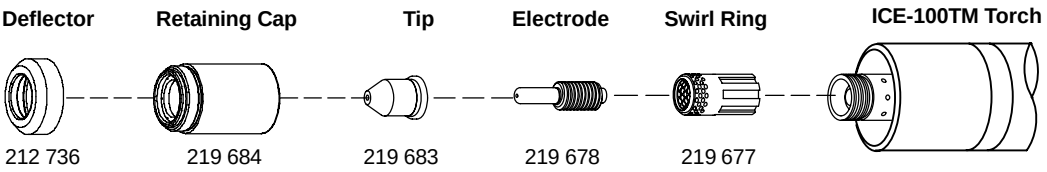
Aluminum

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
40	145	0.25	3/32	2.4	293	7,442	190	4,826
	149	0.5	1/8	3.2	204	5,182	133	3,378
	151	1	1/4	6.4	76	1,930	49	1,245

Without concern for cut appearance, the fastest speed for cutting material is the maximum cut speed. For better cut angle, less dross, and cut surface appearance, use the optimum cut speed. The values in the cut charts are basic starting points and each application may require some adjustment to achieve the best cut characteristics.

100 Amp Machine Torch Extended Consumables

The following cut charts are based on a distance of 3/16 in (4.8 mm) between torch tip and workpiece for all cuts.



Mild Steel

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
100	136	0.5	1/4	6.4	210	5,334	138	3,505
	139	0.5	3/8	9.5	122	3,098	80	2,032
	142	1.0	1/2	12.7	91	2,311	60	1,524
	146	1.0	5/8	15.9	57	1,447	37	939
	151	1.5	3/4	19.0	43	1,092	28	711
	155	2.0	1	25.4	26	660	17	431
	160	2.0	1-1/4	31.8	16	406	10	254

Stainless

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
100	142	0.5	1/4	6.4	240	6,121	153	3,886
	145	0.5	3/8	9.5	131	3,327	85	2,159
	148	1.0	1/2	12.7	80	2,032	53	1,346
	151	1.0	5/8	15.9	51	1,295	33	838
	156	1.5	3/4	19.0	33	838	22	558
	161	2.0	1	25.4	22	558	14	355
	173	2.0	1-1/4	31.8	11	279	7	177

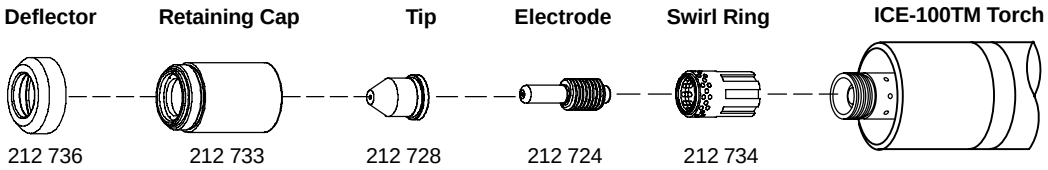
Aluminum

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
100	144	0.5	1/4	6.4	260	6,604	167	4,242
	146	0.5	3/8	9.5	153	3,886	99	2,514
	148	1.0	1/2	12.7	107	2,717	72	1,828
	153	1.0	5/8	15.9	77	1,955	50	1,270
	157	1.5	3/4	19.0	51	1,295	33	838
	160	2.0	1	25.4	31	787	20	508

Without concern for cut appearance, the fastest speed for cutting material is the maximum cut speed. For better cut angle, less dross, and cut surface appearance, use the optimum cut speed. The values in the cut charts are basic starting points and each application may require some adjustment to achieve the best cut characteristics.

80 Amp Machine Torch Extended Consumables

The following cut charts are based on a distance of 3/16 in (4.8 mm) between torch tip and workpiece for all cuts.



Mild Steel

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
80	138	0.25	3/16	4.7	221	5,613	142	3,607
80	140	0.5	1/4	6.4	170	4,318	110	2,794
80	143	0.5	3/8	9.5	98	2,489	63	1,600
80	146	0.5	1/2	12.7	62	1,574	42	1,067
80	149	1	5/8	15.8	42	1,066	28	711

Stainless

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
80	138	0.5	1/4	6.4	160	4,064	106	2,692
	143	1	1/2	12.7	55	1,397	34	863

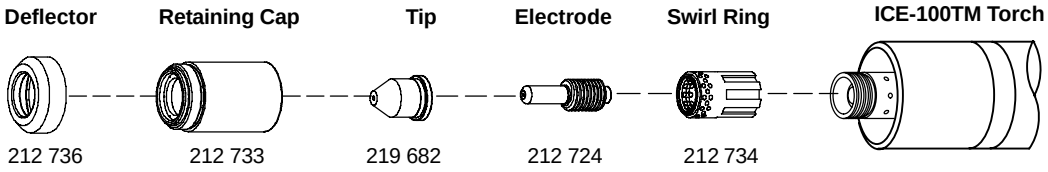
Aluminum

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
80	140	0.25	1/4	6.4	140	3,556	120	3,048
80	147	1	1/2	12.7	80	2,032	42	1,067

Without concern for cut appearance, the fastest speed for cutting material is the maximum cut speed. For better cut angle, less dross, and cut surface appearance, use the optimum cut speed. The values in the cut charts are basic starting points and each application may require some adjustment to achieve the best cut characteristics.

60 Amp Machine Torch Extended Consumables

The following cut charts are based on a distance of 3/16 in (4.8 mm) between torch tip and workpiece for all cuts.



Mild Steel

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
60	136	0.25	3/16	4.5	185	4,699	105	2,667
60	139	0.25	1/4	6.4	131	3,327	87	2,210
60	141	0.75	3/8	9.5	70	1,778	44	1,118

Stainless

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
60	134	0	14 ga	2.2	610	15,494	385	9,779
	138	0.5	1/4	6.4	114	2,896	74	1,879

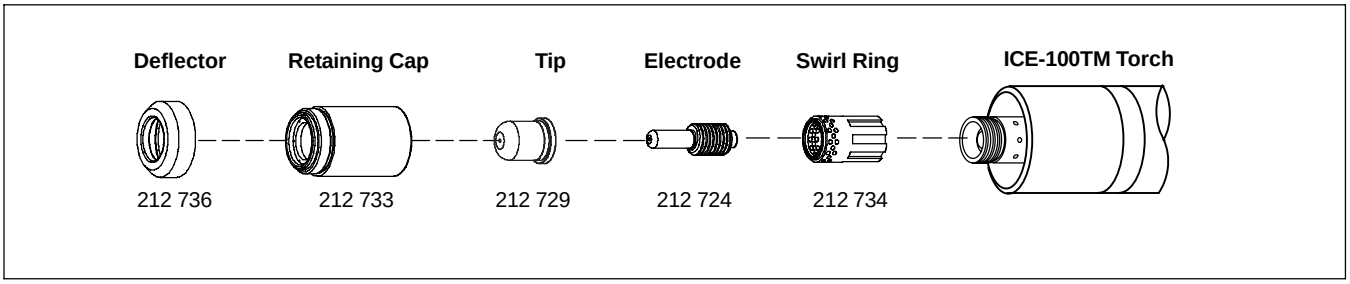
Aluminum

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
60	138	0	1/16	1.6	669	16,992	436	11,074
60	142	0.25	1/4	6.4	153	3,886	97	2,463
60	147	1.25	1/2	12.7	56	1,422	33	838

Without concern for cut appearance, the fastest speed for cutting material is the maximum cut speed. For better cut angle, less dross, and cut surface appearance, use the optimum cut speed. The values in the cut charts are basic starting points and each application may require some adjustment to achieve the best cut characteristics.

40 Amp Machine Torch Extended Consumables

The following cut charts are based on a distance of 3/16 in (4.8 mm) between torch tip and workpiece for all cuts.



Mild Steel

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
40	126	0	14 ga	1.9	320	8,128	214	5,435
	134	0.75	3/16	4.8	95	2,413	63	1,600
	138	1	1/4	6.4	73	1,854	49	1,245

Stainless

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
40	123	0	18 ga	1.3	515	13,081	328	8,331
	130	0.25	14 ga	1.9	222	5,638	145	3,683
	138	1	1/4	6.4	50	1,270	35	889

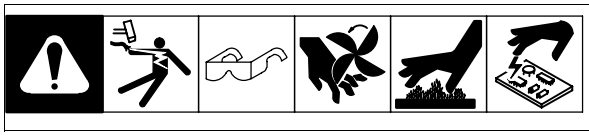
Aluminum

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
40	148	0.5	1/8	3.2	214	5,435	135	3,429
	150	1	1/4	6.4	81	2,057	52	1,320

Without concern for cut appearance, the fastest speed for cutting material is the maximum cut speed. For better cut angle, less dross, and cut surface appearance, use the optimum cut speed. The values in the cut charts are basic starting points and each application may require some adjustment to achieve the best cut characteristics.

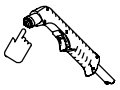
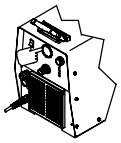
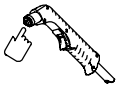
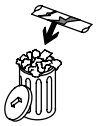
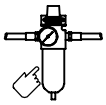
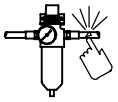
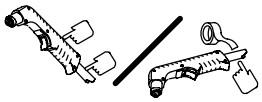
SECTION 7 − MAINTENANCE & TROUBLESHOOTING

7-1. Routine Maintenance



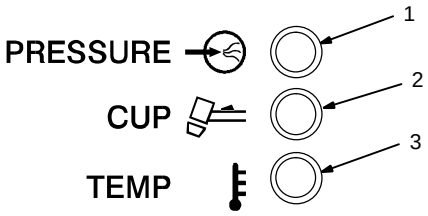
▲ **Disconnect power before maintaining.**

☞ *Maintain more often during severe conditions.*

	✓ = Check ◇ = Change ◒ = Clean ☆ = Replace * To be done by Factory Authorized Service Agent				Reference
Each Use	 ✓ Torch Tip, Electrode, And Shield Cup	 ✓ Gas/Air Pressure			
Every Week	 ✓ Shield Cup Shutdown System				
Every 3 Months	 ☆ Damaged Or Unreadable Labels	 ☆ Cracked Parts	 ◒ Air Filter/Regulator Assembly Filter	 ✓ Gas/Air Hose	
	 ✓ ☆ Torch Body, Cable				
Every 6 Months	 ◒ Inside Unit				

7-2. Trouble Lights

☞ *Difficulty establishing pilot arc may indicate consumables need to be cleaned or replaced.*



1 Pressure Light

Lights if gas/air pressure at torch is below 50 PSI (344 kPa) or above 90 PSI (620 kPa).

Turn power Off, and check for proper gas/air pressure (see Section 5-2).

2 Cup Light

Lights if shield cup is loose.

Turn power Off, and check shield cup connection (see torch Owner's Manual). Power must be reset whenever the cup shutdown is activated.

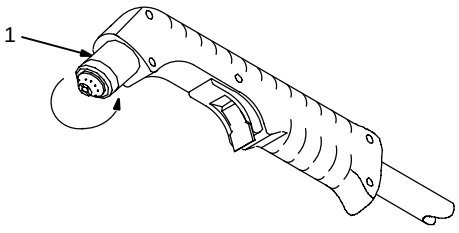
Check shield cup shutdown system once a week (see Section 7-3).

3 Temperature Light

Lights if power source overheats (see Section 4-2).

7-3. Checking Shield Cup Shutdown System

☞ *Power must be reset whenever the cup shutdown system is activated.* ***Always turn Off power when changing or checking consumables. Do NOT overtighten torch shield cup. Gently finger tighten cup onto torch.***



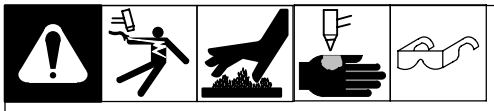
1 Torch Shield Cup

Turn Power On and loosen shield cup. If shutdown system works properly, Ready light goes off and Cup light comes on. If not, immediately turn Off power and have Factory Authorized Service Agent check safety control board PC1 operation.

If system works properly, retighten cup and reset power.

Ref. 801 300-A

7-4. Checking/Replacing Retaining Cup, Tip, And Electrode

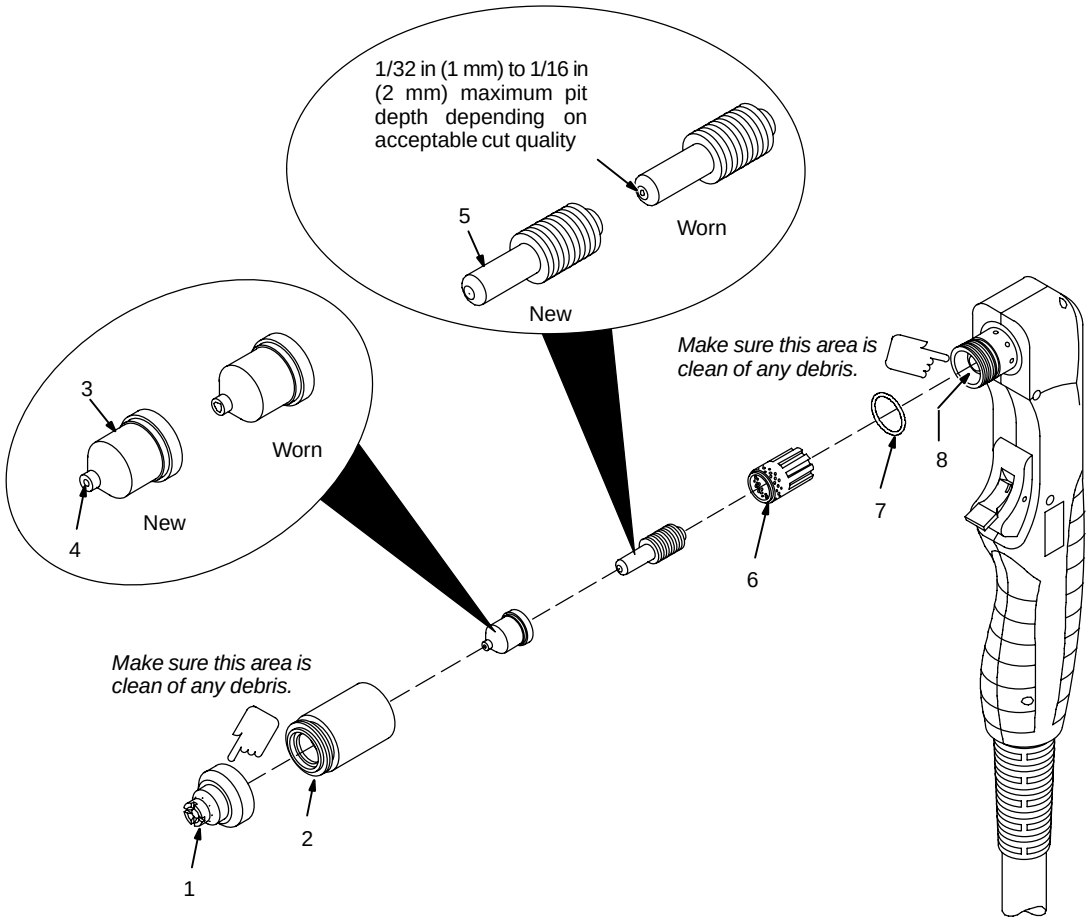


Overtightening will strip threads. Do not overtighten electrode, tip, and retaining cup during assembly. Do not cross-thread parts causing stripping. Use care during torch assembly and parts replacement.

Inspect shield cup, tip, and electrode for wear before cutting or whenever cutting speed has been significantly reduced. Do not operate torch without a tip or electrode in place. Be sure to use genuine replacement parts.

A good practice is to replace both the tip and electrode at the same time.

Turn Off power source before checking torch parts.



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Turn Off power source.

1 Drag Shield

Check this area for any debris or foreign material. Clean out if necessary.

2 Retaining Cup

Remove retaining cup. Check retaining cup for cracks, and replace if necessary.

3 Tip

4 Opening

Remove tip. Check tip, and replace if opening is deformed or 50% oversize. If inside of tip is not clean and bright, clean with steel wool. Be sure to remove any pieces of steel wool afterwards.

5 Electrode

Check electrode. If center has a pit more than a 1/32 in (1 mm) deep, remove and replace electrode.

6 Swirl Ring

Remove swirl ring. Check ring, and replace if side holes are plugged.

7 O-Ring

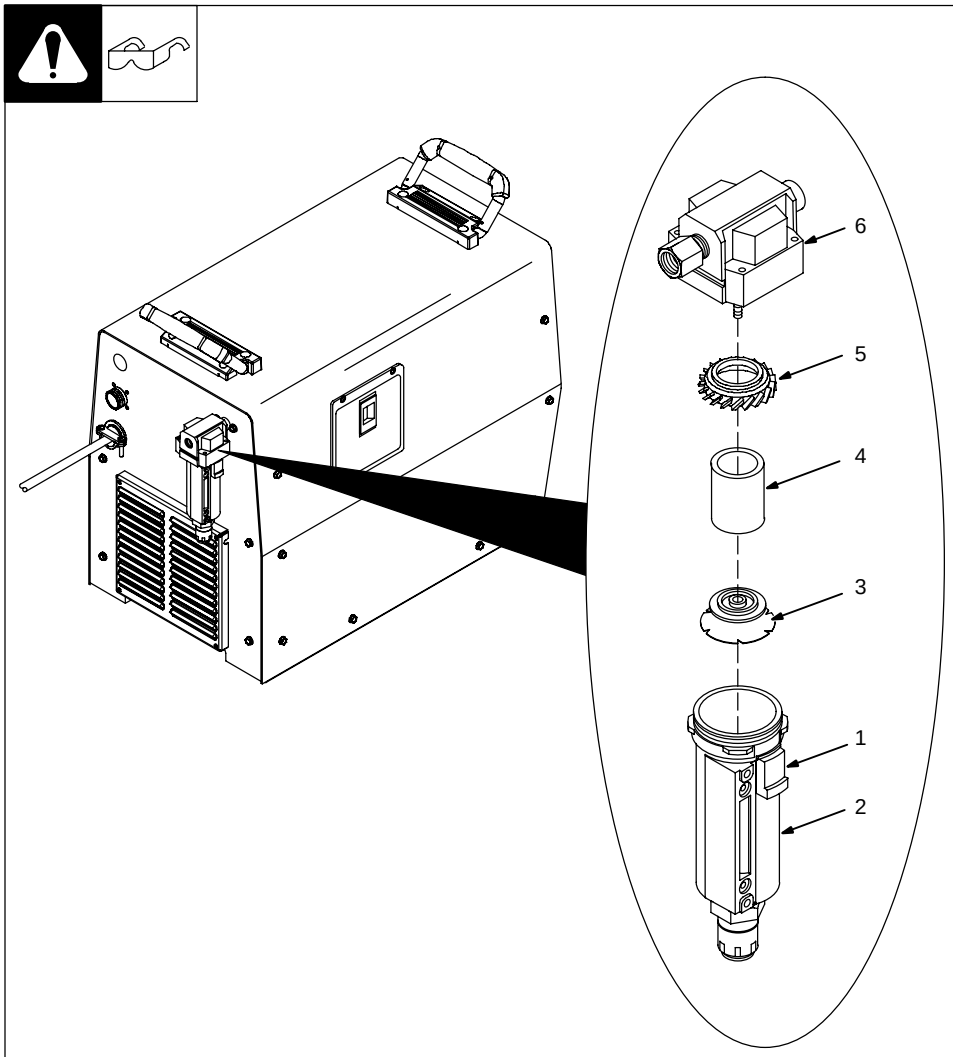
Check O-rings on torch. If needed, coat with thin film of silicone lubricant (part no. 169 231). Replace if damaged.

8 Plunger Area

Check this area for any debris or foreign material. Clean out if necessary.

Carefully reassemble parts in reverse order.

7-5. Checking Or Replacing Filter Element



1 Latch
2 Filter Cup
3 Retaining Nut
4 Filter Element
5 Defuser Ring
6 Filter Cap

Slide latch down, and rotate filter cup approximately 1/4 turn.

Remove cup.

Remove retaining nut, filter element, and defuser ring.

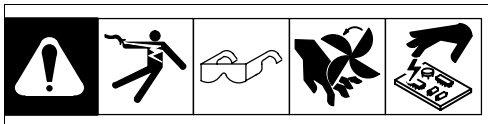
Check filter element for dirt and moisture, and replace if necessary.

Be sure that all parts are clean and dry.

Reinstall all parts, and secure filter cup.

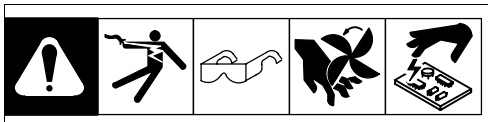
804 054-A

7-6. Troubleshooting Power Source



Trouble	Remedy
No pilot arc; difficulty in establishing an arc.	Clean or replace worn consumables as necessary (see torch Owner's Manual).
	Check for damaged torch or torch cable (see torch Owner's Manual).
	Check position of cut/gouge switch. If using cutting consumables, be sure that switch is in the CUT position. If using gouging consumables, be sure that switch is in the GOUGE position.
No cutting output; Power light off; Trouble lights off; Ready light off; fan motor FM does not run.	Place Power switch in On position.
	Place line disconnect device in On position (see Section 4-7).
	Check line fuse(s) and replace if needed or reset circuit breakers (see Section 4-9).
Pilot arc working; no cutting output; Power light on; Trouble lights off; fan motor running.	Be sure work clamp is connected.
	Clean or replace worn consumables as necessary (see torch Owner's Manual).
No gas/air flow; Power light on; Trouble lights off; fan motor running.	Have Factory Authorized Service Agent check for proper torch connections. Check operation of gas valve AS1, and check gas/air system for leaks. Check filter element (see Section 7-5).
Pressure Trouble light On.	Check for correct gas/air pressure adjustment (see Section 5-2).
	Check for sufficient gas/air supply pressure (see Section 4-5).
	Check for dirty air filter/regulator and replace, if necessary (see manufacturer's instructions).
	Check air lines for leaks.
	Have Factory Authorized Service Agent check pressure switch and control board.
Cup Trouble light On.	Check torch shield cup (see Section 7-3). Reset power switch.
	Have Factory Authorized Service Agent check for proper torch connections.
Temperature Trouble light On.	Unit overheating. Allow fan to run; the Trouble light goes out when the unit has cooled.
	Have Factory Authorized Service Agent check control board.
Trouble lights not working.	Have Factory Authorized Service Agent check unit.
Power light flashing, Trouble lights off.	Reset power switch. Have qualified technician check input line power. Make sure line power is three phase. Single phase power will cause an incorrect power condition.
Pressure trouble light flashes.	Unit lost pressure (momentarily) while cutting. Check air line for leaks.
Short tip life.	Check and clean drag shield of any slag, particles, and debris.
	Check position of cut/gouge switch. Place switch in correct position to match the process.
	Check for correct gas/air pressure adjustment (see Section 5-2).

7-7. Troubleshooting Torch



Trouble	Remedy
Arc goes on and off while cutting.	Torch travel speed too slow; increase travel speed (see Section 5-5). Clean or replace torch consumables as necessary (see Section 7-4). Be sure work clamp is securely attached to workpiece.
Arc goes out while cutting.	Be sure work clamp is securely attached to workpiece. Make sure tip is on or near [1/16 in (1.6 mm) to 1/8 in (3.2 mm)] workpiece (see Section 5-5). Clean or replace torch consumables as necessary (see Section 7-4).
Sparks come out top of cut or cut is not clean.	Torch travel speed too fast; reduce travel speed (see Section 5-5). Clean or replace torch consumables as necessary (see Section 7-4). Be sure work clamp is securely attached to workpiece. Unit not capable of cutting metals thicker than rating (see Section 4-3).
Trouble lights are on; unit has no cutting output.	Check torch consumables. Check for gas/air flow at torch. Check air supply connection and pressure to unit and torch. Reset unit Power switch. Have Factory Authorized Service Agent check torch and connections inside unit.

SECTION 8 − ELECTRICAL DIAGRAM

⚠ WARNING	• Do not touch live electrical parts. • Disconnect input power or stop engine before servicing. • Do not operate with covers removed. • Have only qualified persons install, use, or service this unit.
ELECTRIC SHOCK HAZARD	

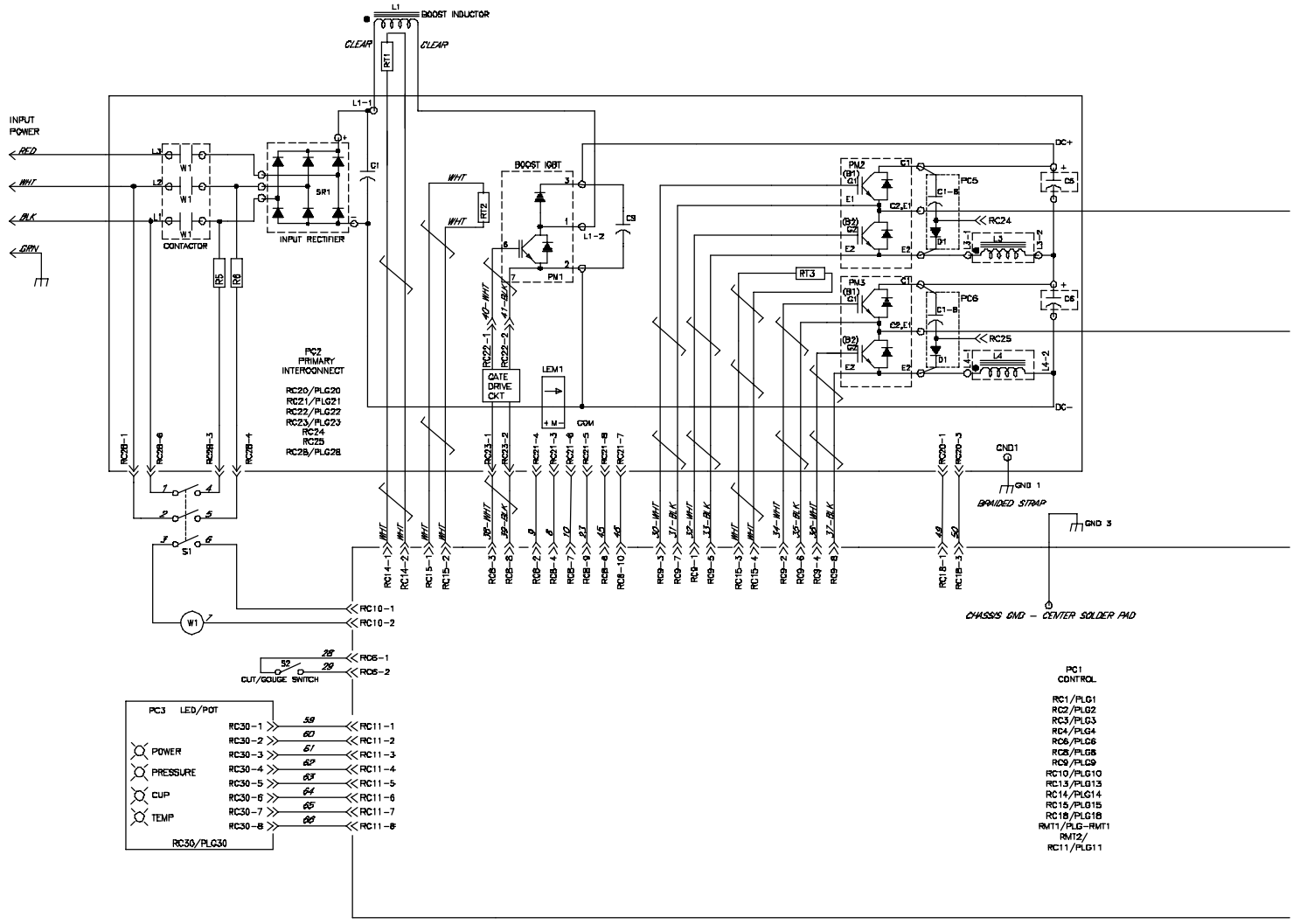
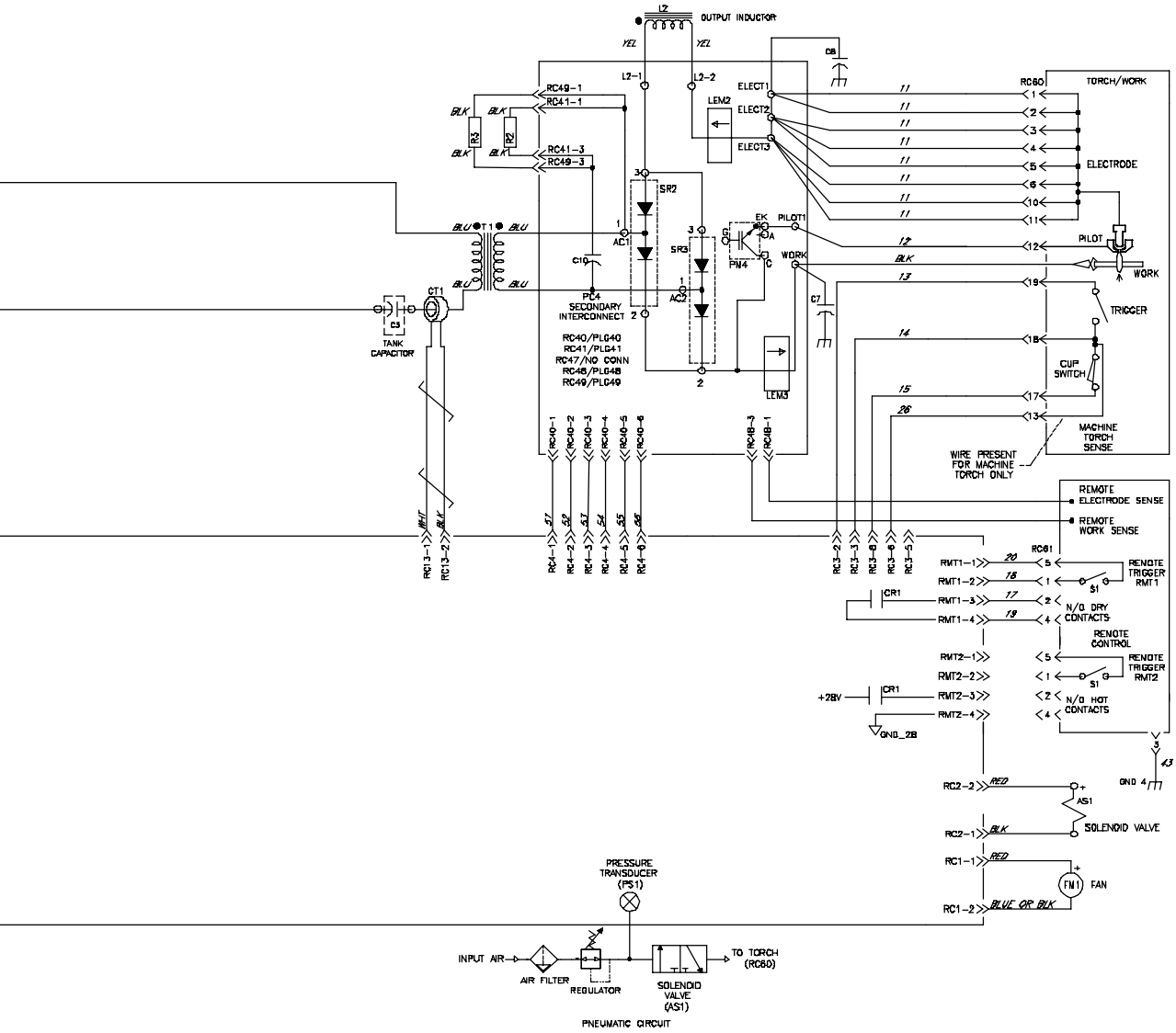


Figure 8-1. Circuit Diagram For Power Source



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SECTION 9 − PARTS LIST

9-1. Recommended Spare Parts

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Recommended Spare Parts	
. . . . .		224749	. . COVER ASSY (including)	1
. . . . .		223835	. . . . LABEL,ICE 100T CONSUMABLES	1
. . . . .		215089	. . FILTER,AIR ELEMENT 5 MICRON	1
. . . . .		223834	. . CABLE,WORK 25 FT 4 GA W/CLAMP STRAIN RLF & TERM (including) . .	1
. . . . .		201846	. . CABLE,WORK 50 FT NO 4 W/CLAMP STRAIN RLF & TERM (including) . .	1
. . . . .		213619	. . . . CLAMP,WORK 300 AMP STL CHROME PLD W/COP CONTACTS	1
. . . . .		134900	. . . . STRAIN RELIEF,CABLE FLEXIBLE .270−.480 CABLE	1
. . . . .		225702	. . ICE−100T 25 FT HAND HELD REPLACEMENT TORCH	1
. . . . .		225704	. . ICE−100T 50 FT HAND HELD REPLACEMENT TORCH	1
. . . . .		225706	. . ICE−100TM 25 FT MACHINE REPLACEMENT TORCH	1
. . . . .		225708	. . ICE−100TM 50 FT MACHINE REPLACEMENT TORCH	1

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Item No.	Part No.	Description
1	215 594	Handle w/Screws (1)
2	215 478	Switch, cup sensor (1)
3	223 775	Torch Head Repair Kit (1)
4	185 833	Switch Assy w/Spring (1)
5	190 220	Trigger Spring (1)
6	215 592	Switch Trigger (1)
7	223 774	Main Body w/Switch (1)
8	223 612	Torch Lead, 25ft (1)
8	223 613	Torch Lead, 50ft (1)

Item No.	Part No.	Description
9	215 606	Clip, retaining (1)
10	212 735	O-Ring, main body (1)
	169 231	Grease, silicon
	225 702	Torch, replacement 25ft (1)
	225 704	Torch, replacement 50ft (1)

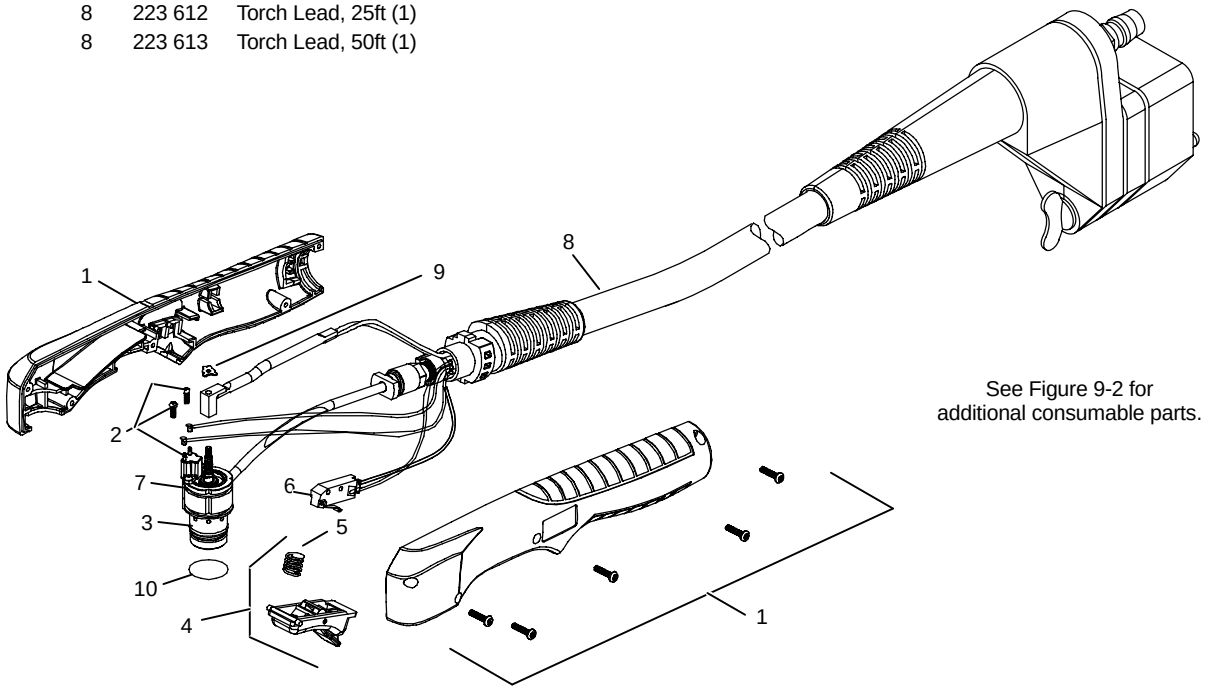

Figure 9-1. Torch, ICE-100T

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

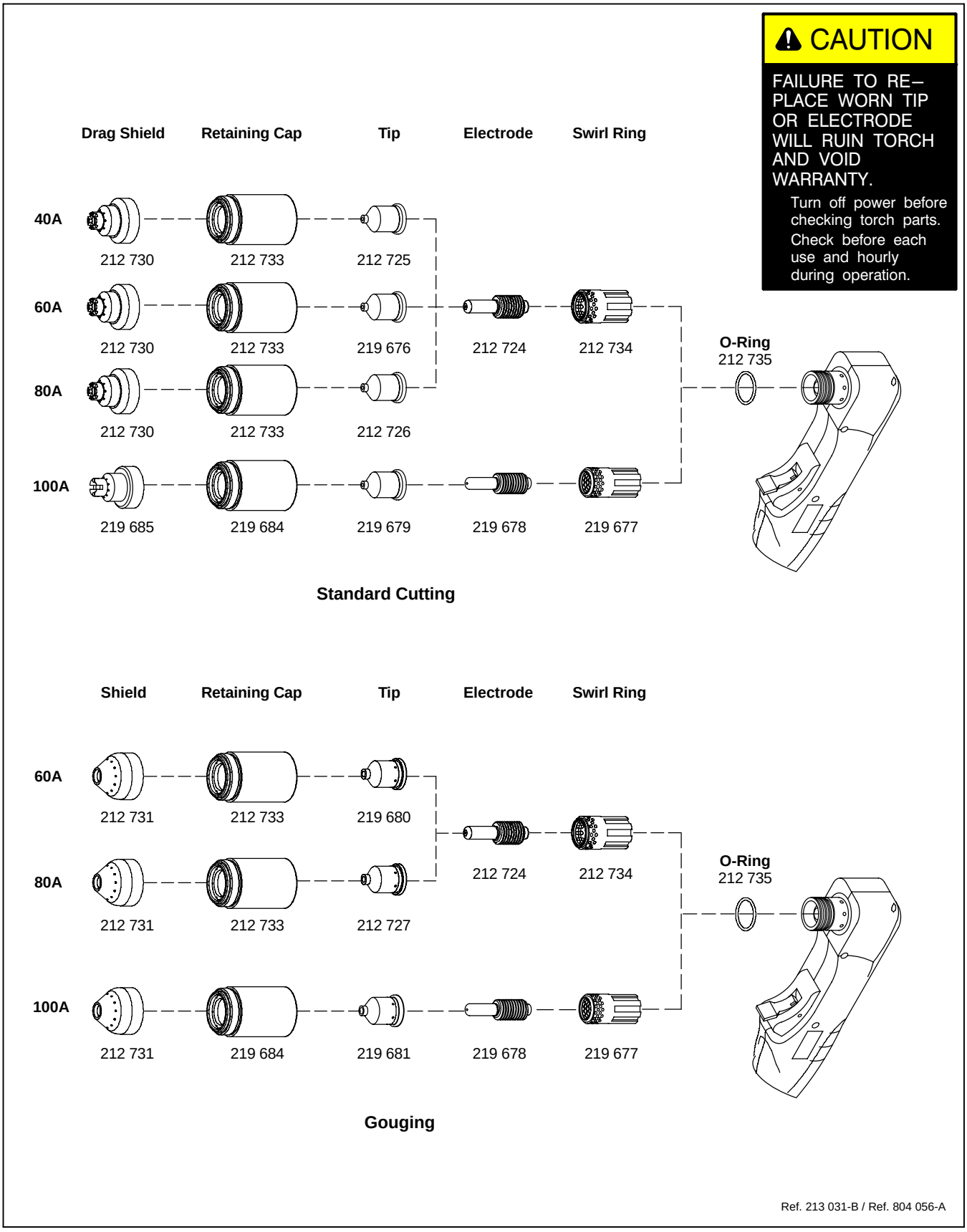

Figure 9-2. Consumable Parts For ICE-100T

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

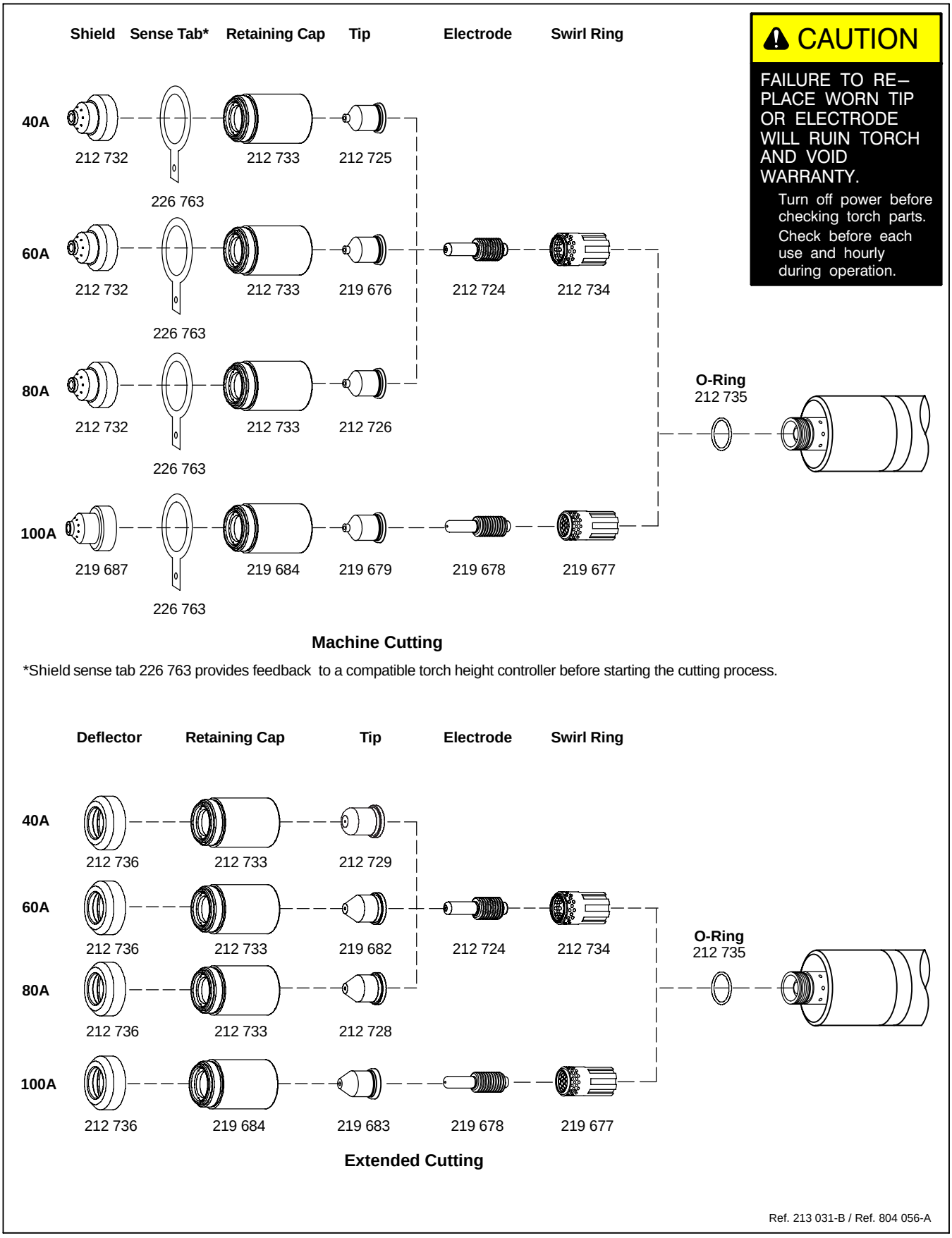

Figure 9-3. Consumable Parts For ICE-100TM

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Item No.	Part No.	Description
1	215 607	Sleeve, torch position (1)
2	223 614	Torch Lead, 25ft (1)
2	223 615	Torch Lead, 50ft (1)
3	215 599	Torch Sleeve (1)
4	223 773	Main Body w/Switch (1)
5	195 513	Remote Pendant Control (1)
6	215 478	Switch, cup sensor (1)
	225 706	Torch, replacement 25ft (1)
	225 708	Torch, replacement 50ft (1)
	220 240	Cable, remote control trigger 25ft (1)
	220 241	Cable, remote voltage sense 26.5ft (1)

See Figure 9-3 for additional consumable parts.

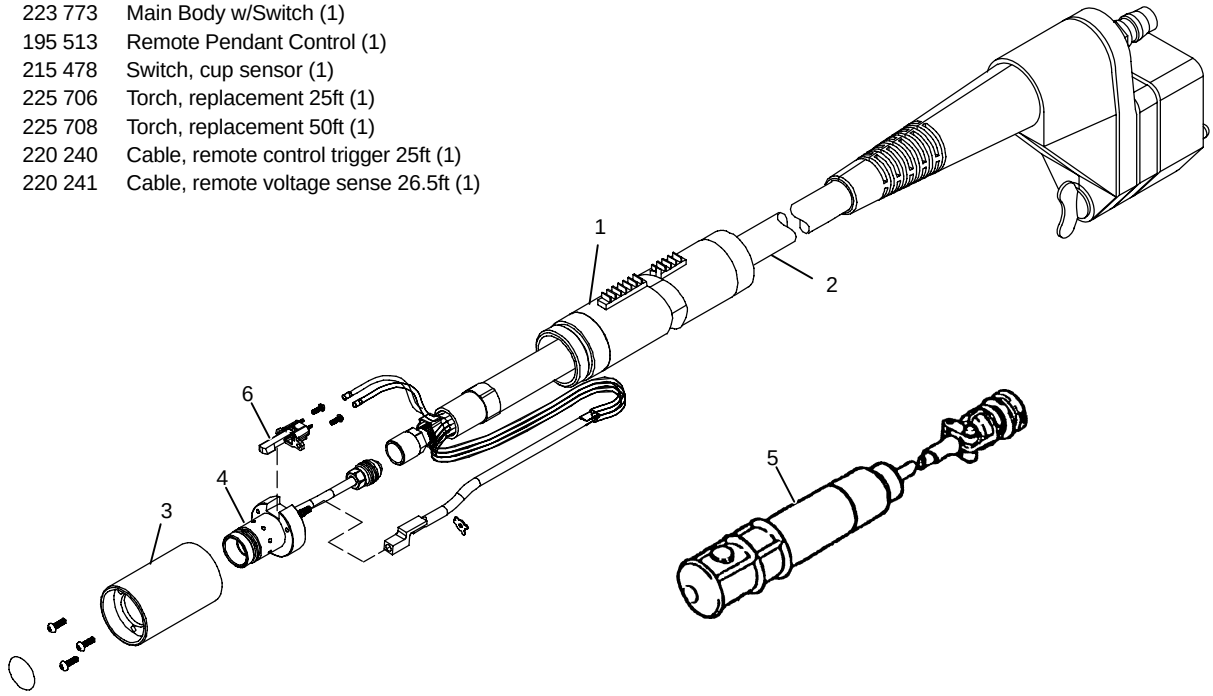

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Figure 9-4. Torch, ICE-100TM

NOTE ☞	*A complete Parts List is available on-liine at www.MillerWelds.com*

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Notes

Warranty Questions?

Call
1-800-4-A-MILLER
for your local
Miller distributor.

Your distributor also gives you ...

Service
You always get the fast, reliable response you need. Most replacement parts can be in your hands in 24 hours.

Support
Need fast answers to the tough welding questions? Contact your distributor. The expertise of the distributor and Miller is there to help you, every step of the way.

Miller

TRUE BLUE® WARRANTY

Effective January 1, 2007
(Equipment with a serial number preface of “LH” or newer)

This limited warranty supersedes all previous Miller warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY − Subject to the terms and conditions below, Miller Electric Mfg. Co., Appleton, Wisconsin, warrants to its original retail purchaser that new Miller equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by Miller. 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, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

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 end-user purchaser, and not to exceed one year after the equipment is shipped to a North American distributor or eighteen months after the equipment is shipped to an International distributor.

1. 5 Years Parts — 3 Years Labor
   * Original main power rectifiers
2. 3 Years — Parts and Labor
   * Transformer/Rectifier Power Sources
   * Plasma Arc Cutting Power Sources
   * Process Controllers
   * Semi-Automatic and Automatic Wire Feeders
   * Inverter Power Sources (Unless Otherwise Stated)
   * Water Coolant Systems (Integrated)
   * Intellitig
   * Engine Driven Welding Generators **(NOTE: Engines are warranted separately by the engine manufacturer.)**
3. 1 Year — Parts and Labor Unless Specified
   * Motor Driven Guns (w/exception of Spoolmate Spoolguns)
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources, Coolers, and Electronic Controls/Recorders
   * Water Coolant Systems (Non-Integrated)
   * Flowgauge and Flowmeter Regulators (No Labor)
   * HF Units
   * Grids
   * Spot Welders
   * Load Banks
   * Arc Stud Power Sources & Arc Stud Guns
   * Racks
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
   * Bernard-Branded Mig Guns (No Labor)
   * Weldcraft-Branded TIG Torches (No Labor)
   * Subarc Wire Drive Assemblies
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches and Subarc (SAW) Guns
   * Induction Heating Coils and Blankets, Cables, and Non-Electronic Controls
   * APT & SAF Model Plasma Cutting Torches
   * Remote Controls
   * Accessory (Kits)
   * Replacement Parts (No labor)
   * Spoolmate Spoolguns
   * Canvas Covers

Miller’s True Blue® Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear. (Exception: brushes, slip rings, and relays are covered on Bobcat, Trailblazer, and Legend models.)**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer’s warranty, if any.
3. Equipment that has been modified by any party other than 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.

MILLER PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller’s option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer’s risk and expense. Miller’s option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a Miller authorized service facility as determined by Miller. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT TORT OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MILLER IS EXCLUDED AND DISCLAIMED BY MILLER.

Some states in the U.S.A. do not allow limitations of how long an implied warranty lasts, or the exclusion of incidental, indirect, special or consequential damages, so the above limitation or exclusion may not apply to you. This warranty provides specific legal rights, and other rights may be available, but may vary from state to state.

In Canada, legislation in some provinces provides for certain additional warranties or remedies other than as stated herein, and to the extent that they may not be waived, the limitations and exclusions set out above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary from province to province.

Owner's Record

Please complete and retain with your personal records.

Model Name	Serial/Style Number
Purchase Date	(Date which equipment was delivered to original customer.)
Distributor	
Address	
City	
State	Zip

For Service

Contact a DISTRIBUTOR or SERVICE AGENCY near you.

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:	Welding Supplies and Consumables Options and Accessories Personal Safety Equipment Service and Repair Replacement Parts Training (Schools, Videos, Books) Technical Manuals (Servicing Information and Parts) Circuit Diagrams Welding Process Handbooks To locate a Distributor or Service Agency visit www.millerwelds.com or call 1-800-4-A-Miller
Contact the Delivering Carrier to:	File a claim for loss or damage during shipment. For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.

Miller Electric Mfg. Co.
An Illinois Tool Works Company
1635 West Spencer Street
Appleton, WI 54914 USA

International Headquarters–USA
USA Phone: 920-735-4505 Auto-Attended
USA & Canada FAX: 920-735-4134
International FAX: 920-735-4125

European Headquarters – United Kingdom
Phone: 44 (0) 1204-593493
FAX: 44 (0) 1204-598066

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