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2008-04

Processes



MIG (GMAW) Welding

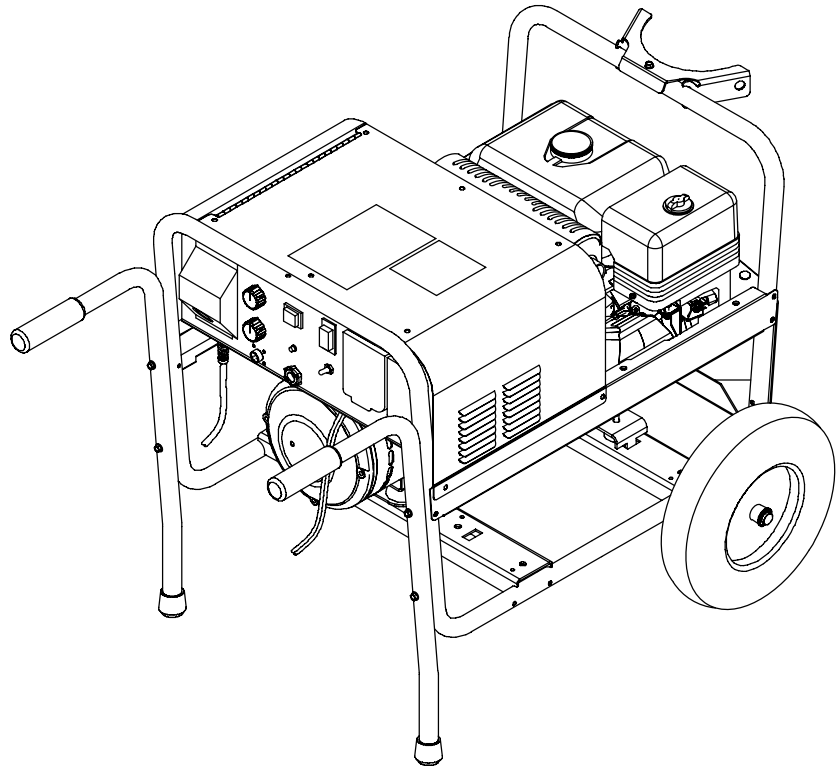
Flux Cored (FCAW) Welding

Description



Engine Driven Welding Power Source/
Wire Feeder/Generator

Renegade™ 180



OWNER'S MANUAL

File: Engine Drive



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From Miller to You

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.



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

Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual specification sheets. **To locate your nearest distributor or service agency call 1-800-4-A-Miller, or visit us at www.MillerWelds.com on the web.**



Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.



TABLE OF CONTENTS

SECTION 1 – SAFETY PRECAUTIONS – READ BEFORE USING	1
1-1. Symbol Usage	1
1-2. Arc Welding Hazards	1
1-3. Engine Hazards	3
1-4. Compressed Air Hazards	3
1-5. Additional Symbols For Installation, Operation, And Maintenance	4
1-6. California Proposition 65 Warnings	5
1-7. Principal Safety Standards	5
1-8. EMF Information	5
SECTION 2 – CONSIGNES DE SÉCURITÉ – LIRE AVANT UTILISATION	6
2-1. Signification des symboles	6
2-2. Dangers relatifs au soudage à l'arc	6
2-3. Dangers existant en relation avec le moteur	8
2-4. Dangers liés à l'air comprimé	9
2-5. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance	9
2-6. Proposition californienne 65 Avertissements	11
2-7. Principales normes de sécurité	11
2-8. Information EMF	11
SECTION 3 – DEFINITIONS	12
SECTION 4 – SPECIFICATIONS	12
4-1. Description	12
4-2. Weld, Power, And Engine Specifications	12
4-3. Gun Specifications	13
4-4. Dimensions, Weights, And Operating Angles	13
4-5. Volt-Ampere Curves	13
4-6. Fuel Consumption	14
4-7. Power Source Duty Cycle	14
4-8. Gun Duty Cycle And Overheating	15
4-9. Generator Power Curve	15
SECTION 5 – INSTALLATION	16
5-1. Installing Welding Generator	16
5-2. Grounding Generator When Supplying Building Systems	17
5-3. Connecting The Battery (Electric Start Models Only)	17
5-4. Engine Prestart Checks	18
5-5. Installing Welding Gun	19
5-6. Work Cable Routing Inside Unit	19
5-7. Weld Process/Polarity Table	20
5-8. Changing Weld Polarity	20
5-9. Connecting Single-Phase, 230 Volt AC Utility Input Power	21
5-10. Electrical Service Guide	22
5-11. Installing Wire Spool And Adjusting Hub Tension	22
5-12. Threading The Welding Gun	24
SECTION 6 – OPERATING THE WELDING GENERATOR	26
6-1. Controls (See Section 6-2)	26
6-2. Description Of Controls (See Section 6-1)	27
6-3. Stainless Steel And 100% CO2 Weld Parameters	27
6-4. Weld Parameter Chart	28
SECTION 7 – OPERATING AUXILIARY EQUIPMENT	30
7-1. Generator Power Panel Receptacles	30

TABLE OF CONTENTS

SECTION 8 – MAINTENANCE	31
8-1. Power Source Routine Maintenance	31
8-2. Gun Routine Maintenance	32
8-3. Welding Power Source Overload Protection	32
8-4. Drive Motor Protection And Tip Saver/Short Circuit Protection	32
8-5. Changing Drive Roll Or Wire Inlet Guide	33
8-6. Replacing Gun Contact Tip	33
8-7. Maintaining Gun	34
8-8. Replacing Switch And/Or Head Tube	35
8-9. Servicing Air Cleaner	36
8-10. Adjusting Engine Speed	37
SECTION 9 – TROUBLESHOOTING	38
SECTION 10 – PARTS LIST	40
10-1. Recommended Spare Parts	40
SECTION 11 – ELECTRICAL DIAGRAMS	41
SECTION 12 – MIG WELDING (GMAW) GUIDELINES	42
SECTION 13 – GENERATOR POWER GUIDELINES	51
COMPLETE PARTS LIST - www.MillerWelds.com	
OPTIONS AND ACCESSORIES	
WARRANTY	

SECTION 1 – SAFETY PRECAUTIONS – READ BEFORE USING

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 Protect yourself and others from injury — read and follow these precautions.

1-1. Symbol Usage



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



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

NOTICE – Indicates statements not related to personal injury.

 Indicates special instructions.



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

1-2. Arc Welding 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 1-7. Read and follow all Safety Standards.



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



During operation, keep everybody, especially children, away.



ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. 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 use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Additional safety precautions are required when any of the following electrically hazardous conditions are present: in damp locations or while wearing wet clothing; on metal structures such as floors, gratings, or scaffolds; when in cramped positions such as sitting, kneeling, or lying; or when there is a high risk of unavoidable or accidental contact with the workpiece or ground. For these conditions, use the following equipment in order presented: 1) a semiautomatic DC constant voltage (wire) welder, 2) a DC manual (stick) welder, or 3) an AC welder with reduced open-circuit voltage. In most situations, use of a DC, constant voltage wire welder is recommended. And, do not work alone!
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.

- Always verify the supply ground — 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.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Keep cords dry, free of oil and grease, and protected from hot metal and sparks.
- 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.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Do not touch electrode holders connected to two welding machines at the same time since double open-circuit voltage will be present.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

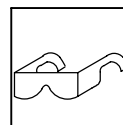
SIGNIFICANT DC VOLTAGE exists in inverters after stopping engine.

- Stop engine on inverter and discharge input capacitors according to instructions in Maintenance Section before touching any parts.



HOT PARTS can cause severe burns.

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



FLYING METAL or DIRT can injure eyes.

- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.



FUMES AND GASES can be hazardous.

Welding 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 welding 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 instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watch-person nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld 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 weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.



BUILDUP OF GAS can injure or kill.

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



ARC RAYS can burn eyes and skin.

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

- Wear an approved welding helmet fitted with a proper shade of filter lenses to protect your face and eyes from arc rays and sparks when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- 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.



WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Do not weld where flying sparks can strike flammable material.
- Protect yourself and others from flying sparks and hot metal.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.

- Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- Do not weld where the atmosphere may contain flammable dust, gas, or liquid vapors (such as gasoline).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock, sparks, and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.
- After completion of work, inspect area to ensure it is free of sparks, glowing embers, and flames.
- Use only correct fuses or circuit breakers. Do not oversize or bypass them.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.



NOISE can damage hearing.

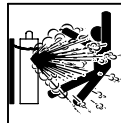
Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.



MAGNETIC FIELDS can affect Implanted Medical Devices.

- Wearers of Pacemakers and other Implanted Medical Devices should keep away.
- Implanted Medical Device wearers should consult their doctor and the device manufacturer before going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations.



CYLINDERS can explode if damaged.

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

- Protect compressed gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder — explosion will result.
- Use only correct shielding 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. Engine Hazards



BATTERY EXPLOSION can BLIND.

- Always wear a face shield, rubber gloves, and protective clothing when working on a battery.
- Stop engine before disconnecting or connecting battery cables or servicing battery.
- Do not allow tools to cause sparks when working on a battery.
- Do not use welder to charge batteries or jump start vehicles.
- Observe correct polarity (+ and -) on batteries.
- Disconnect negative (-) cable first and connect it last.



FUEL can cause fire or explosion.

- Stop engine and let it cool off before checking or adding fuel.
- Do not add fuel while smoking or if unit is near any sparks or open flames.
- Do not overfill tank — allow room for fuel to expand.
- Do not spill fuel. If fuel is spilled, clean up before starting engine.
- Dispose of rags in a fireproof container.
- Always keep nozzle in contact with tank when fueling.



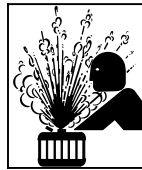
MOVING PARTS can cause injury.

- Keep away from fans, belts, and rotors.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Stop engine before installing or connecting unit.
- Have only qualified people remove doors, panels, covers, or guards for maintenance and troubleshooting as necessary.
- To prevent accidental starting during servicing, disconnect negative (-) battery cable from battery.
- Keep hands, hair, loose clothing, and tools away from moving parts.
- Reinstall doors, panels, covers, or guards when servicing is finished and before starting engine.
- Before working on generator, remove spark plugs or injectors to keep engine from kicking back or starting.
- Block flywheel so that it will not turn while working on generator components.



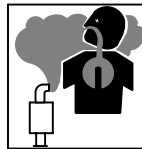
HOT PARTS can cause severe burns.

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



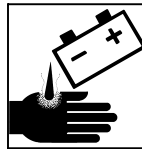
STEAM AND HOT COOLANT can burn.

- If possible, check coolant level when engine is cold to avoid scalding.
- Always check coolant level at overflow tank, if present on unit, instead of radiator (unless told otherwise in maintenance section or engine manual).
- If the engine is warm, checking is needed, and there is no overflow tank, follow the next two statements.
- Wear safety glasses and gloves and put a rag over radiator cap.
- Turn cap slightly and let pressure escape slowly before completely removing cap.



Using a generator indoors CAN KILL YOU IN MINUTES.

- Generator exhaust contains carbon monoxide. This is a poison you cannot see or smell.
- NEVER use inside a home or garage, EVEN IF doors and windows are open.
- Only use OUTSIDE and far away from windows, doors, and vents.



BATTERY ACID can BURN SKIN and EYES.

- Do not tip battery.
- Replace damaged battery.
- Flush eyes and skin immediately with water.



ENGINE HEAT can cause fire.

- Do not locate unit on, over, or near combustible surfaces or flammables.
- Keep exhaust and exhaust pipes way from flammables.



EXHAUST SPARKS can cause fire.

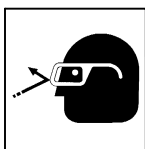
- Do not let engine exhaust sparks cause fire.
- Use approved engine exhaust spark arrestor in required areas — see applicable codes.

1-4. Compressed Air Hazards



BREATHING COMPRESSED AIR can cause serious injury or death.

- Do not use compressed air for breathing.
- Use only for cutting, gouging, and tools.



COMPRESSED AIR can cause injury.

- Wear approved safety goggles.
- Do not direct air stream toward self or others.



TRAPPED AIR PRESSURE AND WHIPPING HOSES can cause injury.

- Release air pressure from tools and system before servicing, adding or changing attachments, or opening compressor oil drain or oil fill cap.



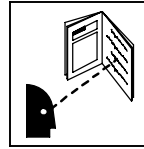
HOT METAL from air arc cutting and gouging can cause fire or explosion.

- Do not cut or gouge near flammables.
- Watch for fire; keep extinguisher nearby.



HOT PARTS can cause burns and injury.

- Do not touch hot compressor or air system parts.
- Let system cool down before touching or servicing.



READ INSTRUCTIONS.

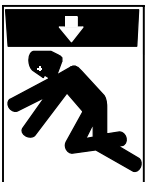
- Read Owner's Manual before using or servicing unit.
- Stop engine and release air pressure before servicing.
- Use only genuine replacement parts from the manufacturer.

1-5. Additional Symbols For Installation, Operation, And Maintenance



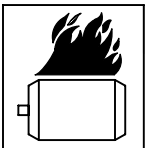
FIRE OR EXPLOSION hazard.

- Do not install or place 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.



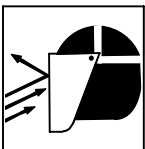
FALLING UNIT can cause injury.

- Use lifting eye to lift unit and properly installed accessories only, NOT gas cylinders. Do not exceed maximum lift eye weight rating (see Specifications).
- Lift and support unit only with proper equipment and correct procedures.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.



OVERHEATING can damage motors.

- Turn off or unplug equipment before starting or stopping engine.
- Do not let low voltage and frequency caused by low engine speed damage electric motors.
- Do not connect 50 or 60 Hertz motors to the 100 Hertz receptacle where applicable.



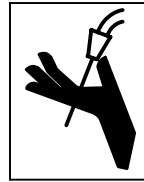
FLYING SPARKS can cause injury.

- Wear a face shield to protect eyes and face.
- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand, and body protection.
- Sparks can cause fires — keep flammables away.



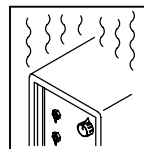
MOVING PARTS can cause injury.

- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.



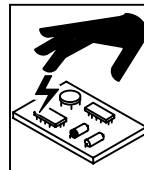
WELDING WIRE can cause injury.

- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.



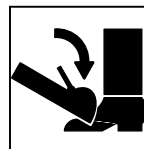
OVERUSE can cause OVERHEATING.

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.



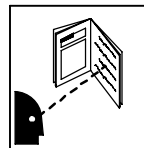
STATIC (ESD) can damage PC boards.

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



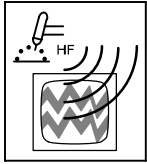
TILTING OF TRAILER can cause injury.

- Use tongue jack or blocks to support weight.
- Properly install welding generator onto trailer according to instructions supplied with trailer.



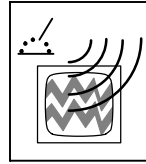
READ INSTRUCTIONS.

- Read Owner's Manual before using or servicing unit.
- Use only genuine replacement parts from the manufacturer.
- Perform engine and air compressor maintenance and service according to this manual and the engine/air compressor (if applicable) manuals.



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 WELDING can cause interference.

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

1-6. California Proposition 65 Warnings

- Warning:** 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.)
- Warning:** 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:

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

For Diesel Engines:

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

1-7. 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 Safe Practices for the Preparation for Welding and Cutting of Containers and Piping, 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, P.O. Box 9101, Quincy, MA 02269-9101 (phone: 617-770-3000, website: www.nfpa.org and www.sparky.org).

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 4221 Walney Road, 5th Floor, Chantilly, VA 20151 (phone: 703-788-2700, website: www.cganet.com).

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 5060 Mississauga,

Ontario, Canada L4W 5NS (phone: 800-463-6727 or in Toronto 416-747-4044, website: www.csa-international.org).

Safe Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002 (phone: 212-642-4900, website: www.ansi.org).

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, from National Fire Protection Association, P.O. Box 9101, 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 15250-7954 (phone: 1-866-512-1800) (there are 10 Regional Offices—phone for Region 5, Chicago, is 312-353-2220, website: www.osha.gov).

1-8. EMF Information

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

Welding current, as it flows through welding 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, or using a cable cover.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

About Implanted Medical Devices:

Implanted Medical Device wearers should consult their doctor and the device manufacturer before performing or going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations. If cleared by your doctor, then following the above procedures is recommended.

SECTION 2 – CONSIGNES DE SÉCURITÉ – LIRE AVANT UTILISATION

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⚠ Se protéger, ainsi que toute autre personne travaillant sur les lieux, contre les étincelles et le métal chaud.

2-1. Signification des symboles



DANGER! – Indique une situation dangereuse qui si on l'évite pas peut donner la mort ou des blessures graves. Les dangers possibles sont montrés par les symboles joints ou sont expliqués dans le texte.



Indique une situation dangereuse qui si on l'évite pas peut donner la mort ou des blessures graves. Les dangers possibles sont montrés par les symboles joints ou sont expliqués dans le texte.

NOTE – Indique des déclarations pas en relation avec des blessures personnelles.

Indique des instructions spécifiques.



Ce groupe de symboles veut dire Avertissement! Attention! DANGER DE CHOC ELECTRIQUE, PIECES EN MOUVEMENT, et PIECES CHAUDES. Consulter les symboles et les instructions ci-dessous y afférant pour les actions nécessaires afin d'éviter le danger.

2-2. Dangers relatifs au soudage à l'arc



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 2-7. 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.



UN CHOC ÉLECTRIQUE peut tuer.

Un simple contact avec des pièces électriques peut provoquer une électrocution ou des blessures graves. L'électrode et le circuit de soudage sont sous tension

dès que l'appareil est sur ON. Le circuit d'entrée et les circuits internes de l'appareil sont également sous tension à ce moment-là. En soudage semi-automatique ou automatique, le fil, le dévidoir, le logement des galets d'entraînement et les pièces métalliques en contact avec le fil de soudage sont sous tension. Des matériels mal installés ou mal mis à la terre présentent un danger.

- Ne jamais toucher les pièces électriques sous tension.
- Porter des gants et des vêtements de protection secs ne comportant pas de trous.
- S'isoler de la pièce et de la terre au moyen de tapis ou d'autres moyens isolants suffisamment grands pour empêcher le contact physique éventuel avec la pièce ou la terre.
- Ne pas se servir de source électrique à courant électrique dans les zones humides, dans les endroits confinés ou là où on risque de tomber.
- Se servir d'une source électrique à courant électrique UNIQUEMENT si le procédé de soudage le demande.
- Si l'utilisation d'une source électrique à courant électrique s'avère nécessaire, se servir de la fonction de télécommande si l'appareil en est équipé.
- Des précautions de sécurité supplémentaires sont requises dans des environnements à risque comme: les endroits humides ou lorsque l'on porte des vêtements mouillés; sur des structures métalliques au sol, grillages et échafaudages; dans des positions assises, à genoux et allongées; ou quand il y a un risque important de contact accidentel avec la pièce ou le sol. Dans ces cas utiliser les appareils suivants dans l'ordre de préférence: 1) un poste à souder DC semi-automatique de type CV (MIG/MAG), 2) un poste à souder manuel (électrode enrobée) DC, 3) un poste à souder

manuel AC avec tension à vide réduite. Dans la plupart des cas, un poste courant continu de type CV est recommandé. Et, ne pas travailler seul!

- Couper l'alimentation ou arrêter le moteur avant de procéder à l'installation, à la réparation ou à l'entretien de l'appareil. Déverrouiller l'alimentation selon la norme OSHA 29 CFR 1910.147 (voir normes de sécurité).
- Installer et mettre à la terre correctement cet appareil conformément à son manuel d'utilisation et aux codes nationaux, provinciaux et municipaux.
- Toujours vérifier la terre du cordon d'alimentation – Vérifier et s'assurer que le fil de terre du cordon d'alimentation est bien raccordé à la borne de terre du sectionneur ou que la fiche du cordon est raccordée à une prise correctement mise à la terre.
- En effectuant les raccordements d'entrée fixer d'abord le conducteur de mise à la terre approprié et contre-vérifier les connexions.
- Les câbles doivent être exempts d'humidité, d'huile et de graisse; protégez-les contre les étincelles et les pièces métalliques chaudes.
- Vérifier fréquemment le cordon d'alimentation pour voir s'il n'est pas endommagé ou dénudé – remplacer le cordon immédiatement s'il est endommagé – un câble dénudé peut provoquer une électrocution.
- Mettre l'appareil hors tension quand on ne l'utilise pas.
- Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épissés.
- Ne pas enrouler les câbles autour du corps.
- Si la pièce soudée doit être mise à la terre, le faire directement avec un câble distinct – ne pas utiliser le connecteur de pièce ou le câble de retour.
- Ne pas toucher l'électrode quand on est en contact avec la pièce, la terre ou une électrode provenant d'une autre machine.
- Ne pas toucher des porte électrodes connectés à deux machines en même temps à cause de la présence d'une tension à vide doublée.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretien l'appareil conformément à ce manuel.
- Porter un harnais de sécurité quand on travaille en hauteur.
- Maintenir solidement en place tous les panneaux et capots.
- Fixer le câble de retour de façon à obtenir un bon contact métal-métal avec la pièce à souder ou la table de travail, le plus près possible de la soudure.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.

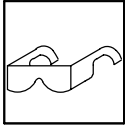
Une tension DC importante subsiste à l'intérieur des onduleurs après avoir coupé l'alimentation.

- Couper l'alimentation du poste et décharger les condensateurs d'entrée comme indiqué dans la Section Maintenance avant de toucher des composants.



DES PIÈCES CHAUDES peuvent provoquer des brûlures graves.

- Ne pas toucher à mains nues les parties chaudes.
- Prévoir une période de refroidissement avant de travailler à l'équipement.
- 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 PIÈCES DE METAL ou DES SALETES peuvent provoquer des blessures dans les yeux.

- Le soudage, l'écaillage, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.
- Porter des lunettes de sécurité avec écrans latéraux ou un écran facial.



LES FUMÉES ET LES GAZ peuvent être dangereux.

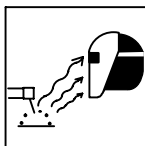
Le soudage génère des fumées et des gaz. Leur inhalation peut être dangereux pour votre santé.

- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- À l'intérieur, ventiler la zone et/ou utiliser une ventilation forcée au niveau de l'arc pour l'évacuation des fumées et des gaz de soudage.
- Si la ventilation est médiocre, porter 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 dégraissants.
- Travailler dans un espace fermé seulement s'il est bien ventilé ou en portant un respirateur à alimentation d'air. Demander toujours à un surveillant dûment formé de se tenir à proximité. Des fumées et des gaz de soudage peuvent déplacer l'air et abaisser le niveau d'oxygène provoquant des blessures ou des accidents mortels. S'assurer que l'air de respiration ne présente aucun danger.
- Ne pas souder dans des endroits situés à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur et les rayons de l'arc peuvent réagir en présence de vapeurs et former des gaz hautement toxiques et irritants.
- Ne pas souder des métaux munis d'un revêtement, tels que l'acier galvanisé, plaqué en plomb ou au cadmium à moins que le revêtement n'ait été enlevé dans la zone de soudure, que l'endroit soit bien ventilé, et en portant un respirateur à alimentation d'air. Les revêtements et tous les métaux renfermant ces éléments peuvent dégager des fumées toxiques en cas de soudage.



LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.

- Fermer l'alimentation du gaz protecteur en cas de non utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d'un respirateur d'adduction d'air homologué.



LES RAYONS DE L'ARC peuvent provoquer des brûlures dans les yeux et sur la peau.

Le rayonnement de l'arc du procédé de soudage génère des rayons visibles et invisibles intenses (ultraviolets et infrarouges) susceptibles de provoquer des brûlures dans les yeux et sur la peau. Des étincelles sont projetées pendant le soudage.

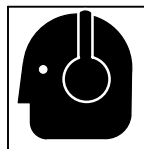
- Porter un casque de soudage approuvé muni de verres filtrants appropriés pour protéger visage et yeux pendant le soudage (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des lunettes de sécurité avec écrans latéraux même sous votre casque.
- Avoir recours à des écrans protecteurs ou à des rideaux pour protéger les autres contre les rayonnements les éblouissements et les étincelles ; prévenir toute personne sur les lieux de ne pas regarder l'arc.
- Porter des vêtements confectionnés avec des matières résistantes et ignifuges (cuir, coton lourd ou laine) et des bottes de protection.



LE SOUDAGE peut provoquer un incendie ou une explosion.

Le soudage effectué sur des conteneurs fermés tels que des réservoirs, tambours ou des conduites peut provoquer leur éclatement. Des étincelles peuvent être projetées de l'arc de soudure. La projection d'étincelles, des pièces chaudes et des équipements chauds peut provoquer des incendies et des brûlures. Le contact accidentel de l'électrode avec des objets métalliques peut provoquer des étincelles, une explosion, un surchauffement ou un incendie. Avant de commencer le soudage, vérifier et s'assurer que l'endroit ne présente pas de danger.

- Déplacer toutes les substances inflammables à une distance de 10,7 m de l'arc de soudage. En cas d'impossibilité les recouvrir soigneusement avec des protections homologués.
- Ne pas souder dans un endroit où des étincelles peuvent tomber sur des substances inflammables.
- Se protéger et d'autres personnes de la projection d'étincelles et de métal chaud.
- Des étincelles et des matériaux chauds du soudage peuvent facilement passer dans d'autres zones en traversant de petites fissures et des ouvertures.
- Surveiller tout déclenchement d'incendie et tenir un extincteur à proximité.
- Le soudage effectué sur un plafond, plancher, paroi ou séparation peut déclencher un incendie de l'autre côté.
- Ne pas effectuer le soudage sur des conteneurs fermés tels que des réservoirs, tambours, ou conduites, à moins qu'ils n'aient été préparés correctement conformément à AWS F4.1 (voir les normes de sécurité).
- Ne soudez pas si l'air ambiant est chargé de particules, gaz, ou vapeurs inflammables (vapeur d'essence, par exemple).
- Brancher le câble de masse sur la pièce la plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des risques d'électrocution, d'étincelles et d'incendie.
- Ne pas utiliser le poste de soudage pour dégeler des conduites gelées.
- En cas de non utilisation, enlever la baguette d'électrode du porte-électrode ou couper le fil à la pointe de contact.
- Porter des vêtements de protection dépourvus d'huile tels que des gants en cuir, une chemise en matériau lourd, des pantalons sans revers, des chaussures hautes et un couvre chef.
- Avant de souder, retirer toute substance combustible de vos poches telles qu'un allumeur au butane ou des allumettes.
- Une fois le travail achevé, assurez-vous qu'il ne reste aucune trace d'étincelles incandescentes ni de flammes.
- Utiliser exclusivement des fusibles ou coupe-circuits appropriés. Ne pas augmenter leur puissance; ne pas les ponter.
- Suivre les recommandations dans OSHA 1910.252(a)(2)(iv) et NFPA 51B pour les travaux à chaud et avoir de la surveillance et un extincteur à proximité.



LE BRUIT peut affecter l'ouïe.

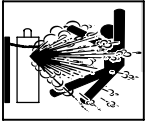
Le bruit des processus et des équipements peut affecter l'ouïe.

- Porter des protections approuvés pour les oreilles si le niveau sonore est trop élevé.



LES CHAMPS MAGNETIQUES peuvent affecter des implants médicaux.

- Porteur de simulateur cardiaque ou autre implants médicaux, rester à distance.
- Les porteurs d'implants doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de soudage par points, de gougeage, du coupage plasma ou de chauffage par induction.



Si des BOUTEILLES sont endommagées, elles pourront exploser.

Des bouteilles de gaz protecteur contiennent du gaz sous haute pression. Si une bouteille est endommagée, elle peut exploser. Du fait que les bouteilles de gaz font normalement partie du procédé de soudage, les manipuler avec précaution.

- Protéger les bouteilles de gaz comprimé d'une chaleur excessive, des chocs mécaniques, des dommages physiques, du laitier, des flammes ouvertes, des étincelles et des arcs.

- Placer les bouteilles debout en les fixant dans un support stationnaire ou dans un porte-bouteilles pour les empêcher de tomber ou de se renverser.
- Tenir les bouteilles éloignées des circuits de soudage ou autres circuits électriques.
- Ne jamais placer une torche de soudage sur une bouteille à gaz.
- Une électrode de soudage ne doit jamais entrer en contact avec une bouteille.
- Ne jamais souder une bouteille pressurisée – risque d'explosion.
- Utiliser seulement des bouteilles de gaz protecteur, régulateurs, tuyaux et raccords convenables pour cette application spécifique; les maintenir ainsi que les éléments associés en bon état.
- Ne pas tenir la tête en face de la sortie en ouvrant la soupape de la bouteille.
- Maintenir le chapeau de protection sur la soupape, sauf en cas d'utilisation ou de branchement de la bouteille.
- 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 existant en relation avec le moteur



L'EXPLOSION DE LA BATTERIE peut RENDRE AVEUGLE.

- Toujours porter une protection faciale, des gants en caoutchouc et vêtements de protection lors d'une intervention sur la batterie.
- Arrêter le moteur avant de débrancher ou de brancher les câbles de batterie.
- Eviter de provoquer des étincelles avec les outils en travaillant sur la batterie.
- Ne pas utiliser le poste de soudage pour charger les batteries ou des véhicules de démarrage rapide.
- Observer la polarité correcte (+ et -) sur les batteries.
- Débrancher le câble négatif (-) en premier lieu. Le rebrancher en dernier lieu.



LE CARBURANT MOTEUR peut provoquer un incendie ou une explosion.

- Arrêter le moteur avant de vérifier le niveau de carburant ou de faire le plein.
- Ne pas faire le plein en fumant ou proche d'une source d'étincelles ou d'une flamme nue.
- Ne pas faire le plein de carburant à ras bord; prévoir de l'espace pour son expansion.
- Faire attention de ne pas renverser de carburant. Nettoyer tout carburant renversé avant de faire démarrer le moteur.
- Jeter les chiffons dans un récipient ignifuge.
- Toujours garder le pistolet en contact avec le réservoir lors du remplissage.



DES ORGANES MOBILES peuvent provoquer des blessures.

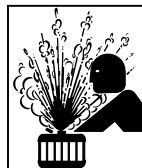
- Ne pas approcher les mains des ventilateurs, courroies et autres pièces en mouvement.
- Maintenir fermés et fixement en place les portes, panneaux, recouvrements et dispositifs de protection.
- Arrêter le moteur avant d'installer ou brancher l'appareil.

- Seules des personnes qualifiées sont autorisées à enlever les portes, panneaux, recouvrements ou dispositifs de protection pour effectuer, s'il y a lieu, des travaux d'entretien et de dépannage.
- Pour empêcher tout démarrage accidentel pendant les travaux d'entretien, débrancher le câble négatif (-) de batterie de la borne.
- Ne pas approcher les mains, cheveux, vêtements lâches et outils des organes mobiles.
- Remettre en place les panneaux ou les dispositifs de protection et fermer les portes à la fin des travaux d'entretien et avant de faire démarrer le moteur.
- Avant d'intervenir, déposer les bougies ou injecteurs pour éviter la mise en route accidentelle du moteur.
- Bloquer le volant moteur pour éviter sa rotation lors d'une intervention sur le générateur.



DES PIÈCES CHAUDES peuvent provoquer des brûlures graves.

- Ne pas toucher à mains nues les parties chaudes.
- Prévoir une période de refroidissement avant de travailler à l'équipement.
- Ne pas toucher aux pièces chaudes, utiliser les outils recommandés et porter des gants de soudage et des vêtements épais pour éviter les brûlures.



LA VAPEUR ET LE LIQUIDE DE REFROIDISSEMENT CHAUD peuvent provoquer des brûlures.

- Il est préférable de vérifier le liquide de refroidissement une fois le moteur refroidi pour éviter de se brûler.
- Toujours vérifier le niveau de liquide de refroidissement dans le vase d'expansion (si présent), et non dans le radiateur (sauf si précisé autrement dans la section maintenance du manuel du moteur).
- Si le moteur est chaud et que le liquide doit être vérifié, opérer comme suivant.
- Mettre des lunettes de sécurité et des gants, placer un torchon sur le bouchon du radiateur.
- Dévisser le bouchon légèrement et laisser la vapeur s'échapper avant d'enlever le bouchon.



L'utilisation d'un groupe autonome à l'intérieur PEUT VOUS TUER EN QUELQUES MINUTES.

- Les fumées d'un groupe autonome contient du monoxyde de carbone. C'est un poison invisible et inodore.
- JAMAIS utiliser dans une maison ou garage, même avec les portes et fenêtres ouvertes.
- Uniquement utiliser à l'EXTERIEUR, loin des portes, fenêtres et bouches aération.



L'ACIDE DE LA BATTERIE peut provoquer des brûlures dans les YEUX et sur la PEAU.

- Ne pas renverser la batterie.
- Remplacer une batterie endommagée.
- Rincer immédiatement les yeux et la peau à l'eau.



LA CHALEUR DU MOTEUR peut provoquer un incendie.

- Ne pas placer l'appareil sur, au-dessus ou à proximité de surfaces inflammables.
- Tenir à distance les produits inflammables de l'échappement.



LES ÉTINCELLES À L'ÉCHAPPEMENT peuvent provoquer un incendie.

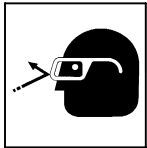
- Empêcher les étincelles d'échappement du moteur de provoquer un incendie.
- Utiliser uniquement un pare-étincelles approuvé – voir codes en vigueur.

2-4. Dangers liés à l'air comprimé



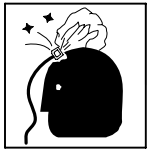
RESPIRER L'AIR COMPRIMÉ peut provoquer des blessures graves ou causer la mort.

- Ne pas utiliser l'air comprimé pour respirer.
- Utiliser l'air comprimé seulement pour le coupage, gougeage et les outils pneumatiques.



L'AIR COMPRIMÉ peut provoquer des blessures.

- Porter des lunettes de sécurité approuvées.
- Ne pas diriger le jet d'air vers d'autres ou soi-même.



L'AIR COMPRIE EMMAGASINE ET DES TUYAUX SOUS PRESSION peuvent provoquer des blessures.

- Relâcher la pression d'air de l'outillage ou du système avant d'effectuer la maintenance, avant de changer ou de rajouter des éléments ou avant d'ouvrir la purge ou le bouchon de remplissage d'huile.



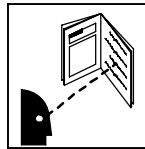
Le METAL CHAUD lors du coupage et gougeage plasma peut provoquer un incendie ou une explosion.

- Ne pas couper ou gouger à proximité de produits inflammables.
- Surveillez et garder un extincteur à proximité.



DES PIÈCES CHAUDES peuvent provoquer des brûlures et blessures.

- Ne pas toucher le compresseur ou d'autres éléments du circuit air comprimé chauds.
- Laisser l'ensemble se refroidir avant de toucher ou d'effectuer la maintenance.



LIRE LES INSTRUCTIONS.

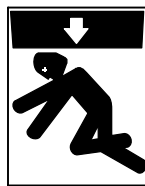
- Lisez le manuel d'instructions avant l'utilisation ou la maintenance de l'appareil.
- Arrêter le moteur et relâcher la pression avant d'effectuer la maintenance.
- N'utiliser que les pièces de rechange recommandées par le constructeur.

2-5. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance



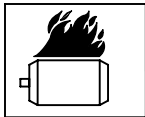
Risque D'INCENDIE OU D'EXPLOSION.

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



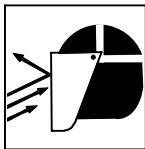
LA CHUTE DE L'APPAREIL peut blesser.

- Utiliser l'anneau de levage pour lever l'appareil et les accessoires correctement installées seuls, PAS les bouteilles de gaz. Ne pas dépasser le poids nominal maximal de l'ceillon (voir les spécifications).
- Ne lever et ne soutenir l'appareil qu'avec de l'équipement approprié et en suivant les procédures adéquates.
- 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.



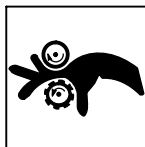
LE SURCHAUFFEMENT peut endommager le moteur électrique.

- Arrêter ou déconnecter l'équipement avant de démarrer ou d'arrêter le moteur.
- Ne pas laisser tourner le moteur trop lentement sous risque d'endommager le moteur électrique à cause d'une tension et d'une fréquence trop faibles.
- Ne pas brancher de moteur de 50 ou de 60 Hz à la prise de 100 Hz, s'il y a lieu.



LES ÉTINCELLES VOLANTES risquent de provoquer des blessures.

- Porter un écran facial pour protéger le visage et les yeux.
- Affûter l'électrode au tungstène uniquement à la meuleuse dotée de protecteurs. Cette manœuvre est à exécuter dans un endroit sûr lorsque l'on porte l'équipement homologué de protection du visage, des mains et du corps.
- Les étincelles risquent de causer un incendie – éloigner toute substance inflammable.



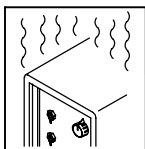
DES ORGANES MOBILES peuvent provoquer des blessures.

- Ne pas s'approcher des organes mobiles.
- Ne pas s'approcher des points de coincement tels que des rouleaux de commande.



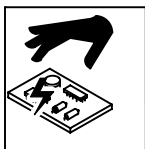
LES FILS DE SOUDAGE peuvent provoquer des blessures.

- Ne pas appuyer sur la gâchette avant d'en avoir reçu l'instruction.
- Ne pas diriger le pistolet vers soi, d'autres personnes ou toute pièce mécanique en engageant le fil de soudage.



L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- Laisser l'équipement refroidir ; respecter le facteur de marche nominal.
- Réduire le courant ou le facteur de marche avant de poursuivre le soudage.
- Ne pas obstruer les passages d'air du poste.



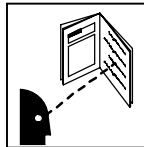
LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- Établir 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 de circuits imprimés.



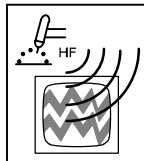
UNE REMORQUE QUI BASCULE peut entraîner des blessures.

- Utiliser les supports de la remorque ou des blocs pour soutenir le poids.
- Installer convenablement le poste sur la remorque comme indiqué dans le manuel s'y rapportant.



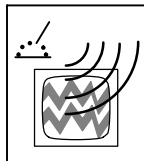
LIRE LES INSTRUCTIONS.

- Lisez le manuel d'instructions avant l'utilisation ou la maintenance de l'appareil.
- N'utiliser que les pièces de rechange recommandées par le constructeur.
- Effectuer la maintenance et le service du moteur et du compresseur d'air suivant les instructions dans ce manuel ou le manuel du moteur/compresseur (si applicable).



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

- Le rayonnement haute fréquence (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 un blindage pour réduire les interférences éventuelles.



LE SOUDAGE À L'ARC risque de provoquer des interférences.

- L'énergie électromagnétique risque de provoquer des interférences pour l'équipement électronique sensible tel que les ordinateurs et l'équipement commandé par ordinateur tel que les robots.
- Veiller à ce que tout l'équipement de la zone de soudage soit compatible électromagnétiquement.
- Pour réduire la possibilité d'interférence, maintenir les câbles de soudage aussi courts que possible, les grouper, et les poser aussi bas que possible (ex. par terre).
- Veiller à souder à une distance de 100 mètres de tout équipement électronique sensible.
- Veiller à ce que ce poste de soudage soit posé et mis à la terre conformément à ce mode d'emploi.
- En cas d'interférences après avoir pris les mesures précédentes, il incombe à l'utilisateur de prendre des mesures supplémentaires telles que le déplacement du poste, l'utilisation de câbles blindés, l'utilisation de filtres de ligne ou la pose de protecteurs dans la zone de travail.

2-6. Proposition californienne 65 Avertissements

⚠ Les équipements de soudage et de coupage produisent des fumées et des gaz qui contiennent des produits chimiques dont l'État de Californie reconnaît qu'ils provoquent des malformations congénitales et, dans certains cas, des cancers. (Code de santé et de sécurité de Californie, chapitre 25249.5 et suivants)

⚠ Les batteries, les bornes et autres accessoires contiennent du plomb et des composés à base de plomb, produits chimiques dont l'État de Californie reconnaît qu'ils provoquent des cancers et des malformations congénitales ou autres problèmes de procréation. Se laver les mains après manipulation.

Pour les moteurs à essence :

⚠ Les gaz d'échappement des moteurs contiennent des produits chimiques dont l'État de Californie reconnaît qu'ils provoquent des cancers et des malformations congénitales ou autres problèmes de procréation.

Pour les moteurs diesel :

⚠ Les gaz d'échappement des moteurs diesel et certains de leurs composants sont reconnus par l'État de Californie comme provoquant des cancers et des malformations congénitales ou autres problèmes de procréation.

2-7. 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 Safe Practices for the Preparation for Welding and Cutting of Containers and Piping, American Welding Society Standard AWS F4.1 de Global Engineering Documents (téléphone : 1-877-413-5184, site Internet : www.global.ihs.com).

National Electrical Code, NFPA Standard 70, de National Fire Protection Association, P.O. Box 9101, Quincy, MA 02269-9101 (téléphone : 617-770-3000, site Internet : www.nfpa.org).

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, de Compressed Gas Association, 4221 Walney Road, 5th Floor, Chantilly, VA 20151 (téléphone : 703-788-2700, site Internet : www.cganet.com).

Code for Safety in Welding and Cutting, CSA Standard W117.2, de Canadian Standards Association, 5060 Mississauga, Ontario, Canada

L4W 5NS (téléphone : 800-463-6727 ou à Toronto 416-747-4044, site Internet : www.csa-international.org).

Safe Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, de American National Standards Institute, 11 West 43rd Street, New York, NY 10036-8002 (téléphone : 212-642-4900, site Internet : www.ansi.org).

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, de National Fire Protection Association, P.O. Box 9101, 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 15250-7954 (téléphone : 1-866-512-1800) (il y a 10 bureaux régionaux--le téléphone de la région 5, Chicago, est 312-353-2220, site Internet : www.osha.gov).

2-8. Information EMF

Considérations sur le soudage et les effets de basse fréquence et des champs magnétiques et électriques.

Le courant de soudage, pendant son passage dans les câbles de soudage, 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.

Pour réduire les champs magnétiques sur le poste de travail, appliquer les procédures suivantes :






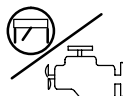








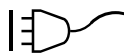





1. Garder les câbles ensemble, les torsader, les scotcher, ou les recouvrir d'une housse.
2. Disposer les câbles d'un côté et à distance de l'opérateur.
3. Ne pas courber pas et ne pas entourer pas les câbles autour de votre corps.
4. Garder le poste de soudage et les câbles le plus loin possible de vous.
5. Connecter la pince sur la pièce aussi près que possible de la soudure.

En ce qui concerne les implants médicaux :

Les porteurs d'implants doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de soudage par points, de gougeage, du coupage plasma ou de chauffage par induction. Si le médecin approuve, il est recommandé de suivre les procédures précédentes.

SECTION 3 – DEFINITIONS

3-1. Symbol Definitions

	Engine Choke		Read Operator's Manual	A	Amperes	V	Volts
	Engine Oil		Fuel		Circuit Protector		Engine
+	Positive	—	Negative		Alternating Current (AC)		Output
h	Hours		Direct Current (DC)		Time		Protective Earth (Ground)
	Off		Temperature		Input		Single-Phase 230 Input Volt Power
	Wire Speed		GMAW Gun Trigger		Shielding Gas Input		Over Temperature
	Spool Gun						

SECTION 4 – SPECIFICATIONS

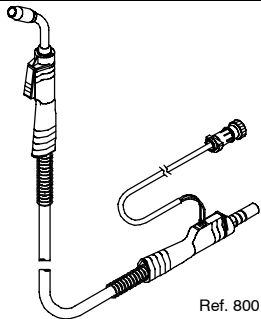
4-1. Description

This unit is an engine driven welding power source/wire feeder with auxiliary power capability. The welding power source/wire feeder can also use utility power to provide weld output (no auxiliary power available in this mode).

4-2. Weld, Power, And Engine Specifications

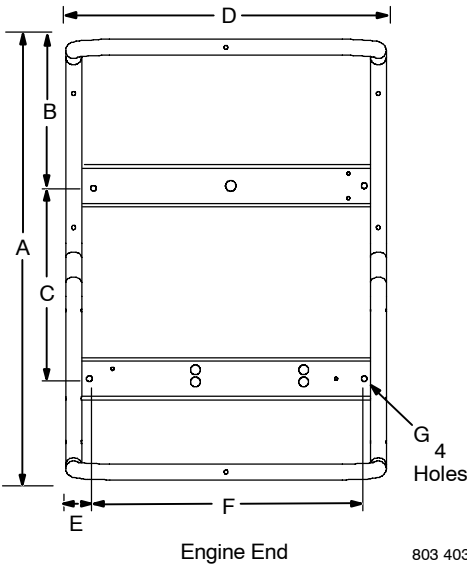
Rated Welding Output	Amperage Range	Maximum Open-Circuit Voltage DC	Amperes Input at Rated Load Output 230 V, 60 Hz, Single-Phase	KVA/KW	Generator Power Rating	Engine	Fuel Capacity
135 A @ 22.5 Volts DC, 30% Duty Cycle At 60 Hz Input	30 – 180	35	19.5	4.60 KVA 3.75 KW	Single-Phase, 5.0 kVA/kW (Peak) 4.5 kVA/kW (Continuous) 40/20 A, 120/240 V AC, 60 Hz	Kohler CS10 Air-Cooled, One-Cylinder, Four-Cycle, 10 HP (300 CC), Gasoline Engine (Recoil or Electric Start)	1.8 Gal (6.9 L) Tank
Wire Type And Dia	Solid/ Stainless	Flux Cored	Wire Feed Speed Range				
	.024 – .035 in. (0.6 – 0.9 mm)	.030 – .045 in. (0.8 – 1.2 mm)	40 – 720 IPM (1.0 – 18.3 m/min) At No Load 20 – 700 IPM (0.5 – 17.8 m/min) Feeding Wire				

4-3. Gun Specifications


 <p style="text-align: right;">Ref. 800 797-D</p>	<p>Air-Cooled Welding Guns For GMAW And FCAW Welding</p> <p><i>Using gasless flux cored wire reduces gun duty cycle.</i></p>
	<p>M-15 Feeds .023 To .045 in. (0.6 To 1.1 mm) Hard Or Flux Cored Wires .045 in. (1.1 mm) wire requires liner change to MILLER Part No. 194012 in addition to contact tip change</p> <p>Duty Cycle Rating: 100%: 150 A With CO₂ Shielding Gas; 120 A With Mixed Gases 60%: 200 A With CO₂ Shielding Gas; 150 A With Mixed Gases</p> <p>Weight With 15 ft (4.6 m) Power Cable: 6.0 lb (2.7 kg) Identified With ♦♦ On Power Cable</p>

4-4. Dimensions, Weights, And Operating Angles

Dimensions	
Height	31 in (787 mm)
Width	32 in (813 mm)
Length	41 in (1041 mm)
A	31-5/8 in (803 mm)
B	10-9/16 in (268 mm)
C	13-25/64 in (340 mm)
D	22-3/4 in (577 mm)
E	1-9/16 in (40 mm)
F	19-5/8 in (498 mm)
G	13/32 in (10 mm) Dia.
Weight	
275 lb (125 kg) Recoil Start 307 lb (140 kg) Electric Start	
Optional Lifting Eye Weight Rating	
430 lb (195 kg)	

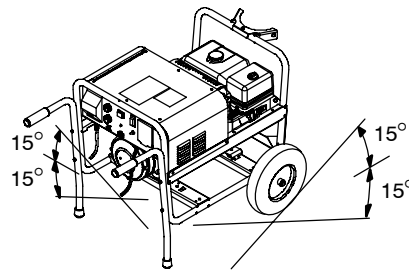


Engine End 803 403



⚠ Do not exceed tilt angles or engine could be damaged or unit could tip.

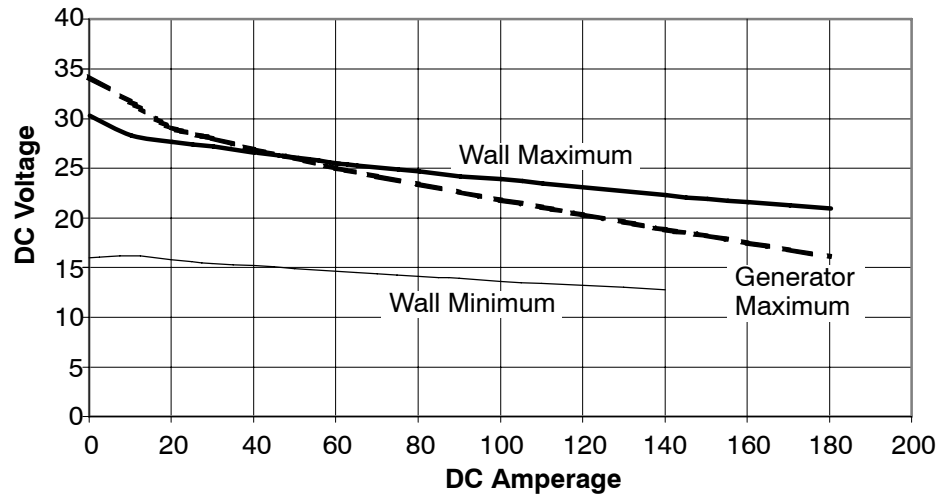
⚠ Do not move or operate unit where it could tip.



804 476-C

NOTICE – Optional lifting eye may not be installed on units with optional cylinder rack.

4-5. Volt-Ampere Curves



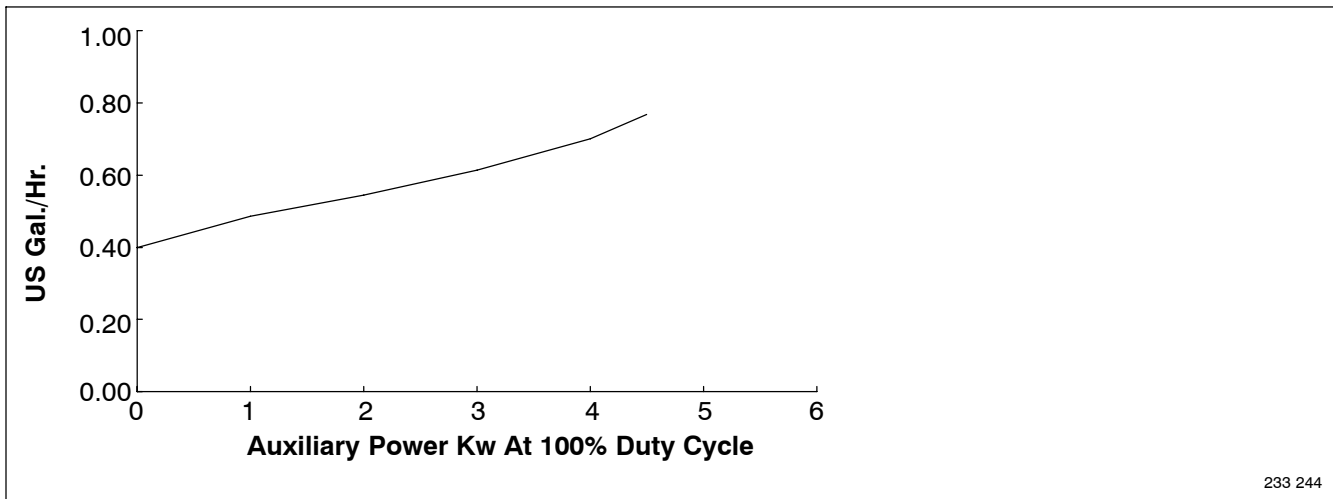
DC Amperage	Wall Maximum Voltage (V)	Wall Minimum Voltage (V)	Generator Maximum Voltage (V)
0	35	16	30
20	30	15	28
40	27	14	26
60	25	13	24
80	23	12	22
100	21	11	20
120	19	10	18
140	17	9	16
160	15	8	14
180	13	7	12

This welding power source can be powered by the unit engine or utility power via a wall receptacle.

The volt-ampere curve shows the minimum and maximum voltage and amperage output capabilities of the unit. Curves of all other settings fall between the curves shown.



233 243

4-6. Fuel Consumption



233 244

4-7. Power Source Duty Cycle

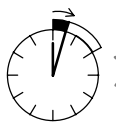






Duty cycle is the percentage of 10 minutes that unit can weld at rated load without overheating.

NOTICE – Exceeding duty cycle can damage unit and void warranty.

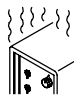

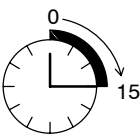

% Duty Cycle	DC Amperes
15	180
20	160
30	135
40	115
50	100
60	85
70	75
80	65
100	60


30% duty cycle at 135 amps, 60 Hz
20% duty cycle at 130 amps, 50 Hz



→



3 Minutes Welding 7 Minutes Resting

Overheating



→

→

→

→



A or V

OR



Reduce Duty Cycle

→



Minutes

230 343-A

4-8. Gun Duty Cycle And Overheating

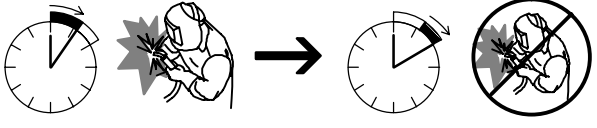



100% duty cycle



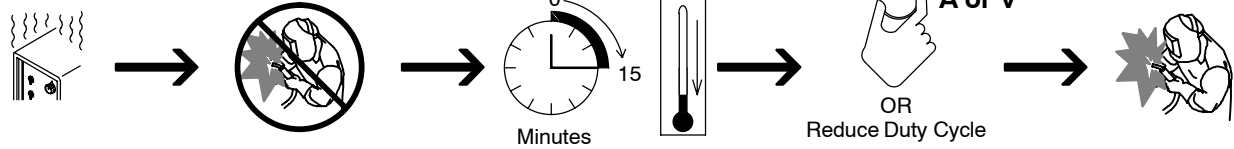
Continuous Welding

60% duty cycle



6 Minutes Welding
4 Minutes Resting

Overheating



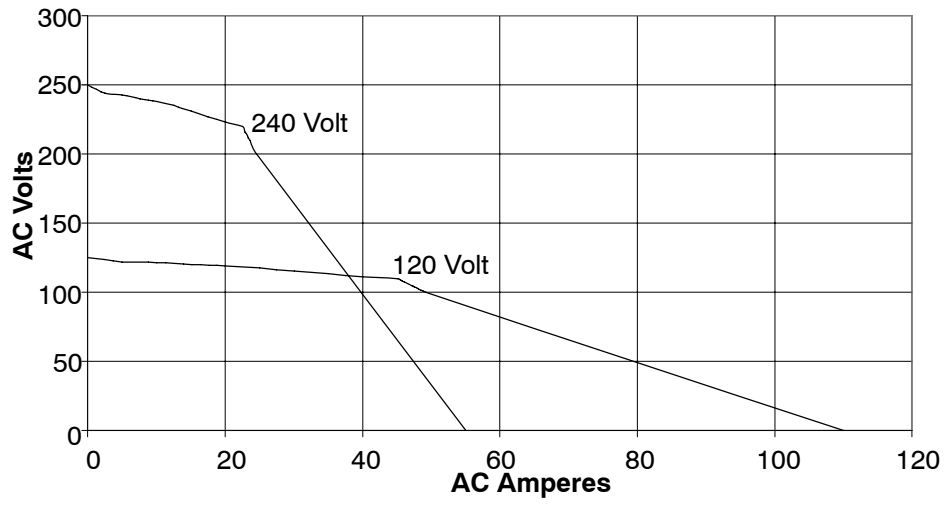
See Section 4-3. Specifications for amperage rating and duty cycle.

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

NOTICE – Exceeding duty cycle can damage unit and void warranty.

sduty1 5/95

4-9. Generator Power Curve



AC Amperes	240 Volt (AC Volts)	120 Volt (AC Volts)
0	250	125
20	220	120
40	100	110
55	0	100
80	-	50
110	-	0

The ac generator power curves show the generator power available in amperes at the receptacles.

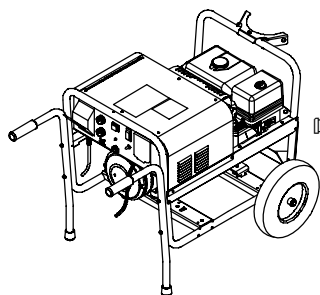
233 242

SECTION 5 – INSTALLATION

5-1. Installing Welding Generator

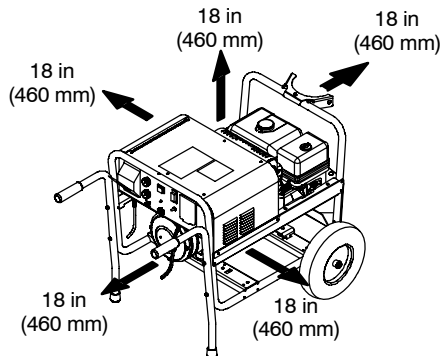


Movement

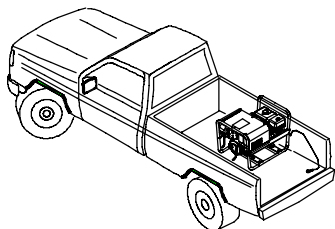


Shown with standard running gear and optional cylinder rack.

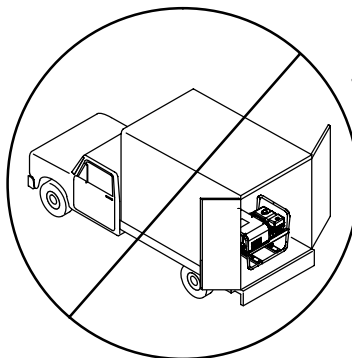
Airflow Clearance



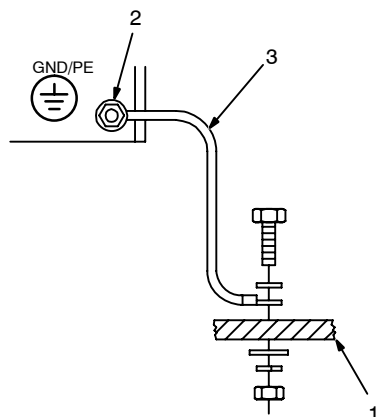
Location



Always securely fasten welding generator onto transport vehicle or trailer and comply with all DOT and other applicable codes.



Do not install unit where air flow is restricted or engine may overheat.



Always ground generator frame to vehicle frame to prevent electric shock and static electricity hazards.

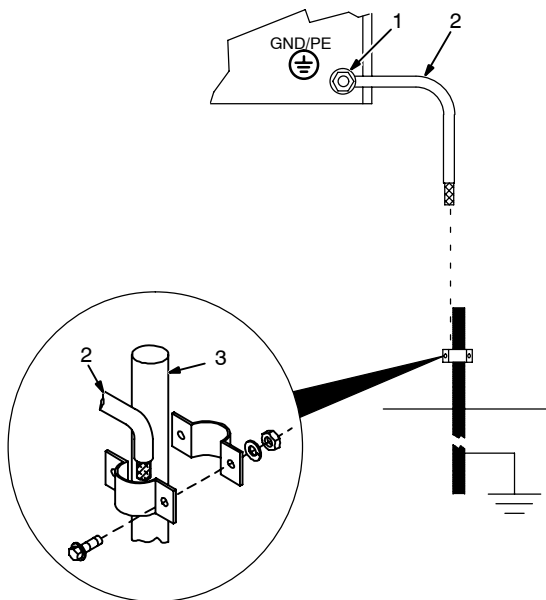
- 1 Metal Vehicle Frame
- 2 Equipment Grounding Terminal
- 3 Grounding Cable

Bed liners, shipping skids, and some running gear insulate the welding generator from the vehicle frame. Always connect a ground wire from the generator equipment grounding terminal to bare metal on the vehicle frame as shown.

Use #10 AWG or larger insulated copper wire to make metal-to-metal grounding connection.

If unit does not have GFCI receptacles, use GFCI-protected extension cord.

5-2. Grounding Generator When Supplying Building Systems



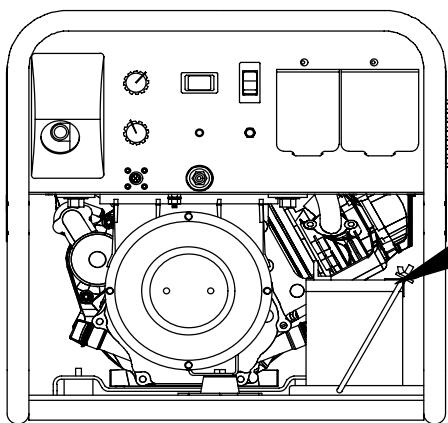
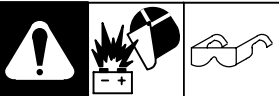
⚠ Ground generator to system earth ground if supplying power to a premises (home, shop, farm) wiring system.

- 1 Equipment Grounding Terminal
 - 2 Grounding Cable
- Use #10 AWG or larger insulated copper wire.
- 3 Ground Device

ℹ Use ground device as stated in electrical codes.

800 576-B

5-3. Connecting The Battery (Electric Start Models Only)



⚠ Turn Engine Switch to Off (electric start models only).

⚠ Connect negative (-) cable last.

RECOMMENDED BATTERY INFORMATION

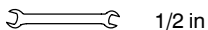
Nominal Voltage: 12V
BCI Group Size: U1

197 mm (7.75 in) maximum	130 mm (5.13 in) maximum
184 mm (7.25 in) maximum	

Cold Crank Rating: 200 Amperes Minimum
Reserve Capacity: 22 Minutes Minimum

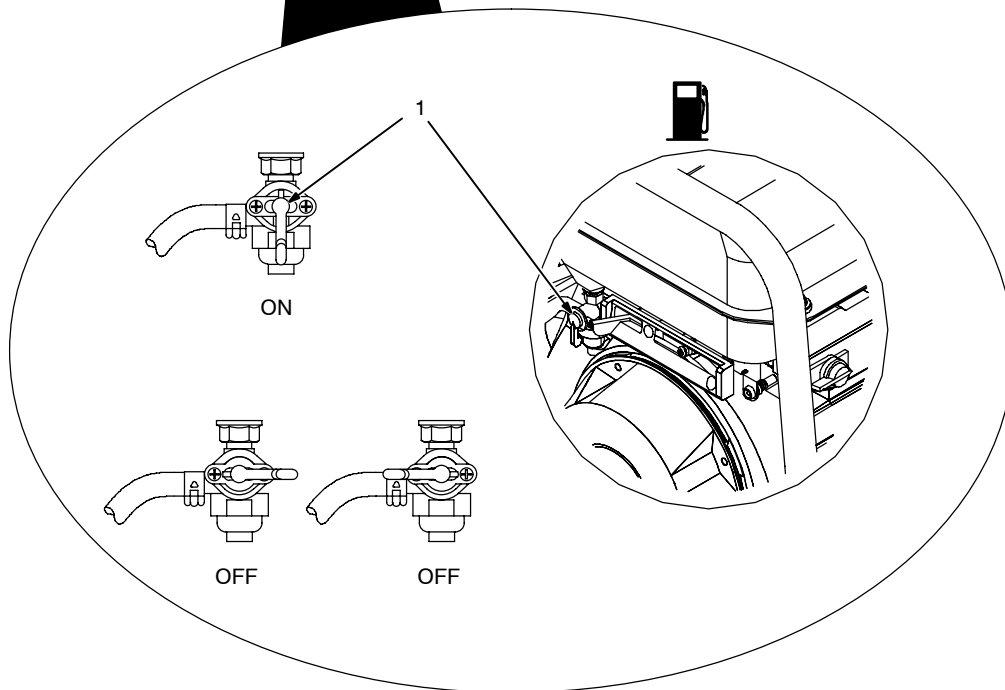
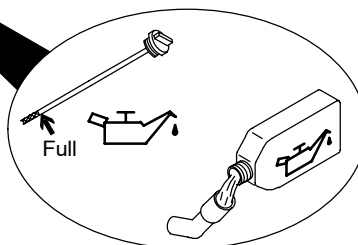
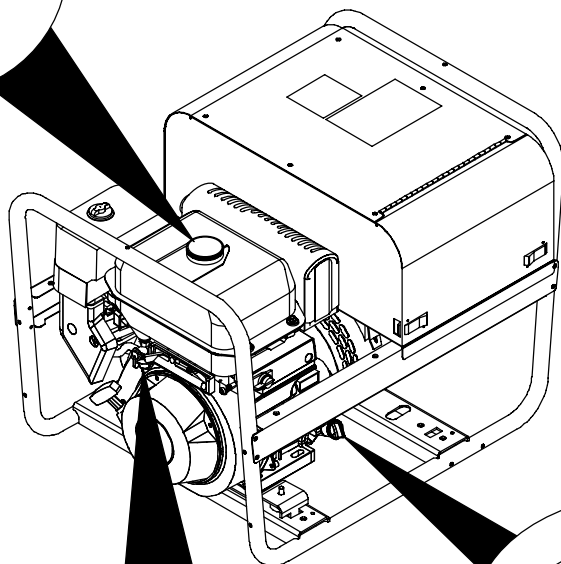
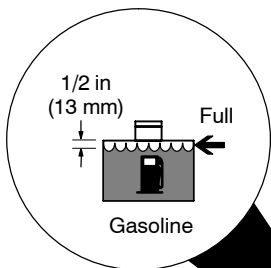
235 586-A

Tools Needed:



805 052-A / 803 466

5-4. Engine Prestart Checks



Check all fluids daily. Engine must be cold and on a level surface. Unit is shipped with 10W30 engine oil.

- 1 Fuel Valve
- Open valve.

Fuel valve is shown in the open position. Always close fuel valve after stopping unit. Moving unit with fuel valve open may cause carburetor flooding and make starting difficult.

Fuel

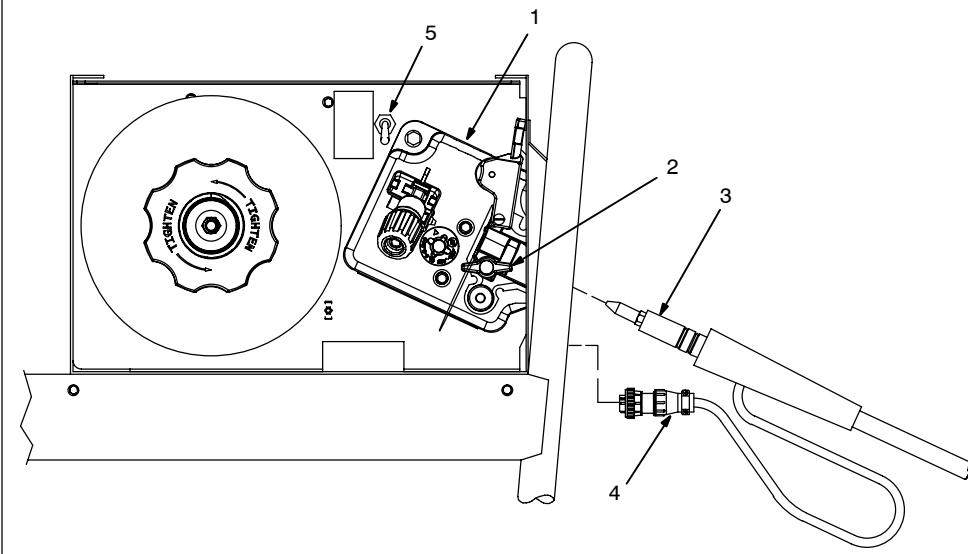
Add fresh fuel before starting engine the first time (see engine manual for specifications). Fill fuel tank up to 1/2 in. (13 mm) from top to allow room for expansion. Check fuel level on a cold engine before use each day.

Oil

After fueling, check oil with unit on level surface. If oil is not up to full mark on dipstick, add oil (see engine manual).

Unit stops if oil level is too low. Unit cannot be restarted until sufficient oil is added.

5-5. Installing Welding Gun



- 1 Drive Assembly
- 2 Gun Securing Knob
- 3 Gun End

Loosen knob. Insert gun end through opening until it bottoms against drive assembly. Tighten knob.

- 4 Gun Trigger Plug

Insert into receptacle, and tighten threaded collar.

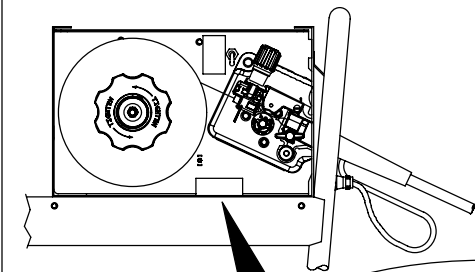
- 5 Mig Gun/Spool Gun Select Switch

Place switch in position for gun being used.

Close door.

804 755-B

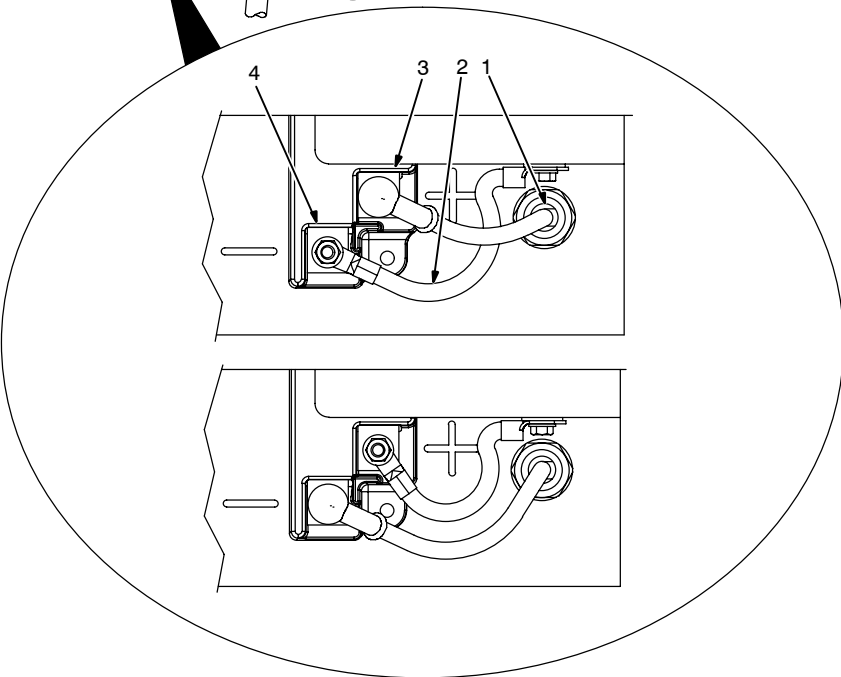
5-6. Work Cable Routing Inside Unit



- 1 Work Clamp Lead
- 2 Wire Drive Lead
- 3 Positive Output Terminal
- 4 Negative Output Terminal

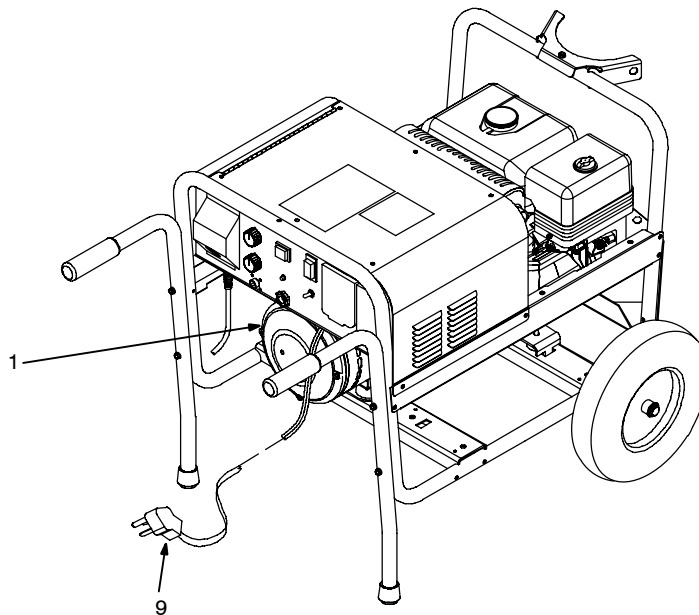
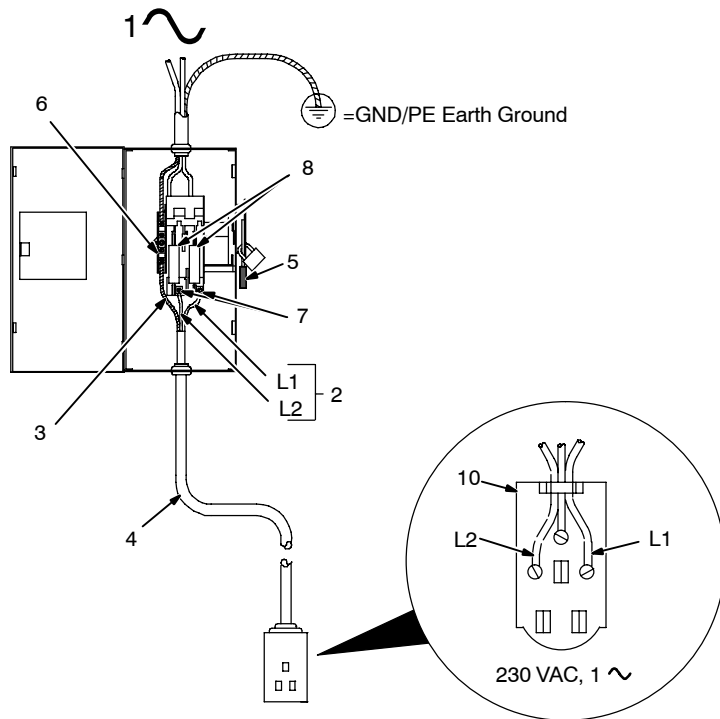
Route work cable to output terminal. See Section 5-7 for connections.

Close door.

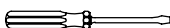


804 755-B

5-9. Connecting Single-Phase, 230 Volt AC Utility Input Power



Tools Needed:



Shown with optional cylinder rack

This unit can provide weld output using the engine to power the welding power source/wire feeder OR single-phase 230 volt ac utility power can be used to power the welding power source/wire feeder.

Warning: Installation must meet all National and Local Codes – have only qualified persons make this installation.

Warning: Disconnect and lockout/tagout input power before connecting input conductors from unit.

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

1 Rating Label

Supply correct input power.

2 Black And White Input Conductor (L1 And L2)

3 Green Or Green/Yellow Grounding Conductor

4 Input Power Cord.

5 Disconnect Device (switch shown in the OFF position)

6 Disconnect Device Grounding Terminal

7 Disconnect Device Line Terminals

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

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

8 Over-Current Protection

Select type and size of over-current protection using Section 5-10 (fused disconnect switch shown).

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

9 Plug (NEMA 6-50P)

10 Receptacle (NEMA 6-50R)

Connect plug to receptacle.

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

5-10. Electrical Service Guide



	60 Hz Single Phase
Input Voltage	230
Input Amperes At Rated Output	20
Max Recommended Standard Fuse Rating In Amperes	
Circuit Breaker ¹ , Time-Delay ²	25
Normal Operating ³	30
Min Input Conductor Size In AWG ⁴	14
Max Recommended Input Conductor Length In Feet (Meters)	67 (20)
Min Grounding Conductor Size In AWG ⁴	14

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

- 1 Choose a circuit breaker with time-current curves comparable to a Time Delay Fuse.
- 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.

⚠ Failure to follow these fuse and circuit breaker recommendations could create an electric shock or fire hazard. These recommendations are for a dedicated branch circuit that applies to the rated output and duty cycle of the welding power source.

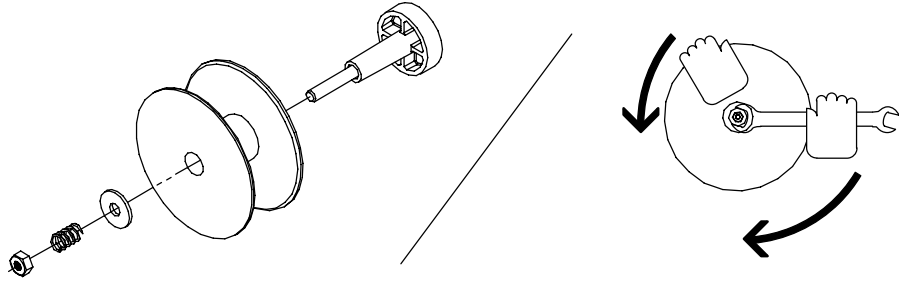
5-11. Installing Wire Spool And Adjusting Hub Tension

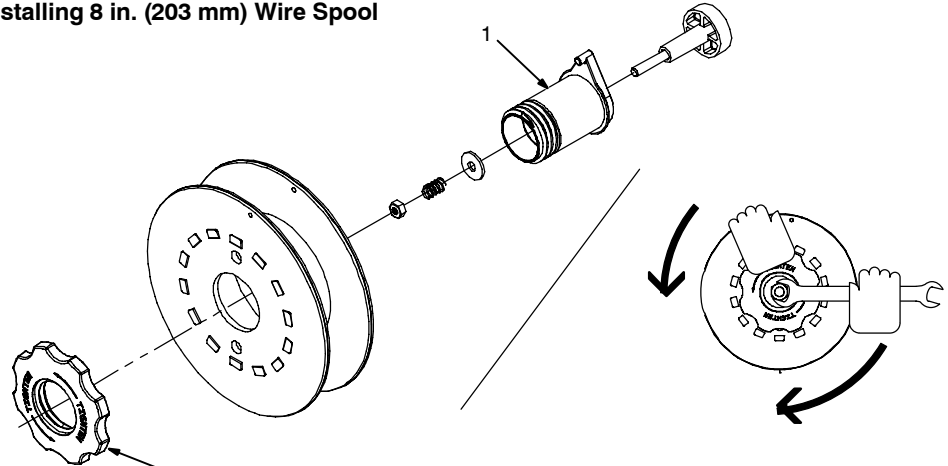
- 1 Adapter
- 2 Retaining Ring

When a slight force is needed to turn spool, tension is set.

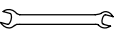
Installing 4 in. (102 mm) Wire Spool



Installing 8 in. (203 mm) Wire Spool

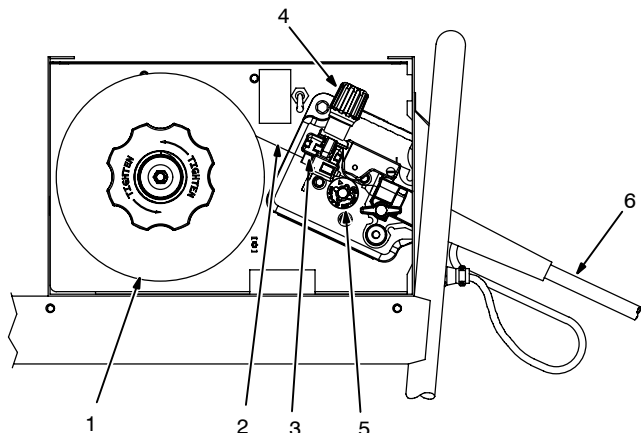


Tools Needed:

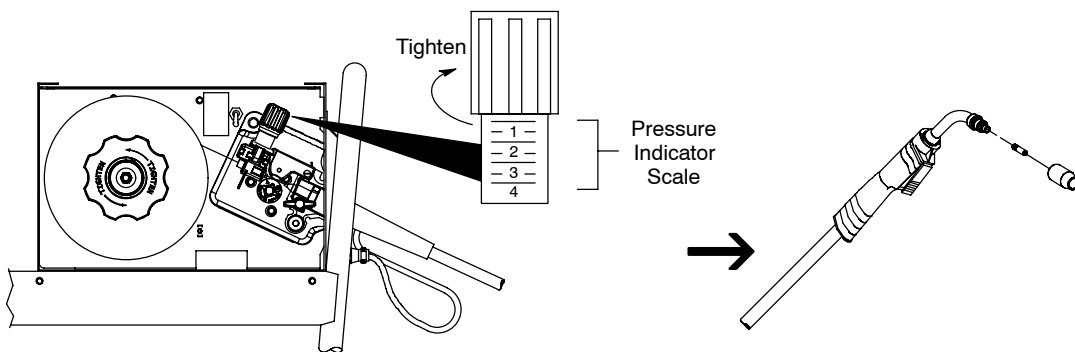
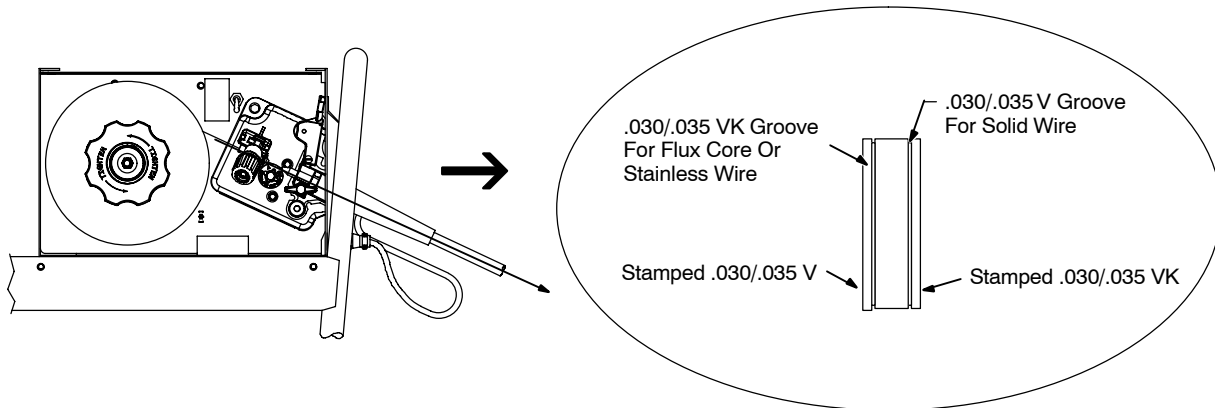
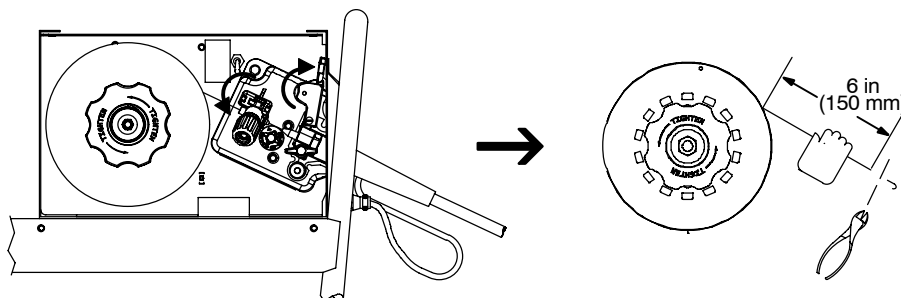
 1/2 in

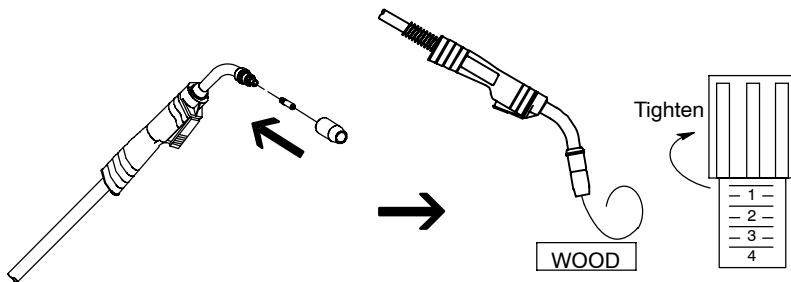
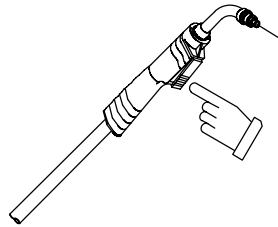
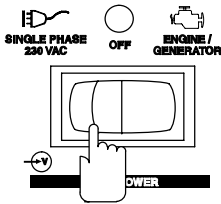
803 012 / 803 013 -B / Ref. 802 444-C

5-12. Threading The Welding Gun



Tools Needed:





- 1 Wire Spool
- 2 Welding Wire
- 3 Inlet Wire Guide
- 4 Pressure Adjustment Knob
- 5 Drive Roll

VK = Knurled V Groove (for use with flux core or stainless wire)

V = Smooth V Groove (for use with solid wire)

The drive roll consists of two different type grooves. The stamped markings on the end surface of the drive roll refer to the groove on the opposite side of the drive roll. The groove closest to the motor shaft is the proper groove to thread.

6 Gun Conduit Cable

Lay gun cable out straight. Open pressure assembly.

Pull about 6 in. (150 mm) of wire off spool. Hold tightly to keep it from unraveling. Cut off end.

Pull wire through guides into gun; continue to hold wire tightly.

Be sure wire is positioned in proper feed roll groove. Close and tighten pressure assembly. Let go of wire.

Use pressure indicator scale to set desired drive roll pressure. Begin with a setting of 3. If necessary, make additional adjustments after trying initial setting.

Remove gun nozzle and contact tip.

Turn power on.

Press gun trigger until wire comes out of gun.

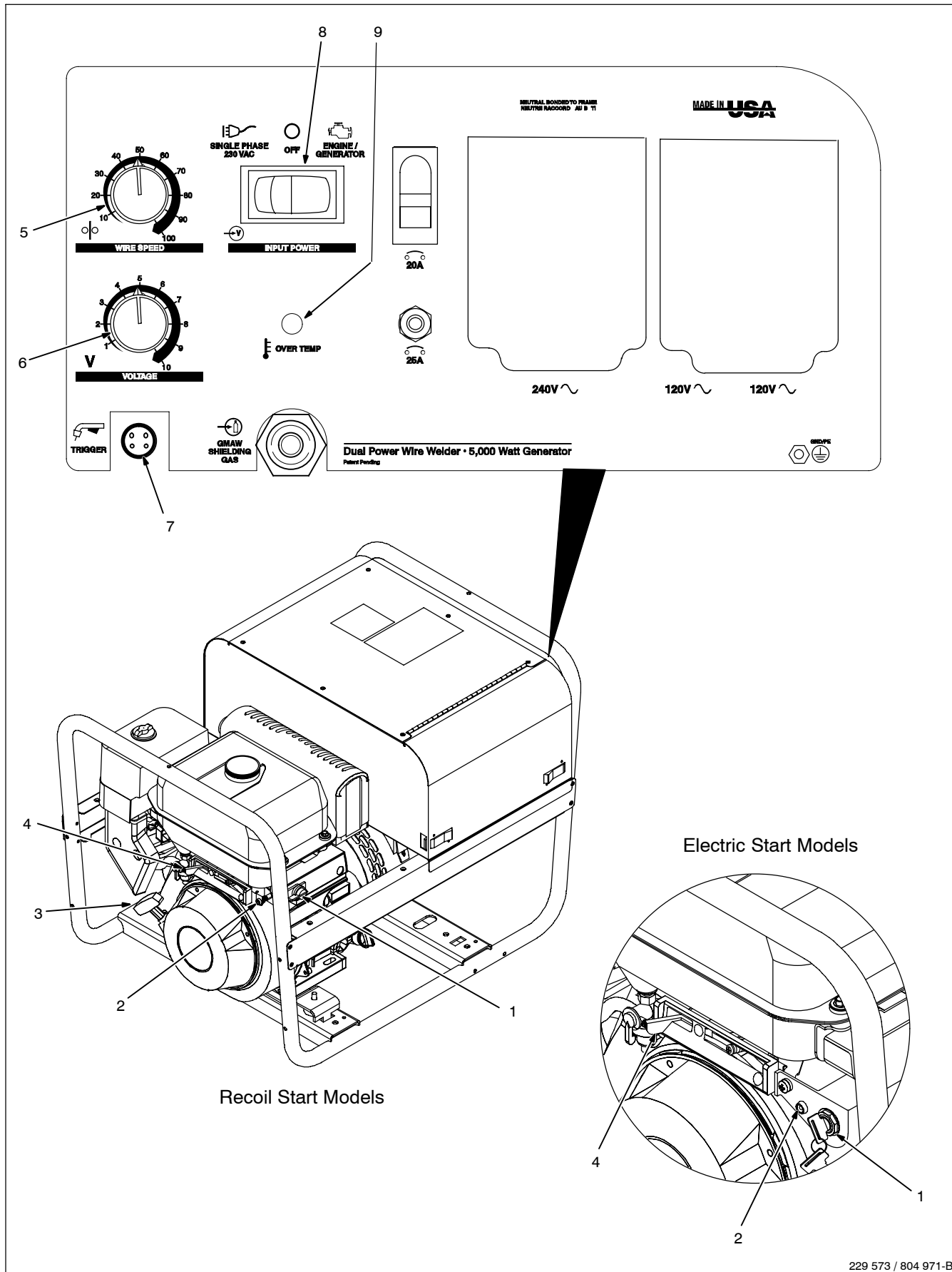
Be sure that tip matches wire diameter. Reinstall contact tip and nozzle.

Feed wire to check drive roll pressure. Tighten knob enough to prevent slipping. Cut off wire.










Close door.

SECTION 6 – OPERATING THE WELDING GENERATOR

6-1. Controls (See Section 6-2)



6-2. Description Of Controls (See Section 6-1)

								
<p>1 Engine Switch Use switch to control ignition circuit.</p> <p>For Recoil Start: Turn switch to On position when starting engine. Turn switch to Off position to stop engine. Engine cannot be started with switch in the Off position.</p> <p>For Electric Start: Turn switch to Start position when starting engine. Switch returns to Run position when engine starts. Turn switch to Off position to stop engine.</p> <p>Engine stops if oil level is too low. Engine cannot be restarted until sufficient oil is added.</p>	<p>2 Low Oil Pressure Light Light goes on and engine stops if engine oil level is too low.</p> <p>Engine cannot be restarted until sufficient oil is added.</p> <p>NOTICE – Stop engine and add oil if light goes on (see Section 5-4).</p>	<p>3 Starter Handle</p> <p>4 Choke Control Use control to change engine air/fuel mix. Move control to far right if starting a cold en-</p>	<p>gine. Move control to far left if starting a warm engine.</p> <p>To Start:</p> <ul style="list-style-type: none"> ● Open fuel valve (see Section 5-4). ● Set choke. ● For Recoil Start: Turn Engine switch to On and pull starter handle. ● For Electric Start: Turn Engine switch to Start. When engine starts, allow switch to return to Run position. ● Open choke as engine warms. <p>NOTICE – If the engine does not start, let engine come to a complete stop before attempting restart.</p> <p>To Stop:</p> <ul style="list-style-type: none"> ● Turn Engine switch to Off. <p>☞ Always close fuel valve after stopping unit. Moving unit with fuel valve open may cause carburetor flooding and make starting difficult.</p>	<p>5 Wire Speed Control Turn control clockwise to increase wire feed speed. (see weld parameter chart in welding power source or Section 6-4).</p>	<p>6 Voltage Control Turn control clockwise to increase voltage (see weld parameter chart in welding power source or Section 6-4).</p> <p>7 Gun Trigger Receptacle</p> <p>8 Input Power Switch Use switch to select source of power for welding power source.</p> <p>Place switch in Engine/Generator position for welding power source to run on generator input power.</p> <p>Place switch in Single Phase 230 VAC position for the welding power source to run on utility power. Place switch in Off position before connecting to utility power.</p> <p>☞ With switch in the Single Phase 230 VAC position and the generator not running, the auxiliary power receptacles do not work.</p> <p>9 Over Temperature Light Light flashes when unit has overheated and weld output is not available. Allow fan to run to cool unit. When light goes out, unit is ready for service.</p>			

6-3. Stainless Steel And 100% CO2 Weld Parameters

Select Wire Type, Polarity, and Shielding Gas	Wire Size	Material Thickness							
		20 ga	18 ga	16 ga	14 ga	1/8 in.	3/16 in.	1/4 in.	5/16 in.
	☞	Shop Settings (Wall or Premise Power, 230 V 1 Ph)							
Solid ER70S-6 (DCEP) 100% CO2 Shielding Gas	0.024	3.2/25	3.5/25	4.0/40	4.5/50	5.0/60	7.0/85	---	---
	0.030	3.0/15	3.5/20	4.0/25	4.5/35	5.5/45	6.0/55	6.5/65	10.0/75
	0.035	---	3.0/12	4.0/20	4.5/30	5.5/35	6.0/40	6.5/50	10.0/55
Stainless Steel (DCEP) Tri-Mix Shielding Gas 90% HE/7.5% Ar/ 2.5% CO2	0.024	3.5/30	3.5/45	4.0/50	4.5/70	5.0/80	6.0/95	---	---
	0.030	3.5/25	3.5/30	4.0/45	5.0/60	5.0/70	6.0/85	7.5/95	---
	0.035	---	2.5/20	3.5/25	4.0/40	4.5/50	6.0/65	7.5/80	---
Aluminum 4043 (DCEP) 100% Argon Shielding Gas	0.030		2.0/70	2.0/70	4.0/70	5.0/70	8.0/95	10/100	
	0.035			2.5/65	4.0/60	5.0/65	8.0/90	10/90	
	☞	Field Setting (Generator Power)							
Solid ER70S-6 (DCEP) 100% CO2 Shielding Gas	0.024	3.5/25	3.5/25	4.0/40	4.5/50	5.0/60	10.0/70	---	---
	0.030	3.0/15	3.5/20	4.0/25	5.0/35	6.0/45	10.0/55	10.0/65	---
	0.035	---	3.0/12	4.0/20	10.0/30	10.0/35	---	---	---
Stainless Steel (DCEP) Tri-Mix Shielding Gas 90% HE/7.5% Ar/ 2.5% CO2	0.024	3.5/30	3.5/45	4.0/50	5.5/70	10.0/80	10.0/95	---	---
	0.030	4.5/25	4.5/30	6.0/45	10.0/60	10.0/70	10.0/85	---	---
	0.035	---	3.0/20	4.0/25	6.0/40	10.0/50	---	---	---
Aluminum 4043 (DCEP) 100% Argon Shielding Gas	0.030		4.0/70	4.0/70	6.0/70	10/75			
	0.035			4.5/60	6.0/60	10/65			

6-4. Weld Parameter Chart



Renegade™ 180

Selecting Wire, Gas and Control Settings

NOTES: Settings are for welding steel. For welding stainless, aluminum, or using 100% CO2 shielding gas, refer to Owner's Manual.

Settings are approximate. Adjust as required.

"---" Not recommended.

"*" Thicker materials can be welded using proper technique, joint preparation and multiple passes.

IMPORTANT: Match drive roll groove to diameter of wire being used. Set Tension knob setting to 3 at start. Adjust tension per instructions in the manual.

Shop Settings (Wall or Premise Power, 230V 1 Ph)

Select Wire Type, Polarity, and Shielding Gas	Wire Sizes (Diameters)	—	—	—		
		24 ga.	22 ga.	20 ga.		
Solid Wire ER70S-6* (DCEP) C25 (75% Argon / 25% CO2)	0.024"	1.5 / 20	2.0 / 25	2.0 / 25		
	0.030"	1.5 / 15	2.0 / 20	2.0 / 20		
	0.035"	---	2.0 / 12	2.0 / 15		
Flux Core E71T-11* (DCEN) No shielding gas required	0.030"	---	---	---		
	0.035"	---	---	---		

Field Settings (Generator Power)

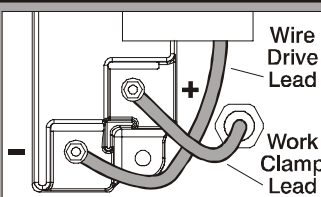
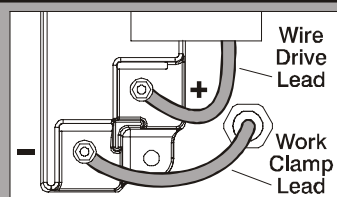
Solid Wire ER70S-6* (DCEP) C25 (75% Argon / 25% CO2)	0.024"	1.5 / 20	2.0 / 25	2.0 / 25		
	0.030"	2.0 / 15	2.5 / 20	2.5 / 20		
	0.035"	---	3.0 / 12	3.0 / 15		
Flux Core E71T-11* (DCEN) No shielding gas required	0.030"	---	---	---		
	0.035"	---	---	---		

Welding Wire Notes: ER70S-6 – Windy conditions may prevent proper shielding gas coverage.
E71T-11 – Self-shielded flux core wire is recommended for outdoor applications and coated steels.

CHANGING POLARITY

DCEP For Solid Wire

DCEN For Flux Core



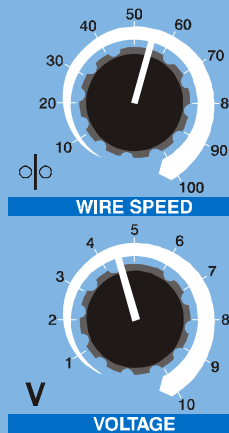
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MillerWelds.com


230 748-C








Refer to chart below to select Voltage and Wire Speed based on thickness of material being welded.

1. Number on right of slash is Wire Speed Knob Setting.
(Example: 4.5 / 55)

2. Number on left of slash is Voltage Knob Setting.
(Example: 4.5 / 55)



 **Shop Settings (Wall or Premise Power, 230V 1 Ph)**

							
	18 ga.	16 ga.	14 ga.	1/8"	3/16"	1/4"	5/16"
	2.5 / 30	3.0 / 45	3.5 / 60	4.0 / 70	6.0 / 100	---	---
	2.5 / 30	3.0 / 35	3.5 / 40	4.5 / 55	6.0 / 75	6.0 / 80	10.0 / 95
	2.5 / 20	3.0 / 25	3.5 / 30	4.5 / 45	6.0 / 55	6.5 / 60	10.0 / 70
	1.0 / 15	2.0 / 20	3.5 / 35	4.0 / 45	6.0 / 65	6.5 / 75	---
	1.0 / 10	2.0 / 15	3.0 / 25	4.0 / 35	6.0 / 55	7.0 / 60	10.0 / 65

 **Field Settings (Generator Power)**

	2.5 / 30	3.0 / 45	3.5 / 60	4.0 / 70	6.0 / 100	---	---
	3.0 / 30	3.0 / 35	4.0 / 40	5.0 / 55	10.0 / 75	---	---
	3.5 / 20	3.5 / 25	4.0 / 30	5.0 / 45	10.0 / 55	---	---
	2.0 / 15	2.5 / 20	4.0 / 35	5.0 / 45	10.0 / 65	10.0 / 75	---
	1.0 / 10	2.0 / 15	3.0 / 25	5.0 / 35	6.0 / 55	---	---

M-10 and M-15 Torch Consumables:

Nozzles	Tip Adapter	Contact Tips	Liners
#169715	#169716	.024" #087299	.024" #194010
		.030" #000067	.030" - .035" #194011
		.035" #000068	.035" - .045" #194012


Quick Change Dual Grooved Drive Rolls:

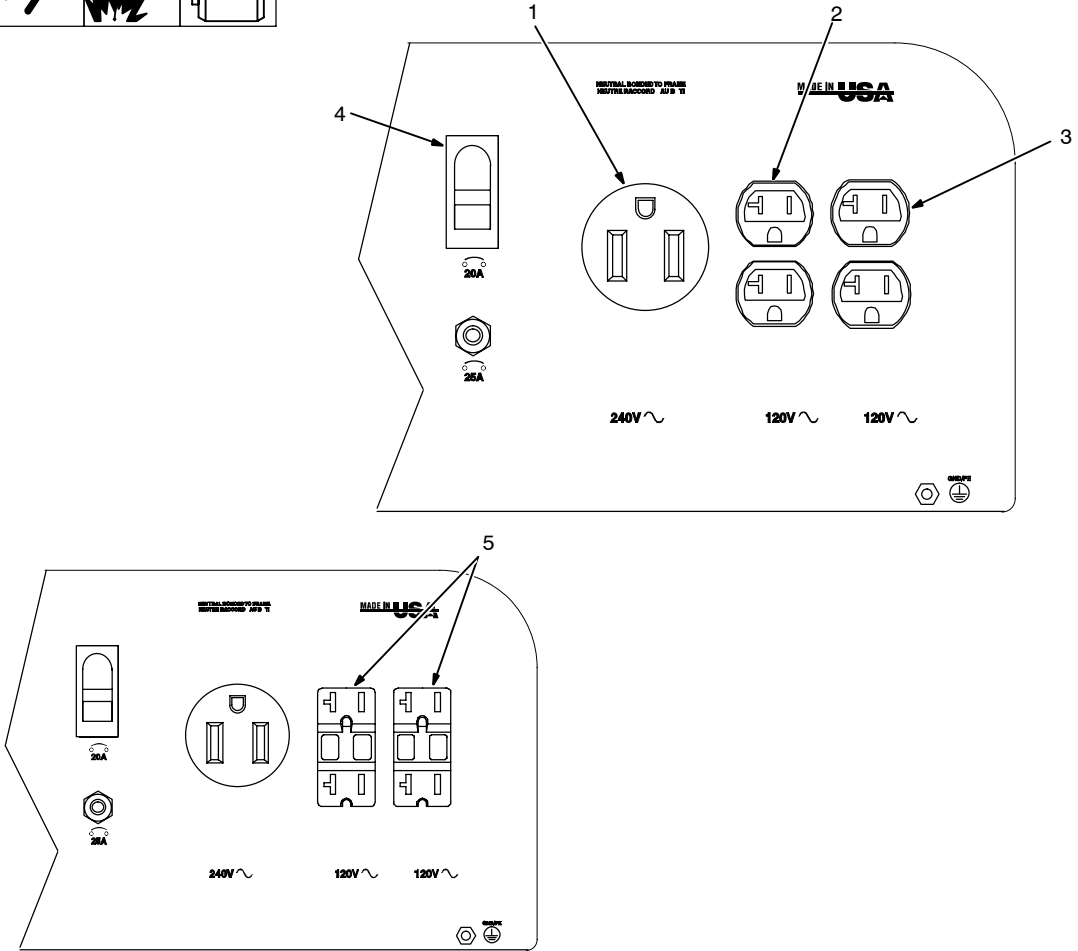
Wire Diameters	V-Smooth	V-Smooth/V-Knurled Combo
.024"	#220179	
.030"/.035"	#220179	#237987

Use V-Knurled for Flux Core or Stainless Wire

SECTION 7 – OPERATING AUXILIARY EQUIPMENT

7-1. Generator Power Panel Receptacles





⚠ If unit does not have GFCI receptacles, use GFCI-protected extension cord.

Generator power decreases as weld current increases.

- 1 240 V AC Receptacle RC1
RC1 supplies 60 Hz single-phase power at weld/power speed. Maximum output is 5 kVA/kW (peak) or 4.5 kVA/kW (continuous).
- 2 120 V 20 A AC Duplex Receptacle RC2
- 3 120 V 20 A AC Duplex Receptacle RC3
RC2 and RC3 supply 60 Hz single-phase power at weld/power speed. Maximum output from RC2 or RC3 is 2.4 kVA/kW.

NOTICE – Do not parallel the two 120 VAC duplex receptacles.

- 4 Supplementary Protector CB1
CB1 protects the receptacles from overload. If CB1 opens, the receptacles do not work. Move switch to the On position to reset.
If supplementary protector continues to open, contact Factory Authorized Service Agent.
- 5 Optional 120 V 20 A AC GFCI Receptacles GFCI-2 and GFCI-3
GFCI2 and GFCI3 supply 60 Hz single-phase power at weld/power speed. Maximum output from GFCI-2 or GFCI-3 is 2.4 kVA/kW. Circuit protection is the same as standard receptacles.
If a ground fault is detected, the GFCI Reset button pops out and the circuit opens to disconnect the faulty equipment. Check for damaged tools, cords, plugs, etc. connected to the receptacle. Press button to reset receptacle and resume operation.
At least once a month, run engine at weld/power speed and press Test button to verify GFCI is working properly.

229 573-A

SECTION 8 – MAINTENANCE

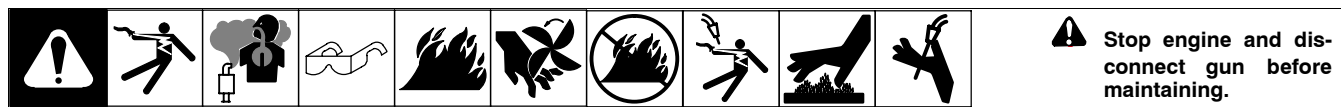
8-1. Power Source Routine Maintenance

Follow the storage procedure in the engine owner's manual if the unit will not be used for an extended period.

<p>Recycle engine fluids. See Engine Manual and Maintenance Label for important start-up, service, and storage information. Service engine more often if used in severe conditions.</p> <p>Stop engine before maintaining.</p>							

		✓ = Check ◇ = Change ● = Clean * To be done by Factory Authorized Service Agent	☆ = Replace	Reference
Every 8 Hours				Section 5-4
	✓ Fuel Level	✓ Oil Level	● Oil, Fuel Spills	
Every 25 Hours				Section 8-9
	● Air Cleaner Precleaner			
Every 50 Hours				
	● Weld Terminals			
Every 100 Hours				Engine Manual, Section 8-9
	◇ Oil	✓ ☆ Air Cleaner Element	● Cooling System	
	✓ ● Battery Terminals (Electric Start Models)		✓ Spark Plug Gap	
Every 200 Hours				
	☆ Unreadable Labels			
Every 300 Hours				Engine Manual
	✓ Valve Clearance*			
Every 500 Hours				Engine Manual
	✓ ☆ Weld Cables	✓ ● Slip Rings* ✓ ☆ Brushes*		
Every 1000 Hours				
	● Inside Unit			

8-2. Gun Routine Maintenance



⌚	✓ = Check	◇ = Change	● = Clean	☆ = Replace	Reference
Every Spool Of Wire	● Gun Casing	● Nozzle, ✓ Contact Tip			Section 8-7
Every 3 Months	☆ Cracked Parts	☆ Cracked Parts	☆ Cracked Parts	☆ Cracked Parts	Section 8-7

8-3. Welding Power Source Overload Protection

☞ Shown with optional cylinder rack

1 Supplementary Protector CB2
 CB2 protects unit from overload. If the unit is using 230 volts ac input power and CB2 opens, unit shuts down.
 Reset supplementary protector.

804 476-C

8-4. Drive Motor Protection And Tip Saver/Short Circuit Protection



A. Drive Motor Protection

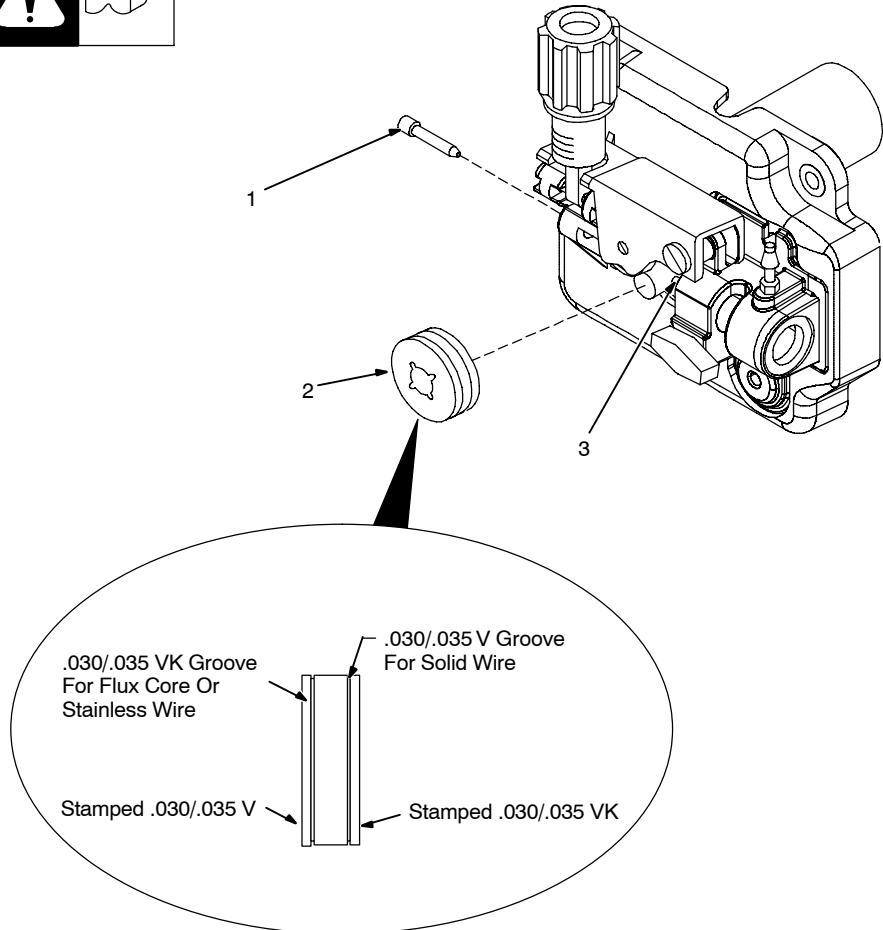
Drive motor protection circuit protects drive motor from overload. If drive motor becomes inoperative, release gun trigger and wait until protection circuit resets allowing drive motor to feed wire again.

B. Tip Saver/Short Circuit Protection

The tip saver/short circuit protection extends contact tip life and protects internal components from damage. If contact tip is shorted to workpiece, the unit shuts down the welding output. To resume operation, release gun trigger to reset unit. If the contact tip has stuck to the workpiece, release gun trigger, turn off unit, and remove contact tip from workpiece. Check contact tip and replace if damaged. Turn on unit to continue operation.

8-5. Changing Drive Roll Or Wire Inlet Guide







1 Inlet Wire Guide
Remove guide by pressing on barbed area or cutting off one end near housing and pulling it out of hole. Push new guide into hole from rear until it snaps in place.

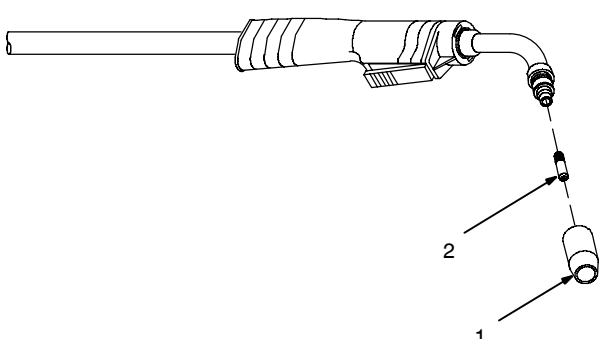
2 Drive Roll
The drive roll consists of two different type grooves. The stamped markings on the end surface of the drive roll refer to the groove on the opposite side of the drive roll. The groove closest to the motor shaft is the proper groove to thread (see Section 5-12).

3 Retaining Pin
To secure drive roll, locate open slot and push drive roll completely over retaining pin, then rotate drive roll 1/4 turn to closed slot.

802 984

8-6. Replacing Gun Contact Tip





⚠ Turn Off power before replacing contact tip.

1 Nozzle
2 Contact Tip

Cut off welding wire at contact tip. Remove nozzle.

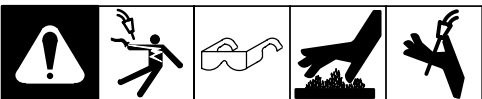
Remove contact tip and install new contact tip. Reinstall nozzle.

Tools Needed:

Ref. 802 399-A

8-7. Maintaining Gun



⚠ Turn off welding power source/wire feeder.

- 1 Nozzle
- 2 Contact Tip
- 3 Adapter
- 4 Head Tube

Cut off wire and disconnect gun from feeder

Remove nozzle contact tip and adapter from head tube.

- 5 Liner

Unscrew and remove liner.

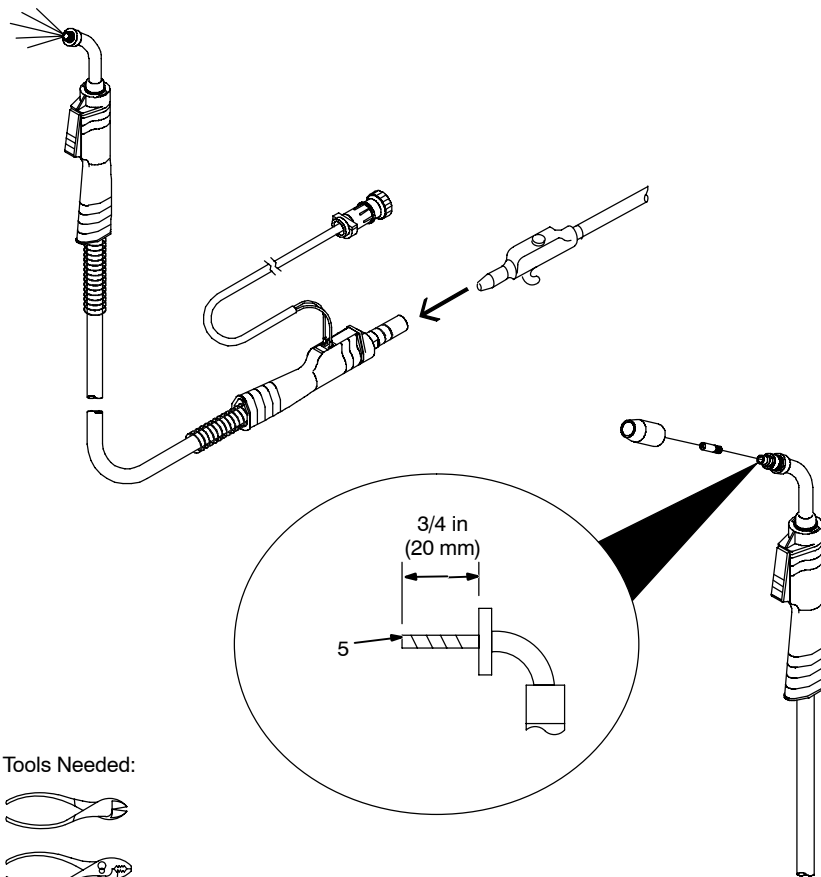
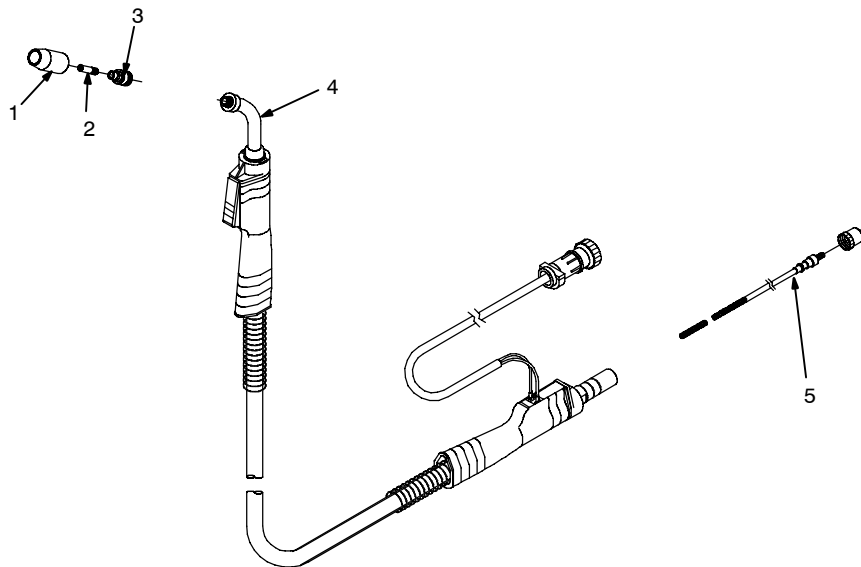
Lay gun cable out straight before installing new liner.

Blow out gun casing.

Reassemble gun in reverse order from taking it apart. Be sure liner stickout is approximately 3/4 in. (20 mm).


☞ *Wire size stamped on tip – check and match wire size.*

☞ *Thread wire according to Section 5-12.*



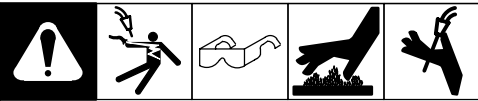
Tools Needed:



 3/8 in

Ref. 800 797-D

8-8. Replacing Switch And/Or Head Tube



⚠ Turn off welding power source/wire feeder and disconnect gun.

- 1 Handle Locking Nut
- 2 Switch Housing
- 3 Handle
- 4 Vise
- 5 Head Tube
- 6 Jam Nut

Remove handle locking nut.

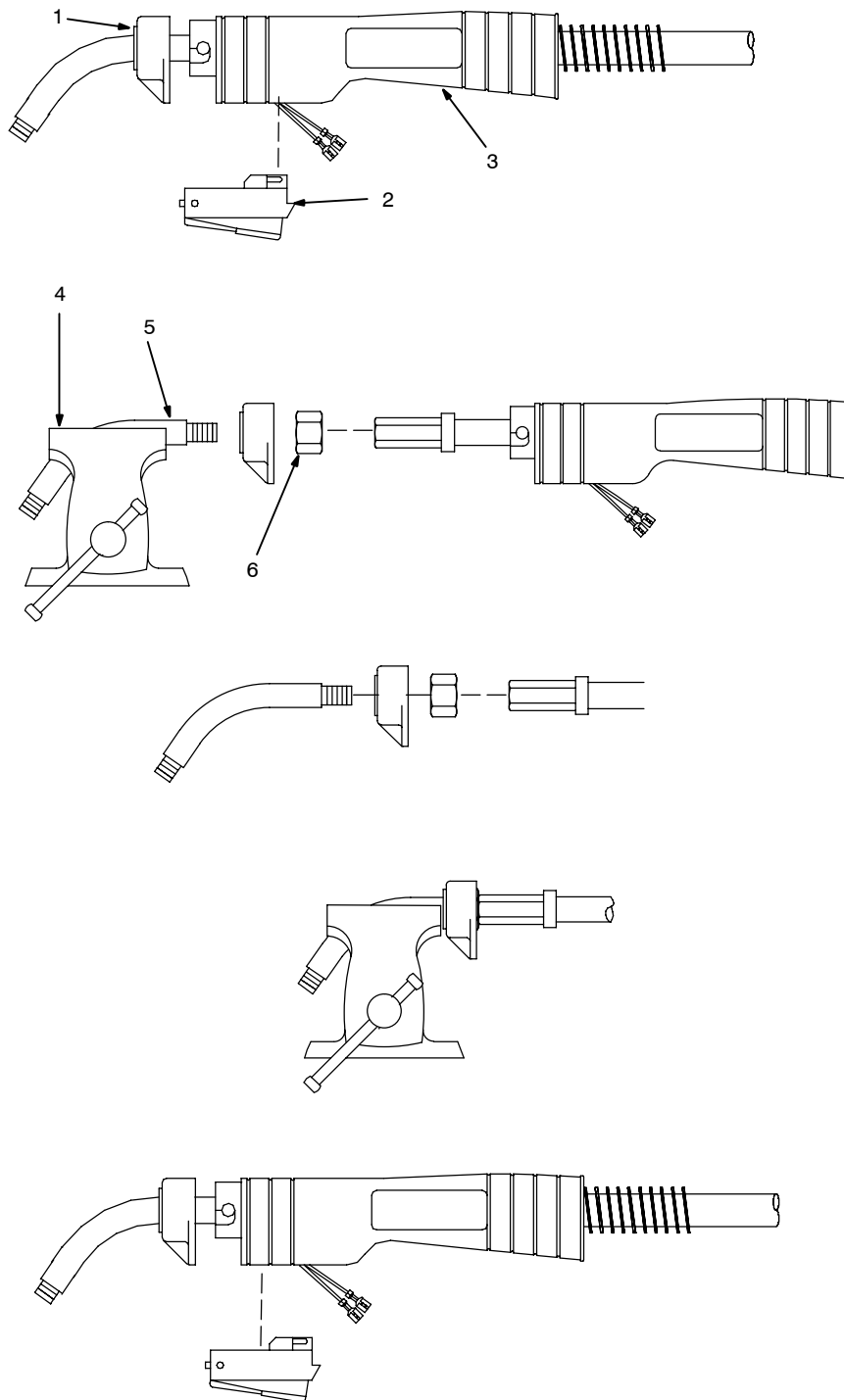
Remove switch housing. Install new switch and connect leads (polarity is not important). Reassemble in reverse order.

Secure head tube in vise.

Loosen jam nut. Remove from vise and turn head tube out by hand.

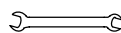
Hand tighten head tube into cable connector. Place head tube in vise and tighten until nuts are tight.

Remove from vise. Reposition handle and install switch housing. Secure with handle locking nut.



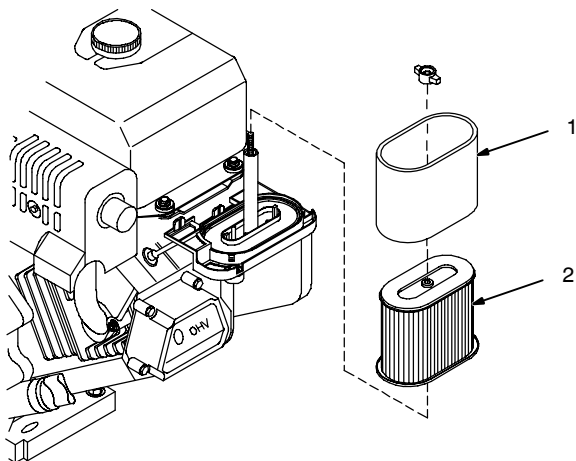
Tools Needed:



 19 mm

Ref. ST-800 795-C

8-9. Servicing Air Cleaner



Standard Model Shown

⚠ Stop engine.

NOTICE – Do not run engine without air cleaner or with dirty element.

- 1 Precleaner
- 2 Paper Element

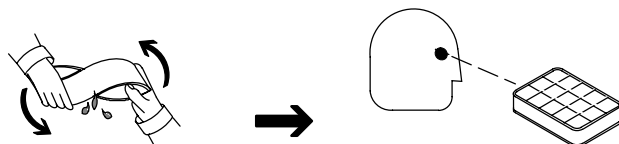
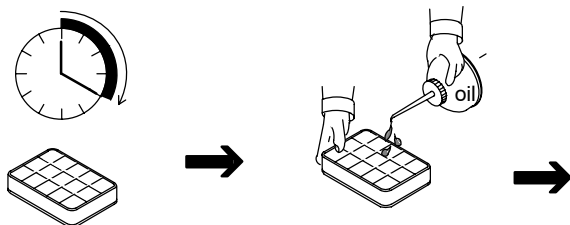
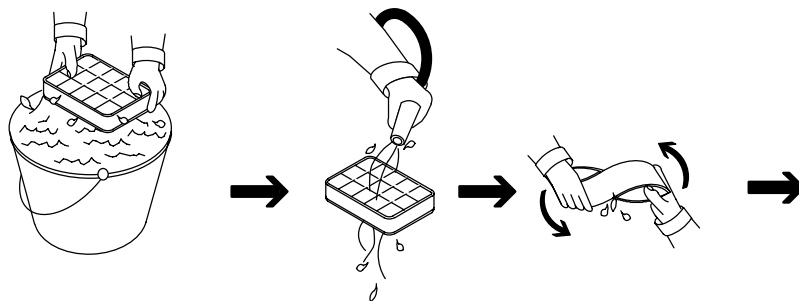
Do not wash paper element or clean with compressed air.

Remove cover.

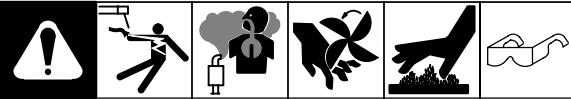
Wash precleaner with soap and water solution. Allow precleaner to air dry completely.



Dip precleaner in clean engine oil. Squeeze out excess oil. The engine will smoke if precleaner contains too much oil.

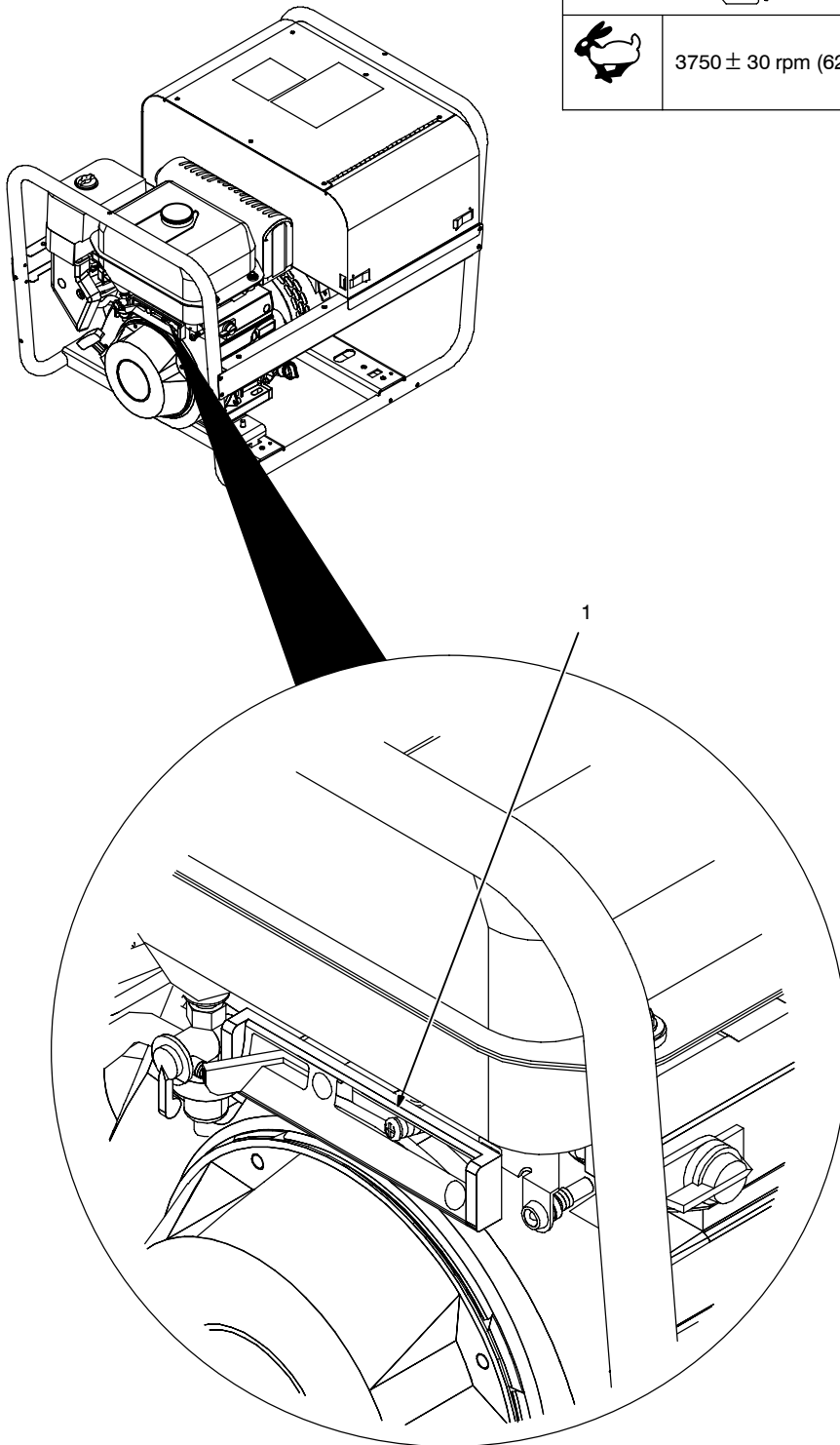
Replace paper element if dirty, oily, or damaged.



8-10. Adjusting Engine Speed



	
	3750 ± 30 rpm (62 Hz)



After tuning engine, check engine speed. See table for proper no load speed. If necessary, adjust speed as follows:

Start engine and run until warm.

1 Adjustment Screw

To increase speed, turn screw in (clockwise). To decrease speed, turn screw out (counterclockwise).

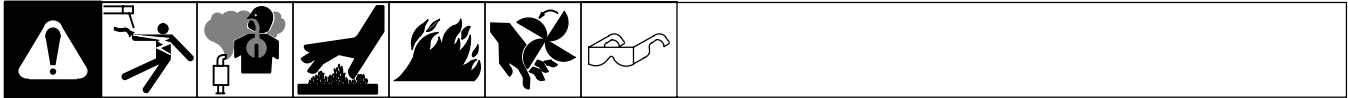
⚠ Stop engine. Close fuel valve.

Tools Needed:



SECTION 9 – TROUBLESHOOTING

9-1. Troubleshooting



A. Welding

Trouble	Remedy
No weld output or generator power output at ac receptacles. ☞ AC receptacles provide auxiliary power only while engine is running.	Be sure all equipment is disconnected from receptacles when starting unit.
	Place switch in Single Phase 230 VAC position or start engine and place switch in Engine/Generator position.
	Over temperature light is flashing. Allow unit to cool with fan running until thermostat TP1 resets and light turns off.
	Have Factory Authorized Service Agent check brushes, slip rings, rotor, stator, and integrated rectifier SR2.
No weld output; generator power output okay at ac receptacles.	Place switch in Engine/Generator position to obtain weld output.
	Check weld connections.
	Check Spool Gun/Mig Gun switch position.
	Have Factory Authorized Service Agent check stator, integrated rectifier SR2, stabilizer Z1, and main rectifier SR1.
Low weld output.	Check Weld Output control setting.
	Check engine speed, and adjust if necessary (see Section 8-10).
	Service engine air cleaner.
	Check weld cable size and length.
	Have Factory Authorized Service Agent check stator, integrated rectifier SR2, stabilizer Z1, and main rectifier SR1.
High weld output.	Check Wire Speed and Voltage control settings.
	Check engine speed, and adjust if necessary (see Section 8-10).
Erratic weld output.	Check Wire Speed and Voltage control settings. Check wire feed for erratic condition.
	Tighten and clean connections to electrode and workpiece.
	Remove excessive coils from work lead and gun power cable.
	Clean and tighten connections both inside and outside welding generator.
	Check engine speed, and adjust if necessary (see Section 8-10).
	Check throttle/governor linkage for smooth, non-binding operation.

B. Generator Power

Trouble	Remedy
No output at generator power ac receptacles; no weld output. ☞ AC receptacles provide auxiliary power only while engine is running.	Be sure all equipment is disconnected from receptacles when starting unit.
	Have Factory Authorized Service Agent check brushes, slip rings, rotor, stator, and integrated rectifier SR2.
No output at generator power ac receptacles; weld output okay.	Reset and check supplementary protector (see Section 7-1).
	Check receptacle wiring and connections.
	Have Factory Authorized Service Agent check stator windings and connections at terminal block 1T.
High output at generator power ac receptacles.	Check engine speed, and adjust if necessary (see Section 8-10).

Trouble	Remedy
Low output at generator power ac receptacles.	Check engine speed, and adjust if necessary (see Section 8-10). Open circuit voltage is reduced as engine speed drops.
Erratic output at generator power ac receptacles.	Check fuel level.
	Have Factory Authorized Service Agent check connections at terminal block 1T.
	Check receptacle supplementary protector, wiring, and connections.
	Check throttle linkage for smooth, non-binding operation.
	Service air cleaner according to engine manual.
	Check engine speed, and adjust if necessary (see Section 8-10).

C. Wire Feeder

Trouble	Remedy
No weld output; wire does not feed; fan does not run.	Secure power cord plug in receptacle (see Section 5-9).
	Replace building line fuse or reset circuit breaker if open.
	Place Input Power switch in Single Phase 230 VAC position.
	Reset welding power source supplementary protector if open.
No weld output; wire does not feed; fan motor continues to run.	Thermostat TP1 open (overheating). Allow fan to run with gun trigger switch off; thermostat closes when unit has cooled.
	Secure gun trigger leads (see Section 5-5).
	Check position of Spool Gun/Mig Gun switch.
No weld output; wire feeds.	Connect work clamp to get good metal to metal contact.
	Replace contact tip (see Section 8-6).
	Check for proper polarity connections (see Section 5-8).
	Check thumbscrew securing gun end to feed head adapter and tighten if necessary.
Low weld output.	Connect unit to proper input voltage or check for low line voltage.
	Place voltage control in desired position (see Section 6-4).
Electrode wire feeding stops during welding.	Straighten gun cable and/or replace damaged parts.
	Adjust drive roll pressure (see Section 5-12).
	Change to proper drive roll groove (see Section 8-5).
	Readjust hub tension (see Section 5-11).
	Replace contact tip if blocked (see Section 8-6). Oversized tip may be required for some wires.
	Clean or replace wire inlet guide or liner if dirty or plugged (see Section 8-5 or Section 8-7).
	Replace drive roll or pressure bearing if worn or slipping (see Section 8-5).
	Secure gun trigger leads or repair leads (see Section 5-5).
	Check and clear any restrictions at drive assembly and liner (see Section 5-12 or Section 8-7).
	Release gun trigger and allow gun and motor protection circuitry to reset.
	Have Factory Authorized Service Agent check drive motor.

D. Engine

Trouble	Remedy
Engine will not crank (Electric Start Models Only)	Check and replace ignition fuse (see engine manual)
	Check battery voltage.
	Check battery connections and tighten if necessary.
	Have Factory Authorized Service Agent check engine ignition system.

Trouble	Remedy
Engine will not start.	Check fuel level (see Section 5-4).
	Move choke control to correct position (see Section 6-1).
	Open fuel valve (see Section 5-4). Close fuel valve before moving unit or carburetor may flood and make starting difficult.
	Be sure engine switch is On.
	Check oil level (see Section 5-4). Engine stops if oil level is too low. Refill crankcase with proper viscosity oil for operating temperature.
	Have Factory Authorized Service Agent check low oil level shutdown switch.
	Check battery voltage (electric start models only).
	Check battery connections and tighten if necessary (electric start models only).
Engine stopped during normal operation.	Check fuel level (see Section 5-4).
	Open fuel valve (see Section 5-4). Close fuel valve before moving unit or carburetor may flood and make starting difficult.
	Check oil level (see Section 5-4). Engine stops if oil level is too low.
Unstable or sluggish engine speeds.	Check engine speed, and adjust if necessary (see Section 8-10).
	Check throttle/governor linkage for smooth, non-binding operation.
	Tune-up engine according to engine manual.
Battery discharges between uses (Electric Start Models Only).	Clean battery terminals and posts with baking soda and water solution; rinse with clear water.
	Periodically recharge battery (approximately every 3 months).
	Replace battery.
	Check engine battery charging circuit and connections according to engine manual.

SECTION 10 – PARTS LIST

☞ A complete parts list is available at www.MillerWelds.com.

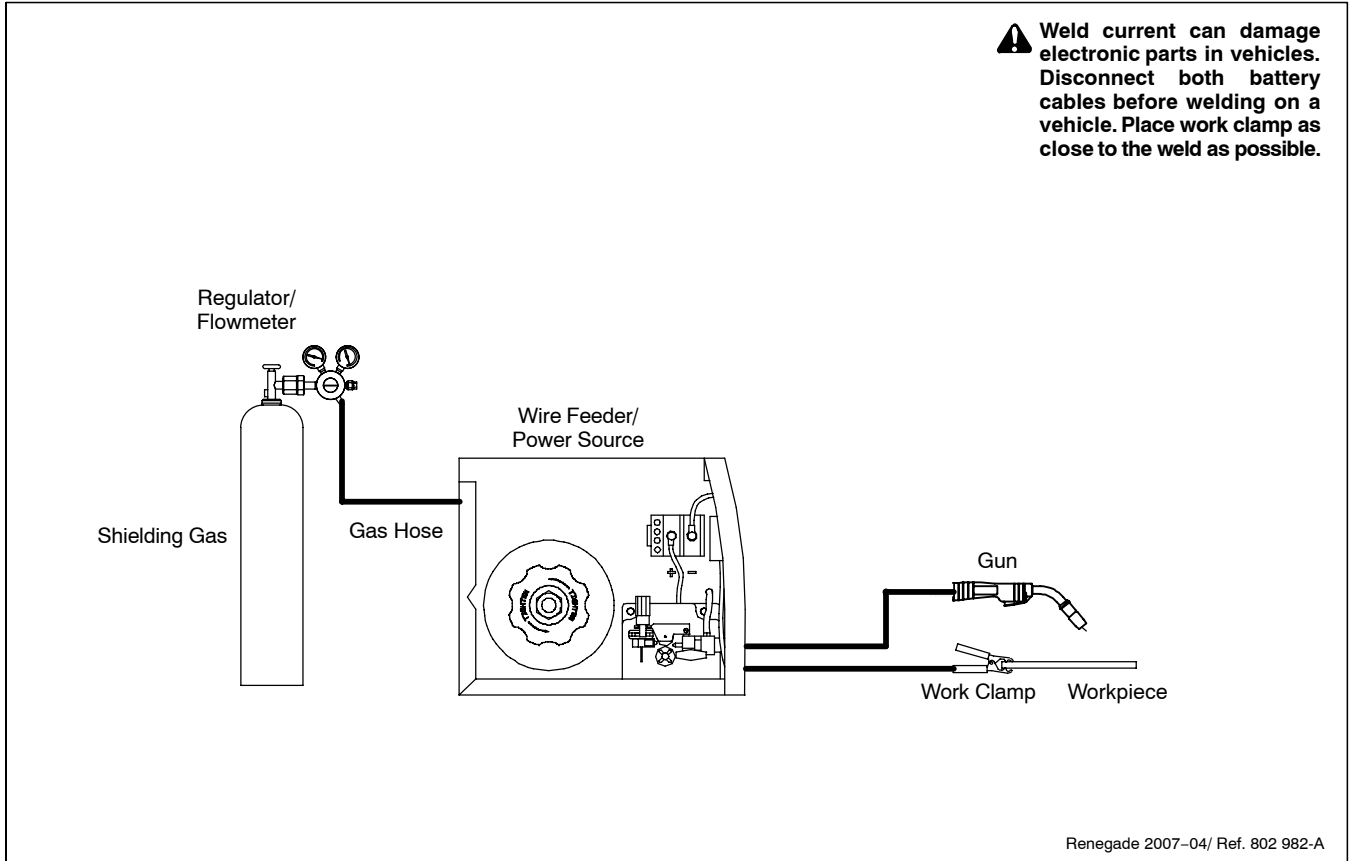
10-1. Recommended Spare Parts

Part No.	Description	Quantity
Recommended Spare Parts		
..... 221581	.. Tune-up & Filter Kit, Kohler (Includes)	1
..... 203960	.. Spark Plug, Kohler (CS8/10/12)	1
..... 221579	.. Air Filter, Kohler (CS10-recoil)	1
..... 221580	.. Air Filter Pre-cleaner, Kohler (CS10-recoil)	1
..... 169715	.. Nozzle, Slip Type .500 Orf Flush	1
..... 087299	.. Tip, Contact Scr .023 Wire X 1.125	1
..... 000067	.. Tip, Contact Scr .030 Wire X 1.125	1
..... 000068	.. Tip, Contact Scr .035 Wire X 1.125	1
..... 000069	.. Tip, Contact Scr .045 Wire X 1.125	1
..... 194010	.. Liner, Monocoil .023/.025 Wire X 15ft (Consisting Of)	1
..... 194011	.. Liner, Monocoil .030/.035 Wire X 15ft (Consisting Of)	1
..... 194012	.. Liner, Monocoil .035-.045 Wire X 15 ft (Consisting Of)	1
..... 079975 O-ring, .187 Id X .103cs Rbr	1

SECTION 12 – MIG WELDING (GMAW) GUIDELINES

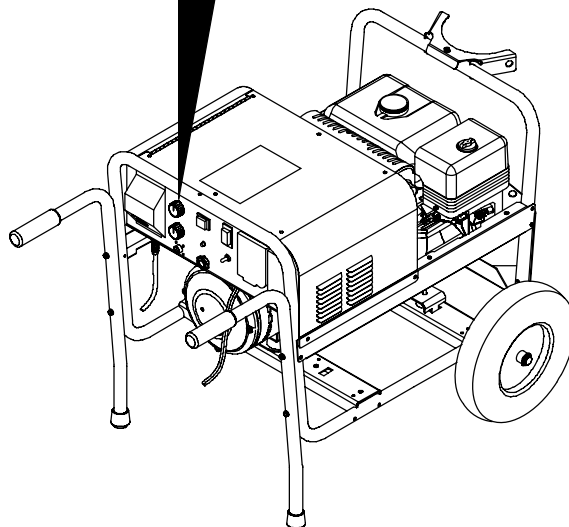
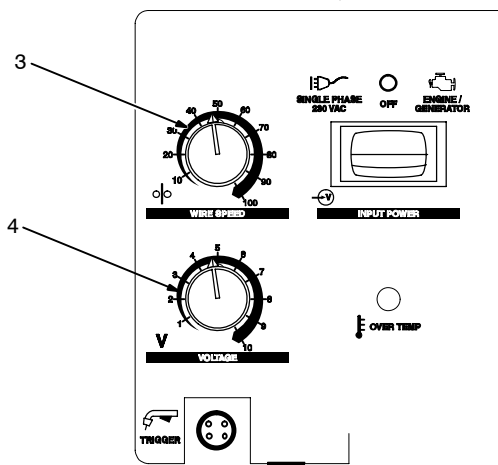
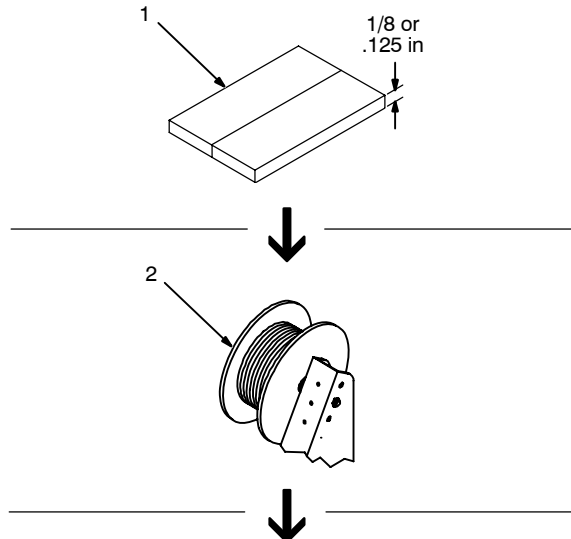


12-1. Typical MIG Process Connections



12-2. Typical MIG Process Control Settings

☞ These settings are guidelines only. Material and wire type, joint design, fitup, position, shielding gas, etc. affect settings. Test welds to be sure they comply to specifications.



☞ These settings are guidelines only. Material and wire type, joint design, fitup, position, shielding gas, etc. affect settings. Test welds to be sure they comply to specifications.

- 1 Convert Material Thickness to Amperage (A)
(.001 in = 1 ampere)
.125 = 125 A

☞ Material thickness determines weld parameters.

- 2 Select Wire Size

Wire Size	Amperage Range
.030 in	40 – 145 A
.035 in	50 – 180 A
.045 in	75 – 250 A

- 3 Select Wire Speed (Amperage)

125 A based on 1/8 in (3 mm) material thickness.
(ipm = inch per minute)

Wire Size	Suggested	Wire Speed (Approx.)
.030 in	2 in per amp	2 x 125 A = 250 ipm
.035 in	1.6 in per amp	1.6 x 125 A = 200 ipm
.045 in	1 in per amp	1 x 125 A = 125 ipm

☞ Wire speed (amperage) controls weld penetration (wire speed = burn-off rate).

- 4 Select Voltage

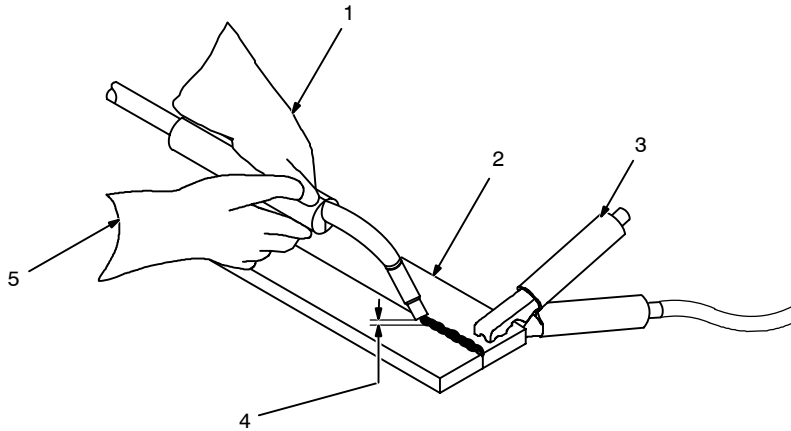
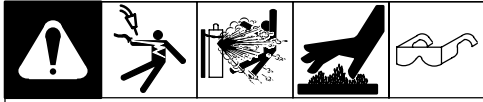
Low Voltage: wire stubs into work
High Voltage: arc is unstable (spatter)

Set voltage midway between high/low voltage.

☞ Voltage controls height and width of weld bead.

12-3. Holding And Positioning Welding Gun

☞ *Welding wire is energized when gun trigger is pressed. Before lowering helmet and pressing trigger, be sure wire is no more than 1/2 in (13 mm) past end of nozzle, and tip of wire is positioned correctly on seam.*



☞ *Welding wire is energized when gun trigger is pressed. Before lowering helmet and pressing trigger, be sure wire is no more than 1/2 in (13 mm) past end of nozzle, and tip of wire is positioned correctly on seam.*

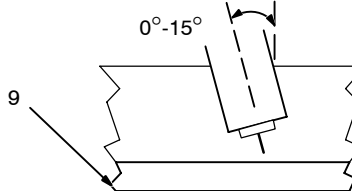
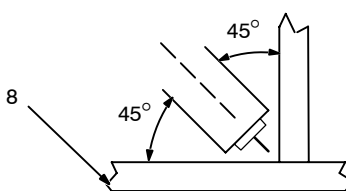
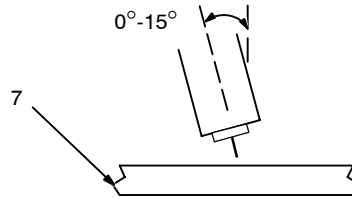
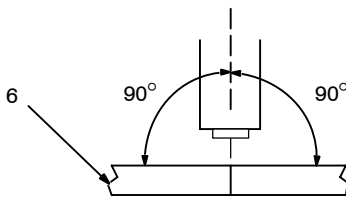
- 1 Hold Gun And Control Gun Trigger
- 2 Workpiece
- 3 Work Clamp
- 4 Electrode Extension (Stickout) 1/4 To 1/2 in (6 To 13 mm)
- 5 Cradle Gun And Rest Hand On Workpiece

Groove Welds

- 6 End View Of Work Angle
- 7 Side View Of Gun Angle

Fillet Welds

- 8 End View Of Work Angle
- 9 Side View Of Gun Angle



12-4. Conditions That Affect Weld Bead Shape

☞ Weld bead shape depends on gun angle, direction of travel, electrode extension (stickout), travel speed, thickness of base metal, wire feed speed (weld current), and voltage.

☞ Weld bead shape depends on gun angle, direction of travel, electrode extension (stickout), travel speed, thickness of base metal, wire feed speed (weld current), and voltage.

Gun Angles And Weld Bead Profiles

- 1 Push
- 2 Perpendicular
- 3 Drag

Electrode Extensions (Stickout)

- 4 Short
- 5 Normal
- 6 Long

Fillet Weld Electrode Extension (Stickout)

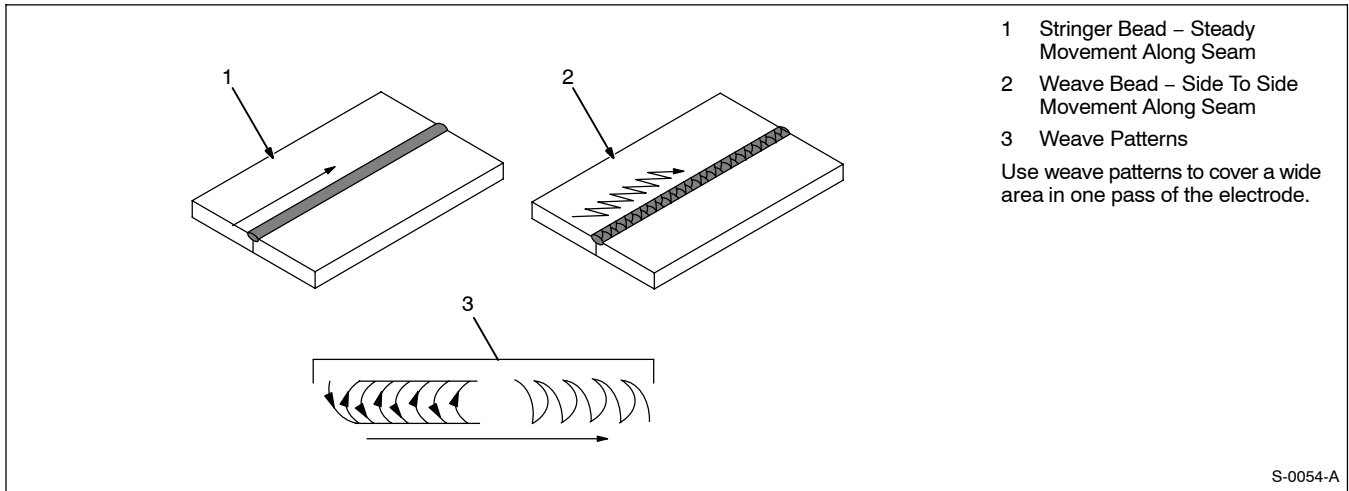
- 7 Short
- 8 Normal
- 9 Long

Gun Travel Speed

- 10 Slow
- 11 Normal
- 12 Fast

12-5. Gun Movement During Welding

☞ Normally, a single stringer bead is satisfactory for most narrow groove weld joints; however, for wide groove weld joints or bridging across gaps, a weave bead or multiple stringer beads works better.

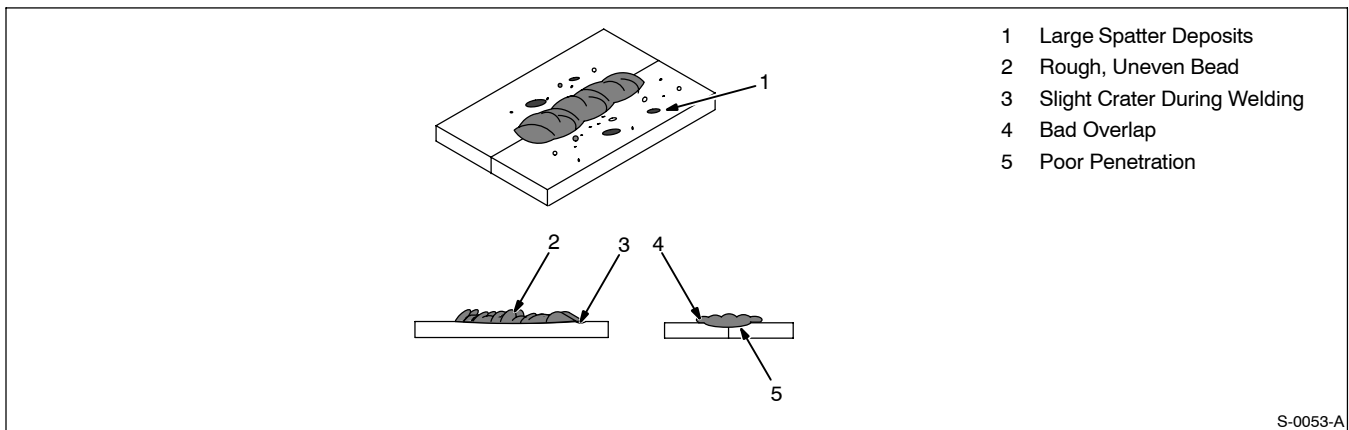


- 1 Stringer Bead – Steady Movement Along Seam
- 2 Weave Bead – Side To Side Movement Along Seam
- 3 Weave Patterns

Use weave patterns to cover a wide area in one pass of the electrode.

S-0054-A

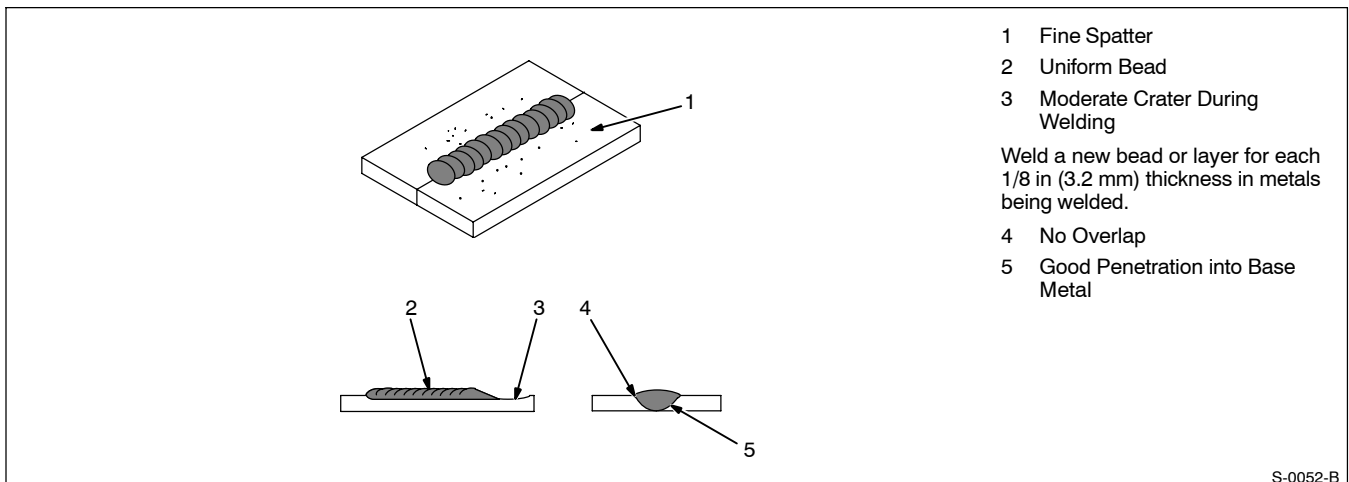
12-6. Poor Weld Bead Characteristics



- 1 Large Spatter Deposits
- 2 Rough, Uneven Bead
- 3 Slight Crater During Welding
- 4 Bad Overlap
- 5 Poor Penetration

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12-7. Good Weld Bead Characteristics



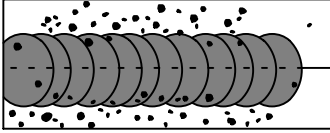
- 1 Fine Spatter
- 2 Uniform Bead
- 3 Moderate Crater During Welding

Weld a new bead or layer for each 1/8 in (3.2 mm) thickness in metals being welded.

- 4 No Overlap
- 5 Good Penetration into Base Metal

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12-8. Troubleshooting – Excessive Spatter

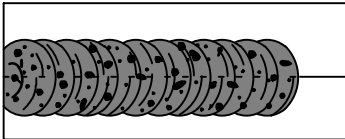


Excessive Spatter – scattering of molten metal particles that cool to solid form near weld bead.

S-0636

Possible Causes	Corrective Actions
Wire feed speed too high.	Select lower wire feed speed.
Voltage too high.	Select lower voltage range.
Electrode extension (stickout) too long.	Use shorter electrode extension (stickout).
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, undercoating, and dirt from work surface before welding.
Insufficient shielding gas at welding arc.	Increase flow of shielding gas at regulator/flowmeter and/or prevent drafts near welding arc.
Dirty welding wire.	Use clean, dry welding wire.
	Eliminate pickup of oil or lubricant on welding wire from feeder or liner.
Wrong polarity.	Configure polarity as shown in Section 5-8. Always read and follow wire manufacturer's recommended polarity, and see Section 5-7.

12-9. Troubleshooting – Porosity

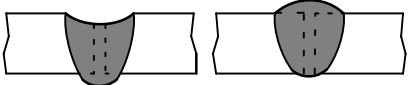


Porosity – small cavities or holes resulting from gas pockets in weld metal.

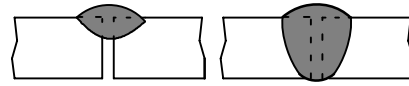
S-0635

Possible Causes	Corrective Actions
Insufficient shielding gas at welding arc.	Increase flow of shielding gas at regulator/flowmeter and/or prevent drafts near welding arc.
	Remove spatter from gun nozzle.
	Check gas hoses for leaks.
	Place nozzle 1/4 to 1/2 in (6-13 mm) from workpiece.
	Hold gun near bead at end of weld until molten metal solidifies.
Wrong gas.	Use welding grade shielding gas; change to different gas.
Dirty welding wire.	Use clean, dry welding wire.
	Eliminate pick up of oil or lubricant on welding wire from feeder or liner.
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, coatings, and dirt from work surface before welding.
	Use a more highly deoxidizing welding wire (contact supplier).
Welding wire extends too far out of nozzle.	Be sure welding wire extends not more than 1/2 in (13 mm) beyond nozzle.
Wrong polarity.	Configure polarity as shown in Section 5-8. Always read and follow wire manufacturer's recommended polarity, and see Section 5-7.

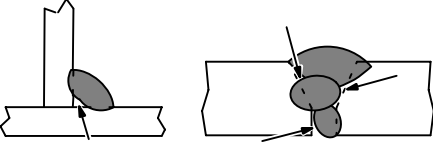
12-10. Troubleshooting – Excessive Penetration

 <p>Excessive Penetration Good Penetration</p>		<p>Excessive Penetration – weld metal melting through base metal and hanging underneath weld.</p>
		S-0639
Possible Causes	Corrective Actions	
Excessive heat input.	Select lower voltage range and reduce wire feed speed.	
	Increase travel speed.	
Wrong polarity.	Configure polarity as shown in Section 5-8. Always read and follow wire manufacturer's recommended polarity, and see Section 5-7.	

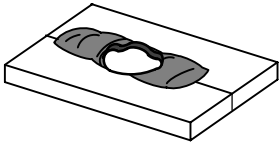
12-11. Troubleshooting – Lack Of Penetration

 <p>Lack of Penetration Good Penetration</p>		<p>Lack Of Penetration – shallow fusion between weld metal and base metal.</p>
		S-0638
Possible Causes	Corrective Actions	
Improper joint preparation.	Material too thick. Joint preparation and design must provide access to bottom of groove while maintaining proper welding wire extension and arc characteristics.	
Improper weld technique.	Maintain normal gun angle of 0 to 15 degrees to achieve maximum penetration.	
	Keep arc on leading edge of weld puddle.	
	Be sure welding wire extends not more than 1/2 in (13 mm) beyond nozzle.	
Insufficient heat input.	Select higher wire feed speed and/or select higher voltage range.	
	Reduce travel speed.	
Wrong polarity.	Configure polarity as shown in Section 5-8. Always read and follow wire manufacturer's recommended polarity, and see Section 5-7.	

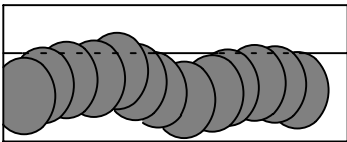
12-12. Troubleshooting – Incomplete Fusion

		<p>Incomplete Fusion – failure of weld metal to fuse completely with base metal or a preceding weld bead.</p>
		S-0637
Possible Causes	Corrective Actions	
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, undercoating, and dirt from work surface before welding.	
Insufficient heat input.	Select higher voltage range and/or adjust wire feed speed.	
Improper welding technique.	Place stringer bead in proper location(s) at joint during welding.	
	Adjust work angle or widen groove to access bottom during welding.	
	Momentarily hold arc on groove side walls when using weaving technique.	
	Keep arc on leading edge of weld puddle.	
	Use correct gun angle of 0 to 15 degrees.	
Wrong polarity.	Configure polarity as shown in Section 5-8. Always read and follow wire manufacturer's recommended polarity, and see Section 5-7.	

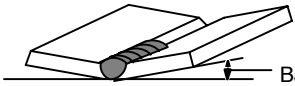
12-13. Troubleshooting – Burn-Through

	<p>Burn-Through – weld metal melting completely through base metal resulting in holes where no metal remains.</p>	S-0640
Possible Causes	Corrective Actions	
Excessive heat input.	Select lower voltage range and reduce wire feed speed.	
	Increase and/or maintain steady travel speed.	
Wrong polarity.	Configure polarity as shown in Section 5-8. Always read and follow wire manufacturer's recommended polarity, and see Section 5-7.	

12-14. Troubleshooting – Waviness Of Bead

	<p>Waviness Of Bead – weld metal that is not parallel and does not cover joint formed by base metal.</p>	S-0641
Possible Causes	Corrective Actions	
Welding wire extends too far out of nozzle.	Be sure welding wire extends not more than 1/2 in (13 mm) beyond nozzle.	
Unsteady hand.	Support hand on solid surface or use two hands.	

12-15. Troubleshooting – Distortion

	<p>Distortion – contraction of weld metal during welding that forces base metal to move.</p>	S-0642
<p>Base metal moves in the direction of the weld bead.</p>		
Possible Causes	Corrective Actions	
Excessive heat input.	Use restraint (clamp) to hold base metal in position.	
	Make tack welds along joint before starting welding operation.	
	Select lower voltage range and/or reduce wire feed speed.	
	Increase travel speed.	
	Weld in small segments and allow cooling between welds.	

12-16. Common MIG Shielding Gases

This is a general chart for common gases and where they are used. Many different combinations (mixtures) of shielding gases have been developed over the years. The most commonly used shielding gases are listed in the following table.

Gas	Application			
	Spray Arc Steel	Short Circuiting Steel	Short Circuiting Stainless Steel	Short Circuiting Aluminum
Argon				All Positions
Argon + 25% CO ₂	Flat & Horizontal ¹ Fillet	All Positions	All Positions ²	
CO ₂	Flat & Horizontal ¹ Fillet	All Positions		
Tri-Mix ³			All Positions	

1 Globular Transfer

2 Single Pass Welding Only

3 90% HE + 7-1/2% AR + 2-1/2% CO₂

SECTION 13 – GENERATOR POWER GUIDELINES

The views in this section are intended to be representative of all engine-driven welding generators. Your unit may differ from those shown.

13-1. Selecting Equipment

- 1 Generator Power Receptacles – Neutral Bonded To Frame
- 2 3-Prong Plug From Case Grounded Equipment
- 3 2-Prong Plug From Double Insulated Equipment

Be sure equipment has double insulated symbol and/or wording on it.

Do not use 2-prong plug unless equipment is double insulated.

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13-2. Grounding Generator To Truck Or Trailer Frame

Always ground generator frame to vehicle frame to prevent electric shock and static electricity hazards.

Also see AWS Safety & Health Fact Sheet No. 29, Grounding of Portable And Vehicle Mounted Welding Generators.

- 1 Equipment Grounding Terminal (On Front Panel)
- 2 Grounding Cable (Not Supplied)
- 3 Metal Vehicle Frame

Connect cable from equipment ground terminal to metal vehicle frame. Use #10 AWG or larger insulated copper wire.



Electrically bond generator frame to vehicle frame by metal-to-metal contact.

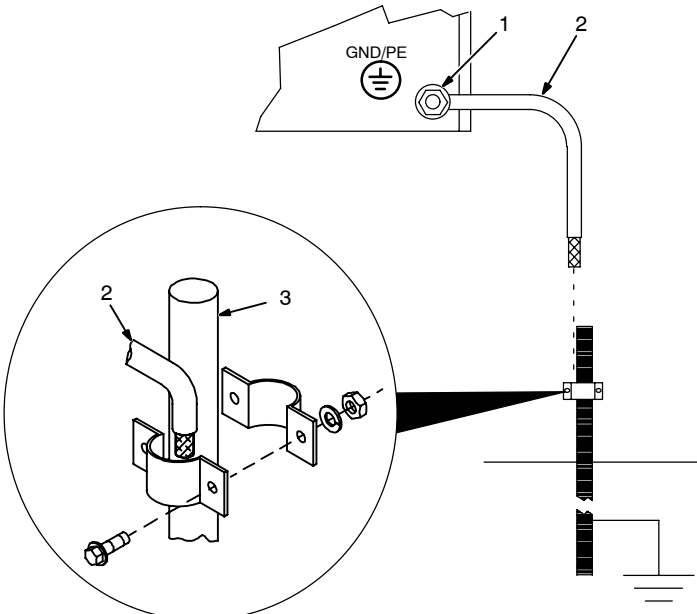
Bed liners, shipping skids, and some running gear insulate the welding generator from the vehicle frame. Always connect a ground wire from the generator equipment grounding terminal to bare metal on the vehicle frame as shown.

If unit does not have GFCI receptacles, use GFCI-protected extension cord.

800 652-D

13-3. Grounding When Supplying Building Systems









- 1 Equipment Grounding Terminal
- 2 Grounding Cable

Use #10 AWG or larger insulated copper wire.

- 3 Ground Device



 Use ground device as stated in electrical codes.

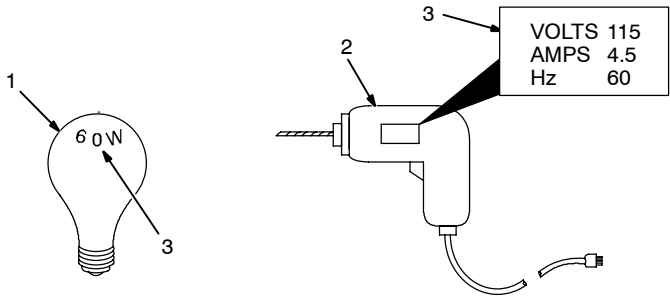
 **Ground generator to system earth ground if supplying power to a premises (home, shop, farm) wiring system.**

 **Also see AWS Safety & Health Fact Sheet No. 29, Grounding of Portable And Vehicle Mounted Welding Generators.**

ST-800 576-B

13-4. How Much Power Does Equipment Require?



- 1 Resistive Load

A light bulb is a resistive load and requires a constant amount of power.

- 2 Non-Resistive Load

Equipment with a motor is a non-resistive load and requires approximately six times more power while starting the motor than when running (see Section 13-8).

- 3 Rating Data

Rating shows volts and amperes, or watts required to run equipment.

Amperes x Volts = Watts

Example 1: If a drill uses 4.5 amperes at 115 volts, calculate its running power requirement in watts.

$$4.5 \text{ A} \times 115 \text{ V} = 520 \text{ W}$$

The load applied by the drill is 520 watts.

Example 2: If three 200 watt flood lamps are used with the drill from Example 1, add the individual loads to calculate total load.

$$(3 \times 200\text{W}) + 520 \text{ W} = 1120 \text{ W}$$

The total load applied by the three flood lamps and drill is 1120 watts.

S-0623

13-5. Approximate Power Requirements For Industrial Motors

Industrial Motors	Rating	Starting Watts	Running Watts
Split Phase	1/8 HP	800	300
	1/6 HP	1225	500
	1/4 HP	1600	600
	1/3 HP	2100	700
	1/2 HP	3175	875
Capacitor Start-Induction Run	1/3 HP	2020	720
	1/2 HP	3075	975
	3/4 HP	4500	1400
	1 HP	6100	1600
	1-1/2 HP	8200	2200
	2 HP	10550	2850
	3 HP	15900	3900
Capacitor Start-Capacitor Run	5 HP	23300	6800
	1-1/2 HP	8100	2000
	5 HP	23300	6000
	7-1/2 HP	35000	8000
	10 HP	46700	10700
Fan Duty	1/8 HP	1000	400
	1/6 HP	1400	550
	1/4 HP	1850	650
	1/3 HP	2400	800
	1/2 HP	3500	1100

13-6. Approximate Power Requirements For Farm/Home Equipment

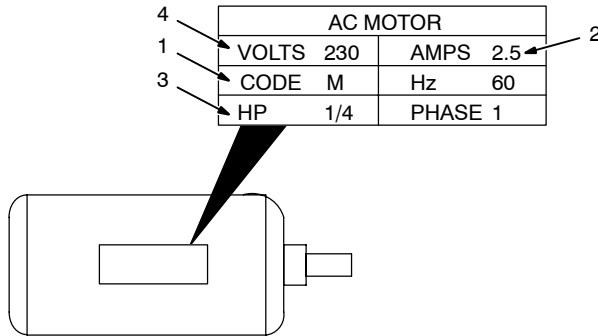
Farm/Home Equipment	Rating	Starting Watts	Running Watts
Stock Tank De-Icer		1000	1000
Grain Cleaner	1/4 HP	1650	650
Portable Conveyor	1/2 HP	3400	1000
Grain Elevator	3/4 HP	4400	1400
Milk Cooler		2900	1100
Milker (Vacuum Pump)	2 HP	10500	2800
FARM DUTY MOTORS	1/3 HP	1720	720
Std. (e.g. Conveyors,	1/2 HP	2575	975
Feed Augers, Air	3/4 HP	4500	1400
Compressors)	1 HP	6100	1600
	1-1/2 HP	8200	2200
	2 HP	10550	2850
	3 HP	15900	3900
	5 HP	23300	6800
High Torque (e.g. Barn	1-1/2 HP	8100	2000
Cleaners, Silo Unloaders,	5 HP	23300	6000
Silo Hoists, Bunk Feeders)	7-1/2 HP	35000	8000
	10 HP	46700	10700
3-1/2 cu. ft. Mixer	1/2 HP	3300	1000
High Pressure 1.8 Gal/Min	500 PSI	3150	950
Washer 2 gal/min	550 PSI	4500	1400
2 gal/min	700 PSI	6100	1600
Refrigerator or Freezer		3100	800
Shallow Well Pump	1/3 HP	2150	750
	1/2 HP	3100	1000
Sump Pump	1/3 HP	2100	800
	1/2 HP	3200	1050

13-7. Approximate Power Requirements For Contractor Equipment

Contractor	Rating	Starting Watts	Running Watts
Hand Drill	1/4 in	350	350
	3/8 in	400	400
	1/2 in	600	600
Circular Saw	6-1/2 in	500	500
	7-1/4 in	900	900
	8-1/4 in	1400	1400
Table Saw	9 in	4500	1500
	10 in	6300	1800
Band Saw	14 in	2500	1100
Bench Grinder	6 in	1720	720
	8 in	3900	1400
	10 in	5200	1600
Air Compressor	1/2 HP	3000	1000
	1 HP	6000	1500
	1-1/2 HP	8200	2200
	2 HP	10500	2800
Electric Chain Saw	1-1/2 HP, 12 in	1100	1100
	2 HP, 14 in	1100	1100
Electric Trimmer	Standard 9 in	350	350
	Heavy Duty 12 in	500	500
Electric Cultivator	1/3 HP	2100	700
Elec. Hedge Trimmer	18 in	400	400
Flood Lights	HID	125	100
	Metal Halide	313	250
	Mercury	1000	
	Sodium Vapor	1400	1000
Submersible Pump	400 gph	600	200
Centrifugal Pump	900 gph	900	500
Floor Polisher	3/4 HP, 16 in	4500	1400
	1 HP, 20 in	6100	1600
High Pressure Washer	1/2 HP	3150	950
	3/4 HP	4500	1400
	1 HP	6100	1600
55 gal Drum Mixer	1/4 HP	1900	700
Wet & Dry Vac	1.7 HP	900	900
	2-1/2 HP	1300	1300

13-8. Power Required To Start Motor

Single-Phase Induction Motor Starting Requirements								
Motor Start Code	G	H	J	K	L	M	N	P
KVA/HP	6.3	7.1	8.0	9.0	10.0	11.2	12.5	14.0



- 1 Motor Start Code
- 2 Running Amperage
- 3 Motor HP
- 4 Motor Voltage

To find starting amperage:

Step 1: Find code and use table to find kVA/HP. If code is not listed, multiply running amperage by six to find starting amperage.

Step 2: Find Motor HP and Volts.

Step 3: Determine starting amperage (see example).

Welding generator amperage output must be at least twice the motor's running amperage.

$$\frac{(kVA/HP \times HP \times 1000)}{\text{Volts}} = \text{Starting Amperage}$$

Example: Calculate starting amperage required for a 230 V, 1/4 HP motor with a motor start code of M.

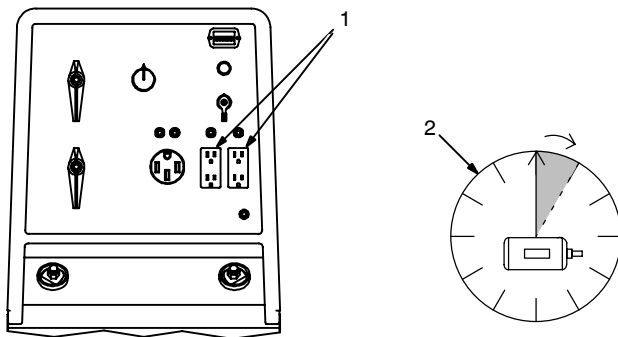
$$\text{Volts} = 230, \text{HP} = 1/4, \text{kVA/HP} = 11.2$$

$$(11.2 \times 1/4 \times 1000) / 230 = 12.2A$$

Starting the motor requires 12.2 amperes.

S-0624

13-9. How Much Power Can Generator Supply?



- 1 Limit Load To 90% Of Generator Output

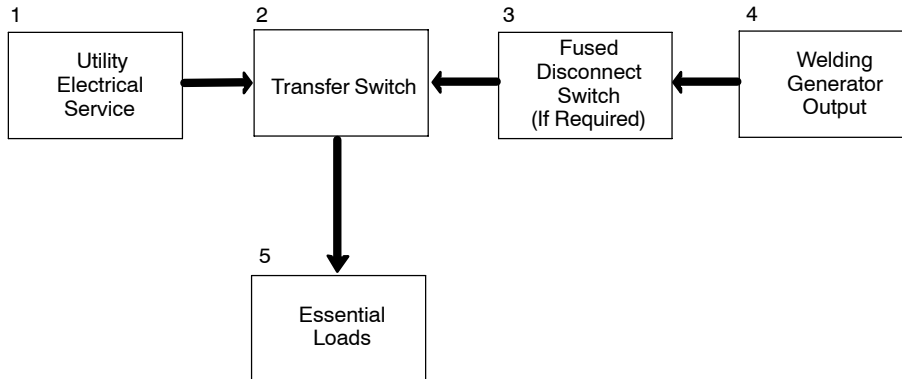
Always start non-resistive (motor) loads in order from largest to smallest, and add resistive loads last.

- 2 5 Second Rule

If motor does not start within 5 seconds, turn off power to prevent motor damage. Motor requires more power than generator can supply.

Ref. ST-800 396-A / S-0625

13-10. Typical Connections To Supply Standby Power



⚠ Have only qualified persons perform these connections according to all applicable codes and safety practices.

⚠ Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.

📄 *Customer-supplied equipment is required if generator will supply standby power during emergencies or power outages.*

1 Utility Electrical Service

2 Transfer Switch (Double-Throw)

Switch transfers the electrical load from electric utility service to the generator. Transfer load back to electric utility when service is restored.

Install correct switch (customer-supplied). Switch rating must be same as or greater than the branch overcurrent protection.

3 Fused Disconnect Switch

Install correct switch (customer-supplied) if required by electrical code.

4 Welding Generator Output

Generator output voltage and wiring must be consistent with regular (utility) system voltage and wiring.


Connect generator with temporary or permanent wiring suitable for the installation.

Turn off or unplug all equipment connected to generator before starting or stopping engine. When starting or stopping, the engine has low speed which causes low voltage and frequency.


5 Essential Loads

Generator output may not meet the electrical requirements of the premises. If generator does not produce enough output to meet all requirements, connect only essential loads (pumps, freezers, heaters, etc. – See Section 13-4).

13-11. Selecting Extension Cord (Use Shortest Cord Possible)

Cord Lengths for 120 Volt Loads							
							
⚠ If unit does not have GFCI receptacles, use GFCI-protected extension cord.							
Current (Amperes)	Load (Watts)	Maximum Allowable Cord Length in ft (m) for Conductor Size (AWG)*					
		4	6	8	10	12	14
5	600			350 (106)	225 (68)	137 (42)	100 (30)
7	840		400 (122)	250 (76)	150 (46)	100 (30)	62 (19)
10	1200	400 (122)	275 (84)	175 (53)	112 (34)	62 (19)	50 (15)
15	1800	300 (91)	175 (53)	112 (34)	75 (23)	37 (11)	30 (9)
20	2400	225 (68)	137 (42)	87 (26)	50 (15)	30 (9)	
25	3000	175 (53)	112 (34)	62 (19)	37 (11)		
30	3600	150 (46)	87 (26)	50 (15)	37 (11)		
35	4200	125 (38)	75 (23)	50 (15)			
40	4800	112 (34)	62 (19)	37 (11)			
45	5400	100 (30)	62 (19)				
50	6000	87 (26)	50 (15)				

*Conductor size is based on maximum 2% voltage drop

Cord Lengths for 240 Volt Loads							
							
⚠ If unit does not have GFCI receptacles, use GFCI-protected extension cord.							
Current (Amperes)	Load (Watts)	Maximum Allowable Cord Length in ft (m) for Conductor Size (AWG)*					
		4	6	8	10	12	14
5	1200			700 (213)	450 (137)	225 (68)	200 (61)
7	1680		800 (244)	500 (152)	300 (91)	200 (61)	125 (38)
10	2400	800 (244)	550 (168)	350 (107)	225 (69)	125 (38)	100 (31)
15	3600	600 (183)	350 (107)	225 (69)	150 (46)	75 (23)	60 (18)
20	4800	450 (137)	275 (84)	175 (53)	100 (31)	60 (18)	
25	6000	350 (107)	225 (69)	125 (38)	75 (23)		
30	7000	300 (91)	175 (53)	100 (31)	75 (23)		
35	8400	250 (76)	150 (46)	100 (31)			
40	9600	225 (69)	125 (38)	75 (23)			
45	10,800	200 (61)	125 (38)				
50	12,000	175 (53)	100 (31)				

*Conductor size is based on maximum 2% voltage drop

TRUE BLUE[®]

WARRANTY

Effective January 1, 2008

(Equipment with a serial number preface of LJ or newer)

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step of the way.

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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 only to include SCRs, diodes, and discrete rectifier modules
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)
 - * Intelligit
 - * 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 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.

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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.

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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



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Contact a DISTRIBUTOR or SERVICE AGENCY near you.

Always provide Model Name and Serial/Style Number.

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Personal Safety Equipment

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