



OM-217 455H

2007-05-21

Processes



Stick (SMAW) Welding



MIG (GMAW) Welding
Flux Cored (FCAW) Welding



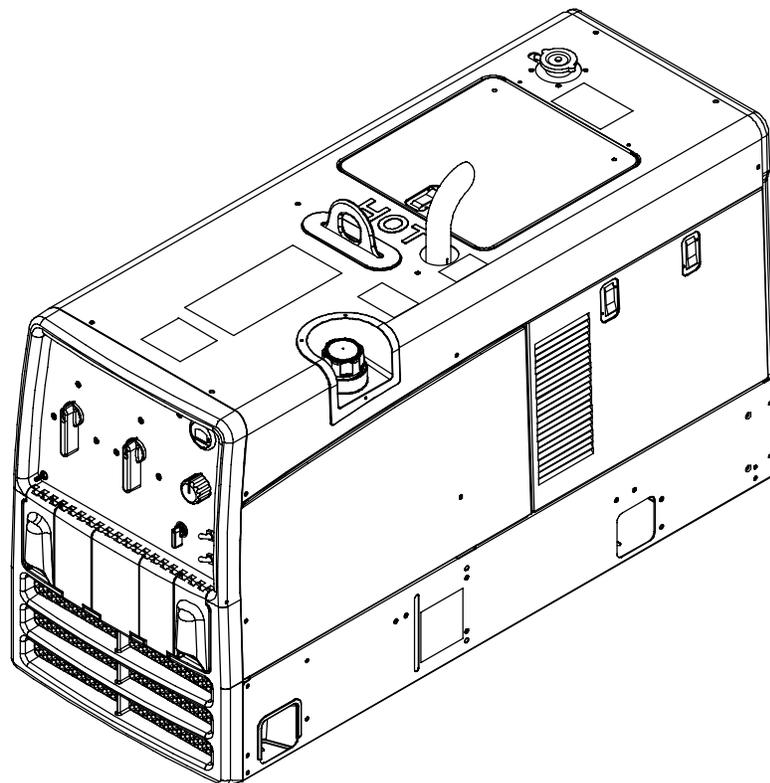
Non-Critical TIG (GTAW)
Welding

Description



Engine Driven Welding Generator

Bobcat[™] 250 Diesel



OWNER'S MANUAL

File: Engine Drive



Visit our website at
www.MillerWelds.com

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. Weld, Power, and Engine Specifications	12
4-2. Dimensions, Weights, and Operating Angles	13
4-3. Dimensions For Units With Optional Running Gear	13
SECTION 5 – INSTALLATION	14
5-1. Installing Welding Generator	14
5-2. Installing Exhaust Pipe	15
5-3. Connecting the Battery	15
5-4. Overview And Engine Prestart Checks	16
5-5. Connecting to Weld Output Terminals	18
5-6. Selecting Weld Cable Sizes*	19
SECTION 6 – OPERATING THE WELDING GENERATOR	20
6-1. Engine Control Switches	20
6-2. Weld Output Controls	21
6-3. Typical Stick Welding Connections And Control Settings	22
6-4. Typical MIG Welding Connections And Settings	23
6-5. Typical MIG Connections And Settings Using Weld Control And Spoolgun	24
SECTION 7 – OPERATING AUXILIARY EQUIPMENT	25
7-1. Generator Power Receptacles	25
7-2. Simultaneous Weld And Power	26
7-3. Wiring Instructions For Optional 240 Volt, Single-Phase Plug (NEMA 14-50P)	26
SECTION 8 – OPERATING OPTIONAL BATTERY CHARGER	27
8-1. Battery Charge Controls	27
8-2. Determining Battery Charging Current	27
8-3. Battery Charge Cable Connections	28
8-4. Battery Charging Procedure	29
SECTION 9 – MAINTENANCE AND TROUBLESHOOTING	31
9-1. Routine Maintenance	31
9-2. Maintenance Label And Engine Maintenance Activities	32
9-3. Servicing Air Cleaner	34
9-4. Adjusting Engine Speed	35
9-5. Overload Protection	38
9-6. Troubleshooting Tables	39

TABLE OF CONTENTS

SECTION 10 – PARTS LIST	41
10-1. Recommended Spare Parts	41
SECTION 11 – ELECTRICAL DIAGRAMS	42
SECTION 12 – RUN-IN AND WETSTACKING	46
12-1. Run-In And Wetstacking	46
SECTION 13 – PERFORMANCE DATA	47
13-1. Fuel Consumption Curves	47
13-2. Generator Power Curve	48
13-3. Duty Cycle	48
13-4. Stick Mode Volt-Ampere Curves	49
13-5. MIG Mode Volt-Ampere Curve	50
SECTION 14 – GENERATOR POWER GUIDELINES	51
SECTION 15 – STICK WELDING (SMAW) GUIDELINES	58
COMPLETE PARTS LIST - www.MillerWelds.com	
OPTIONS AND ACCESSORIES	
WARRANTY	

SECTION 1 – SAFETY PRECAUTIONS – READ BEFORE USING

rom_2007-04

 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.

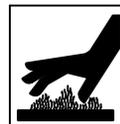
Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, 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.

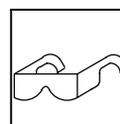
SIGNIFICANT DC VOLTAGE exists in inverters after stopping engine.

- 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.

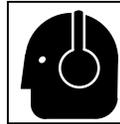


WELDING can cause fire or explosion.

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.

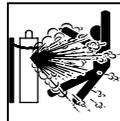
Noise from some processes or equipment can damage hearing.

- 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.



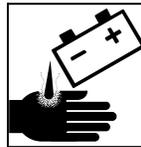
STEAM AND HOT COOLANT can burn.

- 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.

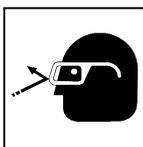
- Do not let engine exhaust sparks cause fire.
- Use approved engine exhaust spark arrestor in required areas — see applicable codes.

1-4. Compressed Air Hazards



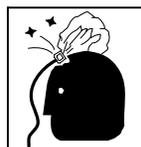
BREATHING COMPRESSED AIR can cause serious injury or death.

- 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.



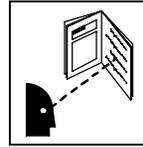
HOT METAL from air arc cutting and gouging can cause fire or explosion.

- 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



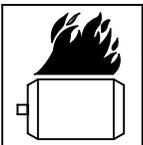
FIRE OR EXPLOSION hazard.

- 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.



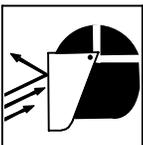
FALLING UNIT can cause injury.

- 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.



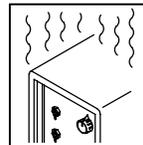
MOVING PARTS can cause injury.

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



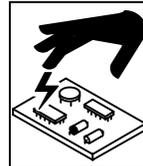
WELDING WIRE can cause injury.

- 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.



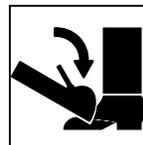
OVERUSE can cause OVERHEATING.

- 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.



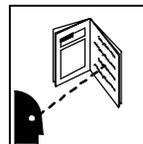
STATIC (ESD) can damage PC boards.

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



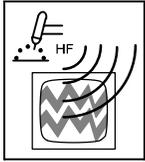
TILTING OF TRAILER can cause injury.

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



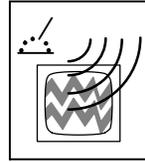
READ INSTRUCTIONS.

- 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

- ⚠ Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)**
- ⚠ Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.**

For Gasoline Engines:

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

For Diesel Engines:

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

1-7. 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

rom_2007-04fre

! 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.

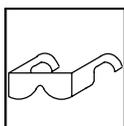
Une tension DC importante subsiste à l'intérieur des onduleurs après avoir coupé l'alimentation.

- 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.

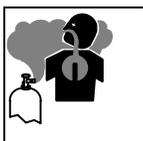
- Le soudage, l'écaillage, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.
- Porter des lunettes de sécurité avec écrans latéraux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



LES FUMÉES ET LES GAZ peuvent être dangereux.

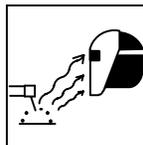
Le soudage génère des fumées et des gaz. Leur inhalation peut être dangereux pour votre santé.

- 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 énumérés 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 tel 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 décongeler 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.

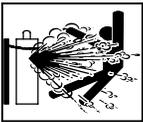
Le bruit des processus et des équipements peut affecter l'ouïe.

- Porter des protections approuvées 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.

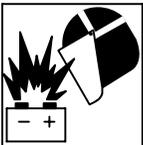


Si des BOUTEILLES sont endommagées, elles pourront exploser.

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 forment 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.
- Éviter 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.

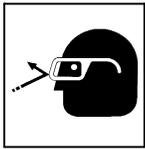
- Ne pas renverser la batterie.
- Remplacer une batterie endommagée.
- Rincer immédiatement les yeux et la peau à l'eau.

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 COMPRI ME 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.



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.



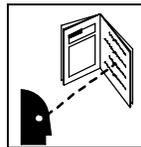
Le METAL CHAUD lors du coupage et gougeage plasma peut provoquer un incendie ou une explosion.

- 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



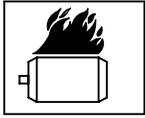
Risque D'INCENDIE OU D'EXPLOSION.

- 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.



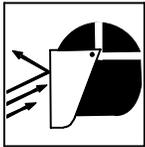
LA CHUTE DE L'APPAREIL peut blesser.

- Utiliser l'anneau de levage pour lever l'appareil et les accessoires correctement installés seuls, PAS les bouteilles de gaz. Ne pas dépasser le poids nominal maximal de l'ocillon (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.



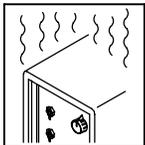
DES ORGANES MOBILES peuvent provoquer des blessures.

- 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.



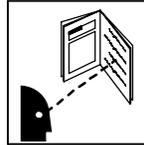
LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- 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.



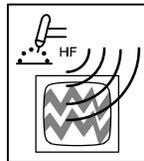
UNE REMORQUE QUI BASCULE peut entraîner des blessures.

- 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.



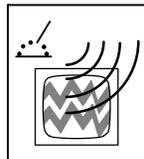
LIRE LES INSTRUCTIONS.

- 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

	Stop Engine		Fast (Run, Weld/Power)		Fast/Slow (Run/Idle)		Slow (Idle)
	Start Engine		Read Operator's Manual	A	Amperes	V	Volts
	Engine Oil		Fuel		Battery (Engine)		Engine
	Temperature		Check Valve Clearance		Do not switch while welding		Work Connection
+	Positive	—	Negative		Alternating Current (AC)		Output
	Welding Arc (Electrode)		MIG (GMAW), Wire		Stick (SMAW)		TIG (GTAW)
h	Hours	s	Seconds		Time		Protective Earth (Ground)
	Circuit Protector						

SECTION 4 – SPECIFICATIONS

4-1. Weld, Power, and Engine Specifications

☞ Also see Performance Data in Section 13.

Welding Mode	Weld Output Range	Rated Welding Output	Maximum Open Circuit Voltage	Generator Power Rating	Fuel Capacity	Engine
CC/AC	40 – 250 A	250 A, 25 V, 100% Duty Cycle	80	Peak: 10.5 kVA/kW Continuous: 9.5 kVA/kW, Single-Phase, 84/42 A, 120/240 V AC, 60 Hz (while not welding)	12 gal (45 L) Tank	Kubota D722 Water-Cooled, Three-Cylinder Four-Cycle 18.8 HP Diesel Engine
CC/DC	40 – 250 A	250 A, 25 V, 100% Duty Cycle	72			
CV/DC	17 – 28 V	275 A, 25 V, 60% Duty Cycle 250 A, 28 V, 100% Duty Cycle	41			

4-2. Dimensions, Weights, and Operating Angles

Dimensions	
Height	35-1/2 in (902 mm) (To Top Of Exhaust)
Width	20 in (508 mm)
Depth	53 in (1346 mm)
A	20 in (508 mm)
B	16-1/2 in (419 mm)
C	1-3/4 in (44 mm)
D	6-1/16 in (154 mm)
E	32-3/4 in (832 mm)
F	51-3/8 in (1305 mm)
G	13/32 in (10 mm) Dia.
Weight	
700 lb (318 kg)	
Lifting Eye Weight Rating	
1280 lbs (580 kg)	

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

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

800 426
804 249-A

4-3. Dimensions For Units With Optional Running Gear

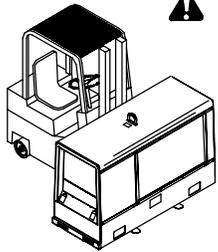
Dimensions	
Height	All Running Gear Options: 42-1/2 in (1079 mm) (To Top Of Handle Assembly)
A	Protective Cage Width: 26 in (660 mm)
B	Running Gear Width: 32 in (813 mm)
C	Protective Cage Length: 48 in (1219 mm)
D	Running Gear Length: 45-1/2 in (1156 mm)

SECTION 5 – INSTALLATION

5-1. Installing Welding Generator

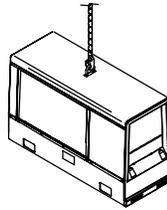


Movement

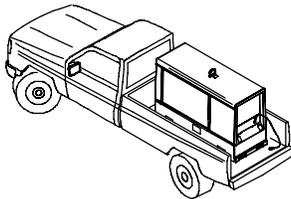


⚠ Do not lift unit from end.

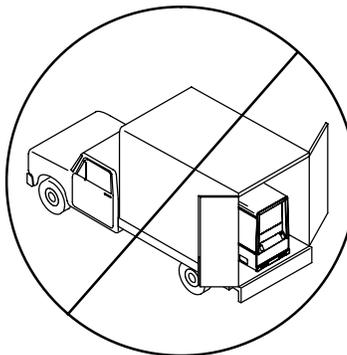
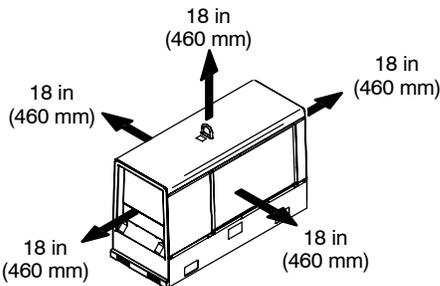
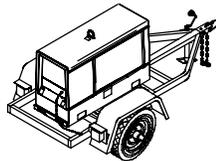
OR



Location / Airflow Clearance



OR



- ⚠** Do not weld on base. Welding on base can cause fuel tank fire or explosion. Bolt unit down using holes provided in base.
- ⚠** Always securely fasten welding generator onto transport vehicle or trailer and comply with all DOT and other applicable codes.
- ⚠** Do not mount unit by supporting the base only at the four mounting holes. Use cross-supports to adequately support unit and prevent damage to base.
- ⚠** Always ground generator frame to vehicle frame to prevent electric shock and static electricity hazards.
- ⚠** If unit does not have GFCI receptacles, use GFCI-protected extension cord.

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

Mounting:

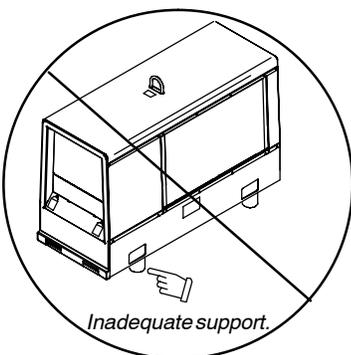
- 1 Cross-Supports
- Mount unit on flat surface or use cross-supports to support base.

Grounding:

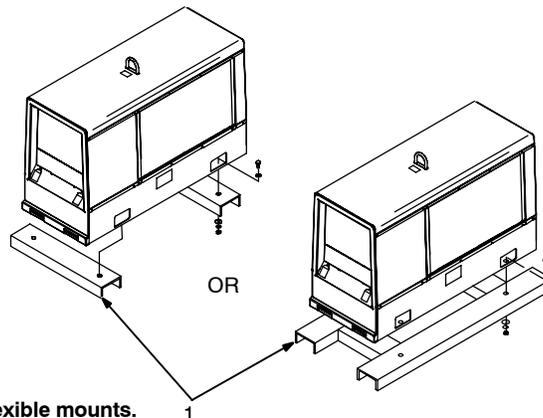
- 2 Equipment Grounding Terminal (On Front Panel)
- 3 Grounding Cable (Not Supplied)
- 4 Metal Vehicle Frame

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

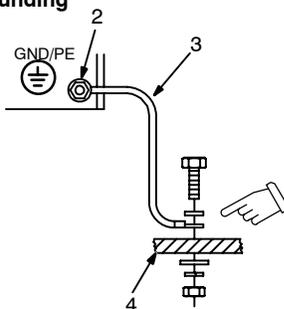
Mounting



⚠ Do not use flexible mounts.



Grounding



⚠ Bed liners, shipping skids, and some running gears 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.

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

5-2. Installing Exhaust Pipe

⚠ Stop engine and let cool.

⚠ Do not blow exhaust toward right side of unit where air inlet is or air cleaner may require frequent service. Point exhaust pipe in desired direction but always away from front panel and direction of travel.

Tools Needed:

1/2 in

804 196-A / Ref. 228 647-A

5-3. Connecting the Battery

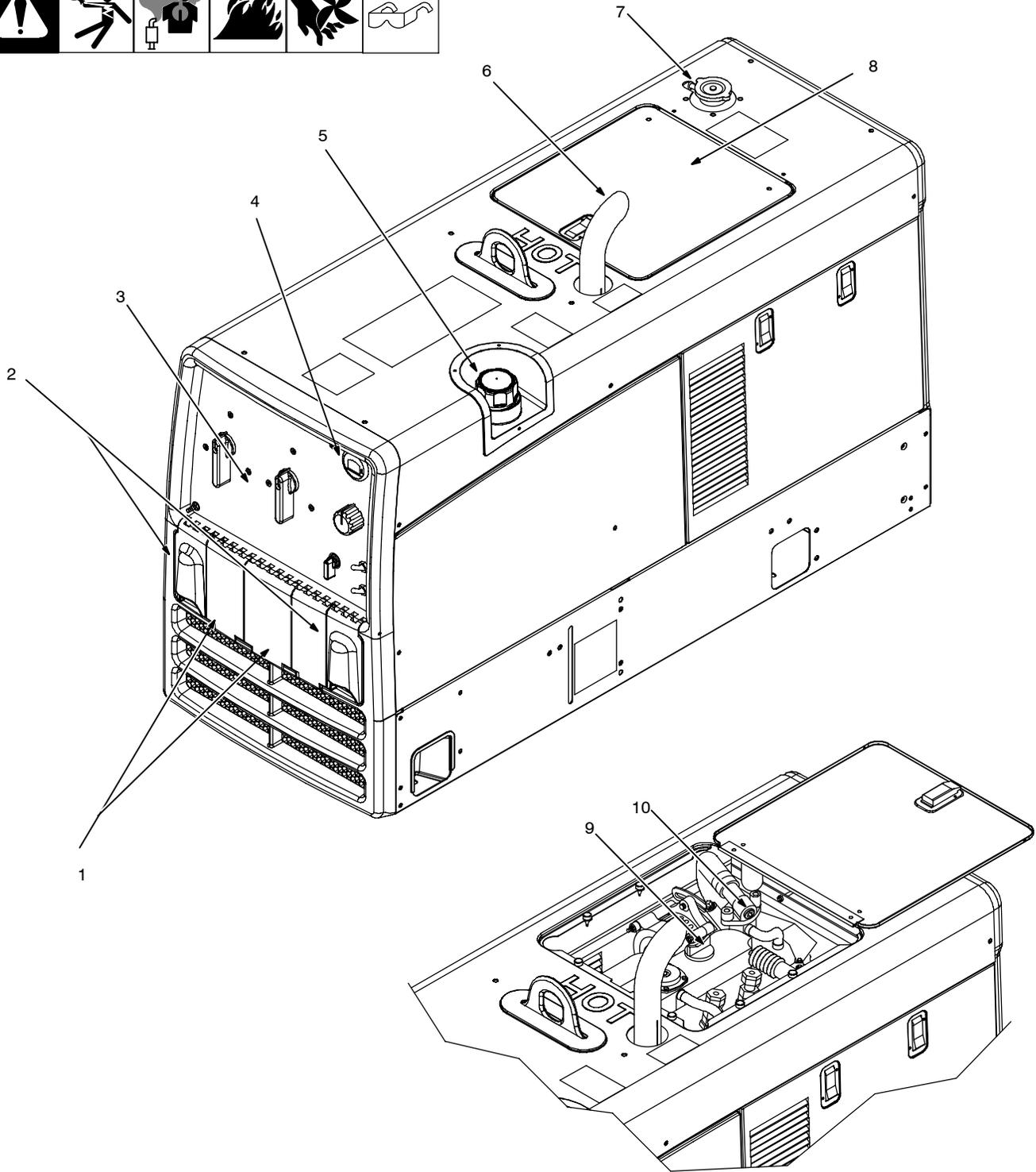
⚠ Connect negative (-) cable last.

Tools Needed:

1/2 in

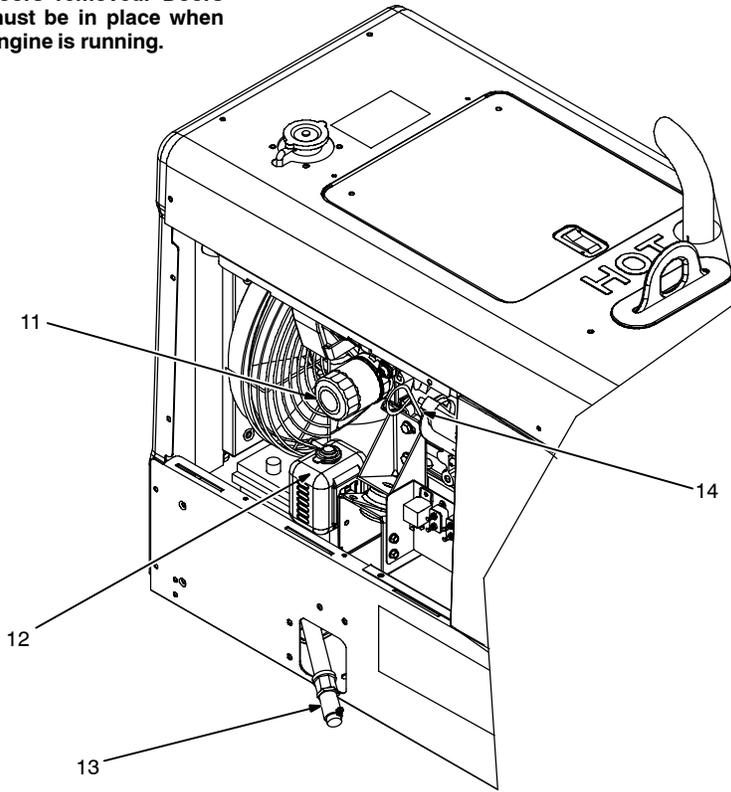
804 250-A / Ref 228 647 / Ref. S-0756-D

5-4. Overview And Engine Prestart Checks

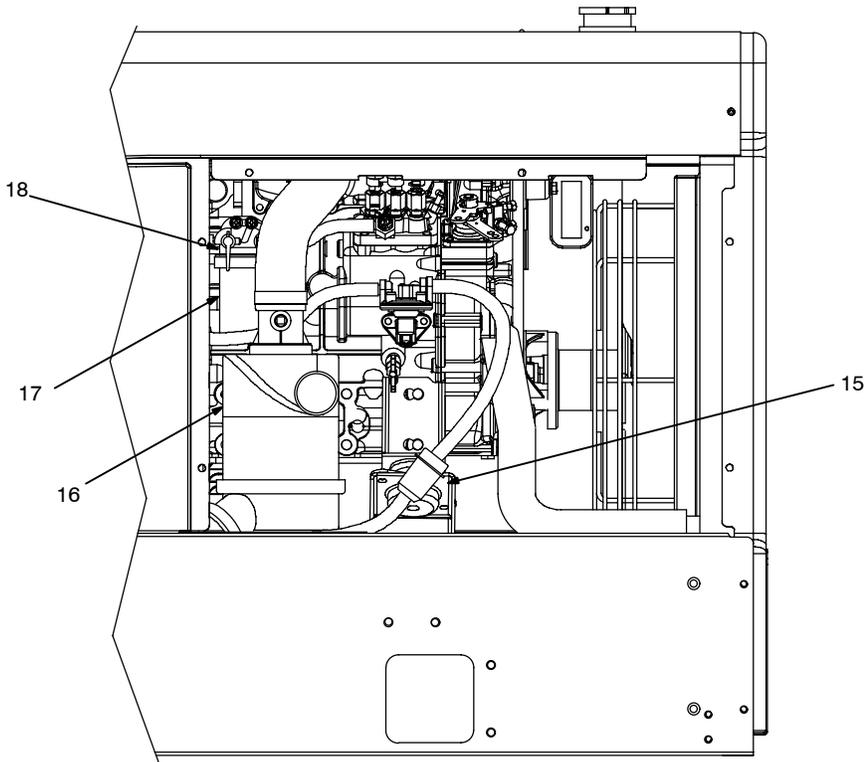


- | | | |
|---|--|-------------------------|
| 1 Generator Power Receptacles (see Section 7) | 7 Radiator Cap | 13 Oil Drain |
| 2 Weld Output Terminals (see Section 5-5) | 8 Engine Maintenance Label (Inside Door) | 14 Oil Dipstick |
| 3 Operator Controls (see Section 6) | 9 Oil Fill Cap | 15 Inline Fuel Strainer |
| 4 Fuel Gauge/Maintenance Display | 10 Thermostat Housing Plug | 16 Air Cleaner |
| 5 Fuel Filler Cap | 11 Oil Filter | 17 Fuel Filter |
| 6 Exhaust Pipe | 12 Coolant Overflow Bottle | 18 Fuel Shut Off Valve |

⚠ Engine shown with doors removed. Doors must be in place when engine is running.



Engine Left Side



Engine Right Side

Engine must be cold and on a level surface. See maintenance label (Section 9-2) for fluid specifications.

Starting engine for the first time:

Add fresh fuel to bottom of filler neck. Open fuel shut-off valve.

If coolant level is below bottom of radiator filler neck, add coolant to overflow bottle.

Run-in period (first 100 hours):

Engine may use oil and wetstacking may occur during run-in (see Section 12). Check oil several times daily during run-in.

Daily pre-start checks:

Add fresh fuel to bottom of filler neck.

Check oil. If oil is not up to full mark on dipstick, add oil. Unit is shipped with 10W30 engine oil.

Check coolant level in overflow bottle. If coolant is below Low level, add coolant until level in tank is between Low and Full levels. If overflow bottle coolant level was low, check coolant level in radiator (see Section 9-2).

Engine damage can result from:

- Low oil level
- High engine temperature
- Incorrect coolant mixture
- Running out of fuel (air in fuel lines)
- Using gasoline
- Using ether to start engine
- Wetstacking

Engine stops if oil pressure is low, engine coolant temperature is high, or fuel level is low. Some conditions may cause engine damage before the engine shuts down.

Oil: Check oil level often and do not use the oil pressure shutdown system to monitor oil level.

Engine Temperature: Incorrect engine temperature can damage engine. Do not run engine without a properly working thermostat and radiator cap.

Keep radiator and air intake clean.

Coolant: A solution of 50% ethylene glycol base antifreeze and 50% water must be used in this engine. Do not use 100% antifreeze or severe damage will occur.

Fuel: Engine will shut down if fuel level is low. Air in the fuel system causes starting problems.

Do not use gasoline. Using ether voids warranty.

Wetstacking: If unburned fuel and oil collect in exhaust pipe during run-in, see Section 12.

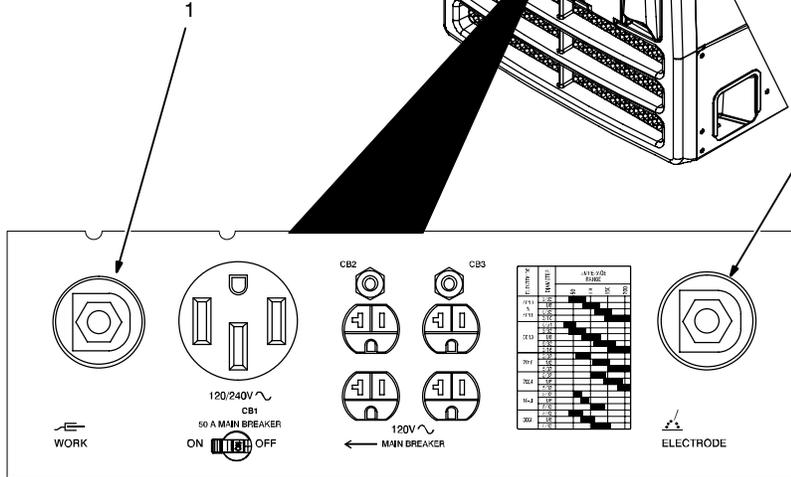
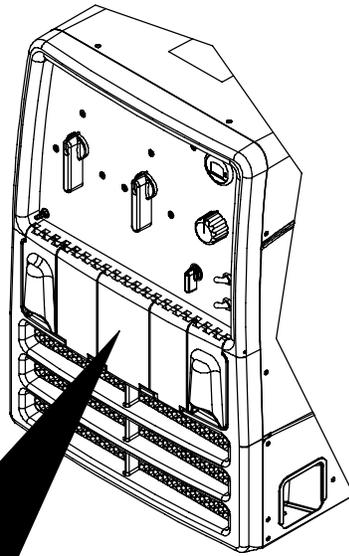
☞ To improve cold weather starting:

Keep battery in good condition. Store battery in warm area.

Use fuel formulated for cold weather (diesel fuel can gel in cold weather). Contact local fuel supplier for fuel information.

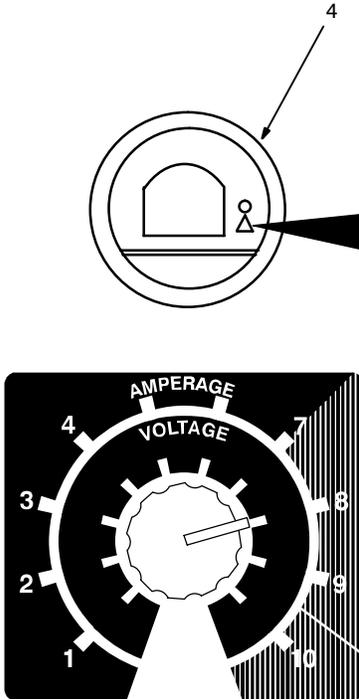
Use correct grade oil for cold weather.

5-5. Connecting to Weld Output Terminals



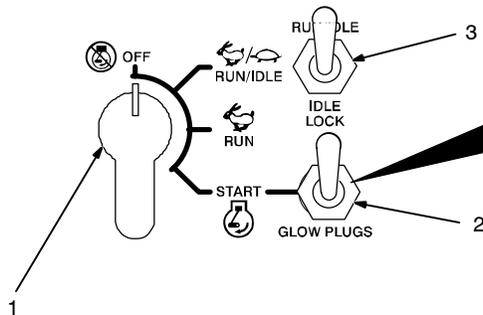
SECTION 6 – OPERATING THE WELDING GENERATOR

6-1. Engine Control Switches



MAINTENANCE DISPLAYS

- **ENGINE HOURS:** With engine off, place Engine Control switch in RUN/IDLE position. Displays hours while running.
- **OIL CHANGE INDICATOR:** With engine off, place Engine Control switch into the RUN position to see hours before next oil change. Oil hours start at 100 and count down to 0 (oil change due). **NOTE:** Negative hours indicate when past recommended oil change interval. **TO RESET:** Cycle Engine Control switch from the RUN/IDLE to RUN position 3 times.
- **LOW FUEL SHUTDOWN:** Engine will shut off prior to running out of fuel to prevent loss of fuel in the system. Display will read: noFUEL. Turn the machine off, add fuel, and restart.
- **HIGH COOLANT TEMPERATURE SHUTDOWN:** Engine will shut off and display will read: HI H2O. See Owner's Manual for coolant information. Turn Engine Control switch OFF to reset shutdown.
- **LOW OIL PRESSURE SHUTDOWN:** Engine will shut off and display will read: LO OIL. Turn Engine Control switch OFF to reset shutdown.



Glow Plug Time	
70°F (21°C)	0 seconds
32°F (0°C)	10 seconds
-4°F (-20°C)	20 seconds
Do not use glow plugs longer than 20 seconds. Do not use ether to start engine. Using ether voids warranty.	

Ref. 228 647-A

NOTICE – Disconnect equipment from auxiliary power receptacles during start-up and shutdown. Some equipment can be damaged by changes in frequency as engine rpms change during start-up and shutdown.

1 Engine Control Switch

Use switch to start engine, select speed, and stop engine. In Run/Idle position, engine runs at idle speed at no load, and weld/power speed under load. In Run position, engine runs at weld/power speed.

☞ Place switch in Run position to operate most MIG equipment.

2 Glow Plug Switch

If necessary, push switch down before start-up. See glow plug table for operating information.

3 Idle Lock Switch

Use switch to lock engine in idle speed during start-up. In Start position and Engine Control switch in Run or Run/Idle, engine is locked in idle speed. In Run/Idle position and Engine Control switch in Run/Idle, engine runs at idle speed at no load and weld/power speed under load.

In Run/Idle position and Engine Control switch in Run, engine runs at weld/power speed.

To Start: Use glow plug switch if necessary. Turn Engine Control switch to Start position. Release switch when engine starts.

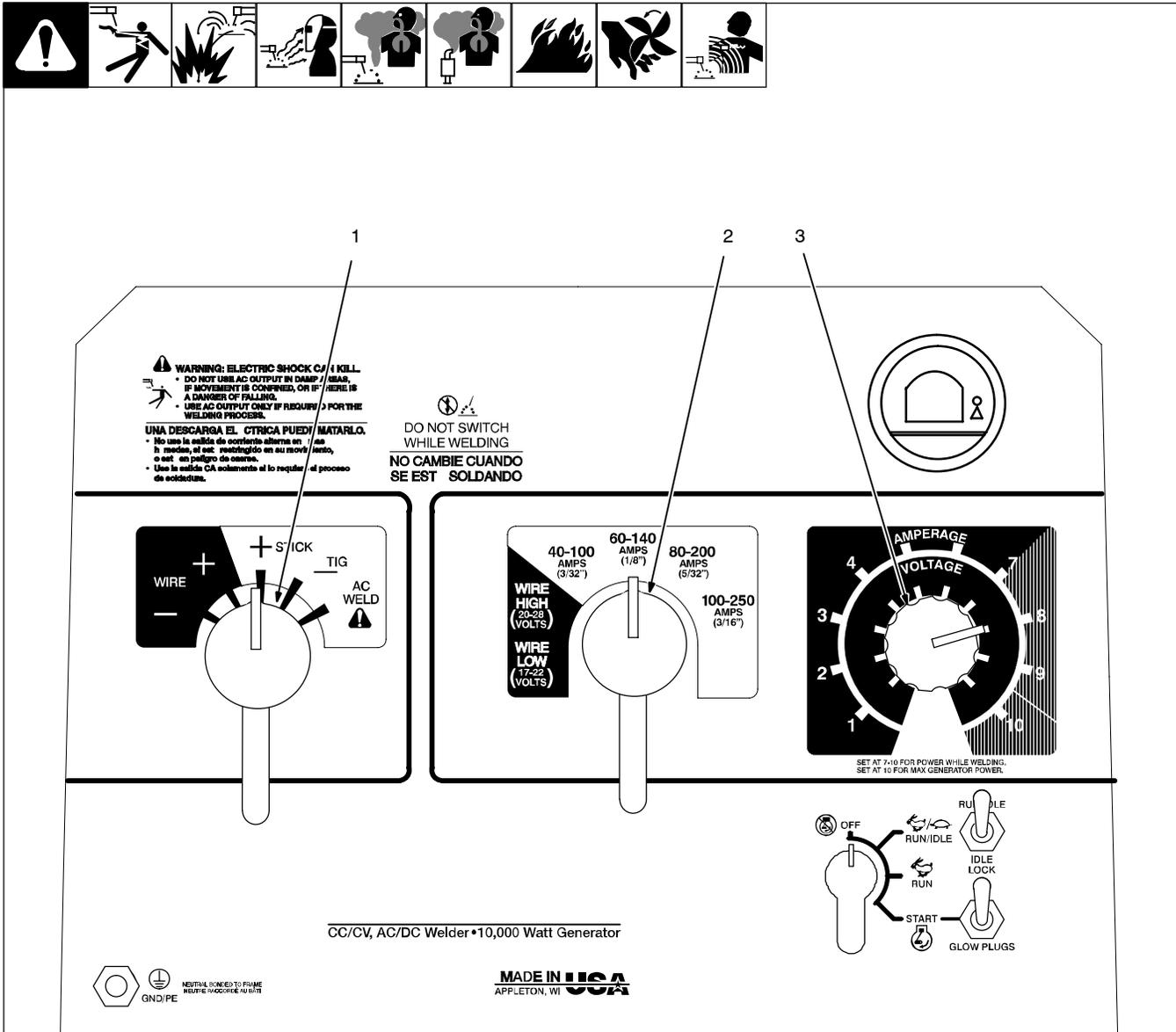
☞ If the engine does not start, let engine come to a complete stop before attempting restart.

To Stop: Turn Engine Control switch to Off position.

☞ Close fuel valve to stop engine if Engine Control switch does not work (see Section 5-4).

4 Fuel Gauge/Maintenance Display
See insert from maintenance label.

6-2. Weld Output Controls



Ref. 228 647-A

1 Weld Process Selector Switch

NOTICE – Do not switch while welding.

Use switch to select type of weld output.

Wire (GMAW) Welding: Use a positive (+) position for Direct Current Electrode Positive (DCEP) and a negative (-) position for Direct Current Electrode Negative.

Stick (SMAW) and TIG (GTAW Welding): Use a positive (+) position for Direct Current Electrode Positive (DCEP) and a negative (-) position for Direct Current Electrode Negative. Use AC position for alternating current.

2 Coarse Range Switch

NOTICE – Do not switch while welding.

Use switch to select weld amperage range when Weld Process Selector switch is in Stick/Tig position, or voltage range when switch is in Wire position.

☞ For best arc starts and when using weld and generator power together, use a low Coarse Range setting with the Fine control set at 7 or higher.

3 Fine Control

Use control to select weld amperage (Stick/Tig) or voltage (Wire) within the range selected by the Coarse Range switch. Control may be adjusted while welding.

Set control at 10 for maximum generator power.

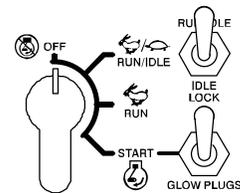
Weld output would be about 124 A DC based on control settings shown (80% of 60 to 140 A). Settings shown are typical for welding with a 7018 (1/8) electrode.

☞ See Sections 6-3 thru 6-5 for typical process connections and control settings.



CC/CV, AC/DC Welder • 10,000 Watt Generator

MADE IN USA
APPLETON, WI



6-3. Typical Stick Welding Connections And Control Settings



⚠ Stop engine.

This section provides general guidelines and may not suit all applications.

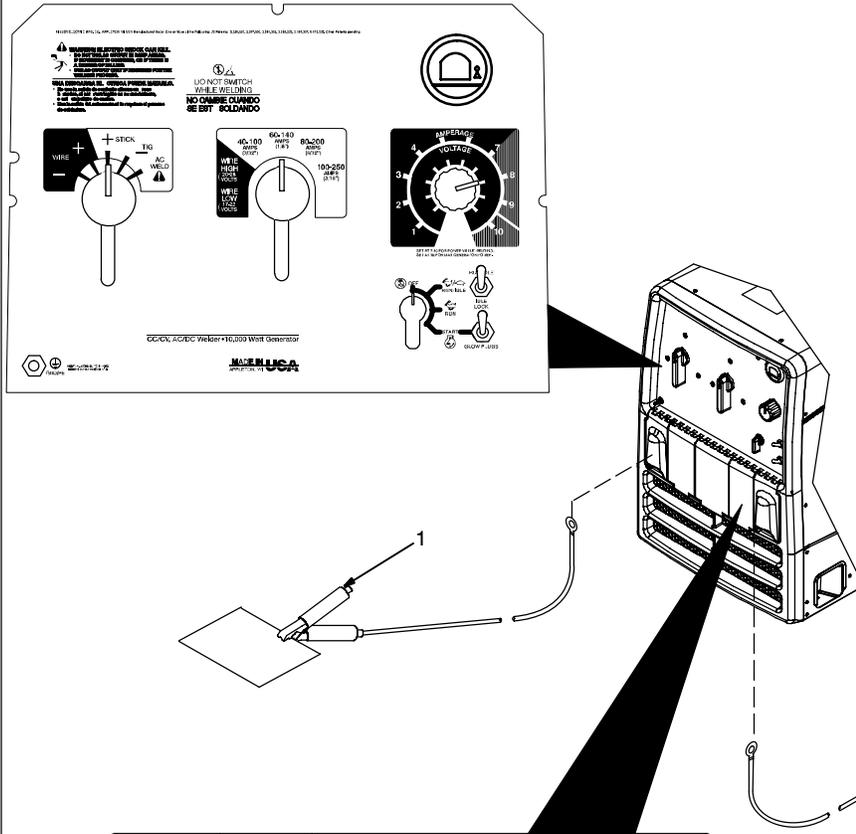
Typical Settings For 7018 (1/8 in) Electrode:

- > Set Weld Process Selector switch to + Stick position.
- > Set Coarse Range switch to 60-140 (1/8") position.
- > Set Fine control at 7 or higher for best results.

Consult the amperage selection tables below if welding with other electrodes.

- 1 Work Clamp
- 2 Electrode Holder

Connect Work cable to Work terminal and Electrode holder cable to Electrode terminal on welding generator.

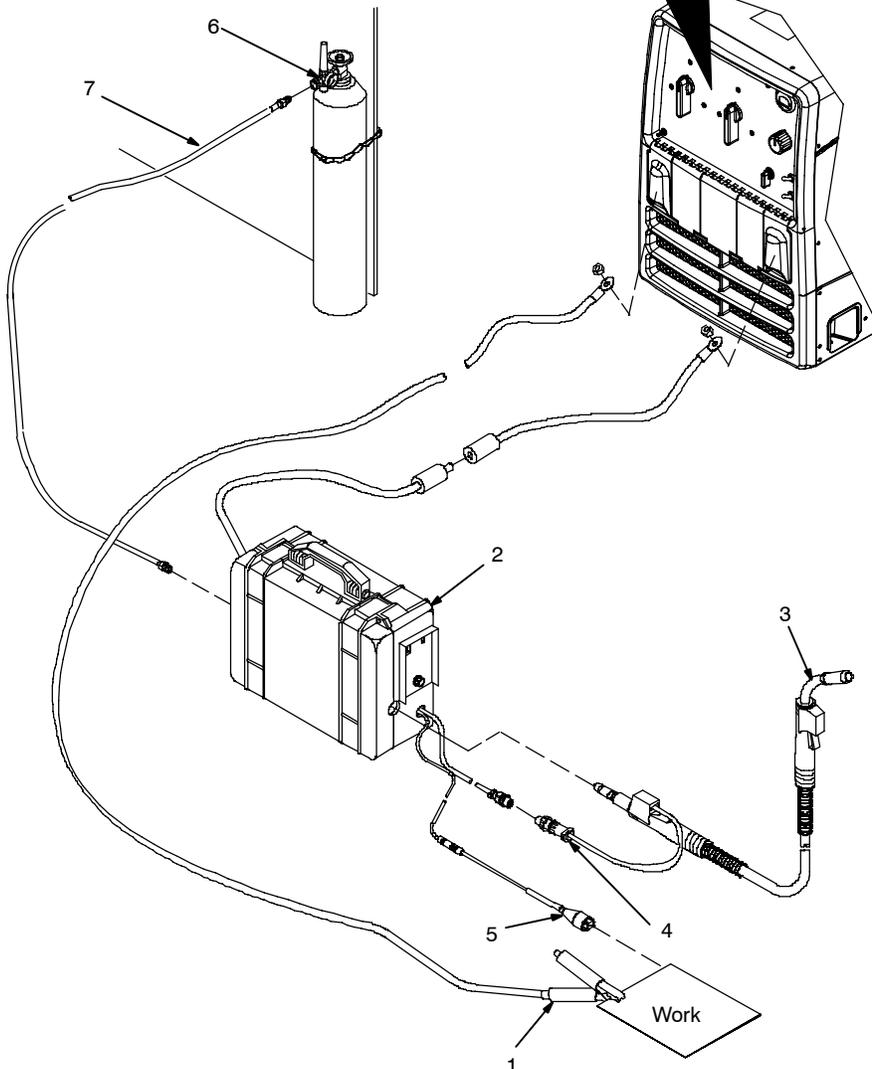
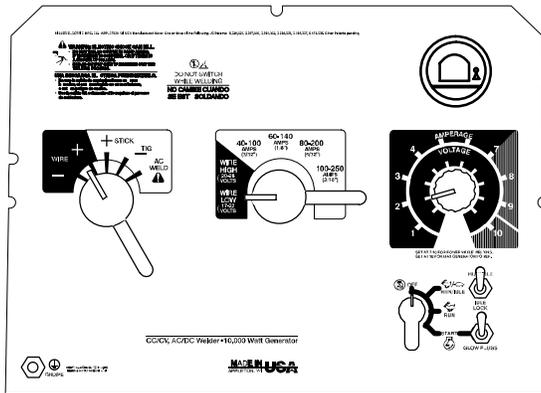


ELECTRODE	DIAMETER	AMPERAGE RANGE			
		50	100	150	200
6010 & 6011	3/32	■			
	1/8		■		
	5/32			■	
6013	3/16			■	■
	5/64	■			
	3/32		■		
	1/8			■	
7018	5/32			■	■
	3/32		■		
	1/8			■	■
7024	3/32			■	
	1/8			■	
	5/32			■	■
Ni-Cr	3/32	■			
	1/8		■		
308L	5/32			■	
	3/32	■			
	1/8		■		

Tools Needed:



6-4. Typical MIG Welding Connections And Settings



Tools Needed:



3/4 in

⚠ Stop engine.

☞ This section provides general guidelines and may not suit all applications.

Typical Control Settings For Short Circuit Transfer Using .035 (ER70S-3) Solid Wire And 75/25 Argon/CO² Gas:

- > Set Weld Process Selector switch to Wire + (DCEP) position.
- > Set Coarse Range switch to Wire/ Low Range (17-22 volts) position.
- > Set Fine Control to obtain minimum spatter.
- > Set wire feed speed between 100-300 ipm.

Typical Control Settings For Spray Transfer Using .035 (ER70S-3) Solid Wire And 80% Or Higher Argon/CO² Gas:

- > Set Weld Process Selector switch to Wire + position.
- > Set Coarse Range switch to Wire/ High Range (20-28 volts) position.
- > Set wire feed speed between 320-500 ipm.
- > Set Fine control to 3 and increase for longer arc length.

Typical Control Settings Using .045 (E71T-11) Self-Shielded Flux Core Wire:

- > Set Weld Process Selector switch to Wire - position (DCEN).
- > Set Coarse Range switch to Wire/ Low Range (17-22 volts) position.
- > Set Fine Control near minimum setting.
- > Set wire feed speed between 125-200 ipm.
- > Do a test weld. To increase arc length, increase Fine Control setting. To shorten arc length, reduce fine control setting or increase wire feed speed.

- 1 Work Clamp
- 2 Wire Feeder
- 3 MIG Gun
- 4 Gun Trigger Plug
- 5 Voltage Sensing Clamp
- 6 Gas Cylinder:

75/25 Argon/CO² Gas for Short Circuit Transfer

80% Argon (Or Higher)/CO² For Spray Transfer

- 7 Gas Hose

Connect work cable to welding generator Work terminal. Connect cable from wire feeder to cable from welding generator Electrode terminal.

6-5. Typical MIG Connections And Settings Using Weld Control And Spoolgun

Tools Needed:

3/4 in

Stop engine.

This section provides general guidelines and may not suit all applications.

Typical Settings For 4043 (.035) Aluminum On 1/8 in Material:

- > Set Weld Process Selector switch to Wire + (DCEP) position.
- > Set Coarse Range switch to Wire/Low (17-22 volts) position.
- > Set Fine Control to desired voltage (arc length). Start with a low voltage setting (about 4) to prevent burnback.

> Set wire feed speed between 240-270 ipm. For 1/4 in. (6 mm) and thicker materials, set Coarse Range switch to Wire/High and Fine Control to 6. Increase/decrease Fine Control setting to increase/decrease arc length.

7 Weld Power Cable From Spoolgun

8 Work Clamp

9 Gas Hose

10 100% Argon Cylinder

11 Trigger Control Cord

12 Input Power Cord

Route weld cable from welding generator Electrode terminal through reed switch to unused contactor terminal. Connect weld cable from spoolgun to weld control weld terminal (item 6).

Connect work cable to welding generator Work terminal.

1 Weld Control

2 Spoolgun

3 Optional Contactor (Recommended)

4 Reed Switch

5 Weld Cable (Customer-Supplied)

6 Weld Control Weld Terminal

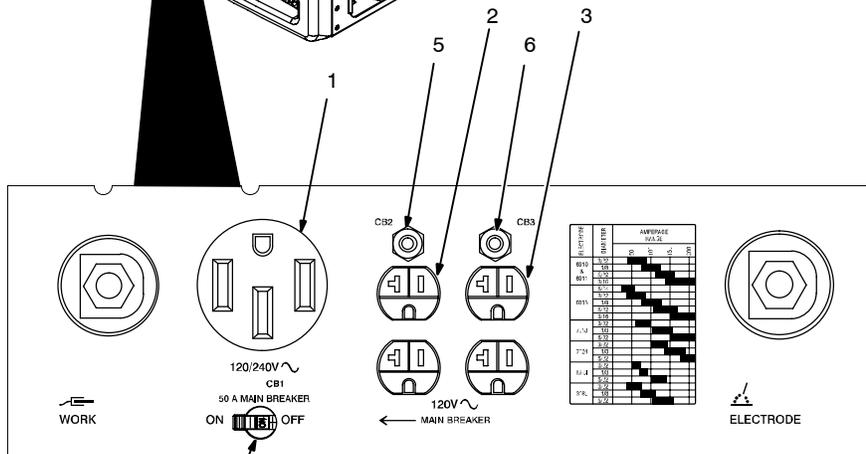
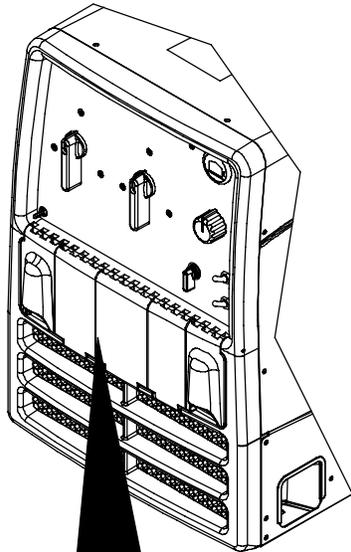
Not Used

To Work

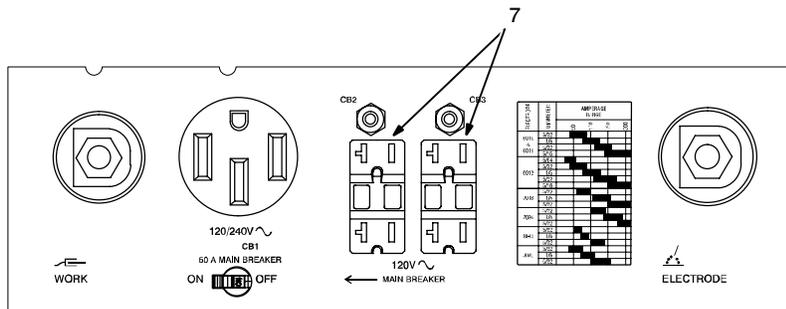
Ref. 804 249-A / Ref. 228 647-A / Ref. 802 750-A

SECTION 7 – OPERATING AUXILIARY EQUIPMENT

7-1. Generator Power Receptacles



4



7

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

NOTICE – Disconnect equipment from auxiliary power receptacles during start-up and shutdown. Some equipment can be damaged by changes in frequency as engine rpm's change during start-up and shutdown.

☞ Generator power decreases as weld current increases.
Set Fine Control R1 at 10 for full generator power.

- 1 240 V 50 A AC Receptacle RC1

RC1 supplies 60 Hz single-phase power at weld/power speed. Maximum output is 10 kVA/kW. See section 7-3 for information on wiring optional 240 V single-phase plug.

- 2 120 V 20 A Duplex Receptacle RC2
- 3 120 V 20 A 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.

- 4 Supplementary Protector CB1

CB1 protects receptacles RC1, RC2, and RC3 from overload. If CB1 opens, the receptacles do not work. Place switch in On position to reset.

- 5 Supplementary Protector CB2

- 6 Supplementary Protector CB3

CB2 protects RC2 and CB3 protects RC3 from overload. If a supplementary protector opens, the receptacle does not work.

☞ Press button to reset. If supplementary protector continues to open, contact Factory Authorized Service Agent.

⚠ Power is still present at the 240 volt receptacle if CB2 and/or CB3 trips. Unplug power cord before attempting to service accessories or tools.

- 7 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.

Combined output of all receptacles limited to 10 kVA/kW rating of the generator.

EXAMPLE: If 20 A is drawn from each 120 V duplex receptacle, only 21 A is available at the 240V receptacle:

$$2 \times (120 \text{ V} \times 20 \text{ A}) + (240 \text{ V} \times 21 \text{ A}) = 10 \text{ kVA/kW}$$

7-2. Simultaneous Weld And Power

Weld Current in Amperes	Total Power in Watts	120 V Full kVA Receptacle Amperes	240 V Full kVA Receptacle Amperes
250	2200	18	9
180	3500	29	14
125	5200	43	21
90	8000	66	33
0	10,500 (Peak)	88	44

7-3. Wiring Instructions For Optional 240 Volt, Single-Phase Plug (NEMA 14-50P)



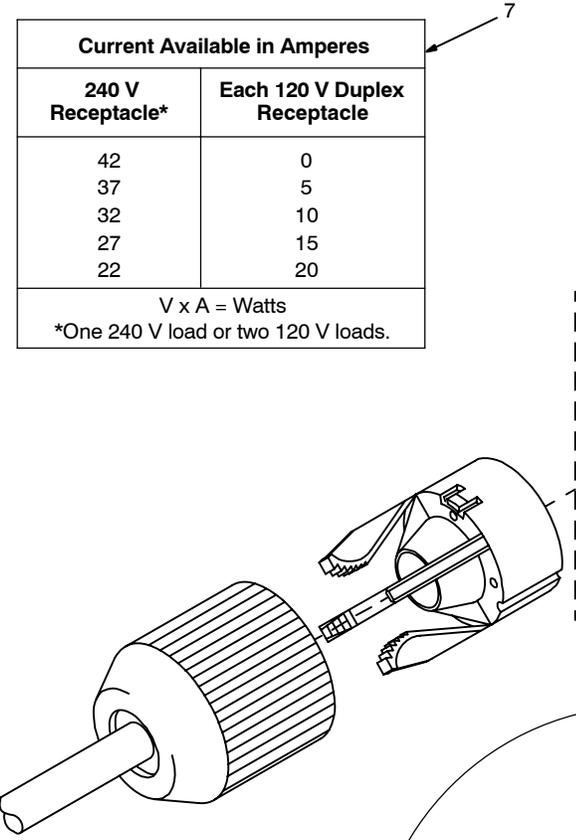
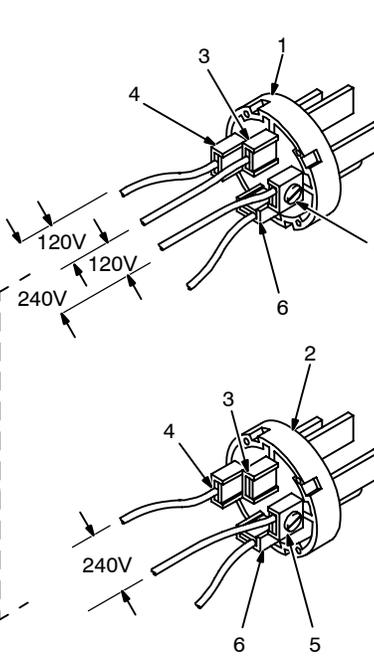
The plug can be wired for a 240 V, 2-wire load or a 120/240V, 3-wire load. See circuit diagram.

- 1 Plug Wired for 120/240 V, 3-Wire Load
- 2 Plug Wired for 240 V, 2-Wire Load
- 3 Neutral (Silver) Terminal
- 4 Load 1 (Brass) Terminal
- 5 Load 2 (Brass) Terminal
- 6 Ground (Green) Terminal
- 7 Amperes Available using 120/240 V Plug

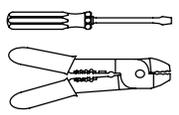
When wired for 120 V loads, each duplex receptacle shares a load with one half of 240 V receptacle.

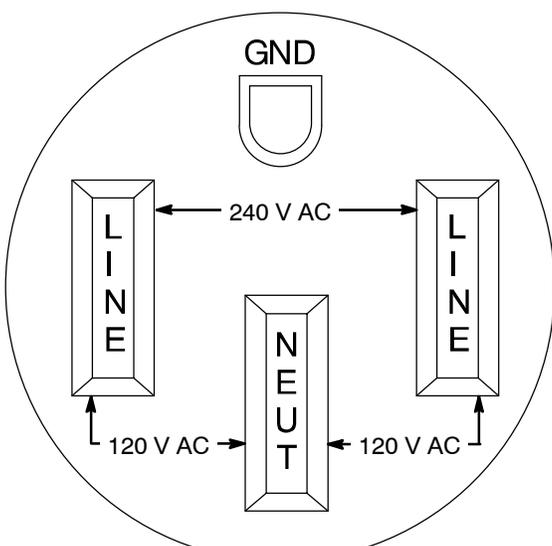
Current Available in Amperes	
240 V Receptacle*	Each 120 V Duplex Receptacle
42	0
37	5
32	10
27	15
22	20

$V \times A = \text{Watts}$
*One 240 V load or two 120 V loads.

Tools Needed:

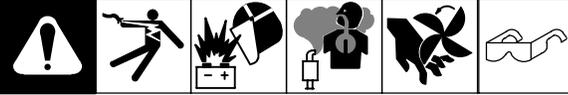
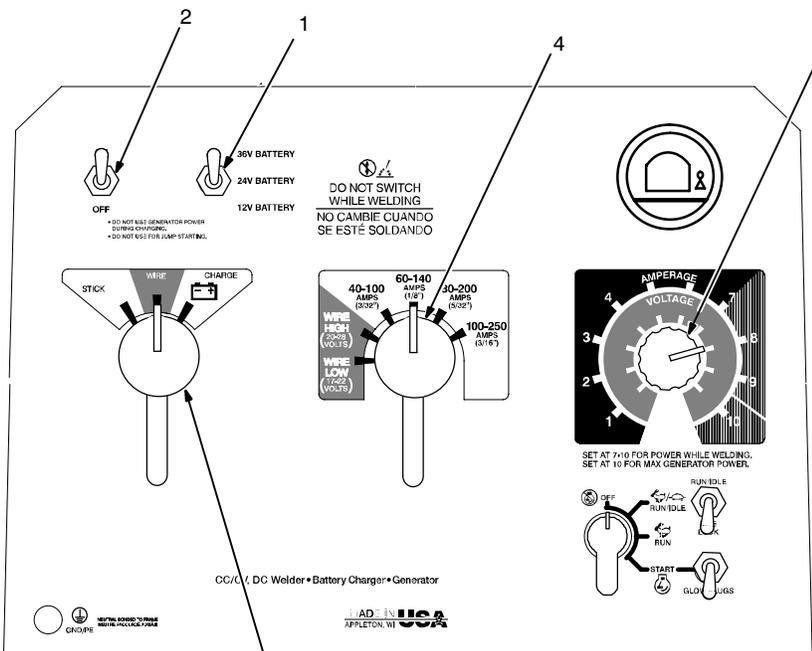




plug1 11/03 - 120 813-D

SECTION 8 – OPERATING OPTIONAL BATTERY CHARGER

8-1. Battery Charge Controls

DO NOT SWITCH WHILE WELDING
NO CAMBIE CUANDO SE ESTE SOLDANDO

CC/CV, DC Welder • Battery Charger • Generator

AD IN USA
APPLETON, WI

⚠ Have only qualified persons charge batteries.

⚠ Do not use battery charger for jump starting.

NOTICE – Do not use generator power at receptacles while using optional battery charger. Low voltage at receptacles may damage tools and other equipment.

1 Charge Voltage Switch
Place switch in position matching voltage of battery being charged.

ℹ Before connecting charging cables, place Charge Voltage switch in position matching voltage of battery being charged.

2 Battery Charging Switch
Place switch in On position to turn on charging current. Place switch in Off position to turn off charging current.

3 Weld Process Switch
⚠ Place switch in Charge position before connecting charging cables and starting engine.
Use switch to select weld or battery charge output (see table in Section 8-2).

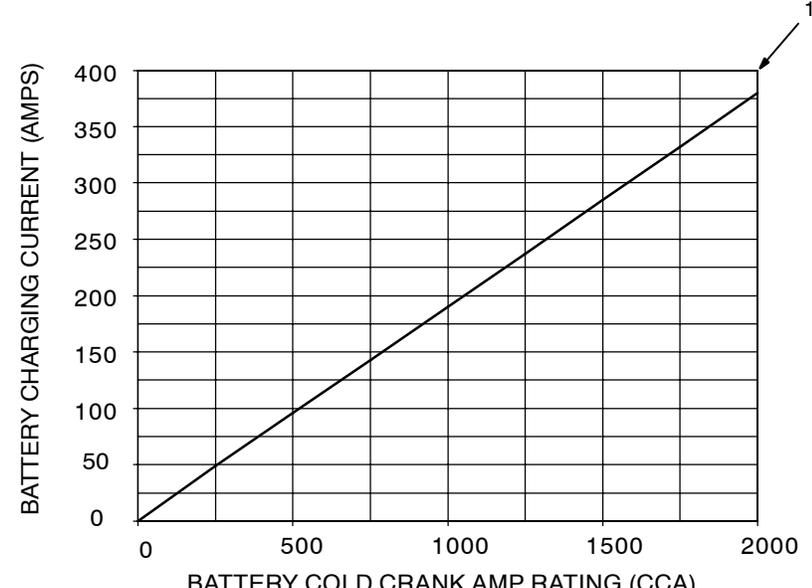
4 Coarse Range Switch
5 Fine Control
Use Coarse Range switch and Fine Control to set charge current.

⚠ Do not change Coarse Range or Weld Process switch position while welding or battery charging.

ℹ Charging current automatically stops when terminal voltage is 15 to 25 percent above required battery voltage.

228 649-A

8-2. Determining Battery Charging Current



1 Battery Charging Current Chart

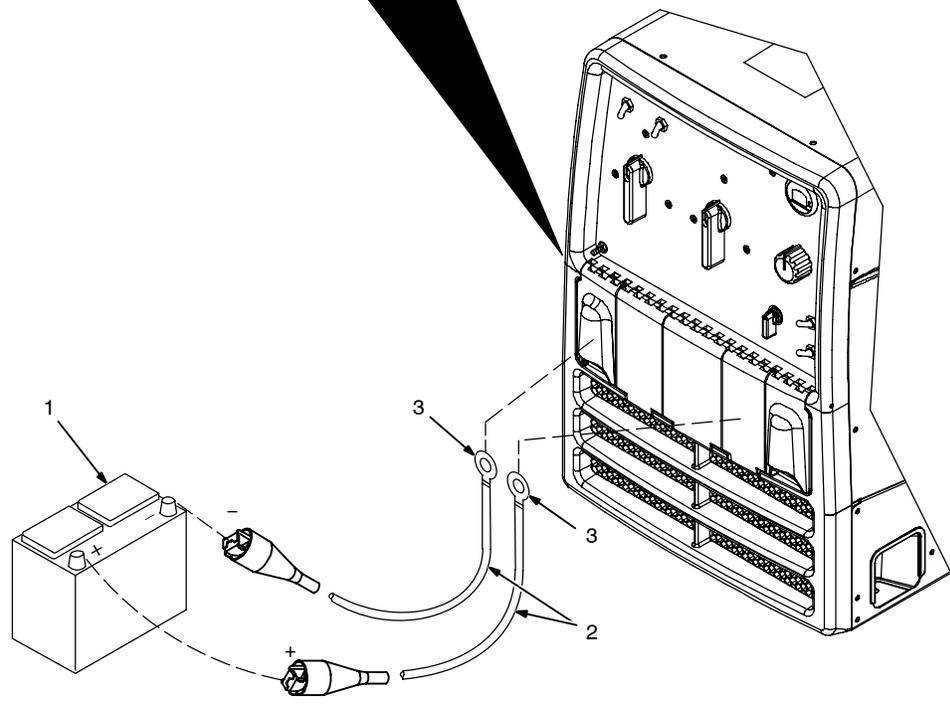
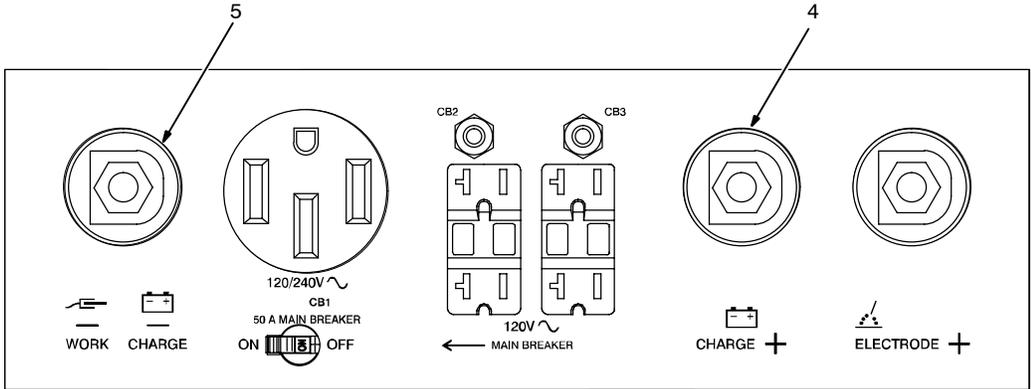
Find battery cold crank amp (CCA) rating on battery. Use CCA rating on chart to find charge current setting for battery.

EXAMPLE: If battery CCA rating is 500, charging current from chart is 100 amperes.

Do not exceed charging current found on chart. For longer battery life, use lowest charge rate possible.

142 975-B

8-3. Battery Charge Cable Connections



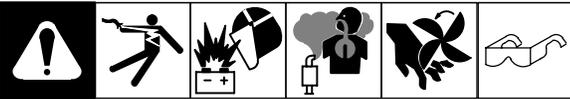
Ref. 228 649-A / Ref. 804 397-A / S-0714

- Stop engine.**
- Do not charge a battery which has loose terminals or one showing damage such as a cracked case or cover.**
- Have only qualified persons do battery charging work.**
- Keep cables away from moving parts.**
- Do not use damaged cables.**
- Be sure charger output voltage matches battery voltage.**

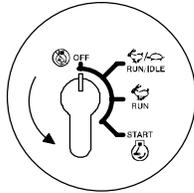
- Read BCI Battery Service Manual before charging.**
- Before connecting to battery, place Charge Voltage switch in position matching voltage of battery being charged.*
- 1 Battery
- 2 Battery Charging Cables
Use less than 20 feet (6.1 m) of AWG #1 or larger cable.
- 3 Terminal Lug
Use lugs of proper amperage capacity and hole size for connecting to charge output terminals.

- Install suitable connectors on remaining ends of battery cables.
- 4 Battery Charge Positive (+) Output Terminal
 - 5 Battery Charge Negative (-) Output Terminal
- Connect charging cables to battery charge output terminals before connecting to battery terminals.*
- Connect Battery Charge Positive (+) cable to battery positive (+) terminal, and battery Charge Negative (-) cable to battery negative (-) terminal.

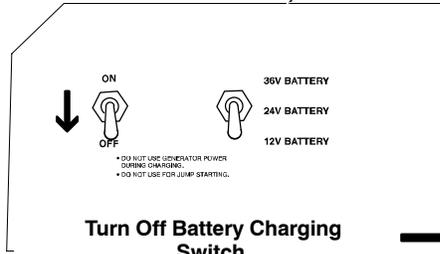
8-4. Battery Charging Procedure



In Example:
 Battery Voltage = 12 Volts
 Battery CCA Rating = 500
 Charge Current = 100 A (See Section 8-2)
 Coarse Range Setting = 60 to 140 A
 V/A Control Setting = 50%



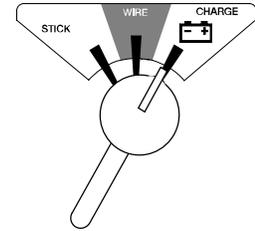
Stop Engine.



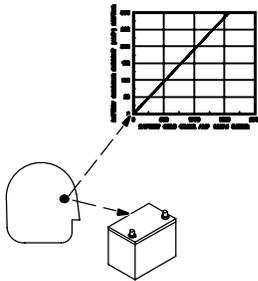
Turn Off Battery Charging Switch.

Set Charge Voltage Switch To Voltage Of Battery Being Charged (12, 24, Or 36 Volt).

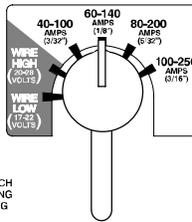
NOTICE – Do not switch under load.



Set Weld Process Switch To Charge Position.



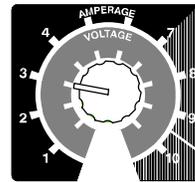
Determine Charge Current From Battery CCA Rating And Chart (See Section 8-2).



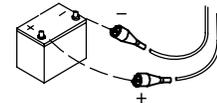
DO NOT SWITCH WHILE WELDING OR CHARGING

Set Coarse Range Switch And Fine Control To Obtain Correct Charging Current.

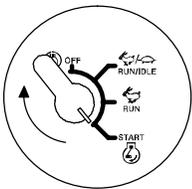
NOTICE – Do not switch under load.



SET AT 100% FOR POWER FULL VOLTAGE. SET AT 10% OR LESS GENERATOR POWER.



Connect Cables (Observe Correct Polarity).



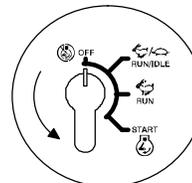
Start Engine.



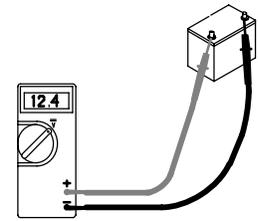
Turn On Battery Charging Switch.



Charge 10 Minutes



Stop Engine.



Charge 10 minutes. Check Battery Voltage. Continue Charging If Necessary.

SECTION 9 – MAINTENANCE AND TROUBLESHOOTING

9-1. Routine Maintenance









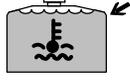
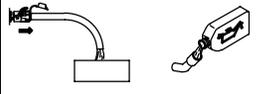
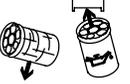
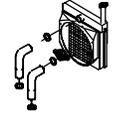
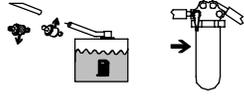
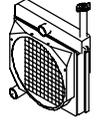
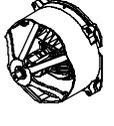
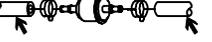


Recycle engine fluids.

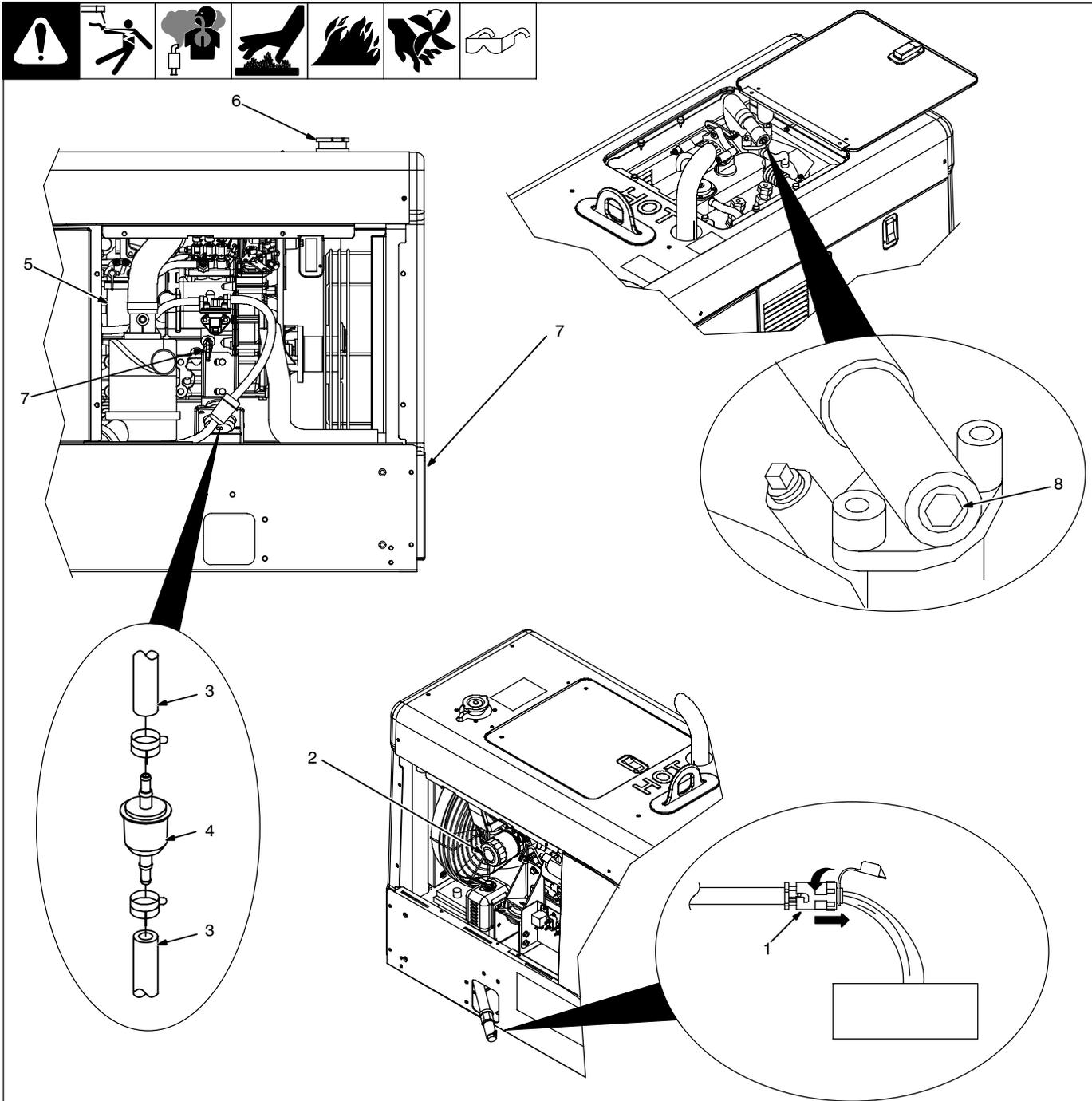


Stop engine before maintaining.

See *Engine Manual and Maintenance Label* for important start-up, service, and storage information. Service engine more often if used in severe conditions.

🕒	✔ = Check	◇ = Change	● = Clean	☆ = Replace	* To be done by Factory Authorized Service Agent	Reference
Every 8 Hours	 ✔ Coolant Level	 ✔ Fuel Level		 ✔ Oil Level	 ● Oil, Fuel Spills	Section 5-4
Every 50 Hours	 ✔ Fuel Connections	 ✔ Fuel Connections		 ● Weld Terminals		
Every 100 Hours	 ● Air Cleaner Element	 ✔ Air Cleaner Hoses		 ✔ Belt Tension	 ● Battery Terminals	Section 9-2, 9-3, Engine Manual
	 ◇ Oil					
Every 200 Hours	 ◇ Oil Filter	 ✔ Radiator Hoses		 ☆ Unreadable Labels	 ◇ Fuel Filters	Engine Manual, Section 9-2
Every 500 Hours	 ✔ Fan Belt	 ● Flush Radiator		 ✔☆ Weld Cables	 ✔ Slip Rings* ✔ Brushes* ☆ 1500 Hours*	Engine Manual, Section 9-4
	 ✔ Engine Speed					
Every 800 Hours	 ✔ Valve Clearance*					Section 9-2
Every 2000 Hours	 ✔☆ Fuel Hoses	 ✔☆ Fuel Hoses		 ✔☆ Coolant & Hoses		Engine Manual, Section 9-2

9-2. Maintenance Label And Engine Maintenance Activities



⚠ Stop engine and let cool.

Oil And Fuel

- 1 Oil Drain Valve
- 2 Oil Filter

Change engine oil and filter according to engine manual.

NOTICE – Close valve and valve cap before adding oil and running engine.

Fill crankcase with new oil to full mark on dipstick (see Section 5-4).

- 3 Fuel Lines
Replace fuel lines if cracked or worn.
- 4 Inline Fuel Strainer
Install new filter as shown.

- 5 Fuel Filter

Replace filter according to engine manual.

Wipe up any spilled fuel.

Start engine, and check for fuel leaks.

⚠ Stop engine, tighten connections as necessary, and wipe up fuel.

Coolant

- 6 Radiator Cap
- 7 Radiator Drain Cocks (One located on bottom of radiator)

Drain engine coolant according to procedure in engine manual.

Add engine coolant as follows:

- 8 Thermostat Housing Plug

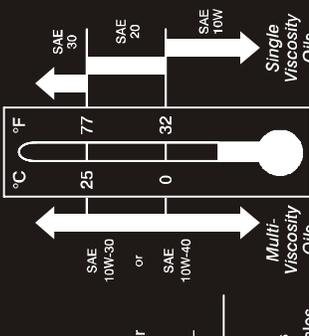
Remove thermostat housing plug. Add coolant to radiator until coolant is at bottom of filler neck and coolant trickles out of thermostat housing plug hole. This ensures all air is purged from the system.

Reinstall plug and radiator cap. Check coolant level in overflow bottle.

Engine coolant is a mixture of water and ethylene glycol base antifreeze. A solution of 50% antifreeze and 50% water must be used in this engine. Do not use 100% antifreeze or severe damage will occur.

BOBCAT KUBOTA D722 ENGINE

See Engine Manual for complete engine care.
 Give Engine Specification and Serial Number when ordering parts.
 Vea el manual del motor para el cuidado completo del motor.
 Dé la especificación del motor y el número de serie cuando ordena partes o piezas.



Check daily / Chequee Diariamente.
 Recommended Oil / API Service Classification . . . CC/CD/CE or better
 Oil Change 100 hours or less
 Oil Filter Change normal conditions – 200 hours or less

Acetate Recomendado
 Clasificación de Servicio API . . . CC/CD/CE o mejor
 Cambio de aceite 100 horas o menos
 Cambio del filtro del aceite Condiciones normales – 200 horas o menos

Oil Filter MILLER 187443 Kubota 15853-99170
 Fram PH2649A
 Oil Capacity 2.75 qt (2.6 L) or 3.0 qt (2.8 L) with filter change
 Fuel Grade 2-D Cetane No. 45 min. (.5% max. Sulfur content)
 Primary Fuel Filter MILLER 213858 Hastings GF160
 Change filter every 200 hours.
 Cambie el filtro cada 200 horas.
 Secondary Fuel Filter Element . . . MILLER 187442 Kubota 15231-43560
 Fill filter with clean fuel before installing – read instructions on filter.
 Llene el filtro con combustible limpio antes de instalar – lea las instrucciones en el filtro.

Air Filter Service 100 hours or less – see Owner's Manual
 Servicio del filtro de aire 100 horas o menos – vea el manual del dueño
 Air Filter Element MILLER 187441 Baldwin RS3715
 Donaldson P822686 Wix 48449
 Air Filter Element (Safety) Opt. . . MILLER 202102 Donaldson P535396

12 Volt Battery . . BCI Group 58
 Cranking Performance at 0° F (-18°C) 430 Amps
 Valve Clearance – Cold
 Espacio de despeje de válvula fría
 .0057 – .0072 in.
 .145 – .185 mm

Engine RPM – No Load
 Weld/Power 3700 -25
 Idle 2450 -75
 Check Engine Speeds every 200 hours.
 Chequee las velocidades del motor Cada 200 horas.

Engine Cooling
 A solution of 50% anti-freeze and 50% water must be used in this engine. Do not use 100% anti-freeze, or severe damage will occur.

Belt MILLER 187459
 Kubota 15881-97011

MAINTENANCE DISPLAYS

- **ENGINE HOURS:** Gauge will display engine hours. To retrieve engine hours while the engine is off, place Engine Control switch in RUN/IDLE position.
- **OIL CHANGE INDICATOR:** With engine off, place Engine Control switch into the RUN position to see hours before next oil change.
 Oil hours start at 100 and count down to 0 (oil change due).
NOTE: Negative hours indicate when past recommended oil change interval.
TO RESET: Cycle Engine Control switch from the RUN/IDLE to RUN position 3 times.
- **LOW FUEL SHUTDOWN:** Engine will shut off prior to running out of fuel to prevent loss of fuel in the system. Display will read: noFUEL. Turn the machine off, add fuel, and restart.
- **HIGH COOLANT TEMPERATURE SHUTDOWN:** Engine will shut off and display will read: HI H2O. See Owner's Manual for coolant information. Turn Engine Control switch OFF to reset shutdown.
- **LOW OIL PRESSURE SHUTDOWN:** Engine will shut off and display will read: LO OIL. Turn Engine Control switch OFF to reset shutdown.

PANTALLAS DE MANTENIMIENTO

- **HORAS DEL MOTOR:** La pantalla o medidor indicará las horas del motor. Para poder conseguir las horas del motor cuando el motor esté apagado, ponga el interruptor de control en la posición "RUN/IDLE" (marcha/ralentí).
- **INDICADOR DE CAMBIO DE ACEITE:** Con el motor apagado, ponga el interruptor de control del motor en la posición "RUN" (marcha) para ver las horas que faltan para el próximo cambio de aceite.
 Las horas del aceite comienzan a 100 y disminuyen a 0 (momento del cambio de aceite).
NOTE: Horas negativas indican que el intervalo de cambio de aceite recomendado ha pasado.
PARA REARMAR: Hagla ciclo en el interruptor de control del motor de la posición "RUN/IDLE" a "RUN" 3 veces.
- **APAGAMIENTO POR RAZÓN DE COMBUSTIBLE BAJO:** El motor se apagará antes de quedarse sin combustible para prevenir que no haya combustible en el sistema. La pantalla indicará: noFUEL (no combustible). Apague el motor, añada combustible, y vuelva a arrancarlo.
- **APAGAMIENTO POR TEMPERATURA ALTA DEL LÍQUIDO REFRIGERANTE:** El motor se apagará y la pantalla indicará: HI H2O. Vea el Manual del Dueño para la información sobre el líquido refrigerante. Use el interruptor de control del motor para APAGARLO (OFF) para rearmar el apagamiento.
- **APAGAMIENTO POR PRESIÓN BAJA DE ACEITE:** El motor se apagará y la pantalla indicará: LO OIL (aceite bajo). Use el interruptor de control del motor para APAGARLO (OFF) y rearmar el apagamiento.

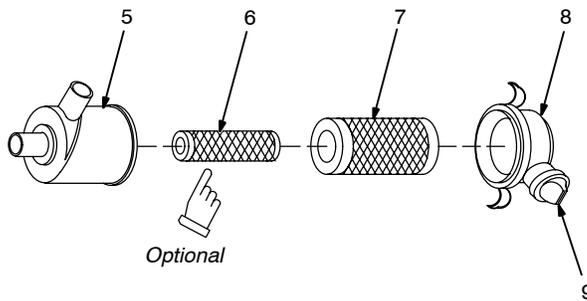
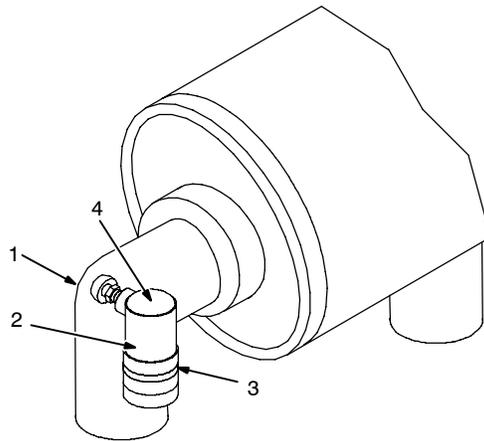
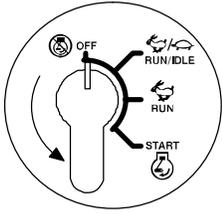


Inspect brushes and slip rings every 1000 hours and replace the brushes every 2000 hours.
 Inspíctase las escobillas y anillos resbaladizos cada 1000 horas y reemplácelas las escobillas cada 2000 horas.

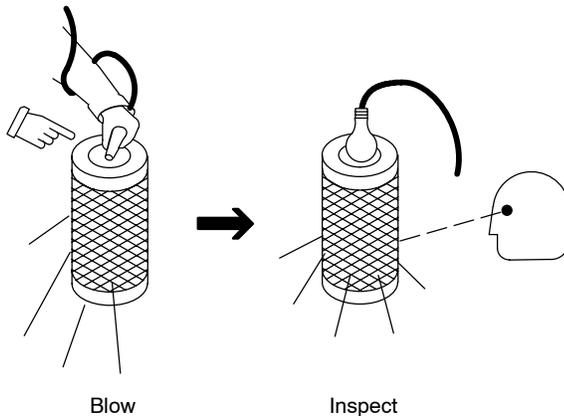
Glow Plugs . . MILLER 187820 Kubota 16851-65512
 Do not use either for starting.
 Note: Operation not required when above 50° F (10° C) or when engine is warm.
 Never operate for more than 20 seconds continuous.
 No use éter para arrancar.
 Note: No se requiere esta operación cuando esté arriba de 50° F (10° C), o cuando el motor esté caliente. Nunca las opere por más de 20 segundos continuamente.

227-733-A

9-3. Servicing Air Cleaner



Keep nozzle
2 in (51 mm)
from element.



⚠ Stop engine.

NOTICE – Do not run engine without air cleaner or with dirty element. Engine damage caused by using a damaged element is not covered by the warranty.

☞ The air cleaner primary element can be cleaned but the dirt holding capacity of the filter is reduced with each cleaning. The chance of dirt reaching the clean side of the filter while cleaning and the possibility of filter damage makes cleaning a risk. Consider the risk of unwarrantable equipment damage when determining whether to clean or replace the primary element.

If you decide to clean the primary element, we strongly recommend installing an optional safety element to provide additional engine protection. **Never clean a safety element.** Replace the safety element after servicing the primary element three times.

- 1 Intake Manifold
- 2 Service Indicator (Optional)
- 3 Window
- 4 Reset Button

Service air cleaner element if red band appears in window. A green band means air cleaner is okay. Press button to reset indicator.

Clean or replace primary element if dirty (see note above before cleaning). **Replace** primary element if damaged. Replace primary element yearly or after six cleanings.

- 5 Housing
- 6 Safety Element (Optional)
- 7 Primary Element
- 8 Cover
- 9 Dust Ejector

To clean air filter:

Wipe off cover and housing. Remove cover and dump out dust. Remove element(s). Wipe dust from inside cover and housing with damp cloth. Reinstall safety element (if present). Reinstall cover.

NOTICE – Do not clean housing with air hose.

Clean primary element with compressed air only.

Air pressure must not exceed 100 psi (690 kPa). Use 1/8 in (3 mm) nozzle and keep nozzle at least 2 in (51 mm) from inside of element. Replace primary element if it has holes or damaged gaskets.

Reinstall primary element and cover (dust ejector down).

9-4. Adjusting Engine Speed

If the engine does not start and stop properly, verify the fuel solenoid is installed properly **before** adjusting engine speed (see Section A following).

If the engine does not stay at idle speed, verify the throttle solenoid is installed and adjusted properly **before** adjusting engine speed (see Section B following).

If the engine runs properly but the speeds are incorrect, **do not** adjust the solenoids. Adjust the engine speed according to the instructions in Section C.

A. Checking Fuel Solenoid



Tools Needed:

-  7/16 in
- 10, 14 mm

⚠ Stop engine.

If the engine does not start and stop when using the Engine Control switch, check the position of the fuel solenoid.

Adjusting Fuel Solenoid Position

- 1 Fuel Solenoid
- 2 Stop Screw
- 3 Fuel Solenoid Mounting Screws

☞ Stop screw is factory-set and should not be adjusted.

When properly adjusted, the solenoid bracket is slightly recessed from the edge of the engine block and the solenoid linkage easily travels between the stop screw and the fuel solenoid internal stop.

If adjustment is necessary, loosen the solenoid mounting screws and push the solenoid **bracket** back toward engine as far as possible.

Continue pushing on solenoid bracket in a clockwise direction while tightening mounting screws.

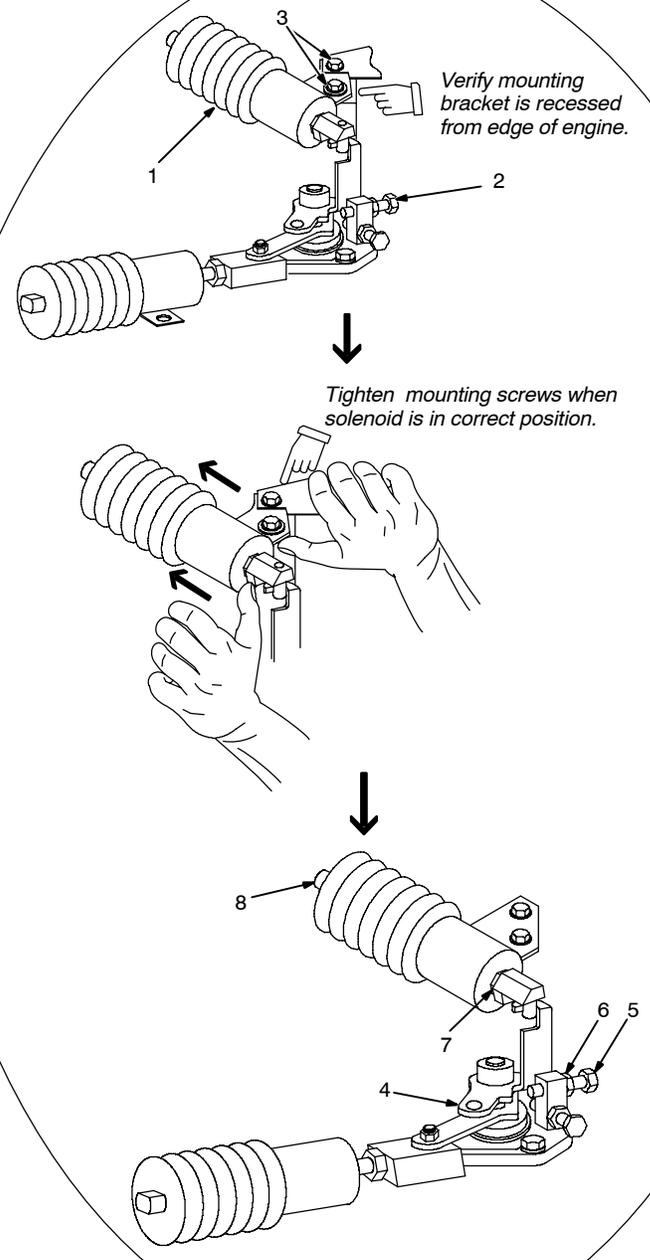
- 4 Shutdown Lever
- 5 Stop screw
- 6 Stop Screw Jam Nut
- 7 Fuel Solenoid Jam Nut
- 8 Plunger

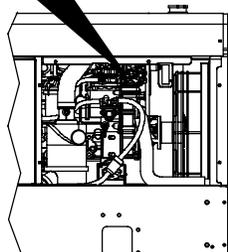
☞ Stop screw is factory-set and should not be adjusted.

Hold throttle solenoid in idle (energized) position. If shutdown lever is touching or within 1/16 in. of stop screw, fuel solenoid is properly adjusted.

If lever is more than 1/16 in. from stop screw, check for clearance between jam nut and fuel solenoid. If there is clearance between jam nut and solenoid, loosen nut and turn plunger clockwise until lever touches stop screw. Retighten nut.

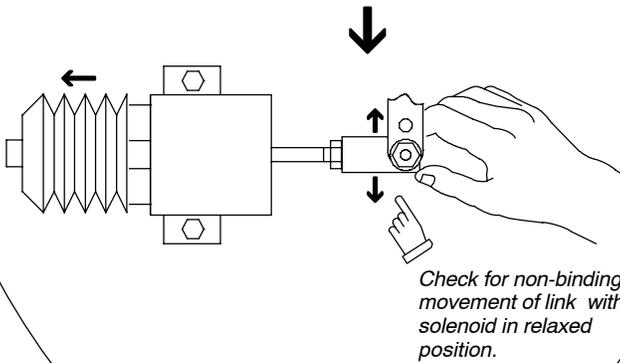
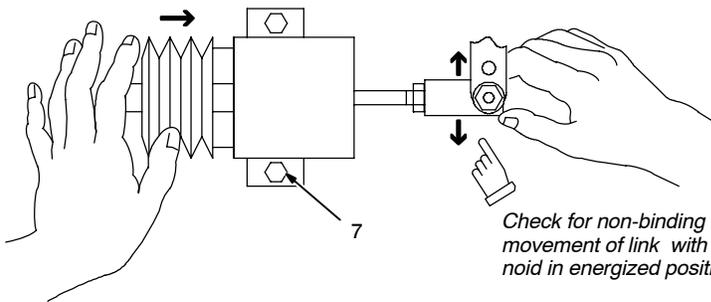
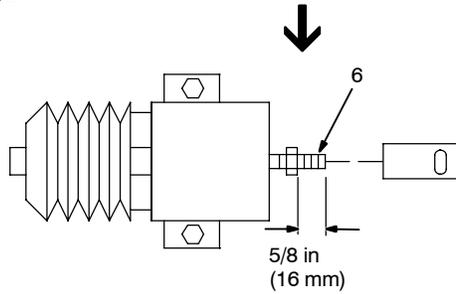
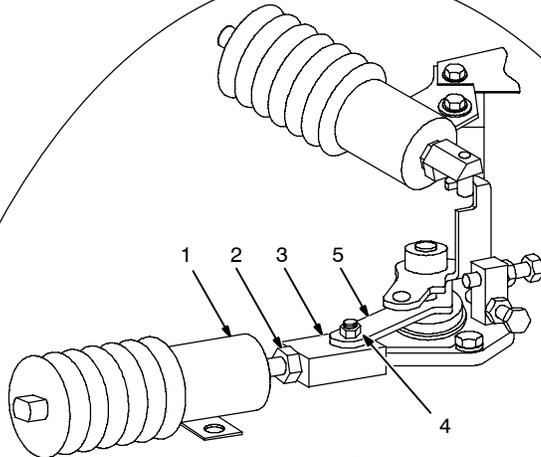
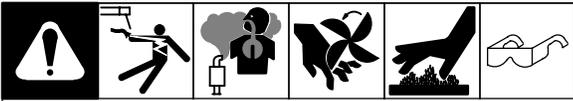
If there is no clearance between jam nut and solenoid, loosen the solenoid mounting screws and reposition the solenoid as described at the beginning of this section.





Ref. 804 250-A / 802 649

B. Checking Throttle Solenoid



⚠ Stop engine.

If the engine does not stay at idle speed, verify the the throttle solenoid and linkage is installed properly.

Adjusting Throttle Solenoid

- 1 Throttle Solenoid
- 2 Jam Nut
- 3 Solenoid Link
- 4 Shoulder Bolt
- 5 Throttle Lever
- 6 Solenoid Rod
- 7 Throttle Solenoid Mounting Screw

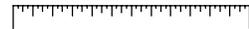
Loosen jam nut, remove shoulder bolt, and remove link from throttle lever. Install link 5/8 in (16 mm) on solenoid rod. Reconnect link to shoulder bolt and throttle lever.

Push solenoid rod into idle (energized) position and check for non-binding lateral movement of throttle link at throttle lever. If link binds, loosen solenoid mounting screws. Move the solenoid slightly until the link moves freely with solenoid in **relaxed and energized** positions. Tighten screws.

Tighten jam nut.

Go to Step C.

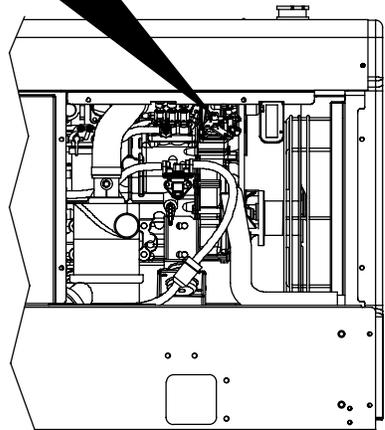
Tools Needed:



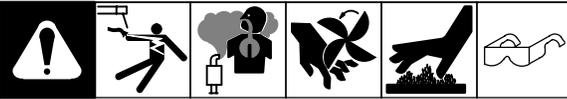
3/8, 7/16 in



5/32 in



C. Making Engine Speed Adjustments



Idle	2375–2450 rpm 39.6–40.8 Hz
Weld/Power	3675–3750 rpm 61.3–62.5 Hz

Before adjusting engine speed, verify throttle solenoid is installed properly (see Section B on previous page).

Check engine speeds with a tachometer (see table). If necessary, adjust speeds as follows:

Start engine and run until warm. Turn V/A control to max.

Adjusting Idle Speed

Turn Engine Control switch to Run/Idle position.

- 1 Throttle Solenoid
- 2 Idle Speed Jam Nut
- 3 Plunger
- 4 Throttle Link
- 5 Throttle Lever

Loosen jam nut. While holding throttle link with a 3/8 in wrench, turn plunger clockwise to increase idle speed or counter-clockwise to decrease idle speed.

After adjusting idle speed, verify the throttle link is parallel with the throttle lever. If necessary, loosen the idle speed jam nut and reposition the throttle link.

Do not twist solenoid boot while adjusting engine speed.

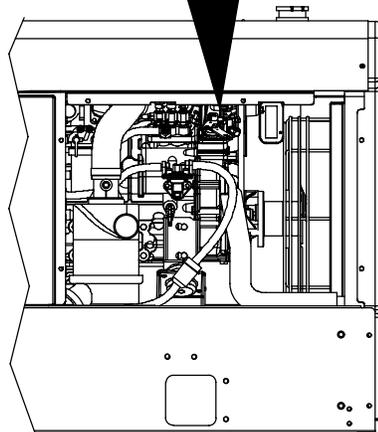
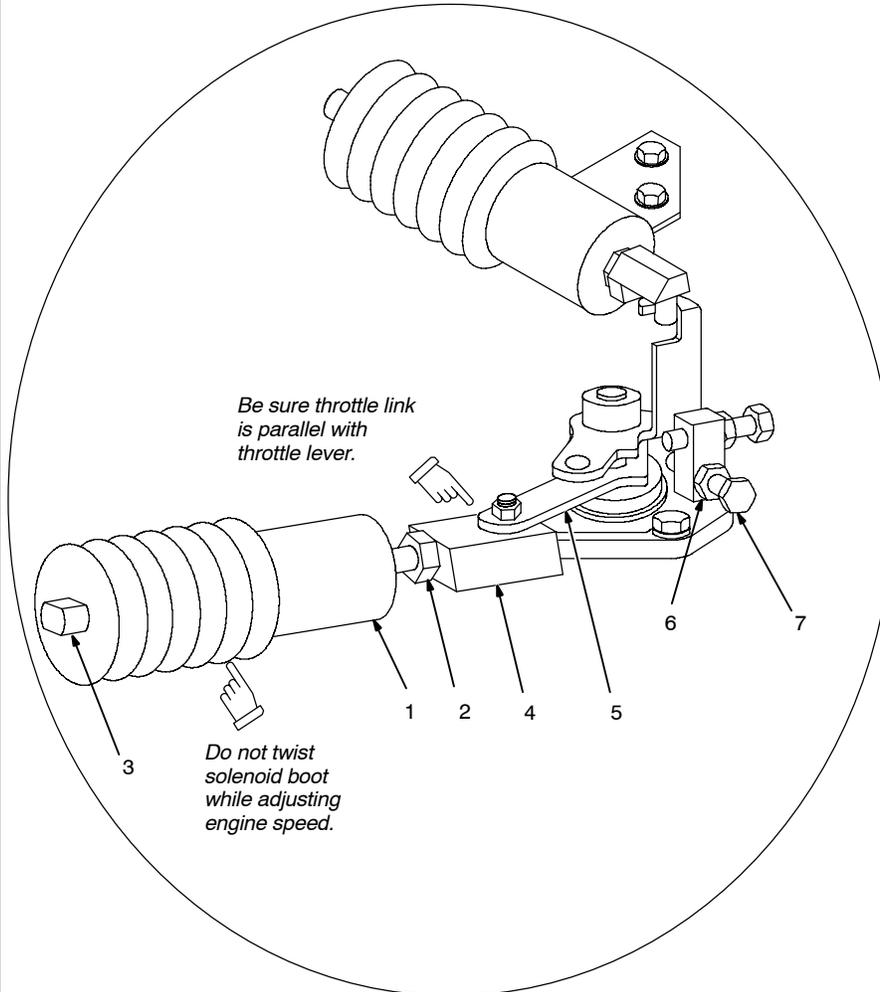
Tighten jam nut.

Adjusting Weld/Power Speed

Start engine and run until warm. Turn V/A control to max.

- 6 Weld Speed Jam Nut
- 7 Adjustment Screw

Turn Engine Control switch to Run position. Loosen nut and turn screw counter-clockwise to increase speed. Turn screw clockwise to decrease speed. Tighten nut.



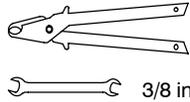
Tools Needed:

- 3/8, 7/16 in
10, 14 mm

9-5. Overload Protection



Tools Needed:



⚠ Stop engine.

When a circuit breaker or fuse opens, it usually indicates a more serious problem exists. Contact a Factory Authorized Service Agent.

1 Fuse F1

F1 protects the weld excitation winding from overload. If F3 opens, weld output stops or is low.

2 Fuse F2

F2 protects the generator power excitation winding from overload. If F4 opens, generator power output stops or is low.

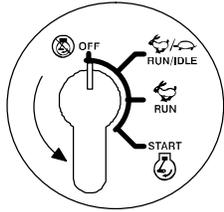
3 Circuit Breaker CB7

CB7 protects the engine glow plug circuit. If CB7 opens, the glow plug will not heat. CB7 automatically resets when the fault is corrected.

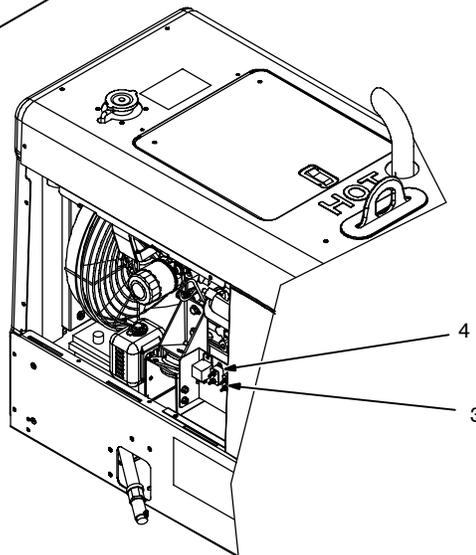
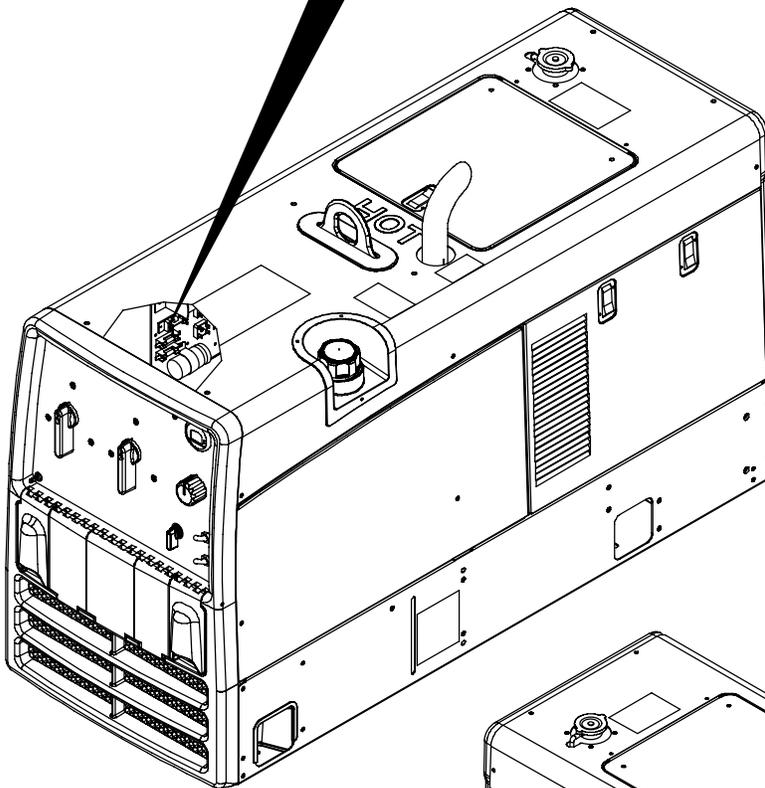
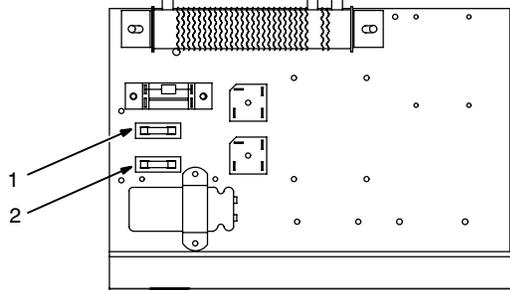
4 Supplementary Protector CB8

CB8 protects the engine battery circuit. If CB8 opens, the engine will not crank. CB8 automatically resets when the fault is corrected.

Replace any open fuses. Close door and/or reinstall cover before operating unit.

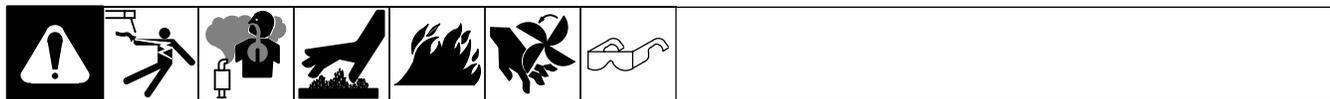


Component Panel



9-6. Troubleshooting Tables

A. Welding



Trouble	Remedy
Low or no weld output; generator power output okay at ac receptacles.	Check control settings.
	Check weld connections.
	Check fuse F1, and replace if open (see Section 9-5).
	Have Factory Authorized Service Agent check brushes, slip rings, integrated rectifiers SR2 and SR3, and main rectifier SR1.
No weld output or generator power output at ac receptacles.	Be sure all equipment is disconnected from receptacles when starting unit.
	Check fuses F1 and F2, and replace if open (see Section 9-5).
	Check plug PLG6 connection.
	Have Factory Authorized Service Agent check brushes, slip rings, and integrated rectifiers SR2, SR3.
Low weld output.	Check control settings.
	Check fuse F1, and replace if open (see Section 9-5).
	Check engine speed, and adjust if necessary (see Section 9-4).
	Service air cleaner (see Section 8-2)
	Have Factory Authorized Service Agent check brushes, slip rings, and integrated rectifiers SR2, SR3.
High weld output.	Check control settings.
	Check engine speed, and adjust if necessary (see Section 9-4).
Erratic weld output.	Check control settings.
	Tighten and clean connections to electrode and workpiece.
	Use dry, properly-stored electrodes for Stick and TIG welding.
	Remove excessive coils from weld cables.
	Clean and tighten connections both inside and outside welding generator.
	Check engine speed, and adjust if necessary (see Section 9-4).
	Have Factory Authorized Service Agent check brushes, slip rings, and integrated rectifiers SR2, SR3.

B. Generator Power

Trouble	Remedy
No or low generator power output at ac receptacles; weld output okay.	Reset supplementary protectors (see Section 7-1).
	Press optional GFCI receptacle Reset button (see Section 7-1).
	Check fuse F2, and replace if open (see Section 9-5).
	Check engine ignition wiring connections.
	Have Factory Authorized Service Agent check brushes, slip rings, and integrated rectifier SR3.
No generator power or weld output.	Be sure all equipment is disconnected from receptacles when starting unit.
	Check fuses F1 and F2, and replace if open (see Section 9-5).
	Check engine ignition wiring connections.
	Have Factory Authorized Service Agent check brushes, slip rings, and integrated rectifiers SR2 and SR3.

Trouble	Remedy
Low power output at ac receptacles.	Increase Fine control R1 setting to max.
	Check fuse F2, and replace if open (see Section 9-5).
High power output at ac receptacles.	Check engine speed, and adjust if necessary (see Section 9-4).
Erratic power output at ac receptacles.	Check fuel level.
	Check engine speed, and adjust if necessary (see Section 9-4).
	Check receptacle wiring and connections.
	Have Factory Authorized Service Agent check brushes and slip rings.

C. Engine

Maintenance Display	Action
noFUEL	Place Engine Control switch in the Off position, refuel, and start engine.
HI H2O	Coolant temperature is too high. Allow engine to cool and check coolant level (see Section 9-2).
LO OIL	Oil pressure is too low. Allow engine to cool and check oil level (see Section 9-2).

Trouble	Remedy
Engine does not crank.	Supplementary protector CB8 may be open (see Section 9-5). Wait and retry.
	Check battery voltage.
	Check battery connections and tighten if necessary.
	Check plug Engine Control switch and engine wiring harness connections.
	Have Factory Authorized Service Agent check Engine Control switch S2 or circuit breaker CB8.
Engine cranks but does not start.	Check fuel level and fault indicators on fuel gauge (see Section 6-1).
	Open fuel valve (see Section 5-6).
	Glow plug circuit breaker CB7 may be open (see Section 9-5). Wait and retry.
	Service inline fuel strainer and fuel filter (see Section 8-2).
	Check battery and replace if necessary.
	Check engine charging system according to engine manual.
	Check fuel solenoid according to engine manual.
	Have Factory Authorized Service Agent check glow Plug switch S6, glow plug, and control relay CR3.
Engine starts but stops when Engine Control switch S2 returns to Run/Idle position.	Check oil level (see Section 5-6) and fault indicators on fuel gauge (see Section 6-1). Engine will not start if oil pressure is too low.
	Check coolant level and fan belt (see Section 5-6 and engine manual), and check fault indicators on fuel gauge (see Section 6-1). Engine will not start if engine temperature is too high.
	Have Factory Authorized Service Agent check low oil pressure shutdown switch S5 and engine temperature switch S4.
Engine does not stop.	Stop engine by closing fuel valve (see Section 5-6). Adjust shutdown solenoid (see Section 9-4).
Engine stopped during normal operation.	Check fuel level and fault indicators on fuel gauge (see Section 6-1).
	Open fuel valve (see Section 5-6).
	Check oil level (see Section 5-6) and fault indicators on fuel gauge (see Section 6-1). Engine will not start if oil pressure is too low.
	Check coolant level and fan belt (see Section 5-6 and engine manual), and check fault indicators on fuel gauge (see Section 6-1). Engine stops if engine temperature is too high.
	Have Factory Authorized Service Agent check low oil pressure shutdown switch S5 and engine temperature switch S4.

Trouble	Remedy
Battery discharges between uses.	Clean top of battery with baking soda and water solution; rinse with clear water.
	Periodically recharge battery (approximately every 3 months).
	Replace battery.
	Check voltage regulator according to engine manual.
Engine does not return to idle speed when load is removed with Engine Control switch in Run/Idle position.	Remove all weld and generator power loads.
	Check for obstructed movement of solenoid linkage (see Section 9-4).
	Have Factory Authorized Service Agent check idle module PC1, current transformer CT1, idle lock switch S7, throttle solenoid TS1, and Engine Control switch S2.
Engine does not remain at weld/power speed when power or weld load is applied with Engine Control switch in Run/Idle position.	Check for obstructed movement of solenoid linkage (see Section 9-4).
	Have Factory Authorized Service Agent check idle module PC1, control relay CR2, control relay CR4, current transformer CT1, and throttle solenoid TS1.
Engine does not remain at idle speed with Engine Control switch in Speed Lock position and Idle Lock switch in Idle position.	Check for obstructed movement of solenoid linkage (see Section 9-4).
	Have Factory Authorized Service Agent check control relay CR2, control relay CR4, Idle Lock switch S7, and throttle solenoid TS1.
Engine uses oil during run-in period; wetstacking occurs.	Dry engine (see Section 12 and engine manual).

SECTION 10 – PARTS LIST

10-1. Recommended Spare Parts

Dia. Mkgs.	Part No.	Description	Quantity
Recommended Spare Parts			
.....	187441	.. Element, Air Cleaner	1
.....	◆202102	.. Element, Air Cleaner Safety	1
.....	213858	.. Filter, Fuel In-line 5/16x5/16 Mic 125 -175	1
.....	187442	.. Element, Fuel Filter	1
.....	187443	.. Oil Filter	1
.....	187459	.. Belt, Fan	1
.....	GLOW PLUG	.. 187820 .. Glow Plug	1
.....	187819	.. Injector Assy,	1
.....	206421	.. Filter Kit, Kubota 722 (Includes air cleaner element, fuel, oil filters)	1
.....	F1, F2	.. 169296 .. Fuse, Mintr GI 25. Amp 125 Volt	2

◆Optional

A complete Parts List is available on-line at www.MillerWelds.com

SECTION 11 – ELECTRICAL DIAGRAMS

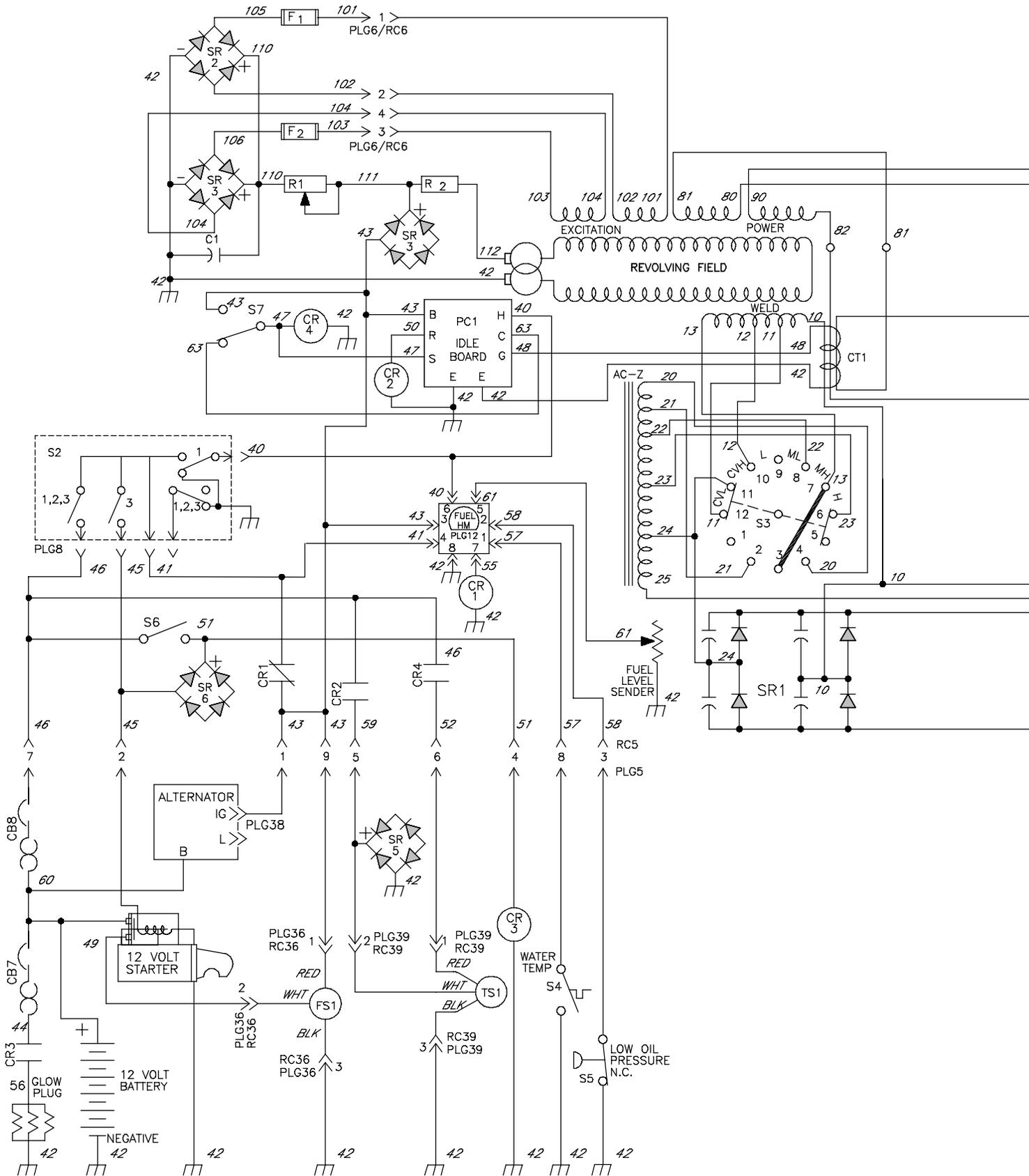
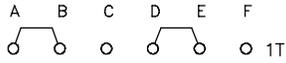
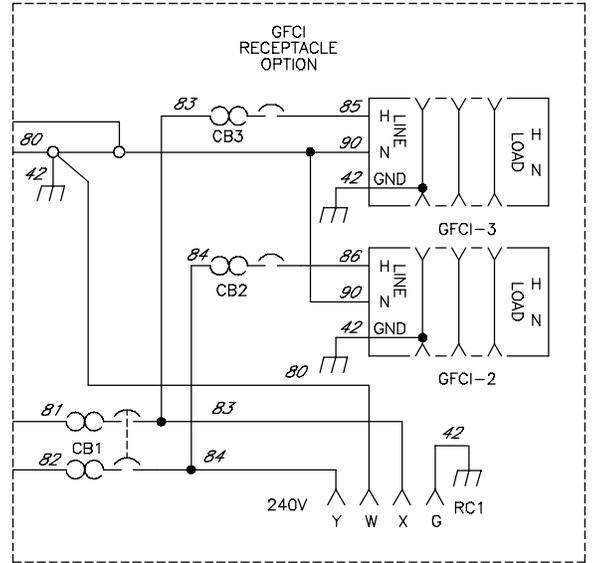
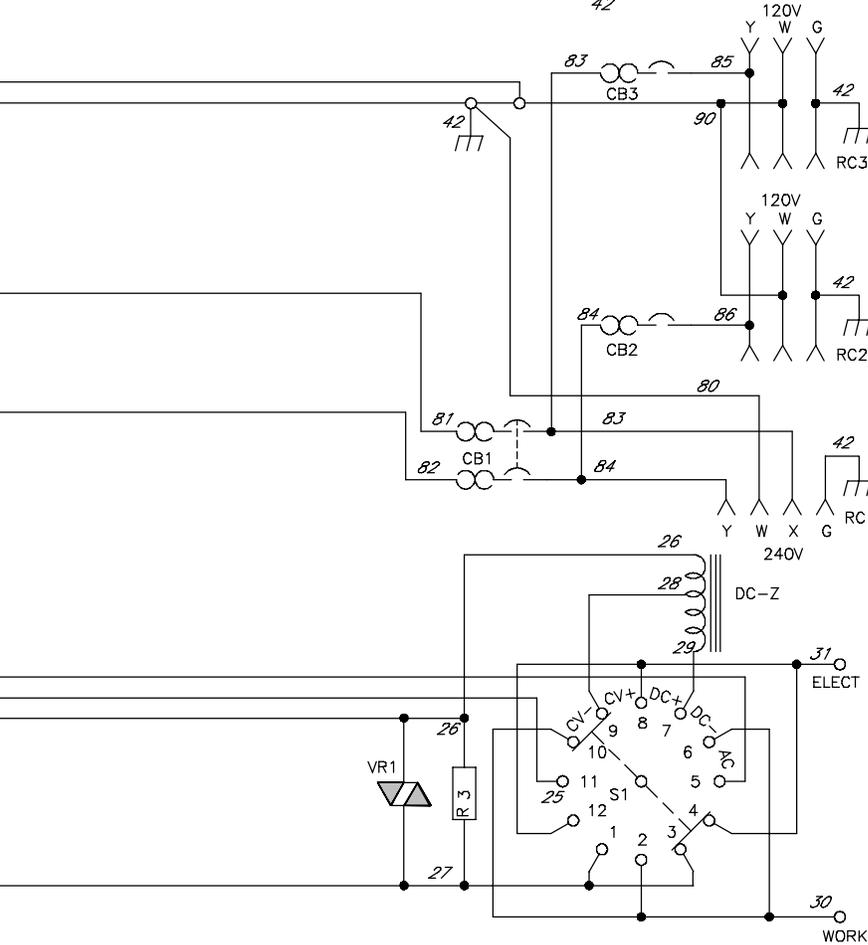


Figure 11-1. Circuit Diagram For Welding Generator



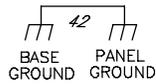
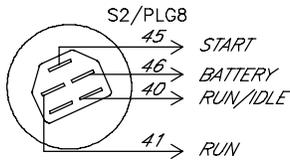
42 42 82 80 90 81
 42 42 82 80 90 81
 42



(POSITION)

(TERMINAL)	S2	OFF	IDLE	RUN	START
RUN/IDLE			X		
RUN		X	X	X	
START					X

X = CLOSED TO "B" TERMINAL



⚠ WARNING

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

ELECTRIC SHOCK HAZARD

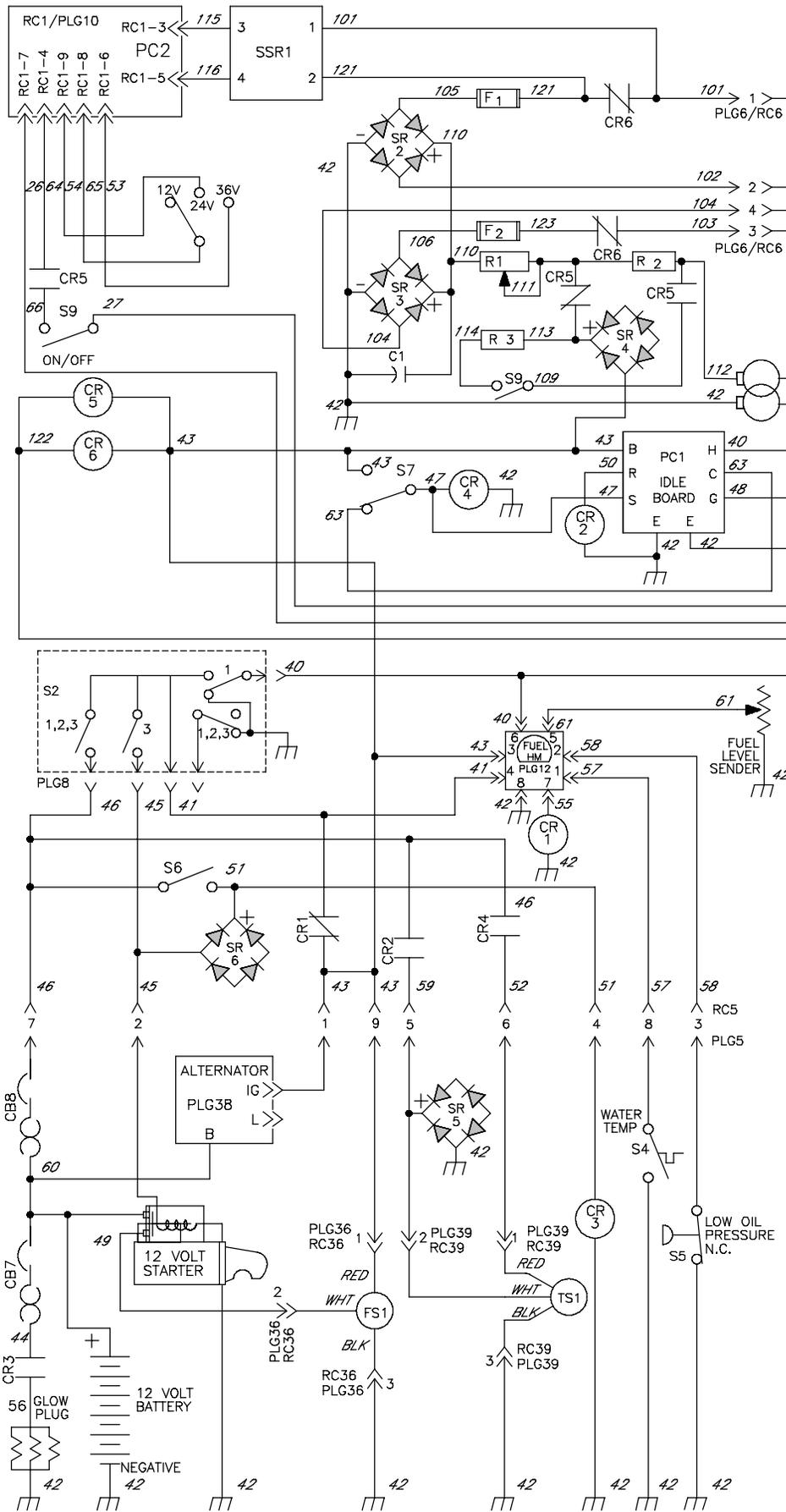
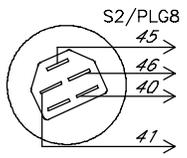
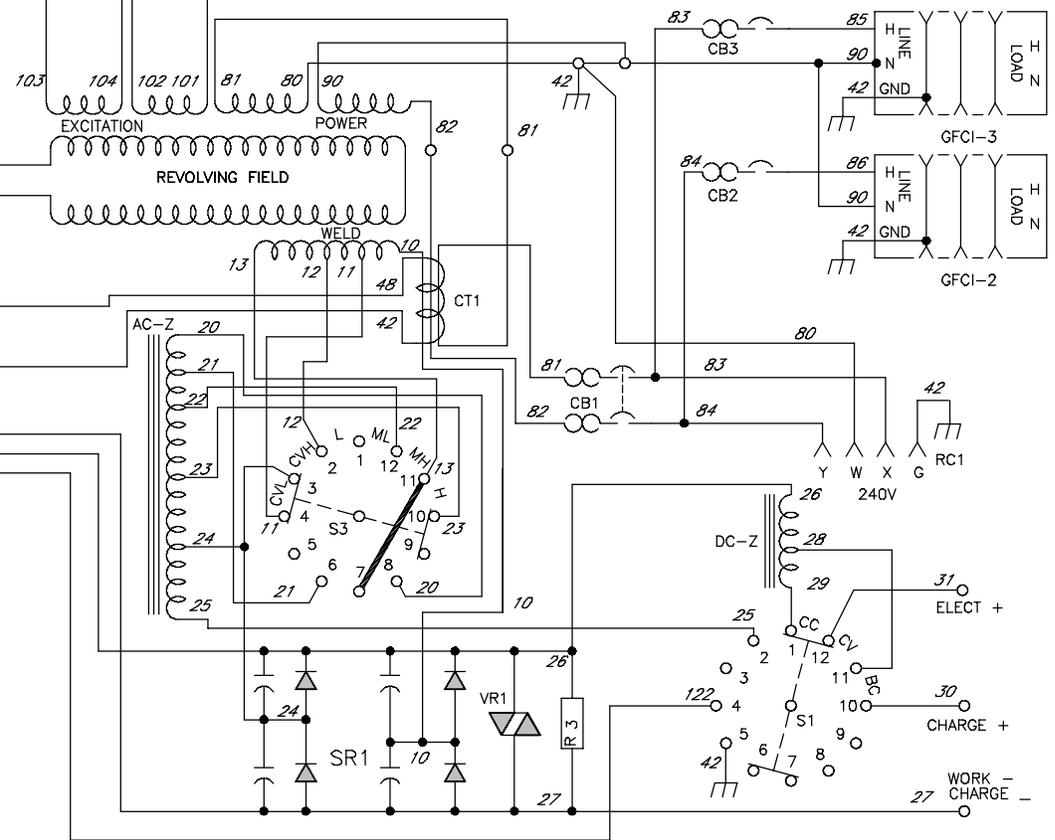
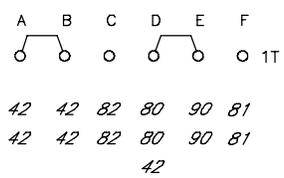
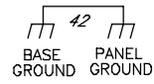


Figure 11-2. Circuit Diagram For Welding Generator With Battery Charging Option



		(POSITION)			
S2		OFF	IDLE	RUN	START
(TERMINAL)	RUN/IDLE		X		
	RUN		X	X	X
	START				X

X = CLOSED TO "B" TERMINAL

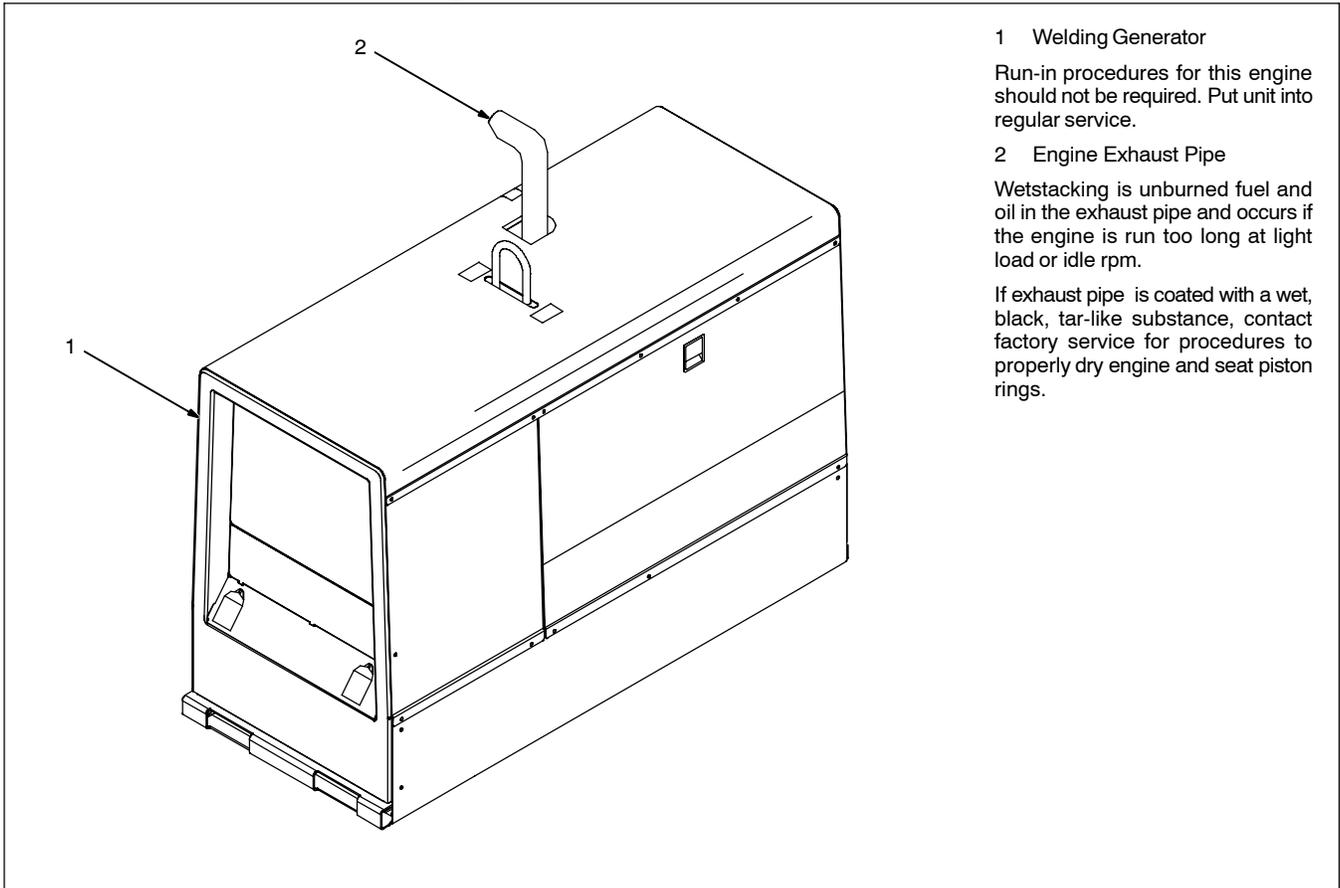


	WARNING	<ul style="list-style-type: none"> Do not touch live electrical parts. Disconnect input power or stop engine before servicing. Do not operate with covers removed. Have only qualified persons install, use, or service this unit.
	ELECTRIC SHOCK HAZARD	

SECTION 12 – RUN-IN AND WETSTACKING

run_in_D722 9/05

12-1. Run-In And Wetstacking



1 Welding Generator

Run-in procedures for this engine should not be required. Put unit into regular service.

2 Engine Exhaust Pipe

Wetstacking is unburned fuel and oil in the exhaust pipe and occurs if the engine is run too long at light load or idle rpm.

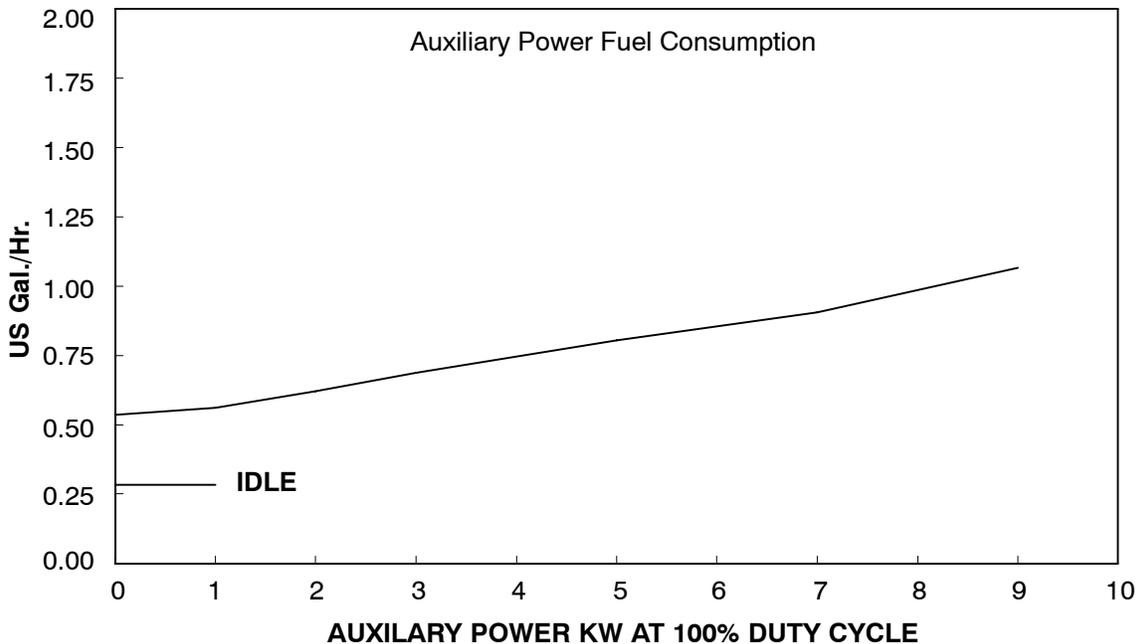
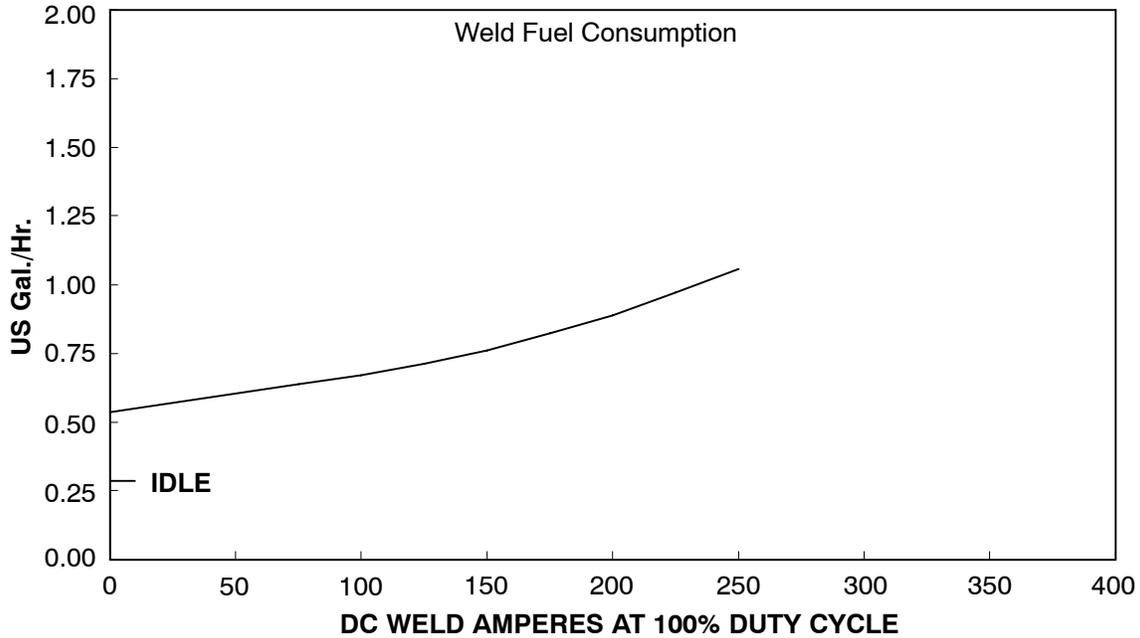
If exhaust pipe is coated with a wet, black, tar-like substance, contact factory service for procedures to properly dry engine and seat piston rings.

SECTION 13 – PERFORMANCE DATA

13-1. Fuel Consumption Curves

On a typical job using 1/8 in 7018 electrodes (125 amps, 20% duty cycle), expect about 24 hours of operation.

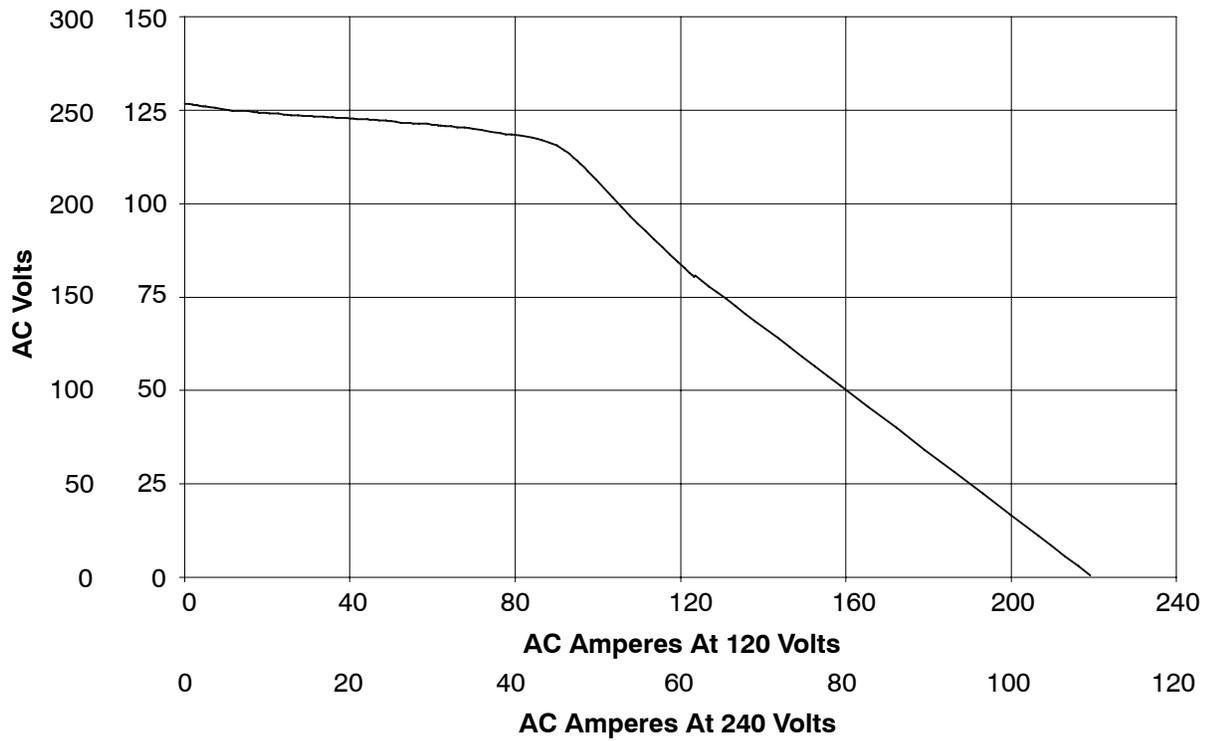
Welding at 150 amps at 40% duty cycle uses approximately 1/2 gallon per hour, or about 20 hours of operation.



226795-A / 226 796-A

13-2. Generator Power Curve

The ac generator power curve shows the generator power available in amperes at the receptacles.



226 791-A

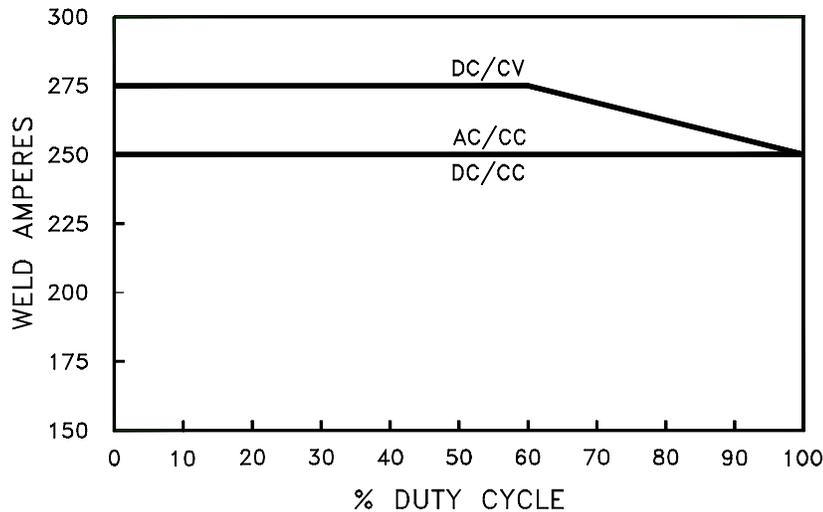
13-3. Duty Cycle



Continuous Welding
100% Duty Cycle at 250 Amperes

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.

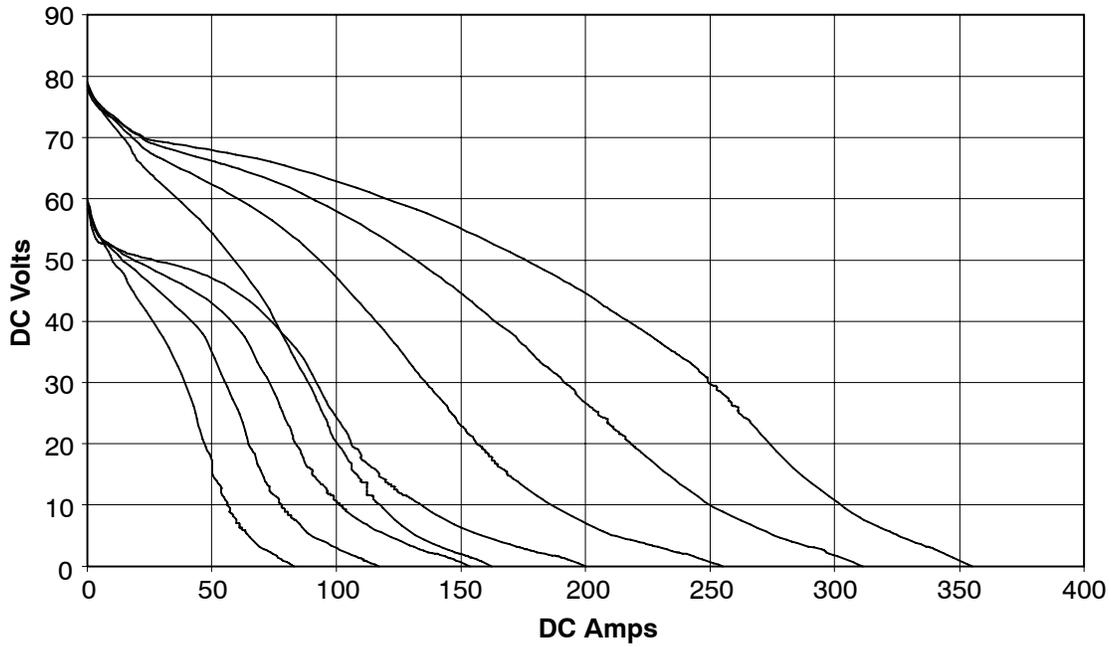


200 293

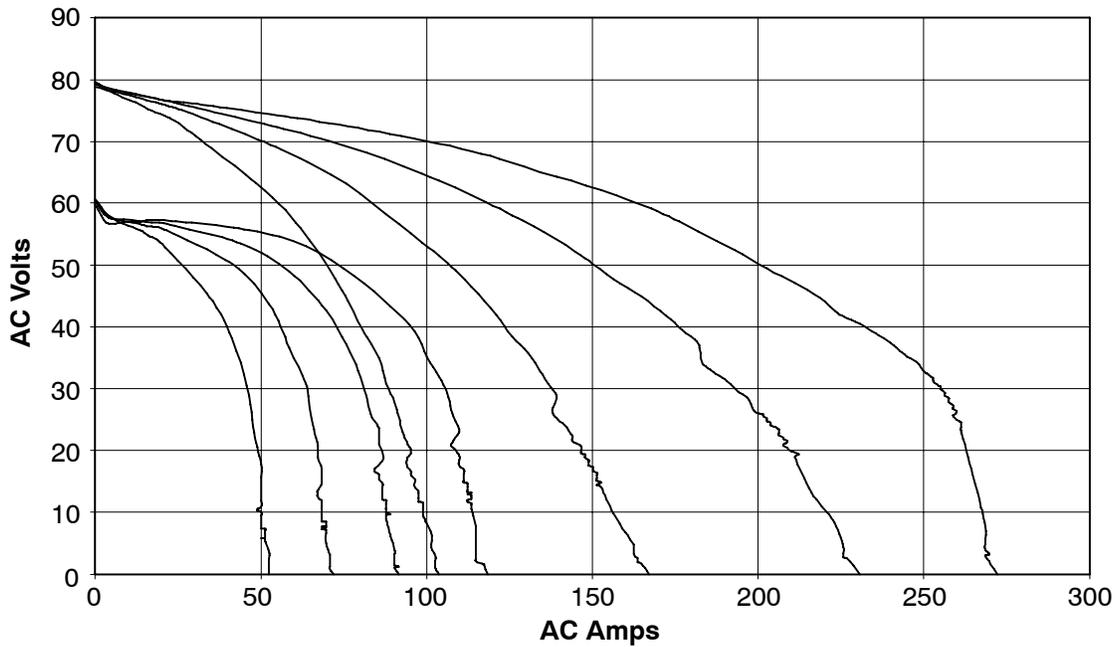
13-4. Stick Mode Volt-Ampere Curves

The volt-ampere curves show the minimum and maximum voltage and amperage output capabilities of the welding generator. Curves of other settings fall between the curves shown.

A. CC/DC Stick Mode

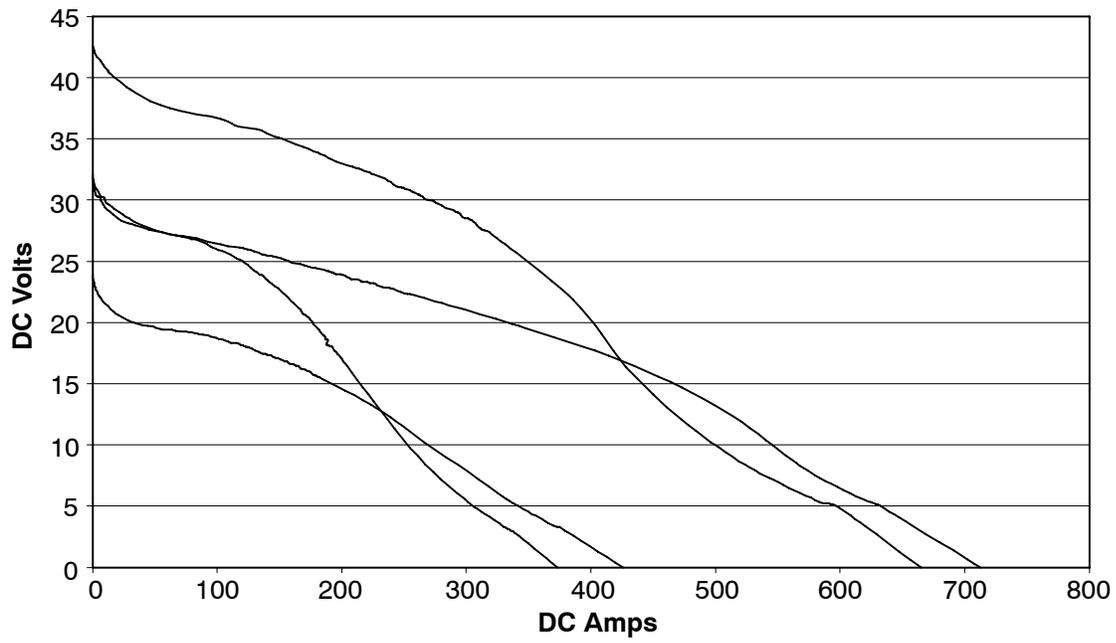


B. CC/AC STICK Mode



13-5. MIG Mode Volt-Ampere Curve

The volt-ampere curves show the minimum and maximum voltage and amperage output capabilities of the welding generator. Curves of other settings fall between the curves shown.



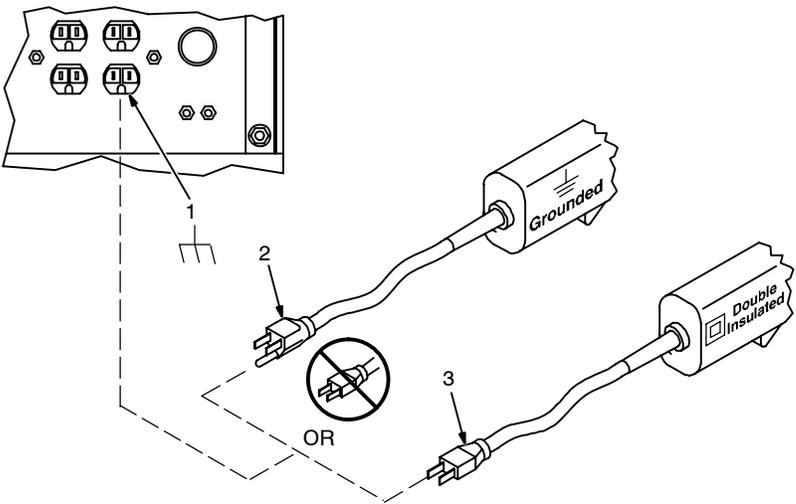
226 794-A

SECTION 14 – 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.

14-1. 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

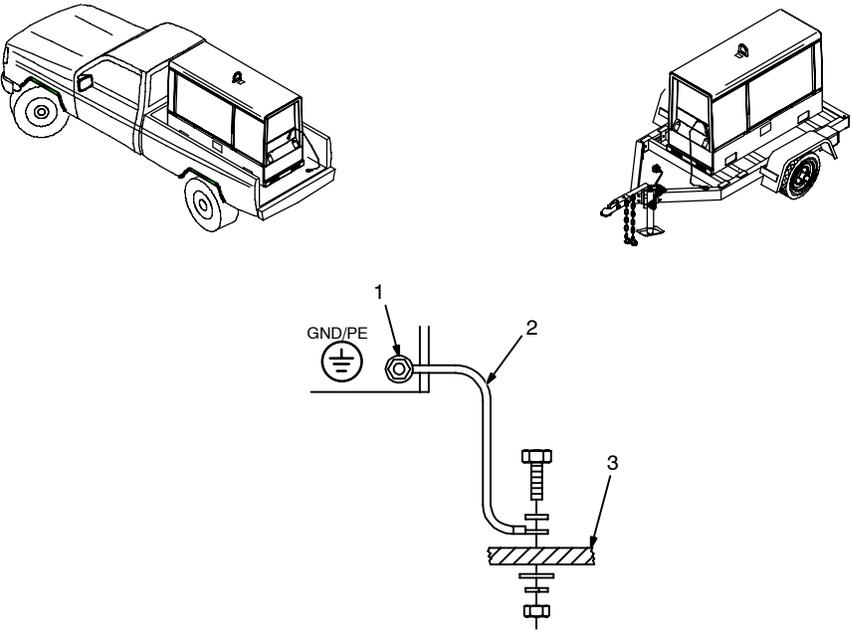
Be sure equipment has double insulated symbol and/or wording on it.

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

gen_pwr 2007-04 – Ref. ST-159 730 / ST-800 577

14-2. 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.

S-0854

14-3. 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

14-4. 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 14-8).

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

14-5. 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
Fan Duty	10 HP	46700	10700
	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

14-6. Approximate Power Requirements For Farm/Home Equipment

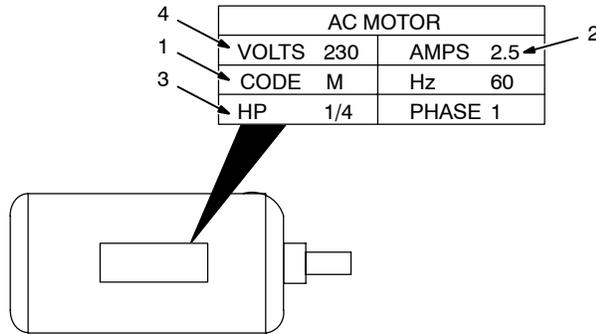
Farm/Home Equipment	Rating	Starting Watts	Running Watts
Stock Tank De-Icer		1000	1000
Grain Cleaner	1/4 HP	1650	650
Portable Conveyor	1/2 HP	3400	1000
Grain Elevator	3/4 HP	4400	1400
Milk Cooler		2900	1100
Milker (Vacuum Pump)	2 HP	10500	2800
FARM DUTY MOTORS	1/3 HP	1720	720
Std. (e.g. Conveyors,	1/2 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

14-7. 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

14-8. 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.

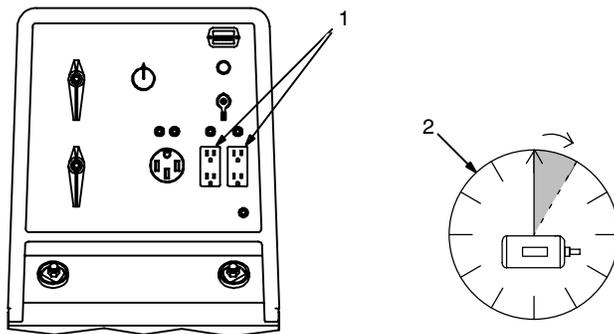
Volts = 230, HP = 1/4, kVA/HP = 11.2

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

Starting the motor requires 12.2 amperes.

S-0624

14-9. How Much Power Can Generator Supply?



- 1 Limit Load To 90% Of Generator Output

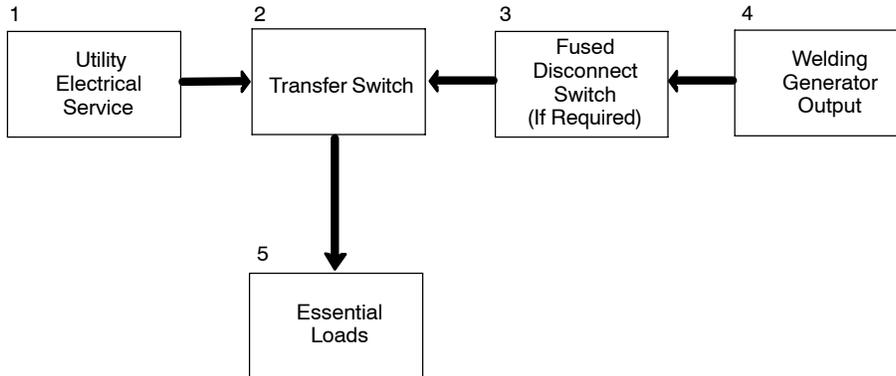
Always start non-resistive (motor) loads in order from largest to smallest, and add resistive loads last.

- 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

14-10. 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 14-4).

14-11. 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

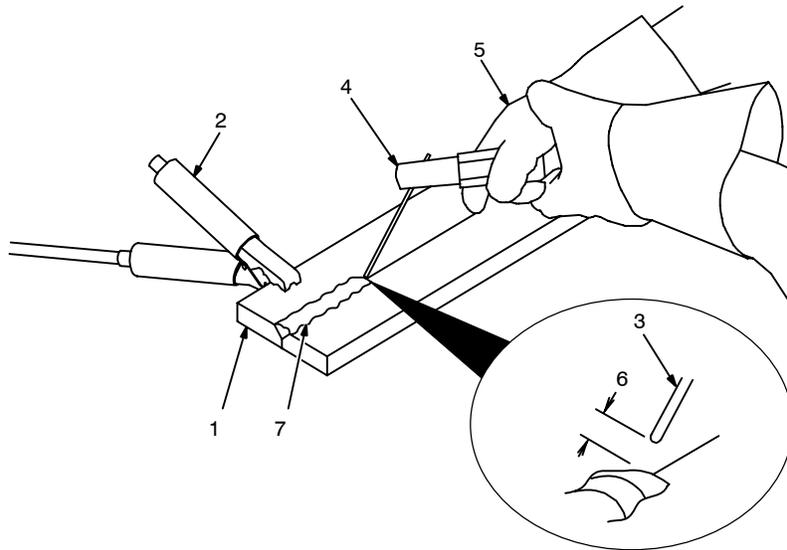
Cord Lengths for 240 Volt Loads							
 If unit does not have GFCI receptacles, use GFCI-protected extension cord.							
Current (Amperes)	Load (Watts)	Maximum Allowable Cord Length in ft (m) for Conductor Size (AWG)*					
		4	6	8	10	12	14
5	1200			700 (213)	450 (137)	225 (84)	200 (61)
7	1680		800 (244)	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

SECTION 15 – STICK WELDING (SMAW) GUIDELINES



15-1. Stick Welding Procedure



⚠ Weld current starts when electrode touches workpiece.

⚠ Weld current can damage electronic parts in vehicles. Disconnect both battery cables before welding on a vehicle. Place work clamp as close to the weld as possible.

1 Workpiece

Make sure workpiece is clean before welding.

2 Work Clamp

3 Electrode

A small diameter electrode requires less current than a large one. Follow electrode manufacturer's instructions when setting weld amperage (see Section 15-2).

4 Insulated Electrode Holder

5 Electrode Holder Position

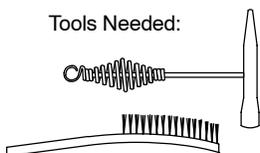
6 Arc Length

Arc length is the distance from the electrode to the workpiece. A short arc with correct amperage will give a sharp, crackling sound.

7 Slag

Use a chipping hammer and wire brush to remove slag. Remove slag and check weld bead before making another weld pass.

Tools Needed:



15-2. Electrode and Amperage Selection Chart

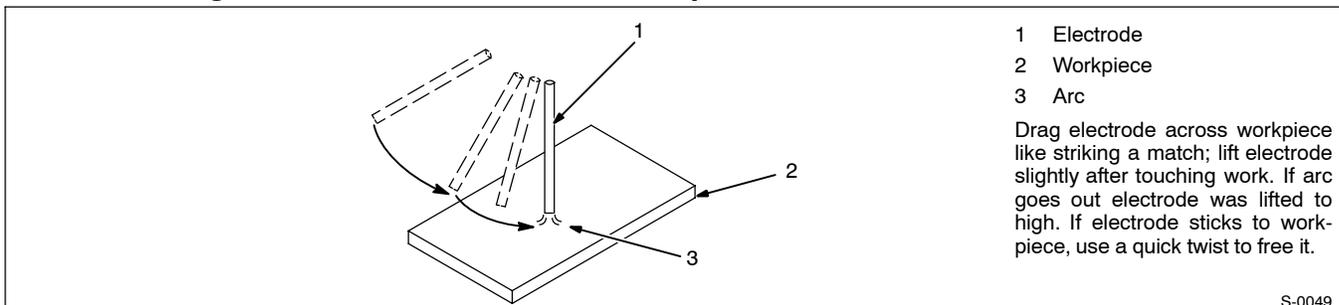
ELECTRODE	DIAMETER	AMPERAGE RANGE								
		50	100	150	200	250	300	350	400	450
6010 & 6011	3/32									
	1/8									
	5/32									
	3/16									
	7/32									
6013	1/4									
	1/16									
	5/64									
	3/32									
	1/8									
	5/32									
	3/16									
7014	7/32									
	1/4									
	3/32									
	1/8									
	5/32									
7018	3/16									
	7/32									
	1/4									
	3/32									
	1/8									
7024	5/32									
	3/16									
	7/32									
	1/4									
	3/32									
Ni-Cl	1/8									
	5/32									
	3/16									
308L	3/32									
	1/8									
	5/32									

ELECTRODE	DC*	AC	POSITION	PENETRATION	USAGE
6010	EP		ALL	DEEP	MIN. PREP, ROUGH
6011	EP	✓	ALL	DEEP	HIGH SPATTER
6013	EP,EN	✓	ALL	LOW	GENERAL
7014	EP,EN	✓	ALL	MED	SMOOTH, EASY, FAST
7018	EP	✓	ALL	LOW	LOW HYDROGEN, STRONG
7024	EP,EN	✓	FLAT HORIZ FILLET	LOW	SMOOTH, EASY, FASTER
Ni-CL	EP	✓	ALL	LOW	CAST IRON
308L	EP	✓	ALL	LOW	STAINLESS

*EP = ELECTRODE POSITIVE (REVERSE POLARITY)
EN = ELECTRODE NEGATIVE (STRAIGHT POLARITY)

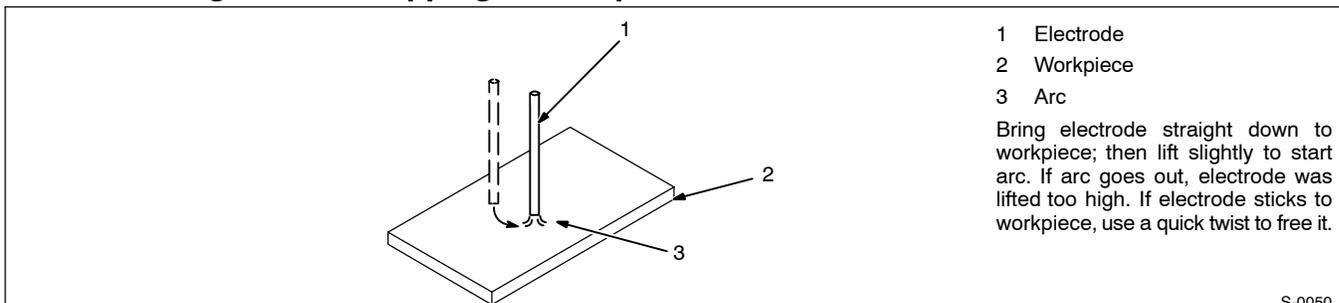
Ref. S-087 985-A

15-3. Striking an Arc – Scratch Start Technique



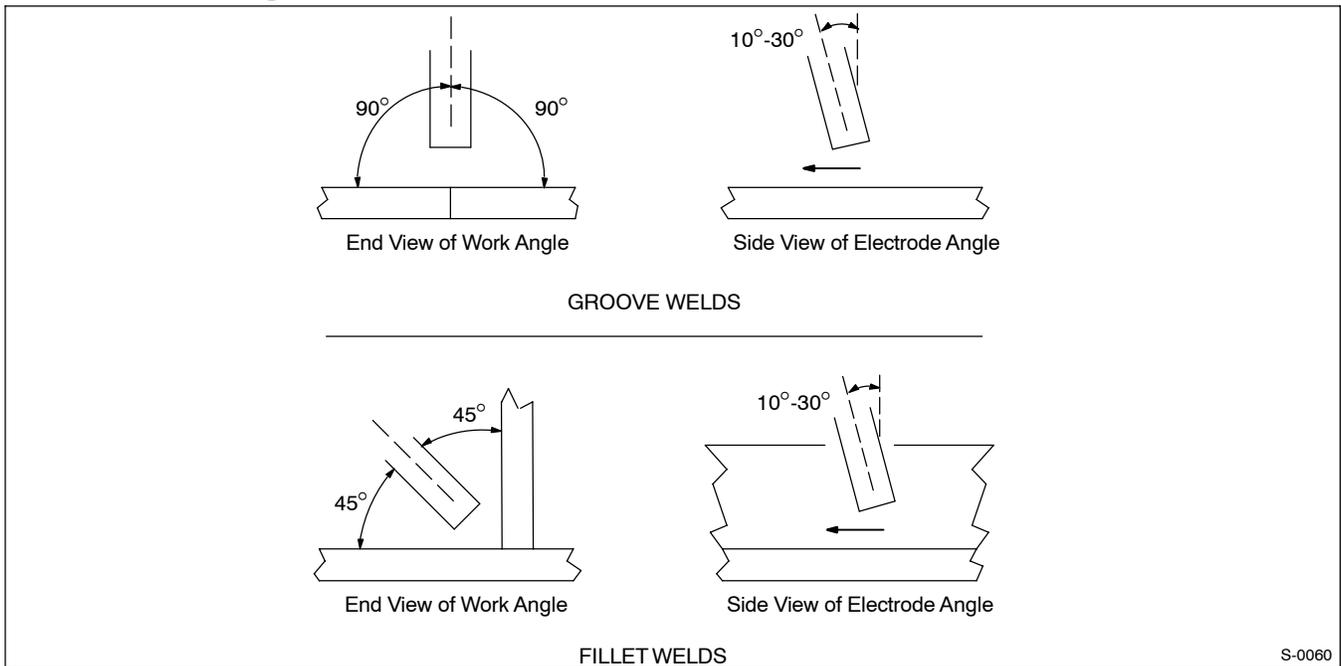
S-0049

15-4. Striking an Arc – Tapping Technique



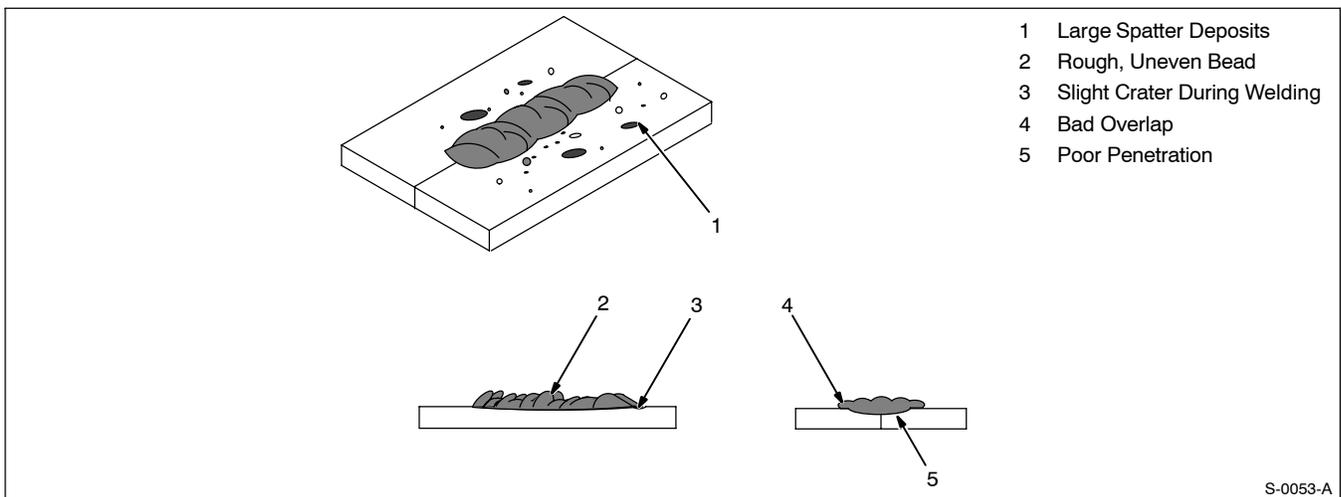
S-0050

15-5. Positioning Electrode Holder



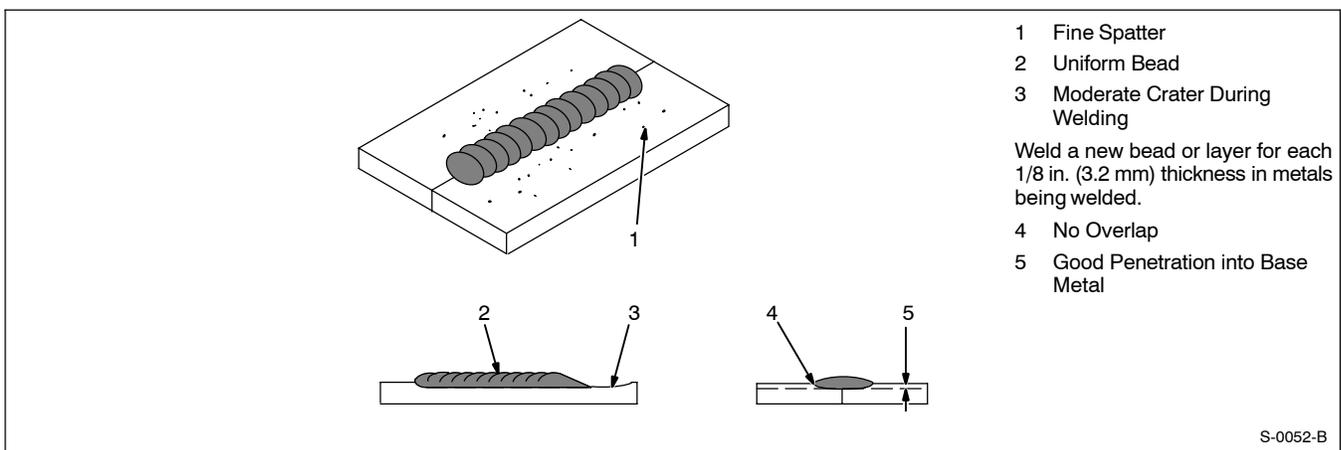
S-0060

15-6. Poor Weld Bead Characteristics



S-0053-A

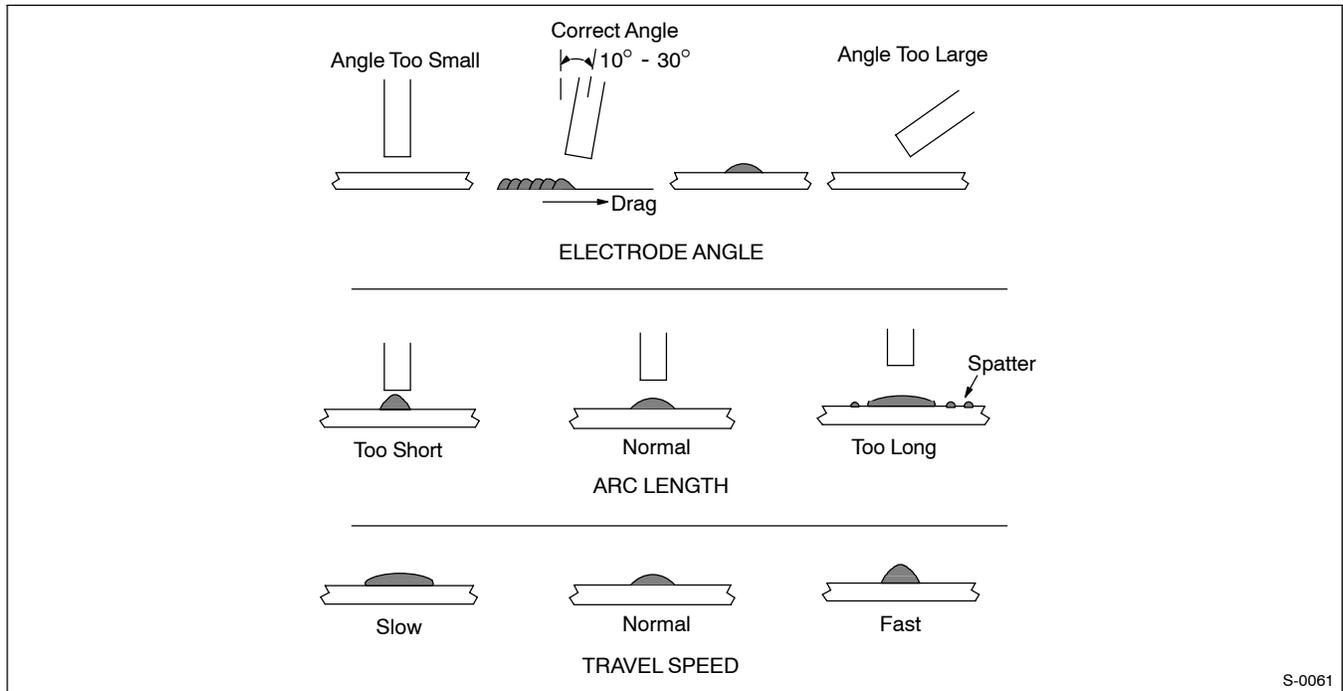
15-7. Good Weld Bead Characteristics



S-0052-B

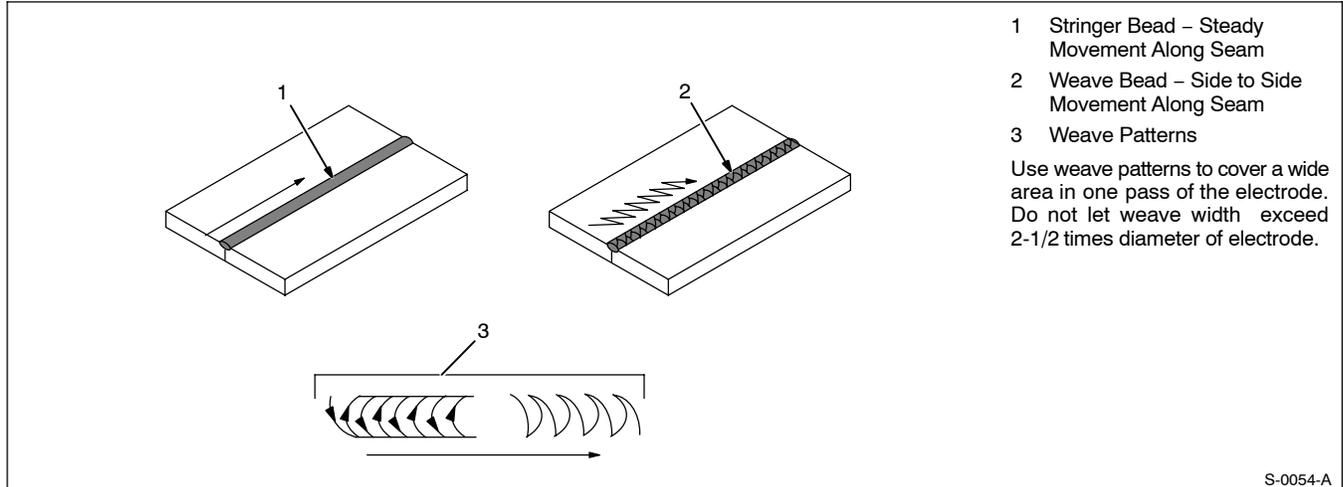
15-8. Conditions That Affect Weld Bead Shape

☞ Weld bead shape is affected by electrode angle, arc length, travel speed, and thickness of base metal.

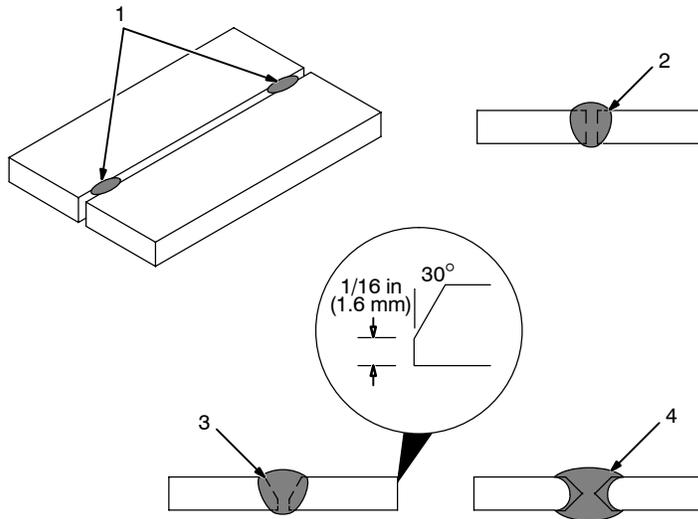


15-9. Electrode Movement During Welding

☞ 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 work better.



15-10. Butt Joints



1 Tack Welds

Prevent edges of joint from drawing together ahead of electrode by tack welding the materials in position before final weld.

2 Square Groove Weld

Good for materials up to 3/16 in (5 mm) thick.

3 Single V-Groove Weld

Good for materials 3/16 – 3/4 in (5-19 mm) thick. Cut bevel with oxy-acetylene or plasma cutting equipment. Remove scale from material after cutting. A grinder can also be used to prepare bevels.

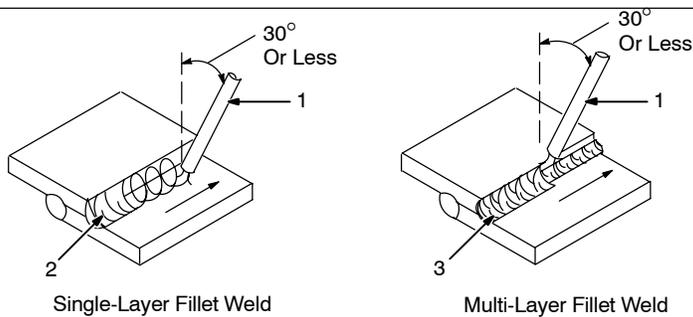
Create 30 degree angle of bevel on materials in V-groove welding.

4 Double V-Groove Weld

Good for materials thicker than 3/16 in (5 mm).

S-0662

15-11. Lap Joint



Single-Layer Fillet Weld

Multi-Layer Fillet Weld

1 Electrode

2 Single-Layer Fillet Weld

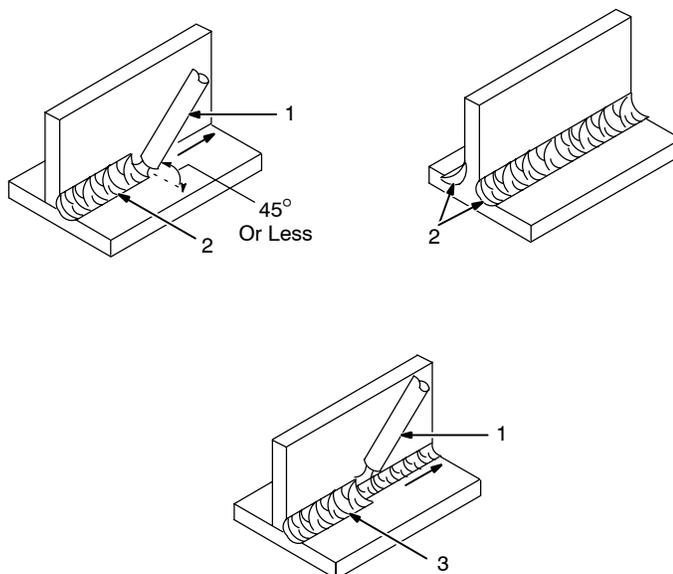
Move electrode in circular motion.

3 Multi-Layer Fillet Weld

Weld a second layer when a heavier fillet is needed. Remove slag before making another weld pass. Weld both sides of joint for maximum strength.

S-0063 / S-0064

15-12. Tee Joint



1 Electrode

2 Fillet Weld

Keep arc short and move at definite rate of speed. Hold electrode as shown to provide fusion into the corner. Square edge of the weld surface.

For maximum strength weld both sides of upright section.

3 Multi-Layer Deposits

Weld a second layer when a heavier fillet is needed. Use any of the weaving patterns shown in Section 15-9. Remove slag before making another weld pass.

S-0060 / S-0058-A / S-0061

15-13. Weld Test

1 Vise
2 Weld Joint
3 Hammer

Strike weld joint in direction shown. A good weld bends over but does not break.

S-0057-B

15-14. Troubleshooting – Porosity

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

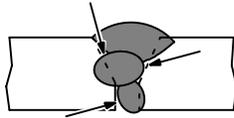
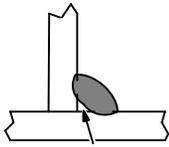
Possible Causes	Corrective Actions
Arc length too long.	Reduce arc length.
Damp electrode.	Use dry electrode.
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, coatings, slag, and dirt from work surface before welding.

15-15. Troubleshooting – Excessive Spatter

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

Possible Causes	Corrective Actions
Amperage too high for electrode.	Decrease amperage or select larger electrode.
Arc length too long or voltage too high.	Reduce arc length or voltage.

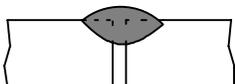
15-16. Troubleshooting – Incomplete Fusion



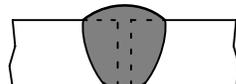
Incomplete Fusion – failure of weld metal to fuse completely with base metal or a preceding weld bead.

Possible Causes	Corrective Actions
Insufficient heat input.	Increase amperage. Select larger electrode and increase amperage.
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.
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, coatings, slag, and dirt from work surface before welding.

15-17. Troubleshooting – Lack Of Penetration



Lack of Penetration

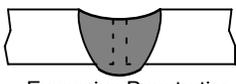


Good Penetration

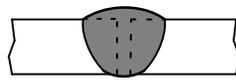
Lack Of Penetration – shallow fusion between weld metal and base metal.

Possible Causes	Corrective Actions
Improper joint preparation.	Material too thick. Joint preparation and design must provide access to bottom of groove.
Improper weld technique.	Keep arc on leading edge of weld puddle.
Insufficient heat input.	Increase amperage. Select larger electrode and increase amperage.
	Reduce travel speed.

15-18. Troubleshooting – Excessive Penetration



Excessive Penetration

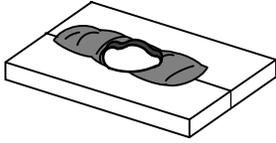


Good Penetration

Excessive Penetration – weld metal melting through base metal and hanging underneath weld.

Possible Causes	Corrective Actions
Excessive heat input.	Select lower amperage. Use smaller electrode.
	Increase and/or maintain steady travel speed.

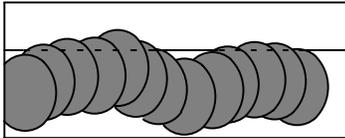
15-19. Troubleshooting – Burn-Through



Burn-Through – weld metal melting completely through base metal resulting in holes where no metal remains.

Possible Causes	Corrective Actions
Excessive heat input.	Select lower amperage. Use smaller electrode.
	Increase and/or maintain steady travel speed.

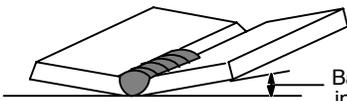
15-20. Troubleshooting – Waviness Of Bead



Waviness Of Bead – weld metal that is not parallel and does not cover joint formed by base metal.

Possible Causes	Corrective Actions
Unsteady hand.	Use two hands. Practice technique.

15-21. Troubleshooting – Distortion



Base metal moves in the direction of the weld bead.

Distortion – contraction of weld metal during welding that forces base metal to move.

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 amperage for electrode.
	Increase travel speed.
	Weld in small segments and allow cooling between welds.

TRUE BLUE[®]

WARRANTY

Effective January 1, 2007

(Equipment with a serial number preface of "LH" or newer)

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

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

Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

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

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

- * Induction Heating Coils and Blankets, Cables, and Non-Electronic Controls
- * APT & SAF Model Plasma Cutting Torches
- * Remote Controls
- * Accessory (Kits)
- * Replacement Parts (No labor)
- * Spoolmate Spoolguns
- * Canvas Covers

Miller's True Blue[®] Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear. (Exception: brushes, slip rings, and relays are covered on Bobcat, Trailblazer, and Legend models.)**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

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

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

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

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

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

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

miller_warr 2007-01

Warranty Questions?

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

Your distributor also gives you ...

Service

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

Support

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





Owner's Record

Please complete and retain with your personal records.

Model Name

Serial/Style Number

Purchase Date

(Date which equipment was delivered to original customer.)

Distributor

Address

City

State

Zip



For Service

Contact a DISTRIBUTOR or SERVICE AGENCY near you.

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:

Welding Supplies and Consumables

Options and Accessories

Personal Safety Equipment

Service and Repair

Replacement Parts

Training (Schools, Videos, Books)

Technical Manuals (Servicing Information and Parts)

Circuit Diagrams

Welding Process Handbooks

To locate a Distributor or Service Agency visit www.millerwelds.com or call 1-800-4-A-Miller

Contact the Delivering Carrier to:

File a claim for loss or damage during shipment.

For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.

Miller Electric Mfg. Co.

An Illinois Tool Works Company
1635 West Spencer Street
Appleton, WI 54914 USA

International Headquarters—USA

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

European Headquarters – United Kingdom

Phone: 44 (0) 1204-593493
FAX: 44 (0) 1204-598066

www.MillerWelds.com

