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2019-02

Processes



Battery Charging



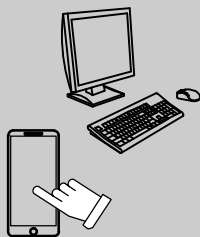
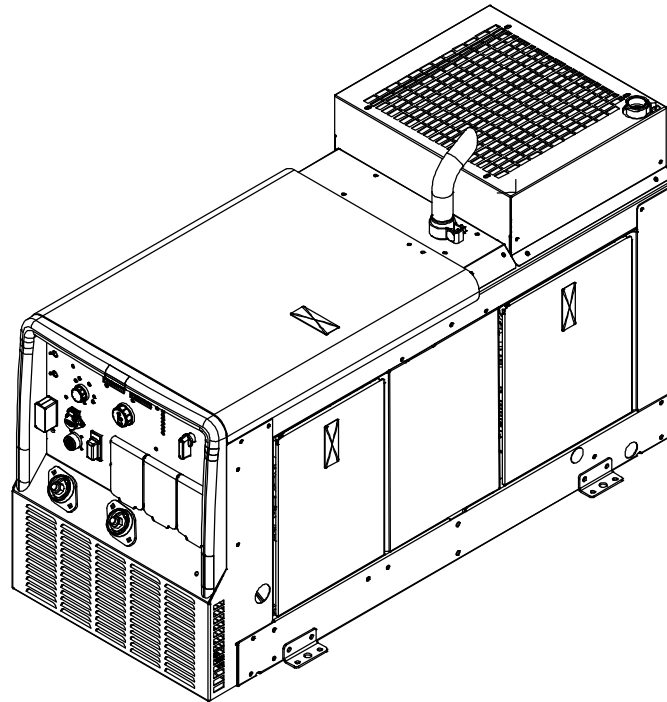
Multiprocess Welding

Description



Engine Driven Air Compressor,
Generator, Battery Charger, And
Welder

Bobcat[™] 200 Air Pak Diesel



For product information,
Owner's Manual translations,
and more, visit

www.MillerWelds.com

OWNER'S MANUAL

File: Engine Drive



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.



ISO 9001
Quality

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

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, and our extensive service network is there to help fix the problem. Warranty and maintenance information for your particular model are also provided.



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	6
1-7. Principal Safety Standards	6
1-8. EMF Information	6
SECTION 2 – CONSIGNES DE SÉCURITÉ – LIRE AVANT UTILISATION	7
2-1. Signification des symboles	7
2-2. Dangers relatifs au soudage à l'arc	7
2-3. Dangers existant en relation avec le moteur	9
2-4. Dangers liés à l'air comprimé	10
2-5. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance	11
2-6. Proposition californienne 65 Avertissements	13
2-7. Principales normes de sécurité	13
2-8. Informations relatives aux CEM	13
SECTION 3 – DEFINITIONS	14
3-1. Additional Safety Symbol Definitions	14
3-2. Miscellaneous Symbol Definitions	14
SECTION 4 – SPECIFICATIONS	16
4-1. Serial Number And Rating Label Location	16
4-2. Air Compressor Specifications	16
4-3. Battery Charger Specifications	16
4-4. Power And Engine Specifications	16
4-5. Weld Specifications	16
4-6. Environmental Specifications	16
4-7. Dimensions, Weights, and Operating Angles	17
4-8. Duty Cycle And Overheating	18
4-9. Generator Power Curves	19
4-10. Volt-Ampere Curves - Weld	20
4-11. Volt-Ampere Curves - Battery Charge	21
4-12. Fuel Consumption	22
SECTION 5 – INSTALLATION	23
5-1. Installing Unit	23
5-2. Grounding Generator To Truck Or Trailer Frame	24
5-3. Air Compressor Connections	24
5-4. Engine Prestart Checks	25
5-5. Compressor Prestart Checks	26
5-6. Connecting The Battery	27
5-7. Installing Exhaust Pipe	27
5-8. Connecting Optional External Fuel Supply	28

⚠ WARNING: Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65warnings.ca.gov/diesel.

TABLE OF CONTENTS

SECTION 6 – CONTROLS	29
6-1. Control Panel	29
6-2. Control Panel (Continued)	30
6-3. Process Switch	31
6-4. Service Menu	32
6-5. Updating Software	33
6-6. Summary File	34
6-7. Fuel/Hour Gauge Descriptions	35
SECTION 7 – COMPRESSOR SYSTEM	36
7-1. Air Compressor Switch And Adjusting Air Pressure	36
7-2. Air Compressor Controls	37
7-3. Air Compressor Operation With Air Tools	38
SECTION 8 – BATTERY CHARGING	39
8-1. Battery Charging Guidelines	39
8-2. Connecting Uninstalled Battery To Battery Charge Receptacle	39
8-3. Connecting Installed Battery To Battery Charge Receptacle	40
8-4. Setting Battery Charge Controls	41
8-5. Setting Battery Jump/Crank Assist Controls	41
8-6. Battery Charging Information On Display Screens	42
SECTION 9 – OPERATING AUXILIARY EQUIPMENT	43
9-1. Generator Power Receptacles And Supplementary Protectors	43
9-2. GFCI Receptacle Information, Resetting, And Testing	44
9-3. Wiring Instructions For Optional 240 Volt, Single-Phase Plug (NEMA 14-50P)	45
SECTION 10 – WELDING OPERATION	46
10-1. Selecting Cable Sizes*	46
10-2. Weld Output Terminals	46
10-3. Connecting Weld Output Cables	47
10-4. Weld Controls	48
10-5. Arc Control Settings	49
10-6. Stick Start Procedure – Scratch Start Technique	49
10-7. Lift-Arc™ TIG With Auto-Stop™	50
10-8. MIG Welding Connections And Settings	51
10-9. Connecting Spool Gun	52
SECTION 11 – MAINTENANCE AND TROUBLESHOOTING	53
11-1. Maintenance Label	53
11-2. Routine Maintenance	54
11-3. Changing Compressor Oil, Oil Filter, Air Cleaner, And Air/Oil Separator	55
11-4. Replacing Engine Air Cleaner	56
11-5. Changing Engine Oil, Oil Filter, And Fuel Filter	57
11-6. Changing Engine Coolant	58
11-7. Overload Protection	59
11-8. Voltmeter/Ammeter Error Displays	60
11-9. Troubleshooting	61
SECTION 12 – PARTS LIST	65
12-1. Recommended Spare Parts	65
SECTION 13 – DIAGRAMS	66
SECTION 14 – GENERATOR POWER GUIDELINES	69
WARRANTY	
COMPLETE PARTS LIST – Available at www.MillerWelds.com	

SECTION 1 – SAFETY PRECAUTIONS – READ BEFORE USING

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

1-1. Symbol Usage



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



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

NOTICE – Indicates statements not related to personal injury.

 Indicates special instructions.



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

1-2. 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 equipment. A qualified person is defined as one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated ability to solve or resolve problems relating to the subject matter, the work, or the project and has received safety training to recognize and avoid the hazards involved.



During operation, keep everybody, especially children, away.



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 weld output in damp, wet, or confined spaces, 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!
- Do not connect to any electrical distribution system normally supplied by utility power unless a proper transfer switch and grounding procedure are employed.

- 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, ground, and operate 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 and ground conductor for damage or bare wiring — replace immediately if damaged — bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or repaired 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. Disconnect cable for process not in use.
- Use GFCI protection when operating auxiliary equipment. Test GFCI receptacles at high speed.

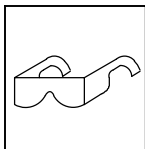
SIGNIFICANT DC VOLTAGE exists in inverter power sources AFTER stopping engine.

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



HOT PARTS can burn.

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



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.
- Ventilate the work area and/or use local forced ventilation at the arc to remove welding fumes and gases. The recommended way to determine adequate ventilation is to sample for the composition and quantity of fumes and gases to which personnel are exposed.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Safety Data Sheets (SDSs) and the manufacturer's instructions for adhesives, coatings, cleaners, consumables, coolants, degreasers, fluxes, and metals.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watch-person nearby. Welding 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 compressed 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 body protection made from durable, flame-resistant material (leather, heavy cotton, wool). Body protection includes oil-free clothing such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.

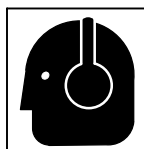


WELDING can cause fire or explosion.

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.

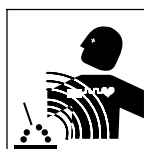
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not cut or weld on tire rims or wheels. Tires can explode if heated. Repaired rims and wheels can fail. See OSHA 29 CFR 1910.177 listed in Safety Standards.
- Do not weld on containers that have held combustibles, or on closed containers such as tanks, drums, or pipes unless they are properly prepared according to AWS F4.1 and AWS A6.0 (see Safety Standards).
- Do not weld where the atmosphere can 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 body protection made from durable, flame-resistant material (leather, heavy cotton, wool). Body protection includes oil-free clothing such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- 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.
- Read and understand the Safety Data Sheets (SDSs) and the manufacturer's instructions for adhesives, coatings, cleaners, consumables, coolants, degreasers, fluxes, and metals.



NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

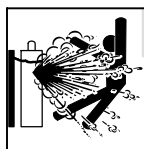
- Wear approved ear protection if noise level is high.



ELECTRIC AND MAGNETIC FIELDS (EMF) 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.

Compressed 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 compressed 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. Do not stand in front of or behind the regulator when opening the valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Use the proper equipment, correct procedures, and sufficient number of persons to lift, move, and transport cylinders.
- 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 injure.

- Always wear a face shield, rubber gloves, and protective clothing when working on a battery.
- Stop engine before disconnecting or connecting battery cables, battery charging cables (if applicable), 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 unless the unit has a battery charging feature designed for this purpose.
- Observe correct polarity (+ and -) on batteries.
- Disconnect negative (-) cable first and connect it last.
- Keep sparks, flames, cigarettes, and other ignition sources away from batteries. Batteries produce explosive gases during normal operation and when being charged.
- Follow battery manufacturer's instructions when working on or near a battery. See Battery Service Manual (listed in Safety Standards) for additional information.



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 injure.

- Keep away from moving parts such as 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 persons 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.



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.



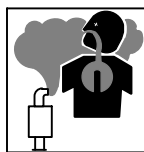
HOT PARTS can burn.

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



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.

1-4. Compressed Air Hazards

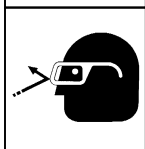


COMPRESSED AIR EQUIPMENT can injure or kill.

- Incorrect installation or operation of this unit could result in equipment failure and personal injury. Only qualified persons should install, operate, and service this unit according to its Owner's Manual, industry standards, and national, state, and local codes.
- Do not exceed the rated output or capacity of the compressor or any equipment in the compressed air system. Design compressed air system so failure of any component will not put people or property at risk.
- Before working on compressed air system, turn off and lockout/tagout unit, release pressure, and be sure air pressure cannot be accidentally applied.
- Do not work on compressed air system with unit running unless you are a qualified person and following the manufacturer's instructions.
- Do not modify or alter compressor or manufacturer-supplied equipment. Do not disconnect, disable, or override any safety equipment in the compressed air system.
- Use only components and accessories approved by the manufacturer.
- Keep away from potential pinch points or crush points created by equipment connected to the compressed air system.
- Do not work under or around any equipment that is supported only by air pressure. Properly support equipment by mechanical means.

**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.

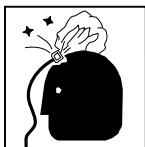
**COMPRESSED AIR can injure or kill.**

- Before working on compressed air system, turn off and lockout/tagout unit, release pressure, and be sure air pressure cannot be accidentally applied.
- Relieve pressure before disconnecting or connecting air lines.
- Check compressed air system components and all connections and hoses for damage, leaks, and wear before operating unit.

- Do not direct air stream toward self or others.
- Wear protective equipment such as safety glasses, hearing protection, leather gloves, heavy shirt and trousers, high shoes, and a cap when working on compressed air system.
- Use soapy water or an ultrasonic detector to search for leaks—never use bare hands. Do not use equipment if leaks are found.
- Reinstall doors, panels, covers, or guards when servicing is finished and before starting unit.
- If ANY air is injected into the skin or body seek medical help immediately.

**BREATHING COMPRESSED AIR can injure or kill.**

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

**TRAPPED AIR PRESSURE AND WHIPPING HOSES can injure.**

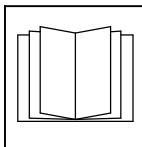
- Release air pressure from tools and system before servicing, adding or changing attachments, or opening compressor oil drain or oil fill cap.

**MOVING PARTS can injure.**

- Keep away from moving parts such as fans, belts and rotors.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Keep hands, hair, loose clothing, and tools away from moving parts.
- Before working on compressed air system, turn off and lockout/tagout unit, release pressure, and be sure air pressure cannot be accidentally applied.
- Have only qualified people remove guards or covers for maintenance and troubleshooting as necessary.
- Reinstall doors, panels, covers, or guards when servicing is finished and before starting engine.

**HOT PARTS can burn.**

- Do not touch hot compressor or air system parts.
- 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.

**READ INSTRUCTIONS.**

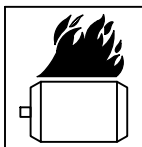
- Read and follow all labels and the Owner's Manual carefully before installing, operating, or servicing unit. Read the safety information at the beginning of the manual and in each section.
- Use only genuine replacement parts from the manufacturer.
- Perform installation, maintenance, and service according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

1-5. Additional Symbols For Installation, Operation, And Maintenance**FIRE OR EXPLOSION hazard.**

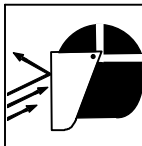
- Do not install or place unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not overload building wiring – be sure power supply system is properly sized, rated, and protected to handle this unit.

**FALLING EQUIPMENT can injure.**

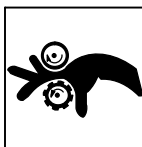
- Use lifting eye to lift unit and properly installed accessories only, NOT gas cylinders. Do not exceed maximum lift eye weight rating (see Specifications).
- Use correct procedures and equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.
- Keep equipment (cables and cords) away from moving vehicles when working from an aerial location.
- Follow the guidelines in the Applications Manual for the Revised NIOSH Lifting Equation (Publication No. 94-110) when manually lifting heavy parts or equipment.

**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.
- Use only equipment suitable for operation on 60 or 50/60 Hz power.

**FLYING SPARKS can injure.**

- 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 injure.**

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



BATTERY CHARGING OUTPUT and BATTERY EXPLOSION can injure.

Battery charging not present on all models.

- Always wear a face shield, rubber gloves, and protective clothing when working on a battery.
- Stop engine before disconnecting or connecting battery cables, battery charging cables (if applicable), 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 unless it has a battery charging feature designed for this purpose.
- Observe correct polarity (+ and -) on batteries.
- Disconnect negative (-) cable first and connect it last.
- Keep sparks, flames, cigarettes, and other ignition sources away from batteries. Batteries produce explosive gases during normal operation and when being charged.
- Follow battery manufacturer's instructions when working on or near a battery. See Battery Service Manual (listed in Safety Standards) for additional information.
- Have only qualified persons do battery charging work.
- If battery is being removed from a vehicle for charging, disconnect negative (-) cable first and connect it last. To prevent an arc, make sure all accessories are off.
- Charge lead-acid batteries only. Do not use battery charger to supply power to an extra-low-voltage electrical system or to charge dry cell batteries.
- Do not charge a frozen battery.
- Do not use damaged charging cables.
- Do not charge batteries in a closed area or where ventilation is restricted.
- Do not charge a battery that has loose terminals or one showing damage such as a cracked case or cover.
- Before charging battery, select correct charger voltage to match battery voltage.
- Set battery charging controls to the Off position before connecting to battery. Do not allow battery charging clips to touch each other.
- Keep charging cables away from vehicle hood, door, or moving parts.



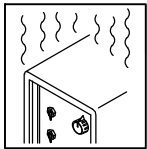
HIGH PRESSURE FLUIDS can injure or kill.

- Engine fuel system components can be under high pressure.
- Before working on fuel system, turn off engine to release pressure.
- If any fluid is injected into the skin or body seek medical help immediately.



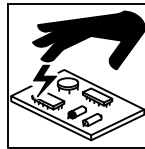
WELDING WIRE can injure.

- 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.



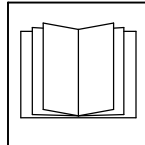
STATIC (ESD) can damage PC boards.

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



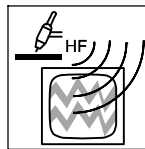
TILTING OF TRAILER can injure.

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



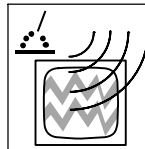
READ INSTRUCTIONS.

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



H.F. RADIATION can cause interference.

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



ARC WELDING can cause interference.

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

1-6. California Proposition 65 Warnings

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

For more information, go to www.P65Warnings.ca.gov.

For Diesel Engines:

⚠ WARNING: Breathing diesel engine exhaust exposes you to chemicals known to the state of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information, go to www.P65Warnings.ca.gov/diesel.

1-7. Principal Safety Standards

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

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

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

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Quincy, MA 02169 (phone: 1-800-344-3555, website: www.nfpa.org and www.sparky.org).

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

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

Battery Chargers, CSA Standard C22.2 NO 107.2-01, from Canadian Standards Association, Standards Sales, 5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N5 (phone: 800-463-6727, website: www.csagroup.org).

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

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

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

Portable Generators Safety Alert, U.S. Consumer Product Safety Commission (CPSC), 4330 East West Highway, Bethesda, MD 20814 (phone: 301-504-7923, website: www.cpsc.gov).

Applications Manual for the Revised NIOSH Lifting Equation, The National Institute for Occupational Safety and Health (NIOSH), 1600 Clifton Rd, Atlanta, GA 30329-4027 (phone: 1-800-232-4636, website: www.cdc.gov/NIOSH).

For Standards regulating hydraulic systems, contact the National Fluid Power Association, 6737 West Washington St., Suite 2350, Milwaukee, WI 53214 (phone: (414) 778-3344, website: www.nfpa.com).

Battery Service Manual, Battery Council International, 330 North Wabash Ave., Suite 2000, Chicago IL 60611 (phone: 1-312-245-1074, website: www.batterycouncil.org).

1-8. EMF Information

Electric current flowing through any conductor causes localized electric and magnetic fields (EMF). The current from arc welding (and allied processes including spot welding, gouging, plasma arc cutting, and induction heating operations) creates an EMF field around the welding circuit. EMF fields can interfere with some medical implants, e.g. pacemakers. Protective measures for persons wearing medical implants have to be taken. For example, restrict access for passers-by or conduct individual risk assessment for welders. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

1. Keep cables close together by twisting or taping them, or using a cable cover.
2. Do not place your body between welding cables. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.

4. Keep head and trunk as far away from the equipment in the welding circuit as possible.
5. Connect work clamp to workpiece as close to the weld as possible.
6. Do not work next to, sit or lean on the welding power source.
7. Do not weld whilst carrying the welding power source or wire feeder.

About Implanted Medical Devices:

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

SECTION 2 – CONSIGNES DE SÉCURITÉ – LIRE AVANT UTILISATION

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⚠ Pour écarter les risques de blessure pour vous-même et pour autrui — lire, appliquer et ranger en lieu sûr ces consignes relatives aux précautions de sécurité et au mode opératoire.

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.

AVIS – 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. Une personne qualifiée est définie comme celle qui, par la possession d'un diplôme reconnu, d'un certificat ou d'un statut professionnel, ou qui, par une connaissance, une formation et une expérience approfondies, a démontré avec succès sa capacité à résoudre les problèmes liés à la tâche, le travail ou le projet et a reçu une formation en sécurité afin de reconnaître et d'éviter les risques inhérents.

⚠ 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 utiliser de sortie de soudage CA dans des zones humides ou confinées ou s'il y a un risque de chute.
- 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!

- Ne brancher aucun système de distribution électrique normalement fourni par un réseau public à moins qu'un commutateur de transfert et une procédure de mise à la terre adéquats ne soient mis en place.
- 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 et le conducteur de mise à la terre afin de s'assurer qu'il n'est pas altéré ou dénudé –, le remplacer immédiatement s'il l'est –. Un fil dénudé peut entraîner la mort.
- Mettre l'appareil hors tension quand on ne l'utilise pas.
- Ne pas utiliser des câbles usés, endommagés, sous dimensionnés ou réparés.
- 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 double.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.
- Ne pas toucher aux portes-électrodes qui sont raccordés à deux machines à souder en même temps, car cela entraîne la présence d'une tension de circuit-ouvert double.
- 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.
- Ne pas raccorder plus d'une électrode ou plus d'un câble de masse à une même borne de sortie de soudage. Débrancher le câble pour le procédé non utilisé.
- Utiliser une protection GFCI lors de l'utilisation d'appareils auxiliaires. Testez les prises GFCI à haute vitesse.

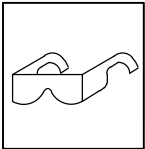
Il reste une TENSION DC NON NÉGLIGEABLE dans les sources de soudage onduleur UNE FOIS le moteur coupé.

- Arrêtez le moteur sur l'onduleur et déchargez les condensateurs d'entrée conformément aux instructions du manuel avant de toucher les pièces.



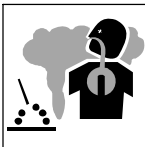
LES PIÈCES CHAUDES peuvent provoquer des brûlures.

- 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.

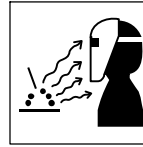
Le soudage génère des fumées et des gaz. Leur inhalation peut être dangereux pour votre santé.

- 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. Pour déterminer la bonne ventilation, il est recommandé de procéder à un prélèvement pour la composition et la quantité de fumées et de gaz auxquelles est exposé le personnel.
- Si la ventilation est médiocre, porter un respirateur anti-vapeurs approuvé.
- Lire et comprendre les fiches de données de sécurité et les instructions du fabricant concernant les adhésifs, les revêtements, les nettoyants, les consommables, les produits de refroidissement, les dégraissants, les flux et les métaux.
- 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.

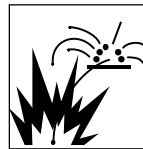
- Fermer l'alimentation du gaz comprimé en cas de non utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d'un respirateur d'adduction d'air homologué.



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 approprié pour protéger visage et yeux pour protéger votre visage et vos yeux pendant le soudage ou pour regarder (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des lunettes de sécurité avec écrans latéraux même sous votre casque.
- Avoir recours à des écrans protecteurs ou à des rideaux pour protéger les autres contre les rayonnements les éblouissements et les étincelles ; prévenir toute personne sur les lieux de ne pas regarder l'arc.
- Porter un équipement de protection pour le corps fait d'un matériau résistant et ignifuge (cuir, coton robuste, laine). La protection du corps comporte des vêtements sans huile comme par ex. des gants de cuir, une chemise solide, des pantalons sans revers, des chaussures hautes et une casquette.

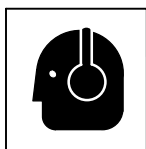


LE SOUDAGE peut provoquer un incendie ou une explosion.

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

- Déplacer toutes les substances inflammables à une distance de 10,7 m de l'arc de soudage. En cas d'impossibilité les recouvrir soigneusement avec des protections homologuées.
- Ne pas souder dans un endroit là 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 et AWS A6.0 (voir les Normes de Sécurité).
- Ne pas souder là où l'air ambiant pourrait contenir des poussières, gaz ou émanations inflammables (vapeur d'essence, par exemple).
- Brancher le câble de masse sur la pièce la plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des risques d'électrocution, d'étincelles et d'incendie.
- Ne pas utiliser le poste de soudage pour dégeler des conduites gelées.
- En cas de non utilisation, enlever la baguette d'électrode du porte-électrode ou couper le fil à la pointe de contact.

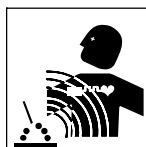
- Porter un équipement de protection pour le corps fait d'un matériau résistant et ignifuge (cuir, coton robuste, laine). La protection du corps comporte des vêtements sans huile comme par ex. des gants de cuir, une chemise solide, des pantalons sans revers, des chaussures hautes et une casquette.
- 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.
- Lire et comprendre les fiches de données de sécurité et les instructions du fabricant concernant les adhésifs, les revêtements, les nettoyeurs, les consommables, les produits de refroidissement, les dégraissateurs, les flux et les métaux.



LE BRUIT peut affecter l'ouïe.

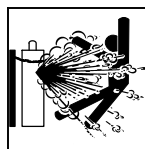
Le bruit des processus et des équipements peut affecter l'ouïe.

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



Les CHAMPS ÉLECTROMAGNÉTIQUES (CEM) peuvent affecter les implants médicaux.

- Les porteurs de stimulateurs cardiaques et autres implants médicaux doivent rester à distance.
- Les porteurs d'implants médicaux doivent consulter leur médecin et le fabricant du dispositif avant de s'approcher de la zone où se déroule du soudage à l'arc, du soudage par points, du gougeage, de la découpe plasma ou une opération de chauffage par induction.



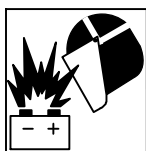
Si des BOUTEILLES sont endommagées, elles pourront exploser.

Des bouteilles de gaz comprimé protecteur contiennent du gaz sous haute pression. Si une bouteille est endommagée, elle peut exploser. Du fait que les

bouteilles de gaz font normalement partie du procédé de soudage, les manipuler avec précaution.

- Protéger les bouteilles de gaz comprimé d'une chaleur excessive, des chocs mécaniques, des dommages physiques, du laitier, des flammes ouvertes, des étincelles et des arcs.
- Placer les bouteilles debout en les fixant dans un support stationnaire ou dans un porte-bouteilles pour les empêcher de tomber ou de se renverser.
- Tenir les bouteilles éloignées des circuits de soudage ou autres circuits électriques.
- Ne jamais placer une torche de soudage sur une bouteille à gaz.
- Une électrode de soudage ne doit jamais entrer en contact avec une bouteille.
- Ne jamais souder une bouteille pressurisée – risque d'explosion.
- Utiliser seulement des bouteilles de gaz comprimé, régulateurs, tuyaux et raccords convenables pour cette application spécifique; les maintenir ainsi que les éléments associés en bon état.
- Tourner le dos à la sortie de vanne lors de l'ouverture de la vanne de la bouteille. Ne pas se tenir devant ou derrière le régulateur lors de l'ouverture de la vanne.
- Maintenir le chapeau de protection sur la soupape, sauf en cas d'utilisation ou de branchement de la bouteille.
- Utilisez les équipements corrects, les bonnes procédures et suffisamment de personnes pour soulever, déplacer et transporter 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 provoquer des blessures.

- 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 des câbles de batterie, des câbles de chargeur de batterie (le cas échéant) ou de batterie d'entretien.
- Éviter de provoquer des étincelles avec les outils en travaillant sur la batterie.
- Ne pas utiliser l'appareil de soudage pour charger des batteries ou faire démarrer des véhicules à l'aide de câbles de démarrage, sauf si l'appareil dispose d'une fonctionnalité de charge de batterie destinée à cet usage.
- Observer la polarité correcte (+ et -) sur les batteries.
- Débrancher le câble négatif (-) en premier lieu. Le rebrancher en dernier lieu.
- Les sources d'étincelles, flammes nues, cigarettes et autres sources d'inflammation doivent être maintenues à l'écart des batteries. Ces dernières produisent des gaz explosifs en fonctionnement normal et en cours de charge.
- Suivre les instructions du fabricant de la batterie lors d'opérations sur une batterie ou à proximité de celle-ci. Voir le manuel de service de batterie (indiqué dans Normes de sécurité) pour plus d'informations.



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.



Les PIÈCES MOBILES peuvent causer des blessures.

- S'abstenir de toucher des parties mobiles telles que des ventilateurs, courroies et rotors.
- Maintenir fermés et verrouillés les portes, panneaux, recouvrements et dispositifs de protection.
- Arrêter le moteur avant d'installer ou brancher l'appareil.
- Lorsque cela est nécessaire pour des travaux d'entretien et de dépannage, faire retirer les portes, panneaux, recouvrements ou dispositifs de protection uniquement par du personnel qualifié.
- 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 portes, panneaux, recouvrements ou dispositifs de protection à la fin des travaux d'entretien et avant de mettre le moteur en marche.
- 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.



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.



LES PIÈCES CHAUDES peuvent provoquer des brûlures.

- Ne pas toucher des parties chaudes à mains nues.
- 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.

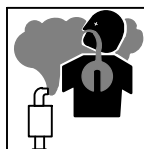


LA VAPEUR ET LE LIQUIDE DE REFROIDISSEMENT CHAUD peuvent provoquer des brûlures.

- 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 pré-

cisé 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'EXTÉRIEUR, loin des portes, fenêtres et bouches aération.



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

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



LA CHALEUR DU MOTEUR peut provoquer un incendie.

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

2-4. Dangers liés à l'air comprimé



Un ÉQUIPEMENT PNEUMATIQUE risque de provoquer des blessures ou même la mort.

- Une installation ou une utilisation incorrecte de cet appareil pourrait conduire à des dégâts matériels ou corporels. Seul un personnel qualifié est autorisé à installer, utiliser et entretenir cet appareil conformément à son manuel d'utilisation, aux normes industrielles et aux codes nationaux, d'état ou locaux.
- Ne pas dépasser le débit nominal ou la capacité du compresseur ou de tout équipement du circuit d'air comprimé. Concevoir le circuit d'air comprimé de telle sorte que la défaillance d'un composant ne risque pas de provoquer un accident matériel ou corporel.
- Avant d'intervenir sur le circuit d'air comprimé, couper l'alimentation électrique, verrouiller et étiqueter l'appareil, détendre la pression et s'assurer que le circuit d'air ne peut être mis sous pression par inadvertance.
- Ne pas intervenir sur le circuit d'air comprimé lorsque l'appareil fonctionne. Seul un personnel qualifié est autorisé, et appliquant les consignes du fabricant.
- Ne pas modifier ou altérer le compresseur ou les équipements fournis par le fabricant. Ne pas débrancher, désactiver ou neutraliser les équipements de sécurité du circuit d'air comprimé.
- Utiliser uniquement des composants et accessoires homologués par le fabricant.
- Se tenir à l'écart de tout point présentant un danger de pincement ou d'écrasement créé par l'équipement raccordé au circuit d'air comprimé.
- Ne pas intervenir sous ou autour d'un équipement qui n'est soutenu que par la pression pneumatique. Soutenir l'équipement de façon appropriée par un moyen mécanique.

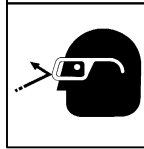


MÉTAL CHAUD provenant du découpage ou du gougeage à l'arc risque de provoquer un incendie ou une explosion.

- Ne pas découper ou gouger à proximité de produits inflammables.
- Attention aux risques d'incendie: tenir un extincteur à proximité.



L'AIR COMPRIMÉ risque de provoquer des blessures ou même la mort.

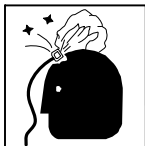


- Avant d'intervenir sur le circuit d'air comprimé, couper l'alimentation électrique, verrouiller et étiqueter l'appareil, détendre la pression et s'assurer que le circuit d'air ne peut être mis sous pression par inadvertance.
- Détendre la pression avant de débrancher ou de brancher des canalisations d'air.
- Avant d'utiliser l'appareil, contrôler les composants du circuit d'air comprimé, les branchements et les flexibles en recherchant tout signe de détérioration, de fuite et d'usure.
- Ne pas diriger un jet d'air vers soi-même ou vers autrui.
- Pour intervenir sur un circuit d'air comprimé, porter un équipement de protection tel que des lunettes de sécurité, des gants de cuir, une chemise et un pantalon en tissu résistant, des chaussures montantes et une coiffe.
- Pour rechercher des fuites, utiliser de l'eau savonneuse ou un détecteur à ultrasons, jamais les mains nues. En cas de détection de fuite, ne pas utiliser l'équipement.
- Remettre les portes, panneaux, recouvrements ou dispositifs de protection quand l'entretien est terminé et avant de mettre en marche l'appareil.
- En cas d'injection d'air dans la peau ou le corps, demander immédiatement une assistance médicale.



L'INHALATION D'AIR COMPRIMÉ risque de provoquer des blessures ou même la mort.

- Ne pas inhaler d'air comprimé.
- Utiliser l'air comprimé uniquement pour découper ou gouger ainsi que pour l'outillage pneumatique.



Une PRESSION D'AIR RÉSIDUELLE ET DES FLEXIBLES QUI FOUETTENT risquent de provoquer des blessures.

- Détendre la pression pneumatique des outils et circuits avant d'entretenir, ajouter ou changer des accessoires et avant d'ouvrir le bouchon de vidange ou de remplissage d'huile du compresseur.



Les PIÈCES MOBILES peuvent causer des blessures.

- S'abstenir de toucher des parties mobiles telles que des ventilateurs, courroies et rotors.
- Maintenir fermés et verrouillés les portes, panneaux, recouvrements et dispositifs de protection.

- Ne pas approcher les mains, cheveux, vêtements lâches et outils des organes mobiles.
- Avant d'intervenir sur le circuit d'air comprimé, couper l'alimentation électrique, verrouiller et étiqueter l'appareil,

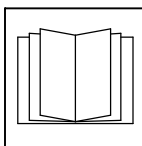
détendre la pression et s'assurer que le circuit d'air ne peut être mis sous pression par inadvertance.

- Demander seulement à un personnel qualifié d'enlever les dispositifs de sécurité ou les recouvrements pour effectuer, s'il y a lieu, des travaux d'entretien et de dépannage.
- Remettre en place les portes, panneaux, recouvrements ou dispositifs de protection à la fin des travaux d'entretien et avant de mettre le moteur en marche.



DES PIÈCES CHAUDES peuvent provoquer des brûlures graves.

- Ne pas toucher de pièces chaudes du compresseur ou du circuit d'air.
- Prévoir une période de refroidissement avant d'intervenir sur 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.



LIRE LES INSTRUCTIONS.

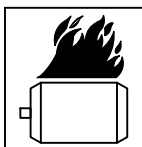
- Lire et appliquer les instructions sur les étiquettes et le Mode d'emploi avant l'installation, l'utilisation ou l'entretien de l'appareil. Lire les informations de sécurité au début du manuel et dans chaque section.
- N'utiliser que les pièces de rechange recommandées par le constructeur.
- Effectuer l'installation, l'entretien et toute intervention selon les manuels d'utilisateurs, les normes nationales, provinciales et de l'industrie, ainsi que les codes municipaux.

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.



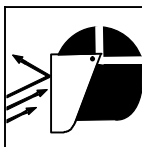
LE SURCHAUFFEMENT peut endommager le moteur électrique.

- 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.
- Utiliser uniquement des équipements adéquats pour un fonctionnement avec une alimentation de 50/60 ou de 60 Hz.



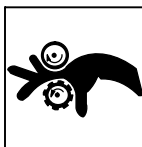
LA CHUTE DE L'ÉQUIPEMENT peut provoquer des blessures.

- 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'œilleton (voir les spécifications).
- Utilisez les procédures correctes et des équipements d'une capacité appropriée pour soulever et supporter l'appareil.
- En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l'appareil.
- Tenir l'équipement (câbles et cordons) à distance des véhicules mobiles lors de toute opération en hauteur.
- Suivre les consignes du Manuel des applications pour l'équation de levage NIOSH révisée (Publication N°94-110) lors du levage manuel de pièces ou équipements lourds.



LES ÉTINCELLES PROJÉTÉES peuvent 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.



Les PIÈCES MOBILES peuvent causer des blessures.

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



LA SORTIE DE RECHARGE et L'EXPLOSION DE LA BATTERIE peuvent provoquer des blessures.

La recharge de batterie n'existe pas sur tous les modèles.

- 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 des câbles de batterie, des câbles de chargeur de batterie (le cas échéant) ou de batterie d'entretien.
- Éviter de provoquer des étincelles avec les outils en travaillant sur la batterie.
- Ne pas utiliser l'appareil de soudage pour charger des batteries ou faire démarrer des véhicules à l'aide de câbles de démarrage, sauf si l'appareil dispose d'une fonctionnalité de charge de batterie destinée à cet usage.
- Observer la polarité correcte (+ et -) sur les batteries.
- Débrancher le câble négatif (-) en premier lieu. Le rebrancher en dernier lieu.
- Les sources d'étincelles, flammes nues, cigarettes et autres sources d'inflammation doivent être maintenues à l'écart des batteries. Ces dernières produisent des gaz explosifs en fonctionnement normal et en cours de charge.
- Suivre les instructions du fabricant de la batterie lors d'opérations sur une batterie ou à proximité de celle-ci. Voir le manuel de service de batterie (indiqué dans Normes de sécurité) pour plus d'informations.
- Les opérations de charge de batterie ne doivent être effectuées que par des personnes qualifiées.
- Pour enlever la batterie d'un véhicule pour la recharge, débrancher tout d'abord le câble négatif (-) et le rebrancher en dernier lieu. Pour éviter un arc, s'assurer que tous les accessoires sont débranchés.
- Ne charger que des batteries plomb-acide. Ne pas utiliser le chargeur de batterie pour alimenter un autre circuit électrique basse tension ou pour charger des batteries sèches.
- Ne pas charger une batterie gelée.
- Ne pas utiliser de câbles de charge endommagés.
- Ne pas charger des batteries dans un espace fermé ou en l'absence d'une ventilation.
- Ne pas charger une batterie dont les bornes sont desserrées ou présentant une détérioration comme par exemple un boîtier ou un couvercle fissuré.
- Avant de charger une batterie, sélectionner la tension de charge correspondant à la tension de la batterie.
- Régler les commandes de charge de batterie sur la position d'arrêt avant de brancher la batterie. Veiller à ce que les pinces de charge ne se touchent pas.
- Ranger les câbles de charge à distance du capot, des portes et des pièces mobiles du véhicule.



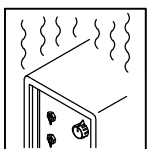
LES LIQUIDES PRESSURISÉS peuvent blesser ou tuer.

- Les composants du système d'alimentation peuvent contenir du carburant sous pression élevée.
- Avant d'intervenir sur le système d'alimentation de carburant, arrêter le moteur pour dépressuriser le système.
- En cas d'injection de tout liquide sous la peau ou dans le corps, solliciter une aide médicale sur le champ.



LES FILS DE SOUDAGE peuvent provoquer des blessures.

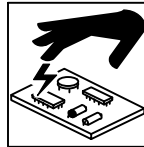
- Ne pas appuyer sur la gâchette avant d'en avoir reçu l'instruction.
- Ne pas diriger le pistolet vers soi, d'autres personnes ou toute pièce mécanique en engageant le fil de soudage.



L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

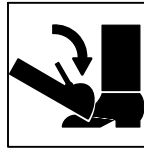
- Laisser l'équipement refroidir ; respecter le facteur de marche nominal.

- Réduire le courant ou le facteur de marche avant de poursuivre le soudage.
- Ne pas obstruer les passages d'air du poste.



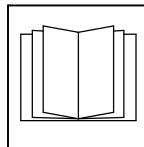
LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- 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.



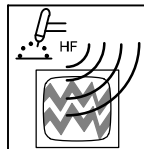
UNE REMORQUE QUI BASCULE peut provoquer des blessures.

- 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.



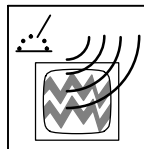
LIRE LES INSTRUCTIONS.

- Lire et appliquer les instructions sur les étiquettes et le Mode d'emploi avant l'installation, l'utilisation ou l'entretien de l'appareil. Lire les informations de sécurité au début du manuel et dans chaque section.
- N'utiliser que les pièces de rechange recommandées par le constructeur.
- Effectuer l'installation, l'entretien et toute intervention selon les manuels d'utilisateurs, les normes nationales, provinciales et de l'industrie, ainsi que les codes municipaux.



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

⚠ Avertissement : ce produit peut vous exposer à des produits chimiques tels que le plomb, reconnus par l'État de Californie comme cancérigènes et sources de malformations ou d'autres troubles de la reproduction.

Pour plus d'informations, consulter www.P65Warnings.ca.gov.

Pour les moteurs diesel :

⚠ Avertissement : les gaz d'échappement de moteurs diesel vous exposent à des produits chimiques, reconnus par l'État de Californie comme cancérigènes et sources de malformations ou d'autres troubles de la reproduction.

- Toujours démarrer et faire tourner le moteur dans une zone bien aérée.
- Si la zone est fermée, diriger l'échappement vers l'extérieur.
- Ne pas modifier ni altérer le système d'échappement.
- Ne pas faire tourner le moteur au ralenti, sauf si nécessaire.

Pour plus d'informations, consulter www.P65Warnings.ca.gov/diesel.

2-7. Principales normes de sécurité

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

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

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

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Quincy, MA 02169 (phone: 1-800-344-3555, website: www.nfpa.org and www.sparky.org).

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

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

Battery Chargers, CSA Standard C22.2 NO 107.2-01, from Canadian Standards Association, Standards Sales, 5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N5 (phone: 800-463-6727, website: www.csagroup.org).

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

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

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, auprès du 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 3123532220, site Internet : www.osha.gov).

Portable Generators Safety Alert, U.S. Consumer Product Safety Commission (CPSC), 4330 East West Highway, Bethesda, MD 20814 (phone: 301-504-7923, website: www.cpsc.gov).

Applications Manual for the Revised NIOSH Lifting Equation, The National Institute for Occupational Safety and Health (NIOSH), 1600 Clifton Rd, Atlanta, GA 30329-4027 (phone: 1-800-232-4636, website: www.cdc.gov/NIOSH).

Pour les normes réglementant les systèmes hydrauliques, communiquez avec National Fluid Power Association, 6737 West Washington St., Suite 2350, Milwaukee, WI 53214 (téléphone : (414) 778-3344, site web : www.nfpa.com).

Manuel de service de batterie, Battery Council International, 330 North Wabash Ave., Suite 2000, Chicago IL 60611 (téléphone : 1-312-245-1074, site Web : www.batterycouncil.org).

2-8. Informations relatives aux CEM

Le courant électrique qui traverse tout conducteur génère des champs électromagnétiques (CEM) à certains endroits. Le courant issu d'un soudage à l'arc (et de procédés connexes, y compris le soudage par points, le gougeage, le découpage plasma et les opérations de chauffage par induction) crée un champ électromagnétique (CEM) autour du circuit de soudage. Les champs électromagnétiques produits peuvent causer interférence à certains implants médicaux, p. ex. les stimulateurs cardiaques. Des mesures de protection pour les porteurs d'implants médicaux doivent être prises: par exemple, des restrictions d'accès pour les passants ou une évaluation individuelle des risques pour les soudeurs. Tous les soudeurs doivent appliquer les procédures suivantes pour minimiser l'exposition aux CEM provenant du circuit de soudage:

1. Rassembler les câbles en les torsadant ou en les attachant avec du ruban adhésif ou avec une housse.
2. Ne pas se tenir au milieu des câbles de soudage. Disposer les câbles d'un côté et à distance de l'opérateur.

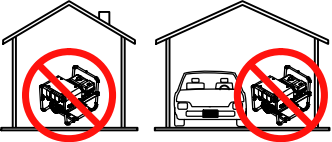
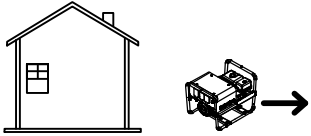
3. Ne pas courber et ne pas entourer les câbles autour de votre corps.
4. Maintenir la tête et le torse aussi loin que possible du matériel du circuit de soudage.
5. Connecter la pince sur la pièce aussi près que possible de la soudure.
6. Ne pas travailler à proximité d'une source de soudage, ni s'asseoir ou se pencher dessus.
7. Ne pas souder tout en portant la source de soudage ou le dévidoir.

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

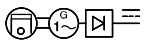
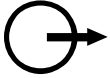
3-1. Additional Safety Symbol Definitions

	Warning! Watch Out! There are possible hazards as shown by the symbols.	Safe1 2012-05
	Never use generator inside a home or garage, even if doors and windows are open.	Safe87 2012-07
	Only use generator outside and far away from windows, doors, and vents.	Safe88 2012-07
	Hot muffler and exhaust pipe can cause severe burns.	Safe90 2017-04
	Recycle.	Safe103 2012-09

3-2. Miscellaneous Symbol Definitions

A	Amperage
V	Voltage
Hz	Hertz
U₀	Rated No-Load Voltage (OCV)
U₂	Load Voltage
I₂	Rated Welding Current
X	Duty Cycle
%	Percent

IP	Internal Protection Rating
—	Negative
+	Positive
≡	Direct Current (DC)
~	Alternating Current (AC)
	Protective Earth (Ground)
	Circuit Breaker
O	Off

I	On
	Single Phase Alternator
	Engine-Driven Generator with Rectifier
	Output
	Remote
	Read Operator's Manual
	Welding (General)

	Shielded Metal Arc Welding (SMAW)
	Gas Metal Arc Welding (GMAW)
	Flux Cored Arc Welding (FCAW)
	Gas Tungsten Arc Welding (GTAW) / Tungsten Inert Gas (TIG) Welding
	Touch Start (GTAW)
	Temperature
	Engine Oil
	Fuel
	Battery (Engine)
	Engine

	Engine
	Engine Start (Engine RPM)
	Engine Stop
	Idle (Slow)
	Run (Fast)
	Air Compressor
	Air Filter
	Glow Plug
	Belt Drive
	Engine Coolant Temperature

	Check Valve Clearance
	Arc Control
	USB
	Push Button
	Rotating Knob And Push Button
	Engine Belt
	Filter
	Engine Coolant
	Certified/Trained Mechanic

SECTION 4 – SPECIFICATIONS

4-1. Serial Number And Rating Label Location

The serial number and rating information for this product is located on the front and side panels. Use rating label to determine rated output. For future reference, write serial number in space provided on back cover of this manual.

4-2. Air Compressor Specifications

Compressor Type	Air Output At Effective Working Pressure	Pressure	Safety Relief Valve Setting	Air Compressor Oil Capacity
Rotary Screw	30 scfm @ 175 psi 100% Duty Cycle, 3600 RPM 32 CFM Max. Flow	Range: 80 –175 psi (552–1206 kPa)	Auto Shutoff: 200 psi (1379 kPa) Pressure Relief: 220 psi (1517 kPa)	2 qt (1.89 L)

4-3. Battery Charger Specifications

Output	Rated Output	Output Range	Output Voltage
Battery Charge	Up to 100 A, 12 V Charge Up to 100 A, 24 V Charge	0 - 100 A	12 or 24 V
Crank Assist	300 A, 12 V for 20 seconds 300 A, 24 V for 20 Seconds	0 - 300 A	

4-4. Power And Engine Specifications

Generator Power Rating	Fuel Capacity	Engine
Continuous: 6.5 kVA/kW, 54/27 A, 120/240 V AC, 60 Hz, Single-Phase, Peak: 8.0 kVA/kW	7 gal (26.5 L) Tank	D722 Kubota, Three-Cylinder, 20 HP Diesel Engine w/Electronic Governor, Auto Glow Plugs, And 60A Alternator

4-5. Weld Specifications

 This equipment will deliver rated output at an ambient air temperature up to 104 °F (40 °C).

Welding Mode	Rated Welding Output	Maximum Weld Open-Circuit Voltage	Weld Output Range
CC/DC TIG	210 A, 18.4 V, 20% Duty Cycle 140 A, 15.6 V, 60% Duty Cycle 120 A, 14.8 V, 100% Duty Cycle	58 Volts	30 – 210 A
CC/DC Stick	210 A, 28.4 V, 20% Duty Cycle 140 A, 25.6 V, 60% Duty Cycle 120 A, 24.8 V, 100% Duty Cycle	58 Volts	30 – 210 A
CV/DC	210 A, 24.5 V, 20% Duty Cycle 140 A, 21.0 V, 60% Duty Cycle 120 A, 20 V, 100% Duty Cycle	58 Volts	30 – 220 A

4-6. Environmental Specifications

A. IP Rating

IP Rating
IP23 This equipment is designed for outdoor use.

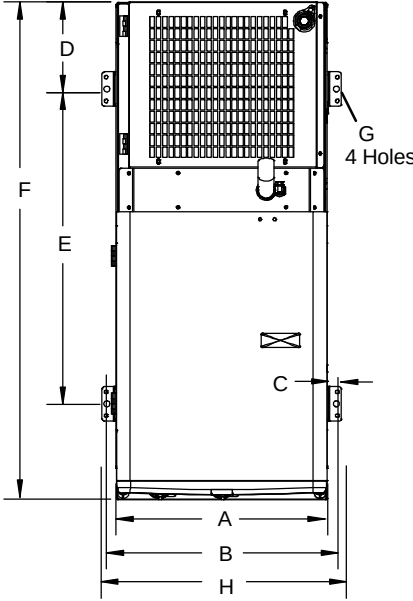
IP23 2017-02

B. Temperature Specifications

Operating Temperature Range*	Storage/Transportation Temperature Range
-20 to 104°F (-29 to 40°C)	-40 to 131°F (-40 to 55°C)
*Output is derated at temperatures above 104°F (40°C).	Temp_2016-07

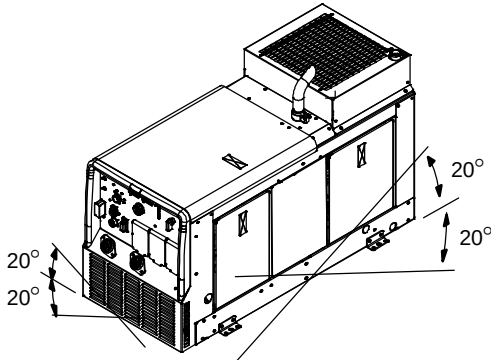
4-7. Dimensions, Weights, and Operating Angles

Dimensions	
Height	28.36 in. (720mm) 29.78 in. (756 mm) with exhaust pipe
Width	20 in. (508 mm)
Depth	47.14 in. (1197 mm)
A	20 in. (508 mm)
B	21.77 in. (553 mm)
C	0.88 in. (22 mm)
D	8.21 in. (209 mm)
E	29.86 in. (758 mm)
F	47.14 in. (1197 mm)
G	9/16 in. (14 mm) Dia.
H	22.73 in. (577 mm)
Weight	
644 lb (292 kg)	
Lifting Eye Weight Rating	
1000 lb (453 kg)	



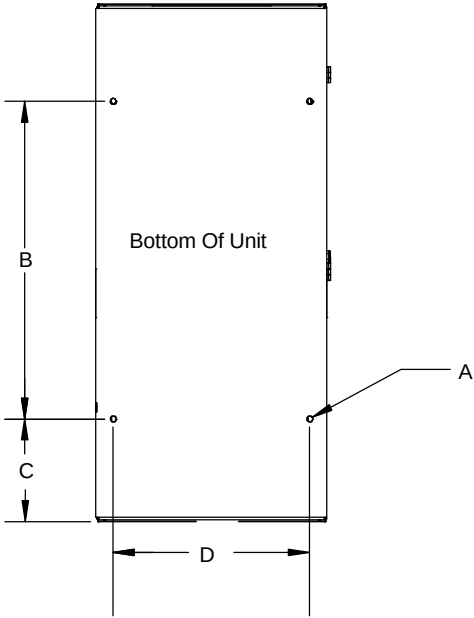


⚠ Do not exceed tilt angles or engine could be damaged or unit could tip.
⚠ Do not move or operate unit where it could tip.
⚠ Do not operate suspended from lifting eye.



907760

Internal Mounting Hole Dimensions	
A	0.5 in. (12.7 mm) dia. (4 holes) for optional internal mounting
B	27.48 in. (698 mm)
C	9.38 in. (238 mm)
D	17 in. (432 mm)



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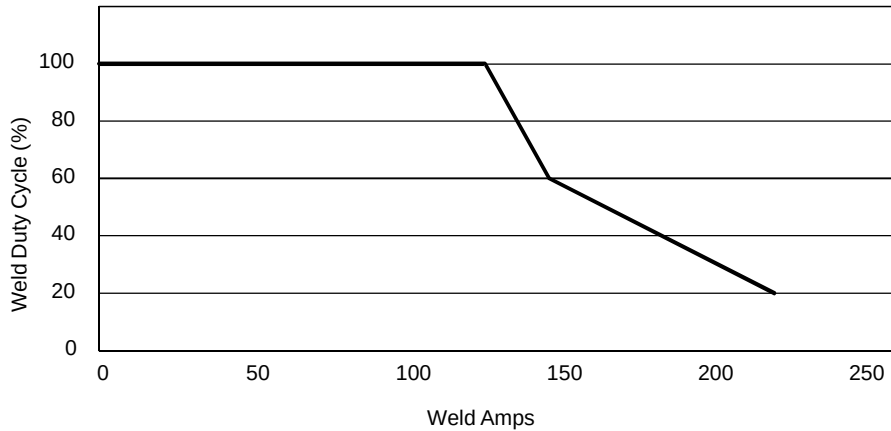
4-8. Duty Cycle And Overheating



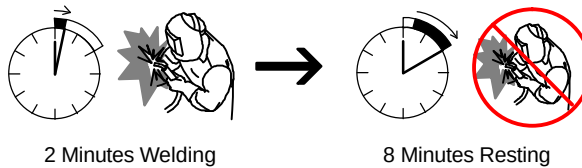
Duty cycle is the percentage of 10 minutes that unit can weld at rated load without overheating.

This unit is rated for welding at 120 amperes continuously.

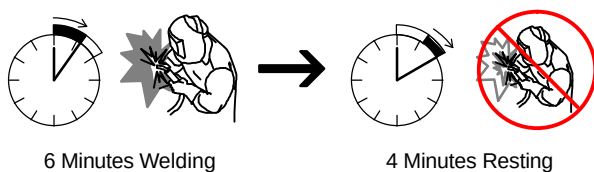
NOTICE – Exceeding duty cycle can damage unit and void warranty.



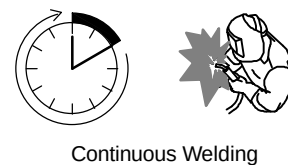
20% Duty Cycle at 200 amperes DC



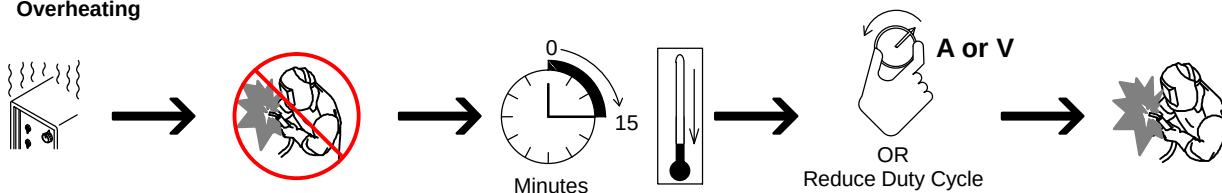
60% Duty Cycle at 140 Amperes DC



100% Duty Cycle at 120 Amperes DC



Overheating

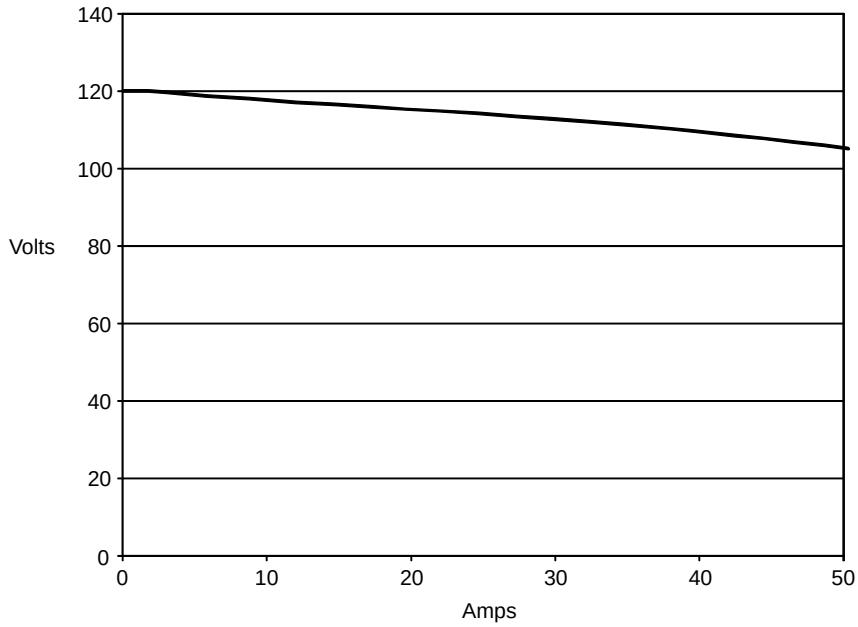


4-9. Generator Power Curves

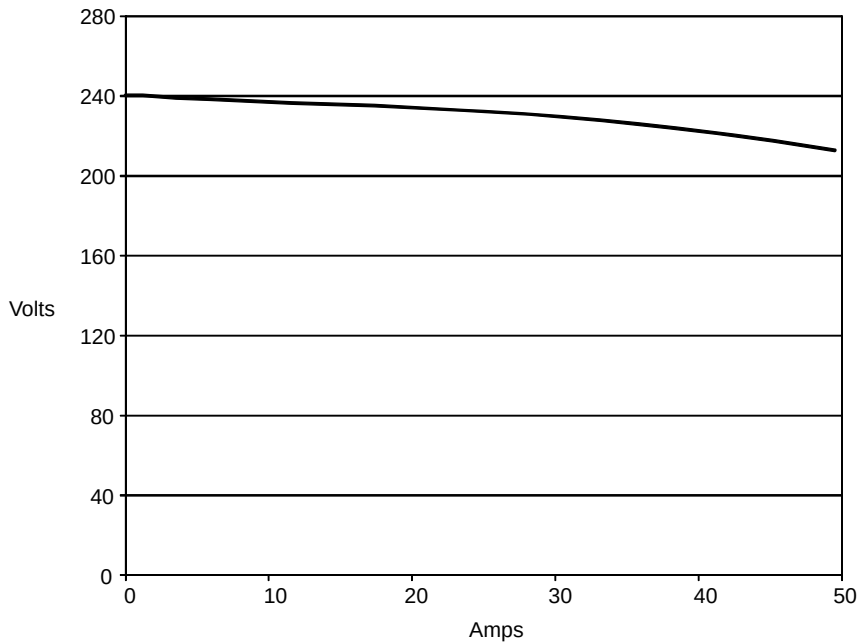
The AC generator power curve shows the generator power available in amperes at the receptacles.

Tools and motors are designed to operate within 10% of 120/240 VAC.

120 Volt



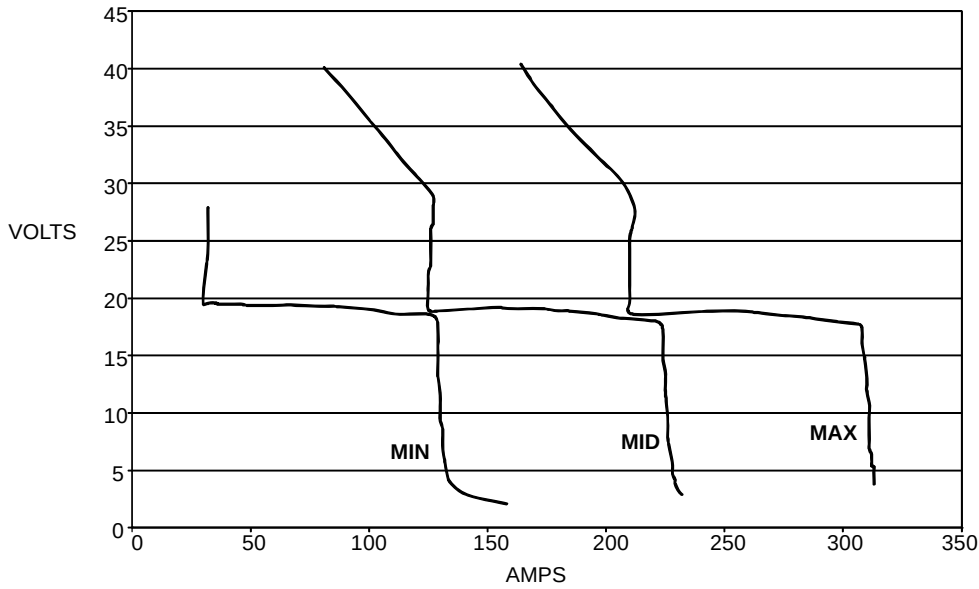
240 Volt



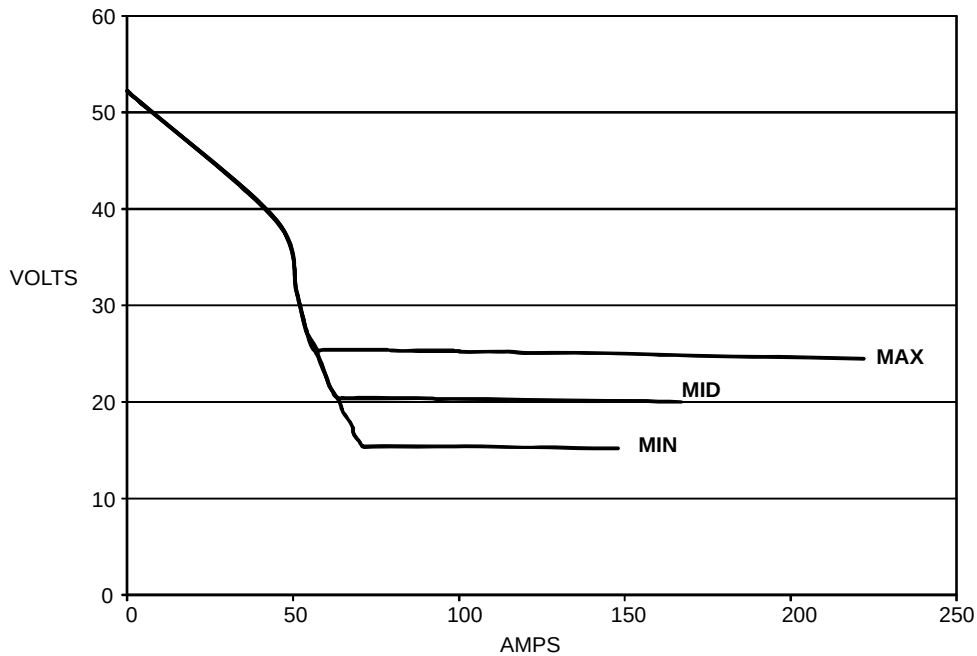
4-10. Volt-Ampere Curves - Weld

Stick

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

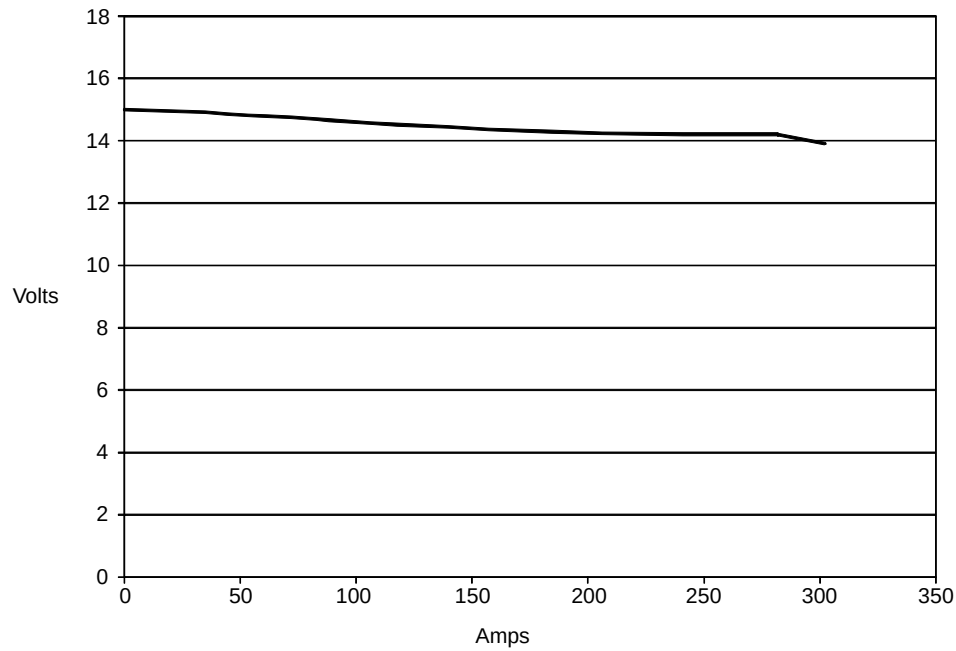


MIG

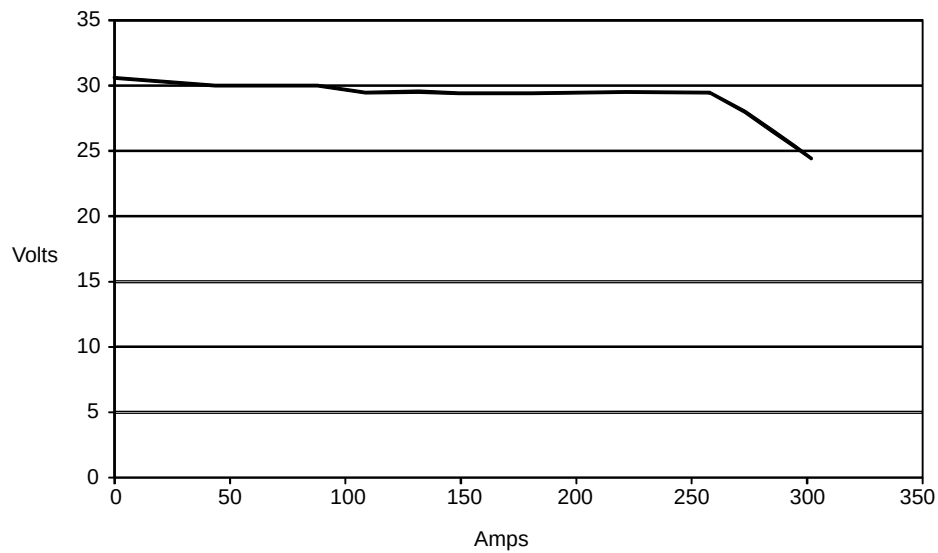


4-11. Volt-Ampere Curves - Battery Charge

12 Volts

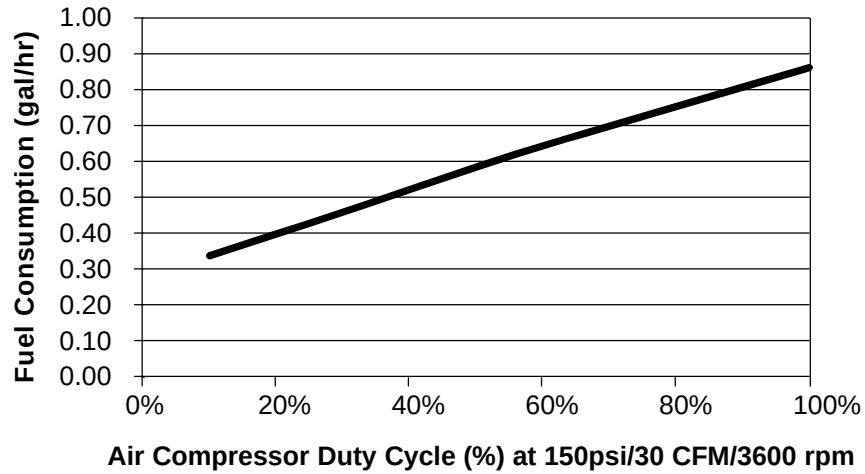


24 Volts

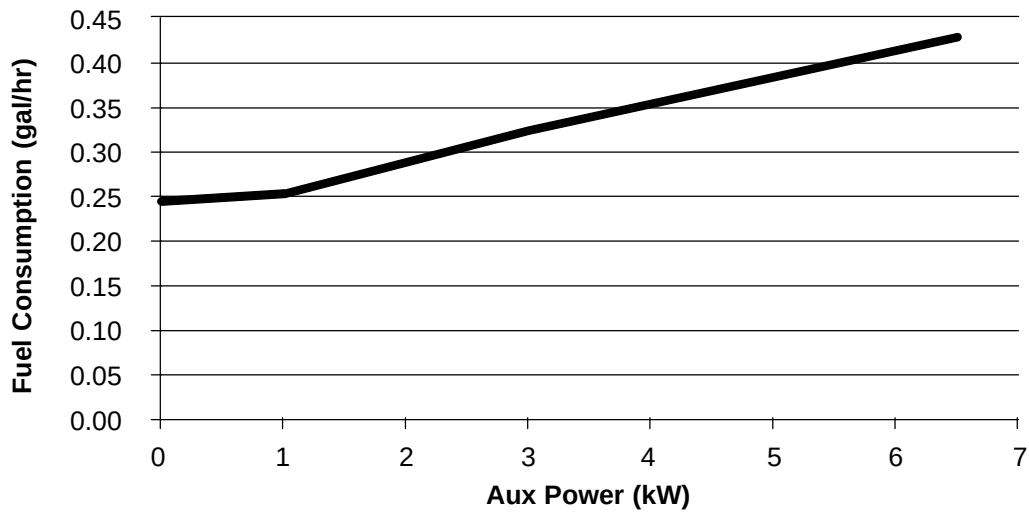


4-12. Fuel Consumption

Air Compressor



Auxiliary Power

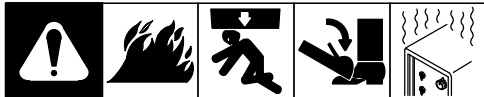


Welding

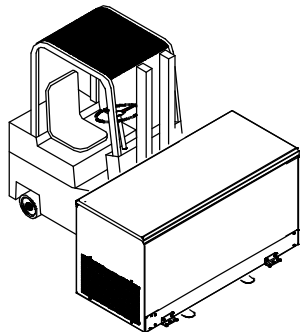


SECTION 5 – INSTALLATION

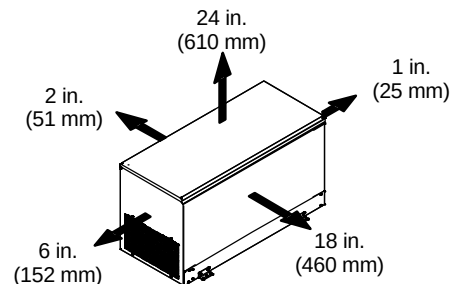
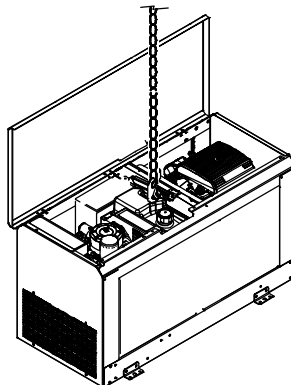
5-1. Installing Unit



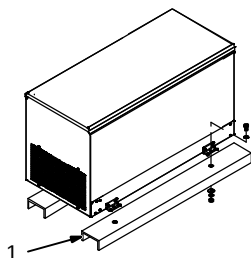
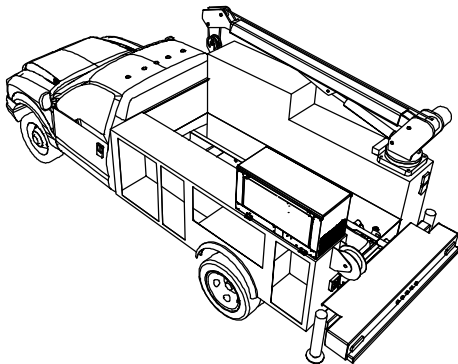
Movement / Airflow Clearance



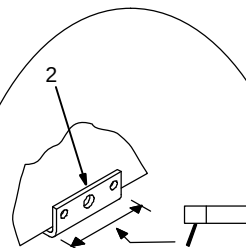
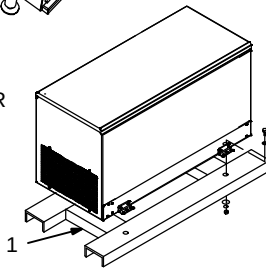
OR



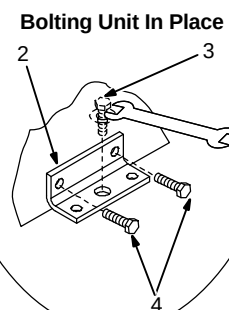
Location / Mounting



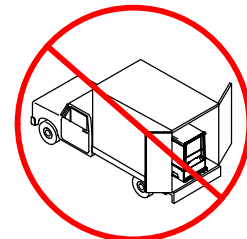
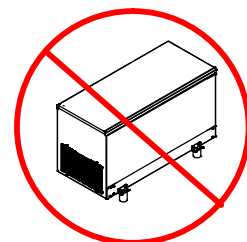
OR



Welding Unit In Place



Bolting Unit In Place



Install4_2019-02 – Ref. 907705 / 805454

Go to MillerWelds.com for more information on truck installations.

Movement

- ⚠ Do not move or operate unit where it could tip.
- ⚠ Do not lift unit from end.

See Section 4-7 for lifting eye rating.

Airflow Clearance

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

Location/Mounting

- ⚠ Always securely fasten unit onto transport vehicle and comply with all DOT and other applicable codes.

- ⚠ Do not weld on base. Welding on base can cause fuel tank fire or explosion.

NOTICE – Do not mount unit by supporting the base only at the four mounting brackets. Do not use flexible mounts. Use cross-supports to adequately support unit and prevent damage to base.

- 1 Cross-Supports (Minimum 3 in. Wide)
- 2 Mounting Brackets (Supplied)

NOTICE – If mounting brackets are removed, the bolts must be reinstalled into the unit.

Mount unit on flat surface or use cross-supports to support base. Secure unit with mounting brackets or through internal holes.

- 3 3/8 in. Bolt And Washer (Minimum – Not Supplied)
- 4 3/8-16 x 1 in. Screws (Supplied)

To Bolt Unit In Place Using Internal Pattern:

Remove hardware securing the four mounting brackets to the base. Discard brackets and reinstall original hardware.

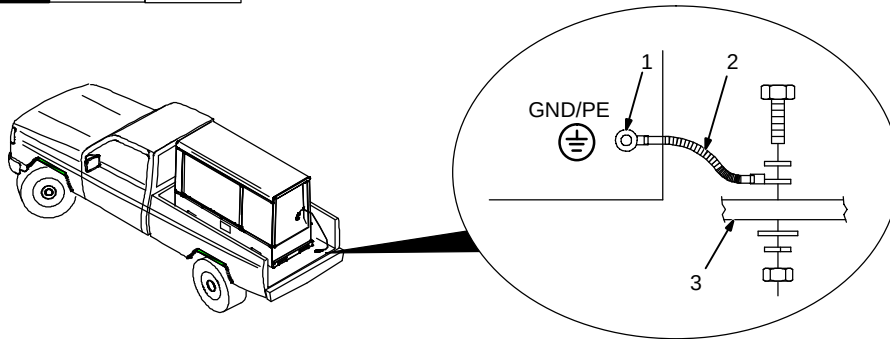
Mount unit to truck with 3/8 in. (10 mm) or larger hardware (not supplied).

To Weld Unit In Place:

Remove hardware securing the four mounting brackets to the base. Reverse brackets and reattach to base with original hardware.

Weld unit to vehicle only at the four mounting brackets.

5-2. Grounding Generator To Truck Or Trailer Frame



rot_grnd2 2014-11 - 800 652-D

⚠ 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.

⚠ Bed liners, shipping skids, and some running gear insulate the unit from the vehicle frame. Always connect

a ground wire from the generator equipment grounding terminal to bare metal on the vehicle frame as shown.

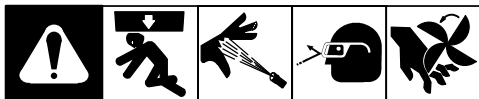
⚠ Use GFCI protection when operating auxiliary equipment. If unit does not have GFCI receptacles, use GFCI-protected extension cord. Do not use GFCI receptacles to power life support equipment.

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

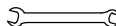
Connect cable from equipment ground terminal to metal vehicle frame. Use #8 AWG or larger insulated copper wire.

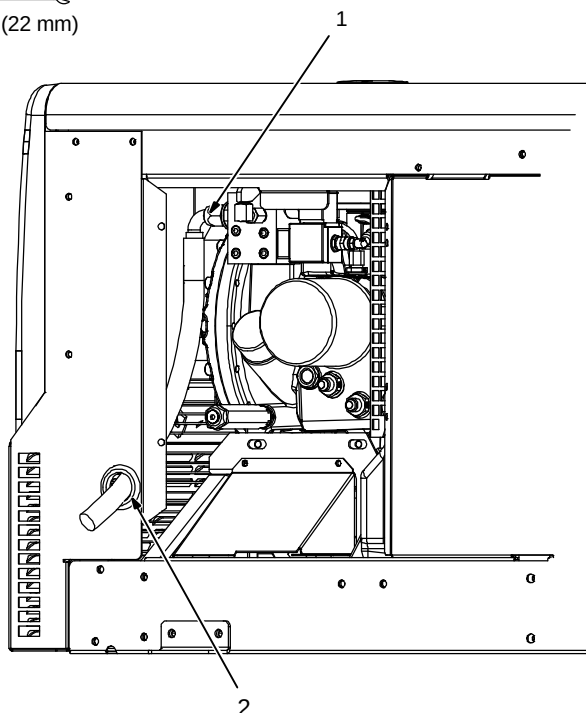
⚠ Electrically bond generator frame to vehicle frame by metal-to-metal contact.

5-3. Air Compressor Connections



Tools Needed:


7/8 in. (22 mm)



⚠ Stop engine and wait for blow down before servicing compressor.

Depending on the desired compressed air quality, air conditioning components such as separators, filters, dryers, or air reservoir may be required.

No check valve should be installed.

Obtain hoses of the proper length and type with appropriate fittings for the installation.

Hose Requirements:

Hose ID: 0.5 in. (12.7 mm)

Minimum Working Pressure: 350 psi (2.41 MPa)

Minimum Burst Pressure: 1400 psi (9.65 MPa)

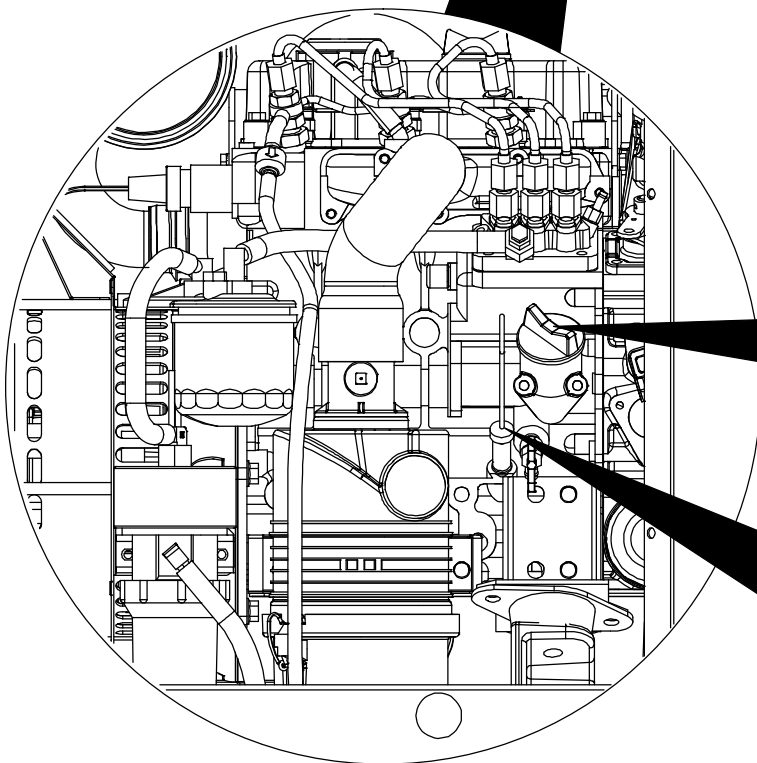
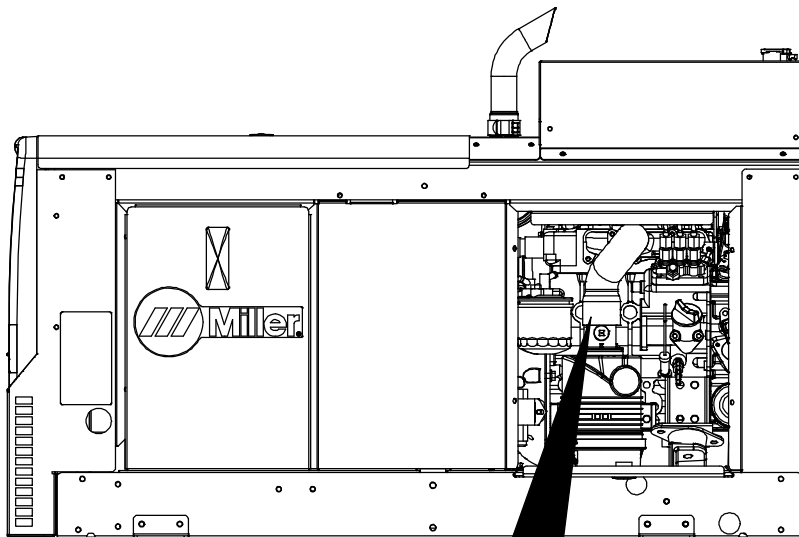
- 1 Air Compressor Connection
- 2 Grommet

Air compressor connection and grommet are located in shipping bag.

Remove plug from side panel. Install supplied grommet in hole. Connect supplied JIC fitting to air hose and route through grommet up to compressor outlet. Connect fitting to compressor outlet and tighten to 40 ft lb.

907760

5-4. Engine Prestart Checks



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

☞ Follow run-in procedure in engine manual.

☞ This unit has a low oil pressure shutdown switch. However, some conditions may cause engine damage before the engine shuts down. Check oil level often and do not use the oil pressure shutdown system to monitor oil level.

Fuel

Add fresh fuel before starting engine the first time (see maintenance label for specifications). Stop fueling before reaching the neck. Leave 2 in. of air space below the neck to allow for fuel expansion and tilt. Check fuel level on a cold engine before use each day.

To check fuel level, turn Engine Control switch On. Fuel gauge indicates fuel level in tank.

Engine Oil

NOTICE – Do not exceed the "Full" mark on the oil level dipstick. Engine damage may occur if crankcase is overfilled.

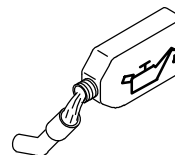
After fueling, check oil with unit on level surface. If oil is not up to full mark on dipstick, add oil (see maintenance label).

Use front panel meters to determine hours until next recommended oil change. See Section 11-5 for oil change and maintenance hours reset procedure.

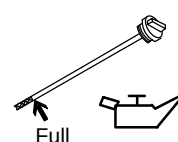
☞ Keep battery in good condition. Store battery in warm area.

Use correct grade oil for cold weather.

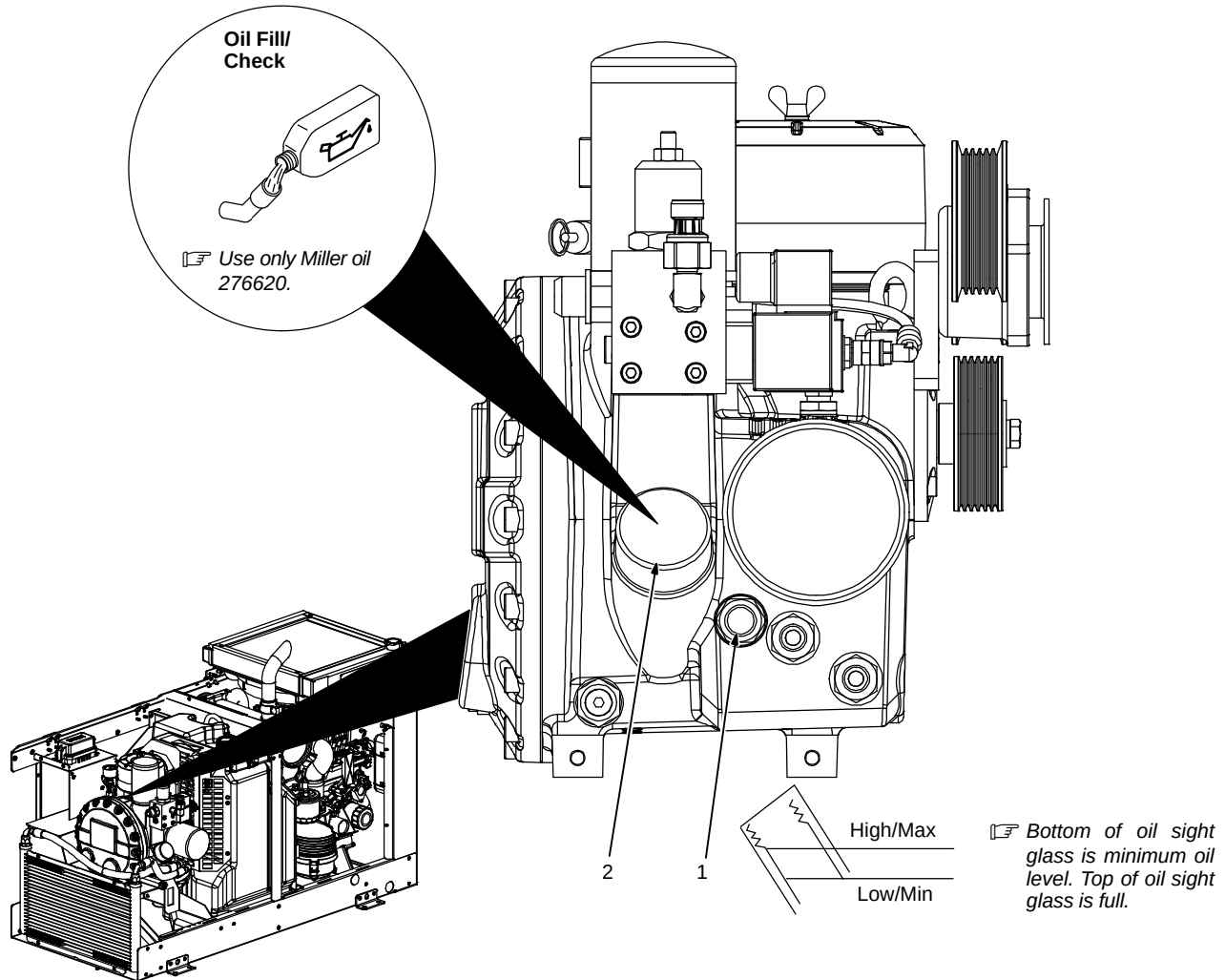
Oil Fill



Oil Check



5-5. Compressor Prestart Checks



907760

⚠ Do not open oil fill cap until unit is off and pressure in the compressor case has been released according to Section 7-2. Do not open oil fill cap while running.

☞ *The compressor is equipped with high oil temperature shutdown. High oil temperature can be caused by low oil or hot air recirculation.*

NOTICE – Do not mix oil types. Do not overfill. Use only Miller oil 276620.

Check all fluids daily. Compressor must be cold and on a level surface. Unit is shipped with oil.

Open side service door.

1 Oil Level Sight Glass

The unit is shipped with oil in the compressor. Oil level sight glass shows oil level.

☞ *Bottom of oil sight glass is minimum oil level. Top of oil sight glass is full.*

Minimum oil level is half way up the oil fill pipe. Maximum oil level is in threaded area of oil fill pipe.

Check level frequently. If oil needs to be added, be sure unit is off and compressor case pressure is released according to Section 7-2 before removing fill cap.

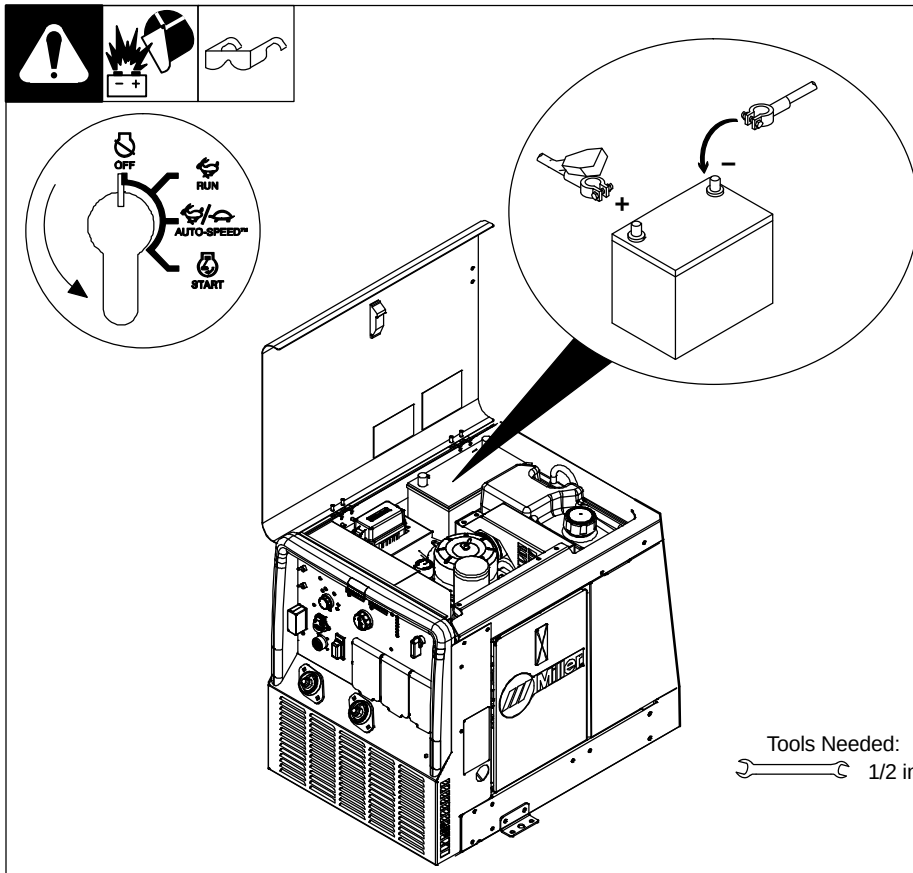
2 Air Compressor Oil Fill Cap

Hand tighten oil fill cap. Using excess force can damage o-ring.

Inspect compressor air cleaner element and replace if dirty (see Section 11-3).

Close side service door.

5-6. Connecting The Battery



⚠ Connect negative (-) battery cable last.

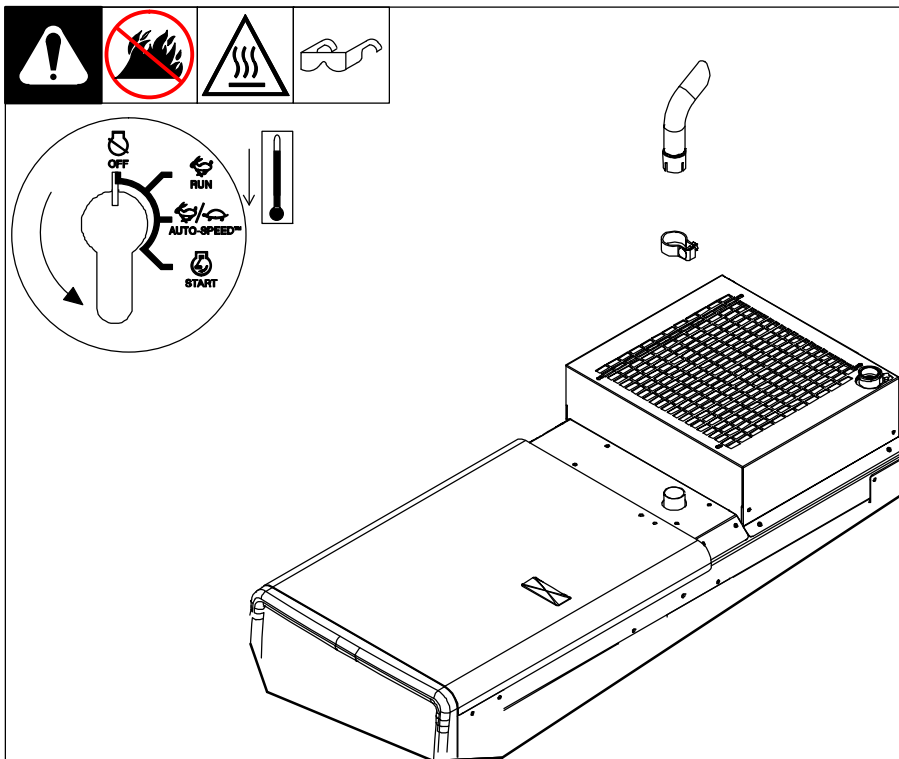
Open top service door. Connect battery, negative cable last.

- Do not allow the battery cables to touch opposing terminals. When connecting the battery cables attach the positive (+) cable to the positive (+) battery terminal first, followed by negative (-) cable to negative (-) battery terminal.
- Never start the engine when the cables are loose or poorly connected to the battery terminals.
- Never disconnect the battery while the engine is running.
- Never use a quick battery charger to start the engine.
- Do not charge battery with Engine Control switch On.
- Always disconnect the negative (-) battery cable before charging battery.

Tools Needed:
 1/2 in.

Ref. 907760 / Ref. S-0756-D / 804 953-B

5-7. Installing Exhaust Pipe



⚠ Stop engine and let cool.

⚠ Engine backfire can cause severe burns or other injuries. Do not point exhaust pipe toward control panel. Keep away from exhaust outlet.

⚠ Do not point exhaust pipe toward any compressed gas tank.

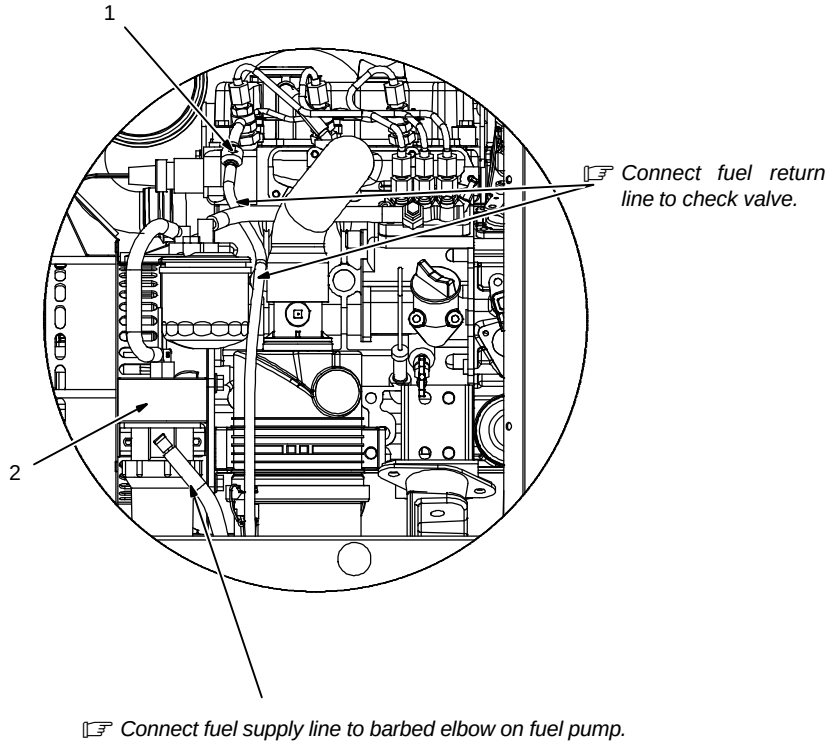
☞ Point exhaust pipe in desired direction but always away from control panel and direction of travel.

Install provided pipe and clamp onto exhaust outlet and tighten.

Tools Needed:
 1/2 in.

804 956-B / Ref. 907760

5-8. Connecting Optional External Fuel Supply



⚠ Route all hoses away from hot, sharp or moving parts. Check all connections and hoses for damage, leaks, and wear.

- 1 Check Valve
- 2 Electric Fuel Pump

The pump provides a 96 in. vertical lift between the Empty level of the fuel tank and the pump inlet.

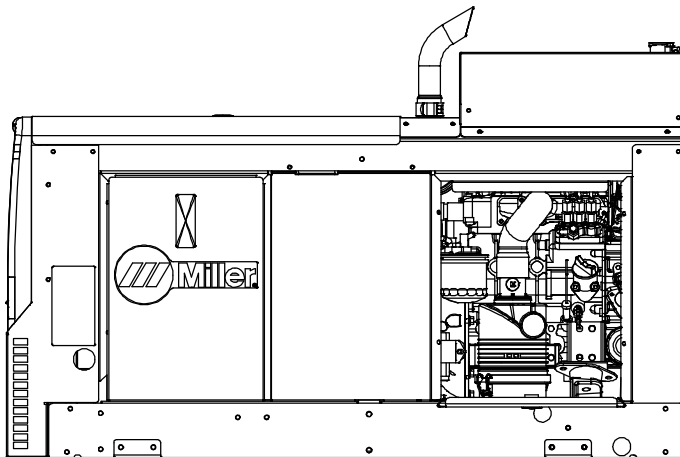
If connecting to an external fuel supply, follow all applicable fuel hose regulations.

To connect to an external fuel supply, disconnect factory hoses from electric fuel pump and return check valve. Use a 5/16 in. (7.94 mm) fuel hose for fuel supply and a 3/16 in. (4.76 mm) fuel hose for fuel return. Connect supply hose to electric fuel pump and return hose to check valve.

Connect hoses and secure with hose clamps. Use grommets if routing hoses through sheet metal.

Plug fuel line from tank.

Connect return fuel line.

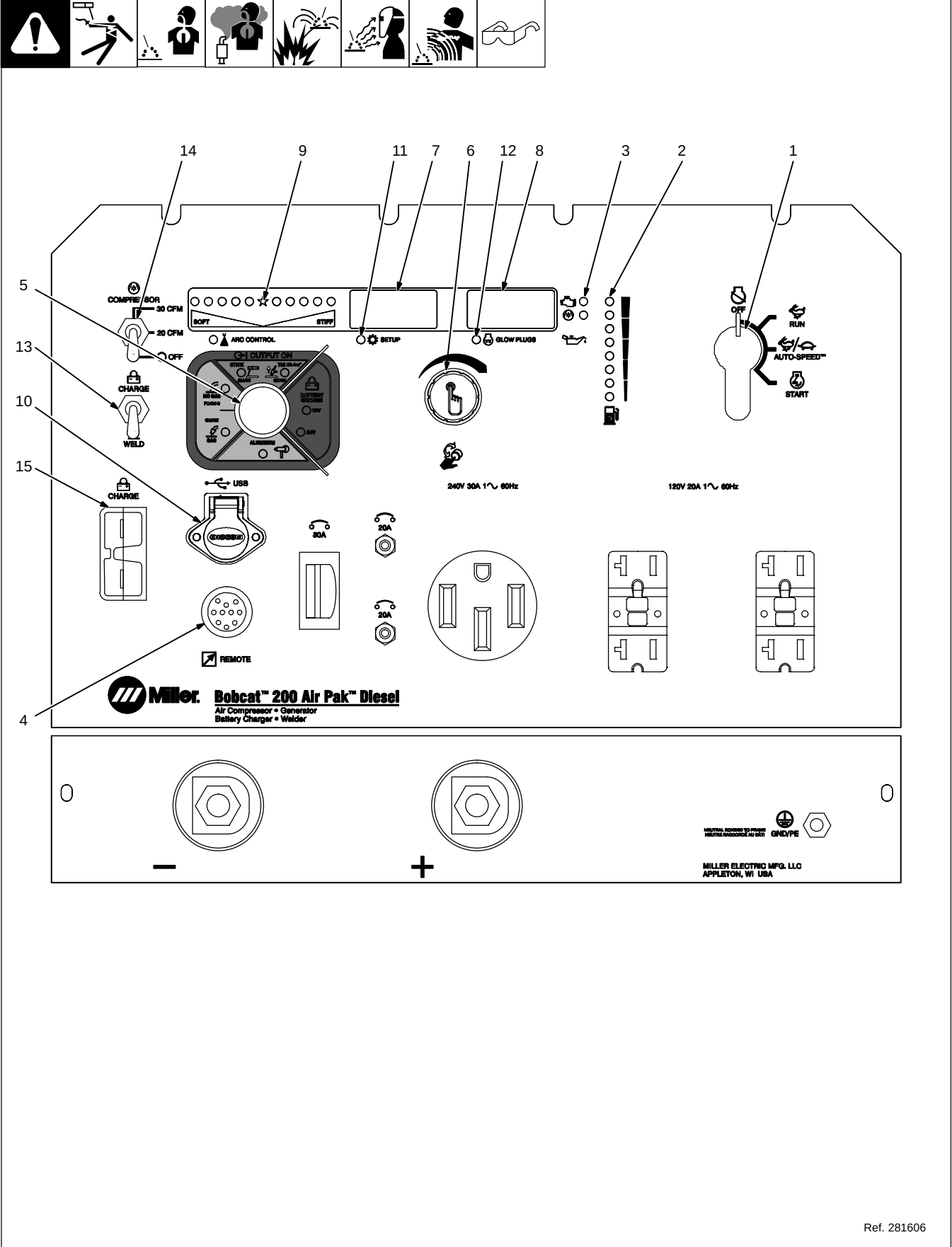


Tools Needed:



SECTION 6 – CONTROLS

6-1. Control Panel



Ref. 281606

6-2. Control Panel (Continued)



Engine Starting Controls

1 Engine Control Switch

Use switch to start engine, select speed mode, and stop engine. In Auto Speed position, engine runs at appropriate speed according to load (see Section 6-3). In Run position, engine runs at 3600 RPM.

To Start: Place switch in the Run or Auto Speed position to allow the control system to initialize. All LEDs and meter displays illuminate for several seconds. The display flashes "BC 200D." Turn switch to start position and release. The starting sequence begins automatically. "STARTING" is displayed on the weld meter displays, and the beeper sounds for five seconds, or longer if the glow plugs are energized. The starter engages and cranks the engine until it starts.

To Stop: Turn engine control switch to OFF position.

Engine Gauges, Meters, And Lights

2 Fuel Gauge

Use gauge to check fuel level.

3 Engine/Compressor Service Indicator Lights

Notifies user that engine oil or compressor oil service is due. The LEDs illuminate when oil change hours are 0 or less.

Weld Controls

4 10-Pin Receptacle

Use receptacle to connect to a remote spoolgun accessory. The remote receptacle provides power, wire feed speed adjustment, and trigger for spoolgun operation.

5 Process Switch

See Section 6-3 for Process switch information. This switch works in conjunction with the Charge/Weld switch.

6 Adjust Control/Select Button

Adjust Control

With Process Switch in any SMAW or GTAW process, turn Adjust control to adjust preset

amperage. With Process switch in any FCAW or GMAW process, turn Adjust control to adjust preset voltage.

Select Button

Push the control to use as Select button.

To access Arc Control setting, push and hold Adjust control for 1 second, then release. Rotate counterclockwise to set softer arc control. Rotate clockwise to set stiffer arc control. Push Adjust control in and release to save Arc Control setting. Arc Control setting will time out after 5 seconds of inactivity.

To access Service Menu, push and hold Adjust control for 5 seconds, then release. See Section 6-4 for Service Menu operation. Service Menu will time out after 5 seconds of inactivity.

Weld Meters

Weld meters also work in combination to display troubleshooting error codes and other mode dependent information.

7 DC Voltmeter

For GMAW and FCAW welding, the voltmeter display toggles between preset voltage and actual voltage. Voltmeter displays voltage at the weld output terminals, but not necessarily the welding arc due to resistance of cable and connections.

To set voltage, turn Process switch to GMAW or FCAW position. Turn V/A control until desired voltage is displayed on Voltmeter. When welding is finished, voltmeter displays average weld voltage and then defaults to preset voltage.

8 DC Ammeter

Ammeter displays preset amperage (Stick and TIG only) when not welding, and actual output amperage when welding.

To set amperage, turn Process switch to Stick or TIG position. Turn V/A control until desired amperage is displayed on Ammeter. When welding is finished, ammeter displays aver-

age weld amperage and then defaults to preset amperage.

9 Arc Control Meter

Displays current Arc Control setting. Default value for all processes is 0. Arc Control settings adjust DIG for SMAW and inductance for FCAW and GMAW processes. Push and hold Adjust Control/Select button for one second to adjust arc control. For softer settings, the LEDs to the left of the star illuminate. For stiffer settings, the LEDs to the right of the star illuminate.

Other Receptacles

10 USB Receptacle

Allows software updates from a USB drive (see Section 6-5). A summary file of recorded data from the unit will be saved to a USB drive that is inserted (see Section 6-6).

Indicator Lights

11 Setup Light

Illuminates when in the Service Menu.

12 Glow Light

Illuminates when the engine glow plugs are energized.

Other Functions

13 Charge/Weld Switch

Place in the Charge position for battery charge operation. Use the process switch to select either 12 or 24 volt charge.

Place in the Weld position for welding operation. Use the process switch to select specific weld process.

When in the Charge position, only battery charge processes are selectable. When in the Weld position, only weld processes are selectable.

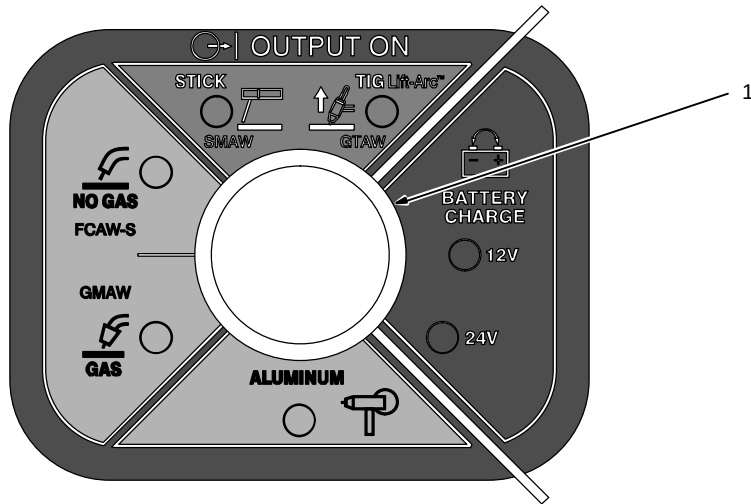
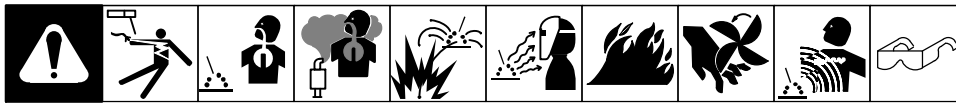
14 Compressor Switch

Use to control air compressor operation. See Section 7.

15 Battery Charge Receptacle

Provides connection point for battery charging or jump starting.

6-3. Process Switch



1 Process Switch

Process switch works in conjunction with Charge/Weld switch.

Charge/Weld switch must be in the WELD position for weld processes, and in the CHARGE position for battery charge operation.

Use switch to select weld process and battery charge process (see table below).

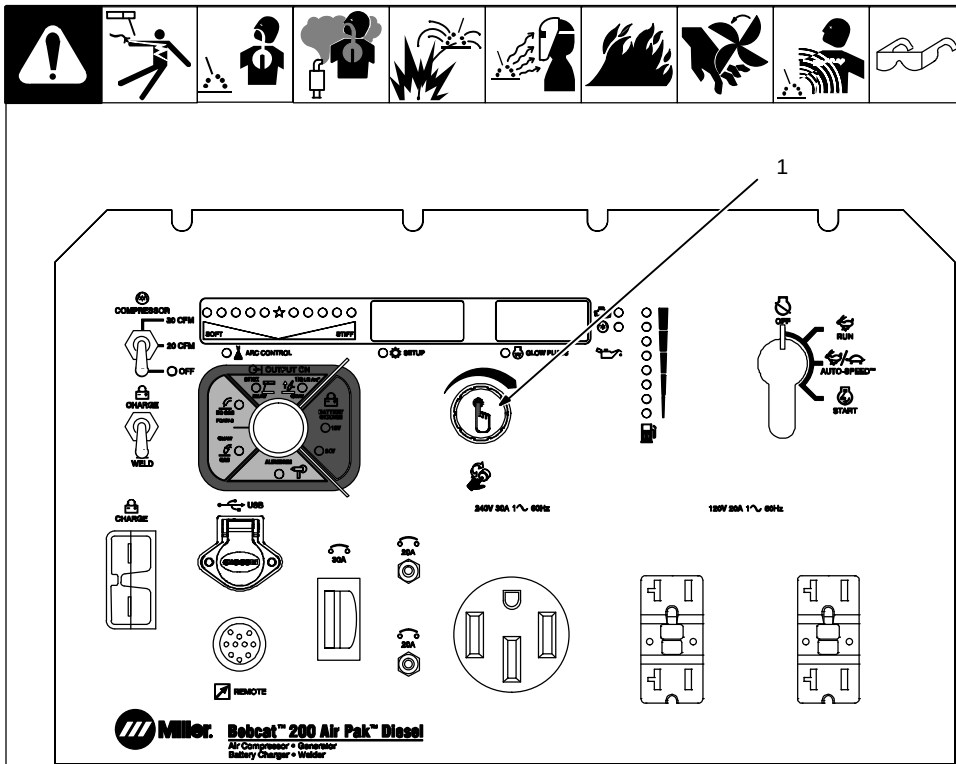
Use the Lift-Arc TIG mode for TIG (GTAW) welding using the Lift-Arc TIG starting procedure (see Section 10-7).

See Section 8 for battery charge operation.

Ref. 281606-A

	Process Switch Setting	Typical Process Applications (DC Only)
OUTPUT ON	Output On – GMAW/FCAW (MIG)	MIG solid wire and dual shield flux core use a voltage sensing (VS) feeder that does not require a control cable back to the welder/generator.
	Output On – FCAW-S (Electrode Negative) No Gas	FCAW (Flux Cored Arc Welding – self shielded) uses a voltage sensing (VS) feeder that does not require a control cable back to the welder/generator.
	Output On – SMAW (STICK XX18 and STICK XX10)	Stick welding. Strike an arc to start welding.
	Output On – GTAW (Lift-Arc TIG)	Lift-Arc TIG: touch tungsten to work and lift to start welding. Uses circuitry internal to the welder/generator to aid arc start.
	Output On – Aluminum	Aluminum solid wire uses a remote connected spoolgun accessory.
BATTERY CHARGE	Battery Charge 12V	Battery charging or jump starting with a 12 volt system.
	Battery Charge 24V	Battery charging or jump starting with a 24 volt system.

6-4. Service Menu



1 Adjust Control/Select Button

Press and hold Adjust Control/Select button for 5 seconds, then release to access the Service Menu. Rotate the knob to scroll through the menu items. Press and release the control to access the options and information within each menu item.

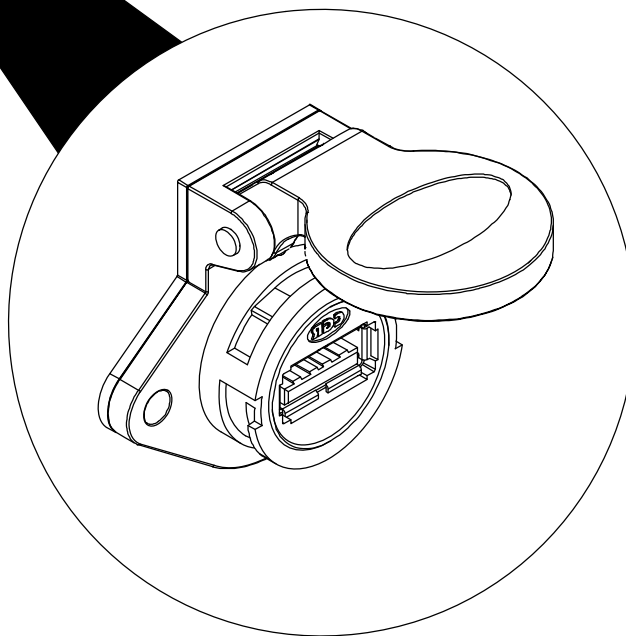
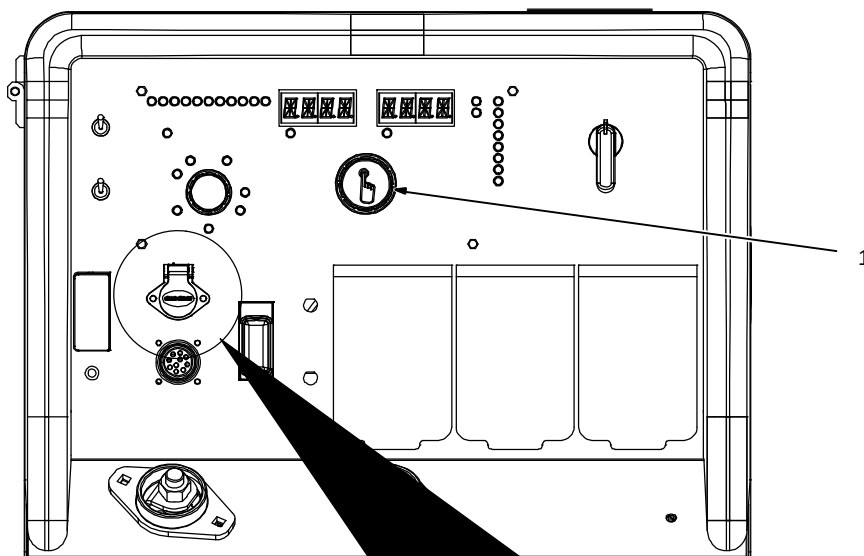
Rotate the control counterclockwise to decrease the value or select NO/OFF. Rotate the control clockwise to increase the value or select YES/ON.

Press and release control to save selection. After 5 seconds of inactivity, the menu will time out and the selection will be saved.

281606-A

Menu Item	Selectable Item Option(s)	Description
HOUR MTR	--	Displays the current engine hours.
ENG OIL	OIL HOUR	Displays the current oil change countdown.
	OIL SET	Sets the oil change interval.
	OIL RSET	Resets the oil change countdown.
COMP OIL	OIL HOUR	Displays the current oil change countdown.
	OIL SET	Sets the oil change interval.
	OIL RSET	Resets the oil change countdown.
RPM DISP	--	Displays current engine RPM.
MIN PRES	90 psi up to 10 psi less than max pressure	Minimum pressure to start air compressor (adjustable in 1 psi increments).
MAX PRES	175 psi down to 10 psi greater than min pressure	Maximum pressure to stop air compressor (adjustable in 1 psi increments).
SOFTWARE	--	Displays the current revision of firmware installed.
FACT RSET	RSET YES	Resets all settings to factory defaults.
	RSET NO	All settings remain at previous settings.

6-5. Updating Software



Obtain the latest software to be loaded from MillerWelds.com.

Copy the desired software to an approved USB flash drive (see Section 12-1).

1 Adjust Control/Select Button

With the machine turned off, insert the flash drive into the USB receptacle on the front of the machine. Turn the Engine Control switch to the Run or Run/Idle position.

Do not start the engine.

When the machine has powered up, if valid files exist on the flash drive, the user is prompted to confirm the start of the download. The Voltmeter/Ammeter display reads: AL? NO.

Confirm by rotating the Adjust Control/Select button clockwise to select YES. Then press the Select button.

After the update has started, do not power down or remove the flash drive until the update is complete.

During the download, the left meter display indicates the active download with AL U, AP U, AL C, and AP C. The right meter display indicates the percentage of the download completed with a number from 0 to 100. Software updates may take several minutes.

If a valid update file for the weld module is detected, the meter display reads AL STRT to instruct the user to start the engine. Do not power down the unit. Turn the engine control switch to start and release. The unit will follow its normal starting procedure. When the engine is running, the left meter display will read AP W for the weld module application update.

When the update has completed successfully, the Voltmeter/Ammeter display reads: AL OK.

Failures are indicated on the meter display. Correction of failed updates depends on what type of failure occurred.

6-6. Summary File

Bobcat 200 Diesel STATUS SUMMARY

** Firmware Revisions **

UI Processor

App Rev.....: 280895D
 App Loader Rev.: 282785B
 Launcher Rev...: 282784B
 Perforce Changelist - App.....: 53657
 Perforce Changelist - App Loader: 52856
 Perforce Changelist - Launcher...: 52969

Control Board Processor

App Rev.....: 283738D
 App Loader Rev.: 283737C
 Launcher Rev...: 283736A
 Perforce Changelist - App.....: 53623
 Perforce Changelist - App Loader: 53623
 Perforce Changelist - Launcher...: 52969

Weld Board Processor

Boot Loader Rev: 284422C
 Secondary Rev...: 282089D
 Primary Rev.....: 274451B

** Usage **

Engine On Time: 7 hours
 Air Compressor On Time: 2 hours

Error Code Log

Most Recent Errors:

No Entries

Error List	Count
S/W ERR	0
ID ERR	0
LOW FUEL	0
COMM ERR	0
WELDTEMP	0
WELDSHRT	0
WELDFAN	0
WELDPRI	0
WELDSEC	0
WELDPWRF	0
WELDBST	0
WELDOV	0
WELDUV	0
WELDCOMM	0
WELDSTCK	0
GUN CON	0
GUN REM	0
WELDPWRF	0
WELDBOOT	0
AC OP	0

1 Summary File

Each time a USB stick is inserted in the USB receptacle when the engine is running, a summary file is saved to the USB stick as SummaryFile.txt.

"USB ACC" will display as the file is written. File is complete when display no longer shows "USB ACC."

The summary file provides diagnostic and weld information.

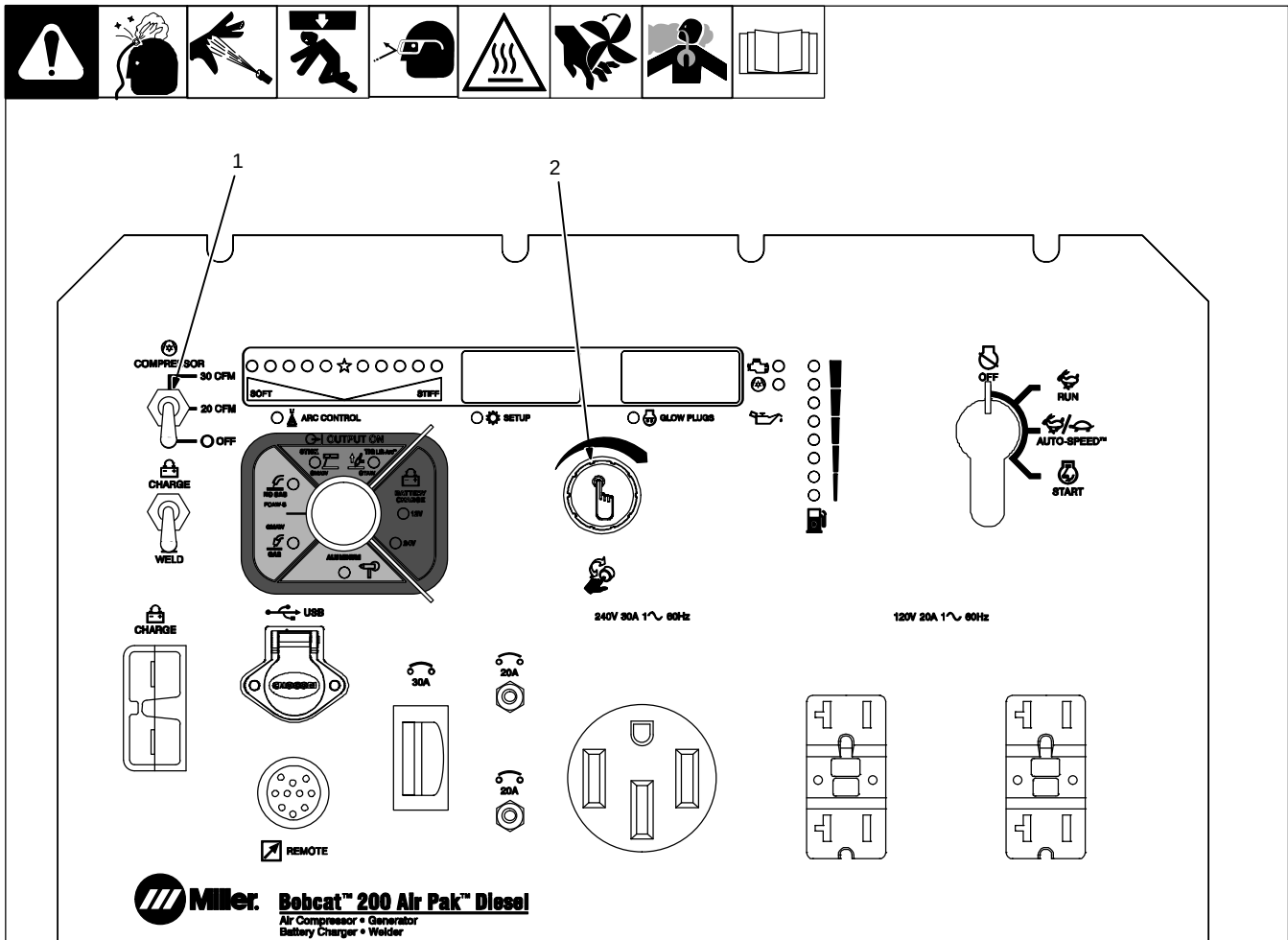
6-7. Fuel/Hour Gauge Descriptions

Fuel, Hour, and Engine Shutdown Descriptions			
LH Display HOUR	RH Display 0000	ENGINE HOURS: To display engine hours while the engine is off, place Engine Control switch in position "2".	
LH Display OIL	RH Display 0499	OIL CHANGE INTERVAL: To display hours remaining before oil change is due, place Engine Control switch in position "3" (with engine off).	
Service Indicator Lights 		OIL CHANGE DUE: Service indicator light will illuminate Red when service is due. To Reset: Press and hold Control/Select knob for 5 sec. to access service menu, scroll to RSET, press knob, scroll to select YES, press knob to reset.	
Fuel Gauge* *If equipped		LOW FUEL PREWARNING: Last LED in fuel gauge is illuminated steady. LOW FUEL: Fuel level low when last LED in fuel gauge blinks.	
LH Display* LOW *If equipped	RH Display* FUEL	NO FUEL: Engine shuts down before fuel runs out. Display shows "LOW FUEL." To Reset: Refuel.	
LH Display OIL	RH Display PRES	LOW OIL PRESSURE: Engine shuts down when oil pressure is low. Display shows "OIL PRES." To Reset: Place Engine Control switch in OFF position.	
LH Display H2O/ENG	RH Display TEMP	HIGH COOLANT TEMP: Engine shuts down when coolant temperature is high. Display shows "H2O TEMP." To Reset: Place Engine Control switch in OFF position.	
Note: Switch positions are numbered to illustrate that there are four switch positions. Actual graphics on front panel will vary.			

284578-A

SECTION 7 – COMPRESSOR SYSTEM

7-1. Air Compressor Switch And Adjusting Air Pressure



Ref. 281606

Weld output and generator power may be reduced when the air compressor is on.

Air Compressor Switch

1 Compressor Switch

Placing Compressor switch in 20 CFM position locks the engine speed at 2400 rpm, which limits maximum air output to 20 CFM. Placing Compressor switch in 30 CFM posi-

tion allows Auto-Speed operation. Engine speed increases to 3600 rpm when air is used and idles after 10 seconds of no air use.

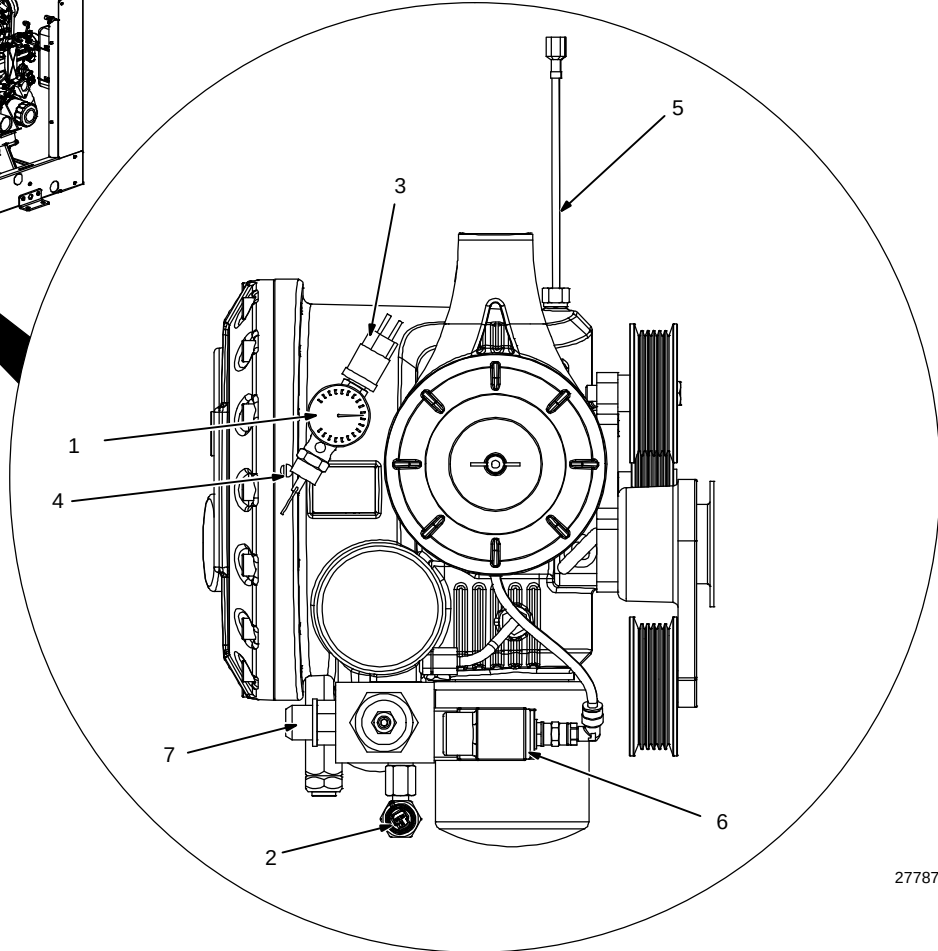
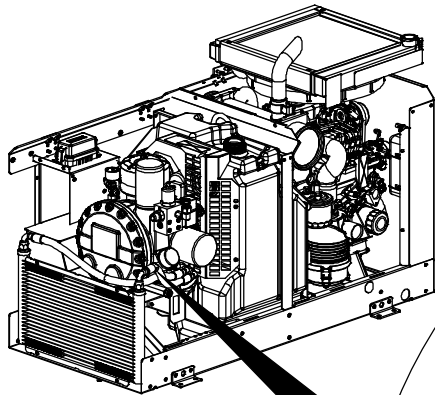
Adjusting Air Pressure

2 Adjust Control/Select Button

When the air compressor switch is in either 20 CFM or 30 CFM position, outlet air pressure is monitored. If pressure is below MIN

pressure setting, compressor clutch engages and engine speed increases to meet air demand. When MAX pressure setting is reached, compressor case pressure reduces. If there is no air demand for 45 seconds, the clutch disengages until outlet pressure is below MIN setting. Access Service menu to set MIN and MAX pressure settings (see Section 6-4). See Section 7-2 for air compressor controls.

7-2. Air Compressor Controls



277873



After the air compressor shuts off, the blow down cycle begins and takes several minutes. When gauge reads zero, open cap slowly to release remaining pressure.

- 1 Air Compressor Case Pressure Gauge

- 2 Pressure Sensor

Pressure sensor measures compressor outlet pressure. A check valve in the compressor allows the outlet pressure to remain while the case pressure is reduced.

See Section 7-1 to set compressor pressure.

☞ **MAX pressure is factory set at 120 psi.**
MIN pressure is factory set at 90 psi.

- 3 Over Pressure Switch (200 ± 10 psi)

Over pressure activates at 200 ± 10 psi (1379 ± 69 kPa), disables compressor, and displays AC OP (see Section 11-8). Power to compressor is disabled until air compressor switch is turned off or case pressure is reduced below 125 psi.

☞ **NOTICE** – Frequent over pressure cycling can cause clutch and belt damage.

- 4 Pressure Relief Valve

The compressor is also equipped with a mechanical safety valve (pressure relief valve) that will open if pressure reaches 225 psi.

- 5 Temperature Sensor

Compressor shuts down due to over-temperature and AC TEMP displays (see Section 11-8). The error condition automatically resets when temperature reduces. Power to compressor is disabled until air compressor switch is turned off.

Compressor Blow Down

- 6 Blow Down Valve

☞ **To prevent foaming or sudden release of pressure, allow 10 minutes after**

shutdown before opening the compressor fill cap or performing other compressor maintenance.

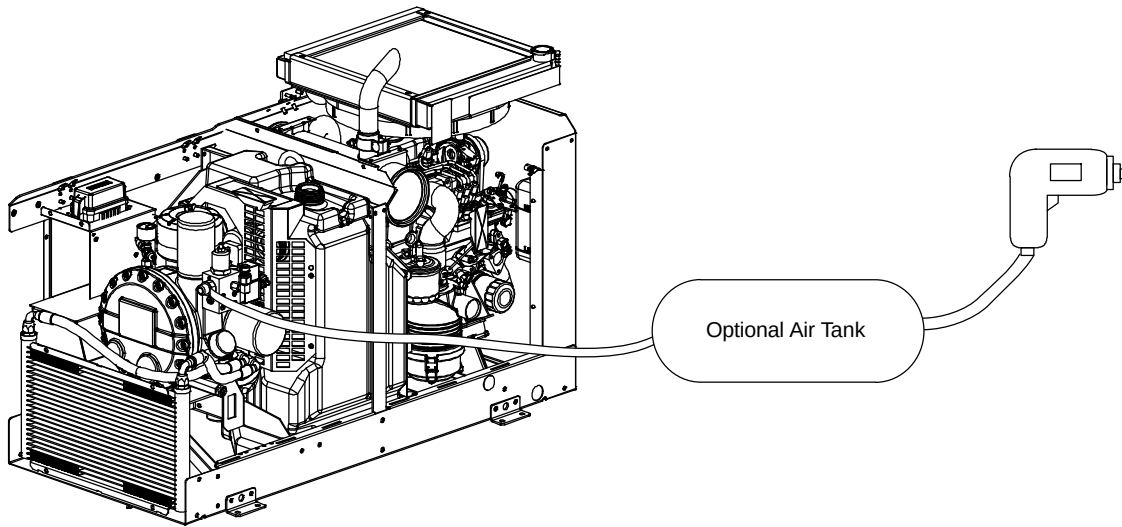
To control the release of air mixed in the compressor oil (while running), the compressor goes through a blow down cycle when the compressor is turned off or the engine is stopped. The blow down valve slowly discharges the pressure in the compressor.

Compressor Idle Down And Standby Mode

- 7 Compressor Outlet

When MAX pressure is reached, the blow-down valve is de-energized and the compressor begins reducing case pressure. If no air is used, the compressor case pressure continues to drop. After 45 seconds, the clutch disengages and the engine idles. If there is a rapid pressure drop on the outlet of the compressor, or if pressure is below MIN pressure, the clutch and compressor engage until MAX pressure is reached.

7-3. Air Compressor Operation With Air Tools



Air Compressor Operation Without A Tank

When using air without a tank and a partial air load, pressure will cycle between MIN and MAX pressure. When air is not being used, the compressor case pressure reduces and a check valve on the outlet of the compressor maintains air pressure downstream of the compressor. When air is used after the engine idles, the compressor starts pumping air to pressurize the compressor case and then provide air output. Depending on the amount of air used, a temporary pressure drop may occur on the air outlet.

Using Air Tools

Air tools up to and including most 1/2 in. impact wrenches will operate with acceptable performance running without a tank. Larger air usage from larger tools may result in a quick pressure drop when using the tool, most noticeably after the engine has idled.

If a pressure drop is noticed, three methods can be used to operate the air tool without a tank:

- Continue operating the tool to ride through the pressure drop.

- Operate the tool briefly to activate the compressor, wait 3 to 5 seconds, then start using the tool. This method allows the compressor to build pressure in preparation for air output.

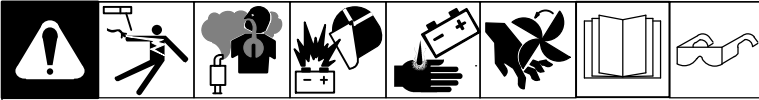
- Add a 3-gallon minimum air tank to the air line. The added air volume will supplement the air output until the compressor builds pressure.

For air usage greater than the compressor output (30 CFM), an air tank is recommended to supplement air output for intermittent use. The more the continuous CFM of the tool exceeds the rating of the compressor, the larger the tank that is needed for proper tool performance.

Air Tool	Average CFM	Continuous CFM
3/4 in. Impact Wrench (IR 2141)	10	40 (may need air tank)
3/4 in. Impact Wrench (Speedaire)	7	26
1/2 in. Impact Wrench (IR 231C)	4	22
Needle Scaler (IR 182LNA1)	3	13
4-1/2 in. Grinder (Dayton)	7	26
1/4 in. Die Grinder (IR G1H340RG4)	6	25
1/2 in. Drill (IR 7AQSTB)	4	17
Air Shears (IR 7802SA)	4	21
Sand Blaster	--	6
Soda Blaster	--	18
Button Punch/Deck Tool	--	4
Decking Crimp Tool	4	15

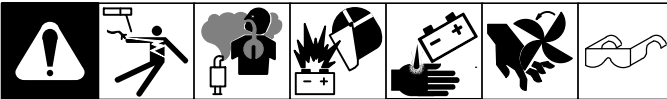
SECTION 8 – BATTERY CHARGING

8-1. Battery Charging Guidelines

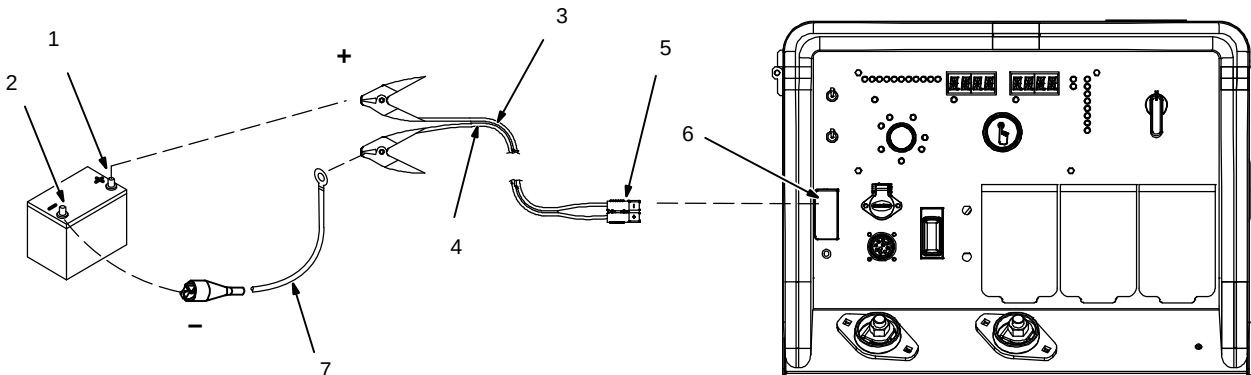


- ⚠ Stop engine.**
- ⚠ Before charging battery, read the Safety Precautions at the beginning of this manual.**
- ⚠ Have only qualified persons do battery charging work.**
- ⚠ Do not charge a defective battery, a battery with loose terminals, or one having evidence of damage such as a cracked case or cover.**
- ⚠ Keep battery charging cables away from vehicle hood, door, and moving parts.**
- ⚠ Do not use damaged battery charging cables.**
- ⚠ Be sure charger output voltage matches battery voltage.**
- ⚠ Do not jump-start/crank assist a vehicle without a battery.**
- ⚠ Never disconnect jump-start/crank assist connections or cables when charging or jumping/crank assisting. Clamps may be energized when unit is in battery charge mode.**
- ⚠ Never place 12V battery on 24V only setting.**

8-2. Connecting Uninstalled Battery To Battery Charge Receptacle



Battery located outside of vehicle



- ⚠ Stop engine. Place Air Compressor switch in the Off position.**
- ⚠ Before charging battery, check polarity of battery posts. Attach a 24 in. (60 cm) AWG 6 insulated battery cable to Negative (-) battery post. Connect charger Positive (+) cable to Positive (+) post of battery. Standing as far from battery as practical and looking away from battery, connect charger Negative (-) cable to**

the cable connected to the Negative (-) battery post.

- 1 Battery Positive (+) Terminal
 - 2 Battery Negative (-) Terminal
- Obtain Battery Charge/Jumper Cable Kit 300422 or equivalent.
- 3 Red (Positive) Charging Cable
 - 4 Black (Negative) Charging Cable
 - 5 Battery Charge Plug
 - 6 Battery Charge Receptacle

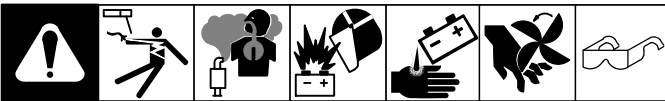
- 7 Insulated Battery Cable (Customer-Supplied)

Connect a 24 in. (60 cm) or longer insulated battery cable (AWG 6) to Negative (-) battery post. Connect red (Positive) battery charging cable to battery Positive (+) post. Connect black (Negative) battery charging cable to insulated battery cable.

Connect Battery Charge plug to Battery Charge receptacle.

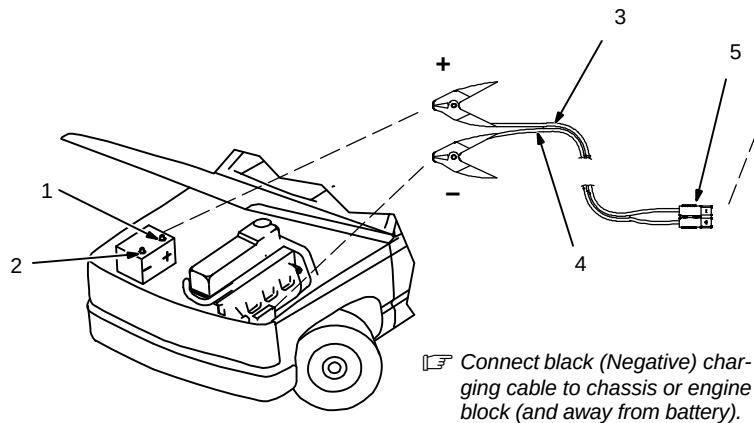
NOTICE – Always connect cables to battery first, then to Battery Charge receptacle.

8-3. Connecting Installed Battery To Battery Charge Receptacle



**Battery located in vehicle
(Negative post grounded to chassis)**

See information below regarding vehicles with battery Positive (+) grounded to chassis.



Connect black (Negative) charging cable to chassis or engine block (and away from battery).

Stop engine. Place Air Compressor switch in the Off position.

Before charging battery, check polarity of battery posts. If battery Negative (-) post is grounded to chassis (most vehicles), connect charger Positive (+) cable to Positive (+) ungrounded post of battery. Connect charger Negative (-) cable to vehicle engine block or heavy gauge metal part of frame (and away from battery). If Positive (+) post is grounded to chassis, connect charger Negative (-) cable to Negative (-) un-

grounded post of battery. Connect charger Positive (+) cable to vehicle chassis or engine block (and away from battery).

NOTICE – For equipment with sensitive electronics, such as a vehicle with an on-board computer, disconnect battery from vehicle or equipment before charging battery.

NOTICE – Never leave machine unattended when charging a battery.

- 1 Battery Positive (+) Terminal
- 2 Battery Negative (-) Terminal

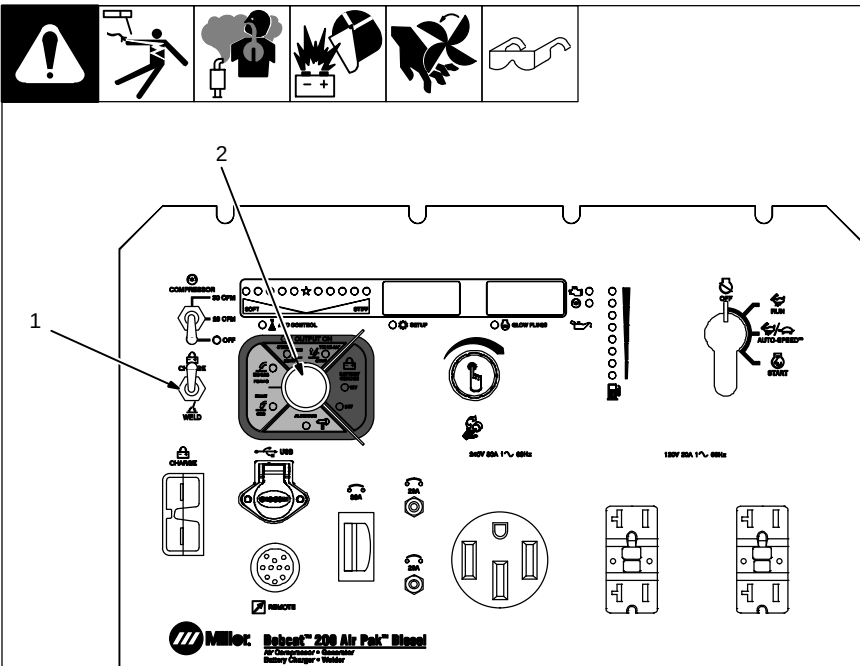
Obtain Battery Charge/Jumper Cable Kit 300422 or equivalent.

- 3 Red (Positive) Charging Cable
- 4 Black (Negative) Charging Cable
- 5 Battery Charge Plug
- 6 Battery Charge Receptacle
- 7 Insulated Battery Cable (Customer-Supplied)

Connect red (Positive) battery charging cable to battery Positive (+) post. Connect black (Negative) battery charging cable to engine block or heavy gauge metal part of frame (and away from battery)

Connect Battery Charge plug to Battery Charge receptacle.

8-4. Setting Battery Charge Controls



Ref. 281606

⚠ Have only qualified persons charge batteries.

⚠ Never place 12V battery on 24V only setting.

1 Charge/Weld Switch

Place switch in charge position.

2 Process Switch

Place switch in position matching voltage of battery being charged. Weld power is not available in battery charge mode.

ℹ Battery output is not energized until battery is checked by unit.

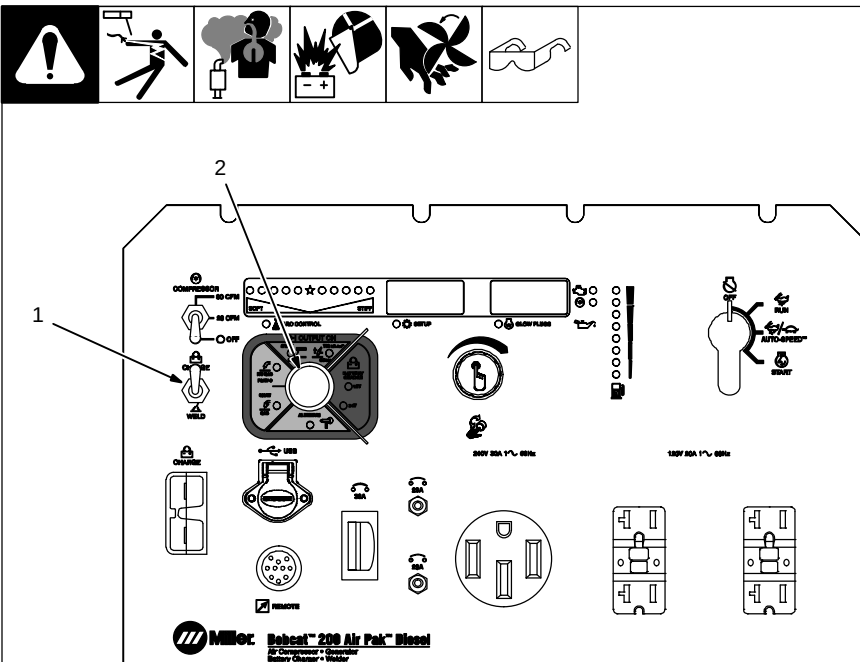
ℹ Charging current automatically stops when terminal current is below five amps for five minutes.

Start engine and charge battery for 10 minutes. Check battery voltage. Continue charging if necessary.

⚠ Stop engine when finished charging. Stand as far from battery as practical and disconnect charging cables from unit. Remove charging cables from battery Negative (-) cable first.

⚠ Always disconnect battery charge plug before removing clamps. Clamps may be energized when unit is in battery charge mode.

8-5. Setting Battery Jump/Crank Assist Controls



⚠ Have only qualified persons jump/crank assist batteries.

1 Charge/Weld Switch

Place switch in charge position.

2 Process Switch

Place switch in position matching voltage of battery being crank assisted. Weld power is not available in battery charge mode.

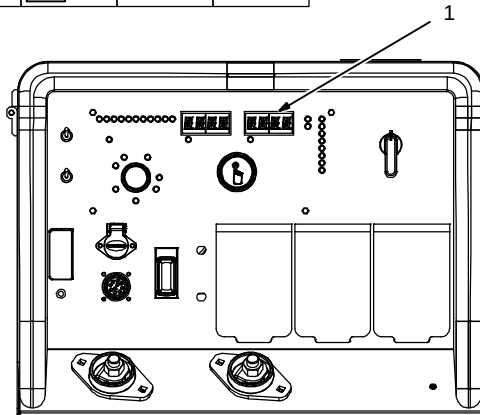
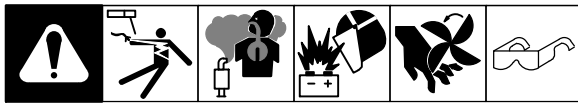
ℹ Battery output is not energized until battery is checked by unit.

NOTICE – Do not attempt to crank engine for intervals longer than 20 seconds. Output will shut down and will reset when unit has cooled.

⚠ Stop engine when finished charging. Stand as far from battery as practical and disconnect charging cables from unit. Remove charging cables from battery Negative (-) cable first.

Ref. 281606

8-6. Battery Charging Information On Display Screens

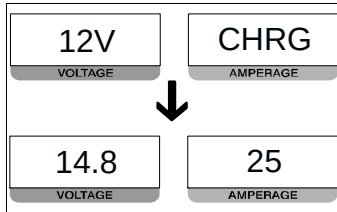


1 Display Screens

Display screens provide information on charge mode, charging output, and charging status. Explanations of the display screen codes are provided in the tables below.

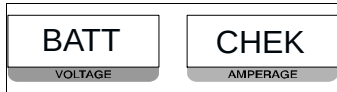
Ref. 907760

A. Selected Charge Voltage And Output Voltage



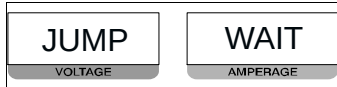
Several seconds after the battery charger is turned on, the display screens indicate the selected charge voltage, then switch to show output voltage and amperage at the battery charging receptacle.

B. Check Battery



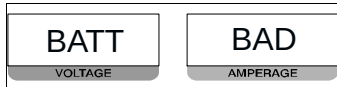
Code indicates the battery will not accept a charge, battery voltage does not match charging voltage, or the system is improperly connected. Check battery and connections. Cycle Charge/Weld switch to restart charging.

C. Jump Timeout



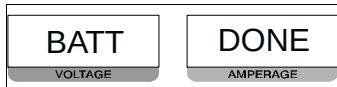
Code indicates the system was drawing too much current for too long of a time during an attempt to jump start. Charge automatically restarts after cool down time.

D. Battery Bad



The charger has determined that the battery is faulty and is unable to take a charge. Replace the battery.

E. Charge Complete



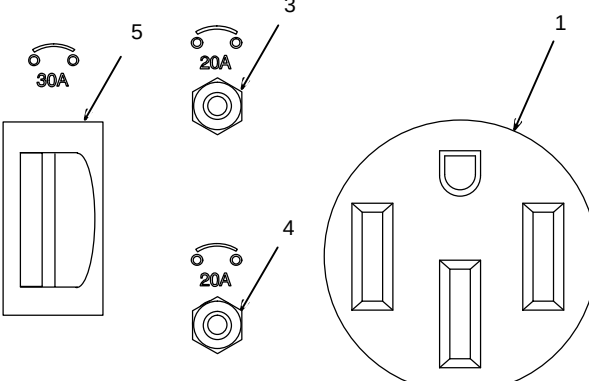
The battery charge process has completed successfully.

SECTION 9 – OPERATING AUXILIARY EQUIPMENT

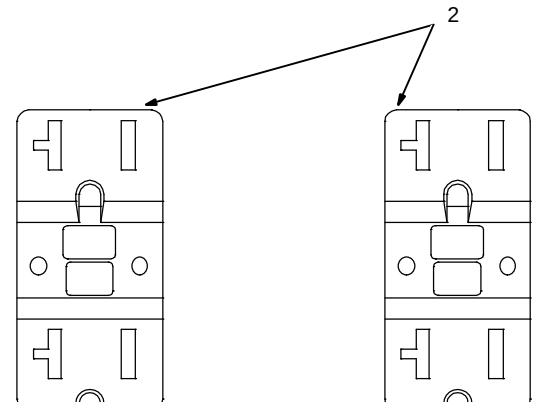
9-1. Generator Power Receptacles And Supplementary Protectors



240V/30A1 ~60Hz



120V/20A1 ~60Hz



⚠ Use GFCI protection when operating auxiliary equipment. If unit does not have GFCI receptacles, use GFCI-protected extension cord. Do not use GFCI receptacle to power life support equipment.

⚠ Unplug power cord before attempting to service accessories or tools.

ℹ Generator power decreases as weld current or air compressor output increases.

1 120/240 V AC Receptacle RC1
RC1 supplies 60 Hz single-phase power at power speed. Maximum output is 6.5 kVA/ kW.

2 120 V 20 A AC Receptacles RC2 and RC3

3 Supplementary Protector CB2

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

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

5 Supplementary Protector CB1

CB1 protects RC1 from overload. CB1 supplies power to RC2 and RC3.

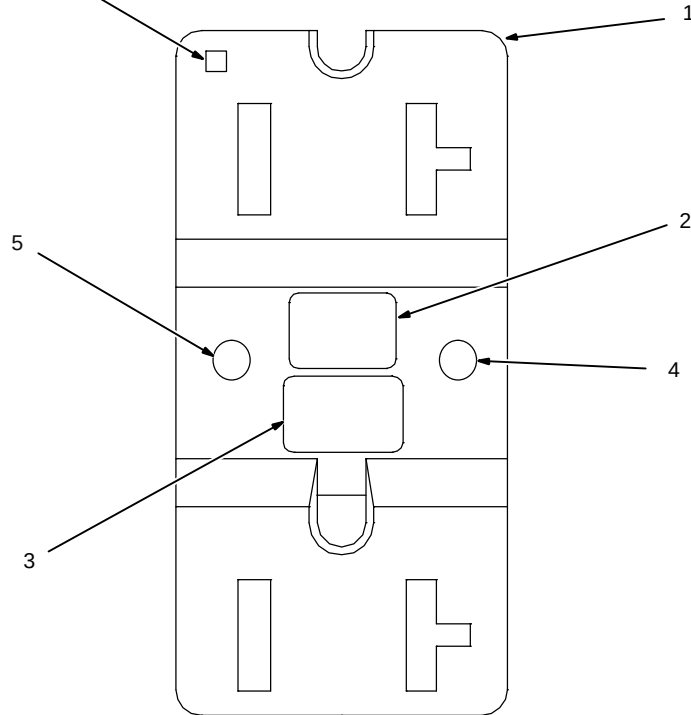
Combined output of all receptacles limited to 6.5 kVA/kW rating of the generator.

Ref. 281606-A

9-2. GFCI Receptacle Information, Resetting, And Testing



Alternate location for red and green indicator LEDs.



Orientation of receptacle may be different in other applications.

RotGFCI1 2018-12

⚠ Use GFCI protection when operating auxiliary equipment. If unit does not have GFCI receptacles, use GFCI-protected extension cord. Do not use GFCI receptacle to power life support equipment.

⚠ Unplug power cord before attempting to service accessories or tools.

- 1 120 V 20 A AC GFCI Receptacle
- 2 GFCI Receptacle Test Button
- 3 GFCI Receptacle Reset Button
- 4 Red GFCI Indicator Light (LED)
- 5 Green GFCI Indicator Light (LED)

Red and Green indicator lights may be combined in a single LED.

GFCI Receptacles

GFCI receptacles protect the user from electric shock if a ground fault occurs in equipment connected to the receptacle. A ground fault occurs when electrical current takes the shortest path to ground (which could be through a person) rather than follow its intended safe path.

If a ground fault is detected, the GFCI Reset button pops out, and the circuit opens to disconnect power to the faulty equipment. A GFCI receptacle does not protect against circuit overloads, short circuits, or shocks not related to ground faults. Reset and test GFCI receptacle according to the following procedures.

A solid green LED indicates power to the GFCI. A solid red LED indicates that the GFCI has been tripped.

Resetting/Testing GFCI Receptacle

- ⚠ Test GFCI monthly.**
- ⚠ If Red LED blinks, stop using GFCI receptacle and have a Factory Authorized Service Agent replace it.**
- ⚠ Extension cords with bad insulation or of extended length can allow enough leakage current to trip the GFCI circuit. Reset and test as follows.**

Resetting GFCI Receptacles

If a GFCI fault occurs, stop engine and disconnect equipment from GFCI receptacle. Check for damaged or wet tools, cords, plugs, etc. connected to the receptacle. Start engine, place engine control switch in RUN position, and press GFCI Reset button. Reconnect equipment to GFCI receptacle. If GFCI Reset button pops out again, check the equipment and repair or replace if faulty.

Testing GFCI Receptacles

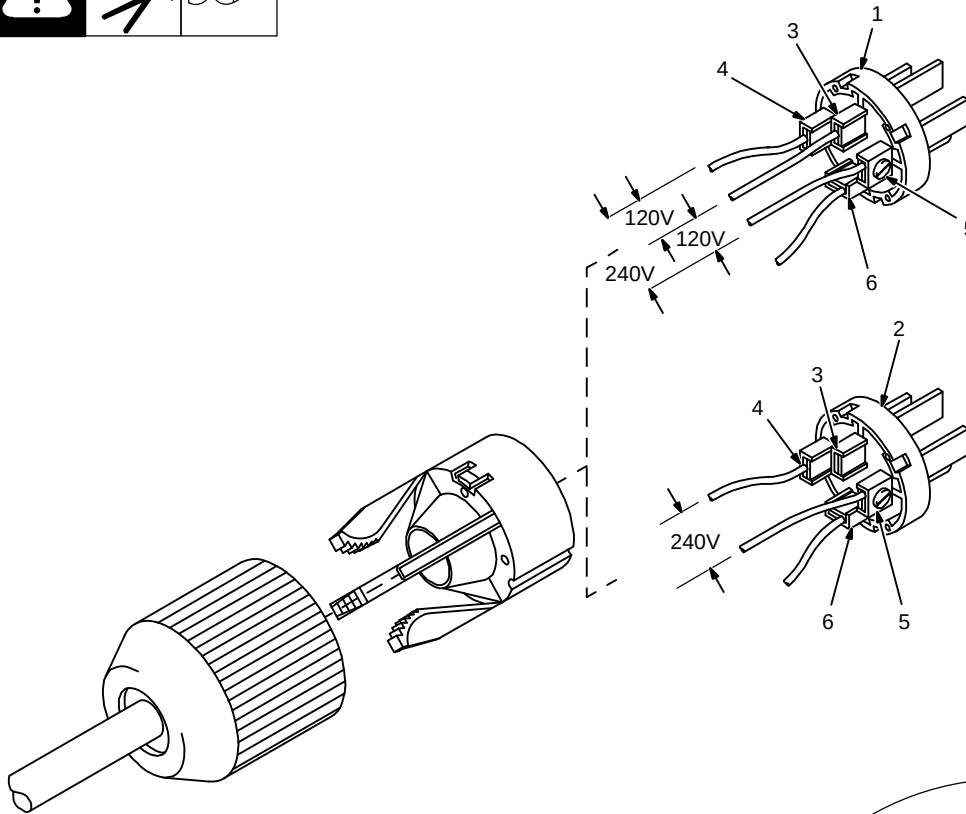
Start engine and place engine control switch in Run position. Press the GFCI Test button. The GFCI Reset button should pop out.

Press the GFCI Reset button.

Have a Factory Authorized Service Agent replace GFCI if any of the following occur:

- GFCI does not trip when tested
- Red LED blinks
- GFCI does not reset.

9-3. 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

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

2 Plug Wired for 240 V, 2-Wire Load

3 Neutral (Silver) Terminal

4 Load 1 (Brass) Terminal

5 Load 2 (Brass) Terminal

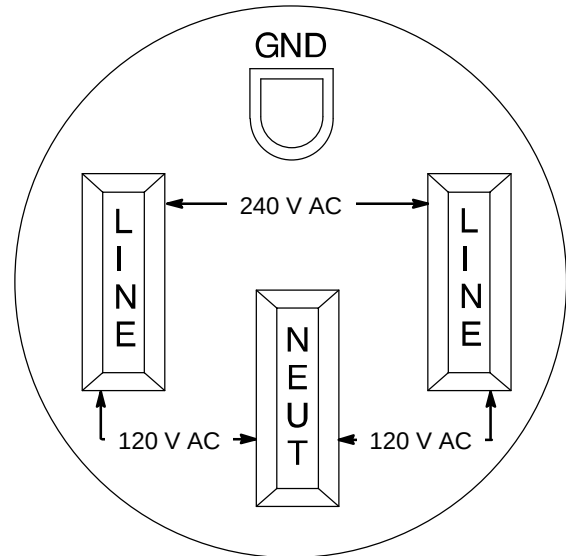
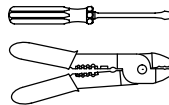
6 Ground (Green) Terminal

7 Amperes Available using 120/240 V Plug

Current Available in Amperes	
240 V Receptacle*	Each 120 V Duplex Receptacle
0	20
5	20
10	15
15	10
20	5
25	0

V x A = Watts
*One 240 V load or two 120 V loads.

Tools Needed:



SECTION 10 – WELDING OPERATION

10-1. Selecting Cable Sizes*

NOTICE – The Total Cable Length in Weld Circuit (see table below) is the combined length of both weld cables. For example, if the power source is 100 ft (30 m) from the workpiece, the total cable length in the weld circuit is 200 ft (2 cables x 100 ft). Use the 200 ft (60 m) column to determine cable size.

Welding Amperes	Weld Cable Size** and Total Cable (Copper) Length in Weld Circuit Not Exceeding***							
	100 ft (30 m) or Less		150 ft (45 m)	200 ft (60 m)	250 ft (70 m)	300 ft (90 m)	350 ft (105 m)	400 ft (120 m)
	10 – 60% Duty Cycle AWG (mm ²)	60 – 100% Duty Cycle AWG (mm ²)	10 – 100% Duty Cycle AWG (mm ²)					
100	4 (20)	4 (20)	4 (20)	3 (30)	2 (35)	1 (50)	1/0 (60)	1/0 (60)
150	3 (30)	3 (30)	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	3/0 (95)
200	3 (30)	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	4/0 (120)
250	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2x2/0 (2x70)	2x2/0 (2x70)

* This chart is a general guideline and may not suit all applications. If cable overheats, use next size larger cable.

**Weld cable size (AWG) is based on either a 4 volts or less drop or a current density of at least 300 circular mils per ampere.
() = mm² for metric use.

***For distances longer than those shown in this guide, see AWS Fact Sheet No. 39, Welding Cables, available from the American Welding Society at <http://www.aws.org>.

Ref. S-0007-M 2017-08

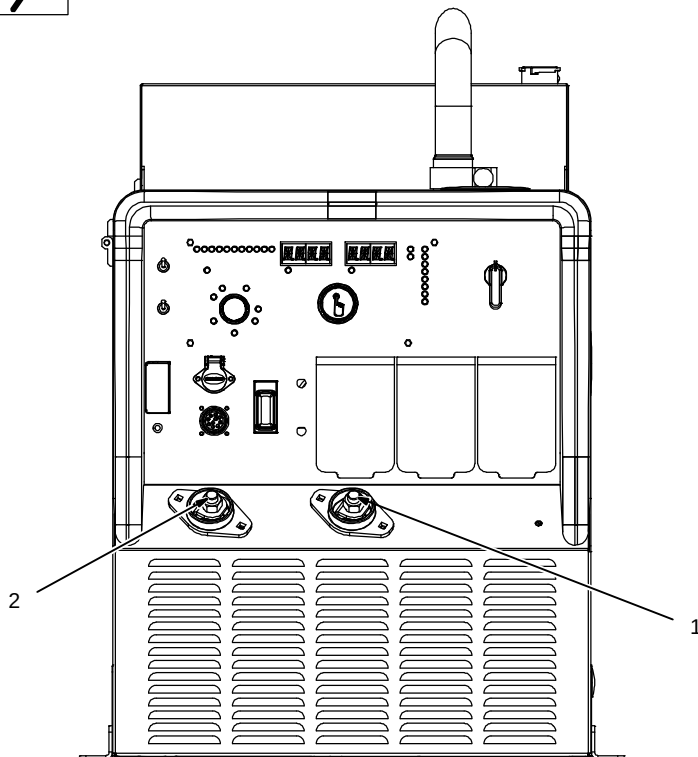
10-2. Weld Output Terminals



! Turn off power before connecting to weld output terminals.

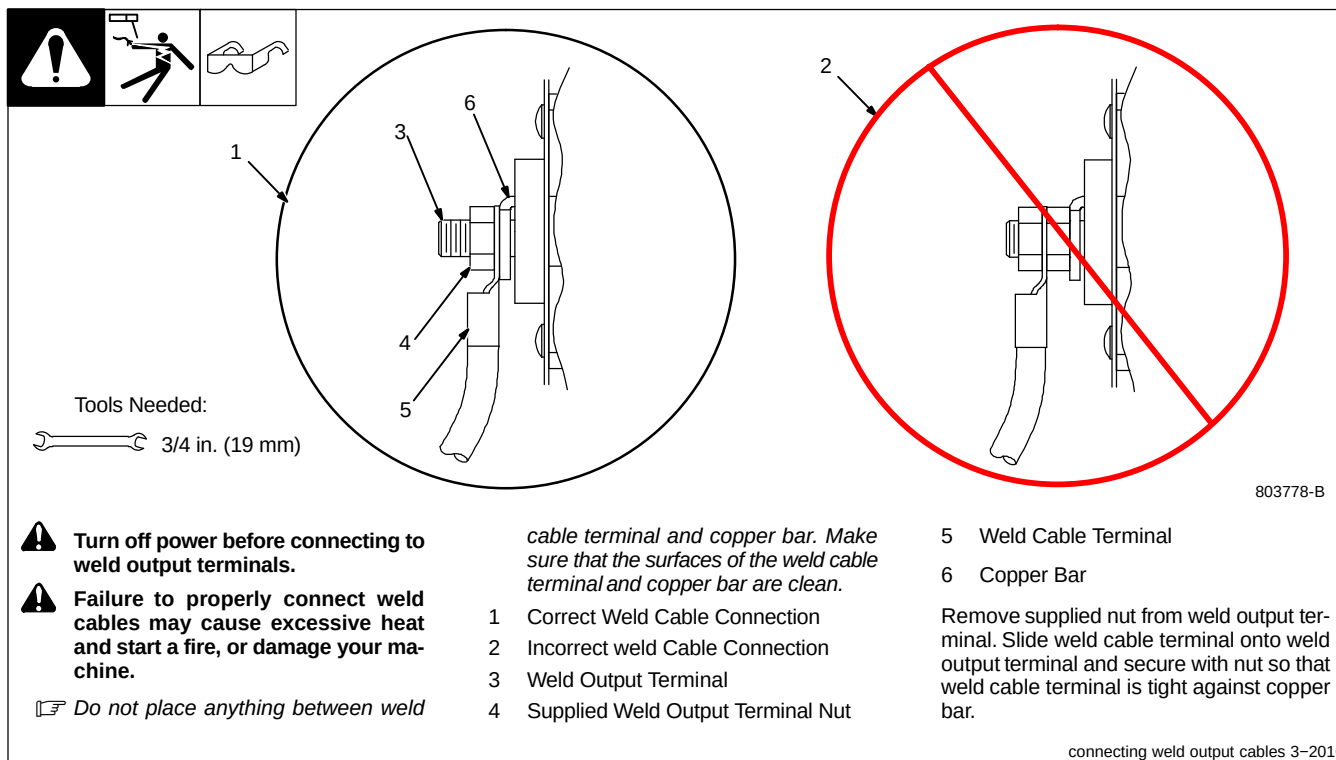
! Do not use worn, damaged, undersized, or repaired cables.

- 1 Positive (+) Weld Output Terminal
- 2 Negative (-) Weld Output Terminal



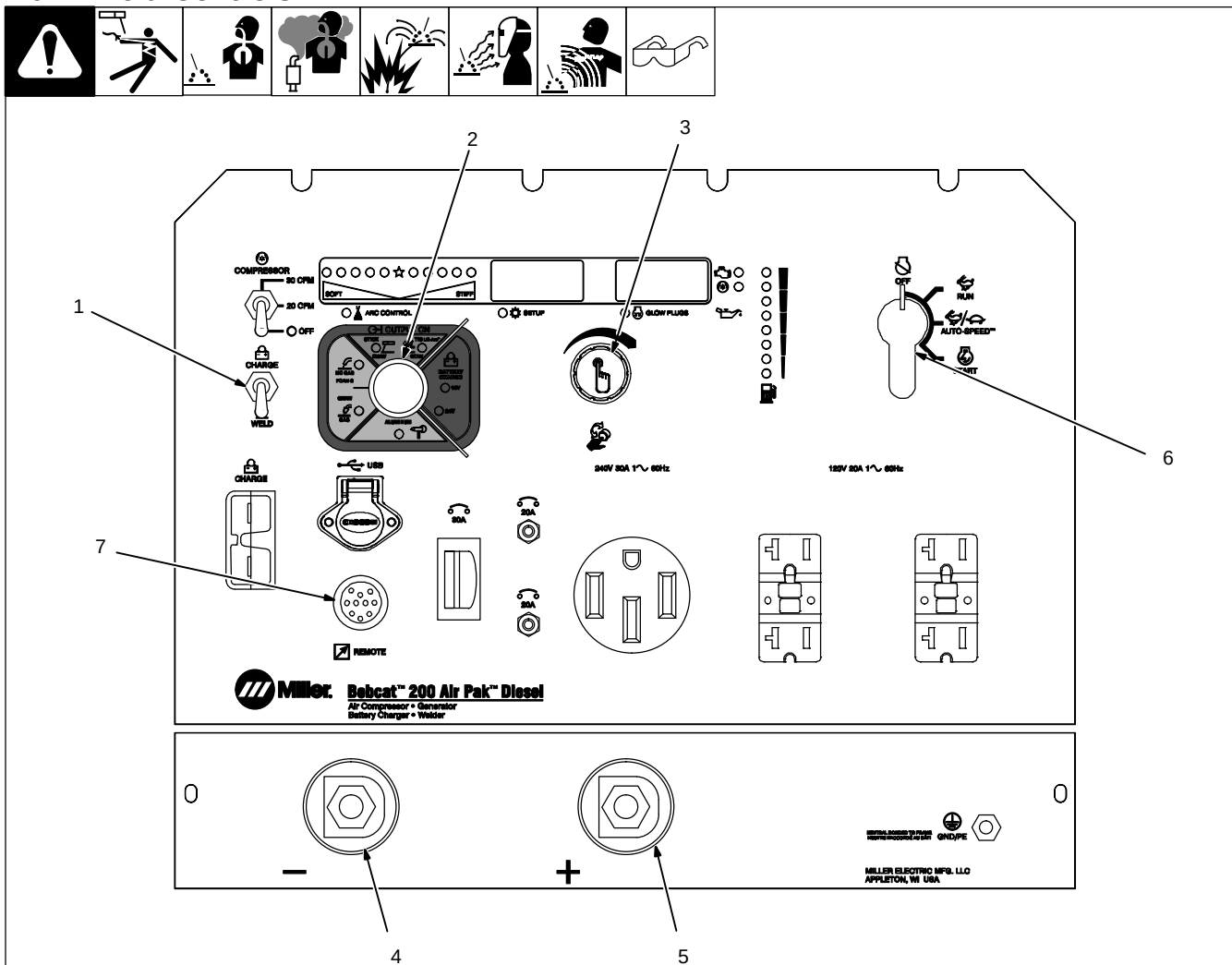
output term1 2015-02

10-3. Connecting Weld Output Cables



Notes

10-4. Weld Controls



Ref. 281606

1 Charge/Weld Switch

Place switch in Weld position to energize weld output terminals.

2 Process Switch

3 Adjust Control/Select Button

4 Negative Weld Output Terminal

5 Positive Weld Output Terminal

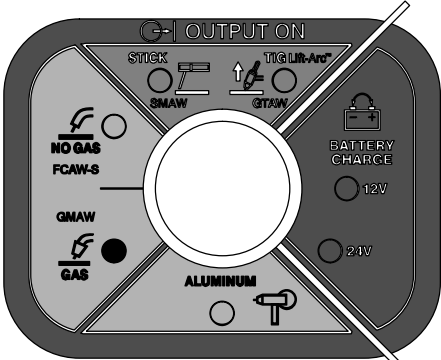
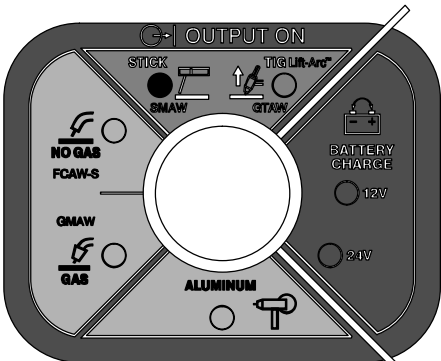
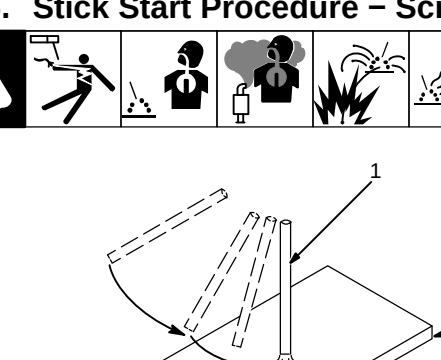
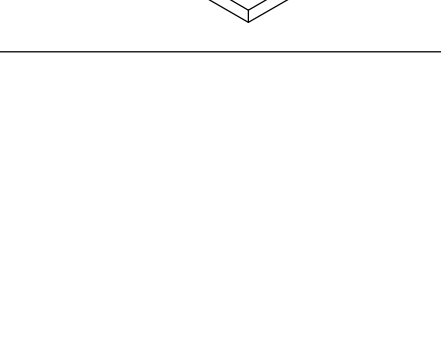
6 Engine Control Switch

7 10-Pin Receptacle

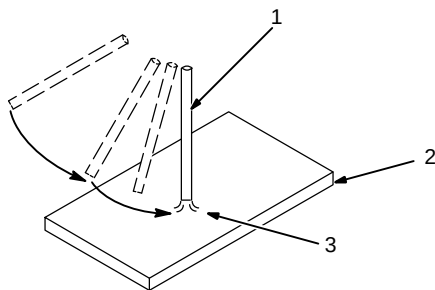
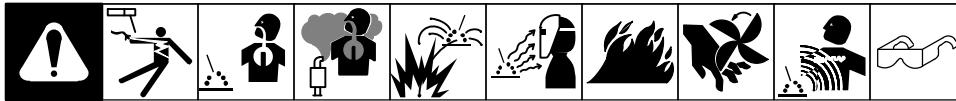
10-5. Arc Control Settings

Arc Control is not active when the Process switch is in the GTAW Lift-Arc TIG position.

Miller recommends Hobart filler metals.

Process Switch	Arc Control	
 Voltage sensing feeder	SOFT (-25 to -1)	Starting point for stainless steel wire (high inductance) SOFT -12
	★ (0)	Starting point for mild steel wire
	STIFF (1 to 25)	Starting point for aluminum wire (low inductance) STIF 12
	★ (0)	Starting point
	SOFT (-25 to -1)	Flat or horizontal welds with XX18 electrode with short weld cables
	★ (0)	Starting point
	STIFF (1 to 25)	Stiffer, more rapidly responding arc for XX10 electrode
	★ (0)	Starting point

10-6. Stick Start Procedure – Scratch Start Technique

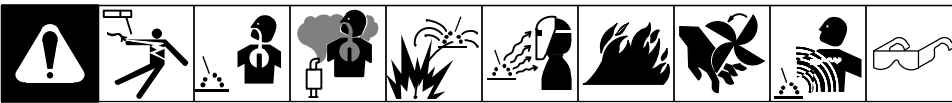


With Stick selected, start arc as follows:

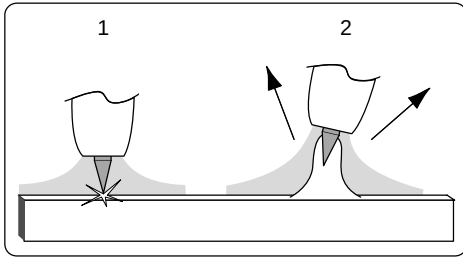
- 1 Electrode
- 2 Workpiece
- 3 Arc

Drag electrode across workpiece like striking a match; lift electrode slightly after touching work. If arc goes out electrode was lifted too high. If electrode sticks to workpiece, use a quick twist to free it.

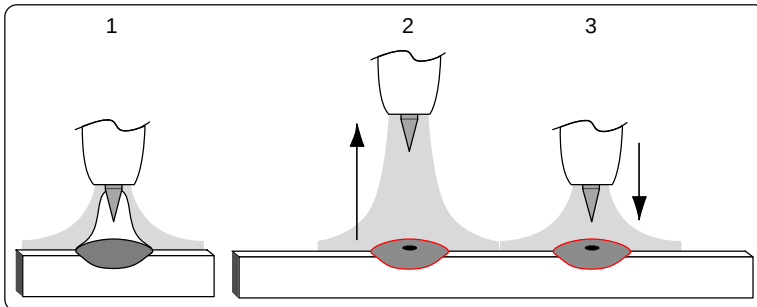
10-7. Lift-Arc™ TIG With Auto-Stop™



Arc Start With Lift-Arc



Arc End With Auto-Stop



Arc Start With Lift-Arc TIG

Lift-Arc is used for the DCEN GTAW process when HF Start method is not permitted.

Select Lift-Arc at Process switch.

Turn gas on.

- 1 Touch or scratch.
- 2 Lift at any angle.

Touch tungsten electrode to workpiece at weld start point. Slowly lift electrode. Arc is started when electrode is lifted.

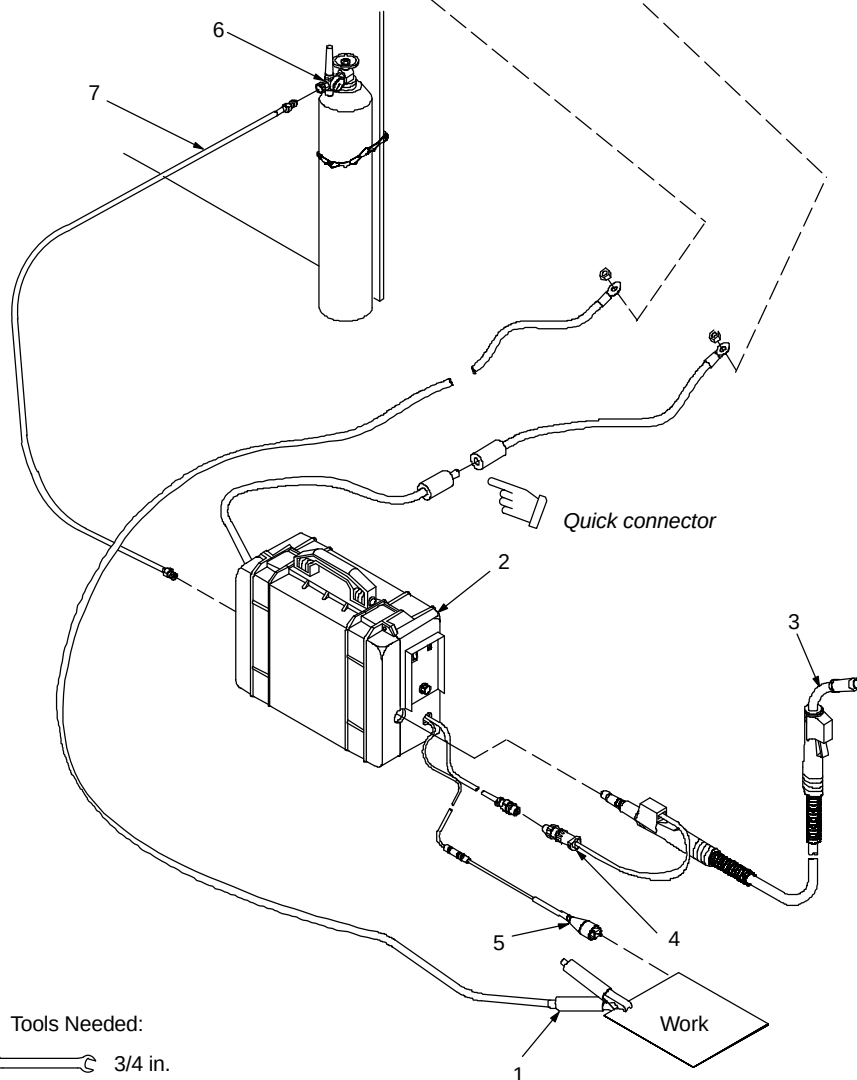
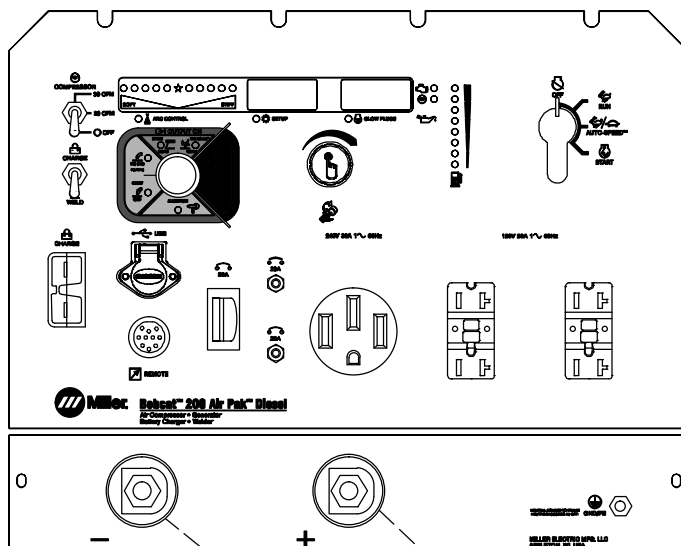
Maintain shielding gas coverage and eliminate tungsten and workpiece contamination by using Auto-Crater or Auto-Stop to end the arc.

Arc End With Auto-Stop:

- 1 While welding.
- 2 Lift torch to start Auto-Stop. Arc stops.
- 3 Move torch back down to maintain gas coverage and prevent contamination.

WM Marketing

Notes

 3/4 in.

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

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

100 CO₂/75/25 Argon-Based Gas for Short Circuit Transfer

- ## 7 Gas Hose

Connect work cable to welder/generator negative terminal. Connect cable from wire feeder to welder/generator positive terminal.

 Be sure to use the correct size weld cables (see Section 10-1).

Loosen MIG gun securing knob. Insert gun end through opening in feeder and position as close as possible to drive rolls without touching. Tighten knob.

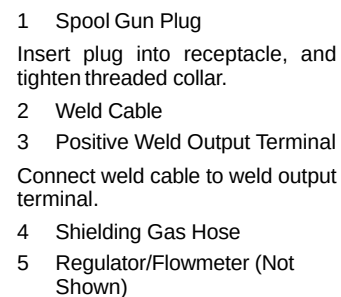
See wire feeder manual for wire threading procedure.

Insert gun trigger plug (item 4) into matching receptacle and tighten threaded collar.

Connect gas hose from feeder to regulator on cylinder.

Typical Control Settings For Short Circuit Transfer Using .035 (ER70S-3) Solid Wire And 100% CO2 Gas:

- > Set Process switch to GMAW.
- > Set weld voltage between 17 and 22 volts to obtain minimum spatter.
- > Set wire feed speed between 100 and 225 IPM.
- > Connection shown for GMAW. Reverse electrode and work cables for FCAW.



Route shielding gas hose up to regulator/flowmeter. Connect gas hose to fitting on regulator/flowmeter.

 3/4, 5/8 in.

SECTION 11 – MAINTENANCE AND TROUBLESHOOTING

11-1. Maintenance Label

KUBOTA D722 ENGINE		AIR COMPRESSOR	
8 h Use Ethylene Glycol Coolant Only. DIESEL 7 gal (26.5 L) DIN 51 601 BS 2869: A1, A2 ASTM D 975-81: 1-D, 2-D VV-F 800C: DF-A, DF-1, DF-2 S ≤ .0015% (Ultra Low Sulfur)	200 h Donaldson: P535396 (optional) MILLER: 187441* Donaldson: P822686 * FILTER KIT 284101 contains noted filters.	8 h	250 h MILLER: 262573**
200 h 4 qt (3.8 L) Check engine dipstick. MILLER: 187443* Kubota: HH150-32430 1/2 in (13 mm) MILLER: 283082 Kubota: 17472-97010	400 h (Bobcat Only) 1. MILLER: 213858* Hastings: GF160 2. MILLER: 259934* Kubota: 15221-43170 Brushes MILLER: 493509	500 h / 1 yr MILLER: 232207** MILLER: 276620** 2 qt (1.9 L) ** FILTER KIT 275644 contains noted filters and oil.	1000 h / 1 yr Air/Oil Separator MILLER: 275648**
200 h SAE 10W-30 or SAE 10W-40 SAE 30 SAE 20 SAE 10W Single Viscosity Oils Multi-Viscosity Oils Use API Class CF or higher. 77 °F 32 °F 25 °C 0 °C		1000 h Intake and Exhaust 0.0057 – 0.0072 in (0.145 – 0.185 mm) 72° F (20° C)	2000 h / 2 yr MILLER: 274630 Dayco: 6060470

281700-A

11-2. Routine Maintenance

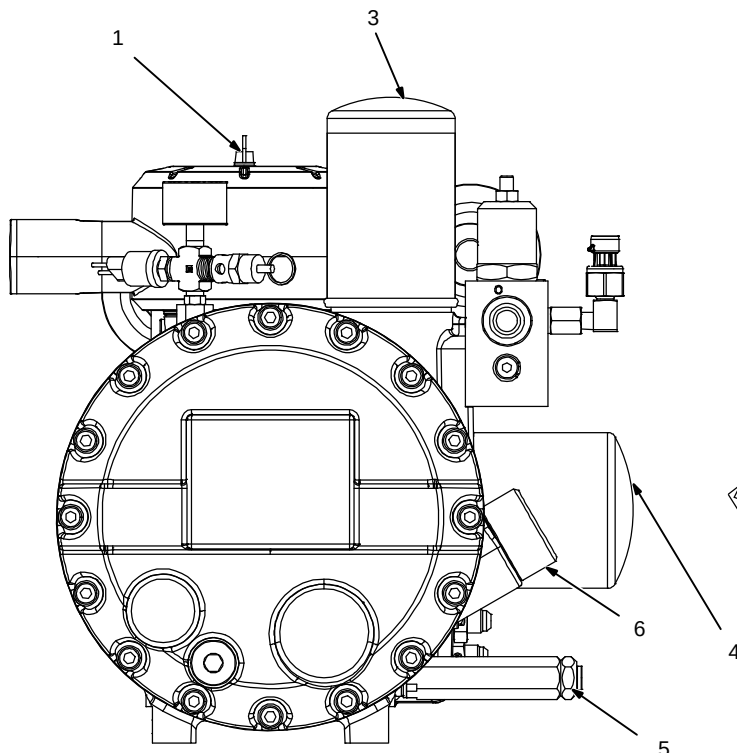
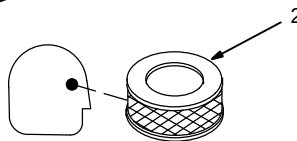
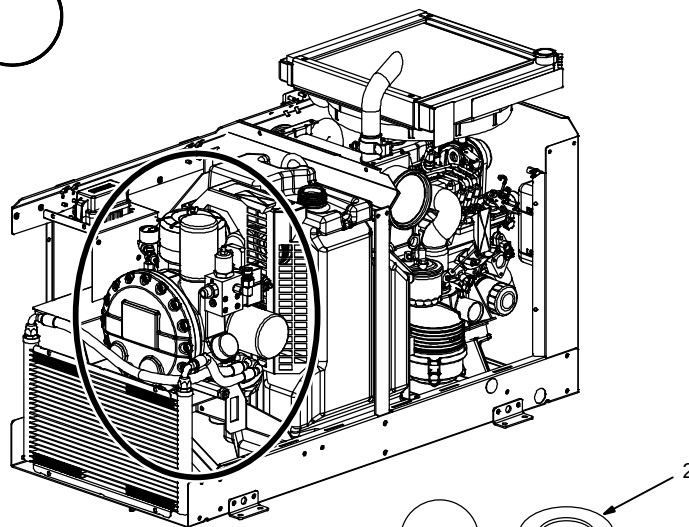
						 Recycle engine fluids.	 Stop engine before maintaining. See Maintenance Label for important start-up, service, and storage information. Service more often if used in severe conditions.

Engine speed is regulated by an electronic governor. Engine speed adjustments may only be performed by a Factory Authorized Service Agent. Follow the storage procedure in the engine owner's manual if the unit will not be used for an extended period.

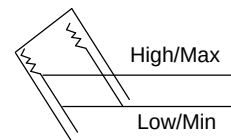
Replace compressor oil and filter after the first 50 hours of operation.

	= Check = Change = Clean = Replace * To be done by Factory Authorized Service Agent					Reference
Every 8 Hours	 Compressor And Engine Oil Level	 Fluid Spills	 Meter For Next Oil Change Interval	 Fuel Level		Sections 5-5, 6-1, 7-1
Every 200 Hours	 Fuel Connections	 Engine Oil	 Engine Oil Filter	 Engine Fan Belt Tension	 Engine Air Cleaner	Section 11-4, Engine Manual
	 Battery Terminals	 Unreadable Labels	 Weld Terminals			
Every 250 Hours	 Compressor Air Cleaner Element		Every 400 Hours	 Fuel Filters		Engine Manual, Section 11-5
Every 500 Hours Or Yearly	 Compressor Oil	 Compressor Oil Filter	 Air & Control Lines For Wear & Aging	 Weld Cables	 Compressor Belt Condition/Tension	Section 11-3, Engine Manual
Every 1000 Hours	 Air/Oil Separator	 Inside Unit	 Flush Radiator Radiator Hoses	 Slip Rings* Brushes*	 Air Cleaner Hoses	Engine Manual
Every 2000 Hours	 Fuel Hoses	 Coolant & Hoses	 Engine Fan Belt Compressor Fan Belt			Engine Manual, Section 11-6

NOTICE – This equipment meets US EPA Evaporative Standards. Be sure fuel system replacement parts meet EPA Evaporative Standards.

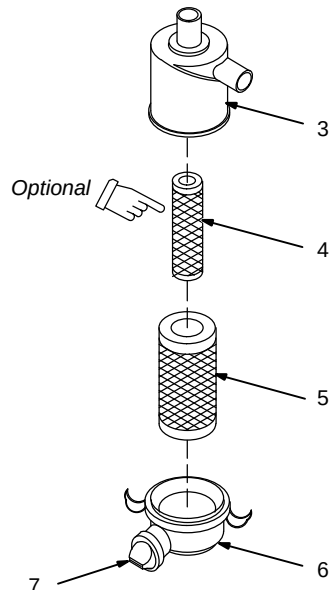
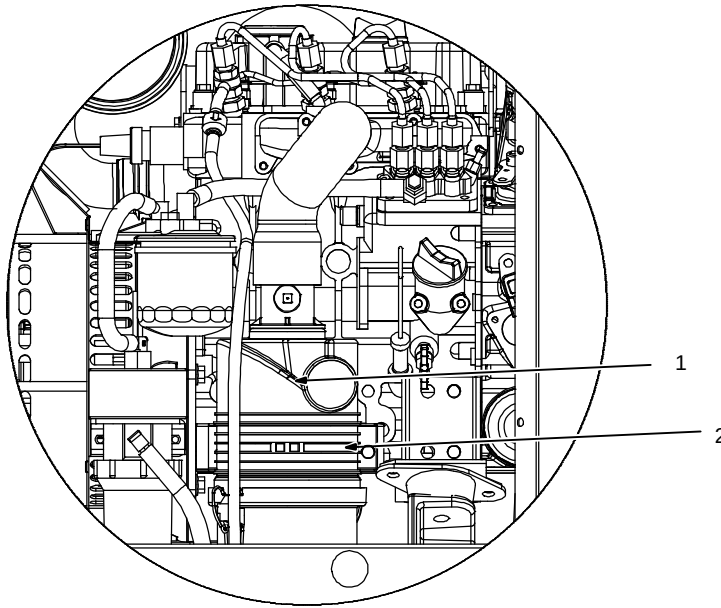
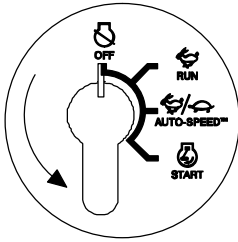


- Check oil level and top off to fill line if necessary.



OM-281710 Page 55

11-4. Replacing Engine Air Cleaner



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.

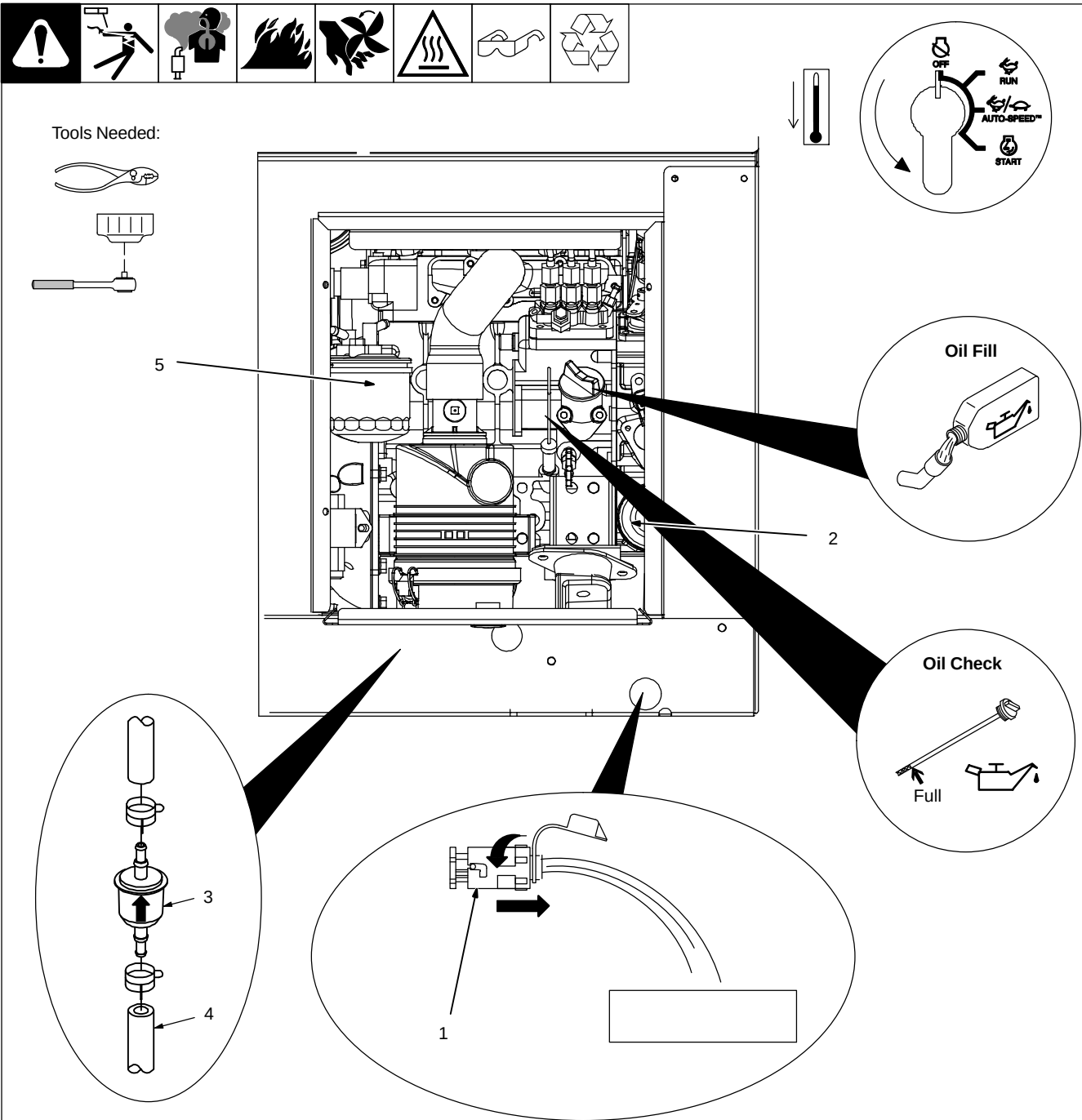
- 1 Air Cleaner
- 2 Air Cleaner Clamp
- 3 Housing
- 4 Safety Element (Optional)
- 5 Primary Element
- 6 Cover
- 7 Dust Ejector

Remove air cleaner clamp. Pull air cleaner out slightly and remove bottom cover.

Remove air cleaner element and replace with new element. Reinstall air cleaner cover and clamp.

Replace air cleaner element every 200 hours or less if used in severe conditions.

11-5. Changing Engine Oil, Oil Filter, And Fuel Filter



907760

⚠ Stop engine and let cool.

To change engine oil and oil filter:

- 1 Oil Drain Valve
- 2 Oil Filter

Remove plastic plug on side of base and route 1/2 in. oil drain hose through hole in base. Change engine oil and filter according to engine owner's 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).

To change in-line fuel filter:

- 3 In-Line Fuel Filter
- 4 Fuel Line

Replace line if cracked or worn. Install new filter with arrow pointing in the direction of fuel flow. Wipe up any spilled fuel.

Start engine, and check for fuel leaks.

To change fuel filter:

- 5 Fuel Filter

Spin off filter, using filter wrench if needed. Install new fuel filter and hand tighten.

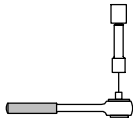
Start engine to prime fuel system and check for leaks. Access service menu to reset oil change countdown. See Section 6-4.

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

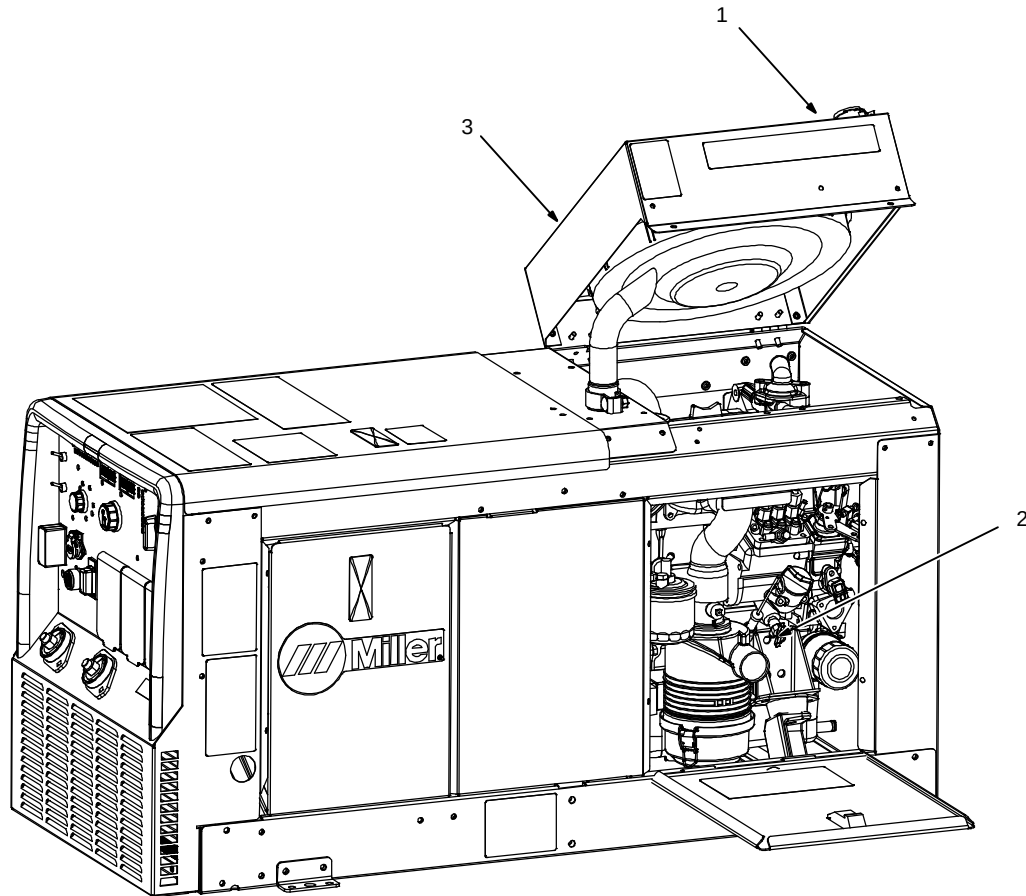
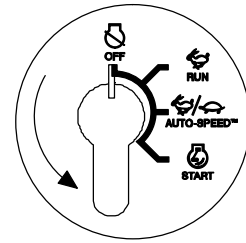
11-6. Changing Engine Coolant



Tools Needed:



3/8 in.



907760

Stop engine and let cool.

- 1 Radiator Cap
- 2 Engine Coolant Drain Valve
- 3 Radiator Housing

To drain engine coolant:

With engine off and cold, remove radiator cap slowly. Install hose on engine coolant drain valve and route hose into a container.

Open coolant drain valve on side of engine block and allow coolant to drain. Close drain valve on side of engine block.

Coolant fill procedure:

Slowly fill cooling system with 50% water/antifreeze solution until full.

Install radiator cap and remove two fasteners from radiator housing. Tilt up radiator to purge air from cooling system.

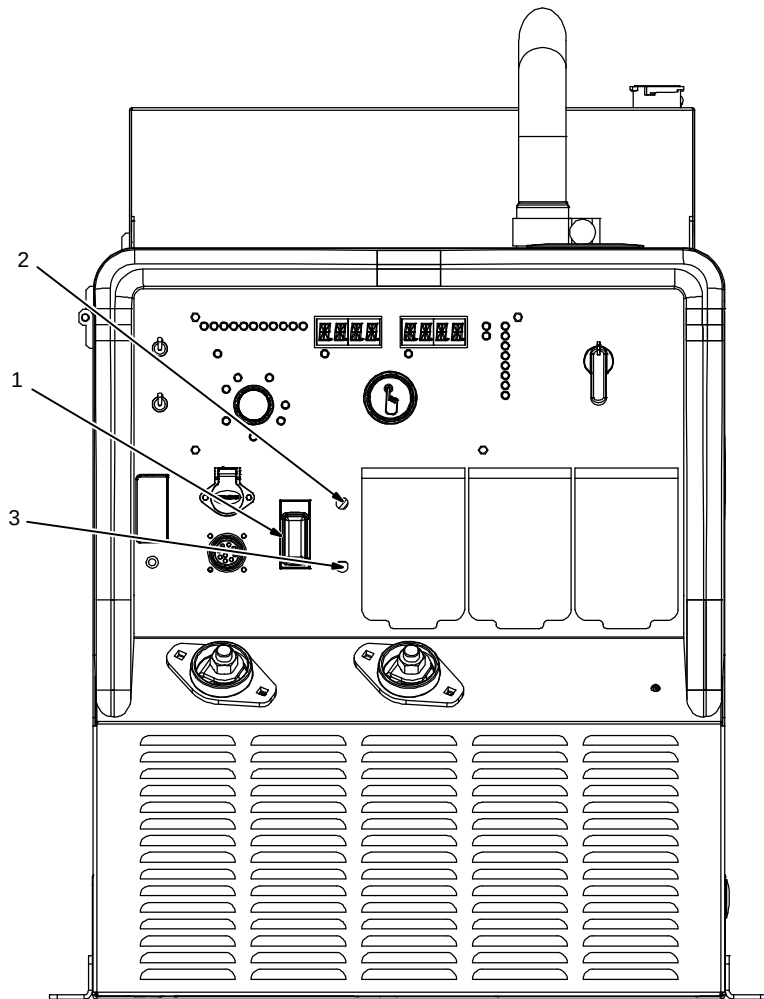
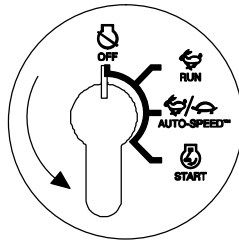
Lower radiator and add coolant.

Repeat the preceding steps until no more coolant can be added. Fill overflow reservoir to FULL indicator. Reinstall fasteners.

Run engine at idle with no load for 15 minutes. Let cool and top off radiator.

NOTICE – Air in engine cooling system can damage engine.

11-7. Overload Protection



⚠ Stop engine.

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

1 Supplementary Protector CB1

CB1 is located on the front panel and protects the auxiliary power receptacles and weld/battery charge module from overload. If CB1 opens, none of the AC receptacles or weld/battery charge functions will work. Place switch in On position to reset.

2 Supplementary Protector CB2

CB2 is located on the front panel and protects 120V receptacle RC2 from overload. If CB2 opens, RC2 will not work. Press button to reset.

3 Supplementary Protector CB3

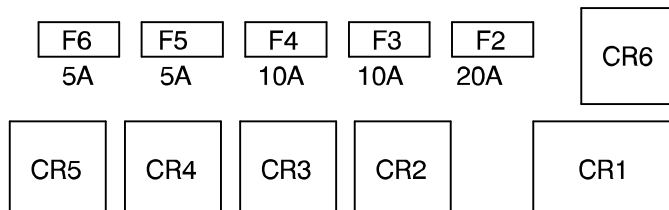
CB3 is located on the front panel and protects 120V receptacle RC3 from overload. If CB3 opens, RC3 will not work. Press button to reset.

4 Fuse/Relay Module Label

Engine and control fuses are located in the fuse/relay module located in the compressor compartment. Fuses protect engine and control components.

CR1-Glow Plug Relay
CR2-Start Sequence Relay
CR3-Engine Starter Relay
CR4-Comp Clutch Relay
CR5-Comp Flow Down Valve Relay
CR6-Auto Start/Stop Relay

F2-Battery Supply
F3-Engine ECU
F4-Fuel Pump
F5-Start/Glow
F6-Can Bus Power



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11-8. Voltmeter/Ammeter Error Displays



WELD

TEMP

Use the Voltmeter/Ammeter error displays to diagnose and correct fault conditions.

Display Example

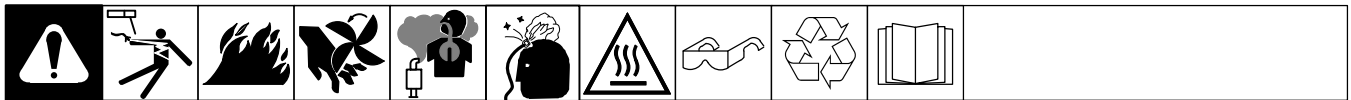
 When an error is displayed, normally weld output has stopped but generator power output may be okay.

 To reset error displays, stop unit and then restart.

Error Display	Error Name	Description	Remedy
S/W ERR	Software Version Mismatch Or Invalid	Different software versions among PC boards.	Reload software.
ID ERR	Invalid Product Id	Invalid ID resistor in harness.	Have factory authorized service agent check ID resistor in harness.
LOW FUEL	Low Fuel Error	Bobcat models only.	Fill fuel tank.
COMM ERR	Can Communications Error	CAN communication timeout between UI and control board.	Have factory authorized service agent check CAN signals from UI.
WELD TEMP	Weld Module Over Temp	Internal temperature of welder has exceeded the maximum limit.	Wait for unit to cool down.
WELD SHRT	Weld Module Output Shorted	CV process has not cleared a short in 200 ms.	Manually clear short between electrode and work.
WELD FAN	Weld Module Fan Tach Error	The fan is running too slow or is damaged.	Clear obstruction from fan. Reconnect the fan.
WELD PRI	Weld Module Primary Thermistor Error	The primary circuit thermistor is reading too high or too low for a valid temperature.	Have factory authorized service agent check thermistor connection.
WELD SEC	Weld Module Secondary Thermistor Error	The secondary circuit thermistor is reading too high or too low for a valid temperature.	Have factory authorized service agent check thermistor connection.
WELD PWRF	Weld Module Power Fail	Primary side power failed.	Cycle power to clear error.
WELD BST	Weld Module Boost Error	The primary boost has not successfully been established.	Cycle power to clear error.
WELD OV	Weld Module Over Voltage	Primary voltage is above 310 volts.	Cycle power to clear error.
WELD UV	Weld Module Under Voltage	Primary voltage is below 90 volts.	Cycle power to clear error.
WELD COMM	Weld Module Communication Error	Weld module is not communicating with control board, or no power to weld module (CB1 tripped).	Check CB1. Check for generator power. Have factory authorized service agent check power to PC1, and connections between PC1 and PC3.
WELD STCK	Weld Module Stuck Electrode	Stick or Tungsten electrode has become stuck in weld puddle and turned output off.	Remove Stick or Tungsten electrode from workpiece, and output will turn back on after about one second.
GUN CON	Weld Module Gun Connect Error	A process that requires a welding gun to be attached is selected, but the gun is not attached.	Connect gun or change process.
GUN REM	Weld Module Gun Remove Error	A process that does not require a welding gun to be attached is selected, but the gun is attached.	Disconnect gun or change process.
WELD PRUP	Weld Module Power Up Error	Power up timeout: longer than 7 seconds to power up.	Cycle power to clear error.
WELD BOOT	Weld Module Error Launching Application	Weld module is communicating but the application is corrupt.	Perform software update.
AC OP	Air Compressor Over Pressure	Tank pressure over 190 psi.	Reduce tank pressure to 125 psi to clear error.
AC TEMP	Air Compressor Over Temperature	Air compressor oil temp over 248°F (120°C).	Error clears when oil temp is less than 248°F (120°C).
ACTM OPEN	Air Compressor Thermistor Open	Air compressor thermistor reading below valid temperature.	Have factory authorized service agent check thermistor connection.
ACTM SHRT	Air Compressor Thermistor Shorted	Air compressor thermistor reading above valid temperature.	Have factory authorized service agent check thermistor connection.
ACTD HIGH	Air Compressor Transducer High Voltage	Air compressor pressure transducer reading above valid pressure.	Have factory authorized service agent check pressure transducer.

Error Display	Error Name	Description	Remedy
ACTD LOW	Air Compressor Transducer Low Voltage	Air compressor pressure transducer reading below valid pressure.	Have factory authorized service agent check pressure transducer connection.
OIL PRES	Engine Oil Low Pressure Error	Despite RPM, oil pressure switch is ON.	Turn key switch OFF.
H2O TEMP	Engine Coolant Over Temperature Error	Engine water temperature greater than or equal to 239°F (115°C).	Turn key switch OFF.
H2O SHRT	Engine Coolant Sense Shorted	Voltage of coolant temperature sensor is 4.9 volts or above	Turn key switch OFF.
H2O GND	Engine Coolant Sense Grounded	Voltage of coolant temperature sensor is 0.1 volts or less.	Turn key switch OFF.
ENG BATT	Engine Battery Failure	ECU recognition of battery voltage is above 18 volts.	Turn key switch OFF.
ENG SPD	Engine Speed Overrun	Engine speed is greater than 4140 RPM.	Turn key switch OFF.
ENG VOLT	Engine Under Voltage	Voltage to sensor is below 4 volts.	Turn key switch OFF.
ENG ACT	Engine Actuator Current Error	Actuator current greater than 3.0 A or less than 80 mA.	Turn key switch OFF.
SPD SENS	Engine Speed Sensor Abnormal	Engine speed is 0 RPM after Starter signal into ECU.	Turn key switch OFF.
ENG STRT	Engine Starter Error	Starter running time is above 12 seconds.	Turn key switch OFF.
ENG ALT	Engine Alternator Abnormal	Alternator L terminal has voltage while 0 RPM (After Key On).	Turn key switch OFF.
ENG CHRG	Engine Battery Charging Error	Alternator L terminal is 0 volts while engine is running.	Turn key switch OFF.
ENG COMM	Engine Can Comm Error	CAN Bus OFF.	Turn key switch OFF.

11-9. Troubleshooting



A. Compressor Troubleshooting

Trouble	Remedy
Air compressor does not operate; no air pressure on gauge; no clutch engagement.	Place Air Compressor switch in an On position. If compressor is turned off, wait for air pressure to bleed off before turning compressor on again.
	Pressure downstream of compressor outlet above MIN pressure setting keeps compressor from engaging. Compressor will engage when outlet pressure reduces below MIN pressure. See Section 7-1 for pressure setting procedure.
	Check for over pressure. Check pressure settings and reduce if necessary (see Section 7-1). Turn Air Compressor switch off to reset.
	Check for over temperature. Allow unit to cool. Recirculation or open covers may cause overheating. Be sure all covers, panels, and doors are in place. Operate in area with proper airflow. Automatic shutdown stops compressor if compressor temperature is too high.
	Check compressor belt and tension. Be sure correct belt is used and is properly installed. Replace belt if damaged or worn.
	Have Factory Authorized Service Agent check air compressor control circuit and clutch.
Air compressor stops producing air, or air compressor cycles on and off.	Compressor idle down causes compressor to turn off when set pressure is reached. See Section 7-2.
	During air use, compressor pressure will continue to decrease if using more than 30 CFM. Decrease load, or allow compressor to build pressure between loads. Compressor will automatically produce air when a load is applied, unless it is a light load such as an air leak. For light loads, pressure will decrease to MIN pressure and then increase to MAX pressure.
	Check for air leaks downstream of compressor outlet. Air leaks cause more frequent compressor cycling. Repair all air leaks.
	Check for over pressure. Check pressure settings and reduce if necessary (see Section 7-1). Turn Air Compressor switch off to reset.
	Check compressor oil level (see Section 5-5). Automatic shutdown stops compressor if compressor temperature is too high.

Trouble	Remedy
	Check for over temperature. Allow unit to cool. Recirculation or open covers may cause overheating. Be sure all covers, panels, and doors are in place. Operate in area with proper airflow. Automatic shutdown stops compressor if compressor temperature is too high.
	Have Factory Authorized Service Agent check and clean compressor cooler core. Automatic shutdown stops compressor if compressor temperature is too high.
	Verify adequate air flow to compressor. Check for blocked air intake.
	Have Factory Authorized Service Agent check operation of over pressure switch S2.
Compressor operates, but air pressure is low.	Check for leaks in air lines and hoses.
	Adjust compressor air pressure (see Section 7-2).
	Reduce air demand/close air outlet valve.
	Run compressor to increase temperature above freezing.
	Check for frozen lines or hoses downstream from compressor outlet.
	Blowdown valve is frozen. Run compressor to build heat and blowdown valve will return to normal operation.
	Check air compressor air cleaner (see Section 11-3).
	Check compressor oil level (see Section 5-5).
	Check air/oil separator, and replace if plugged (see Section 11-3).
	Check compressor belt and tension. Be sure correct belt is used and is properly installed. Replace belt if damaged or worn.
	Have Factory Authorized Service Agent check solenoid blow down valve, and for leaks in control lines. Also check air compressor for rated output.
High air pressure.	Check air compressor gauge. Adjust compressor air pressure (see Section 7-2).
	Check for frozen control lines.
Oil in air from compressor.	Check compressor oil level (see Section 5-5). If oil level is too high, system becomes saturated with oil.
	Open line (nothing connected to compressor outlet) will result in oil in air. Do not operate with open air line.
	Change compressor air/oil separator if close to replacement hours (see Section 11-3).
	Wrong or mixed oil results in foaming which can cause oil in air. If mixed oil is suspected, replace oil, oil filter, and air/oil separator.
	Have Factory Authorized Service Agent check for plugged oil scavenge line.
Engine does not idle with compressor on.	Remove auxiliary power or other loads. Multiple loads keep engine at high speed.
	Wait 45 seconds after air output stops for engine to idle. Verify case pressure reduces during this time.
	Check for air leaks downstream of compressor. Any air leak will cause output pressure to reduce and the compressor to engage.
	When pressure reduces in case, verify clutch disengages 45 seconds after air output stops. If it does not, check for air leaks.
Air compressor overheats. Display reads "AC TEMP."	Check that all covers, panels, and doors are in place during operation.
	Check compressor oil level (see Section 5-4). Low oil level causes increased compressor temperature. Automatic shutdown stops compressor if compressor temperature is too high.
	Recirculation or open covers may cause overheating. Be sure all covers, panels, and doors are in place. Operate in area with proper airflow. Automatic shutdown stops compressor if compressor temperature is too high.
	Check/clean oil cooler.
	Verify adequate air flow to compressor. Check for blocked air intake.
	Adjust compressor air pressure (see Section 7-2).
	Replace compressor oil filter (see Section 11-3).
	Wrong oil or mixed oil. Drain oil and replace with factory oil and filter.
	Have Factory Authorized Service Agent check temperature sensor.

Trouble	Remedy
Oil in compressor air cleaner.	Have Factory Authorized Service Agent verify compressor inlet valve is operating properly.
Water in compressor oil. Oil appears milky.	Operate air compressor continuously under pressure to allow the compressor to reach operating temperature. Water in oil is often caused by intermittent use in which compressor does not reach temperature.
	If oil still appears milky, change oil, oil filter, and air/oil separator.
Water in air from compressor.	Some water in air from compressor is normal. Install air line water separator if necessary.
Compressor case retains pressure after shutdown.	Have Factory Authorized Service Agent check compressor blow down valve.

B. Battery Charge/Jump-start/Crank Assist Troubleshooting

Trouble	Remedy
No battery charge/jump start/crank assist output.	Be sure battery is connected.
	Check polarity.
	Be sure Process switch is in 12V or 24V position according to the voltage of the battery being charged.
	Be sure Charge/Weld switch is in charge position.
	Check battery voltage. Charging may be finished.
	Have Factory Authorized Service Agent check battery charge circuitry.
Charging current turns on and off while charging battery.	Clean and tighten battery connections, if necessary. Clean battery terminals and posts with baking soda solution and rinse with clear water.
	Check condition of battery.

C. Generator Power Troubleshooting

No or low generator power output at AC receptacles.	Reset supplementary protector(s) (see Section 11-7).
	Access service menu to view engine speed (see Section 6-4). Verify engine speed increases to 3600 rpm with auxiliary power load.
	Have Factory Authorized Service Agent check brushes and slip rings and PC2.
	Be sure all equipment is disconnected from receptacles when starting unit.
Low power output at AC receptacles.	Access service menu to view engine speed (see Section 6-4). Verify engine speed increases to 3600 rpm with auxiliary power load.
	Verify there is no weld load.
High power output at AC receptacles.	Access service menu to view engine speed (see Section 6-4). Verify engine speed increases to 3600 rpm with auxiliary power load.
Erratic power output at AC receptacles.	Check fuel level.
	Access service menu to view engine speed (see Section 6-4). Verify engine speed increases to 3600 rpm with auxiliary power load.
	Check receptacle wiring and connections.
	Have Factory Authorized Service Agent check brushes and slip rings and PC2.

D. Welding Troubleshooting

Trouble	Remedy
No weld output or generator power output at AC receptacles.	Be sure all equipment is disconnected from receptacles when starting unit.
	Check and reset circuit breaker CB1.
	Have Factory Authorized Service Agent check brushes and slip rings and PC2.
No weld output; generator power output okay at AC receptacles.	Check weld connections.
	Be sure Charge/Weld switch is in weld position.
	Have Factory Authorized Service Agent check PC1 and weld/battery charge inverter.
No weld output during generator power load.	Reduce generator load.
Low weld output.	Check Weld Output control setting.

Trouble	Remedy
	Be sure Charge/Weld switch is in weld position.
	Check weld cable size and length.
	Access service menu to view engine speed (see Section 6-4).
	Service engine air cleaner (see Section 11-4). Service engine fuel filter (see Section 11-5).
	Have Factory Authorized Service Agent check PC1 and weld/battery charge inverter.
High weld output.	Check Weld Output control setting.
Erratic weld output.	Check Weld Output control setting.
	Tighten and clean connections to electrode and workpiece.
	Use dry, properly stored electrodes for Stick welding.
	Remove excessive coils from weld cables.
	Clean and tighten connections both inside and outside welder/generator.
	Access service menu to view engine speed (see Section 6-4).
	Service engine air cleaner (see Section 11-4). Service engine fuel filter (see Section 11-5).

E. Engine Troubleshooting

Trouble	Remedy
Engine will not crank.	"INTRLOCK" displayed. Connect 12V signal to interlock input.
	Check engine fuses and replace if open (see Section 11-7).
	Check battery voltage.
	Check battery connections and tighten if necessary.
	Check plug PLG8 (ignition switch).
	Have Factory Authorized Service Agent check Engine Control switch S1.
Engine will not start.	Check fuel level.
	Check battery voltage.
	Check battery connections and tighten if necessary.
	Check oil level (see Section 5-4).
	Have Factory Authorized Service Agent check low oil pressure shutdown switch.
Engine starts but stops when Engine Control switch returns to Run position.	Check oil level.
	Check and refill crankcase with proper viscosity oil for operating temperature, if necessary.
	Check low oil pressure shutdown switch.
Engine stopped during normal operation.	Check fuel level.
	Replace fuel filter(s) (see Section 11-5).
	Check oil level (see Section 5-4).
	Check low oil pressure shutdown switch.
	Periodically recharge battery (approximately every 3 months).
	Replace battery.
	Check alternator and connections according to engine manual.
	Have Factory Authorized Service Agent check engine.
Battery discharges between uses.	Clean battery, terminals, and posts with baking soda and water solution; rinse with clear water.
	Check voltage regulator and connections according to engine manual.
	Periodically recharge battery (approximately every 3 months).
	Replace battery.
Engine idles but does not come up to weld speed.	Have Factory Authorized Service Agent check current transformer CT1.
Unstable or sluggish engine speeds.	Check oil level. Oil level should not exceed Full mark on dipstick.
	Tune-up engine according to engine manual.

Trouble	Remedy
Engine does not return to idle speed.	Remove weld and generator power loads.
	Have Factory Authorized Service Agent check current transformer CT1 and Engine Control switch S1.

SECTION 12 – PARTS LIST

12-1. Recommended Spare Parts

Dia. Mkgs.	Part No.	Description	Quantity
.....	276418 ..	USB Flash Drive	1
.....	493509 ..	Brushholder Assy, Generator	1
.....	274630 ..	Belt, Compressor	1
.....		Battery, Stor 12V 450 Crk 70 Rsv Group 51r	1
.....	275644 ..	Kit, Filter/Separator, Compressor (Includes)	1
.....	232207	Filter, Oil Air Compressor	1
.....	275648	Separator, Oil/Air Rotary Screw Compressor	1
.....	262573	Filter, Inlet Air Air Compressor	1
.....	276620	Oil, Air Compressor Rotary Screw (Synthetic) (Quart)	2
.....	284101 ..	Tune-Up & Filter Kit, Kubota (Includes)	1
.....	187443	Engine Oil Filter	1
.....	187441	Engine Air Filter Element	1
.....	213858 ..	Fuel Pre-Filter	1
.....	259934 ..	Fuel Primary Filter	1
.....	283082 ..	Engine Fan Belt	1
.....	187820 ..	Glow Plug	1
..... F2	281760 ..	Fuse, Mini Blade Atm 20. Amp 32 Volt	1
..... F3-F4	281759 ..	Fuse, Mini Blade Atm 10. Amp 32 Volt	2
..... F5-F6	281758 ..	Fuse, Mini Blade Atm 5. Amp 32 Volt	2
..... CR1	281756 ..	Relay, Encl 12VDC Spst 35A Skt Mtg	1
..... CR2-CR6 ..	281755 ..	Relay, Encl 12VDC Spst 20A Skt Mtg	5
.....	222093 ..	Rcpt, Str Dx Grd GFCL w/Capacitor	2

SECTION 13 – DIAGRAMS

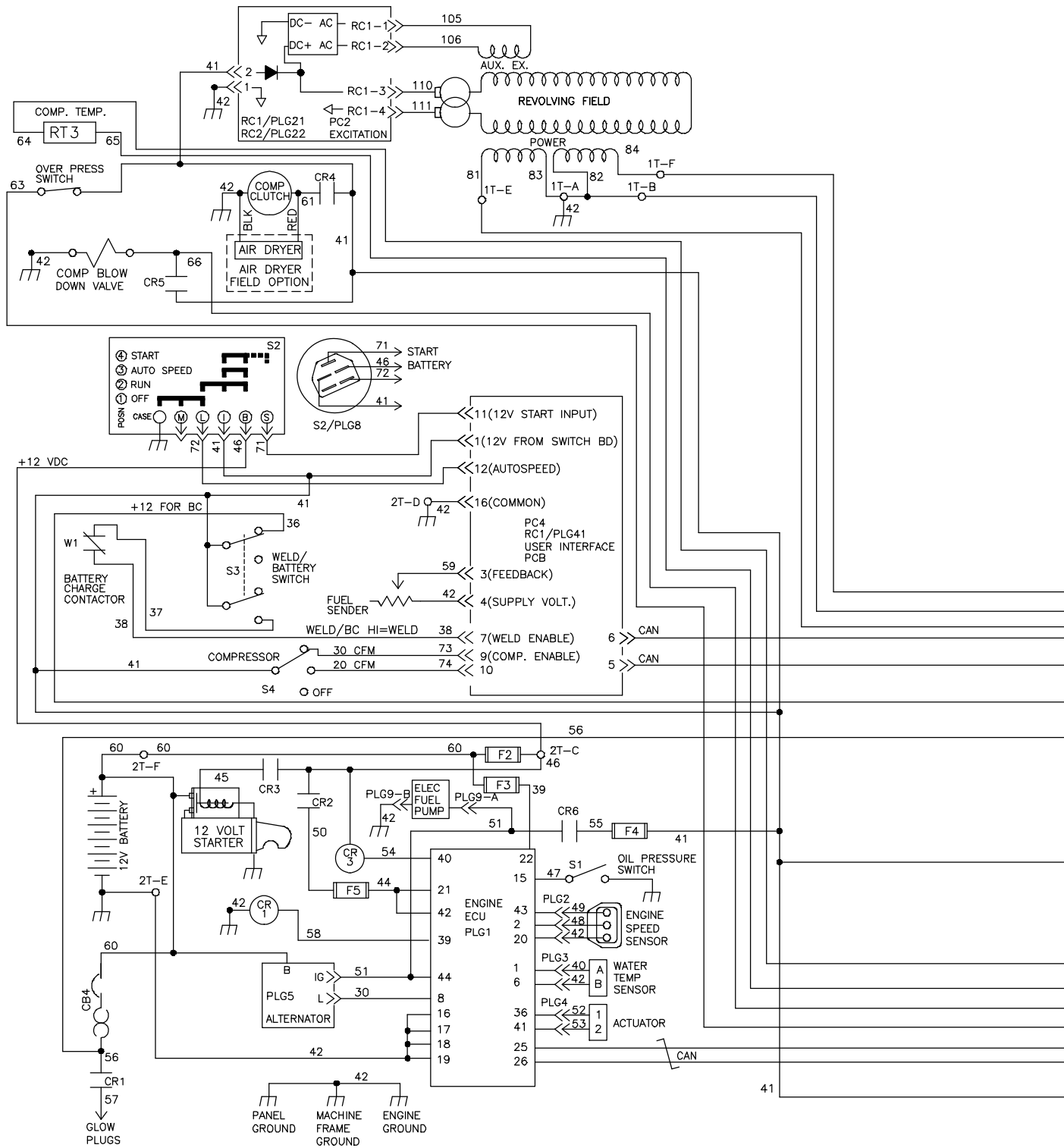


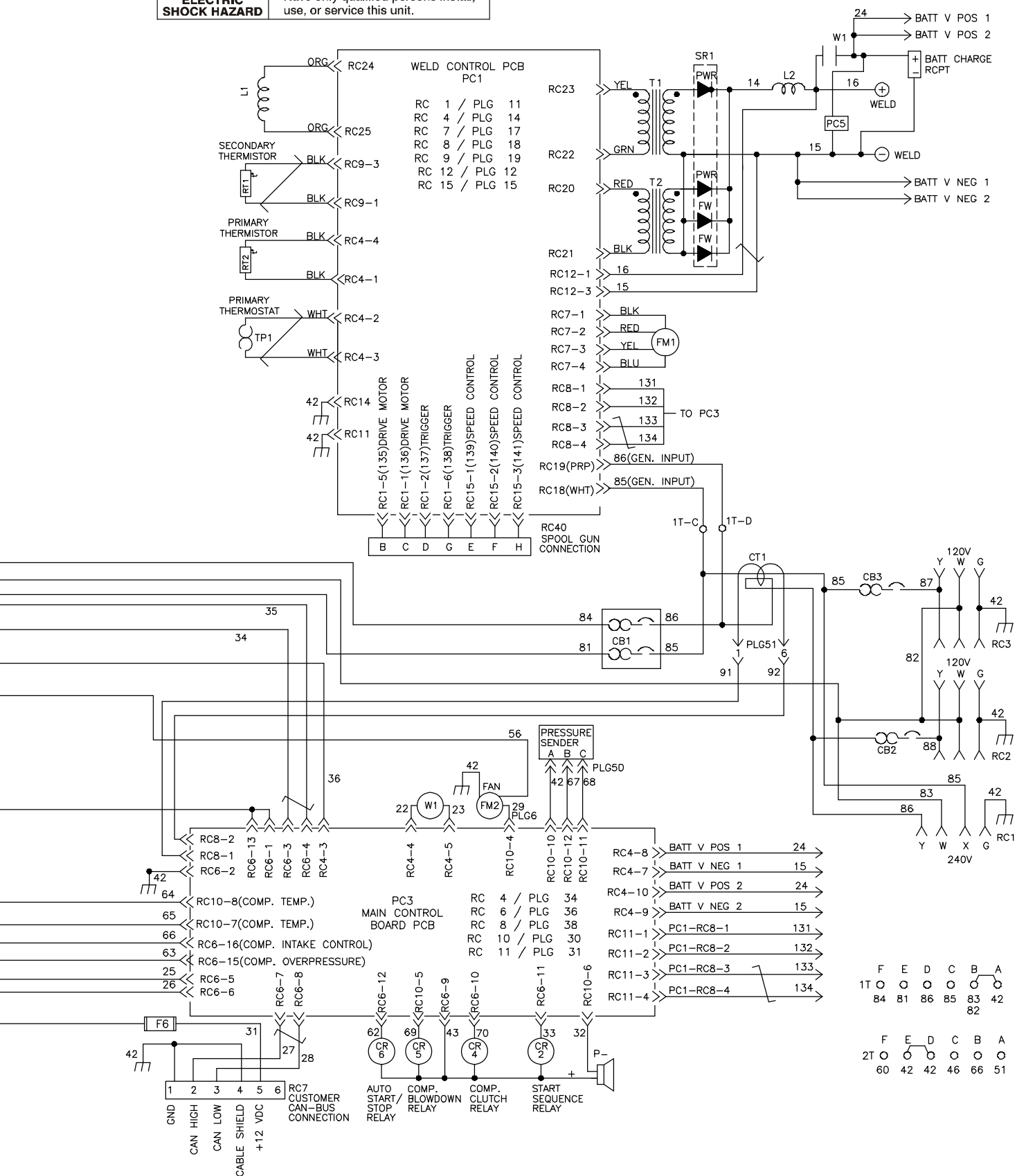
Figure 13-1. Circuit Diagram For Welder/Generator

⚠ WARNING



ELECTRIC SHOCK HAZARD

- 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.



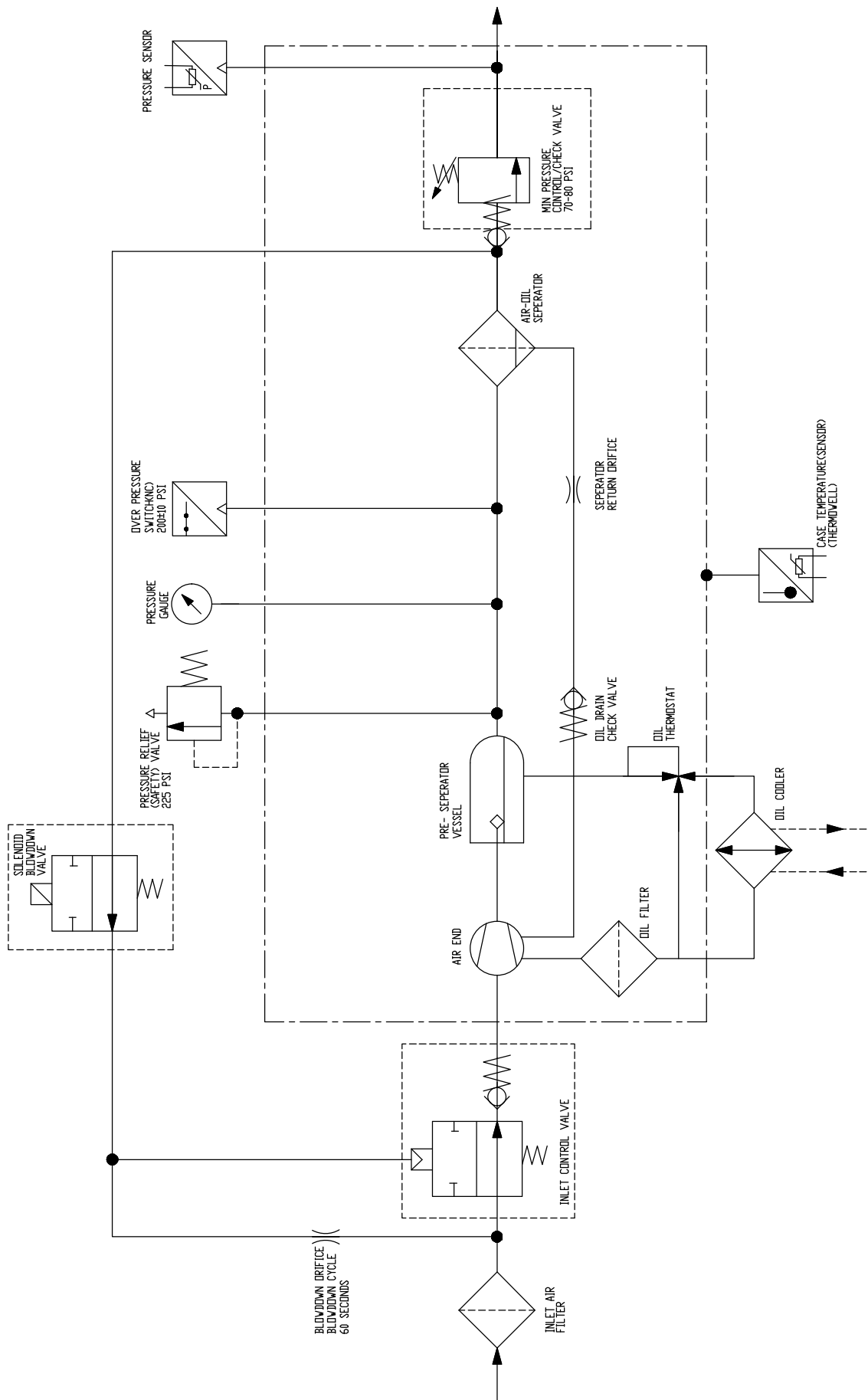


Figure 13-2. Air Compressor Schematic

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SECTION 14 – GENERATOR POWER GUIDELINES

The views in this section are intended to be representative of all engine-driven welder/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.

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14-2. Grounding Generator To Truck Or Trailer Frame

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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 #8 AWG or larger insulated copper wire.

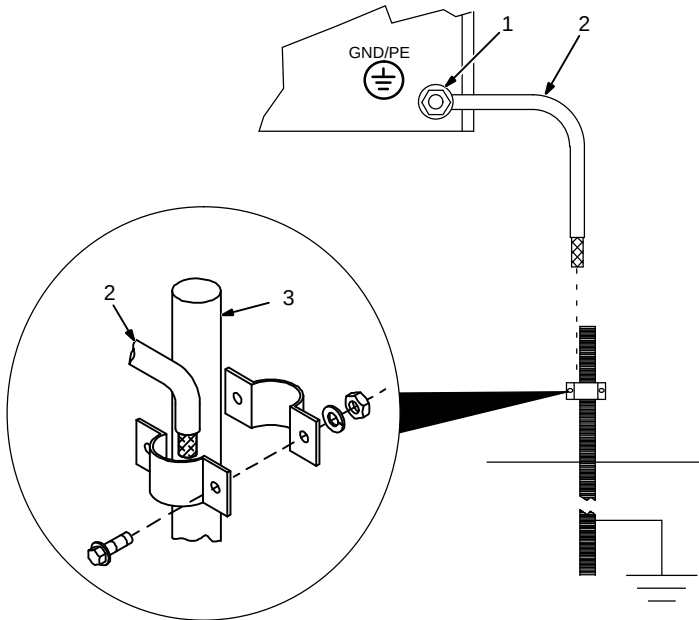
Electrically bond generator frame to vehicle frame by metal-to-metal contact.

Bed liners, shipping skids, and some running gear insulate the welder/generator from the vehicle

frame. Always connect a ground wire from the generator equipment grounding terminal to bare metal on the vehicle frame as shown.

Use GFCI protection when operating auxiliary equipment. If unit does not have GFCI receptacles, use GFCI-protected extension cord. Do not use GFCI receptacles to power life support equipment.

14-3. Grounding When Supplying Building Systems



- 1 Equipment Grounding Terminal
- 2 Grounding Cable

Use #8 AWG or larger insulated copper wire.

- 3 Ground Device

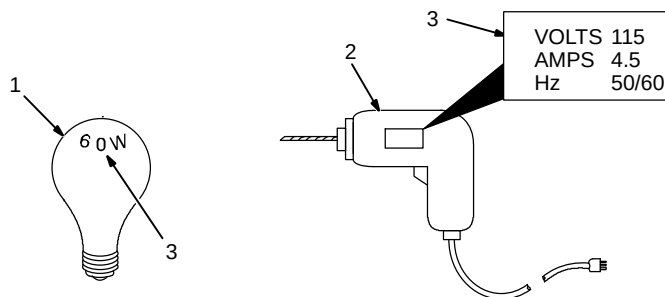
Use ground device as stated in electrical codes.

⚠ 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.

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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.

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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	10,550	2850
	3 HP	15,900	3900
	5 HP	23,300	6800
Capacitor Start-Capacitor Run	1-1/2 HP	8100	2000
	5 HP	23,300	6000
	7-1/2 HP	35,000	8000
	10 HP	46,700	10,700
Fan Duty	1/8 HP	1000	400
	1/6 HP	1400	550
	1/4 HP	1850	650
	1/3 HP	2400	800
	1/2 HP	3500	1100

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	10,500	2800
Farm Duty Motors Std. (e.g. Conveyors, Feed Augers, Air Compressors)	1/3 HP	1720	720
	1/2 HP	2575	975
	3/4 HP	4500	1400
	1 HP	6100	1600
	1-1/2 HP	8200	2200
	2 HP	10,550	2850
	3 HP	15,900	3900
Farm Duty Motors High Torque (e.g. Barn Cleaners, Silo Unloaders, Silo Hoists, Bunk Feeders)	5 HP	23,300	6800
	1-1/2 HP	8100	2000
	5 HP	23,300	6000
	7-1/2 HP	35,000	8000
3-1/2 cu. ft. Mixer	10 HP	46,700	10,700
	1/2 HP	3300	1000
High Pressure 1.8 Gal/Min		3150	950
Washer 2 gal/min	500 PSI	4500	1400
	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

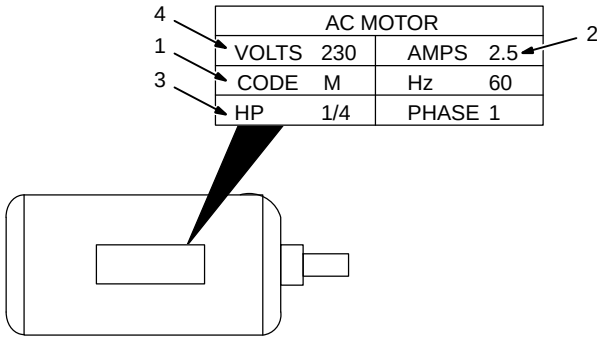
14-7. Approximate Power Requirements For Contractor Equipment

Contractor Equipment	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	10,500	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	1400	
	Vapor	1250	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





AC MOTOR			
VOLTS	230	AMPS	2.5
CODE	M	Hz	60
HP	1/4	PHASE	1

- Motor Start Code
- Running Amperage
- Motor HP
- 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).

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

(kVA/HP x HP x 1000) / Volts = 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

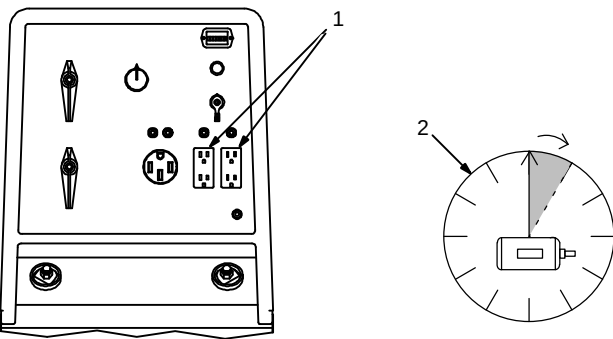
$(11.2 \times 1/4 \times 1000) / 230 = 12.2A$

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

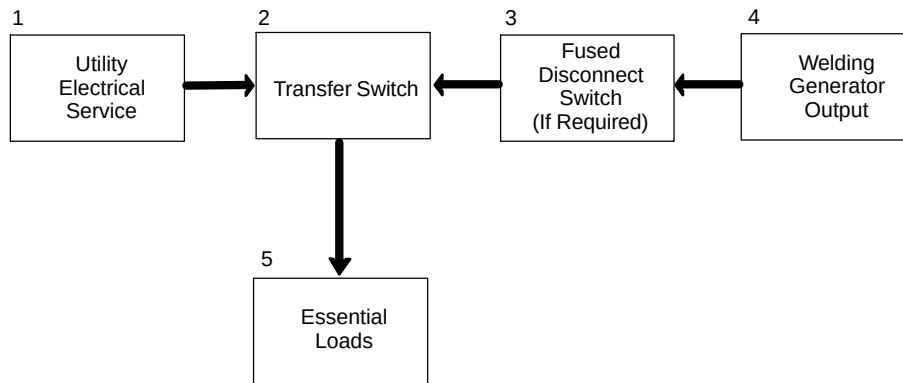
Always start non-resistive (motor) loads in order from largest to smallest, and add resistive loads last.

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

⚠ Do not connect to any electrical distribution system normally supplied by utility power unless a proper transfer switch and grounding procedure are employed.

 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 Welder/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							
							
⚠ Use GFCI protection when operating auxiliary equipment. If unit does not have GFCI receptacles, use GFCI-protected extension cord. Do not use GFCI receptacles to power life support equipment.							
Current (Amperes)	Load (Watts)	Maximum Allowable Cord Length In ft (m) for Conductor Size In AWG (mm ²)*					
		4 (25)	6 (16)	8 (10)	10 (6)	12 (4)	14 (2.5)
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							
							
⚠ Use GFCI protection when operating auxiliary equipment. If unit does not have GFCI receptacles, use GFCI-protected extension cord. Do not use GFCI receptacles to power life support equipment.							
Current (Amperes)	Load (Watts)	Maximum Allowable Cord Length In ft (m) for Conductor Size In AWG (mm ²)*					
		4 (25)	6 (16)	8 (10)	10 (6)	12 (4)	14 (2.5)
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

Notes

Notes

Notes



Effective January 1, 2019

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

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

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.

LIMITED WARRANTY – Subject to the terms and conditions below, Miller Electric Mfg. LLC, Appleton, Wisconsin, warrants to authorized distributors 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. Notifications submitted as online warranty claims must provide detailed descriptions of the fault and troubleshooting steps taken to diagnose failed parts. Warranty claims that lack the required information as defined in the Miller Service Operation Guide (SOG) may be denied by Miller.

Miller shall honor warranty claims on warranted equipment listed below in the event of a defect within the warranty coverage time periods listed below. Warranty time periods start on the delivery date of the equipment to the end-user purchaser, or 12 months after the equipment is shipped to a North American distributor, or 18 months after the equipment is shipped to an international distributor, whichever occurs first.

1. 5 Years Parts — 3 Years Labor
 - * Original Main Power Rectifiers Only to Include SCRs, Diodes, and Discrete Rectifier Modules
2. 3 Years — Parts and Labor Unless Specified
 - * Auto-Darkening Helmet Lenses (No Labor) (See Classic Series Exception Below)
 - * Engine Driven Welder/Generators
(NOTE: Engines are Warranted Separately by the Engine Manufacturer.)
 - * Insight Welding Intelligence Products
 - * Inverter Power Sources
 - * Plasma Arc Cutting Power Sources
 - * Process Controllers
 - * Semi-Automatic and Automatic Wire Feeders
 - * Transformer/Rectifier Power Sources
3. 2 Years — Parts and Labor
 - * Auto-Darkening Helmet Lenses – Classic Series Only (No Labor)
 - * Auto-Darkening Weld Masks (No Labor)
 - * Fume Extractors – Capture 5, Filtrair 400 and Industrial Collector Series
4. 1 Year — Parts and Labor Unless Specified
 - * AugmentedArc and LiveArc Welding Systems
 - * Automatic Motion Devices
 - * Bernard BTB Air-Cooled MIG Guns (No Labor)
 - * CoolBelt and CoolBand Blower Unit (No Labor)
 - * Desiccant Air Dryer System
 - * Field Options
(NOTE: Field options are covered for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
 - * RFCS Foot Controls (Except RFCS-RJ45)
 - * Fume Extractors – Filtrair 130, MWX and SWX Series HF Units
 - * ICE/XT Plasma Cutting Torches (No Labor)
 - * Induction Heating Power Sources, Coolers
(NOTE: Digital Recorders are Warranted Separately by the Manufacturer.)
 - * Load Banks
 - * Motor-Driven Guns (except Spoolmate Spoolguns)
 - * PAPR Blower Unit (No Labor)
 - * Positioners and Controllers
 - * Racks (For Housing Multiple Power Sources)
 - * Running Gear/Trailers
 - * Spot Welders

- * Subarc Wire Drive Assemblies
 - * TIG Torches (No Labor)
 - * Tregaskiss Guns (No Labor)
 - * Water Cooling Systems
 - * Wireless Remote Foot/Hand Controls and Receivers
 - * Work Stations/Weld Tables (No Labor)
5. 6 Months — Parts
 - * Batteries
 6. 90 Days — Parts
 - * Accessories (Kits)
 - * Canvas Covers
 - * Induction Heating Coils and Blankets, Cables, and Non-Electronic Controls
 - * M-Guns
 - * MIG Guns, Subarc (SAW) Torches, and External Cladding Heads
 - * Remote Controls and RFCS-RJ45
 - * Replacement Parts (No labor)
 - * Spoolmate Spoolguns

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

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, relays, work station table tops and welding curtains, or parts that fail due to normal wear. (Exception: brushes and relays are covered on all engine-driven products.)**
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.
4. Defects caused by accident, unauthorized repair, or improper testing.

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

The exclusive remedies for warranty claims are, at Miller's option, either: (1) repair; or (2) replacement; or, if approved in writing by Miller, (3) the pre-approved 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 use). Products may not be returned without Miller's written approval. Return shipment shall be at customer's risk and expense.

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

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





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.

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

International Headquarters—USA

USA Phone: 920-735-4505 Auto-Attended
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For International Locations Visit
www.MillerWelds.com

