OM-4405 200 972A
January 2001

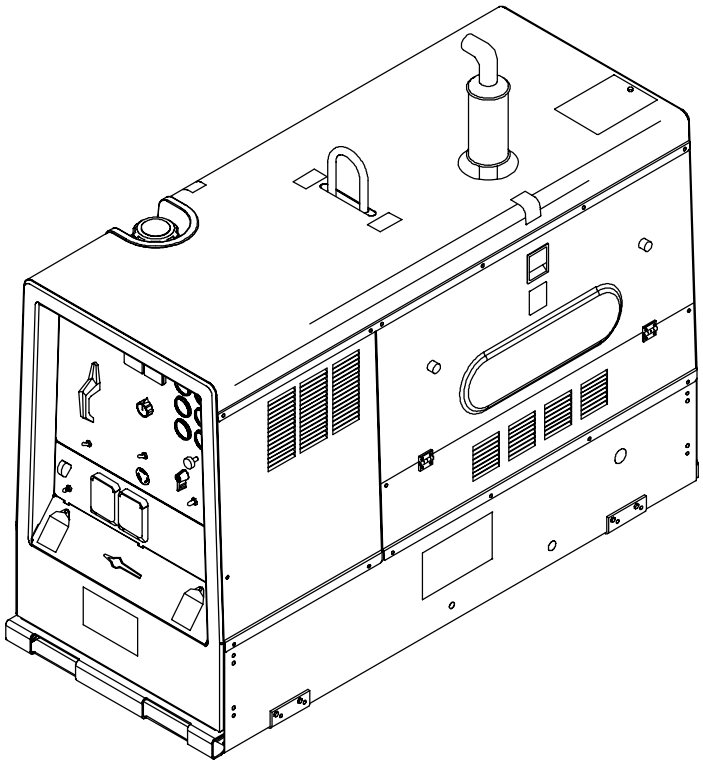
Processes

- Stick (SMAW) Welding
- TIG (GTAW) Welding
- MIG (GMAW) Welding
- Flux Cored (FCAW) Welding
- Air Carbon Arc (CAC-A) Cutting and Gouging

Description

Engine Driven Welding Generator

Big 40® WG



OWNER'S MANUAL

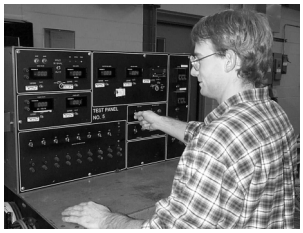
MANUAL DEL OPERADOR

(cuando disponible) sigue al manual en inglés

Visit our website at
www.MillerWelds.com

From Miller to You

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



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

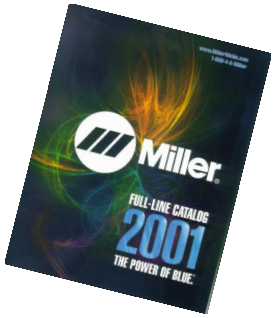
Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

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

ISO 9001 REGISTERED QUALITY SYSTEM

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

Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual catalog 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.**



TRUE BLUE® WARRANTY

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

Miller offers a Technical Manual which provides more detailed service and parts information for your unit. To obtain a Technical Manual, contact your local distributor. Your distributor can also supply you with Welding Process Manuals such as SMAW, GTAW, GMAW, and GMAW-P.

Miller
The Power of Blue.

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(Continued)

⚠ WARNING

This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)

⚠ WARNING

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

⚠ WARNING

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

The following terms are used interchangeably throughout this manual:

Stick = SMAW
TIG = GTAW
MIG = GMAW

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SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

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1-1. Symbol Usage

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

▲ **Marks a special safety message.**

☞ *Means "Note"; not safety related.*

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

1-2. 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 1-5. Read and follow all Safety Standards.**

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

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

ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

SIGNIFICANT DC VOLTAGE exists after stopping engine on inverters.

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

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 a welding helmet fitted with a proper shade of filter 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 and glare; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (wool and leather) and foot protection.

FUMES AND GASES can be hazardous.

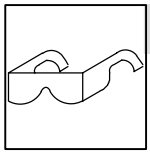
Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
- If ventilation is poor, use an approved air-supplied respirator.
- Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watch-person nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.

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.

- Protect yourself and others from flying sparks and hot metal.
- Do not weld where flying sparks can strike flammable material.
- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- 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 and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.



FLYING METAL 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.

BUILDUP OF GAS can injure or kill.

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

HOT PARTS can cause severe burns.

- Allow cooling period before maintaining.
- Wear protective gloves and clothing when working on a hot engine.
- Do not touch hot engine parts or just-welded parts bare-handed.

NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.

MAGNETIC FIELDS can affect pacemakers.

- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.

CYLINDERS can explode if damaged.

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

- Protect compressed gas cylinders from excessive heat, mechanical shocks, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

1-3. Engine Hazards

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.

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.

MOVING PARTS can cause injury.

- Keep away from fans, belts, and rotors.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Stop engine before installing or connecting unit.
- Have only qualified people remove guards or covers 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 panels or guards and close doors 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.

BATTERY EXPLOSION can BLIND.

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

BATTERY ACID can BURN SKIN and EYES.

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

ENGINE EXHAUST GASES can kill.

- Use equipment outside in open, well-ventilated areas.
- If used in a closed area, vent engine exhaust outside and away from any building air intakes.

ENGINE HEAT can cause fire.

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

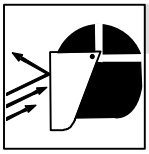
EXHAUST SPARKS can cause fire.

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

1-4. Additional Symbols For Installation, Operation, And Maintenance

FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, trailer, or any other accessories.
- Use 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.

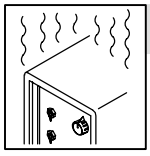


FLYING SPARKS can cause injury.

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

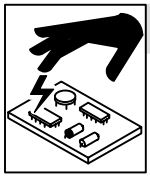
OVERHEATING can damage motors.

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



OVERUSE can cause OVERHEATING.

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

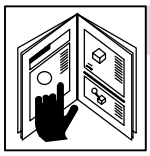


STATIC (ESD) can damage PC boards.

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

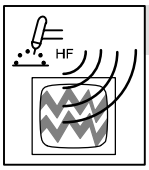
TILTING OF TRAILER can cause injury.

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



READ INSTRUCTIONS.

- Use only genuine MILLER replacement parts.
- Perform engine maintenance and service according to this manual and the engine manual.



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 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.

1-5. Principal Safety Standards

Safety in Welding and Cutting, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami FL 33126

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126

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

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

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

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

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

1-6. EMF Information

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

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

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

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

About Pacemakers:

Pacemaker wearers consult your doctor first. If cleared by your doctor, then following the above procedures is recommended.

SECTION 1 – CONSIGNES DE SÉCURITÉ – LIRE AVANT UTILISATION

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1-1. Signification des symboles

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

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

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

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

1-2. 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 1-5. Veuillez lire et respecter toutes ces normes de sécurité.**

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

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

UN CHOC ÉLECTRIQUE peut tuer.

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

- Ne jamais toucher les pièces électriques sous tension.
- Porter des gants et des vêtements de protection secs ne comportant pas de trous.
- S'isoler de la pièce et de la terre au moyen de tapis ou d'autres moyens isolants suffisamment grands pour empêcher le contact physique éventuel avec la pièce ou la terre.
- Ne pas se servir de source électrique àcourant électrique dans les zones humides, dans les endroits confinés ou là où on risque de tomber.
- Se servir d'une source électrique àcourant électrique UNIQUEMENT si le procédé de soudage le demande.
- Si l'utilisation d'une source électrique àcourant électrique s'avère nécessaire, se servir de la fonction de télécommande si l'appareil en est équipé.
- 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.
- Vérifier fréquemment le cordon d'alimentation pour voir s'il n'est pas endommagé ou dénudé – remplacer le cordon immédiatement s'il est endommagé – un câble dénudé peut provoquer une électrocution.
- Mettre l'appareil hors tension quand on ne l'utilise pas.
- Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épissés.
- Ne pas enrouler les câbles autour du corps.
- Si la pièce soudée doit être mise à la terre, le faire directement avec un câble distinct – ne pas utiliser le connecteur de pièce ou le câble de retour.
- Ne pas toucher l'électrode quand on est en contact avec la pièce, la terre ou une électrode provenant d'une autre machine.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.
- Porter un harnais de sécurité quand on travaille en hauteur.
- Maintenir solidement en place tous les panneaux et capots.
- Fixer le câble de retour de façon à obtenir un bon contact métal-métal avec la pièce à souder ou la table de travail, le plus près possible de la soudure.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.

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

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

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 muni d'un écran de filtre approprié 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 protections approuvés pour les oreilles si le niveau sondre est trop élevé.
- Utiliser des écrans ou des barrières pour protéger des tiers de l'éclair et de l'éblouissement; demander aux autres personnes de ne pas regarder l'arc.
- Porter des vêtements de protection constitué dans une matière durable, résistant au feu (laine ou cuir) et une protection des pieds.

LES FUMÉES ET LES GAZ peuvent être dangereux.

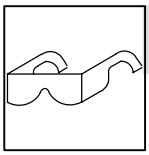
Le soudage génère des fumées et des gaz. Leur inhalation peut être dangereux pour votre santé.

- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- À l'interieur, ventiler la zone et/ou utiliser un échappement au niveau de l'arc pour l'évacuation des fumées et des gaz de soudage.
- Si la ventilation est insuffisante, utiliser un respirateur à alimentation d'air homologué.
- Lire les spécifications de sécurité des matériaux (MSDSs) et les instructions du fabricant concernant les métaux, les consommables, les revêtements, les nettoyants et les dégraisseurs.
- 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 si nécessaire, 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.

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.

- Se protéger et d'autres personnes de la projection d'étincelles et de métal chaud.
- Ne pas souder dans un endroit là où des étincelles peuvent tomber sur des substances inflammables.
- Déplacer toutes les substances inflammables à une distance de 10,7 m de l'arc de soudage. En cas d'impossibilité les recouvrir soigneusement avec des protections homologués.
- Des étincelles et des matériaux chauds du soudage peuvent facilement passer dans d'autres zones en traversant de petites fissures et des ouvertures.
- Surveiller tout déclenchement d'incendie et tenir un extincteur à proximité.
- Le soudage effectué sur un plafond, plancher, paroi ou séparation peut déclencher un incendie de l'autre côté.
- Ne pas effectuer le soudage sur des conteneurs fermés tels que des réservoirs, tambours, ou conduites, à moins qu'ils n'aient été préparés correctement conformément à AWS F4.1 (voir les normes de sécurité).
- Brancher le câble sur la pièce le 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 et d'incendie.
- Ne pas utiliser le poste de soudage pour dégeler des conduites gelées.
- En cas de non utilisation, enlever la baguette d'électrode du porte-électrode ou couper le fil à la pointe de contact.
- Porter des vêtements de protection dépourvus d'huile tels que des gants en cuir, une chemise en matériau lourd, des pantalons sans revers, des chaussures hautes et un couvre chef.
- Avant de souder, retirer toute substance combustible de vos poches telles qu'un allumeur au butane ou des allumettes.



DES PARTICULES VOLANTES peuvent blesser les yeux.

- Le soudage, l'écaillement, 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 ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.

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

DES PIÈCES CHAUDES peuvent provoquer des brûlures graves.

- Prévoir une période de refroidissement avant d'effectuer des travaux d'entretien.
- Porter des gants et des vêtements de protection pour travailler sur un moteur chaud.
- Ne pas toucher à mains nues les parties chaudes du moteur ni les pièces récemment soudées.

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 sondre est trop élevé.

LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs d'un stimulateur cardiaque doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de gougeage ou de soudage par points.

Si des BOUTEILLES sont endommagées, elles pourront exploser.

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

- Protéger les bouteilles de gaz comprimé d'une chaleur excessive, des chocs mécaniques, du laitier, des flammes ouvertes, des étincelles et des arcs.
- Placer les bouteilles debout en les fixant dans un support stationnaire ou dans un porte-bouteilles pour les empêcher de tomber ou de se renverser.
- Tenir les bouteilles éloignées des circuits de soudage ou autres circuits électriques.
- Ne jamais placer une torche de soudage sur une bouteille à gaz.
- Une électrode de soudage ne doit jamais entrer en contact avec une bouteille.
- Ne jamais souder une bouteille pressurisée – risque d'explosion.
- Utiliser seulement des bouteilles de gaz protecteur, régulateurs, tuyaux et raccords convenables pour cette application spécifique; les maintenir ainsi que les éléments associés en bon état.
- Ne pas tenir la tête en face de la sortie en ouvrant la soupape de la bouteille.
- Maintenir le chapeau de protection sur la soupape, sauf en cas d'utilisation ou de branchement de la bouteille.
- Lire et suivre les instructions concernant les bouteilles de gaz comprimé, les équipements associés et les publication P-1 CGA énumérées dans les normes de sécurité.

1-3. Dangers existant en relation avec le moteur

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.

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

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

DES ORGANES MOBILES peuvent provoquer des blessures.

- Ne pas approcher les mains des ventilateurs, courroies et autres pièces en mouvement.
- Maintenir fermés et fixement en place les portes, panneaux, recouvrements et dispositifs de protection.
- Arrêter le moteur avant d'installer ou brancher l'appareil.
- 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.
- Pour empêcher tout démarrage accidentel pendant les travaux d'entretien, débrancher le câble négatif (–) de batterie de la borne.
- Ne pas approcher les mains, cheveux, vêtements lâches et outils des organes mobiles.
- Remettre en place les panneaux ou les dipositifs de protection et fermer les portes à la fin des travaux d'entretien et avant de faire démarrer le moteur.
- Avant d'intervenir, déposer les bougies ou injecteurs pour éviter la mise en route accidentelle du moteur.
- Bloquer le volant moteur pour éviter sa rotation lors d'une intervention sur le générateur.

L'EXPLOSION DE LA BATTERIE peut RENDRE AVEUGLE.

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

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.

LES GAZ D'ÈCHAPPEMENT DU MOTEUR peuvent provoquer des accidents mortels.

- Utiliser l'équipement à l'extérieur dans des zones ouvertes et bien ventilées.
- En cas d'utilisation dans un endroit fermé évacuer les gaz d'échappement du moteur vers l'extérieur à distance des entrées d'air dans les bâtiments.

LA CHALEUR DU MOTEUR peut provoquer un incendie.

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

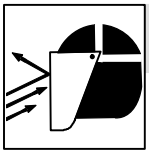
LES ÉTINCELLES À L'ÉCHAPPEMENT peuvent provoquer un incendie.

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

1-4. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance

LA CHUTE DE L'APPAREIL peut blesser.

- Utiliser l'anneau de levage uniquement pour soulever l'appareil lui-même ; sans chariot, de bouteilles de gaz, remorque, ou autres accessoires.
- Utiliser un équipement de levage de capacité suffisante pour lever 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.

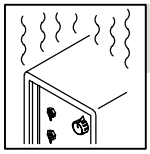


LES ÉTINCELLES VOLANTES risquent de provoquer des blessures.

- Porter un écran facial pour protéger le visage et les yeux.
- Affuterr l'électrode au tungstène uniquement à la meuleuse dotée de protecteurs. Cette manoeuvre 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.

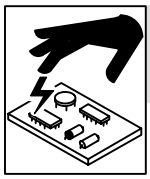
LE SURCHAUFFEMENT peut endommager le moteur électrique.

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



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.

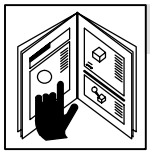


LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- 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 imprimes.

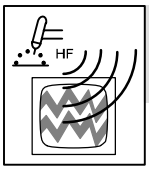
UNE REMORQUE QUI BASCULE peut entraîner des blessures.

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



LIRE LES INSTRUCTIONS.

- Utiliser seulement les pièces de rechange d'origine.
- Effecteur la maintenance et la mise en service d'après le manuel et celui du moteur.



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 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.

1-5. Principales normes de sécurité

Safety in Welding and Cutting, norme ANSI Z49.1, de l'American Welding Society, 550 N.W. Lejeune Rd, Miami FL 33126

Safety and Health Sandards, OSHA 29 CFR 1910, du Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practice for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, norme AWS F4.1, de l'American Welding Society, 550 N.W. Lejeune Rd, Miami FL 33126

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

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

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

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

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

1-6. Information sur les champs électromagnétiques

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

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

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

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

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

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

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

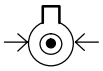
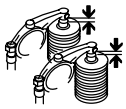
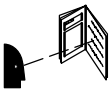
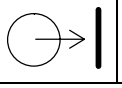
5 Relier la pince de masse le plus près possible de la zone de soudure.

Consignes relatives aux stimulateurs cardiaques :

Les personnes qui portent un stimulateur cardiaque doivent avant tout consulter leur docteur. Si vous êtes déclaré apte par votre docteur, il est alors recommandé de respecter les consignes ci–dessus.

SECTION 2 – DEFINITIONS

2-1. Symbols And Definitions

	Stop Engine		Fast (Run, Weld/ Power)		Slow (Idle)		Start Engine
	Air Temperature Or Engine Temperature		Battery (Engine)		Engine Oil Pressure		Engine Oil
	Engine		Check Valve Clearance		Fuel		Protective Earth (Ground)
	Positive		Negative		Certified/Trained Mechanic		Welding Arc
	Amperes		Volts		Panel/Local		Remote
	Electrode Connection		Work Connection		Output		Alternating Current
	Stick (SMAW) Welding		Constant Current (CC)		MIG (GMAW) Welding		TIG (GTAW)
	Time	h	Hours	s	Seconds	1 	Single Phase
3 	Three Phase		Read Operator's Manual		Circuit Breaker		Do Not Switch While Welding
	Engine Choke		Contactor On	Hz	Hertz		

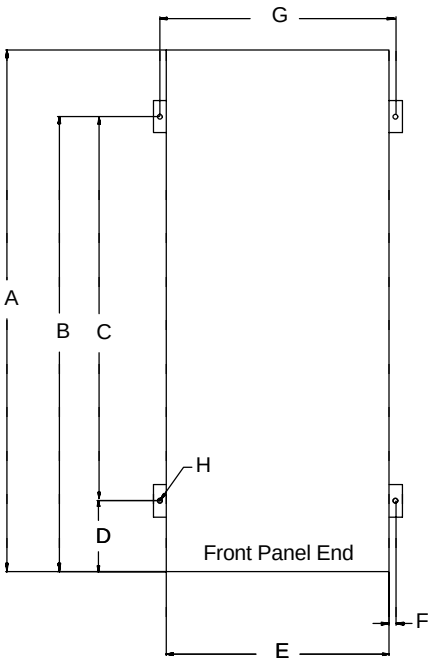
SECTION 3 – SPECIFICATIONS

3-1. Weld, Power, And Engine Specifications

Welding Mode	Weld Output Range	Rated Welding Output	Maximum Open-Circuit Voltage	Auxiliary Power Rating	Engine	Fuel Capacity
CC/DC	45 – 500 A (CC Models) 15 – 500 A (CC/CV Models)	300 A, 40 Volts DC, 100% Duty Cycle 400 A, 40 Volts DC, 60% Duty Cycle 500 A, 30 Volts DC, 40% Duty Cycle	95	**Standard** Single-Phase, 4 kVA/kW, 34/17 A, 120/240 V AC, 50/60 Hz **Full kVA Option*** Single-Phase/Three-Phase, 12/15 kVA/kW, 50/36A, 120/240 VAC, 60 Hz *In Addition To Standard 4 kVA/kW Auxiliary Power	Wis·Con Wis-Con TM-20 Water-Cooled, Three-Cylinder, 38 HP Gasoline Engine	25 gal (95 L)
CV/DC (CC/CV Models Only)	14 – 40 V		56			

3-2. Dimensions, Weights, And Operating Angles

Dimensions	
Height	58 in (1473 mm) (to top of muffler)
Width	28-1/2 in (724 mm) (mtg. brackets turned in) 30-3/4 in (781 mm) (mtg. brackets turned out)
Depth	64-7/16 in (1637 mm)
A	64-7/16 in (1637 mm)
B	55-7/8 in (1419 mm)
C	46-3/8 in (1178)
D	9-1/2 in (241 mm)
E	27-1/2 in (699 mm)
F	1 in (25 mm)
G	29-1/2 in (743 mm)
H	9/16 in (14 mm) Dia. 4 Holes
Weight	
No fuel: 1600 lb (726 kg) w/fuel: 1775 lb (805 kg)	



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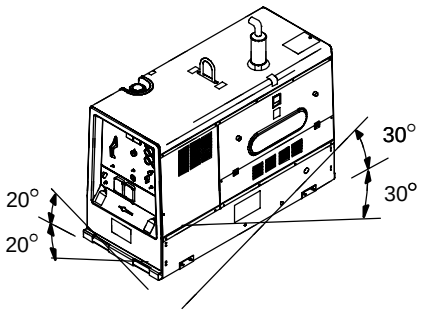
▲ **Do not exceed tilt angles or engine could be damaged or unit could tip.**

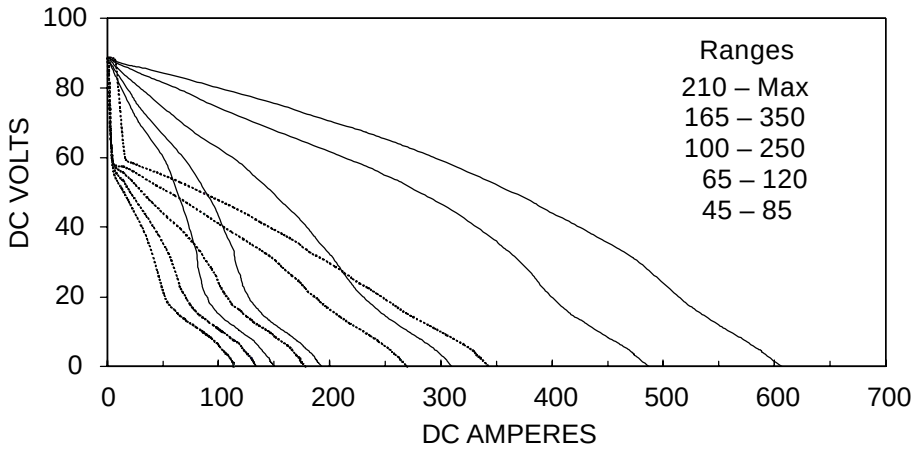
▲ **Do not move or operate unit where it could tip.**



802 729

3-3. Volt-Ampere Curves For CC Models

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

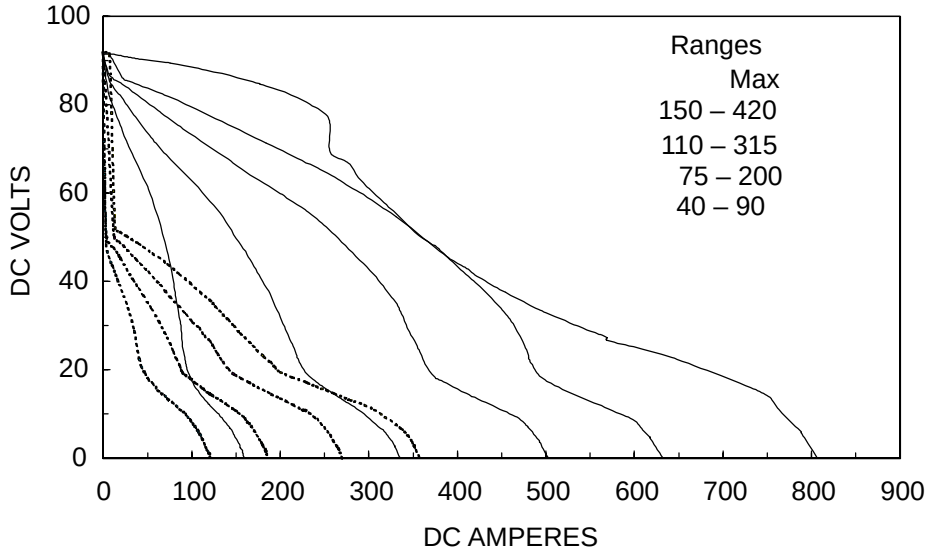


202 666-A

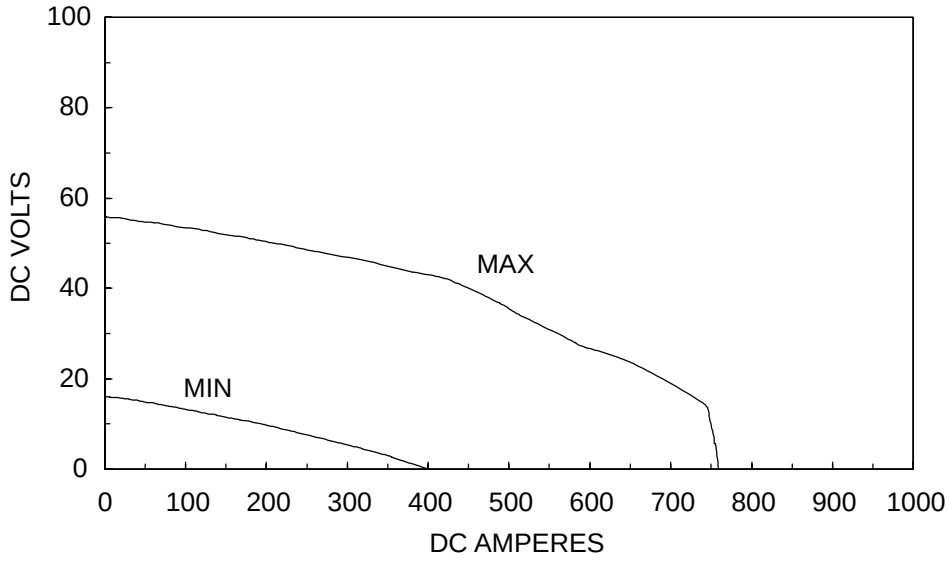
3-4. Volt-Ampere Curves for CC/CV Models

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

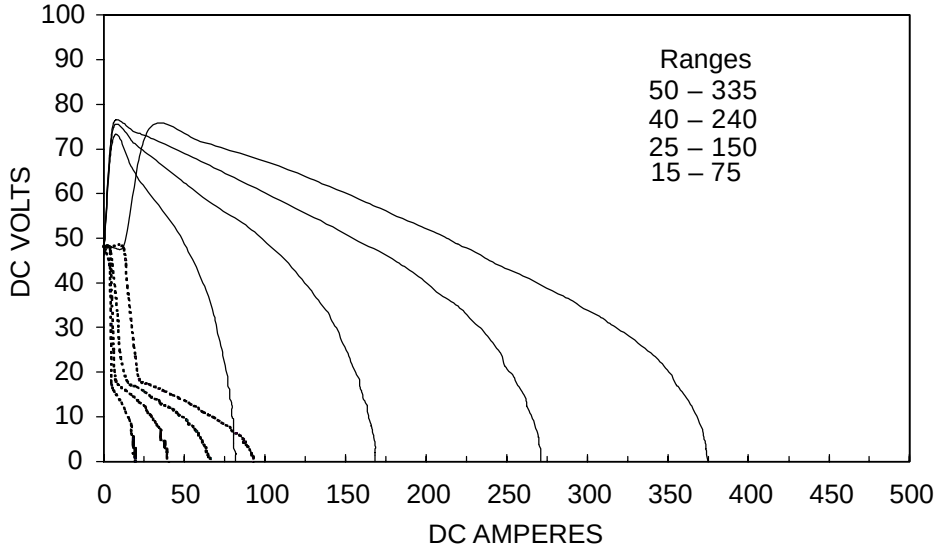
A. Stick Mode



B. MIG Mode



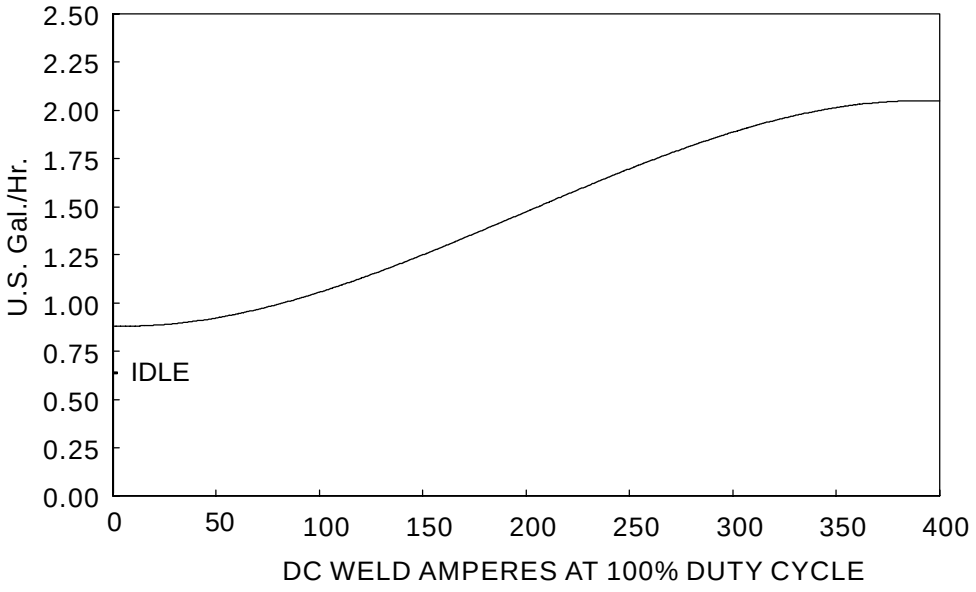
C. TIG Mode



202 655 / 202 656 / 202 654

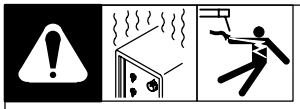
3-5. Fuel Consumption

The curve shows typical fuel use under weld or power loads.

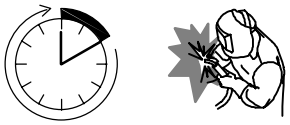


201 033

3-6. Duty Cycle And Overheating



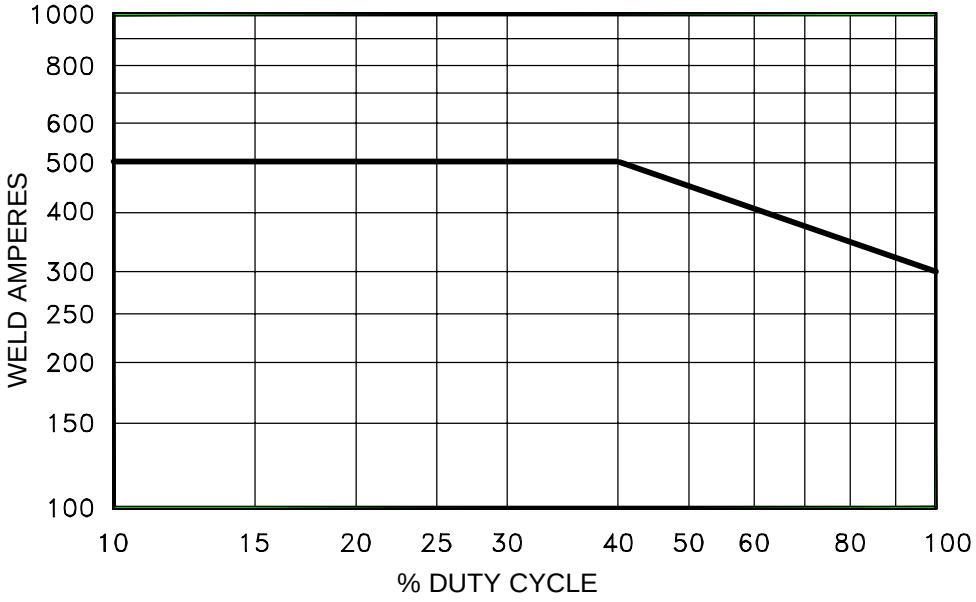
100% Duty Cycle At 300 Amperes



Continuous Welding

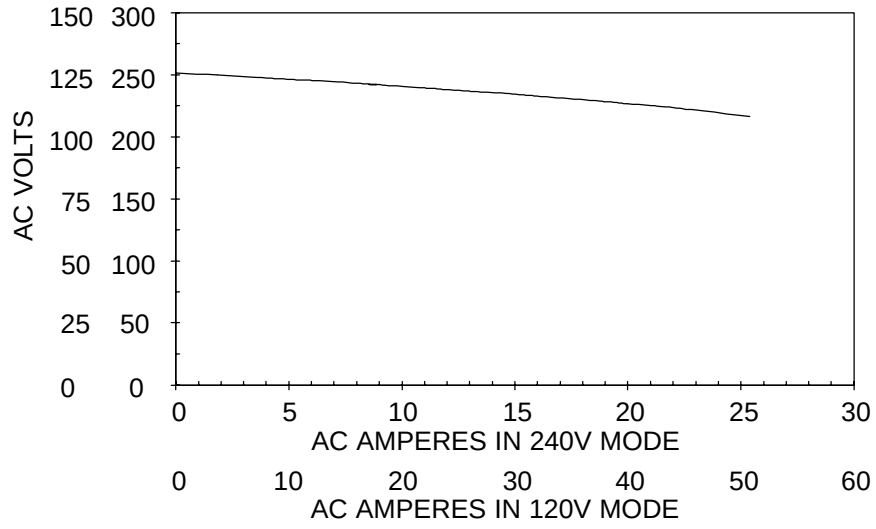
Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

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



199 140

3-7. AC Auxiliary Power Curve

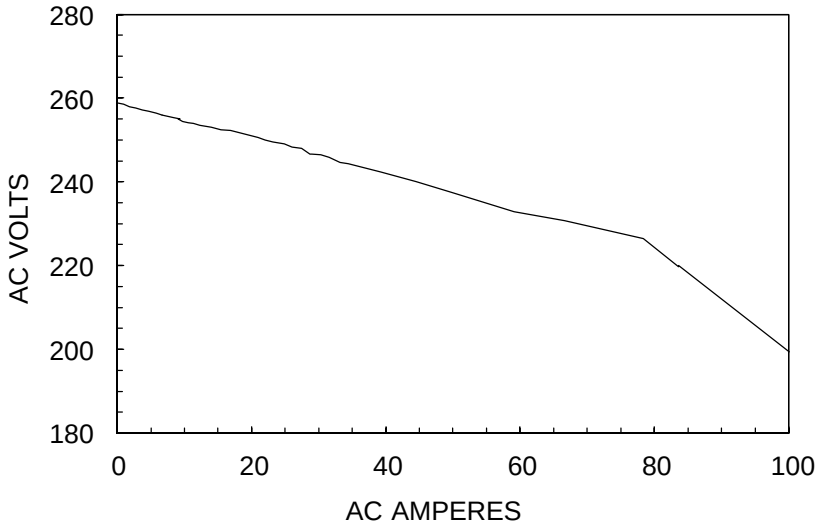


The ac power curve shows the auxiliary power in amperes available at the 120 and 240 volt receptacles.

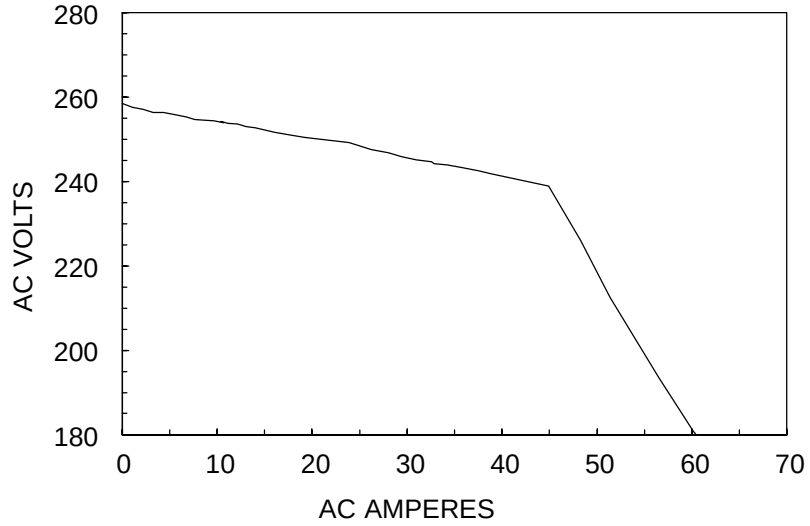
193 018

3-8. Optional AC Power Plant Curves

A. 12 kVA/kW Single-Phase Auxiliary Power Plant (No Weld Load)



B. 15 kVA/kW Three-Phase Auxiliary Power Plant (No Weld Load)

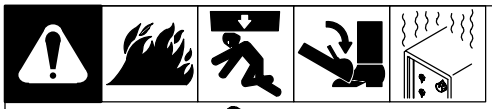


The ac power curves show the auxiliary power available in amperes at the single-phase 120/240 volt receptacle or three-phase 240 volt terminals.

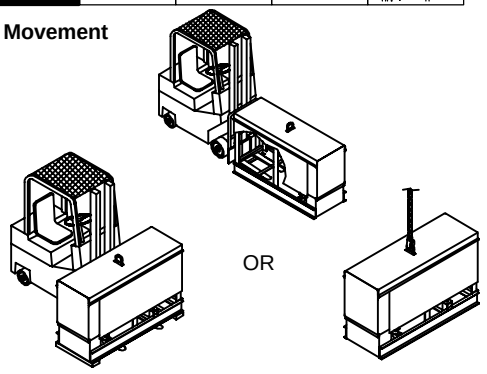
198 868 /98 869

SECTION 4 – INSTALLATION

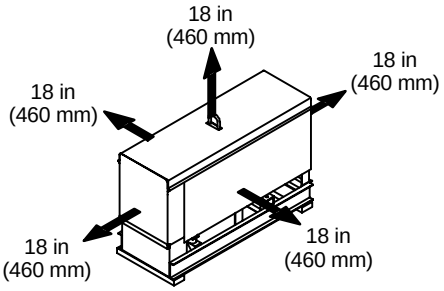
4-1. Installing Welding Generator (See Sections 4-2 And 4-3)



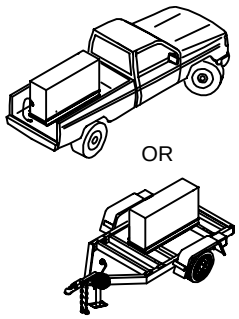
Movement



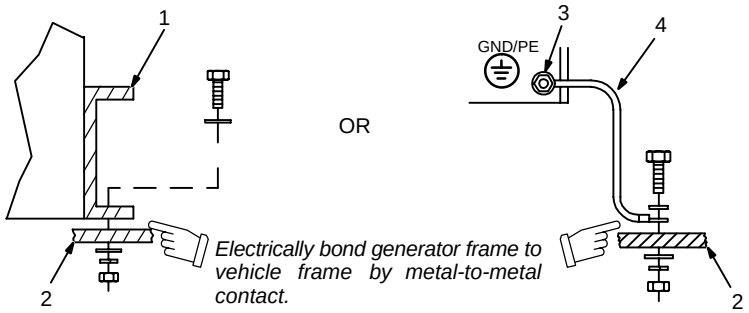
Airflow Clearance



Location



Grounding



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

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

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

1 Generator Base

2 Metal Vehicle Frame

3 Equipment Grounding Terminal

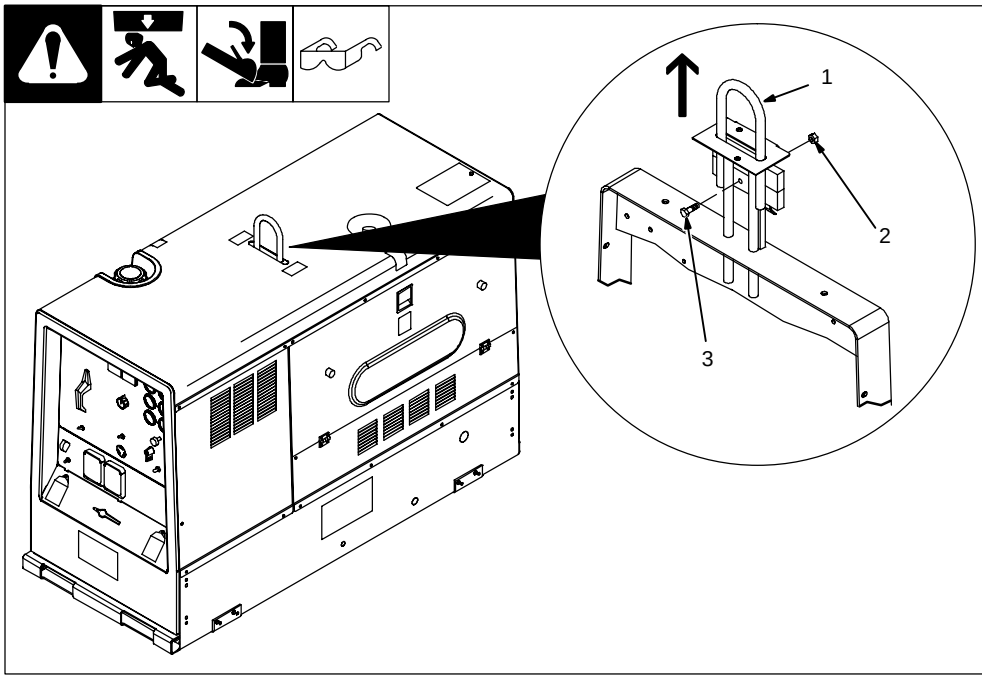
4 Grounding Cable

Use #10 AWG or larger insulated copper wire.

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

install2 1/01 – Ref. 800 652 / Ref. 800 477-A / 158 936-A / 0854

4-2. Using Lifting Eye



1 Lifting Eye

2 Nut

3 Carriage Bolt

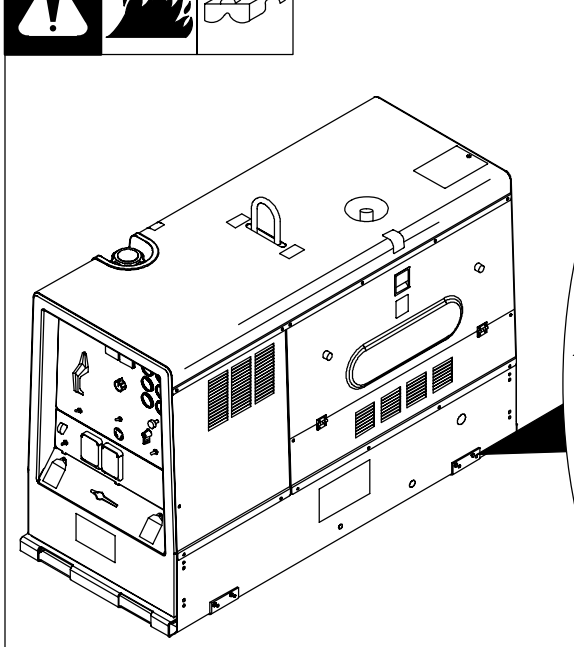
Raise lifting eye until it snaps in place. Lower lifting eye when not needed.

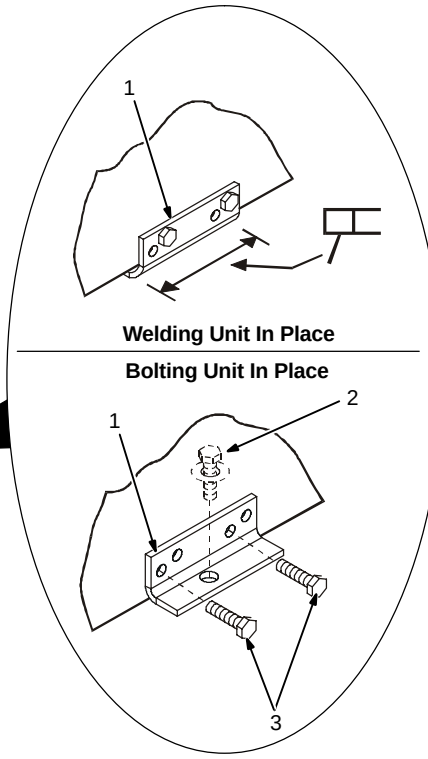
☞ *To lock the lifting eye in the upright position, insert a 3/8-16 x 1-1/2 in carriage bolt through slot in bracket and secure with nut (bolt and nut not supplied).*

Tools Needed:

Ref. 802 729

4-3. Mounting Welding Generator





▲ **Do not weld on base. Welding on base can cause fuel tank fire or explosion. Weld only on the four mounting brackets or bolt unit down.**

1 Mounting Bracket

2 1/2 in Bolt And Washer (Not Supplied)

3 3/8-16 x 1 in Screws (Supplied)

To Bolt Unit In Place:

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

Mount unit to truck or trailer with 1/2 in (12 mm) hardware (not supplied).

To Weld Unit In Place:

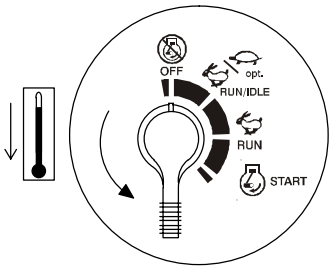
Weld unit to truck or trailer only at the four mounting brackets.

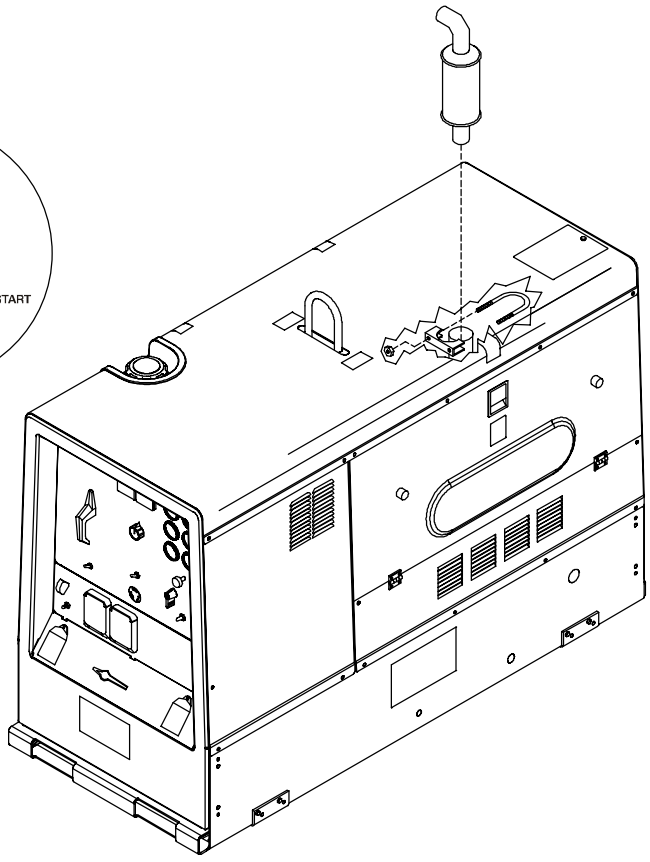
Tools Needed:

9/16 in

Ref. 190 250-A / Ref. 802 730

4-4. 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.**

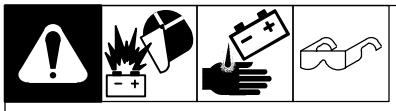
☞ *Point exhaust pipe in desired direction but always away from front panel and direction of travel.*

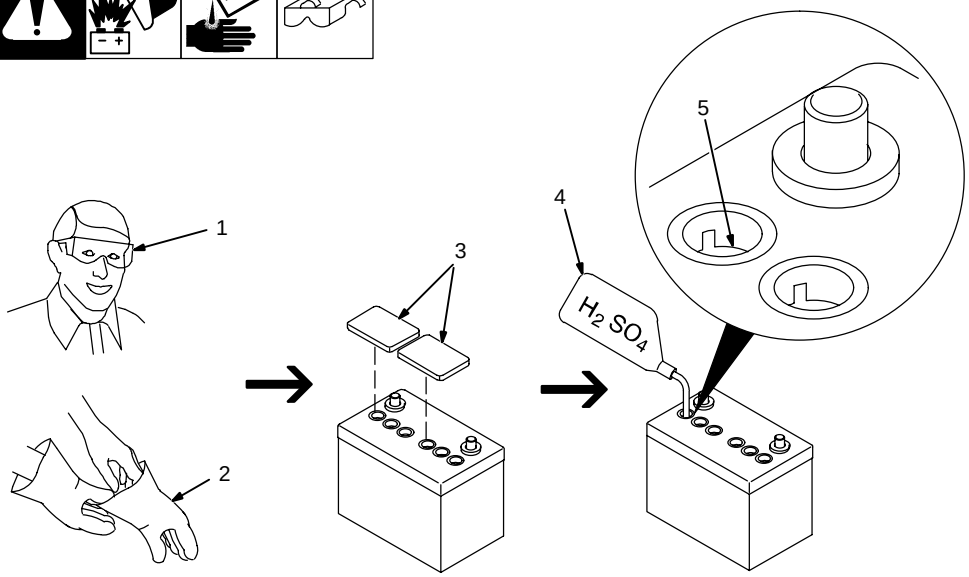
Tools Needed:

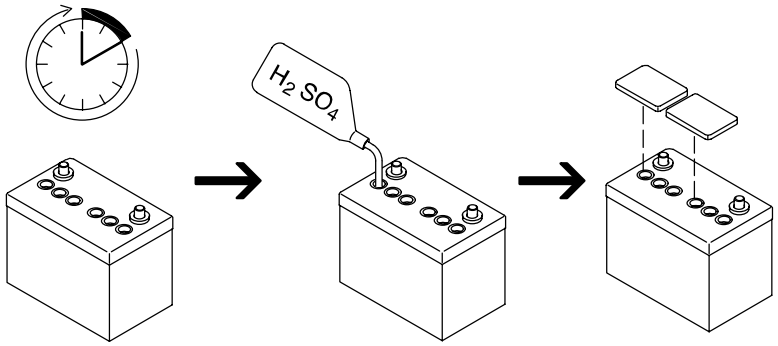
1/2 in

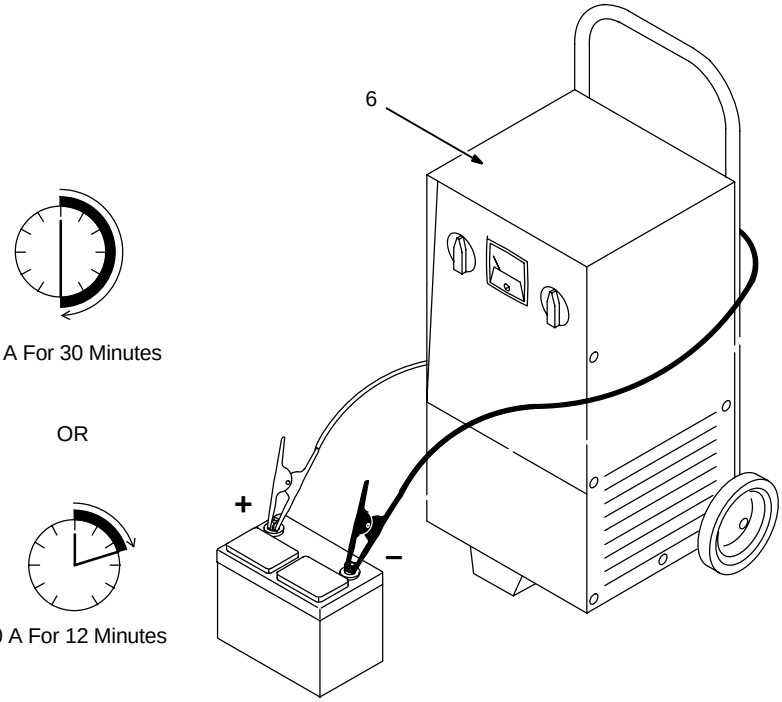
Ref. 802 730 / Ref. 201 841

4-5. Activating The Dry Charge Battery (If Applicable)









5 A For 30 Minutes

OR

30 A For 12 Minutes

Remove battery from unit.

1 Eye Protection – Safety Glasses Or Face Shield

2 Rubber Gloves

3 Vent Caps

4 Sulfuric Acid Electrolyte (1.265 Specific Gravity)

5 Well

Fill each cell with electrolyte to **bottom** of well (maximum).

▲ **Do not overfill battery cells.**

Wait ten minutes and check electrolyte level. If necessary, add electrolyte to raise to proper level. Reinstall vent caps.

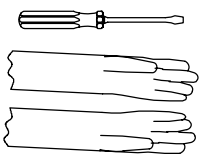
6 Battery Charger

▲ **Read and follow all instructions supplied with battery charger.**

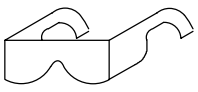
Charge battery for 12 minutes at 30 amperes or 30 minutes at 5 amperes. Disconnect charging cables and install battery.

☞ *When electrolyte is low, add only distilled water to cells to maintain proper level.*

Tools Needed:



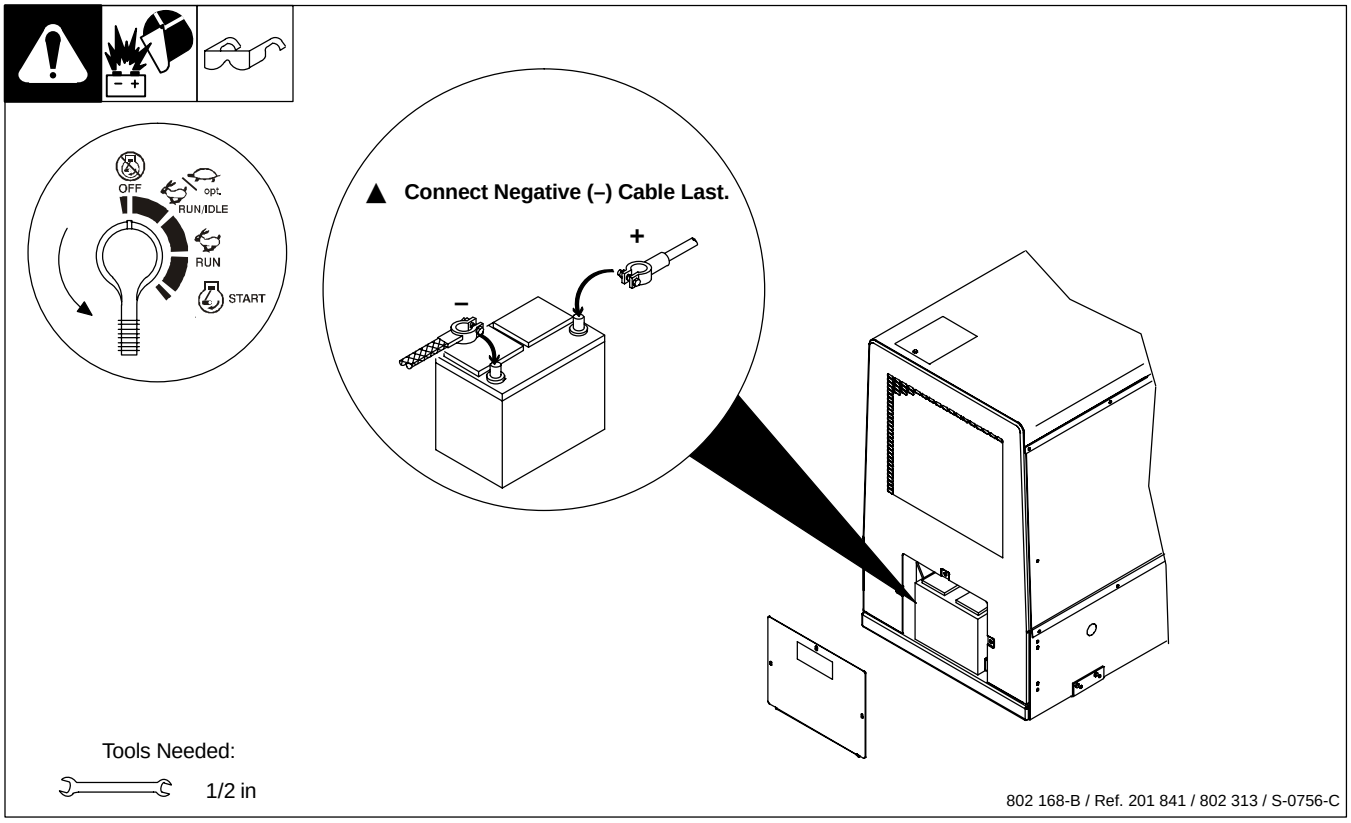
rubber gloves



glasses

drybatt1 1/98 – 0886

4-6. Connecting The Battery



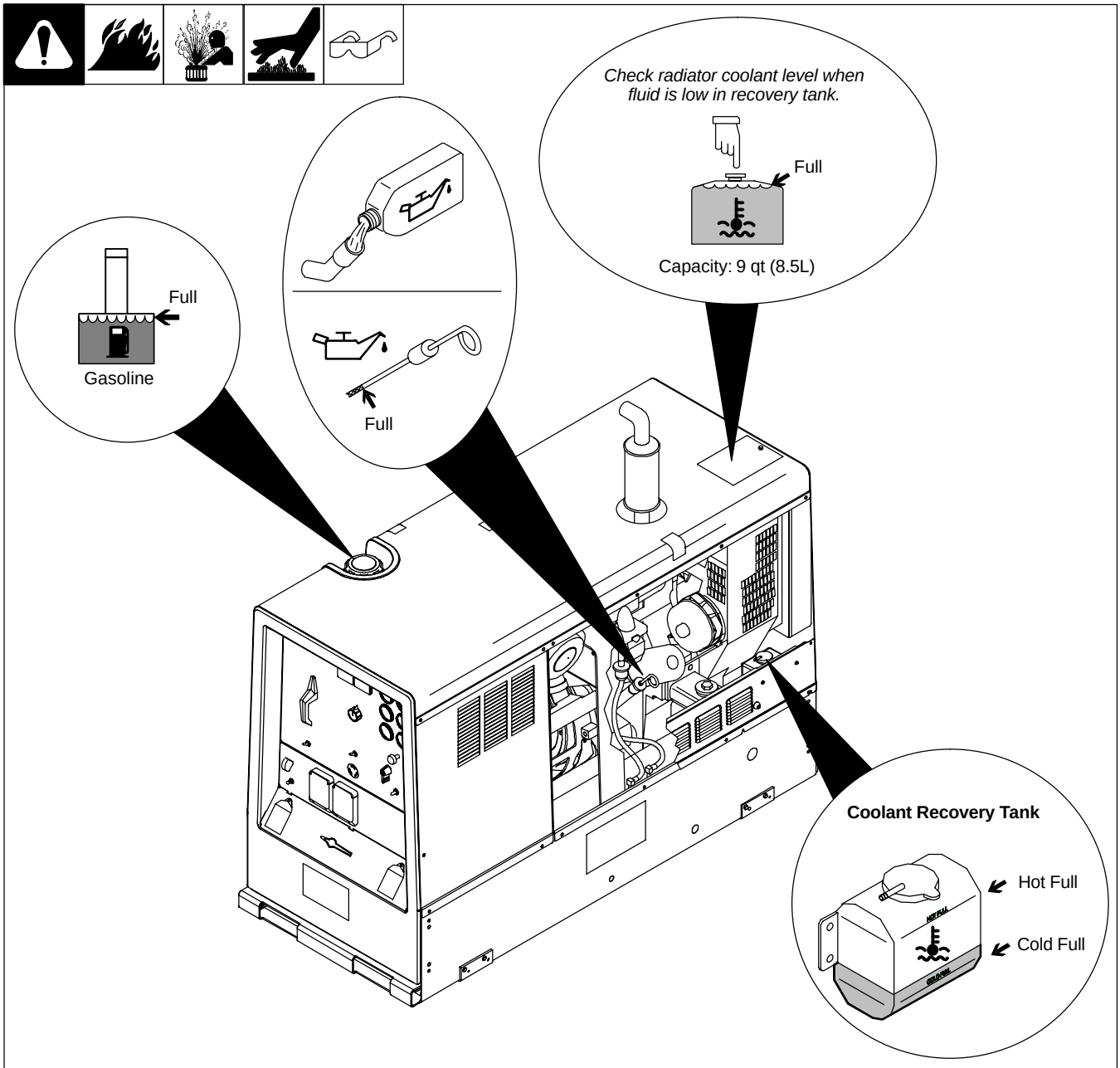
Tools Needed:

1/2 in

802 168-B / Ref. 201 841 / 802 313 / S-0756-C

Notes

4-7. Engine Prestart Checks



☞ *Check all engine fluids daily.*

Engine must be cold and on a level surface. Unit is shipped with 20W break-in oil.

Automatic shutdown system stops engine if oil pressure is too low, or coolant temperature is too high.

☞ *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.*

Follow run-in procedure in engine manual.

Fuel

Add fresh fuel before starting engine the first time (see engine maintenance label for fuel specifications).

Oil

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

Coolant

Check coolant level in radiator before starting unit the first time. If necessary, add coolant to radiator until coolant level is at bottom of filler neck.

Check coolant level in recovery tank daily. If necessary, add coolant to recovery tank until coolant level is between Cold Full and Hot Full levels. If recovery tank coolant level was low, also check coolant level in radiator. Add coolant if level is below bottom of radiator filler neck.

Engine coolant is a mixture of water and ethylene glycol base antifreeze. Add antifreeze to mixture if using the unit in temperatures below –34° F (–37° C).

Keep radiator and air intake clean and free of dirt.

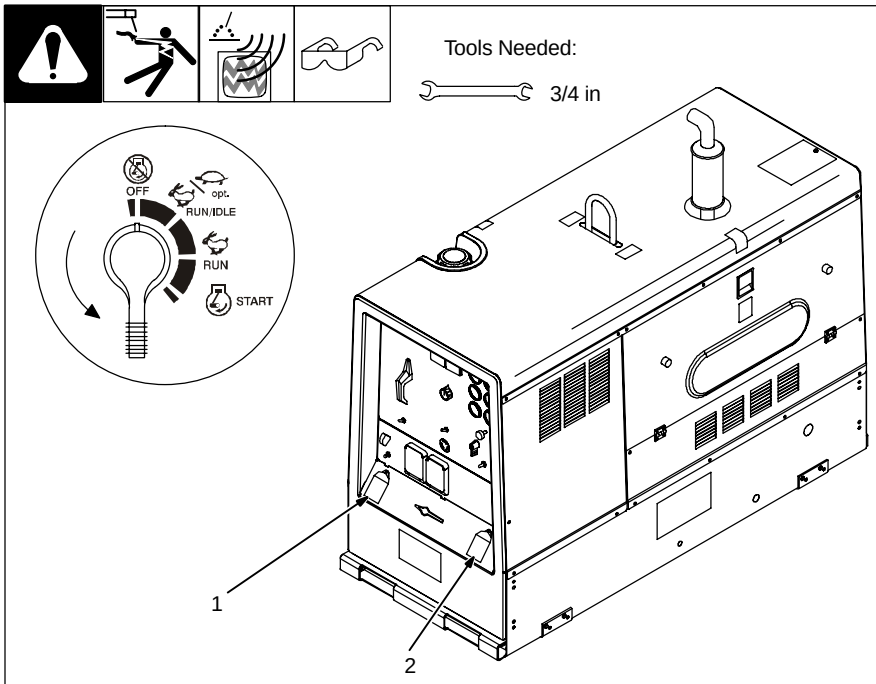
▲ **Incorrect engine temperature can damage engine. Do not run engine without a properly working thermostat and radiator cap.**

☞ *To improve cold weather starting:*

Keep battery in good condition. Store battery in warm area off concrete surface.

Use correct grade oil for cold weather (see Section 8-1).

4-8. Connecting To Weld Output Terminals



▲ **Stop engine.**

1 Positive (+) Weld Output Terminal

2 Negative (–) Weld Output Terminal

For Stick and TIG welding Direct Current Electrode Positive (DCEP), connect electrode holder cable to Positive (+) terminal on left and work cable to Negative (–) terminal on right.

For Direct Current Electrode Negative (DCEN), reverse cable connections.

If equipped with optional polarity switch, connect electrode holder cable to Electrode terminal on left and work cable to Work terminal on right.

For MIG and FCAW welding Direct Current Electrode Positive (DCEP) on CC/CV models, connect wire feeder cable to Positive (+) terminal on left and work cable to Negative (–) terminal on right. Use Process/Contactor switch to select type of weld output (see Section 6-3).

For Direct Current Electrode Negative (DCEN), reverse cable connections.

If equipped with optional polarity switch, connect wire feeder cable to Electrode terminal on left and work cable to Work terminal on right.

802 729

4-9. Selecting Weld Cable Sizes

Weld Output Terminals

▲ **Stop engine before connecting to weld output terminals.**

▲ **Do not use worn, damaged, undersized, or poorly spliced cables.**

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	60 – 100% Duty Cycle	10 – 100% Duty Cycle					
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)	2 ea. 2/0 (2x70)	2 ea. 2/0 (2x70)
300	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 3/0 (2x95)
350	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)
400	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)	2 ea. 4/0 (2x120)
500	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)	3 ea. 3/0 (3x95)	3 ea. 3/0 (3x95)

* This chart is a general guideline and may not suit all applications. If cable overheating occurs (normally you can smell it), 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.
( ) = mm^2 for metric use

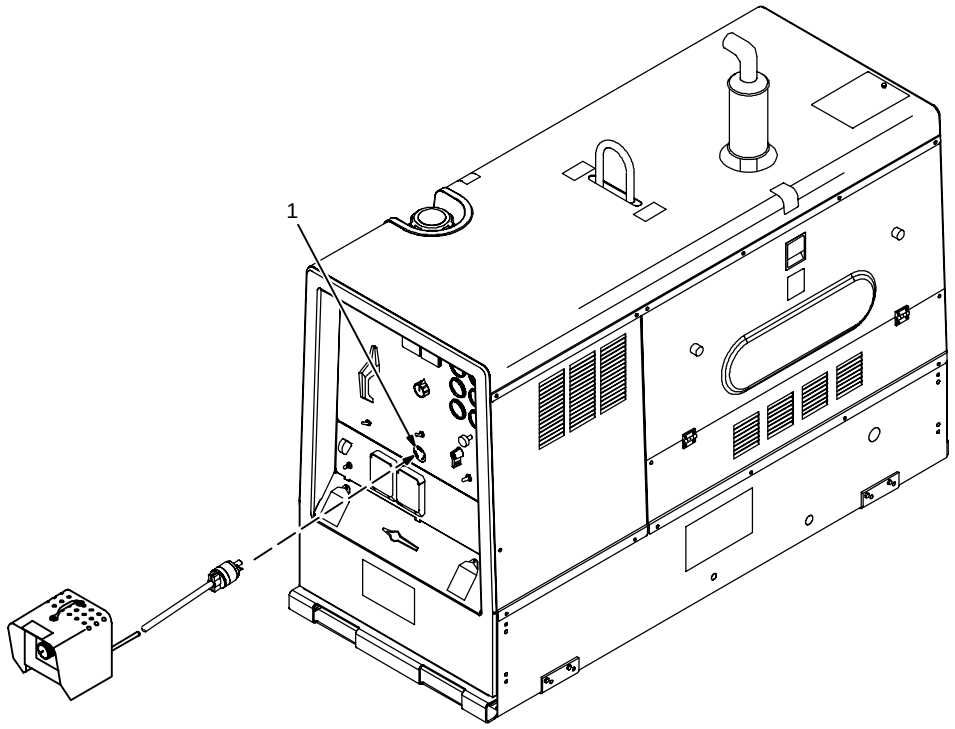
S-0007-E–

***For distances longer than those shown in this guide, call a factory applications representative at 920-735-4505.

4-10. Connecting To Remote Amperage Adjust Receptacle RC13 On CC Models

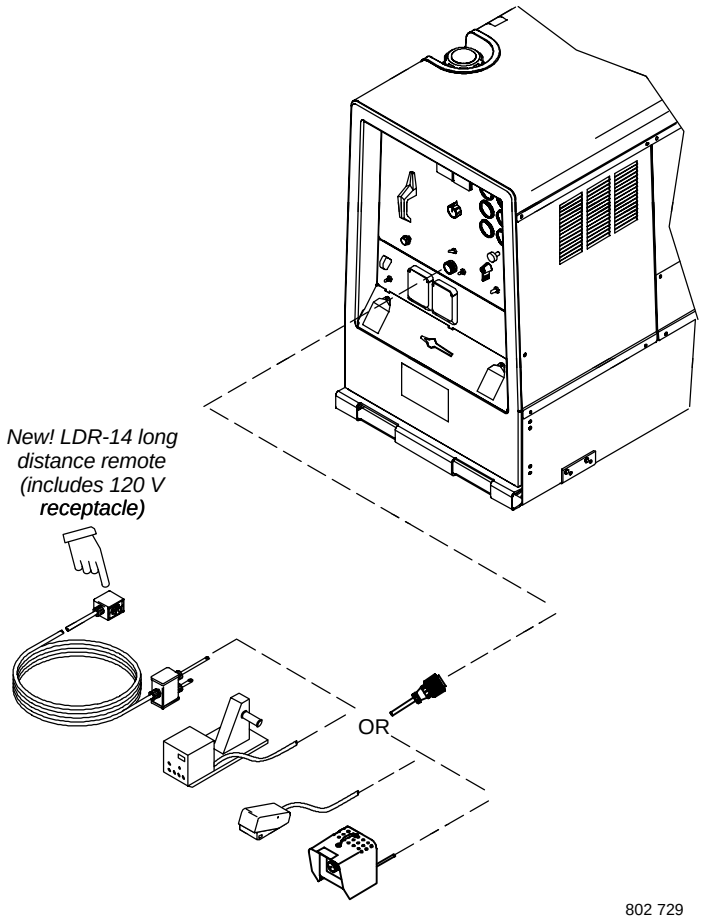
1 Remote Amperage Adjust Receptacle RC13

Connect optional remote control to RC13 (see Section 5-3).



Ref. 154 862-A / 048 720-K / 802 729

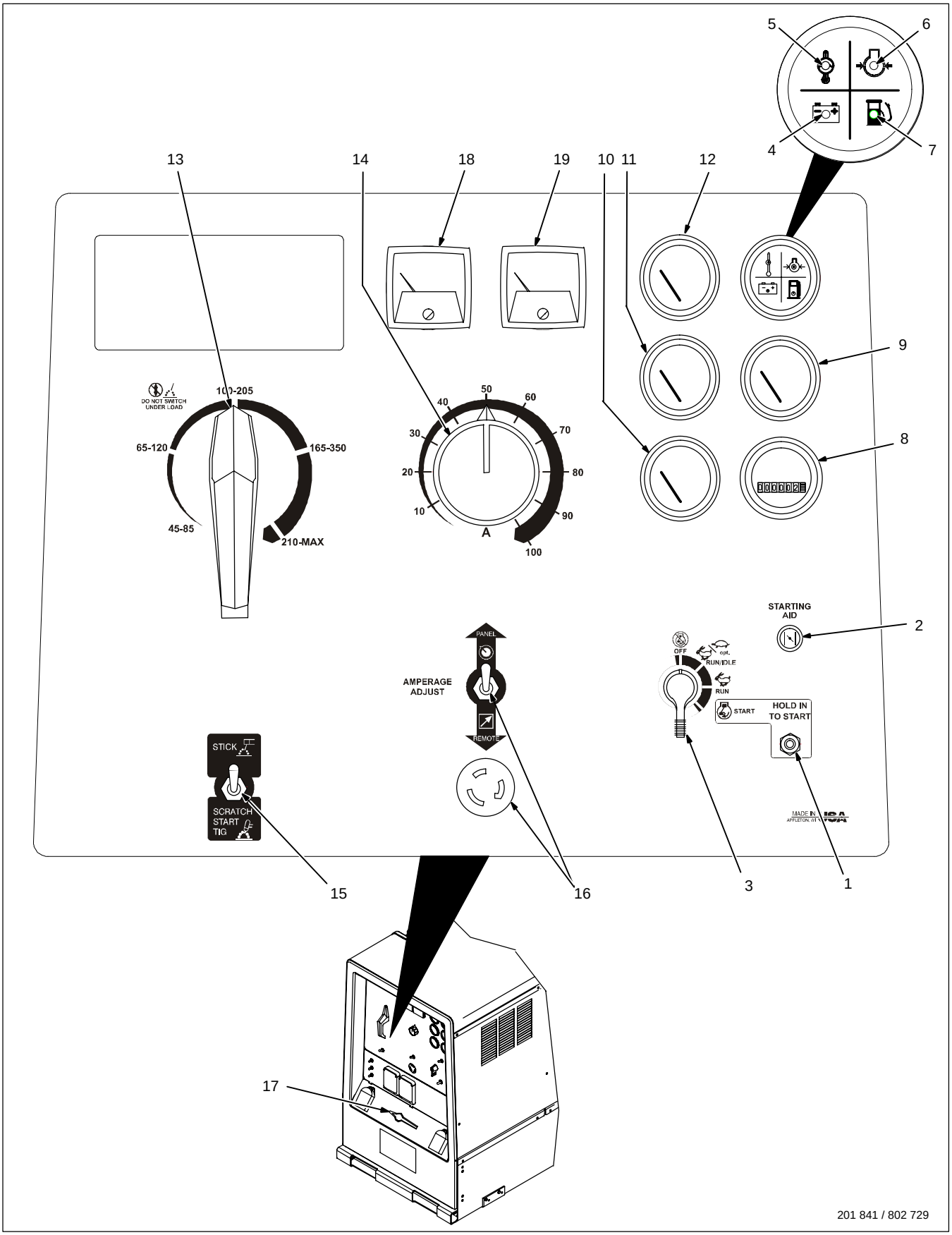
4-11. Connecting To Remote 14 Receptacle RC14 On CC/CV Models



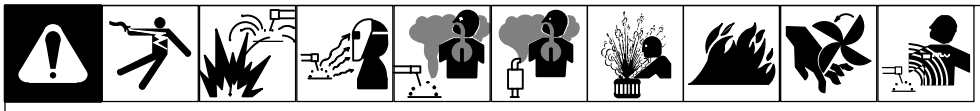
REMOTE 14	Socket*	Socket Information
24 VOLTS AC OUTPUT (CONTACTOR)	A	24 volts ac. Protected by circuit breaker CB5.
	B	Contact closure to A completes 24 volt ac contactor control circuit.
REMOTE OUTPUT CONTROL	C	Output to remote control:+10 volts dc in MIG or Stick mode; 0 to +10 volts dc in TIG mode.
	D	Remote control circuit common.
	E	DC input command signal: 0 to +10 volts from min. to max. of remote control with Voltage/ Amperage Adjust control at max.
GND	K	Chassis common.
NEUTRAL	G	Circuit common for 24 volt ac circuit.

*The remaining sockets are not used.

5-1. Front Panel Controls For CC Models (See Section 5-2)



5-2. Description Of Front Panel Controls For CC Models (See Section 5-1)



Engine Starting Controls

1 Magnetic Shutdown Switch

Use switch during start-up to bypass engine shutdown system. System stops engine if oil pressure is too low or coolant temperature is too high.

2 Starting Aid (Engine Choke Control)

Use control to change engine air-fuel mix.

3 Engine Control Switch

Use switch to start engine, select engine speed, and stop engine.

In Run position, engine runs at weld/power speed. In Run/Idle position, engine runs at idle speed at no load and weld speed with load applied.

To Start:

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

Pull Choke control out. Turn Engine Control switch to Start while pressing Shutdown switch. Release Engine Control switch when engine starts. Continue holding Shutdown switch until engine indicator lights go out. Push Choke control in.

To Stop: turn Engine Control switch to Off position.

Engine Indicator Lights

4 Battery Charging Light

Light goes on if engine alternator is not charging battery. Engine continues to run.

▲ **Stop engine and fix trouble if Battery Charging light goes on.**

5 Engine Temperature Light

Light goes on and engine stops if engine temperature is above 230 ° F (110° C).

▲ **Stop engine and fix trouble if Engine Temperature light goes on.**

6 Engine Oil Pressure Light

Light goes on and engine stops if oil pressure is below 5 psi (34 kPa). Light goes on momentarily during start-up but goes out when engine reaches normal oil pressure.

▲ **Stop engine and fix trouble if Engine Oil Pressure light stays on after start-up.**

7 Fuel Light

Fuel light is not active on this model.

8 Engine Hour Meter

Engine Gauges

☞ *To read gauges and engine indicator lights with engine off, turn Engine Control switch to Run/Idle and press Magnetic Shutdown switch (see Section 8-10).*

9 Fuel Gauge

Use gauge to check fuel level.

To check fuel level when engine is not running, turn Engine Control switch to Run/Idle position and press Magnetic Shutdown switch.

10 Battery Voltmeter (Optional)

Use gauge to check battery voltage and monitor the engine charging system. The meter should read about 14 volts dc when the engine is running, and about 12 volts dc when the engine is stopped.

11 Engine Coolant Temperature Gauge (Optional)

Normal temperature is 180 - 203° F (82 - 95° C). When equipped with gauge option, engine stops if temperature exceeds 220° F (104° C).

12 Engine Oil Pressure Gauge (Optional)

Normal pressure is 30 – 80 psi (207 – 552 kPa). When equipped with gauge option, engine stops if pressure is below 10 psi (69 kPa).

Weld Controls

☞ ***Max OCV Control Circuit:*** *This unit has a max OCV control circuit that resets Amperage Adjust control R1 to maximum when the arc breaks. When an arc is struck, weld output control returns to the R1 front panel or combination front panel/ remote control setting. The Amperage Adjust control adjusts amperage only when welding and does not adjust open-circuit voltage.*

The max OCV circuit is disabled when the Stick/TIG Selection switch is in Scratch Start TIG position (see item 15).

13 Ampere Range Switch

▲ **Do not switch under load.**

Use switch to select weld amperage range. For most welding applications, use lowest amperage range possible to help prevent arc outages.

14 Amperage Adjust Control

Control adjusts amperage within range selected by Ampere Range switch. Weld output would be about 153 A DC with controls set as shown (50% of 100 to 205 A).

☞ *The numbers around the control are for reference only and do not represent an actual percentage value.*

15 Stick/TIG Selection Switch

Use switch to disable the max OCV circuit and the arc drive (dig) circuit for scratch start TIG welding (see max OCV note under Weld Controls).

When switch is in the Stick position, the max OCV circuit resets Amperage Adjust Control R1 to maximum when the arc breaks.

Also in the Stick position, the arc drive (dig) circuit provides additional amperage during low voltage (short arc length conditions) to prevent “sticking” electrodes.

When switch is in Scratch Start TIG position, the max OCV and arc drive (dig) circuits are disabled and OCV changes when the control is adjusted.

16 Amperage Adjust Switch And Remote Amperage Adjust Receptacle

Connect optional remote control to RC13 (See Section 4-10). Use switch to select front panel or remote amperage control. For remote control, place switch in Remote position and connect remote control to Remote Amperage Adjust receptacle RC13 (see Sections 4-10 and 5-3).

17 Polarity Switch (Optional)

▲ **Do not switch under load.**

Use switch to change weld output. Select either DC Electrode Positive (DCEP) or DC Electrode Negative (DCEN).

Weld Meters

18 DC Voltmeter (Optional)

Voltmeter displays voltage at the weld output terminals, but not necessarily the welding arc due to resistance of cable and connections.

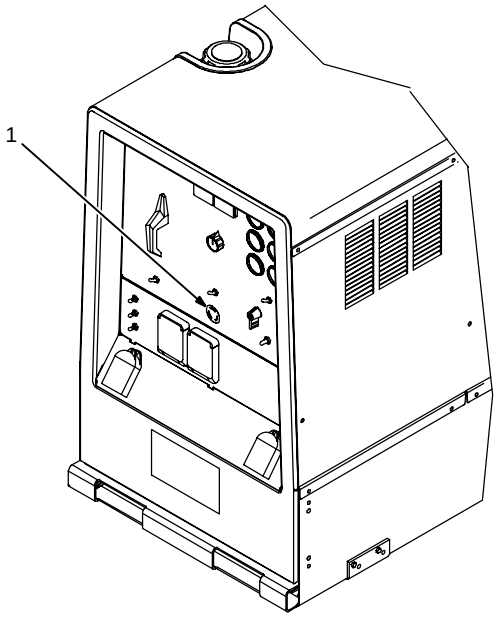
19 DC Ammeter (Optional)

Ammeter displays amperage output of the unit.

5-3. Remote Amperage Control On CC Models (Optional)

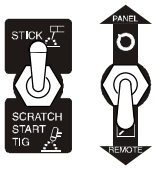
1 Remote Amperage Adjust Receptacle RC13

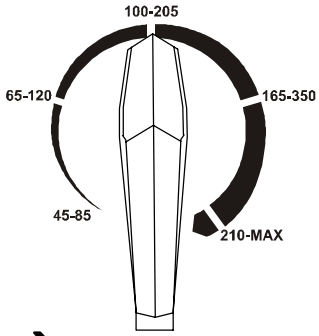
Connect optional remote control to RC13 (see Section 4-10).

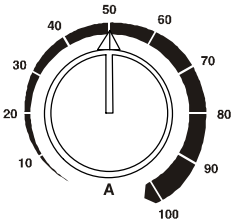


Example: Combination Remote Amperage Control (Stick)

In Example:
Range = 100 to 205 A DC
Percentage Of Range = 50%
Max = About 153 A DC (50% of 100 to 205)

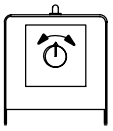






Max (153 A DC)

Min (75 A DC)

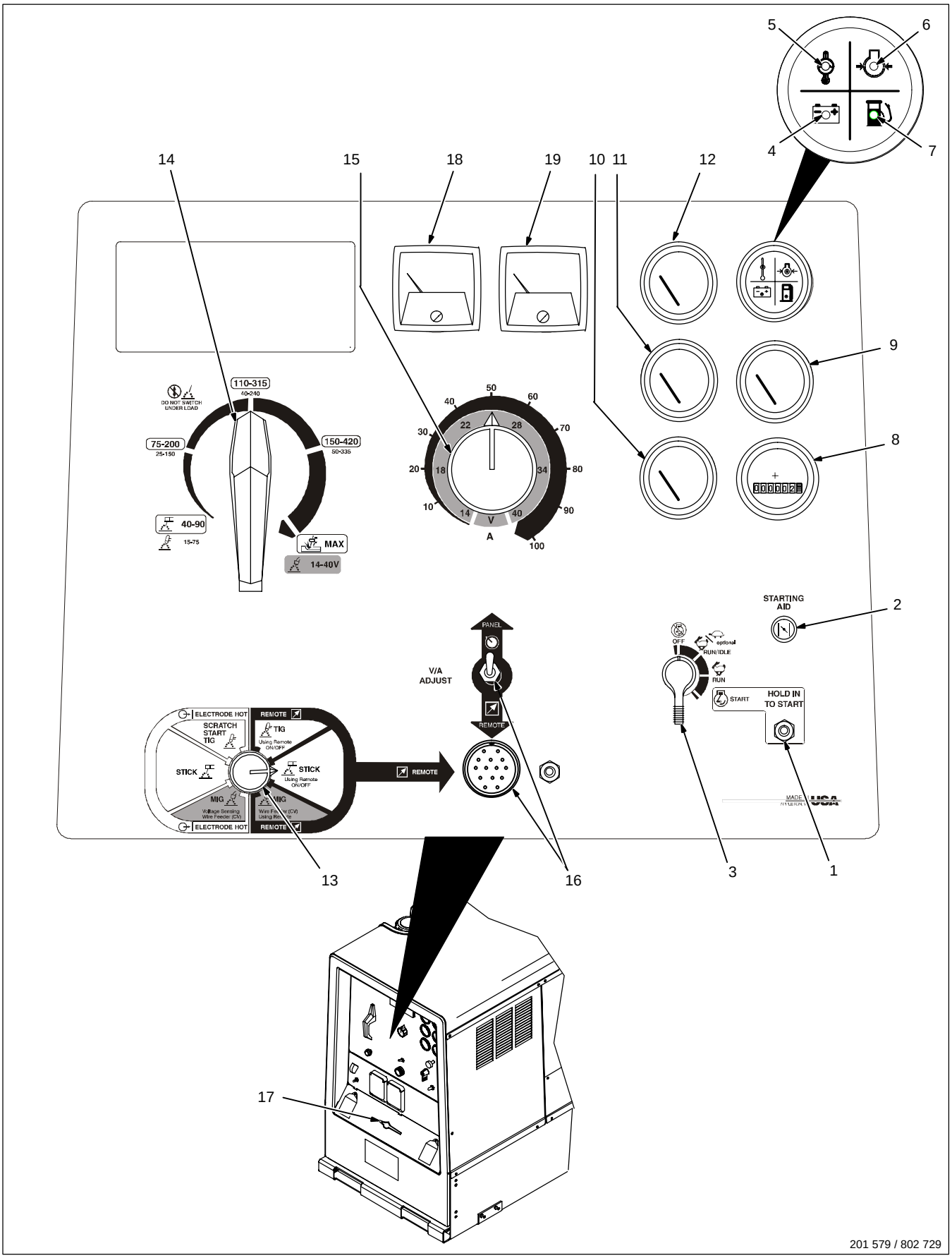


Set Switches → Set Range → Set Control → Adjust Optional Remote Control

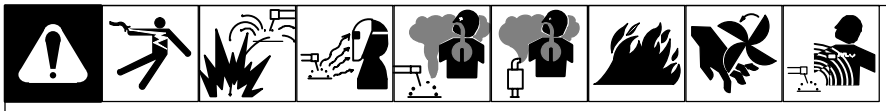
0774 / Ref. 154 862-A / Ref. 181 711-A / 802 729

Notes

6-1. Front Panel Controls For CC/CV Models (See Section 6-2)



6-2. Description Of Front Panel Controls For CC/CV Models (See Section 6-1)



Engine Starting Controls

1 Magnetic Shutdown Switch

Use switch during start-up to bypass engine shutdown system. System stops engine if oil pressure is too low or engine temperature is too high.

2 Starting Aid (Engine Choke Control)

Use control to change engine air-fuel mix.

3 Engine Control Switch

Use switch to start engine, select engine speed, and stop engine.

In Run position, engine runs at weld/power speed. In Run/Idle position, engine runs at idle speed at no load and weld speed with load applied.

To Start:

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

Pull Choke control out. Turn Engine Control switch to Start while pressing Shutdown switch. Release Engine Control switch when engine starts. Continue holding Shutdown switch until engine indicator lights go out. Push Choke control in.

To Stop: turn Engine Control switch to Off position.

Engine Indicator Lights

4 Battery Charging Light

Light goes on if engine alternator is not charging battery. Engine continues to run.

▲ **Stop engine and fix trouble if Battery Charging light goes on.**

5 Engine Temperature Light

Light goes on and engine stops if engine temperature is above 230 ° F (110° C).

▲ **Stop engine and fix trouble if Engine Temperature light goes on.**

6 Engine Oil Pressure Light

Light goes on and engine stops if oil pressure is below 5 psi (34 kPa). Light goes on momentarily during start-up but goes out when engine reaches normal oil pressure.

▲ **Stop engine and fix trouble if Engine Oil Pressure light stays on after start-up.**

7 Fuel Light

Fuel light is not active on this model.

8 Engine Hour Meter

Engine Gauges

☞ *To read gauges and engine indicator lights with engine off, turn Engine Control switch to Run/Idle and press Magnetic Shutdown switch (see Section 8-10).*

9 Fuel Gauge

Use gauge to check fuel level.

To check fuel level when engine is not running, turn Engine Control switch to Run/Idle position and press Magnetic Shutdown switch.

10 Battery Voltmeter (Optional)

Use gauge to check battery voltage and monitor the engine charging system. The meter should read about 14 volts dc when the engine is running, and about 12 volts dc when the engine is stopped.

11 Engine Coolant Temperature Gauge (Optional)

Normal temperature is 180 - 203° F (82 - 95° C). When equipped with gauge option, engine stops if temperature exceeds 220° F (104° C).

12 Engine Oil Pressure Gauge (Optional)

Normal pressure is 30 – 80 psi (207 – 552 kPa). When equipped with gauge option, engine stops if pressure is below 10 psi (69 kPa).

Weld Controls

13 Process/Contactor Switch

See Section 6-3 for Process/Contactor switch information.

14 Ampere Range Switch

▲ **Do not switch under load.**

Use switch to select weld amperage range. Use the lowest four ranges for Stick and TIG welding. Read the upper set of numbers at each range for Stick welding and the lower set at each range for TIG welding.

Use the highest range for MIG welding and for cutting and gouging (CAC-A).

For most welding applications, use lowest amperage range possible to help prevent arc outages.

15 Voltage/Amperage Adjust Control

With Process/Contactor switch in any Stick or TIG setting, use control to adjust amperage within range selected by Ampere Range switch. With Process/Contactor switch in any MIG position, use control to adjust voltage. With Voltage/Amperage Adjust Switch in Remote position, control limits the remote amperage in TIG mode, but has no effect in Stick and MIG modes.

Weld output would be about 213 A DC with controls set as shown (50% of 110 to 315 A).

☞ *The numbers around the control are for reference only and do not represent an actual percentage value.*

16 Voltage/Amperage Adjust Switch And Remote 14 Receptacle

Use switch to select front panel or remote voltage/amperage control. For remote control, place switch in Remote position and connect remote control to Remote 14 receptacle RC14 (see Sections 4-11 and 6-4).

17 Polarity Switch (Optional)

▲ **Do not switch under load.**

Use switch to change weld output. Select either DC Electrode Positive (DCEP) or DC Electrode Negative (DCEN).

Weld Meters

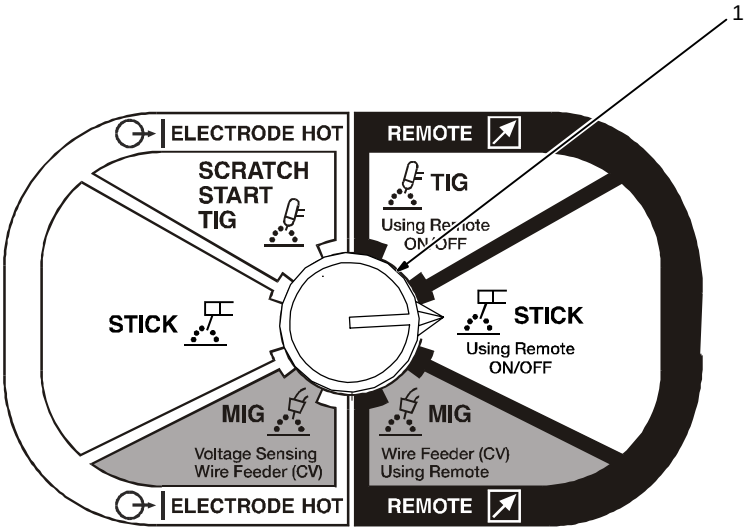
18 DC Voltmeter (Optional)

Voltmeter displays voltage at the weld output terminals, but not necessarily the welding arc due to resistance of cable and connections.

19 DC Ammeter (Optional)

Ammeter displays amperage output of the unit.

6-3. Process/Contactor Switch On CC/CV Models



1 Process/Contactor Switch

▲ **Weld output terminals are energized when Process/Contactor switch is in an Electrode Hot position and the engine is running.**

Use switch to select weld process and weld output on/off control (see table below and Section 6-4).

Place switch in Remote positions to turn weld output on and off with a device connected to the remote 14 receptacle.

Place switch in Electrode Hot positions for weld output to be on whenever the engine is running.

Use Stick position for air carbon arc (CAC-A) cutting and gouging.

When switch is in a Stick position, the arc drive (dig) circuit provides additional amperage during low voltage (short arc length conditions) to prevent "sticking" electrodes.

The arc drive (dig) circuit is disabled when switch is in MIG or TIG positions.

☞ *Place switch in Electrode Hot - Stick position when using optional auxiliary power plant (see Section 7-2).*

☞ *The engine auto idle function does not work in the Remote-TIG mode.*

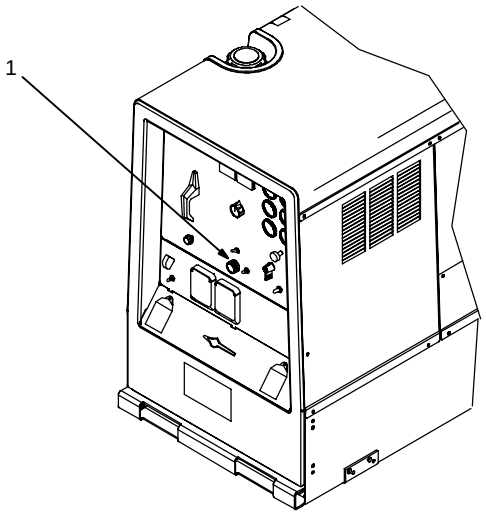
Process/Contactor Switch Settings

Switch Setting	Process	Output On/Off Control	Engine Auto Idle
Remote – TIG	GTAW With HF Unit, Pulsing Device, Or Remote Control	At Remote 14 Receptacle	Not Active
Remote – Stick	Stick (SMAW) With Remote On/Off	At Remote 14 Receptacle	Active
Remote – MIG	MIG (GMAW)	At Remote 14 Receptacle	Active
Electrode Hot – MIG	MIG (GMAW)	Electrode Hot	Active
Electrode Hot – Stick	Stick (SMAW), Air Carbon Arc (CAC-A) Cutting And Gouging	Electrode Hot	Active
Electrode Hot – Scratch Start TIG	Scratch Start TIG (GTAW)	Electrode Hot	Active

6-4. Remote Voltage/Amperage Control On CC/CV Models (Optional)

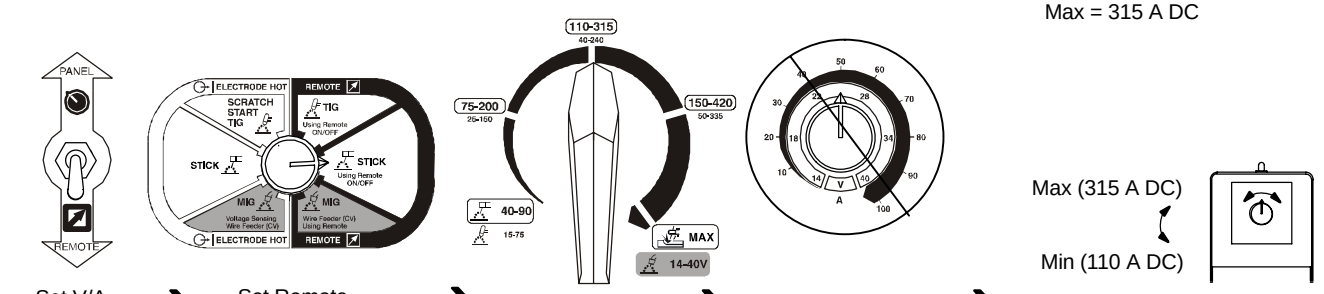
1 Remote 14 Receptacle RC14

Connect optional remote control to RC14 (see Section 4-11).



Example: Combination Remote Amperage Control (Stick)

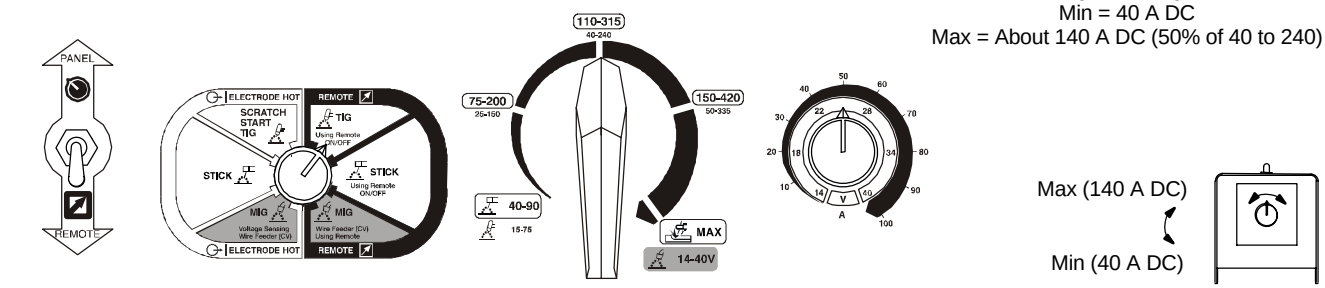
In Example:
Process = Stick (Using Remote On/Off)
Range = 110 to 315 A DC
Min = 110 A DC
Max = 315 A DC



Set V/A Adjust Switch → Set Remote Process → Set Range → Control Not Used In Remote Stick Mode → Adjust Optional Remote Control

Example: Combination Remote Amperage Control (TIG)

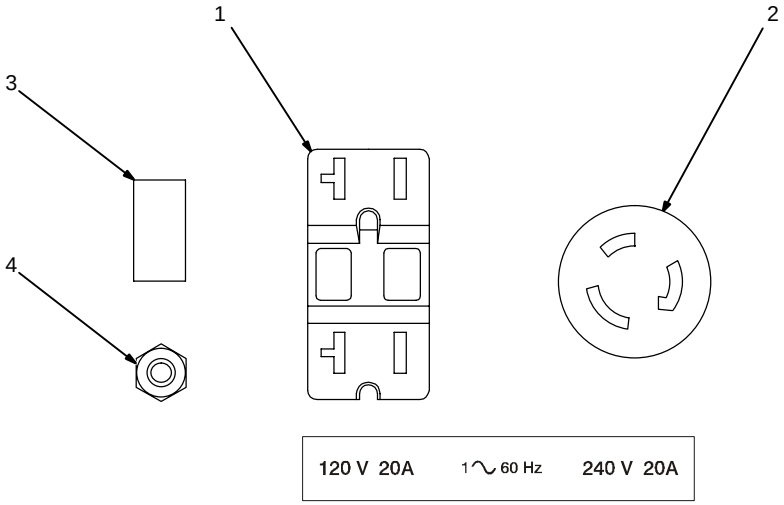
In Example:
Process = TIG (Using Remote On/Off)
Range = 40 to 240 A DC
Percentage Of Range = 50%
Min = 40 A DC
Max = About 140 A DC (50% of 40 to 240)



Set V/A Adjust Switch → Set Remote Process → Set Range → Set Control → Adjust Optional Remote Control

SECTION 7 – OPERATING AUXILIARY EQUIPMENT

7-1. 120 Volt And 240 Volt Receptacles



1 120 V 20 A AC GFCI Receptacle GFCI1

2 240 V 30 A AC Twistlock Receptacle RC1

Receptacles supply 60 Hz single-phase power at weld/power speed.

If a ground fault is detected, GFCI Reset button pops out and receptacle does not work. Check for faulty tools plugged in receptacle. Press button to reset GFCI1.

☞ *At least once a month, run engine at weld/power speed and press test button to verify GFCI is working properly.*

3 Circuit Breaker CB1

4 Circuit Breaker CB2

CB1 protects RC1 and the generator winding from overload. If CB1 opens, RC1 and GFCI1 do not work. Place switch in On position to reset breaker.

CB2 protects GFCI1 from overload. If CB2 opens, GFCI1 does not work. Press button to reset breaker.

☞ *If a circuit breaker continues to open, contact Factory Authorized Service Agent.*

☞ *Auxiliary power is not affected by weld output.*

Maximum output is 2.4 kVA/kW from GFCI1 and 4 kVA/kW from RC1. Maximum output from all receptacles is 4 kVA/kW.

EXAMPLE: If 13 A is drawn from RC1, only 7 A is available at GFCI1:

(240 V x 13 A) + (120 V x 7 A) = 4.0 kVA/kW

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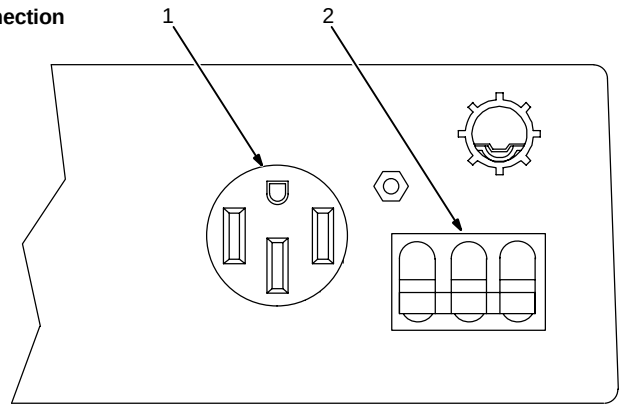
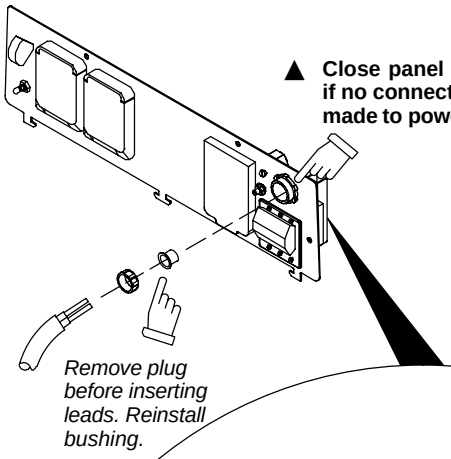
7-2. Connecting To Optional Auxiliary Power Plant (CC/CV Models Only)

Single-Phase Power Connection



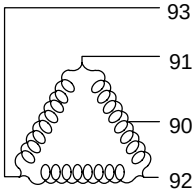
Three-Phase Power Connection

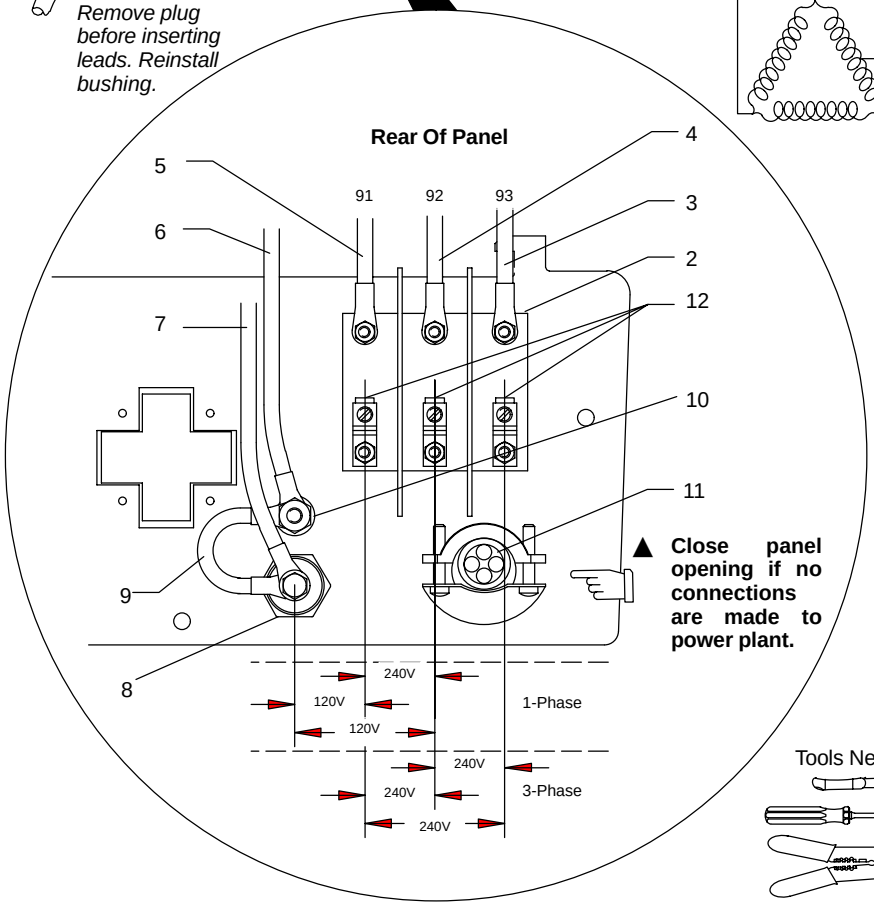


▲ **Close panel opening if no connections are made to power plant.**

Remove plug before inserting leads. Reinstall bushing.

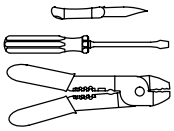
AC ∼ Output	Single Phase 1 ∼	Three Phase 3 ∼
Volts	120/240	240
Amps	50	48
KVA/KW	12	20
Frequency	60 Hz	
Engine Speed	1850 RPM	
Lead 42 connects to GROUND stud on front of unit. Jumper 42 is connected to 90 at factory.		





▲ **Close panel opening if no connections are made to power plant.**

Tools Needed:



☞ *Place Process/Contactor switch in Electrode Hot - Stick position when using auxiliary power plant (see Section 6-3).*

Single-Phase Auxiliary Power

1 120/240 V 50 A Receptacle RC5

RC5 is connected to the optional auxiliary power plant and supplies 60 Hz single-phase power at weld/power speed. Maximum output from RC5 is 12 kVA/kW. Power available at RC5 is reduced when welding**.**

2 Circuit Breaker CB7

Circuit breaker CB7 protects single-phase receptacle RC5 and the load wires from overload. If CB7 opens, all auxiliary power plant output stops and the receptacle does not work.

Three-Phase Auxiliary Power

▲ **Stop engine.**

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

☞ *Have qualified person install according to circuit diagram and Auxiliary Power Guidelines (see Section 10).*

Remove auxiliary power panel mounting screws. Tilt panel forward.

3 Lead 93

4 Lead 92

5 Lead 91

6 Lead 42 (Circuit Grounding Lead)

7 Lead 90 (Neutral)

8 Isolated Neutral Terminal

9 Jumper Lead 42

10 Grounding Terminal

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

Lead 42 connects to front panel Ground stud.

11 User-Supplied Leads

12 Circuit Breaker CB7 User Terminals

Connect user-supplied leads to terminals on CB7 and to the isolated neutral terminal and grounding terminal as necessary.

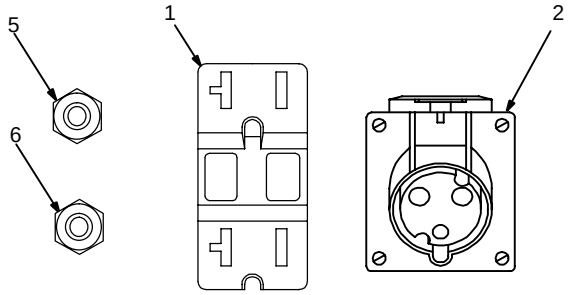
☞ *Circuit breaker CB7 protects single-phase receptacle RC5 and the load wires from overload. If CB7 opens, all auxiliary power plant output stops and the receptacle does not work.*

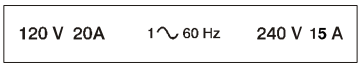
Reinstall auxiliary power panel.

Ref. 197 399 / 802 332-E

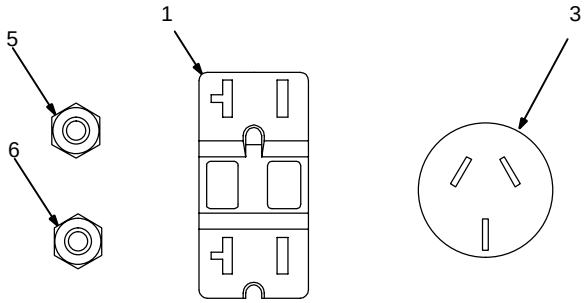
7-3. Optional Auxiliary Power Receptacles

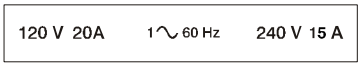
European Receptacle



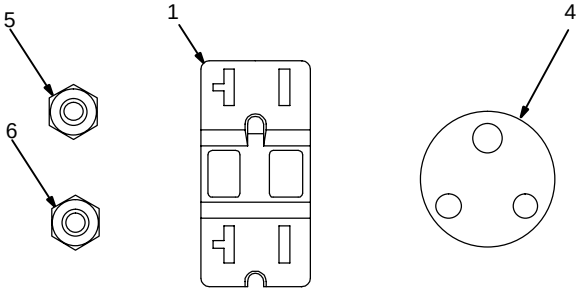


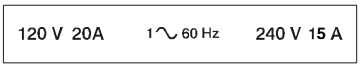
Australian Receptacle





South African Receptacle





1 120 V 20 A AC GFCI Receptacle GFCI1

2 240 V 16 A AC European Receptacle RC1

3 240 V 15 A AC Australian Receptacle RC1

4 240 V 15 A AC South African Receptacle RC1

Receptacles supply 60 Hz single-phase power at weld/power speed.

If a ground fault is detected, the GFCI Reset button pops out and the receptacle does not work. Check for faulty tools plugged in receptacle. Press button to reset GFCI1.

☞ *At least once a month, run engine at weld/power speed and press test button to verify GFCI is working properly.*

5 Circuit Breaker CB2

6 Circuit Breaker CB3

CB2 protects GFCI1 from overload. If CB2 opens, GFCI1 does not work. Place button to reset breaker.

CB3 protects RC1 from overload. If CB3 opens, RC1 does not work. Press button to reset breaker.

☞ *If a circuit breaker continues to open, contact Factory Authorized Service Agent.*

☞ *Auxiliary power is not affected by weld output.*

Maximum output is 2.4 kVA/kW from GFCI1 and 4 kVA/kW from RC1. Maximum output from all receptacles is 4 kVA/kW.

EXAMPLE: If 13 A is drawn from RC1, only 7 A is available at GFCI1:

(240 V x 13 A) + (120 V x 7 A) = 4.0 kVA/kW

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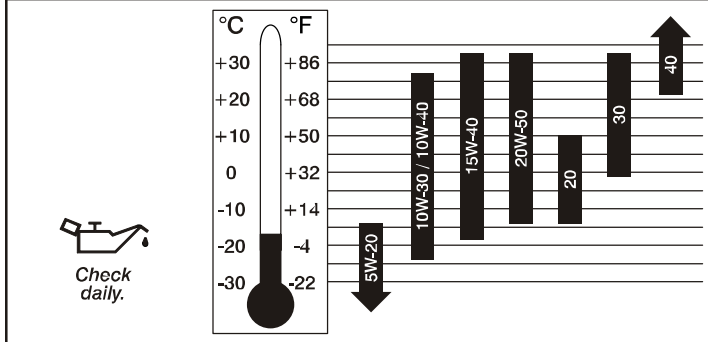
8-1. Maintenance Label

WIS-CON TM-20 GASOLINE ENGINE

See Engine Manual for complete engine care.
Give Engine Specification and Serial Number when ordering parts.



Check daily.

Recommended Oil ...
API Service Classification SE/CD, SF/CD

Oil Change & Filter .. dirty conditions ..... 50 hours or less
normal conditions ..... 100 hours max.
Oil Filter ..... MILLER 114559
WIS-CON TM27L00213
Fram PH43, Hastings LF196
Oil Capacity ..... 5.0 qts. (4.7L)
... with filter change ..... 5.5 qts. (5.2L)

Gasoline

Fuel Capacity ..... 24.75 Gal (93.7L)
Fuel Grade ..... Regular or Unleaded, 85 Octane min.
Fuel Filter ..... MILLER 066113, Fram G2, Hastings GF2

Air Filter Service ..... 50 hours or less - see Owner's Manual
Air Filter Element ..... MILLER 192938, Donaldson P822768, Wix 46489
Air Filter Safety Element (Opt.) ... MILLER 192939, Donaldson P822769, Wix 46490

Check daily.

Coolant Capacity ..... 9 qts. (8.5L)
Thermostat ..... 180°F (82°C), WIS-CON TM27K00429
Radiator Cap 7 lb..... MILLER 605982, Gates 31327

Protect to lowest expected temperature with ethylene glycol based anti-freeze. Protect to at least -34°F (-37°C) for year-round lubrication and antirust protection.

Battery ..... BCI Group 24
Cranking Performance at
0°F (-18°C) .... 660 Amps

Valve Clearance - HOT
Intake ..... 0.014 in. (0.36mm)
Exhaust ..... 0.018 in. (0.46mm)

Engine RPM - No Load
Weld 1850
Idle 1250

Fan Belt ... MILLER 201142
WIS-CON X27019434

Spark Plug Gap ..... 0.032 in (.8 mm)
Spark Plug ..... Champion RN12YC
Firing Order 1-3-2
Ignition Timing ..... 18° BTDC at 1800 RPM
Coil ..... WIS-CON YF41A
Distributor ..... WIS-CON TM20M00505
Cap ..... WIS-CON TM20M00213
Rotor ..... WIS-CON TM27M00243

Use only resistor spark plugs and wires.

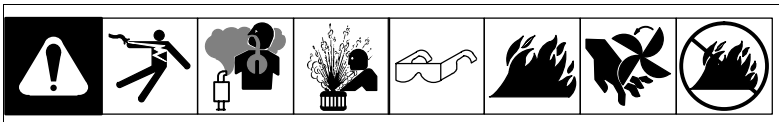
Optional

Spark Arrestor Inspection And Service ..... 250 operating hours - see Owner's Manual

201 031

8-2. Routine Maintenance

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



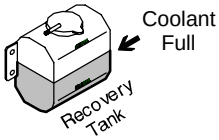
Recycle engine fluids.

▲ **Stop engine before maintaining.**

☞ *See also Engine Manual and Maintenance Label. Service unit more often if used in severe conditions.*

* To be done by Factory Authorized Service Agent.

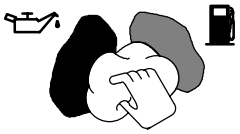
8 h



Coolant Full

OIL Full

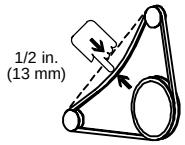
Check Fluid Levels. See Section 4-7.



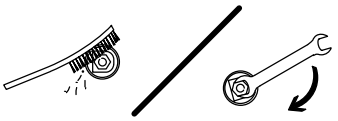
Wipe Up Spills.

50 h

Clean Air Filter. See Section 8-4.

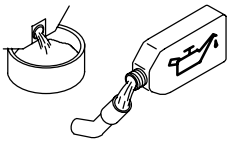


Check Belt Tension.

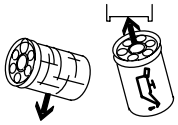


Clean And Tighten Weld Terminals.

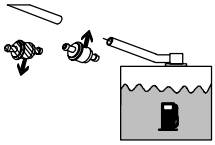
100 h



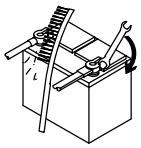
Change Oil. See Section 8-8.



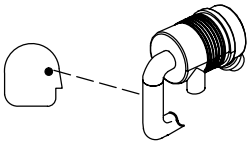
Change Oil Filter. See Section 8-8.



Replace fuel filter. See Section 8-8.

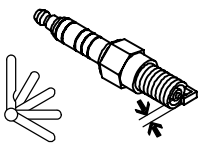


Clean And Tighten Battery Connections.

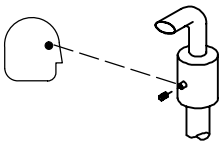


Check air cleaner hoses for cracks and loose clamps.

250 h



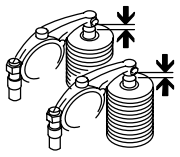
Check Spark Plugs.



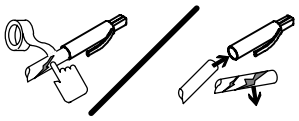
Check And Clean Spark Arrestor. See Section 8-3.

Replace Unreadable Labels.

500 h

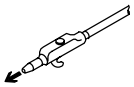


Check Valve Clearance.*



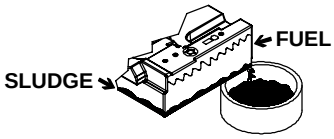
Repair Or Replace Damaged Cables.

1000 h

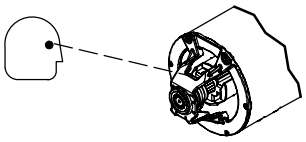


OR

Blow Out Or Vacuum Inside. During Heavy Service, Clean Monthly.

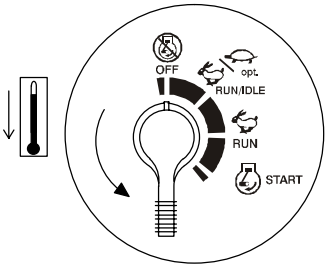


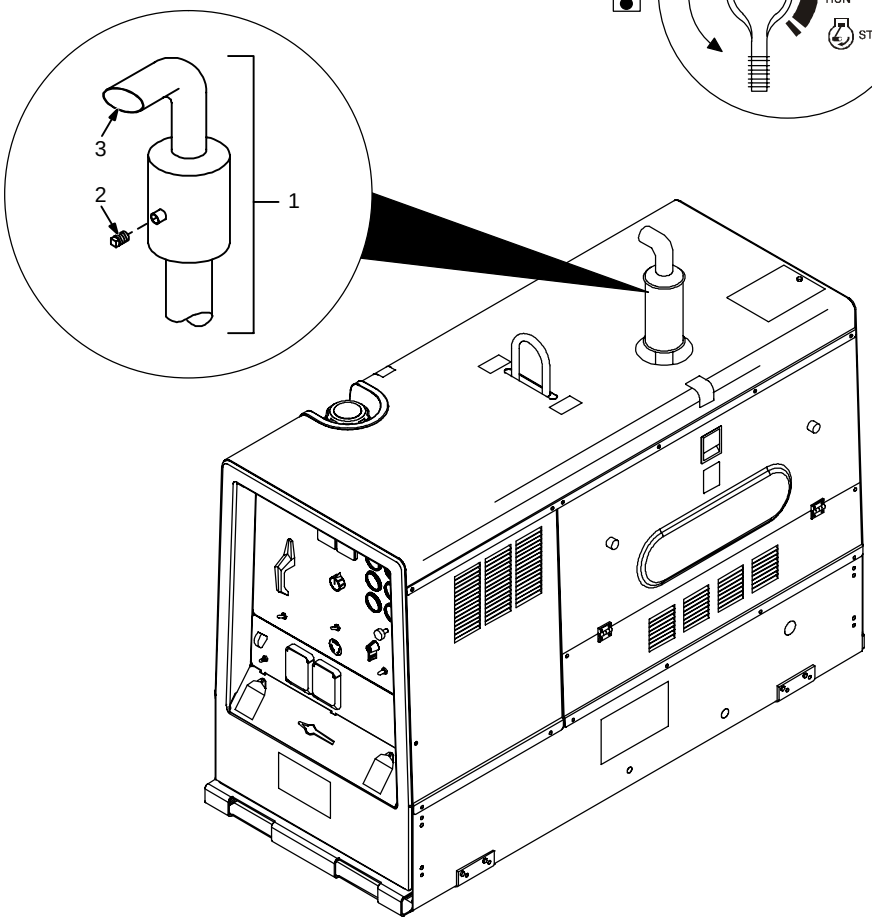
Drain Sludge From Fuel Tank. See Section 8-8.



Service Welding Generator Brushes And Slip Rings. Service More Often In Dirty Conditions.*

8-3. Inspecting And Cleaning Optional Spark Arrestor Muffler





▲ **Stop engine and let cool.**

1 Spark Arrestor Muffler

2 Cleanout Plug

Remove plug and remove any dirt covering cleanout hole.

3 Exhaust Pipe

Start engine and run at idle speed to blow out cleanout hole. If nothing blows out of hole, briefly cover end of exhaust pipe with fireproof material.

▲ **Stop engine and let cool.**

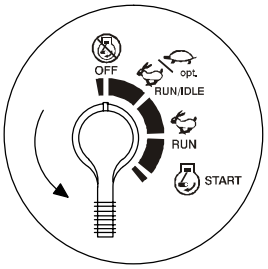
Reinstall cleanout plug.

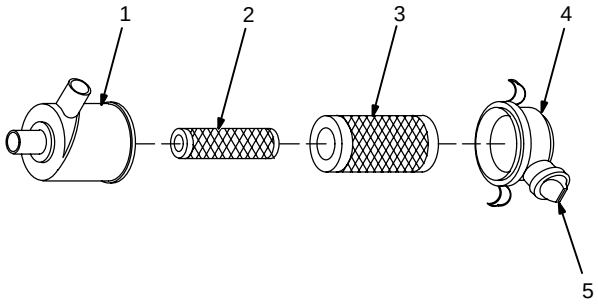
Tools Needed:

3/8 in

802 729 / Ref. 201 841

8-4. Servicing Air Cleaner





▲ **Stop engine.**

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

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

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

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

1 Housing

2 Safety Element (Optional)

3 Primary Element

4 Dust Cap

5 Dust Ejector

To clean air filter:

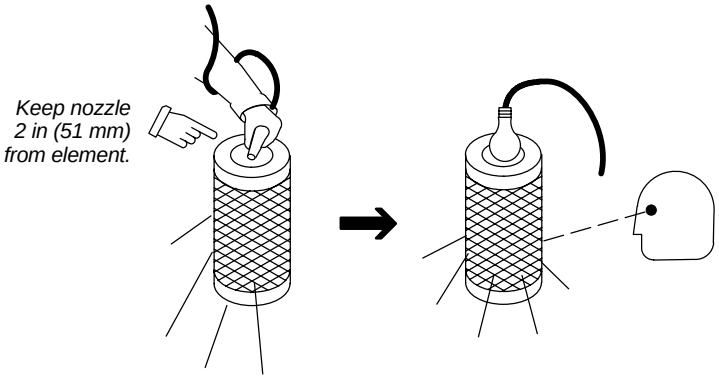
Wipe off cap and housing. Remove cap and dump out dust. Remove element(s). Wipe dust from inside cap and housing with damp cloth. Reinstall safety element (if present). Reinstall cap.

▲ **Do not clean housing with air hose.**

Clean primary element with compressed air only.

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

Reinstall primary element and cap (dust ejector down).

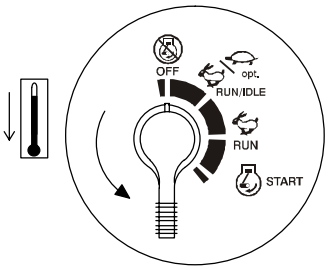


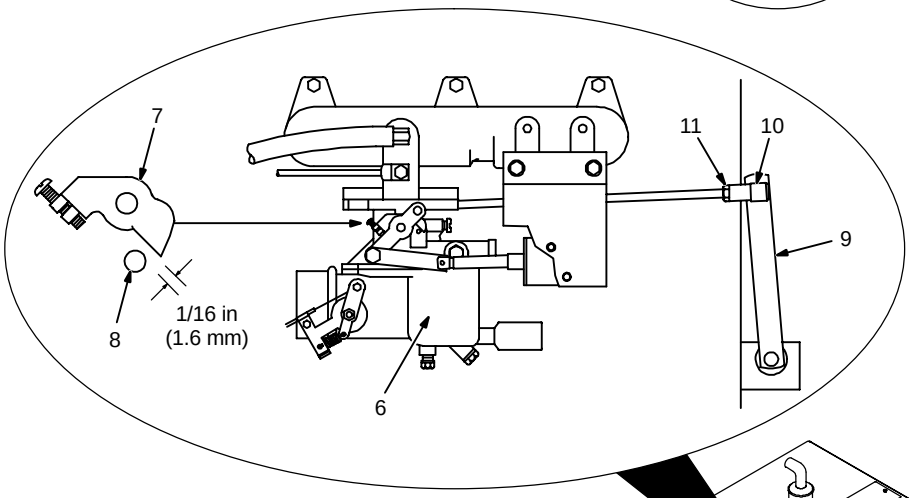
Blow Inspect

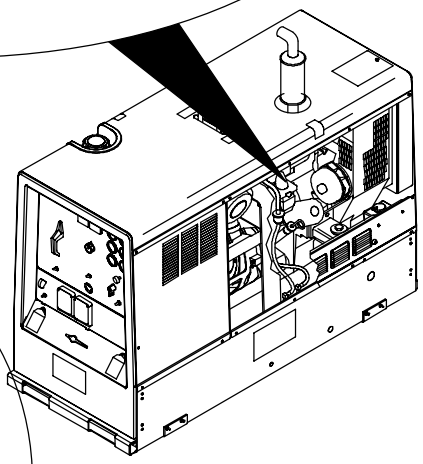
aircleaner1 9/00 – 153 929-B / 153 585 / Ref. S-0698-B

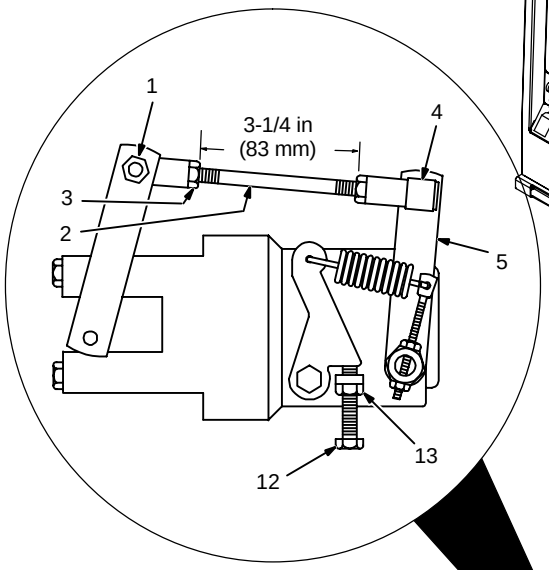
8-5. Adjusting Engine Weld/Power Speed

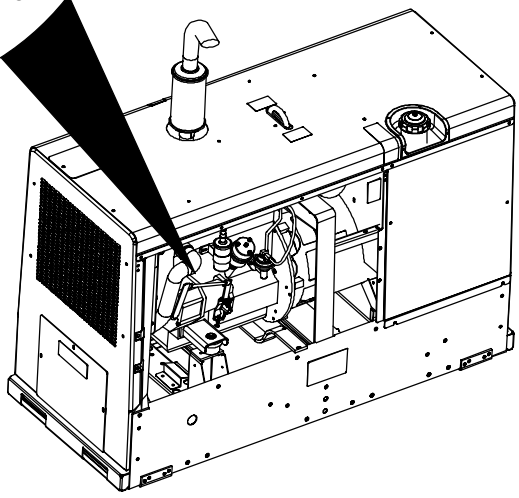
Engine Speed (No Load)	RPM (Hz)
Weld/Power	1850 (61.7) Maximum



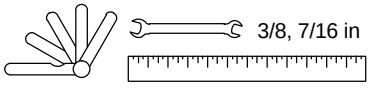








Tools Needed:



▲ Stop engine and let cool.

☞ *Governor sensitivity may require adjustment if engine speed is adjusted (see Section 8-7).*

Engine speed is factory set and should not require adjustment. After tuning engine, check engine speed with tachometer or frequency meter. See table for proper no load speed. If necessary, adjust speed as follows:

Start engine and run until warm.

On CC Models, place Stick/TIG switch in Stick position.

On CC/CV models, turn Process/Contactor switch to Stick – Electrode Hot position.

1 Socket Nut

2 Governor Linkage Rod

3 Lock Nut

4 Socket

5 Governor Arm

Rod length should be 3-1/4 in (83 mm) between lock nuts. To adjust, remove socket from arm and loosen lock nut. Turn socket to adjust length. Tighten nut and reattach socket to arm.

☞ *If linkage binds, loosen socket nuts and turn sockets until linkage works smoothly. Tighten nuts.*

6 Carburetor

7 Throttle Stop Plate

8 Throttle Stop

Clearance between plate and stop should be 1/16 in (1.6 mm). To adjust clearance, proceed as follows:

9 Linkage Pivot Arm

10 Linkage Socket

11 Lock Nut

Remove socket at arm and loosen lock nut. Turn socket to adjust clearance. Reattach socket and tighten nut.

Start engine and run until warm. Turn Engine Control switch to Run position.

12 Governor Speed Screw

13 Lock Nut

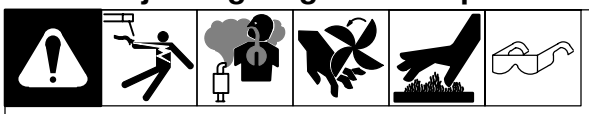
Loosen nut. Turn screw until engine runs at weld/power speed.

▲ Stop engine.

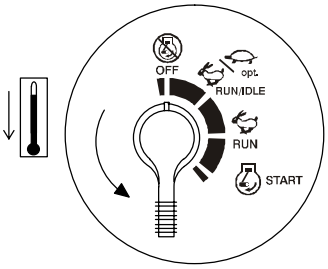
Close door.

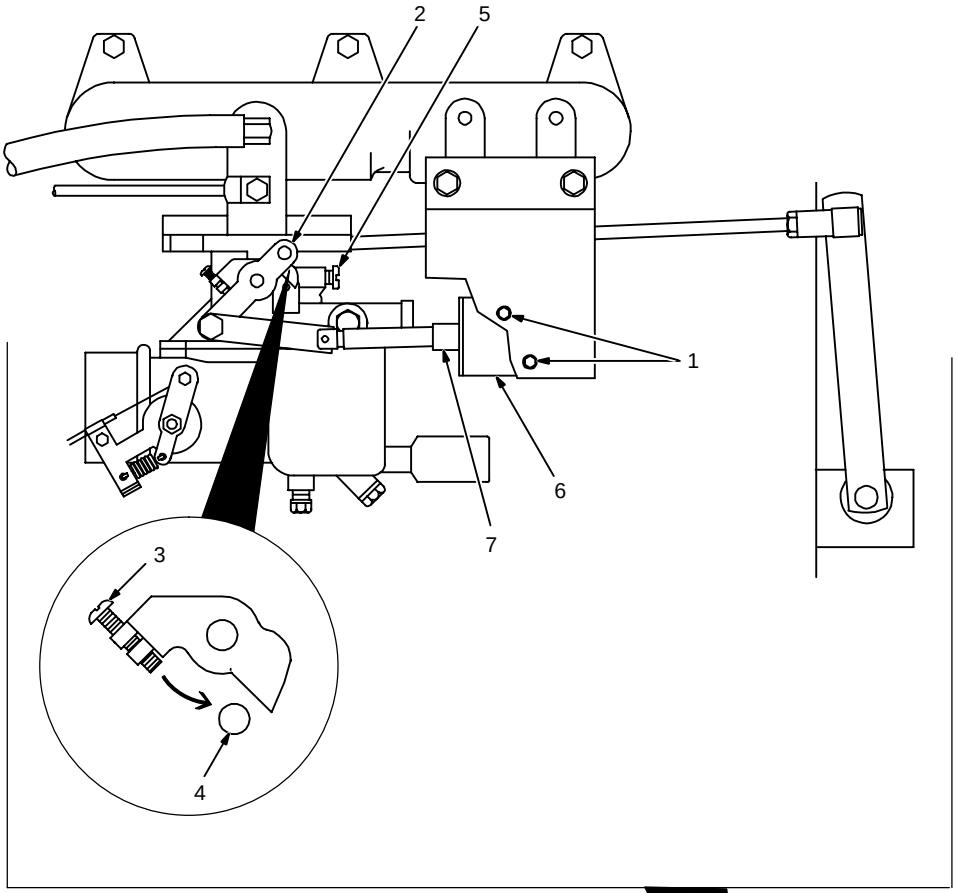
802 731 / 802 780 / Ref. 801 179 / Ref. 800 161

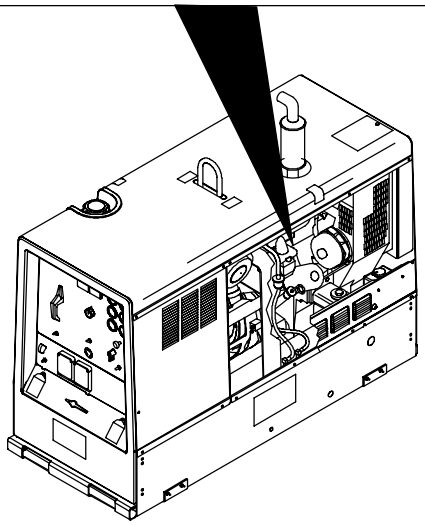
8-6. Adjusting Engine Idle Speed



	Engine Speed (No Load)
	1850 rpm max (61.6 Hz)
	1250 rpm (41.6 Hz)







▲ Stop engine and let cool.

Engine idle speed is factory set and normally should not require adjustment. After tuning engine, check engine speed with tachometer or frequency meter. See table for proper no load speed. If necessary, adjust idle speed as follows:

Start engine and run until warm.

On CC Models, place Stick/TIG switch in Stick position.

On CC/CV models, turn Process/Contactor switch to Stick – Electrode Hot position.

1 Solenoid Bracket Screws

2 Throttle Arm

3 Idle Speed Screw

4 Throttle Stop

Loosen bracket screws and move arm so screw touches stop. Do not release arm. Turn idle speed screw to obtain 550 rpm.

5 Idle Mixture Screw

Turn mixture screw counterclockwise until engine falters, then turn screw clockwise until engine runs smoothly.

Turn idle speed screw to obtain 1250 rpm.

6 Solenoid

7 Plunger

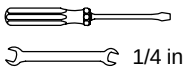
Slide solenoid inside bracket so plunger bottoms in solenoid. If necessary, shim solenoid/bracket to prevent linkage from binding. Do not readjust idle speed screw when adjusting solenoid.

Tighten bracket screws. Release throttle arm. Recheck idle speed and readjust if necessary.

▲ Stop engine.

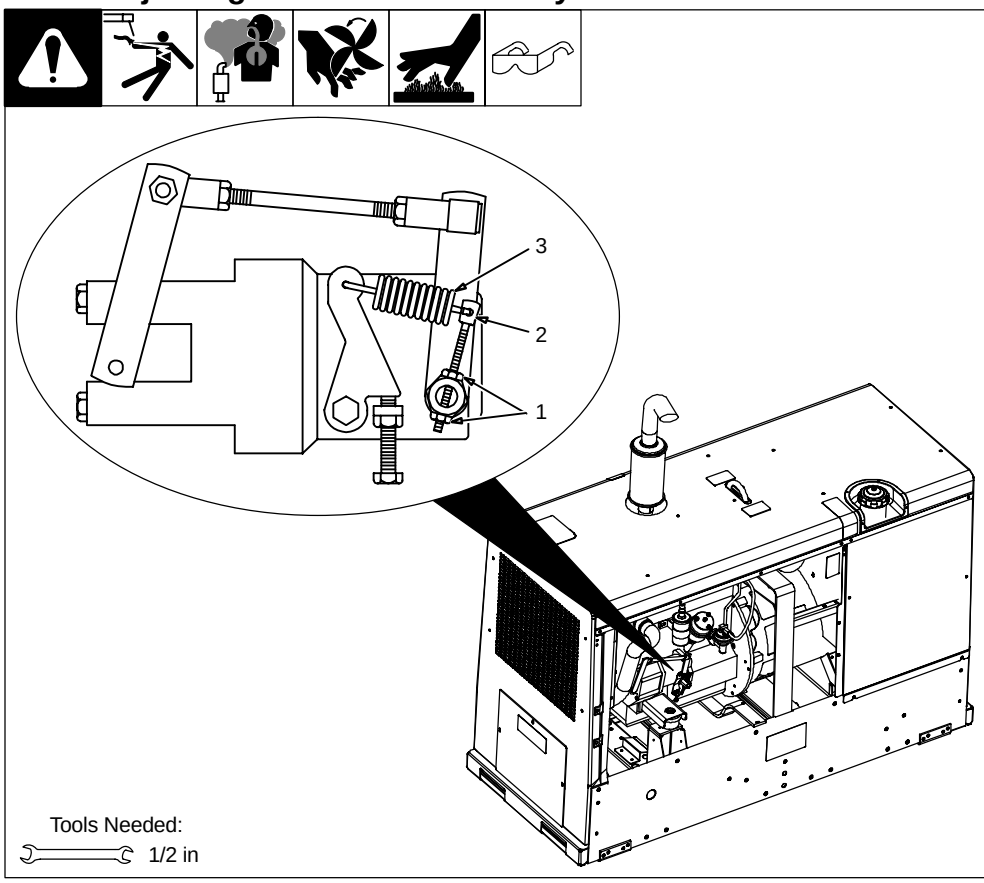
Close door.

Tools Needed:



802 731 / Ref. 115 155-A

8-7. Adjusting Governor Sensitivity



☞ *Governor sensitivity may require readjustment if weld speed is adjusted. Weld speed must be readjusted if sensitivity is adjusted.*

Be sure carburetor and linkages are adjusted properly before adjusting sensitivity.

Start engine. Apply and remove load.

1 Locking Nuts

2 Sensitivity Adjustment Screw

3 Governor Spring

If engine is slow to pick up load or rpm drops under load, adjust spring tension as follows:

Loosen top nut and tighten bottom nut to move screw down. Tighten nuts.

If engine hunts with or without load, adjust spring tension as follows:

Loosen bottom nut and tighten top nut to move screw up. Tighten nuts.

▲ **Stop engine.**

Close door.

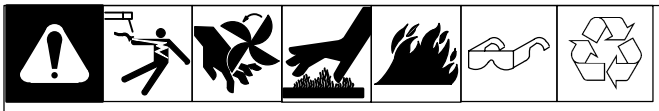
Tools Needed:

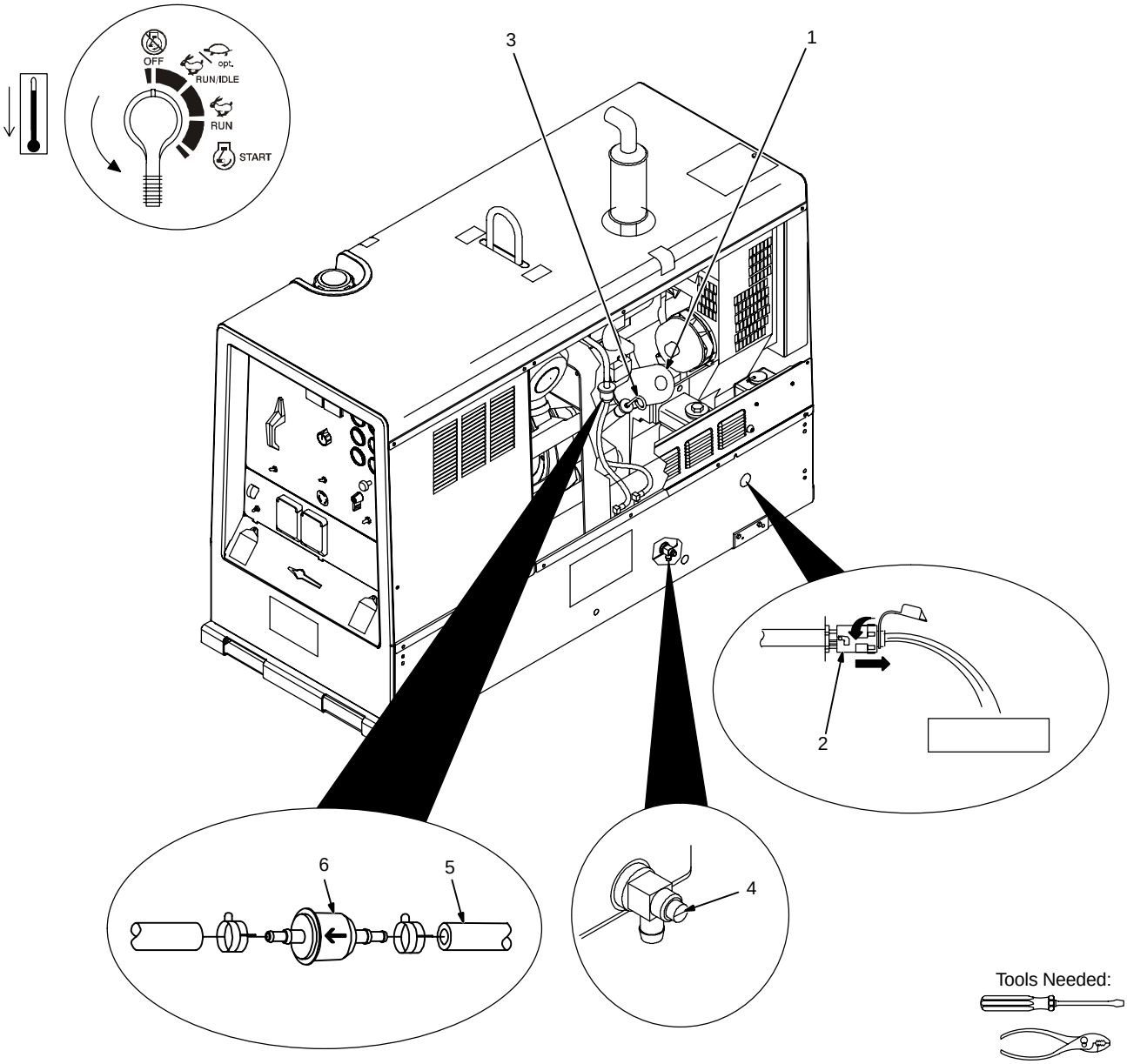
1/2 in

802 780 / Ref. 115 155-A

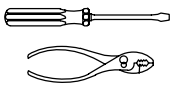
Notes

8-8. Servicing Fuel And Lubrication Systems





Tools Needed:



802 731 / Ref. 801 434

▲ **Stop engine and let cool.**

▲ **After servicing, start engine and check for fuel leaks. Stop engine, tighten connections as necessary, and wipe up spilled fuel.**

1 Oil Filter

2 Oil Drain Valve And Hose

3 Oil Fill Cap/Dipstick

4 Fuel Tank Sludge Drain Valve

To change oil and filter:

Route oil drain valve and hose through hole in base. See engine manual and engine maintenance label for oil/filter change information.

To drain sludge from fuel tank:

▲ **Beware of fire. Do not smoke and keep sparks and flames away from drained fuel. Dispose of drained fuel in an environmentally-safe manner. Do not leave unit unattended while draining fuel tank.**

▲ **Properly lift unit and secure in a level position. Use adequate blocks or stands to support unit while draining fuel tank.**

Attach 1/2 ID hose to drain valve. Put metal container under drain, and use screwdriver to open sludge drain valve. Close valve when sludge has drained. Remove hose.

Close door.

To replace fuel filter:

5 Fuel Line

6 Fuel Filter

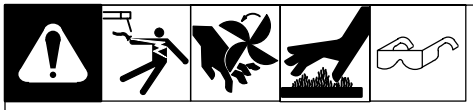
Remove clamps and filter. Install new filter and clamps. Inspect fuel lines and replace if cracked or worn. Wipe up any spilled fuel.

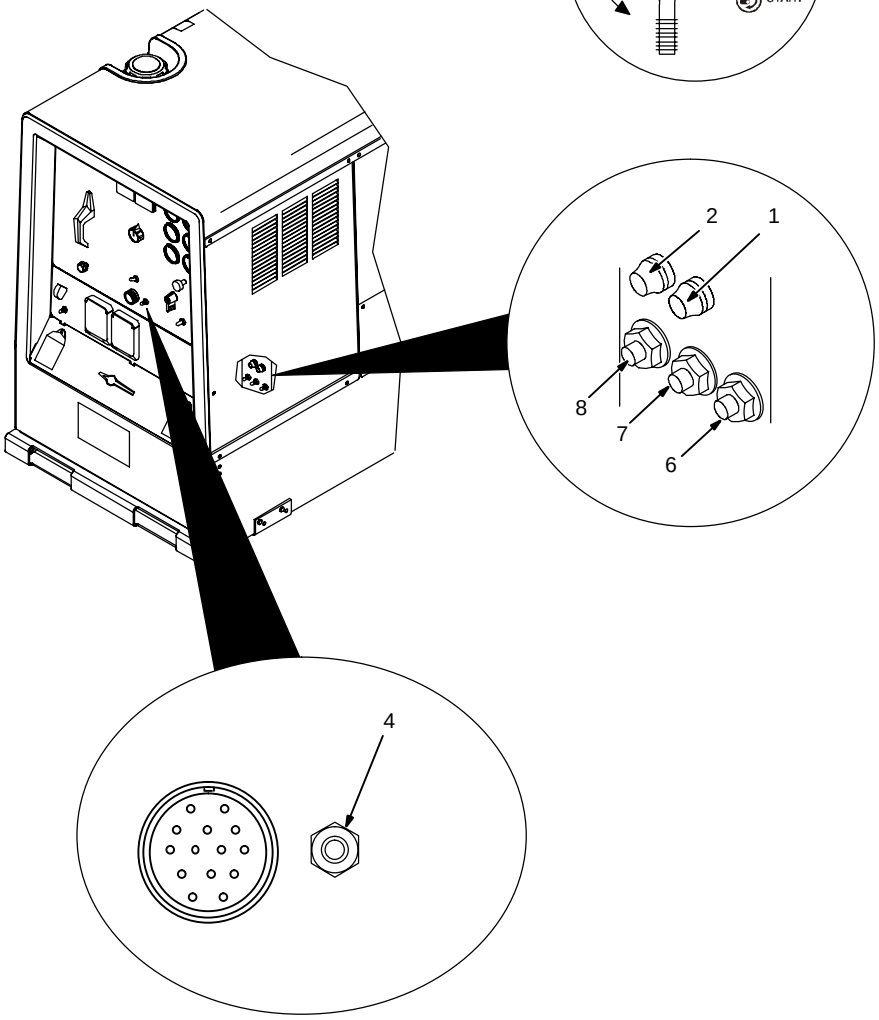
Start engine and check for leaks.

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

Close door.

8-9. Overload Protection





▲ **Stop engine.**

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

1 Fuse F1

2 Fuse F2

F1 and F2 protect the stator exciter winding from overload. If F1 opens, weld and auxiliary power is low or stops entirely. If F2 opens, weld output is low or stops entirely. 4 kVA/kW auxiliary power is still available.

3 Circuit Breaker CB4 (Not Shown)

4 Circuit Breaker CB5 (CC/CV Models Only)

5 Circuit Breaker CB10 (Not Shown)

6 Circuit Breaker CB11

7 Circuit Breaker CB12

8 Circuit Breaker CB13

CB4 protects the welding arc drive (dig) circuit. If CB4 opens, electrode may stick to the workpiece more frequently during low voltage (short arc length) conditions. CB4 automatically resets when the fault is corrected.

CB5 protects the 24 volt ac output to remote receptacle RC14, and 24 volt output to field current regulator board PC1 (CC/CV models only). If CB5 opens, weld output and 24 volt output to RC14 stops. On units with optional auxiliary power plant, auxiliary power output at receptacle RC5 also stops if CB5 opens.

CB10 protects the engine battery circuit. If CB10 opens, the engine will not crank. CB10 automatically resets when the fault is corrected.

CB11 protects the engine wiring harness. On CC models, if CB11 opens the max OCV circuit does not work and open circuit voltage is variable at all times (see max OCV note under Weld Controls in Section 5-2). If CB11 opens on CV models, weld output stops (auxiliary power is still available).

CB12 protects the field flashing circuit. If CB12 opens, the generator may not excite at start-up and weld and auxiliary power output may not be available.

CB13 protects the engine shutdown circuit. If CB13 opens, the engine cranks but does not start.

Press button to reset breaker.

802 729 / Ref. 802 789

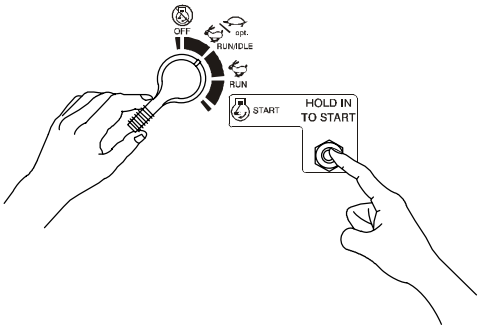
8-10. Diagnosing Causes Of Engine Fault Shutdowns

Use the front panel engine lights to help determine the cause of an automatic engine shutdown.

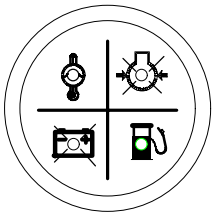
☞ *Correct the cause of the shutdown before operating the welding generator.*

☞ *This unit does not have a battery charging fault shutdown. The engine continues to run if the Battery Charging Light goes on.*

Pre-Start Diagnostic Checks



Turn Engine Control Switch To Run/Idle Position While Pressing Magnetic Shutdown Switch.



Normal Condition:
Oil Pressure Light On;
Battery Charging, Fuel, And Temperature Lights Off.

If Oil Pressure Light Is Off, See Factory Authorized Service Agent.

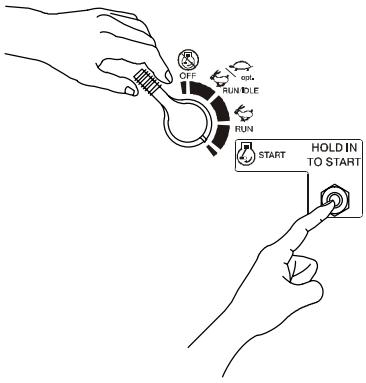
If Battery Charging Light Is On, Have Factory Authorized Service Agent Check Alternator.

If Temperature Light Is On, Correct Cause Of Overheating (See Engine Manual).
If Engine Is Okay, See Factory Authorized Service Agent.

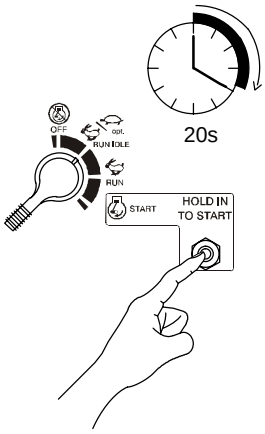
If Fuel Light Is On, Check Fuel Level.

If Fault Continues, See Factory Authorized Service Agent.

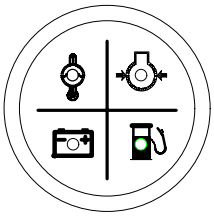
Diagnostic Checks While Running



Start Engine (With No Load Applied).



Continue Pressing Shutdown Switch Until Engine Lights Go Off.



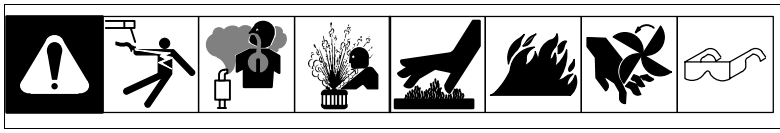
Normal Condition:
Engine Lights Go Off As Engine Reaches Normal Operating Condition.

Lights That Stay On After 20 Sec. Indicate Fault Condition.

Stop Engine And Correct Fault (See Above) If Fault Continues, See Factory Authorized Service Agent.

Ref. 201 841

8-11. Troubleshooting



A. Welding – CC Models

Trouble	Remedy
No weld output; auxiliary power output okay.	Check position of Ampere Range switch.
	Check position of optional polarity switch.
	Place Amperage Adjust switch in Panel position, or place switch in Remote position and connect remote control to Remote Amperage Adjust receptacle RC13 (see Sections 4-10 and 5-1).
	Check and secure connections to Remote Amperage Adjust receptacle RC13 (see Section 4-10).
	Check fuse F2, and replace if open (see Section 8-9). Have Factory Authorized Service Agent check integrated rectifier SR2 and the rotor.
	Have Factory Authorized Service Agent check brushes and slip rings, and field excitation circuit.
No weld output or auxiliary power output.	Disconnect equipment from auxiliary power receptacles during start-up.
	Check fuses F1 and F2, and replace if open (see Section 8-9). Have Factory Authorized Service Agent check integrated rectifier SR1, capacitor C9, integrated rectifier SR2, and the rotor.
	Reset circuit breaker CB12. Have Factory Authorized Service Agent check diode D1 (see Section 8-9).
	Have Factory Authorized Service Agent check brushes and slip rings, and field excitation circuit.
Erratic weld output.	Check and tighten connections inside and outside unit.
	Be sure connection to work piece is clean and tight.
	Use dry, properly stored electrodes.
	Remove excessive coils from weld cables.
High weld output.	Check engine speed, and adjust if necessary.
	Have Factory Authorized Service Agent check OCV control circuit.
Low weld output.	Check engine speed, and adjust if necessary.
	Check fuses F1 and F2, and replace if open (see Section 8-9). Have Factory Authorized Service Agent check integrated rectifier SR1, capacitor C9, integrated rectifier SR2, and the rotor.
Electrode sticks to the workpiece more frequently during low voltage (short arc length) conditions.	Circuit breaker CB4 may be open. CB4 automatically resets when the fault is corrected (see Section 8-9). Have Factory Authorized Service Agent check transformer T1 and integrated rectifiers SR4 and SR5.
Low open-circuit voltage.	Check engine speed, and adjust if necessary.
Maximum weld output only in each ampere range (with Stick/TIG Selection switch in Stick position).	Have Factory Authorized Service Agent check control relay CR7.
No remote fine amperage control.	Place Amperage Adjust switch in correct position.
	Check and secure connections to Remote Amperage Adjust receptacle RC13 (see Section 4-10).
	Reset circuit breaker CB11 (see Section 8-9). Have Factory Authorized Service Agent check control relay CR7.
	Repair or replace remote control device.
	Have Factory Authorized Service Agent check OCV control circuit.

B. Welding – CC/CV Models

Trouble	Remedy
No weld output; auxiliary power output okay.	Place Process/Contactor switch in a Electrode Hot position, or place switch in a Remote position and connect remote contactor to optional Remote 14 receptacle RC14 (see Sections 4-11 and 6-1).
	Check position of Ampere Range switch.
	Check position of optional polarity switch.
	Reset circuit breaker CB11 (see Section 8-9).
	Reset circuit breaker CB5 (see Section 8-9). Check for faulty remote device connected to RC14.
	Check and secure connections to Remote 14 receptacle RC14 (see Section 4-11).
	Have Factory Authorized Service Agent check connector board PC6 and connections.
	Check fuse F2, and replace if open (see Section 8-9). Have Factory Authorized Service Agent check brushes and slip rings, field excitation circuit, field current regulator board PC1, and the rotor.
No weld output or auxiliary power output.	Disconnect equipment from auxiliary power receptacles during start-up.
	Check fuses F1 and F2, and replace if open (see Section 8-9). Have Factory Authorized Service Agent check integrated rectifier SR1, capacitor C9, field current regulator board PC1, and the rotor.
	Have Factory Authorized Service Agent check brushes and slip rings, and field excitation circuit.
Erratic weld output.	Check and tighten connections inside and outside unit.
	Be sure connection to work piece is clean and tight.
	Use dry, properly stored electrodes.
	Remove excessive coils from weld cables.
High weld output.	Check position of Ampere Range switch and Voltage/Amperage Adjust control.
	Check engine speed, and adjust if necessary.
	Have Factory Authorized Service Agent check field current regulator board PC1.
Voltage/Amperage control does not work when welding in Stick mode.	Place Ampere Range switch in lower range. Voltage/Amperage control does not work with Ampere Range switch in highest range.
Low weld output.	Check engine speed, and adjust if necessary.
	Check fuses F1 and F2, and replace if open (see Section 8-9). Have Factory Authorized Service Agent check integrated rectifier SR1, capacitor C9, field current regulator board PC1, and the rotor.
Electrode sticks to the workpiece more frequently during low voltage (short arc length) conditions.	Circuit breaker CB4 may be open. CB4 automatically resets when the fault is corrected (see Section 8-9). Have Factory Authorized Service Agent check transformer T1 and integrated rectifiers SR4 and SR5.
Low open-circuit voltage.	Check engine speed, and adjust if necessary.
No remote fine amperage or voltage control.	Place Voltage/Amperage Adjust switch in Remote position.
	Check and secure connections to Remote 14 receptacle RC14 (see Section 4-11).
	Repair or replace remote control device.
Constant speed wire feeder does not work.	Reset circuit breaker CB5 (see Section 8-9).
	Check and secure connections to Remote 14 receptacle RC14 (see Section 4-11).
	Check voltage requirements of wire feeder. 115 volt output not available through Remote 14 receptacle (see Section 4-11).
	Repair or replace wire feeder.
Low CV weld output.	Set Ampere Range switch to highest range.
Min or max CV weld output only.	Check position of Voltage/Amperage Adjust control and Voltage/Amperage Adjust switch.
	Repair or replace remote control device.
	Have Factory Authorized Service Agent check field current regulator board PC1.

C. Standard Auxiliary Power

Trouble	Remedy
No auxiliary power output; weld output okay.	Reset receptacle circuit breakers.
No auxiliary power or weld output.	Disconnect equipment from auxiliary power receptacles during start-up.
	Check fuses F1 and F2, and replace if open (see Section 8-9). Have Factory Authorized Service Agent check integrated rectifier SR1, capacitor C9, and the rotor.
	Reset circuit breaker CB12. Have Factory Authorized Service Agent check diode D1 (CC models) or field current regulator board PC1 (CC/CV models) (see Section 8-9).
	Have Factory Authorized Service Agent check brushes and slip rings, and field excitation circuit.
High output at auxiliary power receptacles.	Check engine speed, and adjust if necessary.
	Have Factory Authorized Service Agent adjust auxiliary power field current resistor R3.
Low output at auxiliary power receptacles.	Check engine speed, and adjust if necessary.
	Check fuse F1, and replace if open (see Section 8-9). Have Factory Authorized Service Agent check integrated rectifier SR1, resistor R3, and capacitor C9.

D. Optional Auxiliary Power Plant

Trouble	Remedy
No or low output at optional auxiliary power plant/receptacle RC5 (CC/CV models only).	Place Process/Contactor switch in Electrode Hot - Stick position (see Section 6-3).
	Reset circuit breaker CB7 (see Section 7-2).
	Reset circuit breaker CB5 (see Section 8-9).
	Check engine weld/power speed, and adjust if necessary (see Section 8-5).
	Have Factory Authorized Service Agent check brushes and slip rings, and field current regulator board PC1.
High output at optional auxiliary power plant/receptacle RC5 (CC/CV models only).	Check engine weld/power speed, and adjust if necessary (see Section 8-5).
	Have Factory Authorized Service Agent check field current regulator board PC1.
Erratic output at optional auxiliary power plant/receptacle RC5 (CC/CV models only).	Have Factory Authorized Service Agent check brushes and slip rings, and field current regulator board PC1.

E. Engine

Trouble	Remedy
Engine will not crank.	Check battery, and replace if necessary.
	Check battery connections and tighten if necessary.
	Circuit breaker CB10 may be open. CB10 automatically resets when fault is corrected (see Section 8-9). Have Factory Authorized Service Agent check engine wiring harness and components.
	Check engine wiring harness plug connections.
	Have Factory Authorized Service Agent check Engine Control switch S1.

Trouble	Remedy
Engine cranks but does not start.	Press Magnetic Shutdown switch MS1 when starting engine.
	Check fuel level.
	Reset circuit breaker CB13 (see Section 8-9). Have Factory Authorized Service Agent check engine-wiring harness and components.
	Check battery and replace if necessary. Check engine charging system according to engine manual.
	Have Factory Authorized Service Agent check control relay CR2, and fuel solenoid FS1.
Engine starts, but stops when Magnetic Shutdown switch is released.	When starting engine, continue holding Magnetic Shutdown switch until after engine indicator lights go out.
	Check oil, and coolant levels. Automatic shutdown system stops engine if oil pressure is too low or coolant temperature is too high (see Sections 4-7 and 8-10).
Engine hard to start in cold weather.	Use starting Aid (Engine Choke control, see Section 5-1).
	Keep battery in good condition. Store battery in warm area off cold surface.
	Use correct grade oil for cold weather (see Section 8-1).
Engine suddenly stops.	Check fuel, oil, and coolant levels. Automatic shutdown system stops engine if oil pressure is too low, or coolant temperature is too high (see Sections 4-7 and 8-10).
	See engine manual.
Engine slowly stopped and cannot be restarted.	Check fuel level.
	Check engine air and fuel filters (see Section 8-8).
	Check engine wiring harness connections.
	See engine manual.
Battery discharges between uses.	Turn Engine Control switch off when unit is not running.
	Clean top of battery with baking soda and water solution; rinse with clear water.
	Recharge or replace battery if necessary.
	Periodically recharge battery (approximately every 3 months).
Engine idles, but does not come up to weld speed.	Have Factory Authorized Service Agent check idle module PC7, current transformer CT1, and throttle solenoid TS1.
	Check for obstructed throttle solenoid and linkage.
Engine does not run at idle speed.	CC models: place Stick/TIG Selection switch in Stick position. CC/CV models: place Process/Contactor switch in any position but Remote-TIG.
	Check for obstructed throttle solenoid and linkage.
	Have Factory Authorized Service Agent check idle module PC7, and control relays CR3 and CR6.

Notes

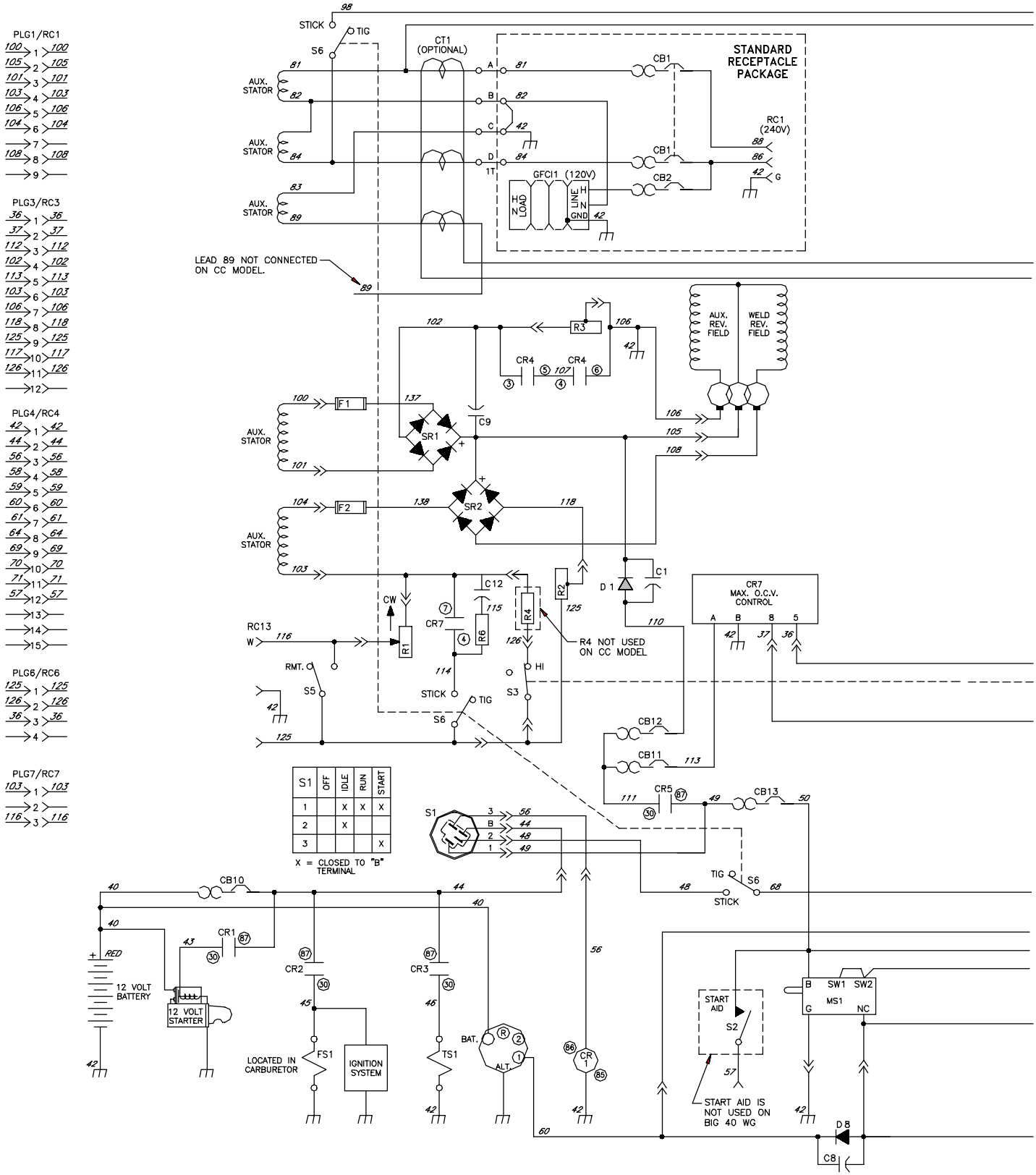
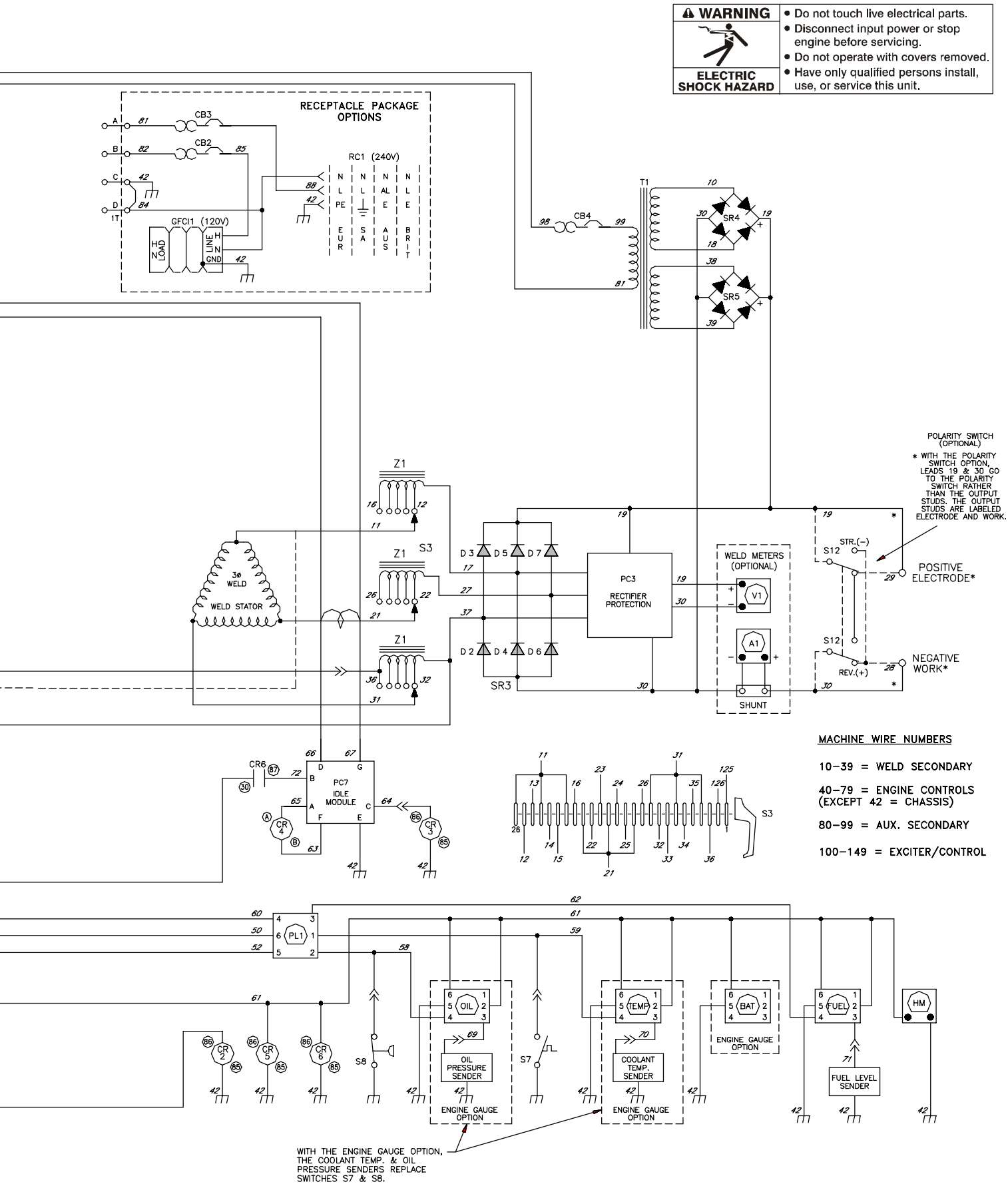


Figure 9-1. Circuit Diagram For CC Welding Generator


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.
RECEPTACLE PACKAGE OPTIONS
RC1 (240V)
GFCI1 (120V)
CB2
CB3
CB4
T1
SR4
SR5
Z1
S3
3ø WELD
WELD STATOR
D3 D5 D7
D2 D4 D6
SR3
PC3
RECTIFIER PROTECTION
WELD METERS (OPTIONAL)
V1
A1
SHUNT
POLARITY SWITCH (OPTIONAL)
* WITH THE POLARITY SWITCH OPTION, LEADS 19 & 30 GO TO THE POLARITY SWITCH RATHER THAN THE OUTPUT STUDS. THE OUTPUT STUDS ARE LABELED ELECTRODE AND WORK.
STR.(−)
REV.(+)
POSITIVE ELECTRODE*
NEGATIVE WORK*
CR6
PC7 IDLE MODULE
CR4
CR3
MACHINE WIRE NUMBERS
10−39 = WELD SECONDARY
40−79 = ENGINE CONTROLS (EXCEPT 42 = CHASSIS)
80−99 = AUX. SECONDARY
100−149 = EXCITER/CONTROL
PL1
CR2
CR5
CR6
S8
S7
OIL
TEMP
BAT
FUEL
HM
OIL PRESSURE SENDER
COOLANT TEMP. SENDER
FUEL LEVEL SENDER
ENGINE GAUGE OPTION
ENGINE GAUGE OPTION
ENGINE GAUGE OPTION
WITH THE ENGINE GAUGE OPTION, THE COOLANT TEMP. & OIL PRESSURE SENDERS REPLACE SWITCHES S7 & S8.

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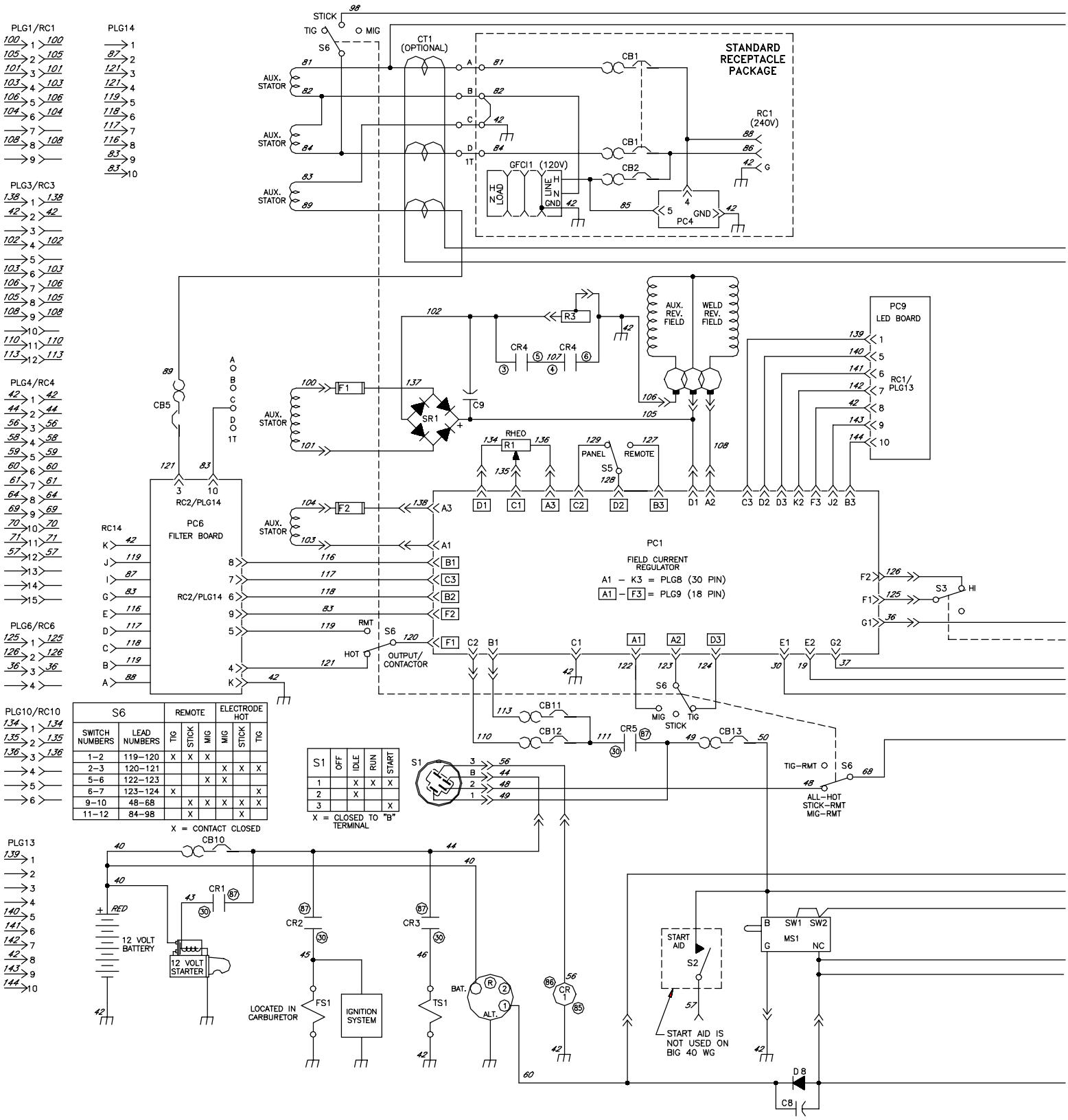


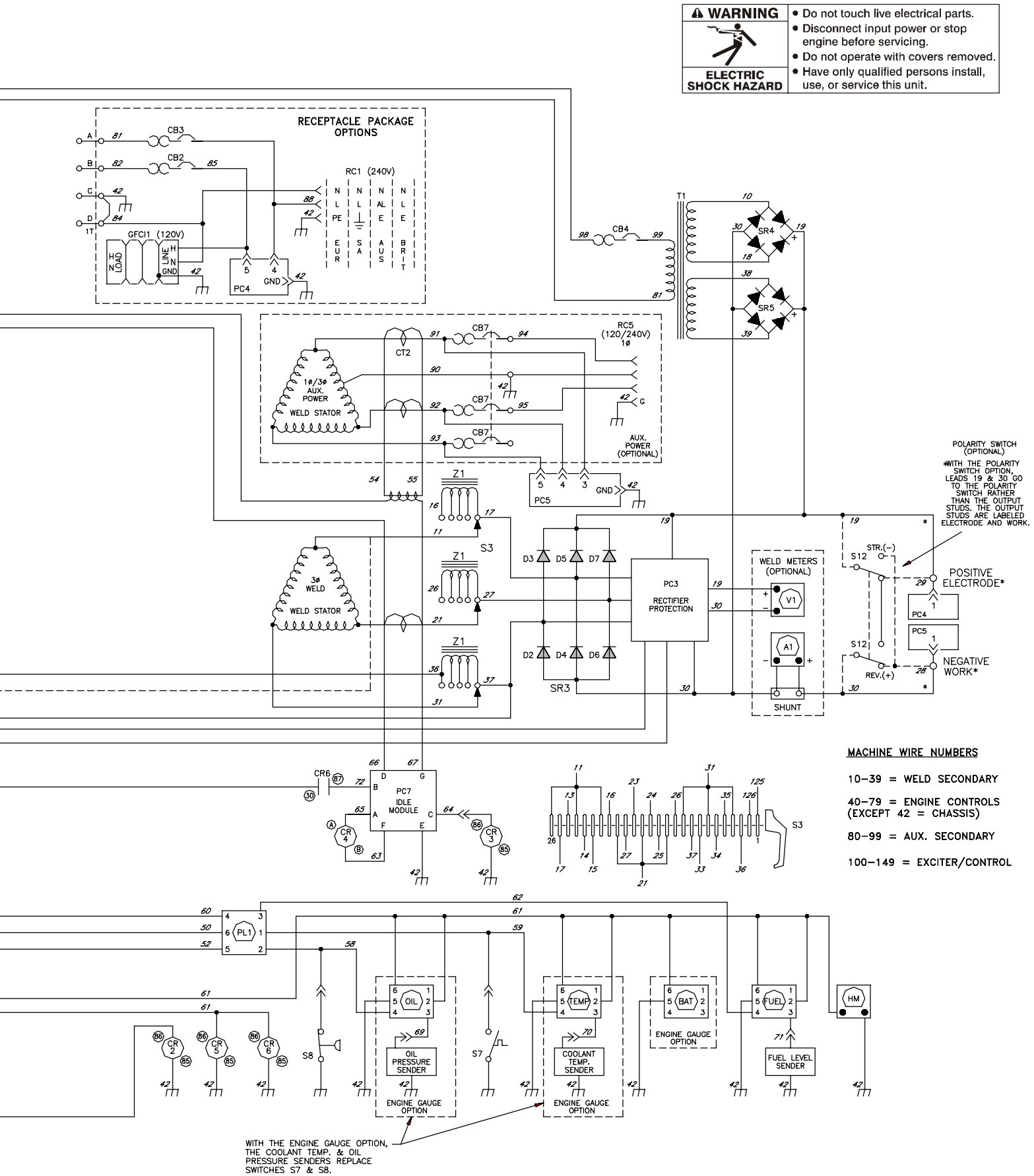
S6		REMOTE			ELECTRODE HOT		
SWITCH NUMBERS	LEAD NUMBERS	TIG	STICK	MIG	MIG	STICK	TIG
1–2	119–120	X	X	X			
2–3	120–121				X	X	X
5–6	122–123			X	X		
6–7	123–124	X					X
9–10	48–68		X	X	X	X	X
11–12	84–98		X			X	

X = CONTACT CLOSED

S1	OFF	IDLE	RUN	START
1		X	X	X
2		X		
3				X

X = CLOSED TO "B" TERMINAL

Figure 9-2. Circuit Diagram For CC/CV Welding Generator


WARNING
• Do not touch live electrical parts.
• Disconnect input power or stop engine before servicing.
• Do not operate with covers removed.
• Have only qualified persons install, use, or service this unit.
ELECTRIC SHOCK HAZARD
RECEPTACLE PACKAGE OPTIONS
RC1 (240V)
GFCI1 (120V)
PC4
CB2
CB3
CB4
CB7
T1
SR4
SR5
RC5 (120/240V) 1ø
CT2
1ø/3ø AUX. POWER WELD STATOR
AUX. POWER (OPTIONAL)
PC5
Z1
S3
3ø WELD WELD STATOR
D2 D3 D4 D5 D6 D7
SR3
PC3 RECTIFIER PROTECTION
WELD METERS (OPTIONAL)
V1
A1
SHUNT
POLARITY SWITCH (OPTIONAL)
*WITH THE POLARITY SWITCH OPTION, LEADS 19 & 30 GO TO THE POLARITY SWITCH RATHER THAN THE OUTPUT STUDS. THE OUTPUT STUDS ARE LABELED ELECTRODE AND WORK.
STR.(-)
REV.(+)
S12
POSITIVE ELECTRODE*
NEGATIVE WORK*
CR6
PC7 IDLE MODULE
CR 4
CR 3
PL1
CR 2
CR 5
CR 6
S8
S7
OIL PRESSURE SENDER
COOLANT TEMP. SENDER
FUEL LEVEL SENDER
ENGINE GAUGE OPTION
HM
WITH THE ENGINE GAUGE OPTION, THE COOLANT TEMP. & OIL PRESSURE SENDERS REPLACE SWITCHES S7 & S8.
MACHINE WIRE NUMBERS
10–39 = WELD SECONDARY
40–79 = ENGINE CONTROLS (EXCEPT 42 = CHASSIS)
80–99 = AUX. SECONDARY
100–149 = EXCITER/CONTROL

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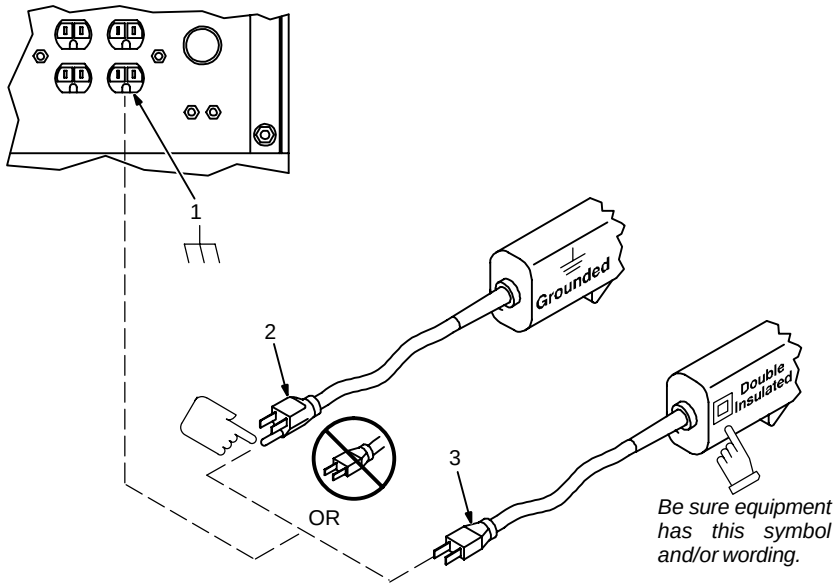
SECTION 10 – AUXILIARY POWER GUIDELINES

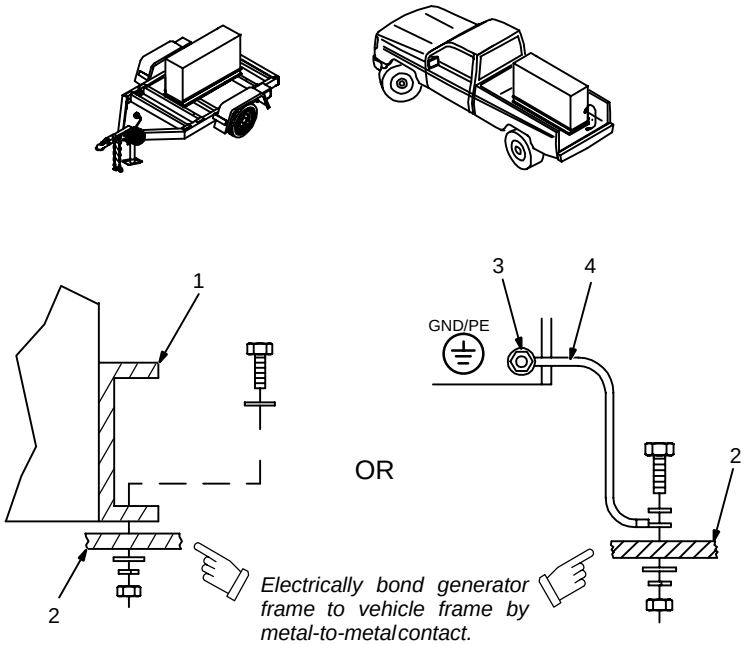
10-1. Selecting Equipment



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

aux_pwr 2/99 – Ref. ST-159 730 / ST-800 577

10-2. Grounding Generator To Truck Or Trailer Frame



1 Generator Base
2 Metal Vehicle Frame
3 Equipment Grounding Terminal
4 Grounding Cable

Use #10 AWG or larger insulated copper wire.

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

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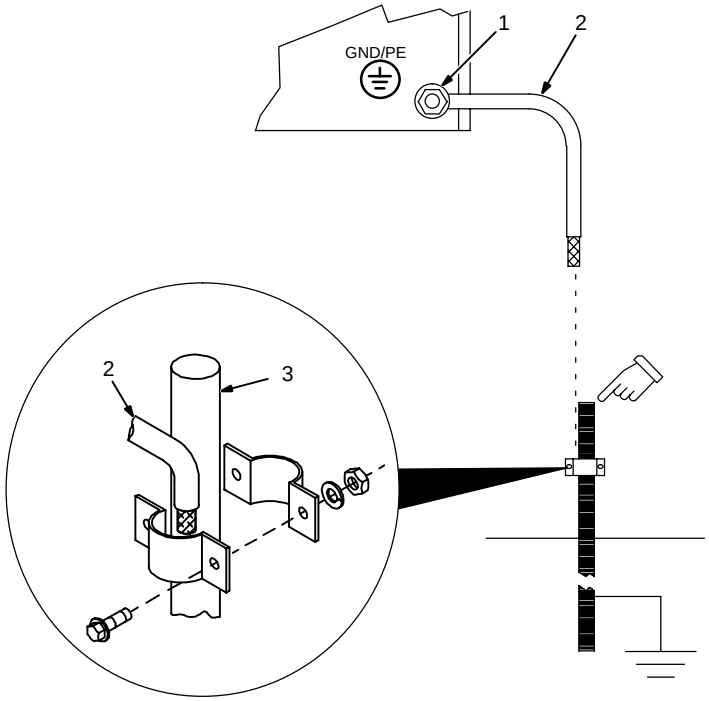
10-3. Grounding When Supplying Building Systems



1 Equipment Grounding Terminal

2 Grounding Cable

Use #10 AWG or larger insulated copper wire.

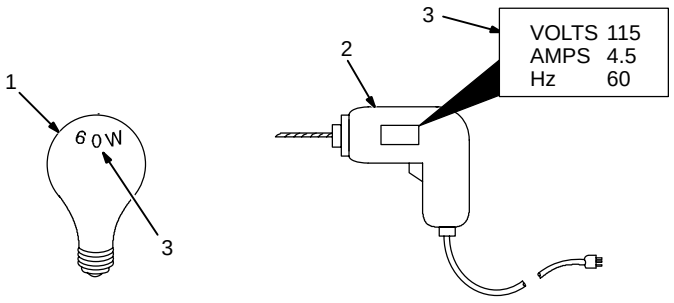
3 Ground Device

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

Use ground device as stated in electrical codes.

ST-800 576-B

10-4. 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 10-8).

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 A x 115 V = 520 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.

(200 W + 200 W + 200 W) + 520 W = 1120 W

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

S-0623

10-5. Approximate Power Requirements For Industrial Motors

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

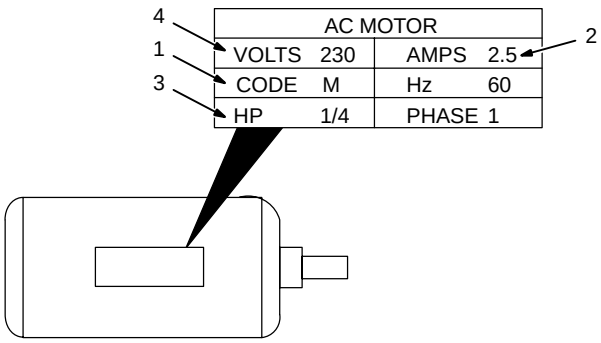
10-6. Approximate Power Requirements For Farm/Home Equipment

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

10-7. Approximate Power Requirements For Contractor Equipment

Contractor	Rating	Starting Watts	Running Watts
Hand Drill	1/4 in	350	350
	3/8 in	400	400
	1/2 in	600	600
Circular Saw	6-1/2 in	500	500
	7-1/4 in	900	900
	8-1/4 in	1400	1400
Table Saw	9 in	4500	1500
	10 in	6300	1800
Band Saw	14 in	2500	1100
Bench Grinder	6 in	1720	720
	8 in	3900	1400
	10 in	5200	1600
Air Compressor	1/2 HP	3000	1000
	1 HP	6000	1500
	1-1/2 HP	8200	2200
	2 HP	10500	2800
Electric Chain Saw	1-1/2 HP, 12 in	1100	1100
	2 HP, 14 in	1100	1100
Electric Trimmer	Standard 9 in	350	350
	Heavy Duty 12 in	500	500
Electric Cultivator	1/3 HP	2100	700
Elec. Hedge Trimmer	18 in	400	400
Flood Lights	HID	125	100
	Metal Halide	313	250
	Mercury	1000	
	Sodium	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

10-8. Power Required To Start Motor



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

To find starting amperage:

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

Step 2: Find Motor HP and Volts.

Step 3: Determine starting amperage (see example).

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

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

$$\frac{\textbf{kVA/HP x HP x 1000}}{\textbf{VOLTS}} = \textbf{STARTING AMPERAGE}$$

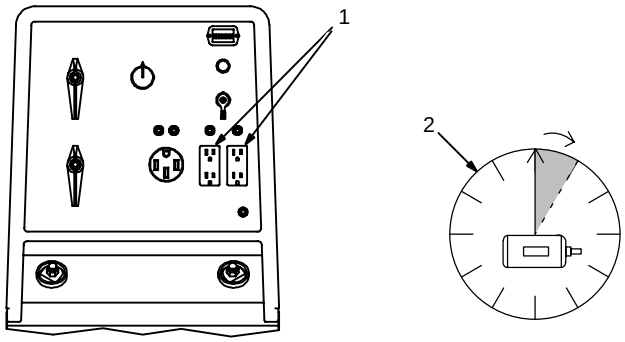
EXAMPLE: Calculate the starting amperage required for a 230 V, 1/4 HP motor with a motor start code of M.

Volts = 230 HP = 1/4 Using Table, Code M results in kVA/HP = 11.2

$$\frac{11.2 \times 1/4 \times 1000}{230} = 12.2\ \text{A}$$ **Starting the motor requires 12.2 amperes.**

S-0624

10-9. How Much Power Can Generator Supply?



1 Limit Load To 90% Of Generator Output

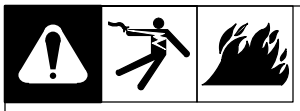
Always start non-resistive (motor) loads in order from largest to smallest, and add resistive loads last.

2 5 Second Rule

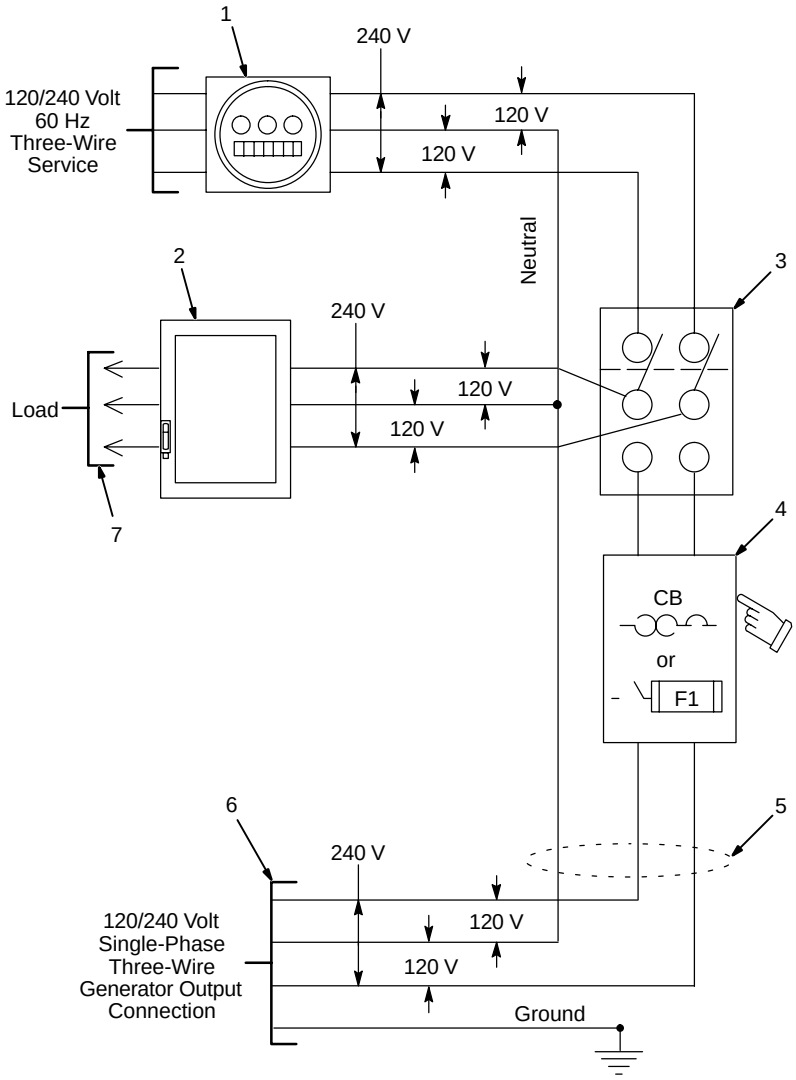
If motor does not start within 5 seconds, turn off power to prevent motor damage. Motor requires more power than generator can supply.

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

10-10. Typical Connections To Supply Standby Power



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



Item 4 is not necessary if circuit protection is already present in welding generator auxiliary power output circuit.

1 Power Company Service Meter

2 Main and Branch Overcurrent Protection

3 Double-Pole, Double-Throw Transfer Switch

Obtain and install correct switch. Switch rating must be same as or greater than the branch overcurrent protection.

4 Circuit Breakers or Fused Disconnect Switch

Obtain and install correct switch.

5 Extension Cord

Select as shown in Section 10-11.

6 Generator Connections

Connect terminals or plug of adequate amperage capacity to cord. Follow all applicable codes and safety practices.

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.

7 Load Connections

S-0405-A

10-11. Selecting Extension Cord (Use Shortest Cord Possible)

Cord Lengths for 120 Volt Loads

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

Current (Amperes)	Load (Watts)	Maximum Allowable Cord Length in ft (m) for Conductor Size (AWG)*					
		4	6	8	10	12	14
5	600			350 (106)	225 (68)	137 (42)	100 (30)
7	840		400 (122)	250 (76)	150 (46)	100 (30)	62 (19)
10	1200	400 (122)	275 (84)	175 (53)	112 (34)	62 (19)	50 (15)
15	1800	300 (91)	175 (53)	112 (34)	75 (23)	37 (11)	30 (9)
20	2400	225 (68)	137 (42)	87 (26)	50 (15)	30 (9)	
25	3000	175 (53)	112 (34)	62 (19)	37 (11)		
30	3600	150 (46)	87 (26)	50 (15)	37 (11)		
35	4200	125 (38)	75 (23)	50 (15)			
40	4800	112 (34)	62 (19)	37 (11)			
45	5400	100 (30)	62 (19)				
50	6000	87 (26)	50 (15)				

*Conductor size is based on maximum 2% voltage drop

Cord Lengths for 240 Volt Loads

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

Current (Amperes)	Load (Watts)	Maximum Allowable Cord Length in ft (m) for Conductor Size (AWG)*					
		4	6	8	10	12	14
5	1200			700 (213)	450 (137)	225 (84)	200 (61)
7	1680		800 (244)	500 (152)	300 (91)	200 (61)	125 (38)
10	2400	800 (244)	550 (168)	350 (107)	225 (69)	125 (38)	100 (31)
15	3600	600 (183)	350 (107)	225 (69)	150 (46)	75 (23)	60 (18)
20	4800	450 (137)	275 (84)	175 (53)	100 (31)	60 (18)	
25	6000	350 (107)	225 (69)	125 (38)	75 (23)		
30	7000	300 (91)	175 (53)	100 (31)	75 (23)		
35	8400	250 (76)	150 (46)	100 (31)			
40	9600	225 (69)	125 (38)	75 (23)			
45	10,800	200 (61)	125 (38)				
50	12,000	175 (53)	100 (31)				

*Conductor size is based on maximum 2% voltage drop

Notes

SECTION 11 – PARTS LIST

☞ *Hardware is common and not available unless listed.*

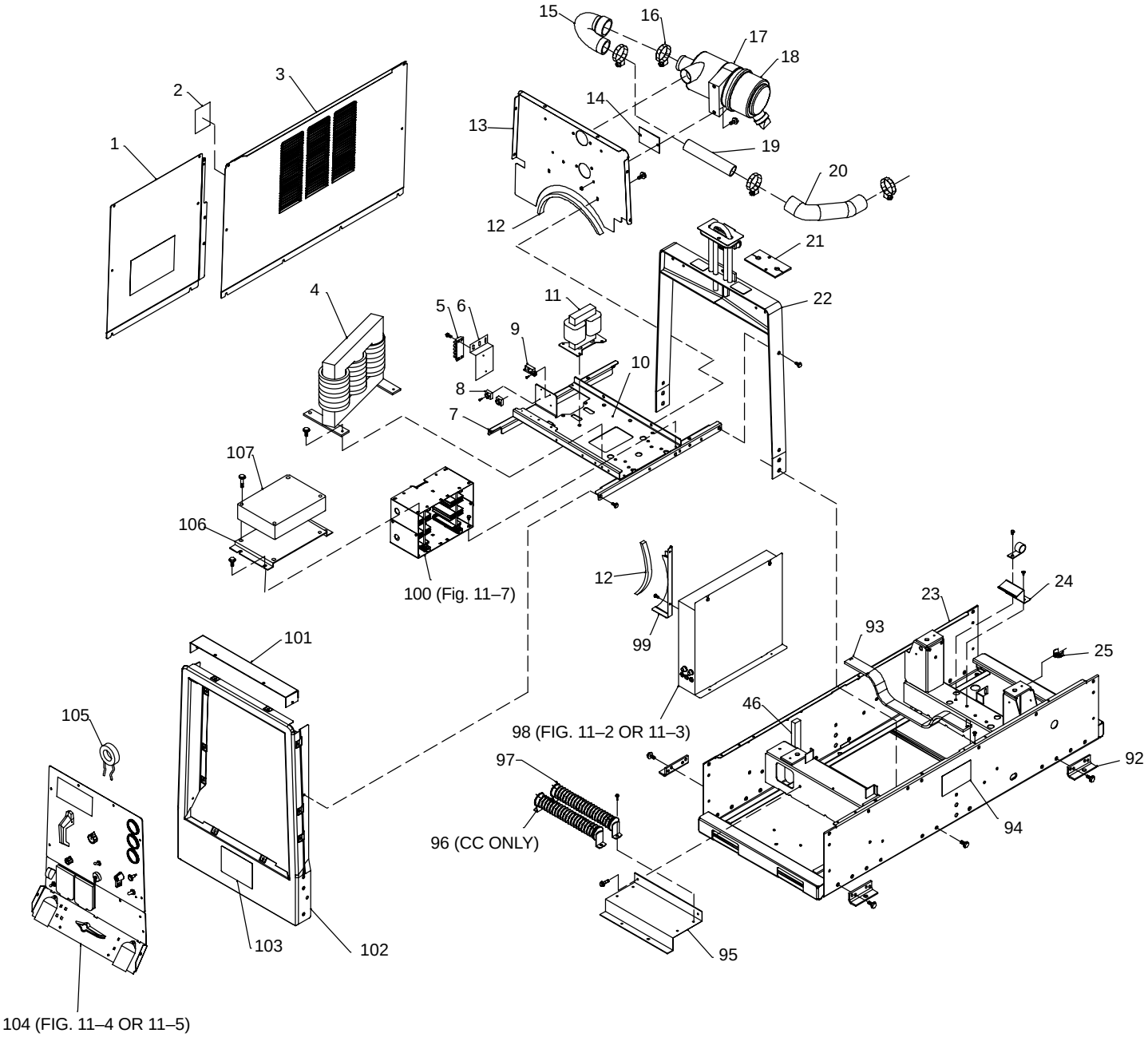
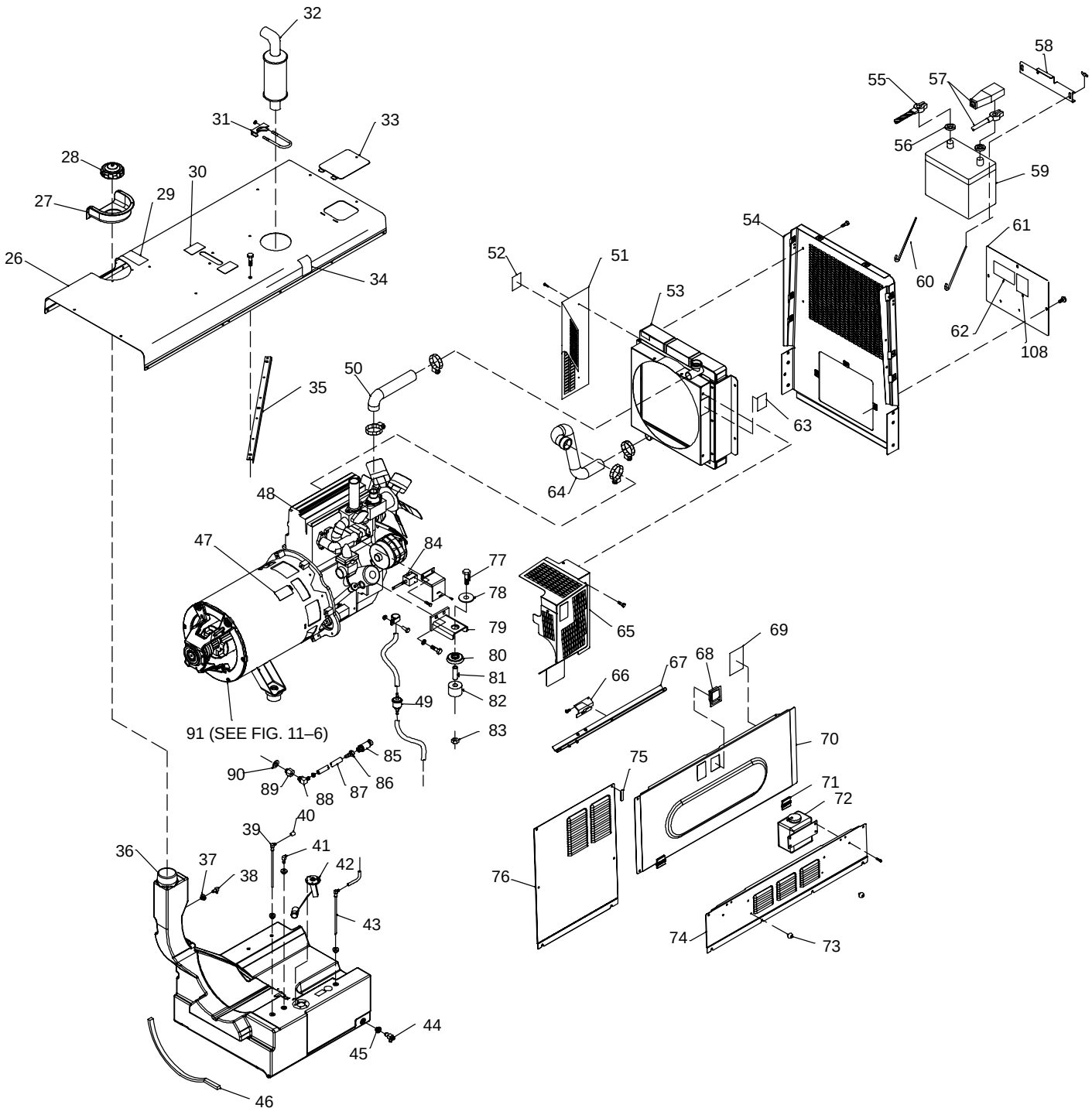


Figure 11-1. Main Assembly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802 789

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 11-1. Main Assembly

1		189 824	PANEL, gen LH	1
2		191 623	LABEL, warning all panels must be in place while running	2
3		+189 828	PANEL, engine side	1
4	Z1	$^{c}_{c}$202 151	REACTOR, ac	1
4	Z1	$^{c}_{v}$201 514	REACTOR, ac	1
5	1T	038 621	BLOCK, term 30A 4 pole frict term str	1
		038 620	LINK, jumper term blk 30A	2
6		081 499	BRACKET, mtg strip terminal	1
7		201 701	BRACE, front to center upright	2
8	SR4, SR5	035 704	RECTIFIER, integ bridge 40. amp 800v	2
9	CB4	045 061	CIRCUIT BREAKER, auto reset 24vdc 7 amp	1
10		201 697	PAN, reactor and rectifier	1
11	T1	201 613	TRANSFORMER w/bracket	1
12		173 352	EXTRUSION, rubber clamp/bulb (order by ft)	3ft
13		189 708	FIREWALL, top	1
14		191 307	COVER, plate	1
15		200 968	HOSE, elbow air cleaner	1
16		010 863	CLAMP, hose 1.125 – 3.000 clp dia	4
17		189 763	BRACKET, mtg air cleaner	1
18		189 764	AIR CLEANER, intake	1
		*192 938	FILTER, air element primary	1
		*♦192 939	FILTER, air element safety	1
19		198 457	TUBE, air intake	1
20		200 969	HOSE, air cleaner	1
21		189 464	SEAL, weather lift eye	1
		173 909	HOSE, sae .312 id x .560 od x 24.000 (order by ft)	2
22		201 658	UPRIGHT, center assembly	1
23		+200 999	BASE	1
24		196 220	BRACKET, hold down fuel tank rear	1
25		192 362	BRACKET, mtg nyl 1/2 conduit	1
26		+200 995	COVER, top	1
27		189 052	GROMMET, plastic neck filler fuel	1
28		190 198	CAP, tank screw-on 3.500 in w/vent	1
29		192 042	LABEL, use gasoline fuel only	1
30		108 487	LABEL, warning falling equipment	2
31		010 875	CLAMP, muffler 2.000 dia	1
32		105 740	PIPE, muffler exhaust engine 1.925 inlet/outlet	1
33		201 851	COVER, radiator access	1
34		176 230	LABEL, warning hot exhaust	1
35		191 354	SUPPORT, cover	1
36		189 245	TANK, fuel 23gal (consisting of)	1
37		124 253	BUSHING, tank fuel	4
		084 173	CLAMP, hose .460 – .545clp dia slfttng	2
38		189 912	FITTING, stl barbed elbow w/.047 in orf zinc pld	1
39		189 909	FITTING, stand pipe hose .250 x 9.260 lg 90deg zinc	1
40		201 025	CAP, fuel fitting	1
41		189 913	FITTING, stl barbed elbow zinc pld	1
42		190 142	SENDER, fuel gauge 9.7500 deep tank	1
43		189 910	FITTING, stand pipe hose .3125 x 9.260 lg 90deg zinc	1
44		189 908	VALVE, drain fuel 180deg	1
45		181 572	BUSHING, tank fuel	1
46		191 446	EXTRUSION, rubber w/adhesive 1.000 x 1.000 D (order by ft)	6ft
47		013 367	LABEL, warning moving parts	2
48		200 984	ENGINE, Wis-Con gasoline TM-20 (consisting of)	1
		*025 474	SWITCH, thermo temp 240 make 230 open	1
		*025 473	SWITCH, pressure oil 8 psi brake or make	1
		201 141	FTG, adapter oil drain 1/2-20 male x 3/8 npt female	1
		*201 142	BELT, fan	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 11-1. Main Assembly (Continued)	
		172 725	BOOT, starter eyelet terminal	1
		*114 559	FILTER, oil	1
49		*066 113	FILTER, inline	1
50		200 966	HOSE, radiator upper Wis-Con TM-20	1
51		+202 052	GUARD, fan (left side)	1
52		147 923	LABEL, warning moving parts	2
53		201 982	RADIATOR, w/shroud and 7lb cap 3 row core	1
		605 982	CAP, radiator pressure 7 lb	1
54		201 749	UPRIGHT, rear	1
55		190 206	CABLE, bat neg 42 in lg No. 2 awg w/clamp and .375rng	1
56		108 081	TERMINAL PROTECTOR, battery post mtg	2
57		190 207	CABLE, bat pos 45 in lg No. 1 awg w/clamp and .406rng	1
58		203 430	BRACKET, battery holddown	1
59		190 897	BATTERY, stor 12V 650crk 110rsv gp 24	1
60		201 006	BOLT, j stl .312–18 x 8.500 pld	2
61		+201 183	COVER, battery access	1
62		168 385	LABEL, warning battery explosion can blind	1
63		201 996	LABEL, warning do not operate with guard missing	2
64		200 967	HOSE, radiator lower Wis-Con TM-20	1
65		+200 990	GUARD, fan (right side)	1
66		190 992	KEEPER, latch engine access door	1
67		190 076	CHANNEL, stiffener engine access	1
68		199 592	LATCH, paddle series 20 (black)	1
69		201 031	LABEL, gasoline engine maintenance Wis-Con TM-20	1
70		+200 989	DOOR, engine access	1
71		189 975	HINGE, door access 180deg	2
72		190 190	TANK, coolant recovery	1
73		201 591	STOP, door	2
74		189 826	PANEL, rocker	1
75		191 626	BUMPER, door engine access	2
76		189 827	PANEL, gen RH	1
77		199 849	SCREW, 625-11 x 4.00hexhd pln gr 5 pld	4
78		071 731	WASHER, flat .656 ID x 2.250 OD x .187T stl pld	4
79		200 985	BRACKET, mtg engine Wis-Con TM-20	2
80		071 890	RETAINER, mount eng/gen	4
81		071 730	TUBING, stl .875 OD x 12ga wall x 2.500	4
82		083 476	MOUNT, eng/gen nprn .875 ID x 2.500 OD x 2.000	4
83		135 205	NUT, 625-11 .94hex .76H stl pld elastic stop nut	4
84		190757	SOLENOID ASSY (consisting of)	1
		113658	LINKAGE, throttle	1
		115857	BRACKET, mtg solenoid idle	1
		005373	SOLENOID, 14vdc .84 amp pull type cont	1
		010837	PIN, spring cs .093 x .625	1
		199 505	HOSE, oil drain assy 32 in (consisting of)	1
85		165 271	VALVE, oil drain 3/8-18NPTF	1
86		176 529	FITTING, hose brs barbed fem 1/2tbg x 3/8NPT	1
87		113 854	HOSE, SAE .500 ID x .780 OD xc oil (order by ft)	3ft
88		197 448	FITTING, hose brs barbed elbow m 1/2 tbg x 3/8 npt	1
89		201 141	FITTING, engine adapter oil drain 12-20 x 3/8 npt female	1
90		201 362	WASHER, oil drain	1
91	Figure 11-6		GENERATOR	1
92		191 897	BRACKET, mtg unit	4
93		191 512	BRACKET, hold down fuel tank	1
94		190 250	LABEL, warning do not weld on base	2
95		190 179	PANEL, mtg components	1
96	R2	[c]189 699	RESISTOR, WW tap 375W 10 ohm w/mtg bkt	1
97	R3	189 699	RESISTOR, WW tap 375W 10 ohm w/mtg bkt	1
98	Figure 11-2, Figure 11-3		CONTROL BOX ASSEMBLY	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 11-1. Main Assembly (Continued)

. . . 99		189 731	. . FIREWALL, lower	1
. . 100		Figure 11-7	. . MAIN RECTIFIER ASSEMBLY	1
. . 101		191 448	. . TOP, cover front upright	1
. . 102		+201 750	. . UPRIGHT, front	1
. . 103		182 761	. . LABEL, warning general precautionary	1
. . 104		Figure 11-4, Figure 11-5	PANEL, front w/components	1
. . 105		202130	. . XFMR, current sensing	1
. . 106		c_v193 453	. . BRACKET, mtg box fcr	1
. . 107	PC1	c_v189 143	. . MODULE, field current regulator	1
. . 108		+147 923	. . LABEL, warning moving parts can cause serious injury	1
. . . . .		190 058	. . NUT, .250-20 u-nut multi-thread	19
. . . . .		049 525	. . NUT, 312-18 u-nut multi-thread	32
. . . . .		202 022	. . KIT, label (includes safety and informational labels)	1

\+ When ordering a component originally displaying a precautionary label, the label should also be ordered. Order label individually or as part of Label Kit 202 022.

*Recommended Spare Parts.

c_c CC models only.

c_v CC/CV models only.

♦Optional

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

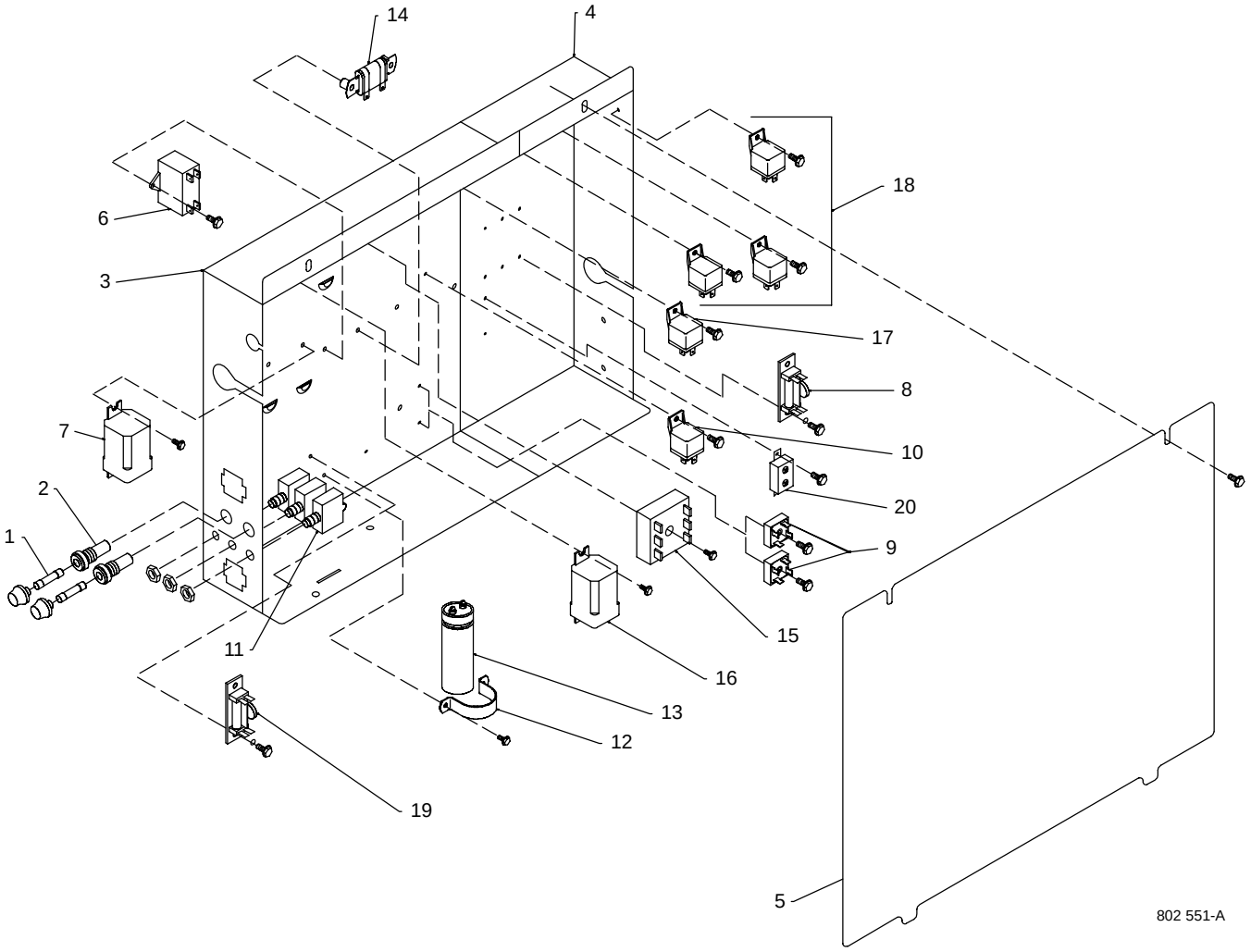

Figure 11-2. Control Box Assembly – CC Models

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
1	F1, F2	*085 874	FUSE, mintr cer slo-blo 10A 250V	2
2		046 432	HOLDER, fuse mintr .250 x 1.250	2
3		201 077	CONTROL BOX, lh	1
4		201 078	CONTROL BOX, rh	1
5		201 079	COVER, control box	1
6	C12	191 944	CAPACITOR, polyp met film 10. uf 250 vac 10%	1
		201 681	HARNESS, control box, weld control (consisting of)	1
7	CR7	188 636	RELAY, OCV control	1
8	D1/C1	189 701	DIODE/CAPACITOR BOARD	1
9	SR1, SR2	035 704	RECTIFIER, integ 40A 800V	2
10	CR5	090 104	RELAY, encl 12VDC SPST 30A/15VDC	1
	S5	011 609	SWITCH, tgl spdt 15a 125vac on–none–on spd term chr (located on front panel, see Figure 11-4)	1
	S6	011 622	SWITCH, tgl 3pdt 15a 125vac on–none–on spd term (located on front panel, see Figure 11-4	1
	RC4	047 483	CONNECTOR, rect univ 084 15P/S 3 row rcpt cable/panel lkg	1
	RC3	158 466	CONNECTOR, rect univ 084 12P/S 3 row rcpt cable/panel lkg	1
	RC1	135 133	CONNECTOR, rect univ 084 9P/S 3 row rcpt cable/panel lkg	1
		148 850	SOCKET, relay 5 pin	1
		177 859	CONN, body 5 terminal (to engine control switch S1)	1
		150 316	CONN, rect univ 039 6p/s 3row plug cable lkg	6
		092 670	CONN, rect univ 084 3p/s 1row plug cable lkg	1
11	CB11, 12, 13	139 266	CIRCUIT BREAKER, man reset 1P 15A 250VAC frict	3
		190 260	HARNESS, unit weld control (consisting of)	1
	PLG3	158465	CONN, rect univ 084 12p/s 3row plug cable lkg	1
		187654	SEAL, wire univ 12p/s 3row	1
	PLG6	114063	CONN, rect univ 084 4p/s 1row plug cable lkg	1
		192309	CLIP, snap in .630 bundle .250 hole .248 thk	2
12		177 136	CLAMP, capacitor 1.375dia	1
13	C9	087 110	CAPACITOR, elctlt 240uf 200VDC	1
14	R6	141 424	RESISTOR, ww fxd 30 w 25 ohm faston te	1
15	PC7	195706	MODULE, pull to idle, two output, 7 pin	1
16	CR4	113247	RELAY, encl 12vdc dpdt 20a/120vac 8pin flange mtg	1
17	CR6	090104	RELAY, encl 12vdc spst 30a/15vdc 5pin flange mtg	1
18	CR1, CR2, CR3	090 104	RELAY, encl 12VDC SPST 30A/15VDC spin flange mtg	3
		201 357	HARNESS, engine control (consisting of)	1
19	D8/C8	189 701	DIODE/CAPACITOR BOARD	1
20	CB10	190 374	CIRCUIT BREAKER, auto reset 12VDC 40A	1
		148 850	SOCKET, relay 5 pin	3
	PLG4	114 062	CONNECTOR, rect univ 084 15P/S 3 row plug cable lkg	1

Figure 11-2. Control Box Assembly – CC Models (Figure 11-1 Item 98)

*Recommended Spare Parts.

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

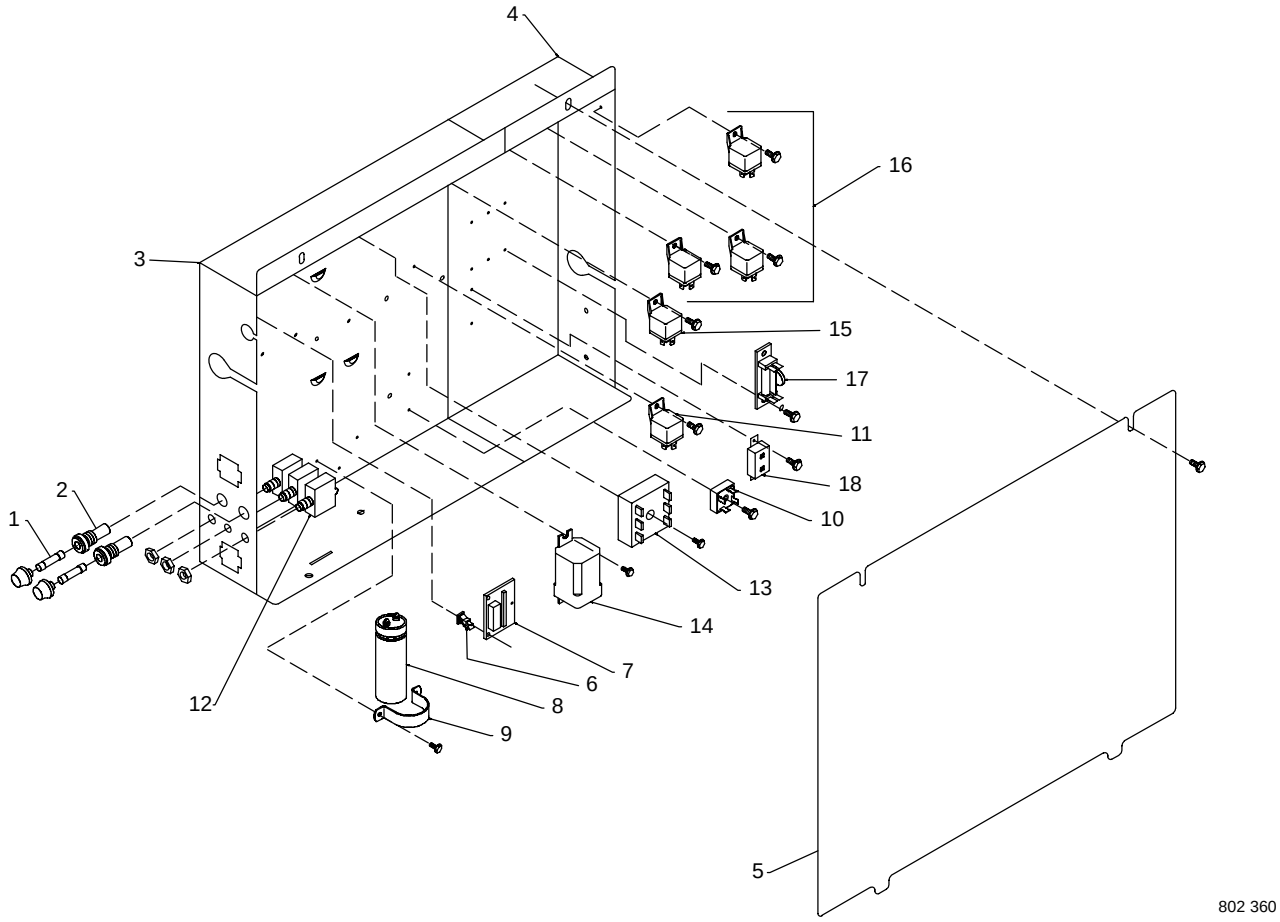

Figure 11-3. Control Box Assembly – CC/CV Models

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 11-3. Control Box Assembly – CC/CV Models (Figure 11-1 Item 98)	
1	F1, F2	*085 874	FUSE, mintr cer slo-blo 10A 250V	2
2		046 432	HOLDER, fuse mintr .250 x 1.250	2
3		201 077	CONTROL BOX, lh	1
4		201 078	CONTROL BOX, rh	1
5		201 079	COVER, control box	1
6		134 201	STAND-OFF, support pc card	3
7	PC9	192 224	CIRCUIT CARD ASSY, display	1
8	C9	087 110	CAPACITOR, elctlt 240uf 200VDC	1
9		177 136	CLAMP, capacitor 1.375dia	1
		201 495	HARNESS, control box, cv weld control (consisting of)	1
10	SR1	035 704	RECTIFIER, integ 40A 800V	1
11	CR5	090 104	RELAY, encl 12VDC SPST 30A/15VDC	1
	RC4	047 483	CONNECTOR, rect univ 084 15P/S 3 row rcpt cable/panel lkg	1
	RC3	158 466	CONNECTOR, rect univ 084 12P/S 3 row rcpt cable/panel lkg	1
	RC1	135 133	CONNECTOR, rect univ 084 9P/S 3 row rcpt cable/panel lkg	1
12	CB11, 12, 13	139 266	CIRCUIT BREAKER, man reset 1P 15A 250VAC frict	3
		148 850	SOCKET, relay 5 pin	1
	S6	193 324	SWITCH, rotary 6 position gold contacts (located on front panel, see Figure 11-5)	1
	S5	011 609	SWITCH,tgl spdt 15a 125vac on–none–on spd term chr (located on front panel, see Figure 11-5)	1
		150 316	CONN, rect univ 039 6p/s 3row plug cable lkg	6

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 11-3. Control Box Assembly – CC/CV Models (Continued)

		177 859	CONN, body 5 terminal (to engine control switch S1)	1
		193 183	CONN, rect cinch 18 pin	1
		196 602	PLUG, cavity 18,30 position cinch connector	4
		196 603	SEAL, switch 6 position rotary .250 shaft	1
		141 450	CONN, rect metrmate 10skt 1row plug cable lkg	1
13	PC7	195706	MODULE, pull to idle, two output, 7 pin	1
14	CR4	113247	RELAY, encl 12vdc dpdt 20a/120vac 8pin flange mtg	1
15	CR6	090104	RELAY, encl 12vdc spst 30a/15vdc 5pin flange mtg	1
16	CR1, CR2, CR3	090 104	RELAY, encl 12VDC SPST 30A/15VDC spin flange mtg	3
		201 357	HARNESS, engine control (consisting of)	1
17	D8/C8	189 701	DIODE/CAPACITOR BOARD	1
18	CB10	190 374	CIRCUIT BREAKER, auto reset 12VDC 40A	1
		148 850	SOCKET, relay 5 pin	3
	PLG4	114 062	CONNECTOR, rect univ 084 15P/S 3 row plug cable lkg	1
		185 655	SEAL, wire univ 15P/S 3 row	1

*Recommended Spare Parts.

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

☞ *Hardware is common and not available unless listed.*

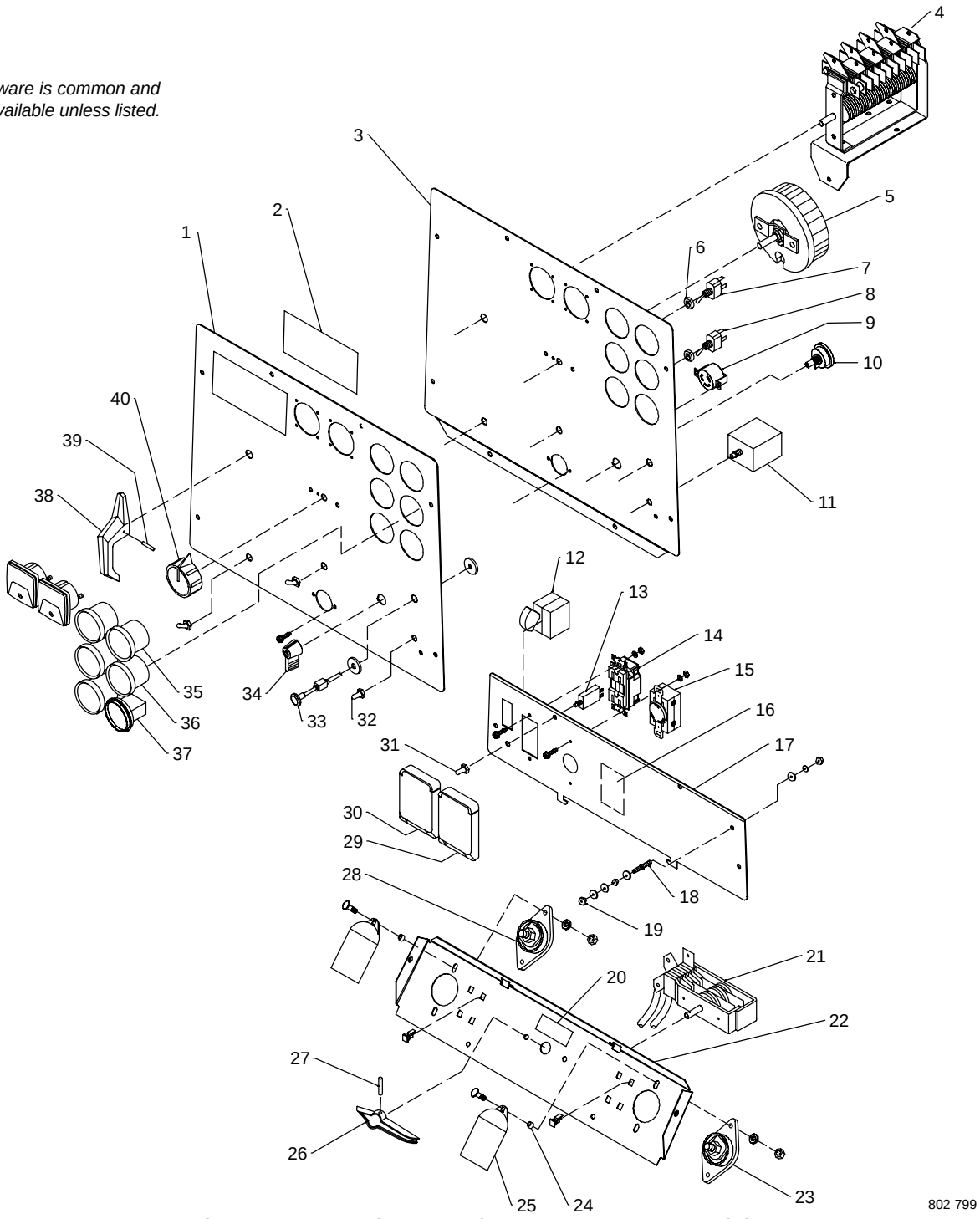

Figure 11-4. Panel, Front w/Components – CC Models

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 11-4. Panel, Front w/Components – CC Models (Figure 11-1 Item 104)	
1		201 841	PLATE SCREENED, ident control rating; when ordering this item, the nameplate should also be ordered)	1
2			NAMEPLATE, screened (order by model and serial number)	1
3		201 580	PANEL, engine/weld control	1
4	S3	189 382	SWITCH, range/changeover	1
		202 223	BUS BAR, idealized	2
		192 558	HARNESS, range (consisting of)	1
	RC6	148 439	HOUSING, rect univ 084 4p/s 1 row rcpt	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 11-4. Panel, Front w/Components – CC Models (Continued)

5	R1	188 635	RHEOSTAT, WW 300W 34 ohm	1
6		202 209	SPACER, nylon	3
7	S6	011 622	SWITCH, tgl DPDT 15A 125VAC (included in control box harness, see Figure 11-2	1
8	S5	011 609	SWITCH, tgl SPDT 15A 125VAC on-none-on spd term chr (included in control box harness, see Figure 11-2)	1
9	RC13	032 897	RECEPTACLE, twlk grd 2P3W 15A 125V	1
10	S1	176 606	SWITCH, ignition 4posn w/o handle	1
11	MS1	189 698	SWITCH, magnetic manual reset low current	1
		201 553	CLIP, circuit breaker retaining	1
12	CB1	201 083	CIRCUIT BREAKER, man reset 2P 20 A, 250VAC	1
		201 109	HARNESS, auxiliary power (consisting of)	1
13	CB2	093 996	CIRCUIT BREAKER, man reset 1P 20A 250VAC fric t	3
14	GFCI1	151 981	RECEPTACLE, str dx grd 2P3W 15/20A 125V GFCI	1
15	RC1	147 632	RECEPTACLE, tw lk grd 2P3W 30A 250V L6-30R	1
16		190 861	LABEL, warning electric shock and moving parts	1
17		+201 106	PANEL, aux pwr	1
18		083 030	STUD, brs .250–20 x 1.750 w/hex collar	1
19		601 836	NUT, 250–20 .50hex .19h brs	3
20		♦196 073	LABEL, do not switch while welding	1
21	S12	♦195 825	SWITCH, polarity	1
22		201 125	PANEL, mtg terminal pwr output	1
23		039 046	TERMINAL, pwr output black	1
		180 735	WASHER, output stud	2
24		181 169	SPACER, output stud	2
25		186 621	BOOT, generic output stud	2
26		♦059 773	HANDLE, switch	1
27		♦010 647	PIN, spring cs .156 x 1.250	1
28		039 047	TERMINAL, pwr output red	1
29		193 260	COVER, receptacle 2.250 dia lexan	1
30		193 258	COVER, receptacle GFCI	1
31		190 323	BOOT, circuit breaker clear hex nut	1
32		193 143	BOOT, magnetic shutdown switch	1
33		200 993	CONTROL, push-pull	1
34		119 014	LEVER, switch black	1
35	PL1	191 241	LED, red 12V 4 ind lights panel mtg round	1
36	FUEL	192 265	GAUGE, fuel elec switch w/o sensor	1
37	HM	118 058	METER, hour 12-24VDC 2.25dia	1
38		189 161	HANDLE, switch range	1
39		010 647	PIN, spring CS .156 x 1.250	1
40		148 723	KNOB, pointer	1
		024 103	BLANK, snap–in nyl .750 mtg hole black	1

\+ When ordering a component originally displaying a precautionary label, the label should also be ordered. Order label individually or as part of Label Kit 192 505 or Label Kit 202 022.

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

☞ *Hardware is common and not available unless listed.*

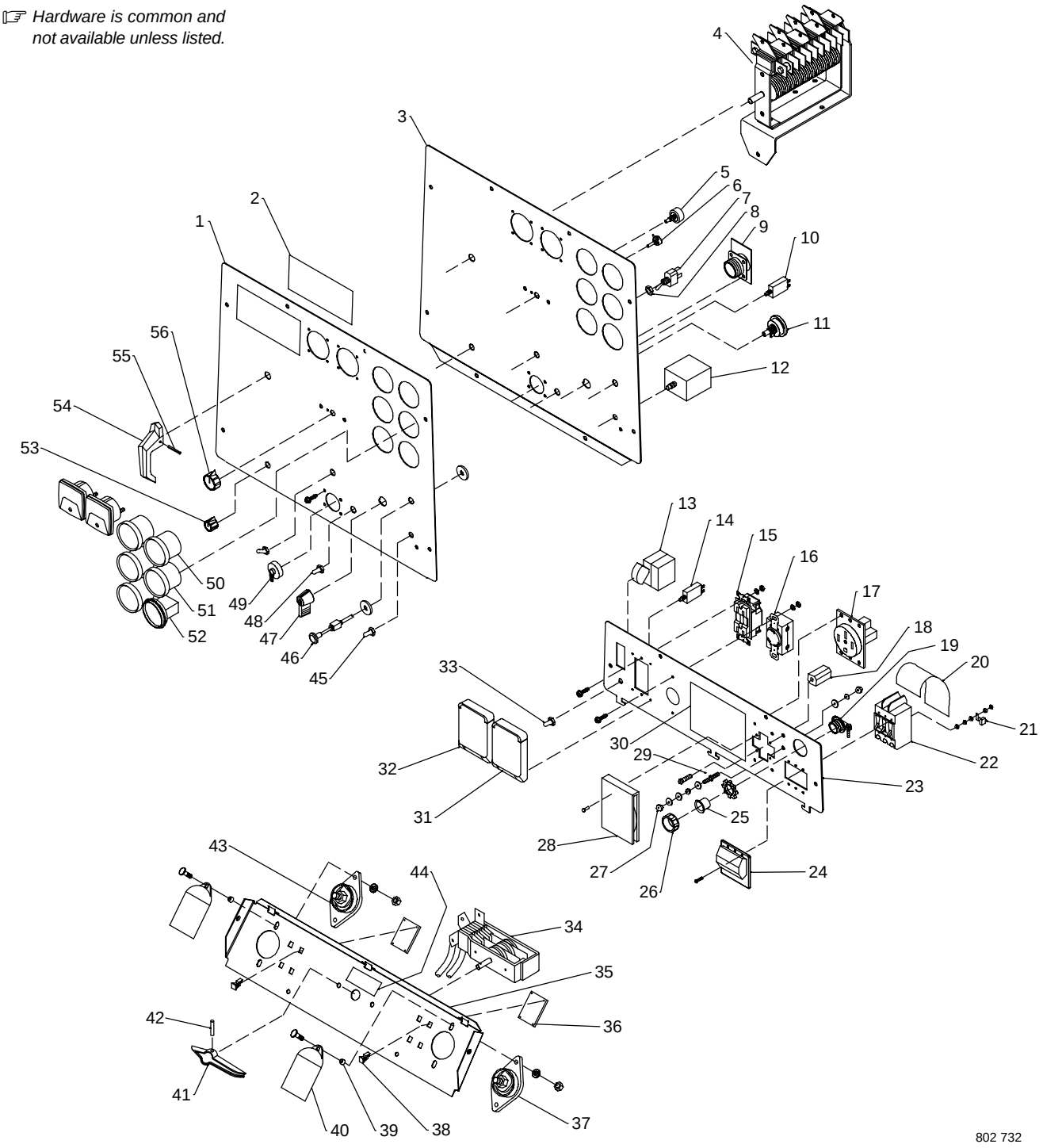

Figure 11-5. Panel, Front w/Components – CC/CV Models

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 11-5. Panel, Front w/Components – CC/CV Models (Figure 11-1 Item 104)	
1		201 579	PLATE SCREENED, ident control; when ordering this item, the nameplate should also be ordered)	1
2			NAMEPLATE, screened (order by model and serial number)	1
3		201 580	PANEL, engine/weld control	1
4	S3	189 382	SWITCH, range/changeover	1
		♦202223	BUS BAR, idealized	2
		192 558	HARNESS, range (consisting of)	1
	RC6	148 439	HOUSING, rect univ 084 4p/s 1 row rcpt	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 11-5. Panel, Front w/Components – CC/CV Models (Continued)

5	R1	193 118	POT, cp flat 1t 2w 1k ohm linear	1
6	S6	193 234	SWITCH, rotary 6 position gold contacts (included in control box harness, see Figure 11-3)	1
7	S5	011 609	SWITCH, tgl SPDT 15A 125VAC on-none-on spd term chr (included in control box harness, see Figure 11-3)	1
8		202 209	SPACER, nylon	2
9	PC6	192 995	CIRCUIT CARD ASSY, connector/receptacle	1
10	CB5	139 266	CIRCUIT BREAKER, man reset 1p 15a 250vac frict	1
11	S1	176 606	SWITCH, ignition 4posn w/o handle	1
12	MS1	189 698	SWITCH, magnetic manual reset low current	1
13	CB1	201 083	CIRCUIT BREAKER, man reset 2P 20 A, 250VAC	1
		201 553	CLIP, circuit breaker retaining	1
		201 109	HARNESS, auxiliary power (consisting of)	1
14	CB2	093 996	CIRCUIT BREAKER, man reset 1P 20A 250VAC frict	1
15	GFCI1	151 981	RECEPTACLE, str dx grd 2P3W 15/20A 125V GFCI	1
16	RC1	147 632	RECEPTACLE, tw lk grd 2P3W 30A 250V L6-30R	1
17	RC5	♦182 954	RCPT, str 3P4W 50A 125/250V	1
18		♦025 248	STAND-OFF, insul .250-20 x 1.2	1
19		♦604 102	CONNECTOR, clamp cable 1.000	1
20		♦197 527	GUARD, circuit breaker	1
21		♦197 363	TERMINAL, ring tng screw clamp	3
22	CB7	♦196 780	CIRCUIT BREAKER, man reset 3p	1
23		+201 106	PANEL, auxiliary power	1
23		+♦201 107	PANEL, auxiliary power (full kVA option)	1
24		♦196 781	BOOT, circuit breaker 3 pole	1
25		♦197 508	PLUG, protective	1
26		♦077 440	BUSHING, conduit 1 in	1
27		601 836	NUT, 250–20 .50hex .19h brs	3
28		♦197 291	COVER, receptacle w/gasket	1
29		083 030	STUD, brs .250–20 x 1.750 w/hex collar	1
	CT2	♦197 433	TRANSFORMER, current sensing	1
30		190 861	LABEL, warning electric shock and moving parts	1
30		♦197 399	LABEL, warning 3 ph auxiliary power	1
31		193 260	COVER, receptacle 2.250 dia lexan	1
32		193 258	COVER, receptacle GFCI	1
33		190 323	BOOT, circuit breaker clear hex nut	1
34	S12	♦195 825	SWITCH, polarity	1
35		201 125	PANEL, mtg terminal pwr output	1
36	PC4, PC5	189 744	CIRCUIT CARD ASSEMBLY, filter hf	2
37		039 046	TERMINAL, pwr output black	1
		180 735	WASHER, output stud	2
38		134 201	STAND-OFF, support	12
39		181 169	SPACER, output stud	2
40		186 621	BOOT, generic output stud	2
41		♦059 773	HANDLE, switch	1
42		♦010 647	PIN, spring cs .156 x 1.250	1
43		039 047	TERMINAL, pwr output red	1
44		♦196 073	LABEL, do not switch while welding	1
45		193 143	BOOT, magnetic shutdown switch	1
46		200 993	CONTROL, push-pull	1
47		119 014	LEVER, switch black	1
48		190 323	BOOT, circuit breaker clear hex nut	1
49		170 391	CONN, circ ms protective cap size 20	1
50	PL1	191 241	LED, red 12V 4 ind lights panel mtg round	1
51	FUEL	192 265	GAUGE, fuel elec switch w/o sensor	1
52	HM	118 058	METER, hour 12-24VDC 2.25dia	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 11-5. Panel, Front w/Components – CC/CV Models (Continued)

. . . 53		097 922 . .	KNOB, pointer .875 dia x .250 ID w/set screws plstc	1
. . . 54		189 161 . .	HANDLE, switch range	1
. . . 55		010 647 . .	PIN, spring CS .156 x 1.250	1
. . . 56		097 924 . .	KNOB, pointer 1.625 dia x .250 ID w/set scrws plstc	1
. . . . .		193 158 . .	HARNESS, unit weld control – CV (consisting of)	1
. . . . .	PLG6	114 063	CONNECTOR, rect univ 084 4p/s 1 row plug cable lkg	1
. . . . .	PLG8 . . .	193 184	CONNECTOR, rect cinch 30 pin	1
. . . . .	PLG13 . .	147 992	CONNECTOR, rect univ 039 10p/s 2 row plug cable	1
. . . . .	PLG3 . . .	158 465	CONNECTOR, rect univ 084 12p/s 3 row plug cable	1
. . . . .		088 731	BUSHING, snap-in nyl .375 ID x .500 mtg hole	1
. . . . .		135 873	CLIP, conduit convoluted 1/2 in mtg hole	2
. . . . .		187 654	SEAL, wire univ 12p/s 3 row	1
. . . . .		024 103 . .	BLANK, snap-in nyl .750 mtg hole blk	1
. . . . .		120 304 . .	BLANK, snap–in nyl .250 mtg hole black	2

\+ When ordering a component originally displaying a precautionary label, the label should also be ordered. Order label individually or as part of Label Kit 202 022.

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

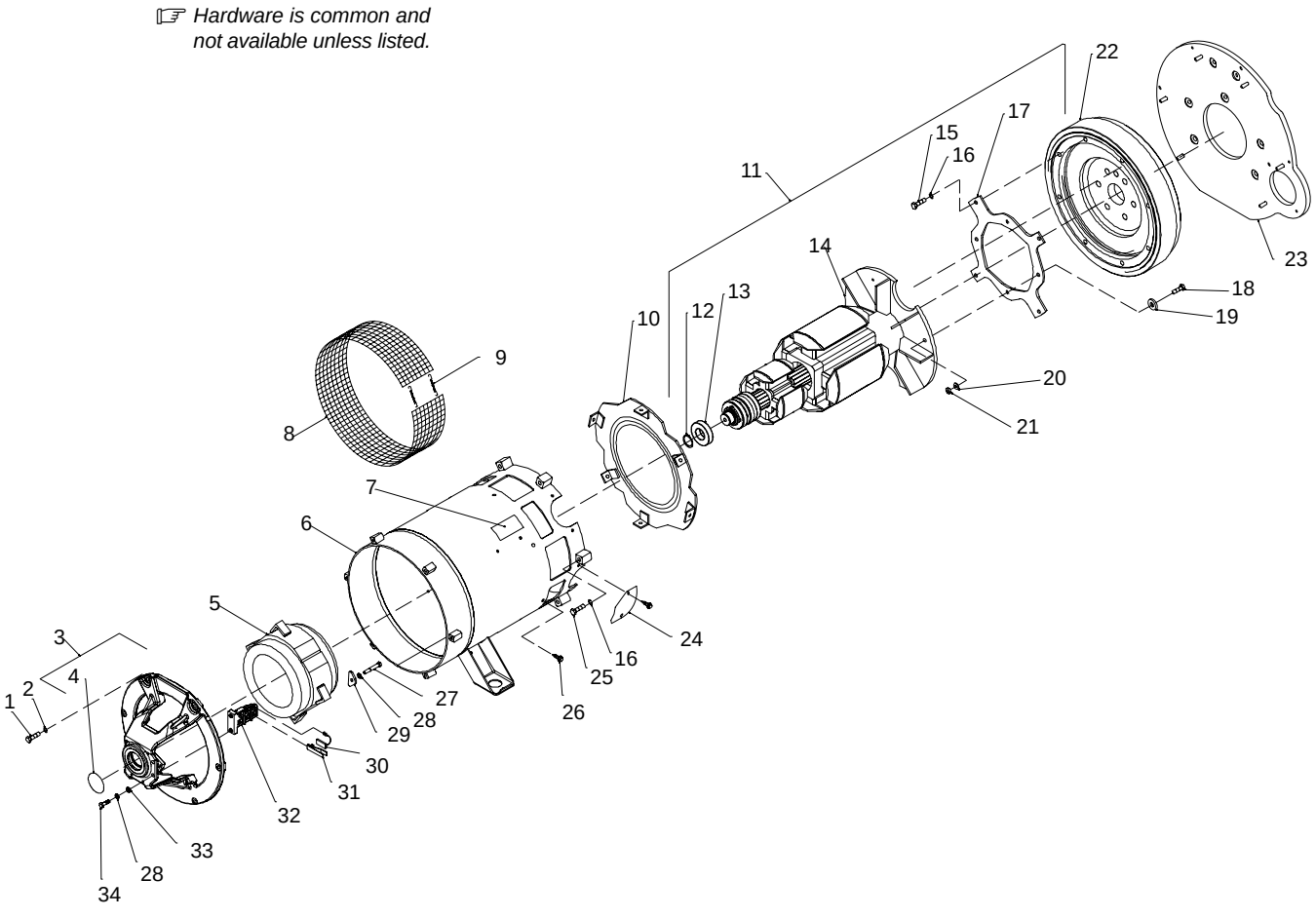

Figure 11-6. Generator

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 11-6. Generator (Figure 11-1 Item 91)	
1		132 053	SCREW, .375–16x1.50 hex hd–pln gr5 pld	6
2		183 387	WASHER, conical spring .406 ID x .875 OD pltd	6
3		195 911	ENDBELL, gen (consisting of)	1
4		143 220	O-RING, 2.859 ID x .139CS	1
5		201 099	STATOR, exciter/aux pwr	1
6		+201 110	STATOR, weld assembly complete	1
6		+♦201 089	STATOR, weld assembly complete (full kVA option)	1
7		013 367	LABEL, warning moving parts	2
8		190 197	GUARD, generator wire mesh	1
9		172 674	SPRING, ext .240 OD x .041 wire x 3.500pld	2
10		039 207	BAFFLE, air	1
11		201 098	ROTOR, gen (consisting of)	1
12		024 617	RING, rtng ext 1.375 shaft x .050thk	1
13		053 390	BEARING, ball rdl sgl row 1.370 x 2.830 x .6	1
14		195 547	FAN, rotor gen	1
15		049 026	SCREW, M10-1.5 x 25hexhd pln 8.8pln	6
16		083 883	WASHER, lock .402 ID x 0.709 OD	10
17		202 301	PLATE, flex	1
18		605 231	SCREW, m10–1.5x 35 hex hd–pln 8.8 pld	4
19		194 512	WASHER, flat 1.250 od x .406id x 7ga thk stl pld	4
20		183 387	WASHER, cone .380idx .860odx.109t stl pld 4000lbs	6
21		198 631	NUT, m10 hex lock nut stl pld	4
22		201 139	FLYWHEEL, engine Wis-Con TM-20	1
23		201 140	ADAPTER, engine Wis-Con TM-20	1
24		191 579	COVER, starter hole	1
		200 991	GUARD, starter hole Wis-Con TM-20	1
		191 580	COVER, starter hole	1
25		172 555	SCREW, M10-1.5 x 50hexhd pln 8.8pld	6
26		602 159	SCREW, .312–18x .75 hexwhd.66d stl pld slffmg tap–rw	6
27		601 950	SCREW, .312-18 x 2.00 hexhd pln gr 5pld	4
28		602 211	WASHER, lock .318 ID x 0.586	6
29		139 341	WASHER, exciter	4
30		*190 823	BRUSH, contact	3
31		188 560	CLIP, spring	3
32		189 142	BRUSHHOLDER ASSEMBLY, gen	1
33		602 242	WASHER, flat .375IDx0.875odx.083t stl pld	2
34		604 534	SCREW, .312–18x1.25 hex hd–pln gr5 pld	2
		190 259	HARNESS, brush (consisting of)	1
	PLG1	135 134	CONNECTOR, rect univ 084 9P/S 3 row plug cable lkg	1
		187 651	SEAL, wire univ 9P/S 3 row	1

\+ When ordering a component originally displaying a precautionary label, the label should also be ordered. Order label individually or as part of Label Kit 202 022.

*Recommended Spare Parts.

♦Optional

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

☞ *Hardware is common and not available unless listed.*

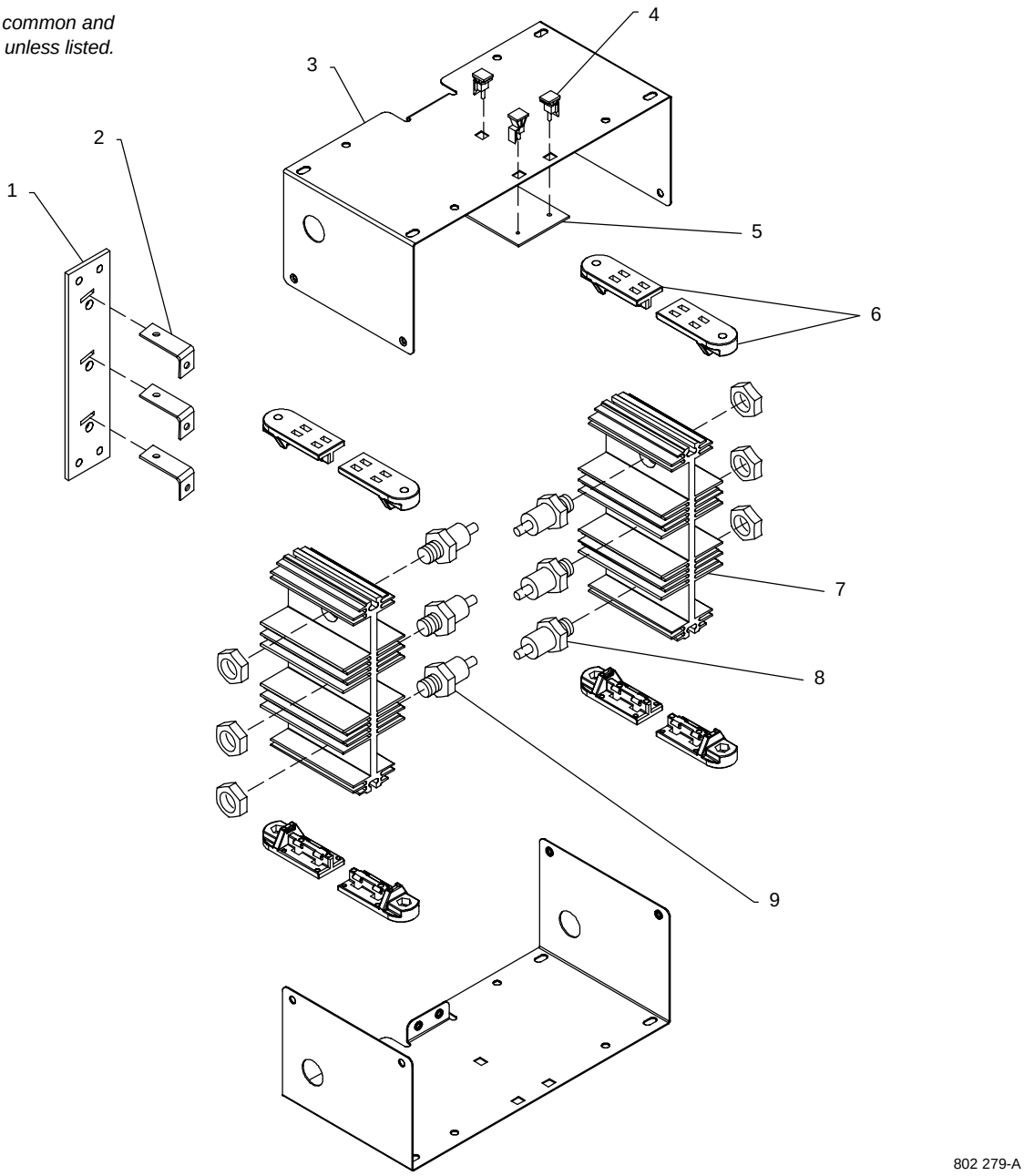

Figure 11-7. Main Rectifier Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 11-7. Main Rectifier Assembly (Figure 11-1 Item 100)	
. . . . .		201 747	. . RECTIFIER (consisting of)	1
. . . 1		188 137	. . . . CONNECTION BOARD, rectifier AC	1
. . . 2		188 517	. . . . BUS BAR, connection board	3
. . . 3		188 135	. . . . ENCLOSURE, rectifier	2
. . . 4		134 201	. . . . STAND-OFF, support	3
. . . 5	PC3 . . .	201 449	. . . . CIRCUIT CARD ASSEMBLY, protection	1
. . . 6		188 136	. . . . INSULATOR, heat sink	8
. . . 7		188 493	. . . . HEAT SINK, rectifier al	2
. . . 8 .	D3, D5, D7	037 956	. . . . DIODE, rect 275A 300V SP	3
. . . 9 .	D2, D4, D6	037 957	. . . . DIODE, rect 275A 300V RP	3

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

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The Power of Blue.

TRUE BLUE® WARRANTY

Effective January 1, 2000
(Equipment with a serial number preface of "LA" or newer)

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

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

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

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the date that the equipment was delivered to the original retail purchaser, or one year after the equipment is sent to a North American distributor or eighteen months after the equipment is sent to an International distributor.

1. 5 Years Parts – 3 Years Labor
   * Original main power rectifiers
   * Inverters (input and output rectifiers only)
2. 3 Years — Parts and Labor
   * Transformer/Rectifier Power Sources
   * Plasma Arc Cutting Power Sources
   * Semi-Automatic and Automatic Wire Feeders
   * Inverter Power Supplies
   * Intellitig
   * Engine Driven Welding Generators **(NOTE: Engines are warranted separately by the engine manufacturer.)**
3. 1 Year — Parts and Labor
   * DS-2 Wire Feeder
   * Motor Driven Guns (w/exception of Spoolmate 185 & Spoolmate 250)
   * Process Controllers
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources
   * Water Coolant Systems
   * HF Units
   * Grids
   * Maxstar 140
   * Spot Welders
   * Load Banks
   * Miller Cyclomatic Equipment
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options
     (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches
   * Induction Heating Coils and Blankets
   * APT, ZIPCUT & PLAZCUT Model Plasma Cutting Torches
   * Remote Controls
   * Accessory Kits
   * Replacement Parts (No labor)
   * Spoolmate 185 & Spoolmate 250
   * Canvas Covers

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

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

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

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

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Purchase Date (Date which equipment was delivered to original customer.)

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	Welding Process Handbooks
Contact the Delivering Carrier for:	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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