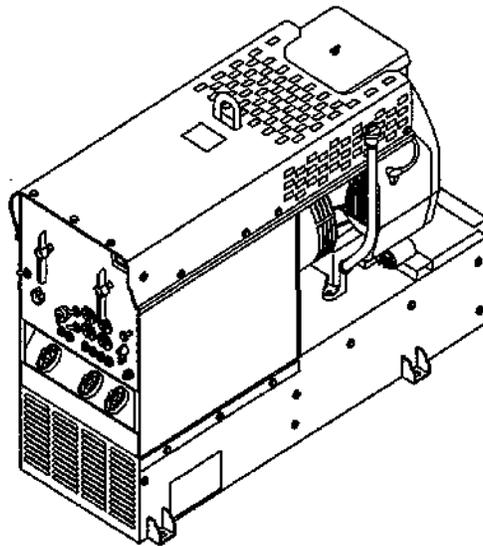




Miller®

November 1994 Form: OM-426G
Effective With Serial No. KE668695

OWNER'S MANUAL



Trailblazer® 250G

- CC/CV, AC/DC Multiprocess Welding Generator
- For SMAW, FCAW, GMAW, And GTAW Welding
- 200 Amperes, 25 Volts DC At 100% Duty Cycle (See Specifications)
- 4 kVA/kW AC Auxiliary Power With Overload Protection
- Onan P220XSL, Air-Cooled, Gasoline Engine
- Low Oil Pressure Shutdown Switch
- For Options And Accessories, See Rear Cover



- Read and follow these instructions and all safety blocks carefully.
- Have only trained and qualified persons install, operate, or service this unit.
- Call your distributor if you do not understand the directions.



- Give this manual to the operator.



- For help, call your distributor
- or: MILLER Electric Mfg. Co., P.O. Box 1079, Appleton, WI 54912 414-734-9821

MILLER'S TRUE BLUE™ LIMITED WARRANTY

Effective January 1, 1995
(Equipment with a serial number preface of "KC" 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
2. 3 Years - Parts and Labor
 - * Transformer/Rectifier Power Sources
 - * Plasma Arc Cutting Power Sources
 - * Semi-Automatic and Automatic Wire Feeders
 - * Robots
3. 2 Years - Parts and Labor
 - * Engine Driven Welding Generators
(NOTE: Engines are warranted separately by the engine manufacturer for a period of two years.)
 - * Air Compressors
4. 1 Year - Parts and Labor
 - * Motor Driven Guns
 - * Process Controllers
 - * Water Coolant Systems
 - * HF Units
 - * Grids
 - * Spot Welders
 - * Load Banks
 - * SDX Transformers
 - * Running Gear/Trailers
 - * Plasma Cutting Torches (except APT, ZIPCUT & PLAZCUT 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.)
5. 6 Months - Batteries
6. 90 Days - Parts and Labor
 - * MIG Guns/TIG Torches
 - * APT, ZIPCUT & PLAZCUT Model Plasma Cutting Torches

- * Remote Controls
- * Accessory Kits
- * Replacement Parts

MILLER'S True Blue™ Limited Warranty shall not apply to:

1. 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.
2. Consumable components; such as contact tips, cutting nozzles, contactors and relays or parts that fail due to normal wear.
3. Equipment that has been modified by any party other than MILLER, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

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

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

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

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

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

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

RECEIVING-HANDLING

Before unpacking equipment, check carton for any damage that may have occurred during shipment. File any claims for loss or damage with the delivering carrier. Assistance for filing or settling claims may be obtained from distributor and/or equipment manufacturer's Transportation Department.

When requesting information about this equipment, always provide Model Designation and Serial or Style Number.

Use the following spaces to record Model Designation and Serial or Style Number of your unit. The information is located on the rating label or nameplate.

Model _____

Serial or Style No. _____

Date of Purchase _____

ERRATA SHEET

February 2, 1995

FORM: OM-426G

Use above FORM number when ordering extra manuals.

After this manual was printed, refinements in equipment design occurred. This sheet lists exceptions to data appearing later in this manual.

CHANGES TO SECTION 10 – PARTS LIST

Change Parts List as follows:

| ** | Part No. | Replaced With | Description | Quantity |
|---------|--------------|---------------|---|----------|
| .. 45-2 | 114 557 | ... +173 209 | .. COVER, top (Eff w/KF806591) | 1 |
| .. 45- | 143 397 | Deleted | .. Eff w/KF806591 | |
| . 45-27 | ... 115 511 | Deleted | .. Eff w/KF806591 | |
| .. 46- | Added | 168 385 | .. LABEL, warning battery explosion can blind (located on Item No. 33 battery access door) | 1 |
| . 49-18 | ... 038 777 | 083 030 | .. STUD, brs .250-20 x 1.750 | 1 |

**First digit represents page no – digits following dash represent item no.

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

ARC WELDING SAFETY PRECAUTIONS

WARNING

ARC WELDING can be hazardous.

PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS KEEP AWAY UNTIL CONSULTING YOUR DOCTOR.

In welding, as in most jobs, exposure to certain hazards occurs. Welding is safe when precautions are taken. The safety information given below is only a summary of the more complete safety information that will be found in the Safety Standards listed on the next page. Read and follow all Safety Standards.

HAVE ALL INSTALLATION, OPERATION, MAINTENANCE, AND REPAIR WORK PERFORMED ONLY BY QUALIFIED PEOPLE.



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.

1. Do not touch live electrical parts.
2. Wear dry, hole-free insulating gloves and body protection.
3. Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
4. 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).
5. Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
6. 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.

7. When making input connections, attach proper grounding conductor first – double-check connections.
8. Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
9. Turn off all equipment when not in use.
10. Do not use worn, damaged, undersized, or poorly spliced cables.
11. Do not drape cables over your body.
12. If earth grounding of the workpiece is required, ground it directly with a separate cable – do not use work clamp or work cable.
13. Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
14. Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
15. Wear a safety harness if working above floor level.
16. Keep all panels and covers securely in place.
17. Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.



ARC RAYS can burn eyes and skin; NOISE can damage hearing; FLYING SLAG OR SPARKS can injure eyes.

Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Noise from some processes can damage hearing. Chipping, grinding, and welds cooling throw off pieces of metal or slag.

NOISE

1. Use approved ear plugs or ear muffs if noise level is high.

ARC RAYS

2. Wear a welding helmet fitted with a proper shade of filter to protect your face and eyes when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
3. Wear approved safety glasses with side shields.
4. Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
5. Wear protective clothing made from durable, flame-resistant material (wool and leather) and foot protection.



FUMES AND GASES can be hazardous to your health.

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

1. Keep your head out of the fumes. Do not breathe the fumes.
2. If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
3. If ventilation is poor, use an approved air-supplied respirator.
4. Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instruction for metals, consumables, coatings, cleaners, and degreasers.

5. Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watchperson nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
6. 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.
7. 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.



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.

1. Protect compressed gas cylinders from excessive heat, mechanical shocks, slag, open flames, sparks, and arcs.
2. Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
3. Keep cylinders away from any welding or other electrical circuits.

4. Never drape a welding torch over a gas cylinder.
5. Never allow a welding electrode to touch any cylinder.
6. Never weld on a pressurized cylinder – explosion will result.
7. Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
8. Turn face away from valve outlet when opening cylinder valve.
9. Keep protective cap in place over valve except when cylinder is in use or connected for use.
10. Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.



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.

1. Protect yourself and others from flying sparks and hot metal.
2. Do not weld where flying sparks can strike flammable material.
3. Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
4. Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
5. Watch for fire, and keep a fire extinguisher nearby.

6. Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
7. 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).
8. 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.
9. Do not use welder to thaw frozen pipes.
10. Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
11. Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
12. Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.



WARNING

ENGINES can be hazardous.



ENGINE EXHAUST GASES can kill.

Engines produce harmful exhaust gases.

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



ENGINE FUEL can cause fire or explosion.

Engine fuel is highly flammable.

3. Do not overfill tank – allow room for fuel to expand.
4. Do not spill fuel. If fuel is spilled, clean up before starting engine.

1. Stop engine and let it cool off before checking or adding fuel.
2. Do not add fuel while smoking or if unit is near any sparks or open flames.



MOVING PARTS can cause injury.

Moving parts, such as fans, rotors, and belts can cut fingers and hands and catch loose clothing.

3. Have only qualified people remove guards or covers for maintenance and troubleshooting as necessary.
4. To prevent accidental starting during servicing, disconnect negative (-) battery cable from battery.
5. Keep hands, hair, loose clothing, and tools away from moving parts.
6. Reinstall panels or guards and close doors when servicing is finished and before starting engine.

1. Keep all doors, panels, covers, and guards closed and securely in place.
2. Stop engine before installing or connecting unit.



SPARKS can cause BATTERY GASES TO EXPLODE; BATTERY ACID can burn eyes and skin.

Batteries contain acid and generate explosive gases.

1. Always wear a face shield when working on a battery.
2. Stop engine before disconnecting or connecting battery cables.
3. Do not allow tools to cause sparks when working on a battery.
4. Do not use welder to charge batteries or jump start vehicles.
5. Observe correct polarity (+ and -) on batteries.



STEAM AND PRESSURIZED HOT COOLANT can burn face, eyes, and skin.

It is best to check coolant level when engine is cold to avoid scalding.

1. If the engine is warm and checking is needed, follow steps 2 and 3.
2. Wear safety glasses and gloves and put a rag over cap.
3. Turn cap slightly and let pressure escape slowly before completely removing cap.

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.

EMF INFORMATION

NOTE

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

The following is a quotation from the General Conclusions Section of the U.S. Congress, Office of Technology Assessment, *Biological Effects of Power Frequency Electric & Magnetic Fields – Background Paper*, OTA-BP-E-53 (Washington, DC: U.S. Government Printing Office, May 1989): “. . . there is now a very large volume of scientific findings based on experiments at the cellular level and from studies with animals and people which clearly establish that low frequency magnetic fields can interact with, and produce changes in, biological systems. While most of this work is of very high quality, the results are complex. Current scientific understanding does not yet allow us to interpret the evidence in a single coherent framework. Even more frustrating, it does not yet allow us to draw definite conclusions about questions of possible risk or to offer clear science-based advice on strategies to minimize or avoid potential risks.”

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 the body.
4. Keep welding power source and cables as far away as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

About Pacemakers:

The above procedures are among those also normally recommended for pacemaker wearers. Consult your doctor for complete information.

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SECTION 1 – SAFETY INFORMATION

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- Read all safety messages throughout this manual.
- Obey all safety messages to avoid injury.
- Learn the meaning of WARNING and CAUTION.

1 **WARNING**

ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Disconnect input power before installing or servicing.

2 **CAUTION**

MOVING PARTS can injure.

- Keep away from moving parts.
- Keep all panels and covers closed when operating.

6 **WARNING** **READ SAFETY BLOCKS at start of Section 3-1 before proceeding.**

7 **NOTE** *Turn Off switch when using high frequency.*

1 Safety Alert Symbol
 2 Signal Word
WARNING means possible death or serious injury can happen.
CAUTION means possible minor injury or equipment damage can happen.
 3 Statement Of Hazard And Result
 4 Safety Instructions To Avoid Hazard
 5 Hazard Symbol (If Available)
 6 Safety Banner
 Read safety blocks for each symbol shown.
 7 NOTE
 Special instructions for best operation – not related to safety.

Figure 1-1. Safety Information

SECTION 2 – SPECIFICATIONS

Table 2-1. Welding Generator

| Specification | Description | | |
|----------------------------|---|--|--|
| Type Of Output | Constant Current/Constant Voltage (CC/CV), Alternating Current/Direct Current (AC/DC) | | |
| Welding Processes | Shielded Metal Arc (SMAW), Flux Cored Arc (FCAW), Gas Metal Arc (GMAW), And Gas Tungsten Arc Welding (GTAW) | | |
| Auxiliary Power Rating | Single-Phase, 4 kVA/kW, 120/240 Volts AC, 33/16.5 Amperes, 60 Hz | | |
| Engine | Onan Performer Series P220XSL Air-Cooled, Twin-Cylinder, Four-Cycle, Gasoline Engine | | |
| Engine Speed (No Load) | Weld/Power Speed: 3700 rpm; Idle Speed: 2200 rpm | | |
| Fuel Tank Capacity | 7.5 gal (28.4 L) | | |
| Overall Dimensions | See Figure 3-3 | | |
| Weight | Net: 545 lb (247 kg); Ship: 655 lb (297 kg) | | |
| | CC/AC Mode | CC/DC Mode | CV/DC Mode |
| Rated Weld Output | 250 A, 25 V At 60% Duty Cycle 200 A, 25 V At 100% Duty Cycle (See Section 2-2) | 250 A, 25 V At 60% Duty Cycle 200 A, 25 V At 100% Duty Cycle (See Section 2-2) | 250 A, 20 V At 60% Duty Cycle 200 A, 20 V At 100% Duty Cycle (See Section 2-2) |
| Amperage Or Voltage Ranges | 25–80 A, 35–115 A, 75–250 A | 25–80 A, 35–115 A, 75–250 A | 14–30 V, 24–36 V |
| Max. Open-Circuit Voltage | 72 V | 95 V | 46 V |

2-1. Volt-Ampere Curves

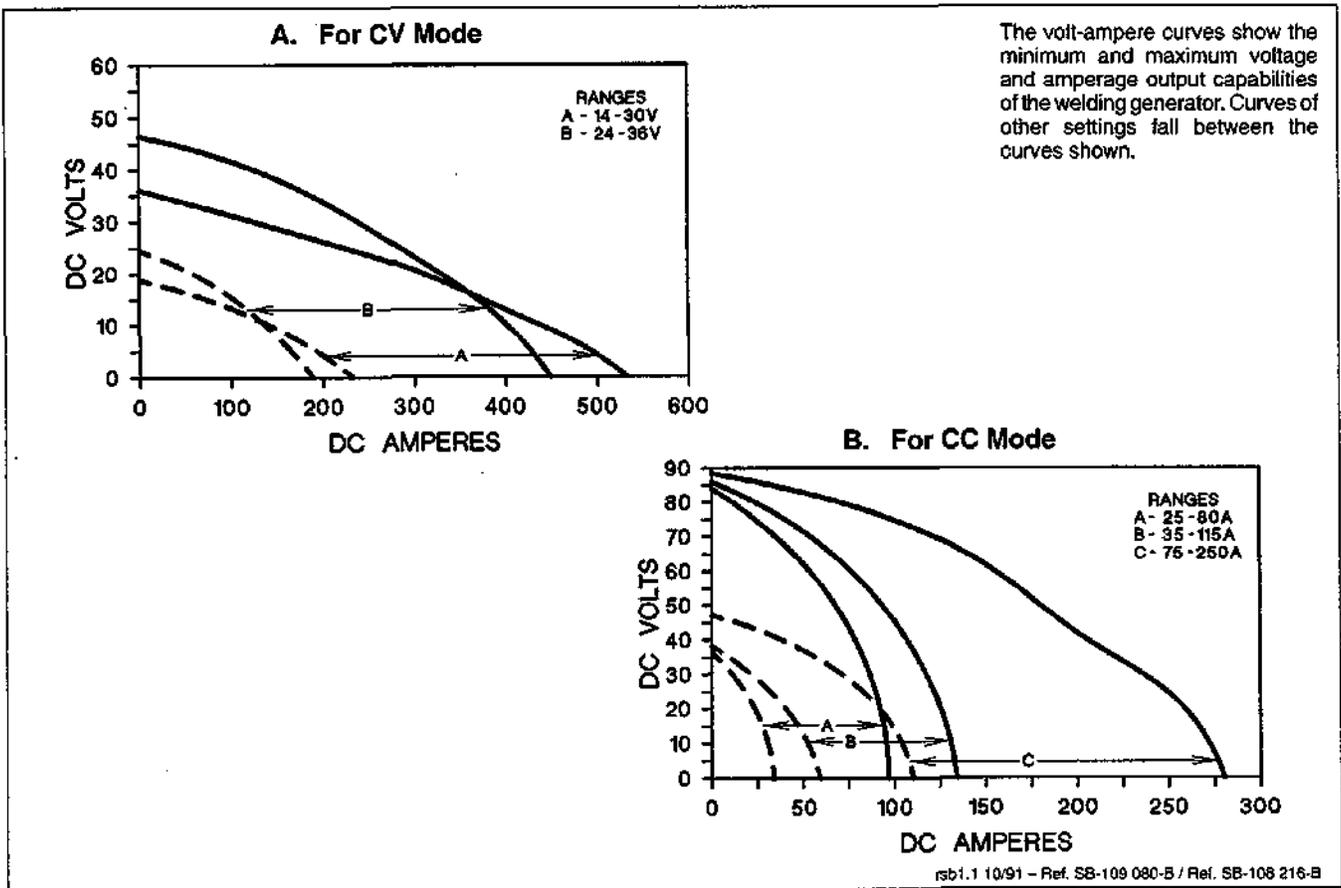


Figure 2-1. Volt-Ampere Curves

2-2. Duty Cycle

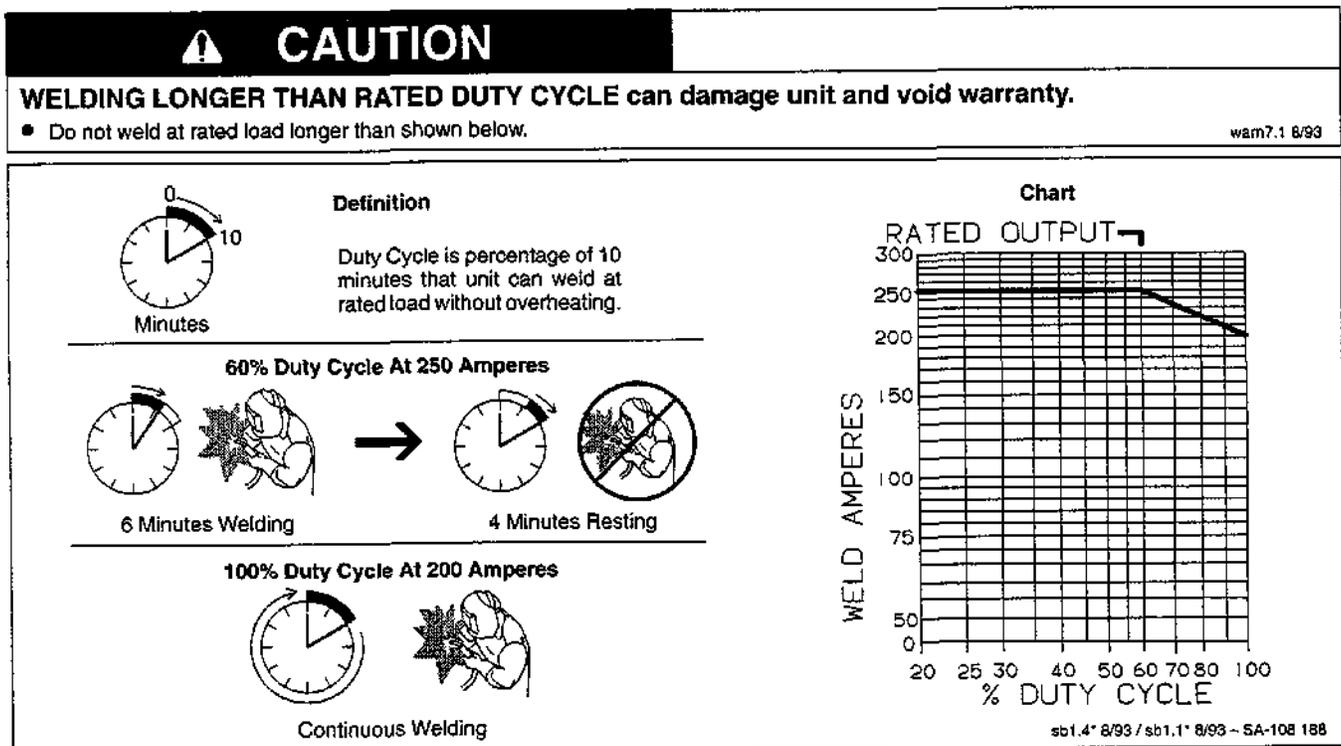


Figure 2-2. Duty Cycle

2-3. Fuel Consumption

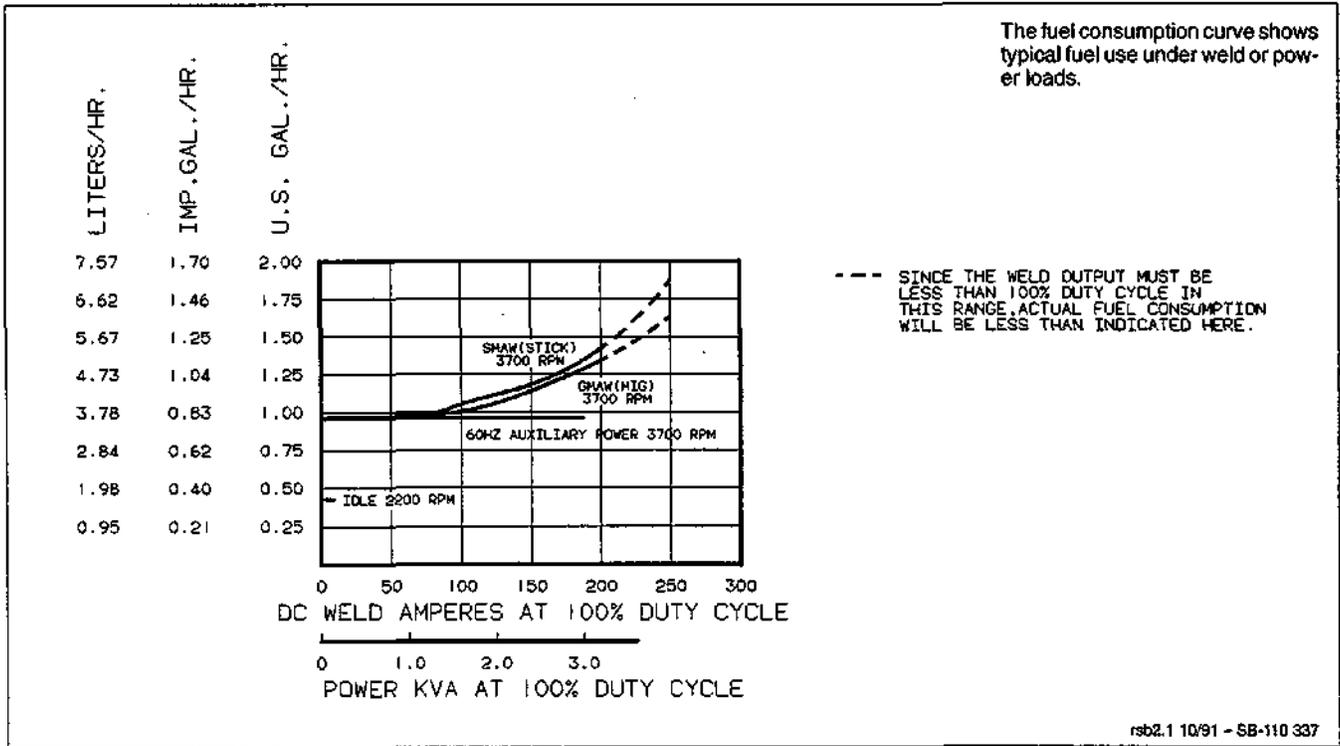


Figure 2-3. Fuel Consumption Curve

2-4. AC Auxiliary Power

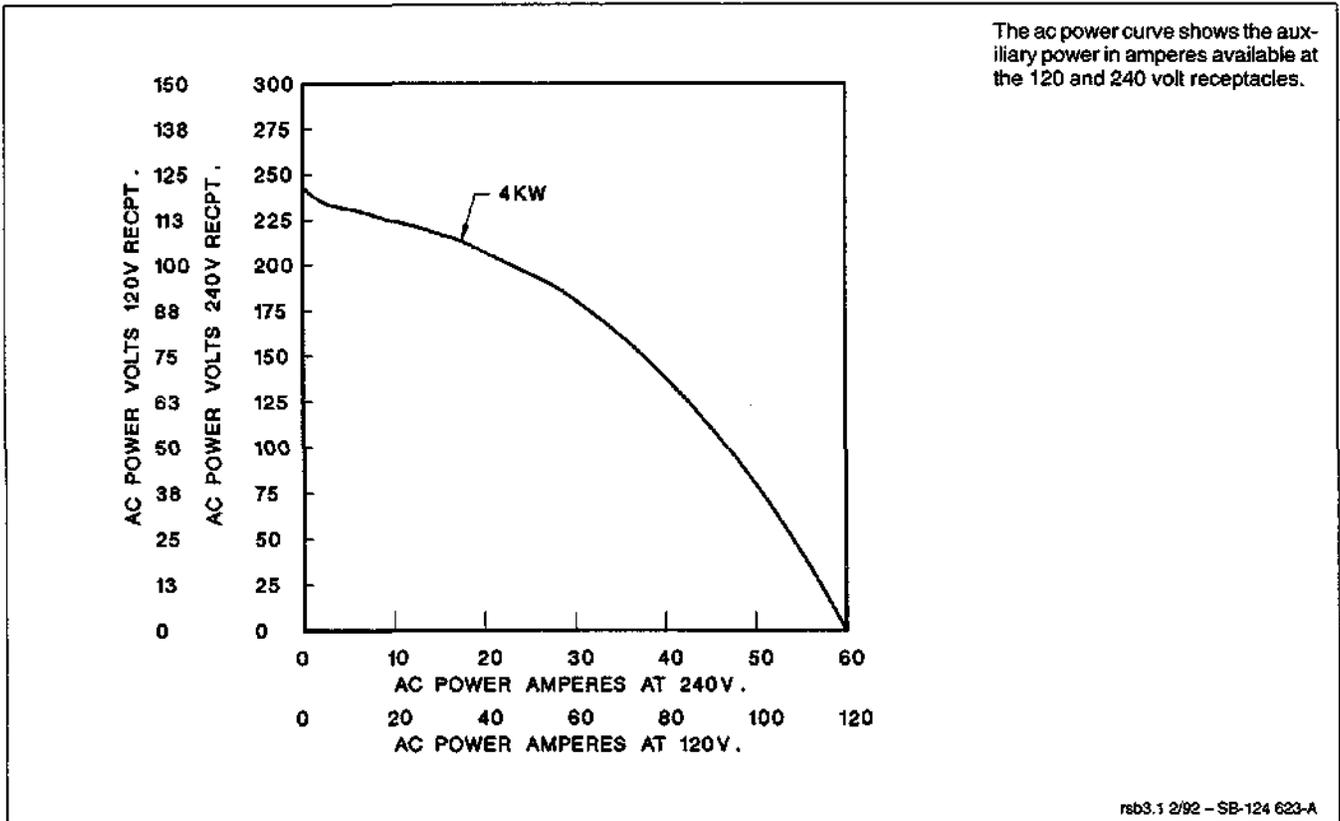


Figure 2-4. AC Power Curve For 120 And 240 Volt Receptacles

SECTION 3 – INSTALLATION

3-1. Typical Process Connections

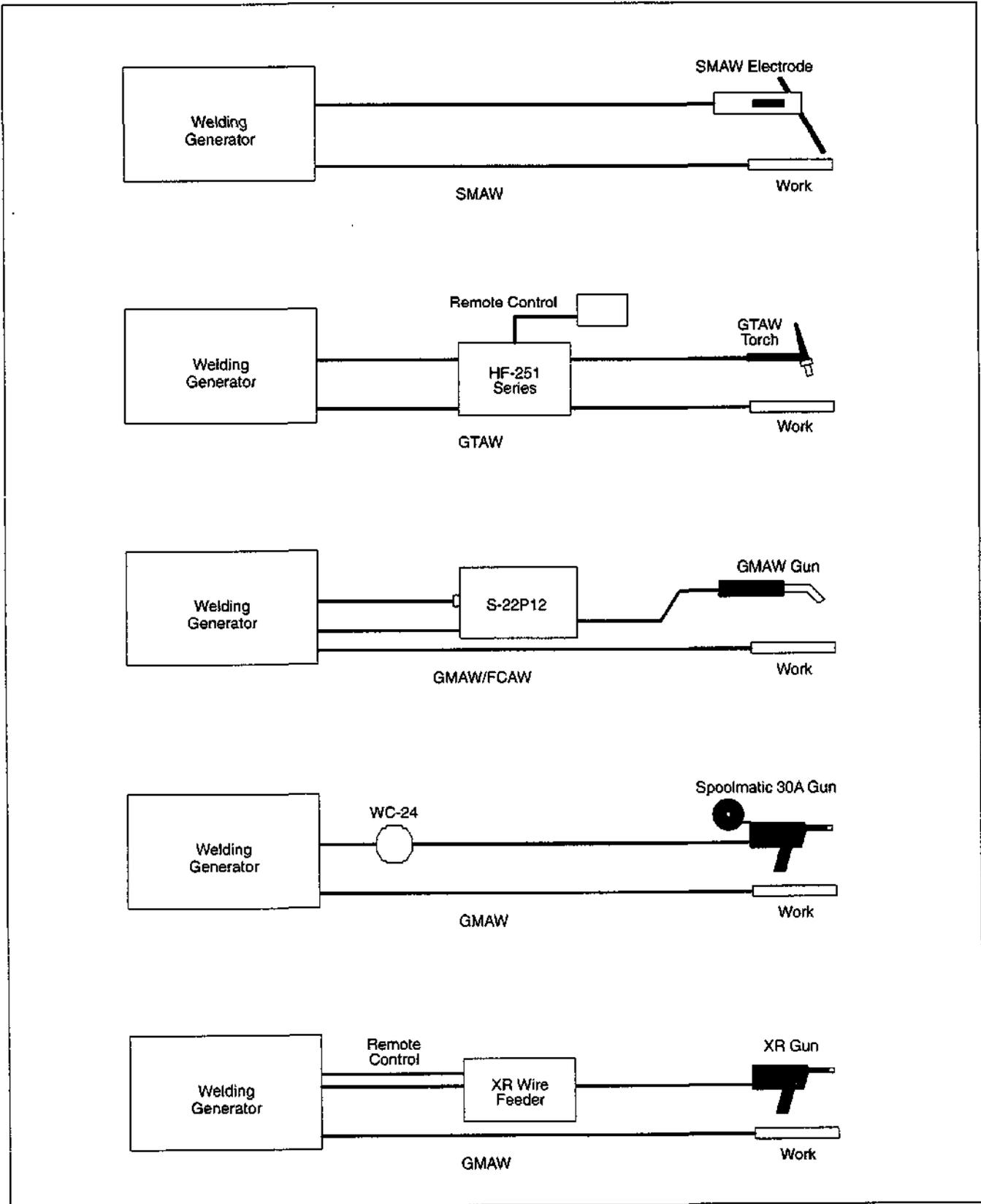


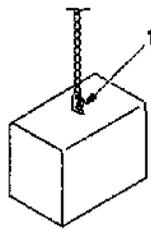
Figure 3-1. Typical Process Connections

3-2. Selecting A Location And Moving Welding Generator

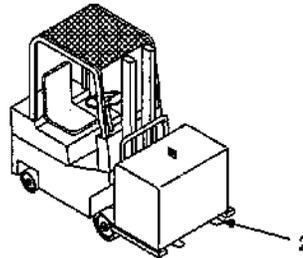
|  WARNING | | | |
|--|---|---|--|
|  | ENGINE EXHAUST GASES can kill. <ul style="list-style-type: none"> Do not breathe exhaust fumes. Use in open, well-ventilated areas, or vent exhaust outside and away from building air intakes. |  | HOT ENGINE EXHAUST AND EXHAUST PIPE can cause fires. <ul style="list-style-type: none"> Keep exhaust and pipe away from flammables. |
|  | ENGINE EXHAUST SPARKS can cause fire. <ul style="list-style-type: none"> Use only U.S. Forestry Department approved spark arrestor and comply with all local, state, and federal laws. A spark arrestor is mandatory in all National Forests and in grass, brush, or forest covered lands in California, Oregon, and Washington. Check with state and local authorities in other areas. Properly maintain the spark arrestor. Stop engine and allow exhaust system to cool down before servicing spark arrestor. Service spark arrestor away from flammables. |  | FALLING EQUIPMENT can cause serious personal injury and equipment damage. <ul style="list-style-type: none"> Use lifting eye to lift unit only, NOT running gear, gas cylinders, trailer, or any other heavy options, accessories, or devices. Use equipment of adequate capacity to lift the unit. |
| | |  | TILTING OF TRAILER can result in personal injury or equipment damage. <ul style="list-style-type: none"> Install unit properly on trailer (if applicable) according to trailer manual. |

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Movement



OR



- Lifting Eye
- Lifting Forks

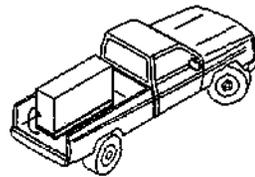
Use lifting eye or lifting forks to move unit.

If using lifting forks, extend forks beyond opposite side of unit.

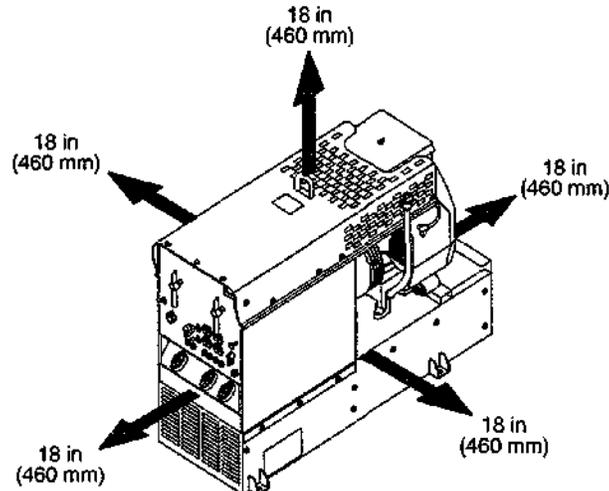
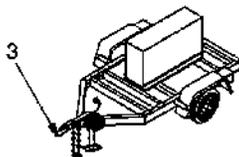
- Trailer

Install unit on trailer according to trailer manual.

Location And Airflow



OR



rsb20.1* 12/93 - ST-800 402 / ST-123 740-B

Figure 3-2. Location And Movement Of Welding Generator

⚠ WARNING



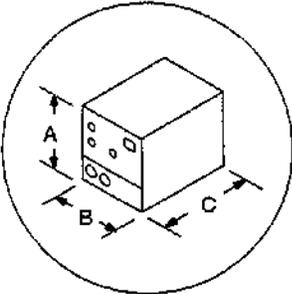
WELDING ON BASE can cause fuel tank fire or explosion.

- Do not weld on base.
- Use mounting feet to fasten unit to truck bed, trailer, or other location.

rwam14.1 1/93

NOTE

Overall dimensions (A, B, and C) include lifting eye, handles, hardware, etc.



| | Inches | Millimeters |
|---|-----------------------|--------------------|
| A | 31-5/8 | 803 |
| B | 18 | 457 |
| C | 45 | 1143 |
| D | 16-1/2 | 419 |
| E | 32-3/4 | 1143 |
| F | 13/16 Dia. 4 Holes | 21 Dia. 4 Holes |

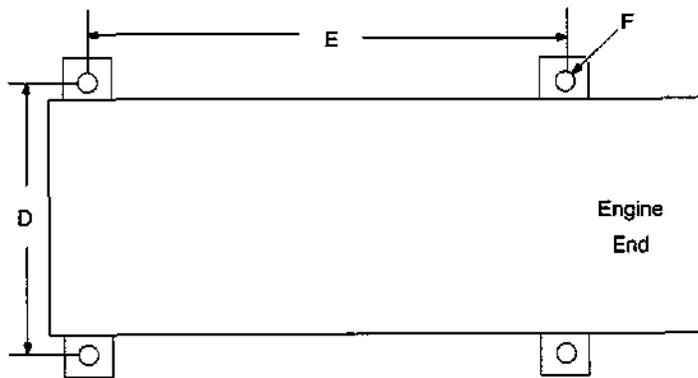
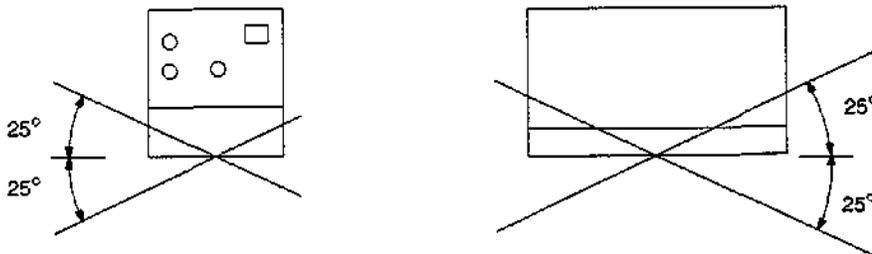


Figure 3-3. Overall Dimensions And Base Mounting Hole Layout



Do not exceed operating angles while running or engine damage will occur.



S-0024-C

Figure 3-4. Maximum Welding Generator Operating Angles

3-3. Connecting The Battery

| | |
|----------------|--|
| WARNING | |
| | <p>SPARKS can cause BATTERY GASES TO EXPLODE; BATTERY ACID can burn eyes and skin.</p> <ul style="list-style-type: none"> • Stop engine before disconnecting or connecting battery cables. • Always wear a face shield and proper protective clothing when working on a battery. • Do not allow tools to cause sparks when working on a battery. |
| rwam2.1 9/91 | |

| | | |
|--|--|--|
| | | <p>1 Engine Control Switch Place switch in the Off position.</p> <p>2 Bolt</p> <p>3 Rear Panel Remove bolts, and pull out rear panel.</p> |
| <p>Tools Needed:</p> 3/8, 1/2 in | | <p>4 Positive (+) Battery Terminal</p> <p>5 Positive (+) Battery Cable Connect positive cable first.</p> <p>6 Negative (-) Battery Terminal</p> <p>7 Negative (-) Battery Cable Connect negative cable last.</p> <p>Reinstall rear panel.</p> <p>If engine does not crank, check battery voltage according to Section 6-5.</p> |
| ST-144 839-C / Ref. ST-131 117-B / Ref. S-0758-B | | |

Figure 3-5. Connecting The Battery

3-4. Engine Prestart Checks

| | |
|----------------|---|
| WARNING | |
| | <p>ENGINE FUEL can cause fire or explosion.</p> <ul style="list-style-type: none"> • Stop engine before fueling. • Do not fuel while smoking or near sparks or flames. • Do not overfill tank; clean up any spilled fuel. |
| | <p>REMOVE FUEL CAP SLOWLY; FUEL SPRAY may cause injury; FUEL may be under pressure.</p> <ul style="list-style-type: none"> • Rotate fuel cap slowly and wait until hissing stops before removing cap. |
| rwam3.1 3/93 | |

| | |
|---|--|
| | <p>Check all fluids daily. Engine must be cold and on a level surface.</p> <p>Add fresh fuel before starting engine the first time (see Figure 6-2).</p> <p>1 Fuel Cap</p> <p>2 Oil Dipstick</p> <p>3 Oil Fill Tube</p> <p>If oil is not up to full mark, add oil (see Figure 6-2). Engine stops if oil pressure gets too low.</p> |
| rsb4.1* 11/92 - ST-151 983 / ST-123 740-B | |

Figure 3-6. Checking Fluid Levels

3-5. Generator Auxiliary Power System

A. Selecting Equipment

 **WARNING**

 **ELECTRIC SHOCK can kill.**

- Use only grounded or double insulated 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

Be sure equipment has this symbol and/or wording.

Ref. ST-123 697-B / ST-800 577

Figure 3-7. Proper Equipment To Use

B. Grounding The Generator To A 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.

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

rst6.1 9/93 – S-0854

Figure 3-8. Grounding Methods

C. Grounding The Generator When Connecting To Home, Shop, Or Farm Wiring

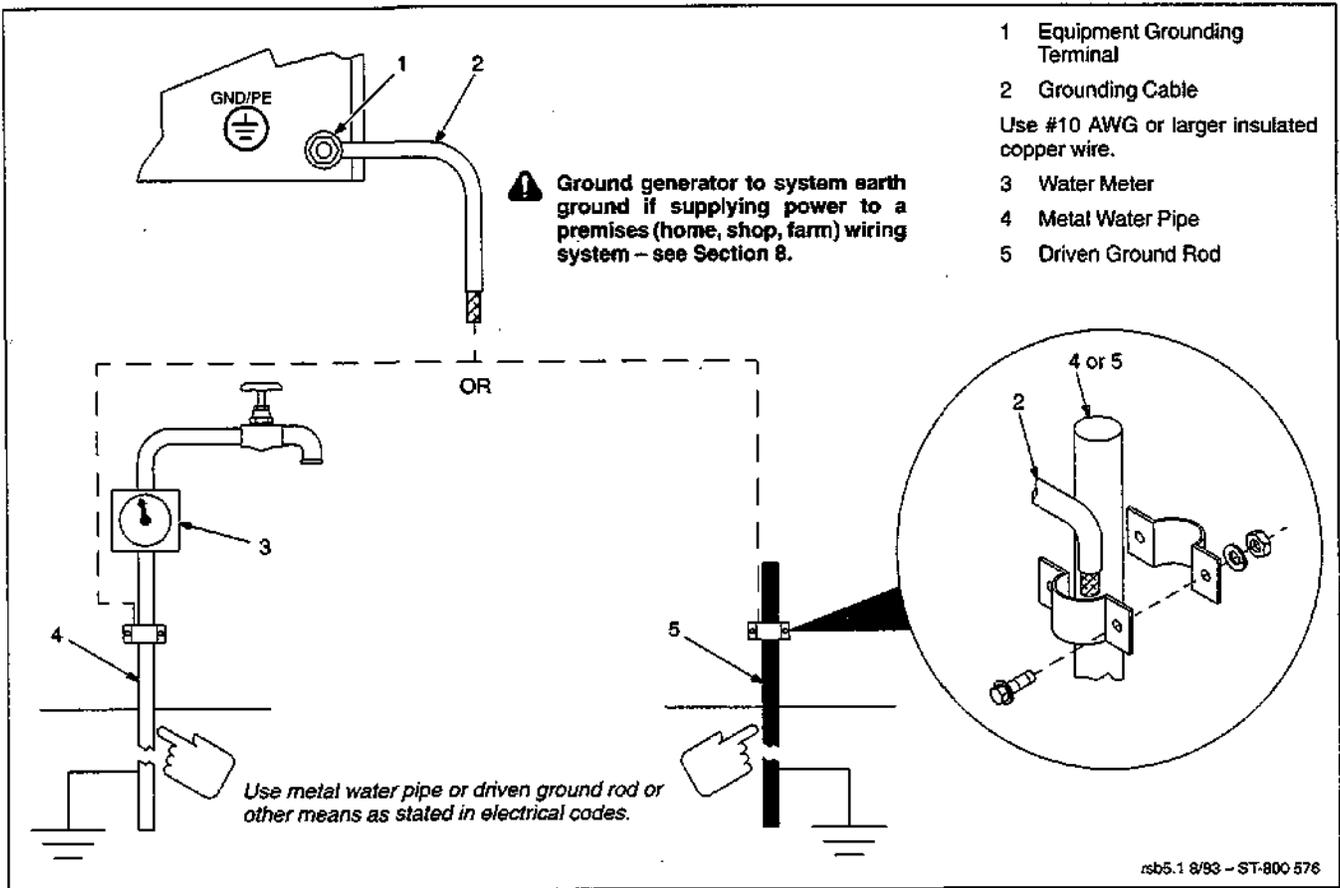


Figure 3-9. Grounding When Supplying Building Systems

3-6. Selecting And Preparing Weld Output Cables

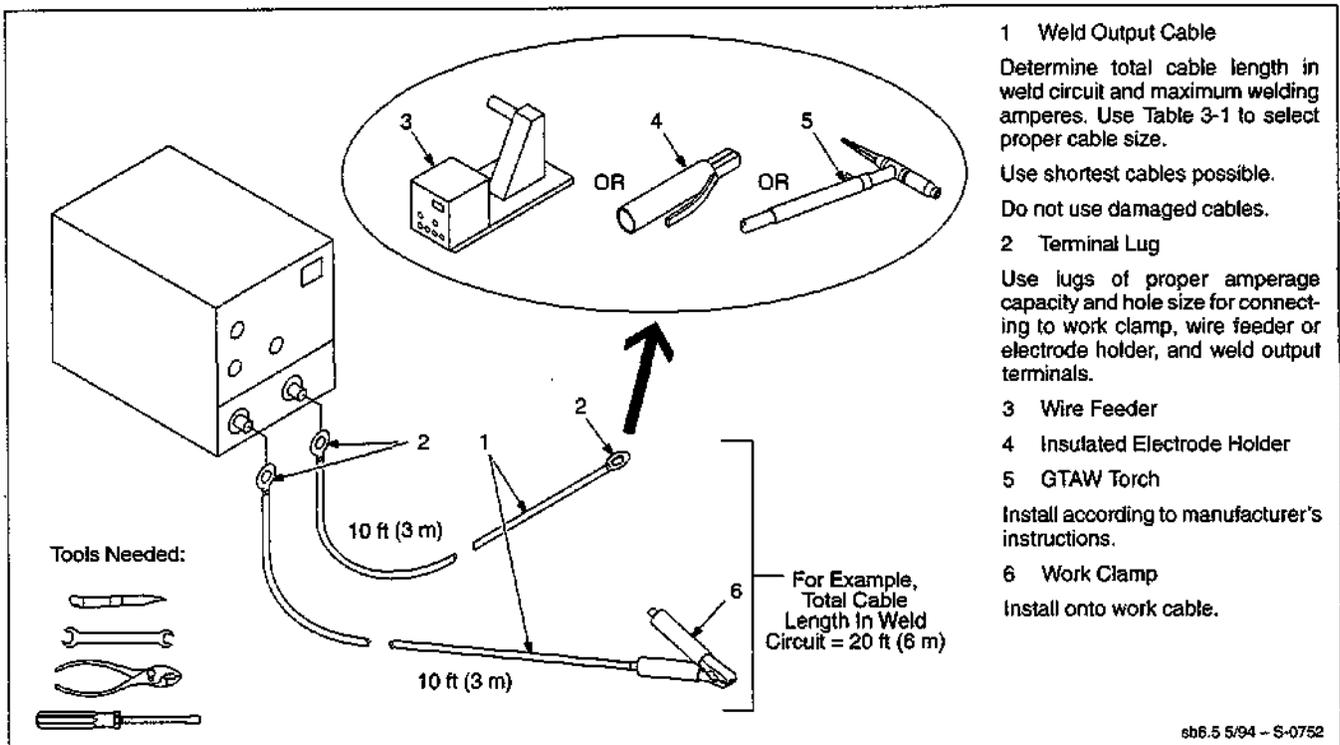


Figure 3-10. Selecting And Preparing Weld Output Cables

Table 3-1. Weld Cable Size*

| Welding Amperes | 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 To 60% Duty Cycle | 60 Thru 100% Duty Cycle | 10 Thru 100% Duty Cycle | | | | | |
| 100 | 4 | 4 | 4 | 3 | 2 | 1 | 1/0 | 1/0 |
| 150 | 3 | 3 | 2 | 1 | 1/0 | 2/0 | 3/0 | 3/0 |
| 200 | 3 | 2 | 1 | 1/0 | 2/0 | 3/0 | 4/0 | 4/0 |
| 250 | 2 | 1 | 1/0 | 2/0 | 3/0 | 4/0 | 2-2/0 | 2-2/0 |
| 300 | 1 | 1/0 | 2/0 | 3/0 | 4/0 | 2-2/0 | 2-3/0 | 2-3/0 |
| 350 | 1/0 | 2/0 | 3/0 | 4/0 | 2-2/0 | 2-3/0 | 2-3/0 | 2-4/0 |

*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. S-0007-0

3-7. Connecting To Weld Output Terminals

WARNING

ELECTRIC SHOCK can kill.

- Disconnect weld cable from output terminal not in use.
- Always wear dry insulating gloves.
- Do not touch live electrical parts.
- Stop engine before making any weld output connections.
- Read Safety Precautions at beginning of this manual.

rwarn13.1* 2/92

Use **ONLY** two terminals at a time.

- 1 Work Weld Output Terminal
- 2 CC Weld Output Terminal
- 3 CV Weld Output Terminal

For CV welding, connect work cable to Work terminal and wire feeder cable to CV terminal.

For CC welding, connect work cable to Work terminal and electrode holder cable to CC terminal.

Tools Needed:

3/4 in

Ref. ST-131 117-B

Figure 3-11. Weld Output Connections

3-8. Remote 14 Receptacle Information And Connections

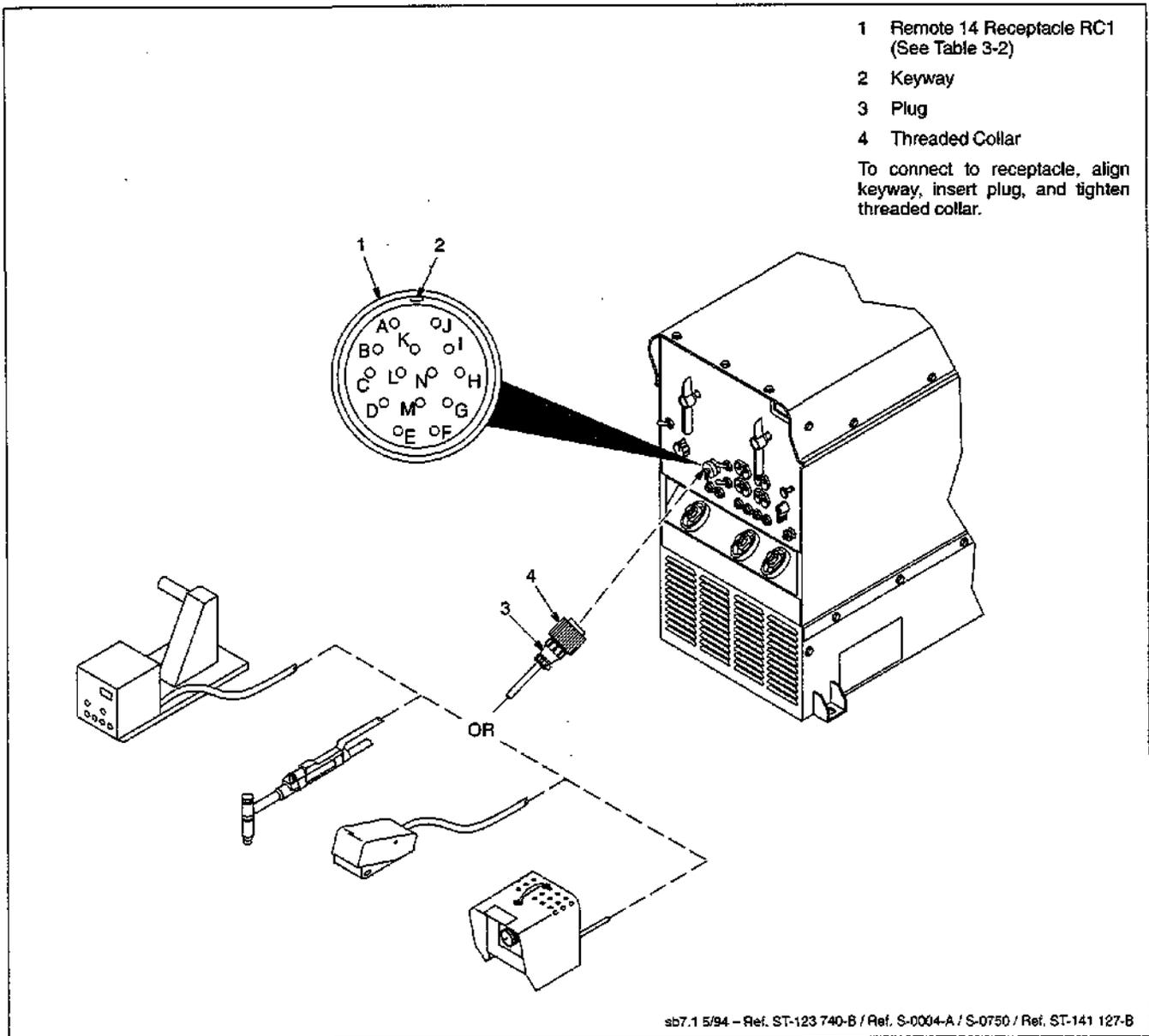


Figure 3-12. Remote 14 Connections

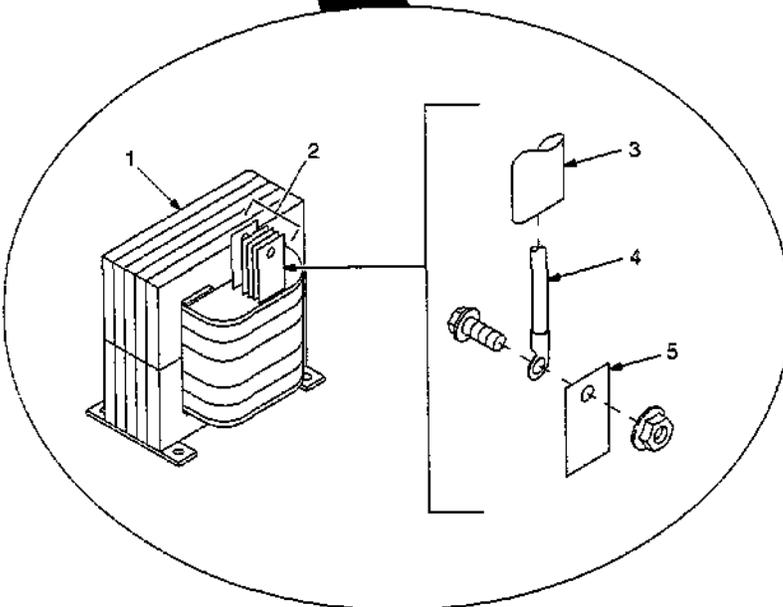
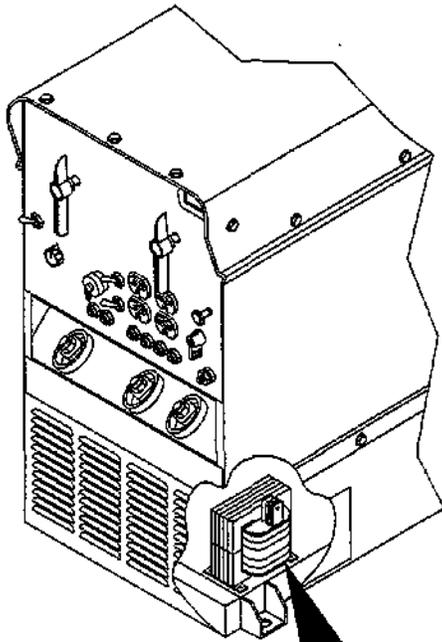
Table 3-2. Remote 14 Socket Information

|  REMOTE 14 | Socket* | Socket Information |
|--|---------|--|
|  OUTPUT (CONTACTOR)  FEEDER | A | 24 volts ac. Protected by circuit breaker CB2. |
| | B | Contact closure to A completes 24 volts ac contactor control circuit. |
| | I | 115 volts ac. Protected by circuit breaker CB1. |
| | J | Contact closure to I completes 115 volts ac contactor control circuit. |
| | G | Circuit common for 24 and 115 volts ac circuits. |
|  AMPERAGE VOLTAGE | C | +10 volts dc output to remote control. |
| | D | Remote control circuit common. |
| | E | 0 to +10 volts dc input command signal from remote control. |
| | K | Chassis common. |

*The remaining sockets are not used.

3-9. Adjusting GMAW Weld Puddle Consistency

| | |
|---|---|
| ⚠ WARNING | |
|  | <p>ELECTRIC SHOCK can kill.</p> <ul style="list-style-type: none"> Do not touch live electrical parts. Stop engine before installing or servicing. |
|  | <p>HOT PARTS can cause severe burns.</p> <ul style="list-style-type: none"> Allow cooling period before servicing. Wear protective gloves and clothing when working on a hot engine. |
|  | <p>MOVING PARTS can cause injury.</p> <ul style="list-style-type: none"> Keep away from moving parts such as fans, belts, and rotors. |



Stabilizer DC-Z is factory connected to suit most GMAW applications.

DC-Z controls the inductance applied to the GMAW weld current. Increasing inductance wets out weld puddle. Decreasing inductance stiffens weld puddle.

To change GMAW weld puddle consistency, proceed as follows:

Stop engine. Remove right side panel.

- 1 Stabilizer DC-Z
 - 2 Taps 1 Thru 5
- Starting from center of DC-Z, taps will be referred to as 1 through 5.
- 3 Insulation Sleeve
 - 4 Lead 4
 - 5 Tap

Lead 4 is connected to tap 3. Cut cables ties as necessary to get to lead 4.

Slide sleeve up on lead 4, and remove hardware to disconnect lead 4 from tap.

To wet out weld puddle, proceed as follows:

Connect lead 4 to tap 2 reusing hardware.

To stiffen weld puddle, proceed as follows:

Connect lead 4 to tap 4 reusing hardware.

Install insulation over new lead connection, and secure with cable ties. Install side panel.

Tools Needed:



 3/8, 7/16 in

ST-135 106-A

Figure 3-13. Changing Stabilizer DC-Z Connections

SECTION 4 – OPERATING THE WELDING GENERATOR

|  WARNING | |
|---|---|
|  | <p>ELECTRIC SHOCK can kill.</p> <ul style="list-style-type: none"> Do not touch live electrical parts. Always wear dry insulating gloves. Insulate yourself from work and ground. Stop engine before installing or servicing. Keep all panels and covers securely in place. |
|  | <p>WELDING can cause fire or explosion.</p> <ul style="list-style-type: none"> Do not weld near flammable material. Watch for fire; keep extinguisher nearby. Do not locate unit over combustible surfaces. Do not weld on closed containers. Allow work and equipment to cool before handling. |
|  | <p>ARC RAYS can burn eyes and skin; NOISE can damage hearing.</p> <ul style="list-style-type: none"> Wear welding helmet with correct shade of filter. Wear correct eye, ear, and body protection. |
|  | <p>FUMES AND GASES can be hazardous.</p> <ul style="list-style-type: none"> Keep your head out of the fumes. Ventilate area, or use breathing device. Read Material Safety Data Sheets (MSDSs) and manufacturer's instructions for material used. |
|  | <p>ENGINE EXHAUST GASES can kill.</p> <ul style="list-style-type: none"> Do not breathe exhaust fumes. Use in open, well-ventilated areas, or vent exhaust outside and away from any building air intakes. |
|  | <p>ENGINE FUEL can cause fire or explosion.</p> <ul style="list-style-type: none"> Stop engine before fueling. Do not fuel while smoking or near sparks or flames. Do not overfill tank; clean up any spilled fuel. |
|  | <p>MOVING PARTS can cause injury.</p> <ul style="list-style-type: none"> Keep away from moving parts such as fans, belts, and rotors. Keep all doors, panels, covers, and guards closed and securely in place. |
|  | <p>MAGNETIC FIELDS FROM HIGH CURRENTS can affect pacemaker operation.</p> <ul style="list-style-type: none"> Pacemaker wearers keep away. Wearers should consult their doctor before going near any welding operations. |
| <p>See Safety Precautions at beginning of manual for basic welding safety information. rwam5.1 10/91</p> | |

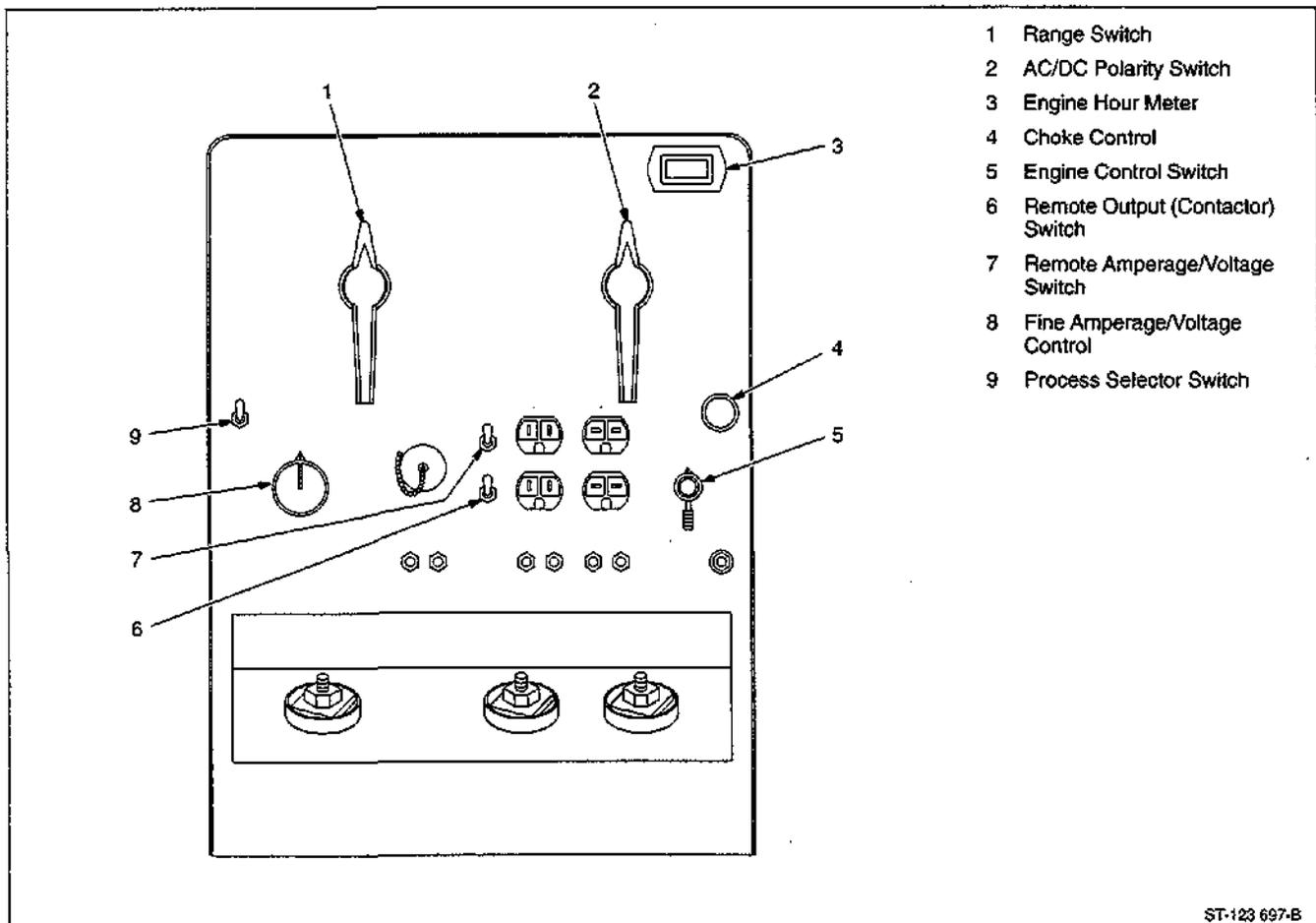


Figure 4-1. Controls

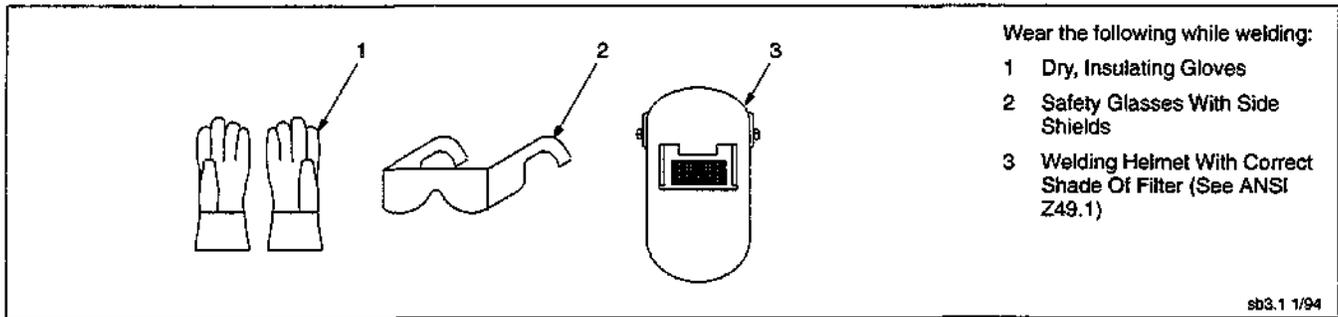


Figure 4-2. Safety Equipment

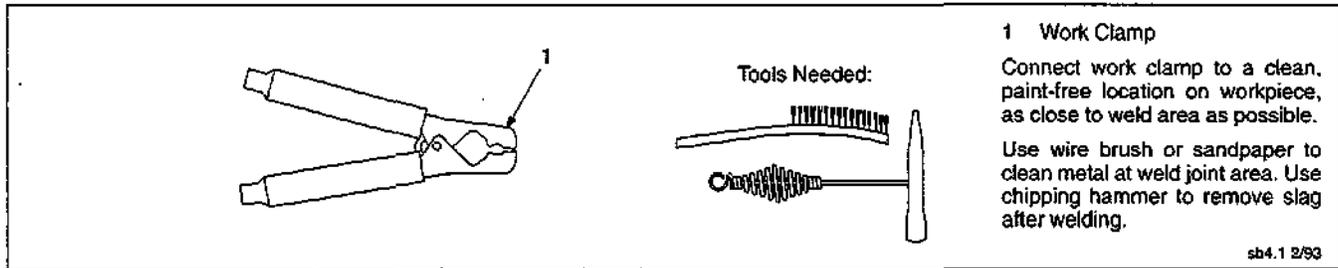


Figure 4-3. Work Clamp

| | |
|--|--|
| ⚠ WARNING | |
| <p>ELECTRIC SHOCK can kill.</p> <ul style="list-style-type: none"> • 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. • Read Safety Precautions at beginning of this manual. | <p>ARCING can damage switch.</p> <ul style="list-style-type: none"> • Do not change AC/DC Polarity switch position while welding. <p>Arcing inside switch can damage contacts, causing switch to fail.</p> <p style="text-align: right;">warn6.2 4/92 / rwarn6.1* 2/93</p> |

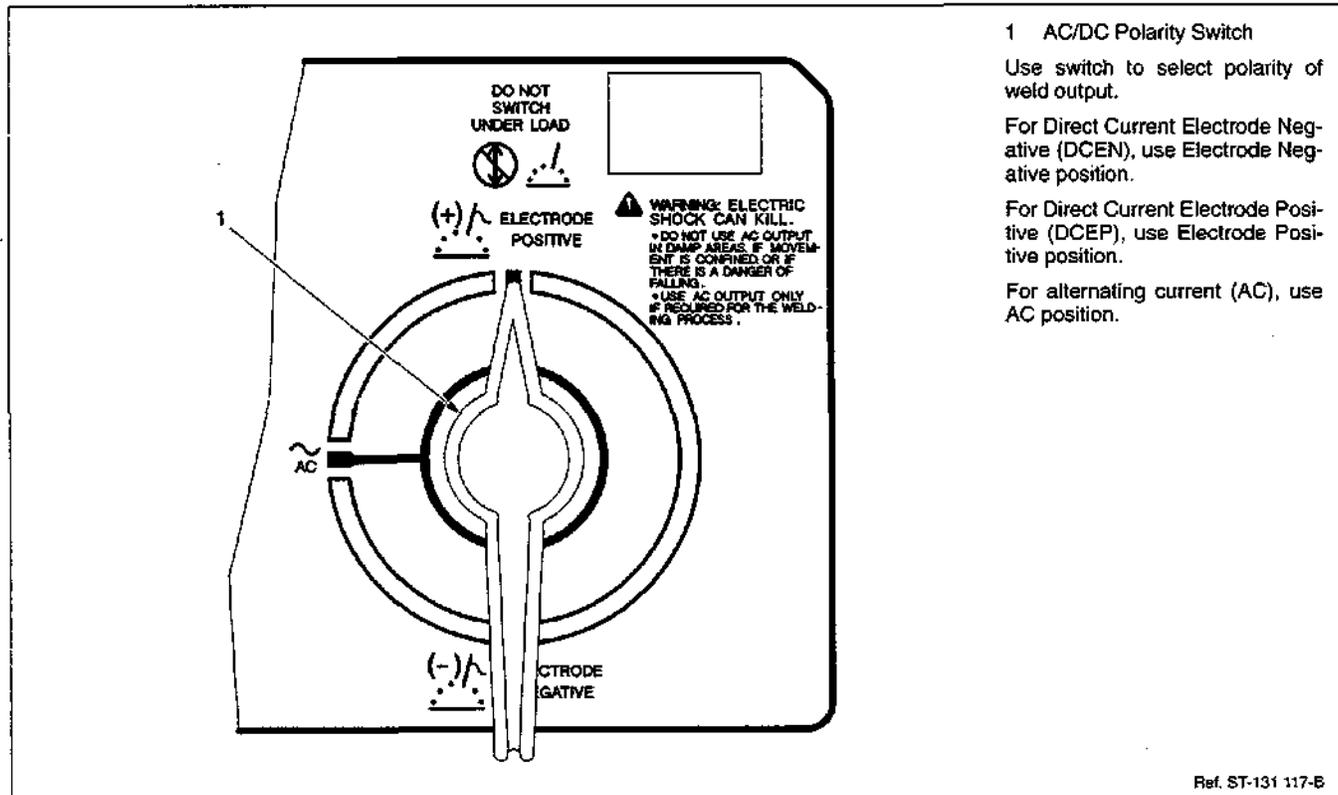


Figure 4-4. AC/DC Polarity Switch

⚠ CAUTION

ARCING can damage switch.

- Do not change Range switch position while welding.
- Arcing inside switch can damage contacts, causing switch to fail.

rwam5.1* 2/93

1 Range Switch

Use switch to select range of weld output.

If AC/DC Polarity switch is in Electrode Negative or Electrode Positive position, set switch according to DC scale.

If AC/DC Polarity switch is in the AC position, set switch according to AC scale.

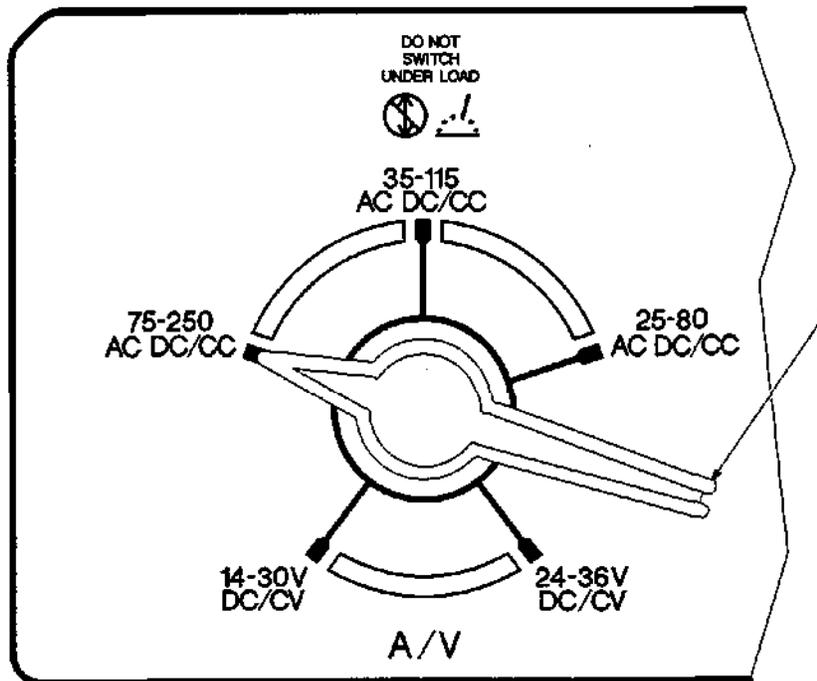
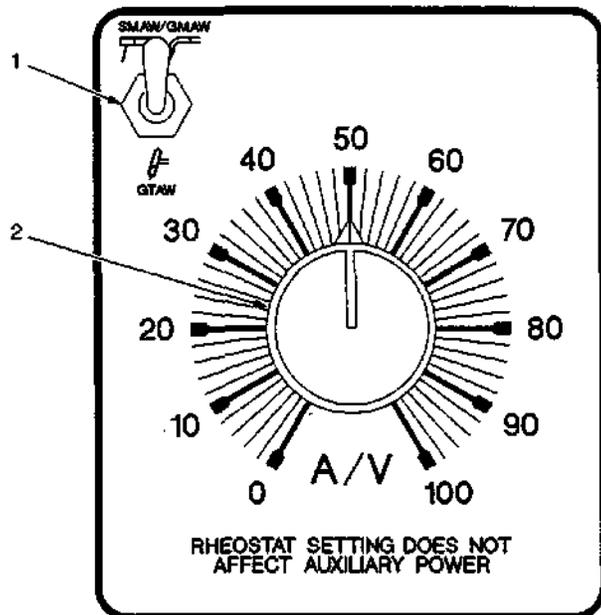


Figure 4-5. Range Switch



1 Process Selector Switch

Use switch to select unit output for welding process: SMAW/GMAW (Shielded Metal Arc and Gas Metal Arc Welding), or GTAW (Gas Tungsten Arc Welding).

For FCAW (Flux Cored Arc Welding), use SMAW/GMAW position.

2 Fine Amperage/Voltage Control

Use control to adjust amperage or voltage within range selected by Range switch (see Figure 4-5). Numbers around control are for reference only.

Example Of Front Panel Amperage Control

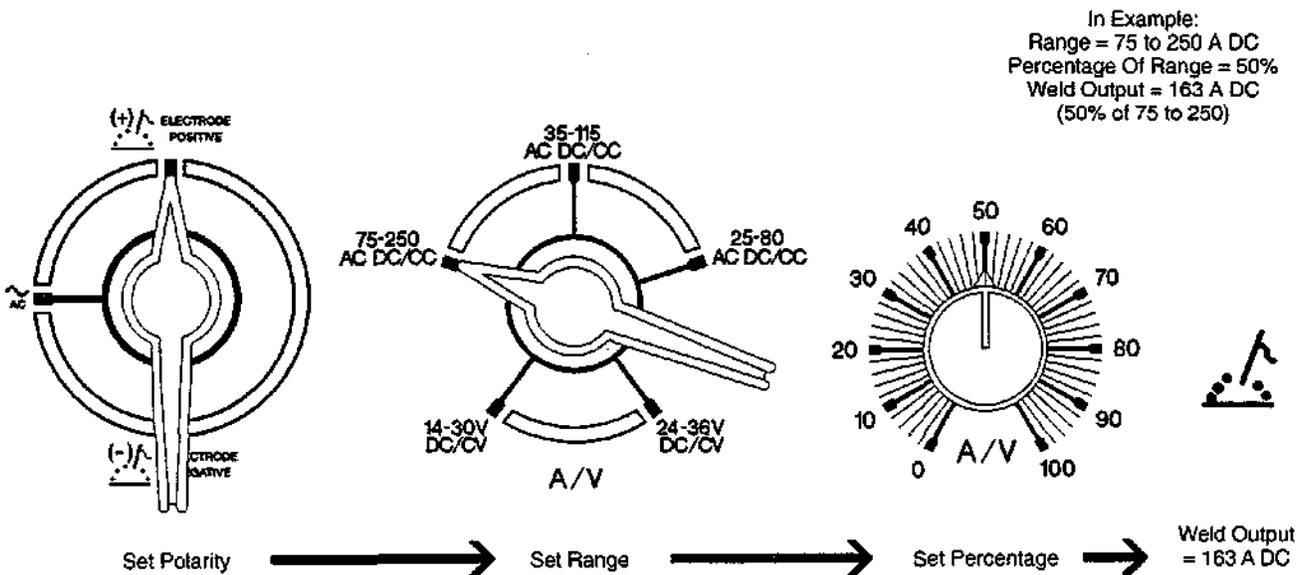
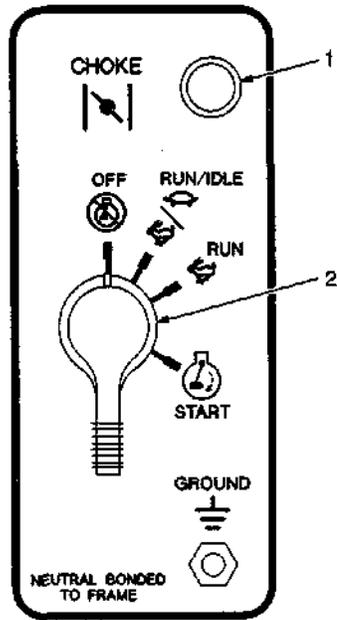


Figure 4-6. Process Selector Switch And Fine Amperage/Voltage Control

NOTE

Place Engine Control switch in Run position to operate GMAW equipment. Some GMAW equipment may work with switch in Run/Idle position.



1 Choke Control

Use control to change fuel-air mixture to engine. Pull fully out before starting engine. As engine warms up, slowly push in.

2 Engine Control Switch

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

To start, turn switch to Start position and release as soon as engine starts. Do not crank engine while flywheel is turning.

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

In Run position, engine runs at weld/power speed all the time.

To stop engine, turn switch to Off position.

Figure 4-7. Engine Controls

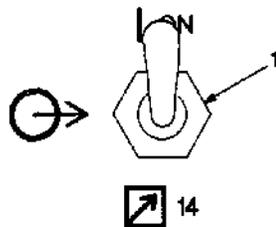
WARNING



ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Do not touch weld output terminals when engine is running.
- Do not touch electrode and work clamp at the same time.

rwam7.1 9/91



1 Remote Output (Contactor) Switch

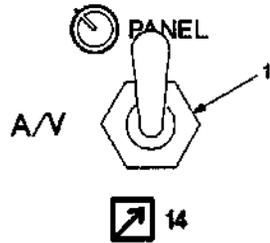
Use switch to select way of controlling unit output.

For weld output, place switch in On position. Open-circuit voltage is present at the weld output terminals when engine is running.

For remote output control, place switch in Remote 14 position (see Section 3-8). Open-circuit voltage is present at the weld output terminals when remote contactor switch is closed.

 Weld output terminals are energized when Remote Output (Contactor) switch is On and engine is running.

Figure 4-8. Remote Output (Contactor) Switch



1 Remote Amperage/Voltage Switch

Use switch to select way of controlling amperage and voltage adjustment.

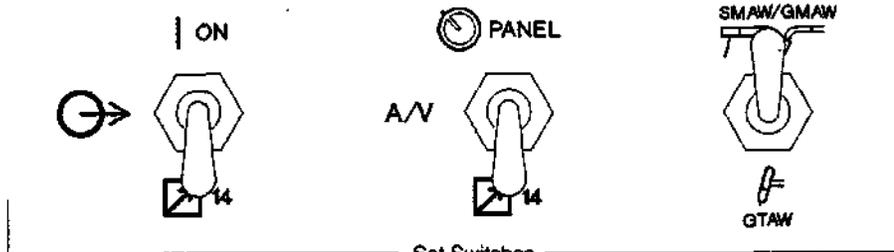
For front panel control, place switch in Panel position.

For remote control, place switch in Remote 14 position (see Section 3-8).

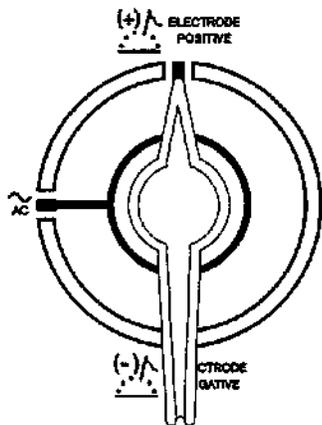
2 Remote Amperage Control

Use control for SMAW only.

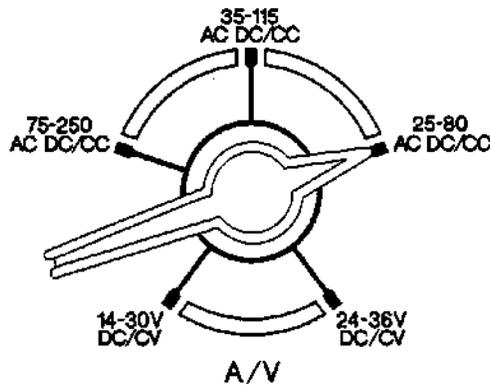
EXAMPLE Of Combination Remote Amperage Control For SMAW/GMAW



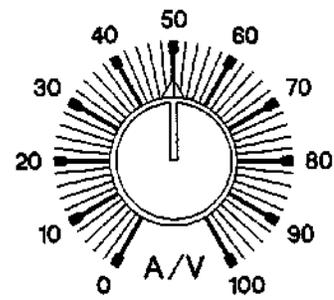
Set Switches



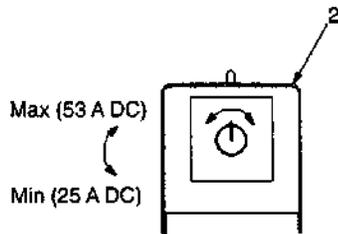
Set Polarity



Set Range



Set Percentage



Max (53 A DC)

Min (25 A DC)

Adjust Remote Control

In Example:
 Min = 25 A DC/CC
 Percentage Of Range = 50%
 Max = 53 A DC/CC (50% of 25 to 80)

Figure 4-9. Remote Amperage/Voltage Switch

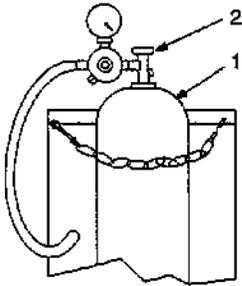
WARNING



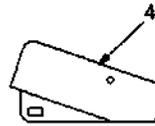
BUILDUP OF SHIELDING GAS can harm health or kill.

- Shut off shielding gas supply when not in use.

warn1.1 9/91



OR



- 1 Shielding Gas Cylinder
- 2 Valve
- 3 Gun Trigger
- 4 Foot Control

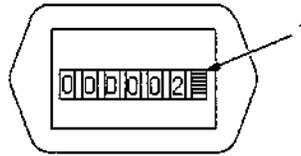
Open valve on cylinder just before welding.

Gun trigger or foot control turns weld output and gas flow on and off.

Close valve on cylinder when finished welding.

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Figure 4-10. Shielding Gas

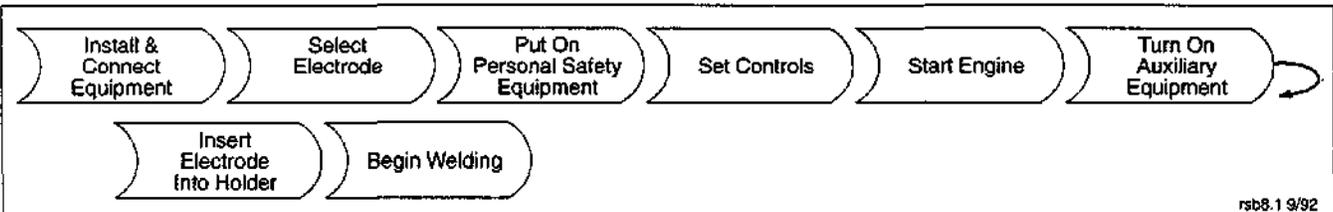


- 1 Engine Hour Meter

Use meter to check total operating hours (see Section 6-1). This meter operates only when engine is running.

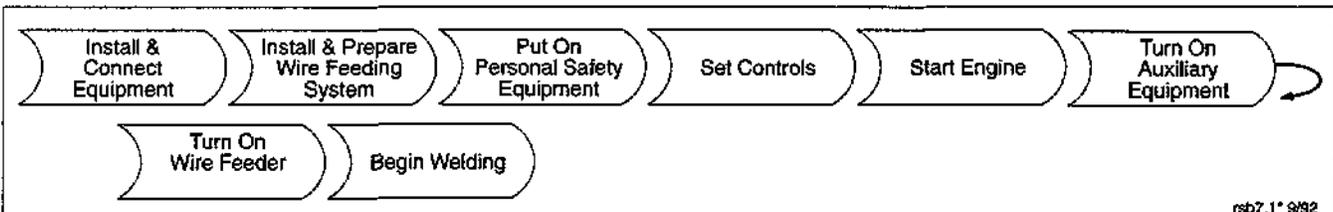
rsb6.1 2/92

Figure 4-11. Engine Hour Meter



rsb8.1 9/92

Figure 4-12. Sequence Of Shielded Metal Arc Welding (SMAW)



rsb7.1* 9/92

Figure 4-13. Sequence Of Flux Cored Arc Welding (FCAW)

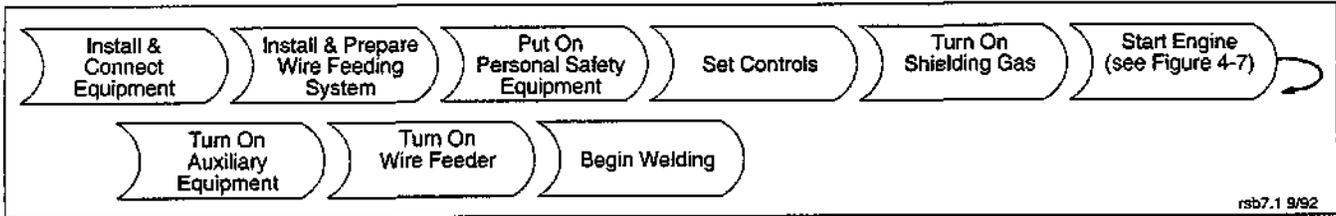


Figure 4-14. Sequence Of Gas Metal Arc Welding (GMAW)

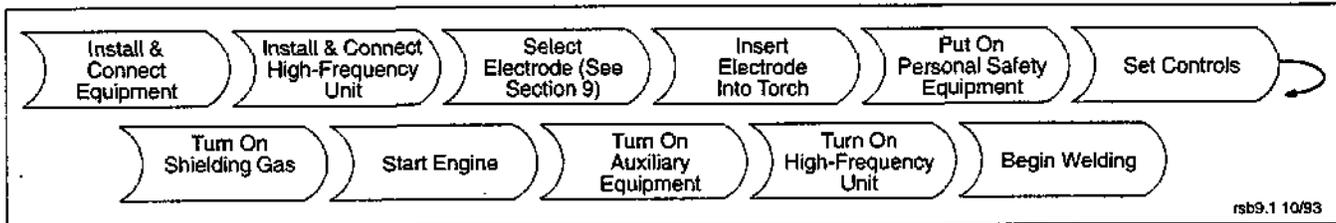
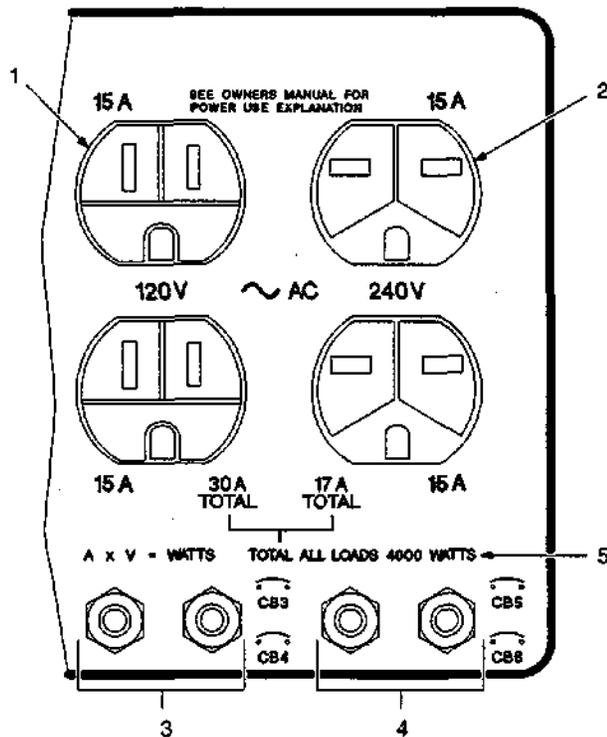


Figure 4-15. Sequence Of Gas Tungsten Arc Welding (GTAW)

SECTION 5 – OPERATING AUXILIARY EQUIPMENT

| WARNING | |
|----------------|---|
| | <p>ELECTRIC SHOCK can kill.</p> <ul style="list-style-type: none"> Do not touch live electrical parts. Stop engine before making internal inspection or reconnection. Ground generator according to all applicable national, state, and local codes. Connect equipment grounding terminal to a proper earth ground. Do not connect to any electrical distribution system normally supplied by utility power unless a proper transfer switch and grounding procedure are employed (see Section 8). |
| | <p>MOVING PARTS can cause serious injury.</p> <ul style="list-style-type: none"> Keep away from moving parts such as fans, belts, and rotors. Keep all doors, panels, covers, and guards closed and securely in place. |
| | <p>ELECTRIC SPARKS can cause fire.</p> <ul style="list-style-type: none"> If using auxiliary power only and not welding, disconnect both welding cables to prevent live electrode from causing electric shock and fire hazards. Watch for fire. Keep a fire extinguisher nearby, and know how to use it. <p>The weld output terminals are electrically energized when the engine is running and the contactor, if applicable, is energized.</p> |
| | <p>LOW VOLTAGE AND FREQUENCY can damage electrical equipment.</p> <ul style="list-style-type: none"> Turn off or unplug all electrical equipment connected to auxiliary power receptacles before starting or stopping the engine. <p>When starting or stopping, the engine has low speed which causes low voltage and frequency. <small>rwam8.1 10/92</small></p> |



1 120 V 15 A AC Duplex Receptacle RC1

This receptacle supplies 60 Hz single-phase power at weld/power speed. Maximum output from receptacle is 3.6 kVA/kW.

2 240 V 15 A AC Duplex Receptacle RC2

This receptacle supplies 60 Hz single-phase power at weld/power speed. Maximum output is 4.0 kVA/kW.

3 Circuit Breaker CB3 And CB4

CB3 and CB4 protect the 120 V receptacle from overload. If CB3 or CB4 opens, half of the receptacle does not work. Press button to reset breaker.

4 Circuit Breaker CB5 And CB6

CB5 and CB6 protect the 240 V receptacle from overload. If CB5 or CB6 opens, the receptacle does not work. 120 volts may still be present at the 240 V receptacle. Press button to reset breaker.

5 Total Auxiliary Power Output

Combined output of all receptacles limited to 4 kVA/kW output of the generator.

EXAMPLE: If 15 A is drawn from the 120 V receptacle, only 9 A is available at the 240 V receptacle:

$$(120 \text{ V} \times 15 \text{ A}) + (240 \text{ V} \times 9 \text{ A}) = 4.0 \text{ kVA/kW}$$

6 Auxiliary Power While Welding Label

Label shows approximate ac auxiliary power available under various welding loads.

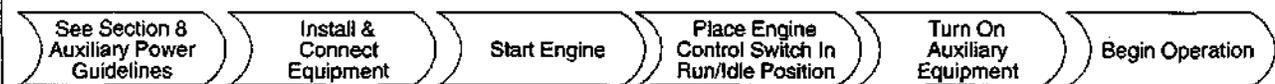
SIMULTANEOUS WELDING AND POWER

| Weld Current CV/CC | Watts | Current In Amperes | |
|-----------------------|-------|-----------------------|------|
| | | 120V | 240V |
| 250 | 2200 | 18.5 | 9 |
| 225 | 2750 | 23 | 11.5 |
| 200 | 3250 | 27 | 13.5 |
| 150 | 3300 | 27.5 | 14 |
| 100 | 3800 | 32 | 16 |
| 50 | 4000 | 33.3 | 16.7 |
| 0 | 4000 | 33.3 | 16.7 |

See Owner's Manual for additional information. S-135 048-B

Ref. ST-131 117-B

Figure 5-1. Auxiliary Power Receptacles And Circuit Breakers



rsb11.1 2/93

Figure 5-2. Sequence Of Auxiliary Equipment Operation

SECTION 6 – MAINTENANCE & TROUBLESHOOTING

|  WARNING | | | |
|--|---|---|--|
|  | <p>ELECTRIC SHOCK can kill.</p> <ul style="list-style-type: none"> • Do not touch live electrical parts. • Always wear dry insulating gloves. • Insulate yourself from work and ground. • Stop engine before installing or servicing. • Keep all panels and covers securely in place. |  | <p>HOT PARTS can cause severe burns.</p> <ul style="list-style-type: none"> • Allow cooling period before servicing. • Wear protective gloves and clothing when working on a hot engine. |
|  | <p>ENGINE EXHAUST GASES can kill.</p> <ul style="list-style-type: none"> • Do not breathe exhaust fumes. • Use in open, well-ventilated areas, or vent exhaust outside and away from any building air intakes. |  | <p>ENGINE EXHAUST SPARKS can cause fire.</p> <ul style="list-style-type: none"> • Use only U.S. Forestry Department approved spark arrestor and comply with all local, state, and federal laws. • A spark arrestor is mandatory in all National Forests and in grass, brush, or forest covered lands in California, Oregon, and Washington. Check with state and local authorities in other areas. • Properly maintain the spark arrestor. • Stop engine and allow exhaust system to cool down before servicing spark arrestor. • Service spark arrestor away from flammables. |
|  | <p>ENGINE FUEL can cause fire or explosion.</p> <ul style="list-style-type: none"> • Stop engine before fueling. • Do not fuel while smoking or near sparks or flames. • Do not overfill tank; clean up any spilled fuel. | | |
|  | <p>MOVING PARTS can cause injury.</p> <ul style="list-style-type: none"> • Keep away from moving parts such as fans, belts, and rotors. • Keep all doors, panels, covers, and guards closed and securely in place. | | <p>Maintenance to be performed only by qualified persons.</p> |

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6-1. Routine Maintenance

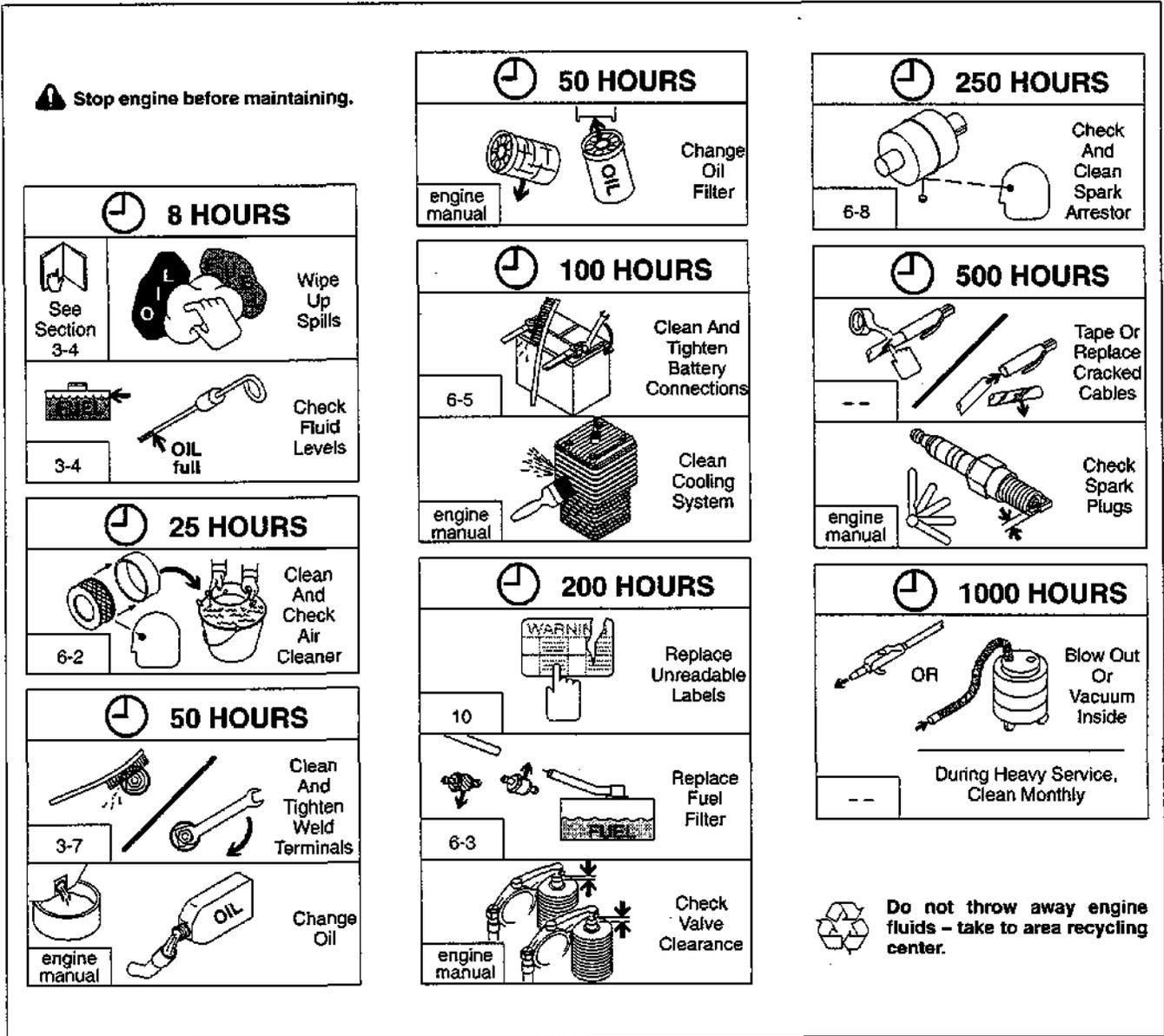


Figure 6-1. Maintenance Schedule

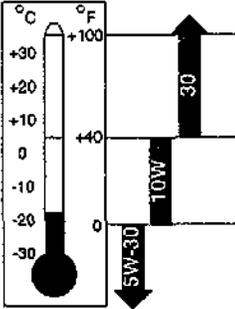
| ONAN P220 GAS ENGINE | |
|--|---|
|  | See Engine Manual for complete engine care. Give engine Specification and Serial Number when ordering parts. |
|  | Check daily. |
| Recommended Oil API Service Classification SF, SF/CC, SF/CD |  |
| Oil Change & Filter dirty conditions 25 hours or less normal conditions 50 hours | |
| Oil Filter MILLER 065 251, Onan 122-0645 | |
| Oil Capacity 1.5 qt (1.4 L) or 1.75 qt (1.6 L) with filter change | |
|  | Fuel Capacity 7.5 gal (28.4 L) Fuel Grade Regular or Unleaded, 87 Octane min. Fuel Filter MILLER 066 113, Onan 149-2206-01, Fram G10E1 |
| <i>Gasoline</i> | |
|  | Air Filter Service 100 hours or less – see Owner's Manual Air Filter Element MILLER 064 617, Onan 140-2628-01 Air Filter Wrapper MILLER 065 653, Onan 140-1496 |
|  | 12 Volt Battery BCI Group 24 Cranking Performance at 0°F (-18°C) 260 Amps min. |
|  | Engine RPM – No Load Power 3700 (60 Hz) Weld 3700 Idle 2200 |
|  | Valve Clearance – Cold In. 0.005 in (0.13 mm) Ex. 0.013 in (0.33 mm) |
|  | Spark Plug Gap 0.025 in. (0.6 mm) Spark Plug Champion RS17YX Preferred or RS14YC Ignition Timing 20° BTDC with engine stopped Ignition Capacitor MILLER 065 673, Onan 312-0256 <i>Use only resistor spark plugs and wires.</i> |
|  | Spark Arrester Inspection And Service 250 operating hours - see Owner's Manual |
| <i>Optional</i> | S-133 602-C |

Figure 6-2. Maintenance Label

6-2. Servicing Air Cleaner

⚠ CAUTION

DIRTY AIR can damage engine.

- Do not run engine without air cleaner element in place or with dirty element.

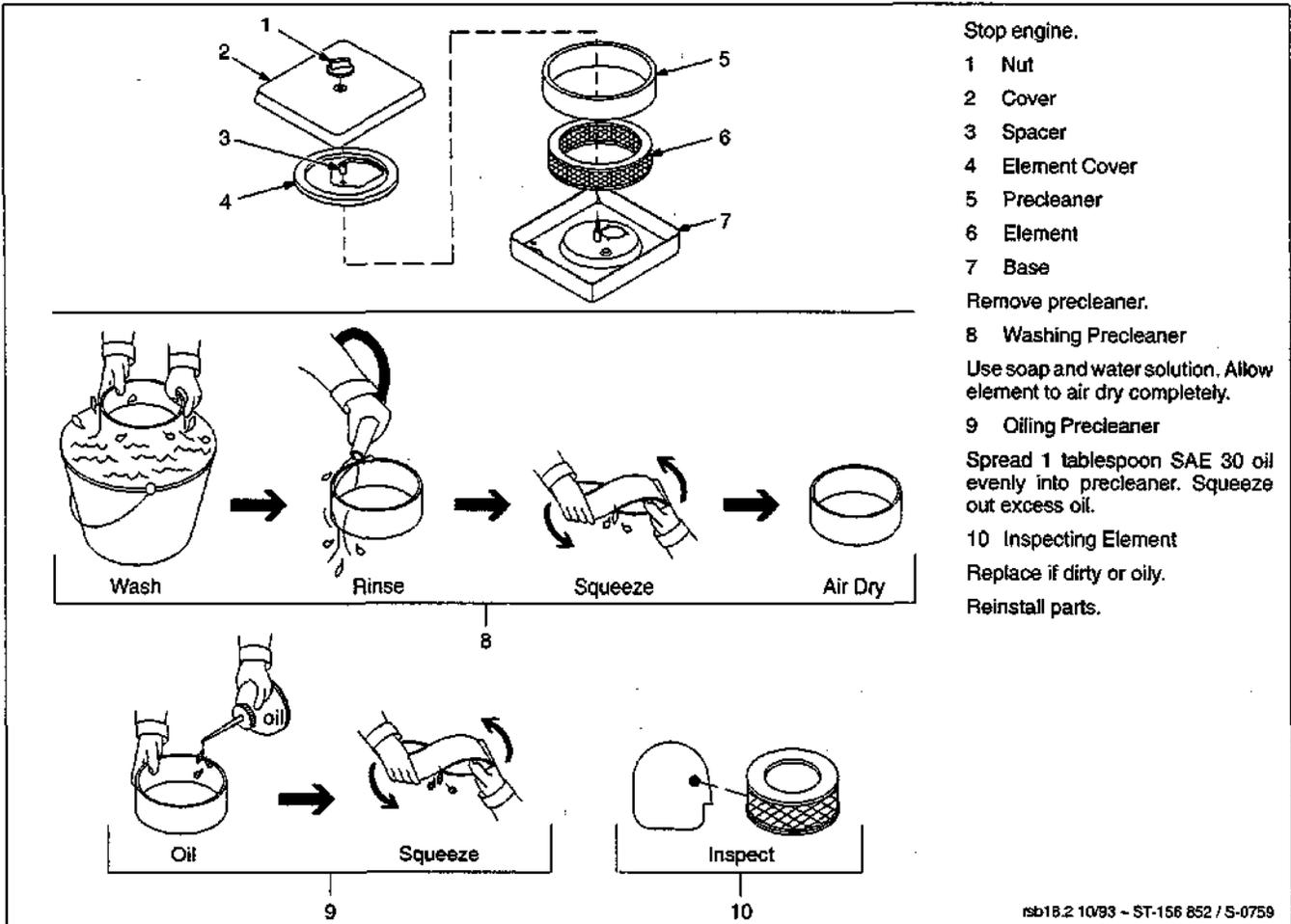


Figure 6-3. Air Cleaner Service

6-3. Replacing Fuel Filter

⚠ WARNING



READ SAFETY BLOCKS at start of Section 6 before proceeding.

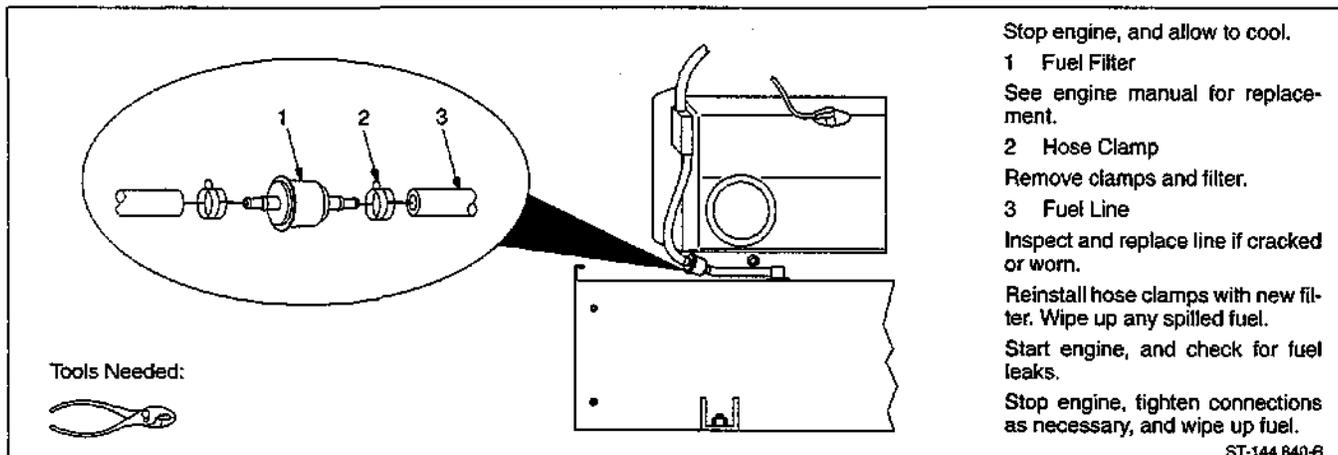


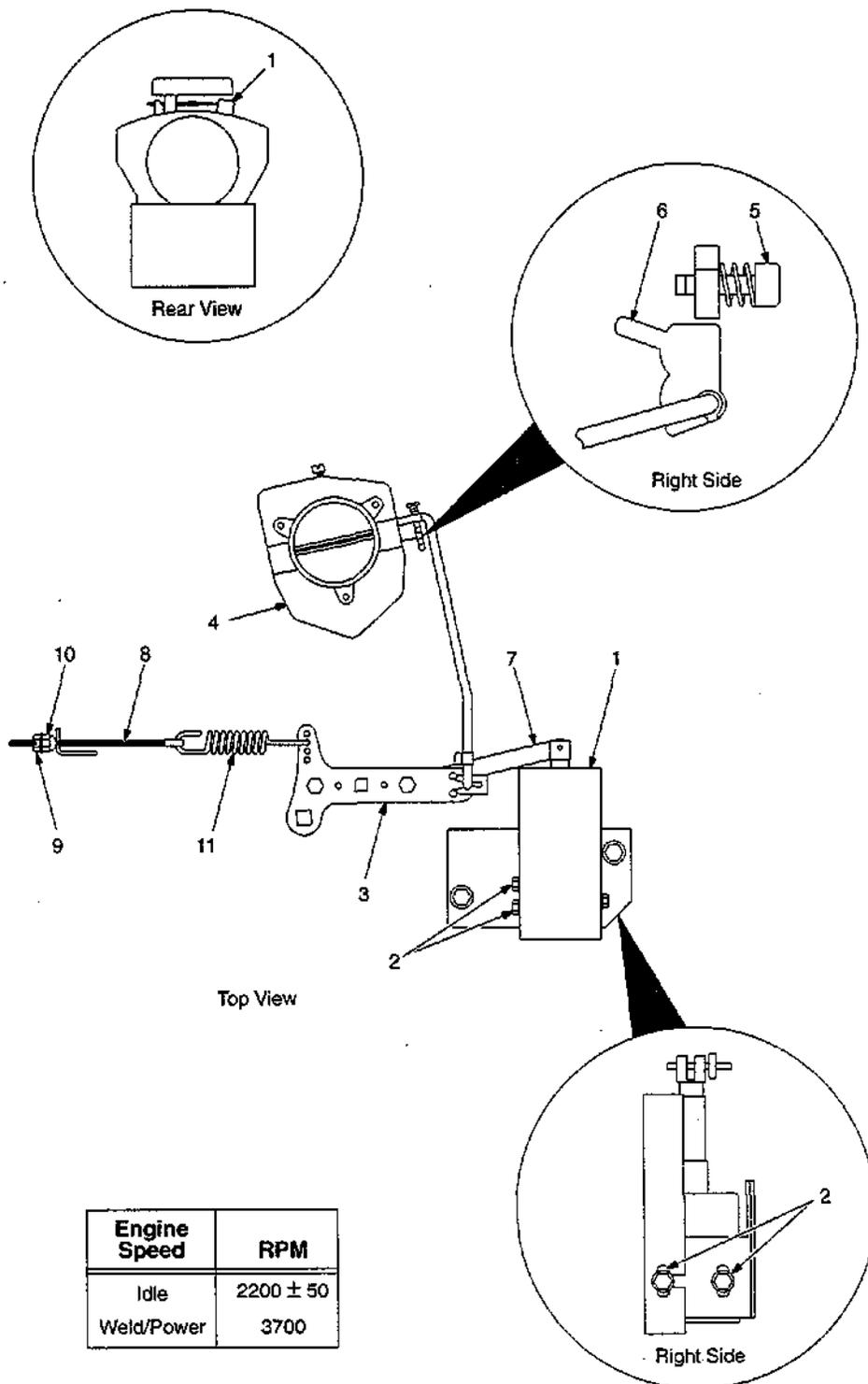
Figure 6-4. Fuel Filter Components

6-4. Adjusting Engine Speed

WARNING



READ SAFETY BLOCKS at start of Section 6 before proceeding.



Engine speeds have been factory set and should not require adjustment. After tuning engine, check engine speeds with a tachometer. See table for proper no load speeds. If necessary, adjust speeds as follows:

Start engine, and rotate Fine Amperage/Voltage control to 100.

- 1 Throttle Solenoid
- 2 Solenoid Screw
- Loosen four screws.
- 3 Governor Arm
- 4 Carburetor
- 5 Idle Speed Screw

Pull governor arm away from carburetor and hold while making the following adjustments:

Turn idle speed screw until engine runs at idle speed.

Release governor arm. Place Engine Control switch in Run/Idle position.

- 6 Carburetor Stop

Slide solenoid until idle speed screw just touches carburetor stop. Tighten solenoid screws.

- 7 Solenoid Linkage

Check for binding of linkage, and readjust solenoid position if necessary.

Place Engine Control switch in Run position.

- 8 Weld/Power Speed Rod

- 9 Locking Nut

Loosen nut.

- 10 Adjustment Nut

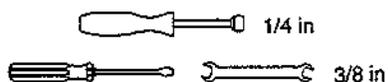
Turn nut until engine runs at weld/power speed. Tighten locking nut. Stop engine.

- 11 Sensitivity Spring

See engine manual for governor sensitivity adjustment.

| Engine Speed | RPM |
|--------------|-----------|
| Idle | 2200 ± 50 |
| Weld/Power | 3700 |

Tools Needed:

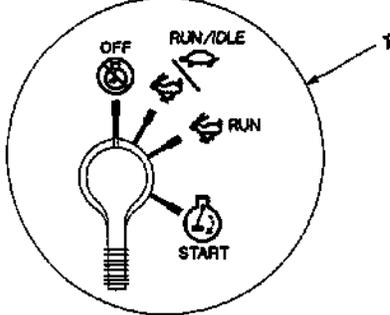
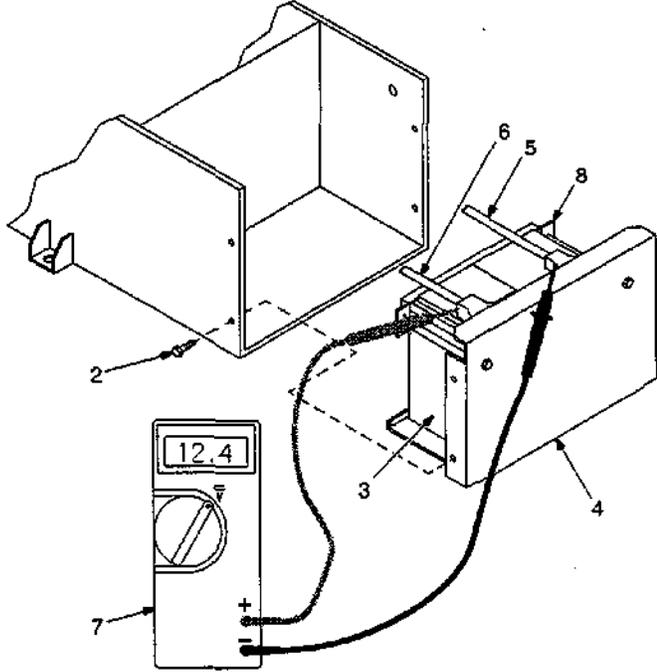


ST-121 112-D / ST-151 732

Figure 6-5. Engine Speed Adjustments

6-5. Replacing Battery Or Checking Battery Voltage

| | |
|---|---|
| ⚠ WARNING | |
|  | <p>SPARKS can cause BATTERY GASES TO EXPLODE; BATTERY ACID can burn eyes and skin.</p> <ul style="list-style-type: none"> • Stop engine before disconnecting or connecting battery cables. • Always wear a face shield and proper protective clothing when working on a battery. |
|  | <ul style="list-style-type: none"> • 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. |
| <small>rwam10.1 9/91</small> | |

If engine will not crank, check battery voltage as follows:

- 1 Engine Control Switch

Place Engine Control switch in the Off position.

- 2 Bolt
- 3 Battery
- 4 Rear Panel

Remove bolts, and pull out rear panel.

- 5 Negative (-) Battery Cable
- 6 Positive (+) Battery Cable
- 7 Voltmeter

Remove terminal covers from battery.

If battery voltage is less than 12.4 volts, charge battery following battery charger's instructions.

To replace battery, proceed as follows:

Disconnect battery cables, negative cable first.

- 8 Hold Down

Remove hold down and battery. When reconnecting battery, connect negative (-) cable last. Reinstall terminal covers and rear panel.

Tools Needed:

 3/8, 1/2 in

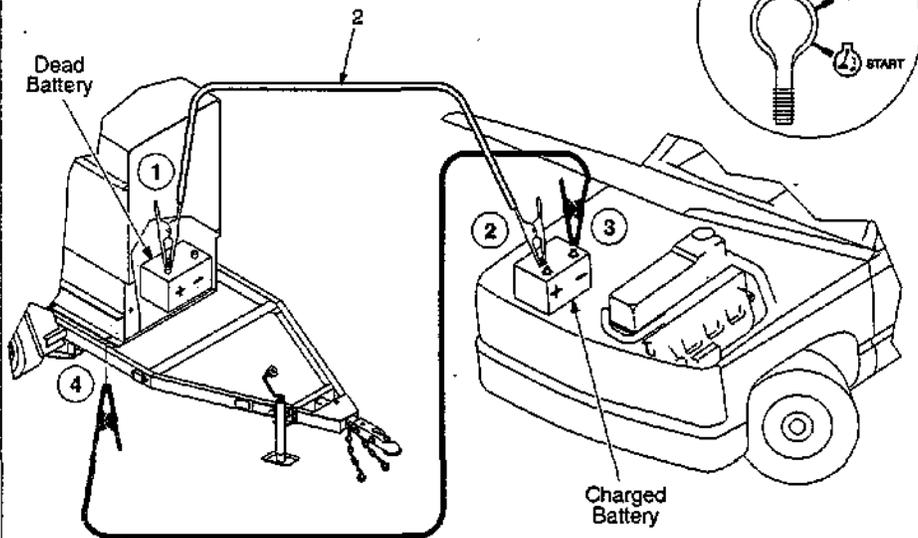
ST-144 839-C / ST-131 117-B

Figure 6-6. Checking And Replacing Battery

6-6. Jump-Starting Welding Generator

| | |
|---|--|
| ⚠ WARNING | |
|  <p>BATTERY EXPLOSION can BLIND and INJURE.</p> <ul style="list-style-type: none"> • Stop engine before servicing battery. • When servicing wear a face shield, rubber gloves, and protective clothes. • Keep welding, sparks, flames, or smoking away. • Disconnect negative (-) cable first, connect it last. |  <p>BATTERY ACID can BURN SKIN.</p> <ul style="list-style-type: none"> • Do not tip. • Replace damaged battery. • Flush eyes and skin immediately with water. |

Welding Generator NOT Mounted On Or Attached To Vehicle



If battery voltage is low and welding generator does not crank, charge battery. If necessary, jump-start unit as follows:

1 Engine Control Switch

Place switch in the Off position.

Turn vehicle off.

Be sure batteries are the same voltage and are not frozen.

2 Jumper Cable

Connect cables in numerical order.

Start vehicle, then start welding generator.

⚠ Vehicle must not touch welding generator or trailer.

Make last cable connection ④ to frame away from battery. Never make last connection at battery.

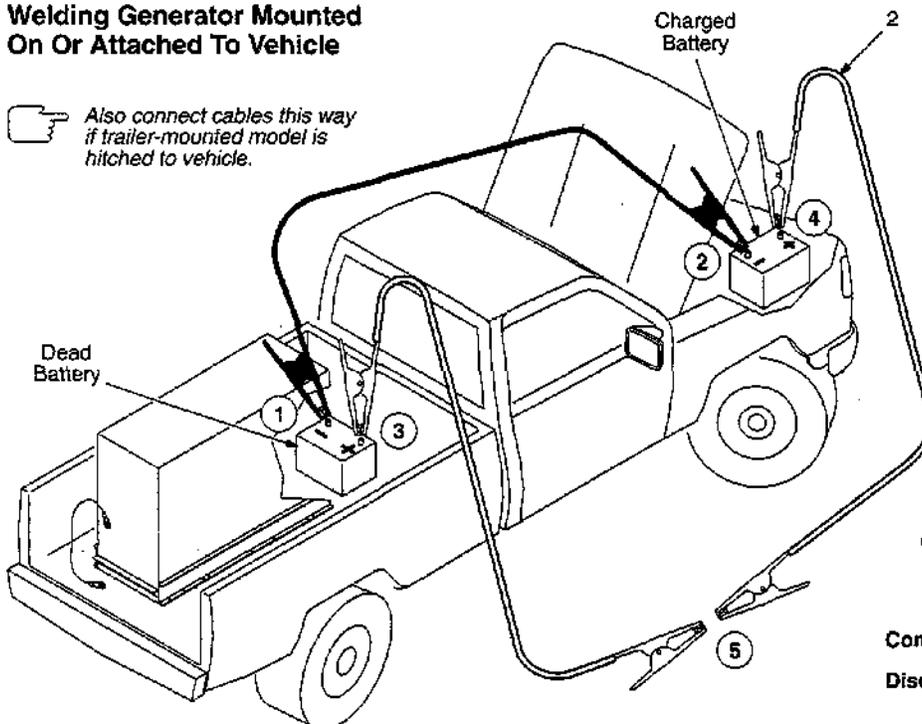
Connection Order: ① ② ③ ④

Disconnection Order: ④ ③ ② ①

OR

Welding Generator Mounted On Or Attached To Vehicle

 Also connect cables this way if trailer-mounted model is hitched to vehicle.



⚠ Make last cable connection ⑤ away from batteries. Never make last connection at battery.

Connection Order: ① ② ③ ④ ⑤

Disconnection Order: ⑤ ④ ③ ② ①

Ref. ST-154 863-B / ST-800 776 / ST-800 731

Figure 6-7. Jump-Starting Welding Generator

6-7. Overload Protection

WARNING



READ SAFETY BLOCKS at start of Section 6 before proceeding.

A. Circuit Breakers CB1 And CB2

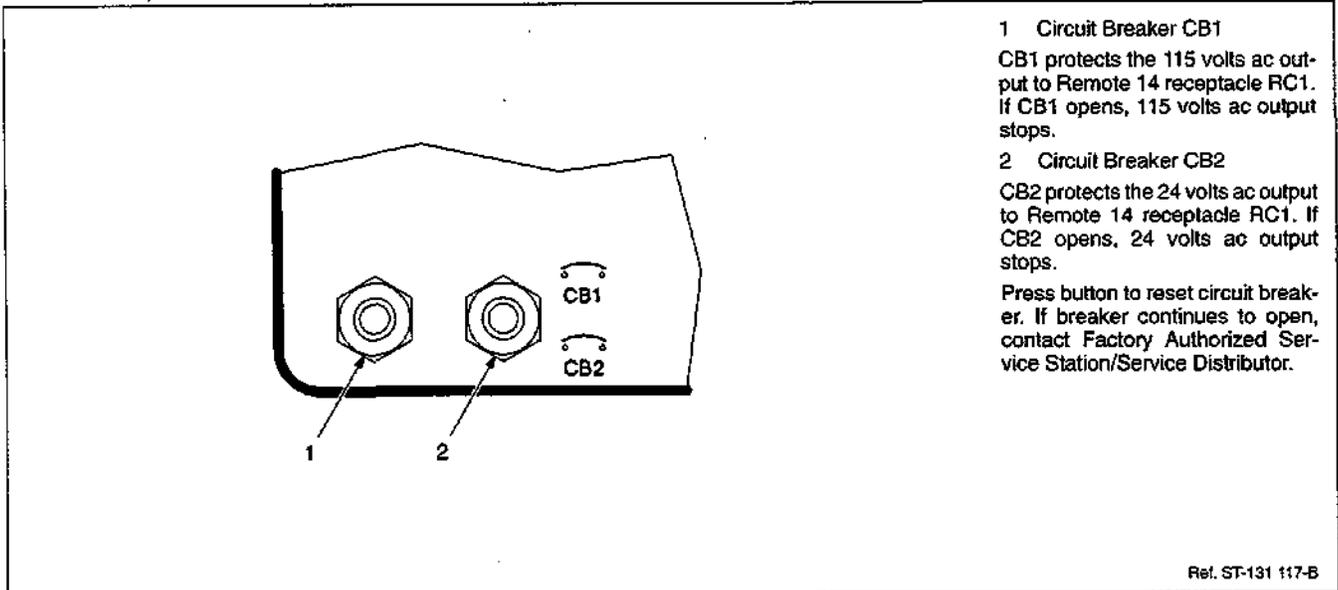


Figure 6-8. Circuit Breakers CB1 And CB2

B. Fuses F1 And F2

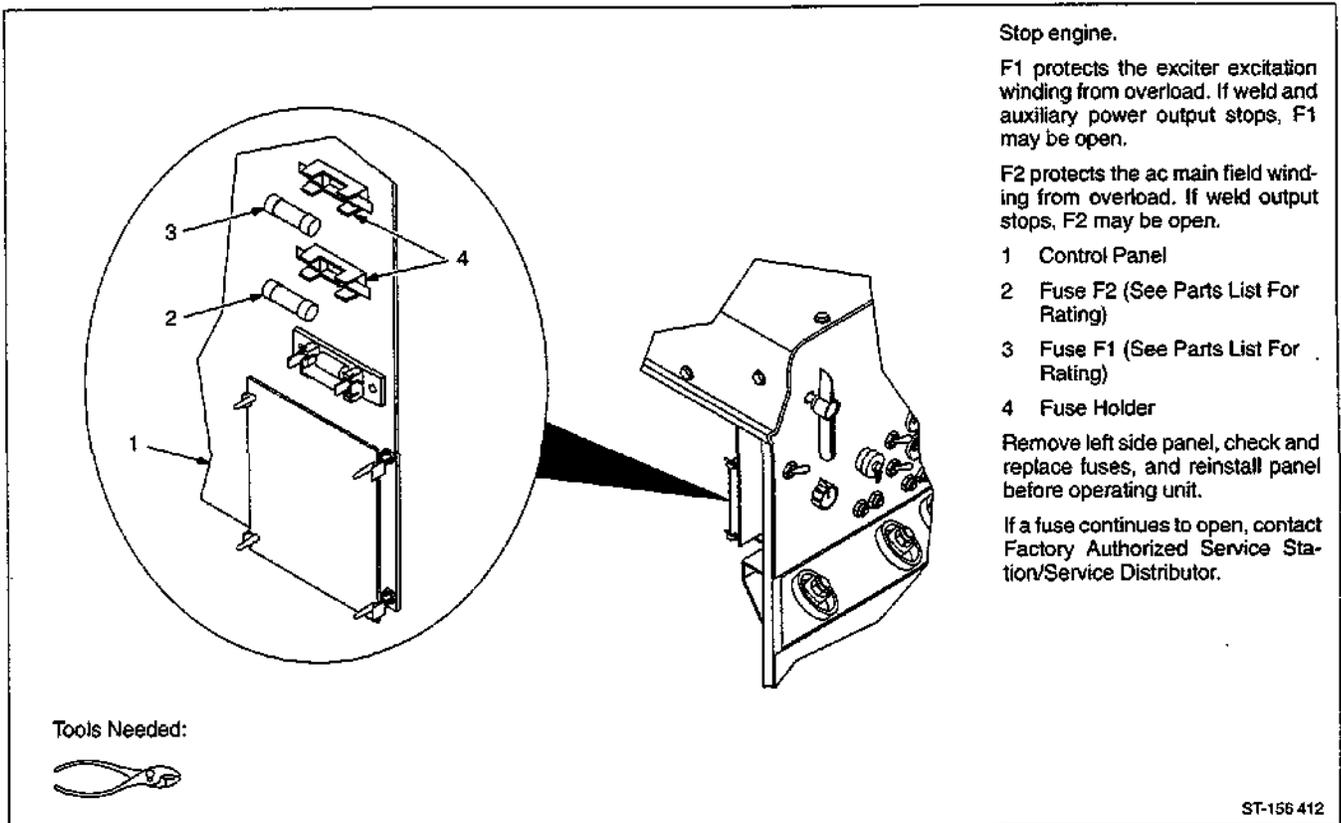


Figure 6-9. Fuse F1 And F2 Replacement

6-8. Optional Spark Arrestor Inspection And Cleaning

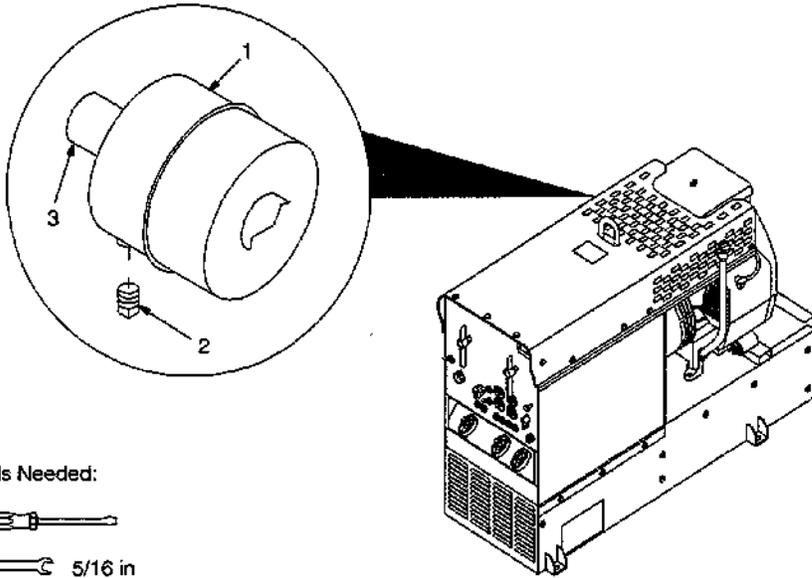
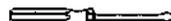
| | | |
|--|---|--|
| ⚠ WARNING |  | READ SAFETY BLOCKS at start of Section 6 before proceeding. |
|  <p>Tools Needed:</p>   5/16 in | <p>Stop engine and allow to cool.</p> <ol style="list-style-type: none"> 1 Spark Arrestor 2 Cleanout Plug <p>Remove plug and remove any dirt covering cleanout hole.</p> <ol style="list-style-type: none"> 3 Exhaust Pipe <p>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.</p> <p>Stop engine and allow to cool.</p> <p>Reinstall cleanout plug.</p> | |
| <small>ST-155 997 / Ref. ST-123 740-8</small> | | |

Figure 6-10. Spark Arrestor Inspection And Cleaning

6-9. Troubleshooting

| ⚠ WARNING | | | |
|---|--|---|--|
|  | ELECTRIC SHOCK can kill. <ul style="list-style-type: none"> Do not touch live electrical parts. Always wear dry insulating gloves. Insulate yourself from work and ground. Stop engine before installing or servicing. Keep all panels and covers securely in place. |  | ENGINE FUEL can cause fire or explosion. <ul style="list-style-type: none"> Stop engine before fueling. Do not fuel while smoking or near sparks or flames. Do not overfill tank; clean up any spilled fuel. |
|  | ENGINE EXHAUST GASES can kill. <ul style="list-style-type: none"> Do not breathe exhaust fumes. Use in open, well-ventilated areas, or vent exhaust outside and away from any building air intakes. |  | MOVING PARTS can cause injury. <ul style="list-style-type: none"> Keep away from moving parts such as fans, belts, and rotors. Keep all doors, panels, covers, and guards closed and securely in place. |
|  | HOT PARTS can cause severe burns. <ul style="list-style-type: none"> Allow cooling period before servicing. Wear protective gloves and clothing when working on a hot engine. | Troubleshooting to be performed only by qualified persons. | |
| <small>rwam11.1 11/91</small> | | | |

Table 6-1. Welding Trouble

| Trouble | Remedy | Section |
|-----------------|--|--------------------------------------|
| No weld output. | Place Output (Contactor) switch in On position, or move switch to Remote 14 position and connect remote contactor to Remote 14 receptacle. Check and replace fuse F2 if necessary. Have Factory Authorized Service Station/Service Distributor check brushes and slip rings. | 3-8, Figure 4-8 6-7 -- |

| Trouble | Remedy | Section |
|---|---|--------------------|
| Low weld output. | Place Remote Amperage/Voltage switch in Panel position, or move switch to Remote 14 position and connect remote amperage/voltage control to Remote 14 receptacle. | 3-8, Figure 4-9 |
| | Check and clean air cleaner as necessary. | 6-2 |
| | Check and adjust engine speed. | 6-4 |
| | Clean and adjust plugs and carburetor according to engine manual. | -- |
| High weld voltage with Range switch in 25-80 AC DC/CC or 35-115 AC DC/CC position while welding SMAW. | Check and secure lead connections to Range switch. | Figure 4-5 |
| | Check for obstructed movement of solenoid linkage. | 6-4 |
| | Have Factory Authorized Service Station/Service Distributor check field current regulator board PC2. | -- |
| No weld output and no power output. | Check and replace fuse F1 if necessary. | 6-7B |
| Erratic weld and power output. | Have Factory Authorized Service Station/Service Distributor check brushes and slip rings. | -- |
| Weld output cannot be adjusted. | Check position of Remote Amperage/Voltage switch. | Figure 4-9 |
| Erratic welding arc. | Clean and tighten connections both inside and outside unit. | -- |
| | Check and secure lead connections to Range switch. | Figure 4-5 |
| | Be sure connection to work piece is clean and tight. | Figure 4-3 |
| | Use dry, properly stored electrodes. | -- |
| Remote contactor control does not activate contactor. | Place Remote Output (Contactor) switch in Remote 14 position. | Figure 4-8 |
| | Check and tighten connections to Remote 14 receptacle. | 3-8 |
| No power output at Remote 14 receptacle. | Reset circuit breaker CB1 and/or CB2. | 6-7A |
| Lack of high frequency; difficulty in establishing Gas Tungsten Arc Welding arc. | Use proper size tungsten for welding amperage. | 9-1 |
| | Leakage of high frequency from torch or work cable. | -- |
| | Check cables and torch for cracked or deteriorated insulation or bad connections. Repair or replace necessary parts. | -- |
| Wandering arc - poor control of arc direction. | Reduce gas flow rate. | -- |
| | Select proper size tungsten. | 9-1 |
| | Properly prepare tungsten. | 9-2 |
| Tungsten electrode oxidizing and not remaining bright after conclusion of weld. | Shield weld zone from drafts. | -- |
| | Increase postflow time. | -- |
| | Check and tighten all gas fittings. | -- |
| | Properly prepare tungsten. | 9-2 |

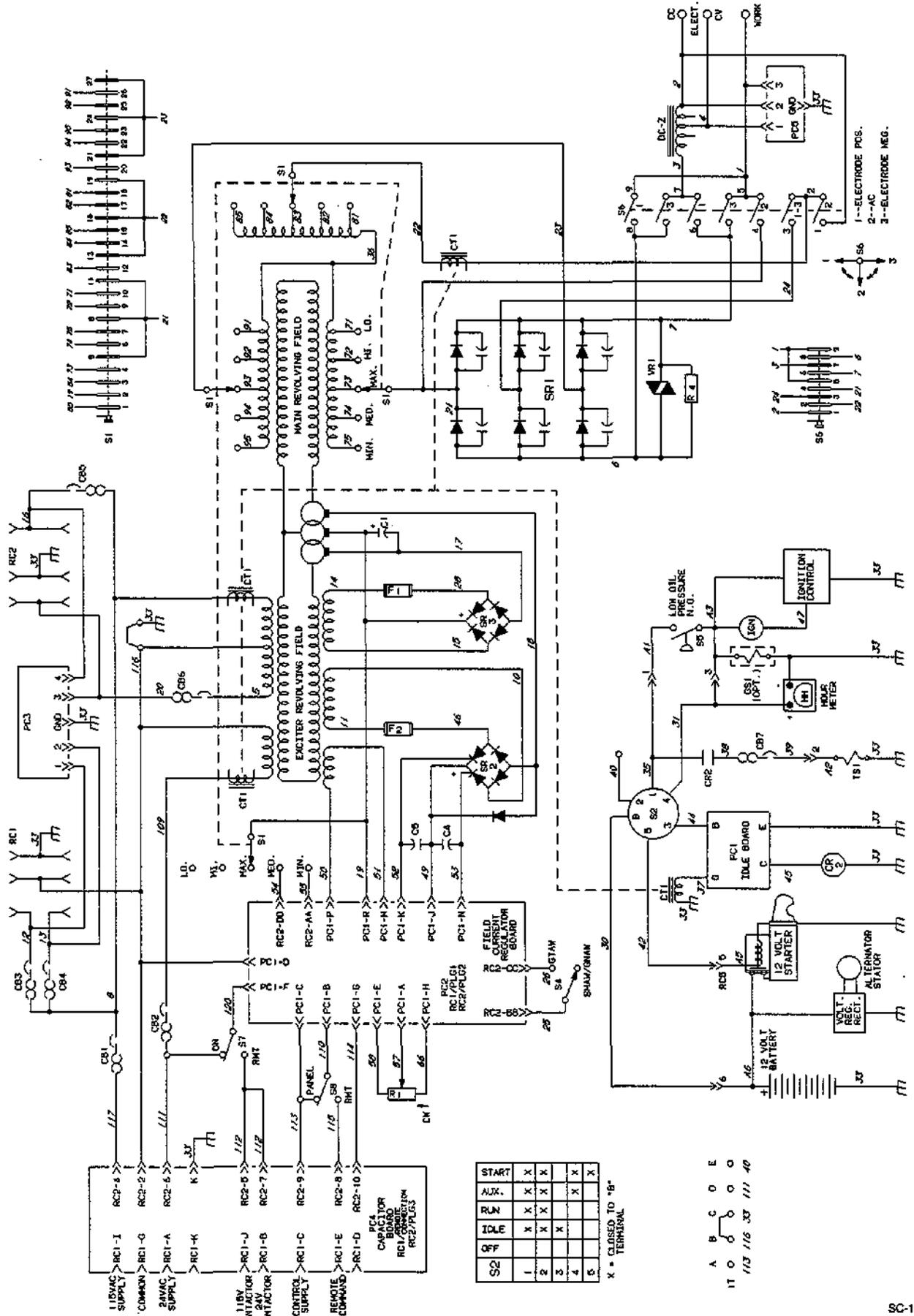
Table 6-2. Auxiliary Power Trouble

| Trouble | Remedy | Section |
|--------------------------------------|---|---------|
| No power output at receptacles. | Reset circuit breakers CB3, CB4, CB5 and/or CB6. | 5 |
| Erratic power output at receptacles. | Have Factory Authorized Service Station/Service Distributor check brushes and slip rings. | -- |
| Low power output at receptacles. | Check and clean air cleaner as necessary. | 6-2 |
| | Check and adjust engine speed. | 6-4 |
| | Clean and adjust plugs and carburetor according to engine manual. | -- |

Table 6-3. Engine Trouble

| Trouble | Remedy | Section |
|--|---|--------------------|
| Engine does not start. | Check fuel level. | 3-4 |
| | Check battery and replace if necessary. | 6-5 |
| | Check engine charging system according to engine manual. | -- |
| Engine starts but stops as soon as Engine Control switch returns to Run position. | Check oil level. Have Factory Authorized Service Station/Service Distributor check low oil pressure shutdown switch S5. | 3-4 |
| | Check and refill crankcase with proper viscosity oil for operating temperature, if necessary. | 3-4, Figure 6-2 |
| Battery discharges between uses. | Clean top of battery with baking soda and water solution; rinse with clear water. | -- |
| | Periodically recharge battery (approximately every 3 months). | 6-5 |
| | Replace battery. | 6-5 |
| | Check voltage regulator according to engine manual. | -- |
| Engine does not return to idle speed. | Be sure Engine Control switch is in Run/Idle position. | Figure 4-7 |
| | Turn off remote device connected to Remote 14 receptacle. | 3-8 |
| | Check for obstructed movement of solenoid linkage. | 6-4 |
| | Have Factory Authorized Service Station/Service Distributor check idle module PC1. | -- |
| Engine does not remain at weld/power speed when power or weld load is applied with Engine Control switch in Run/Idle position. | Place Engine Control switch in the Run position for small loads. | Figure 4-7 |

SECTION 7 - ELECTRICAL DIAGRAMS



| | START | AUX. | REL. | IDLE | OFF | S2 |
|---|-------|------|------|------|-----|----|
| 1 | X | X | X | X | X | X |
| 2 | X | X | X | X | X | X |
| 3 | X | X | X | X | X | X |
| 4 | X | X | X | X | X | X |
| 5 | X | X | X | X | X | X |

X = CLOSED TO "B" TERMINAL

Figure 7-1. Circuit Diagram For Welding Generator

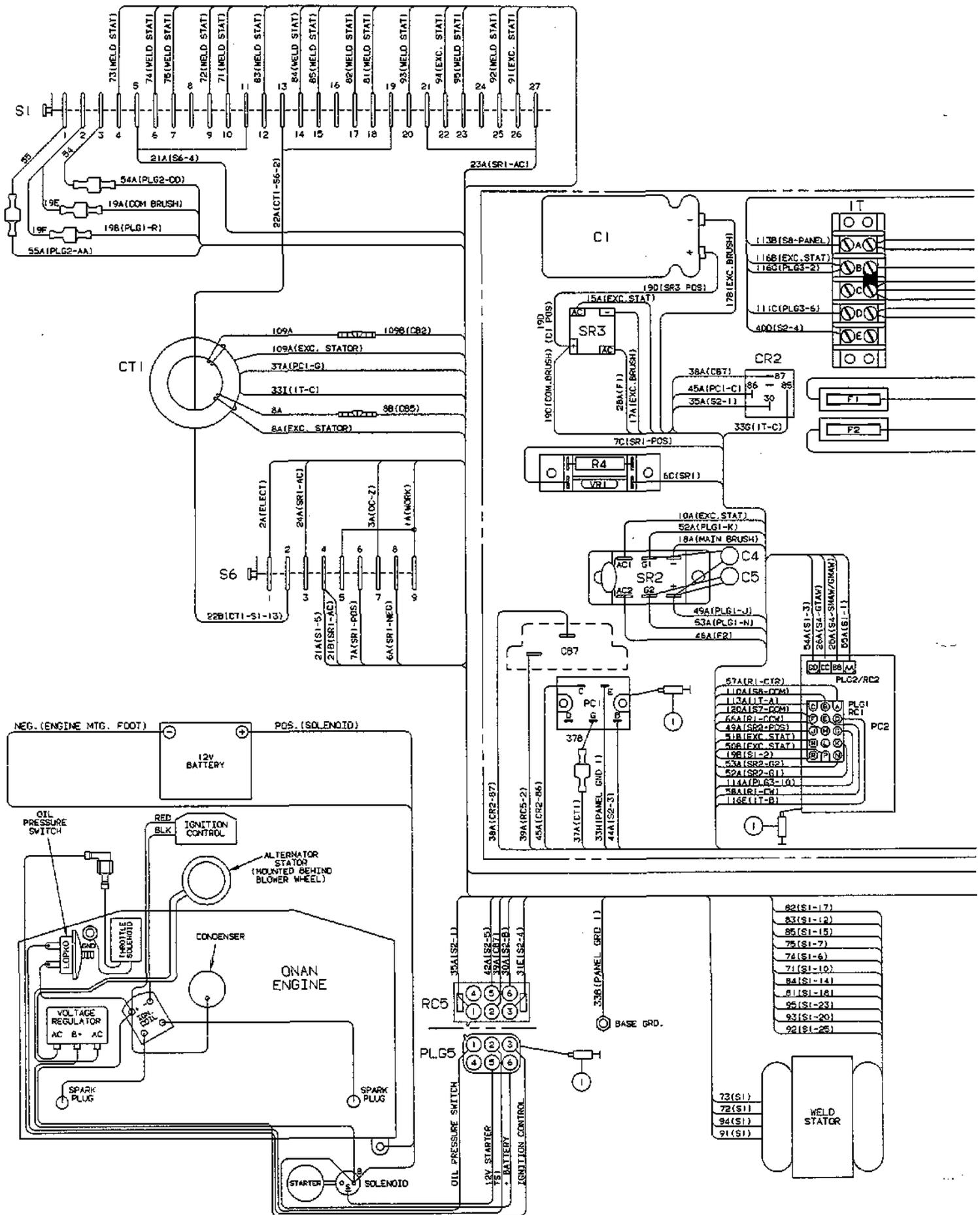
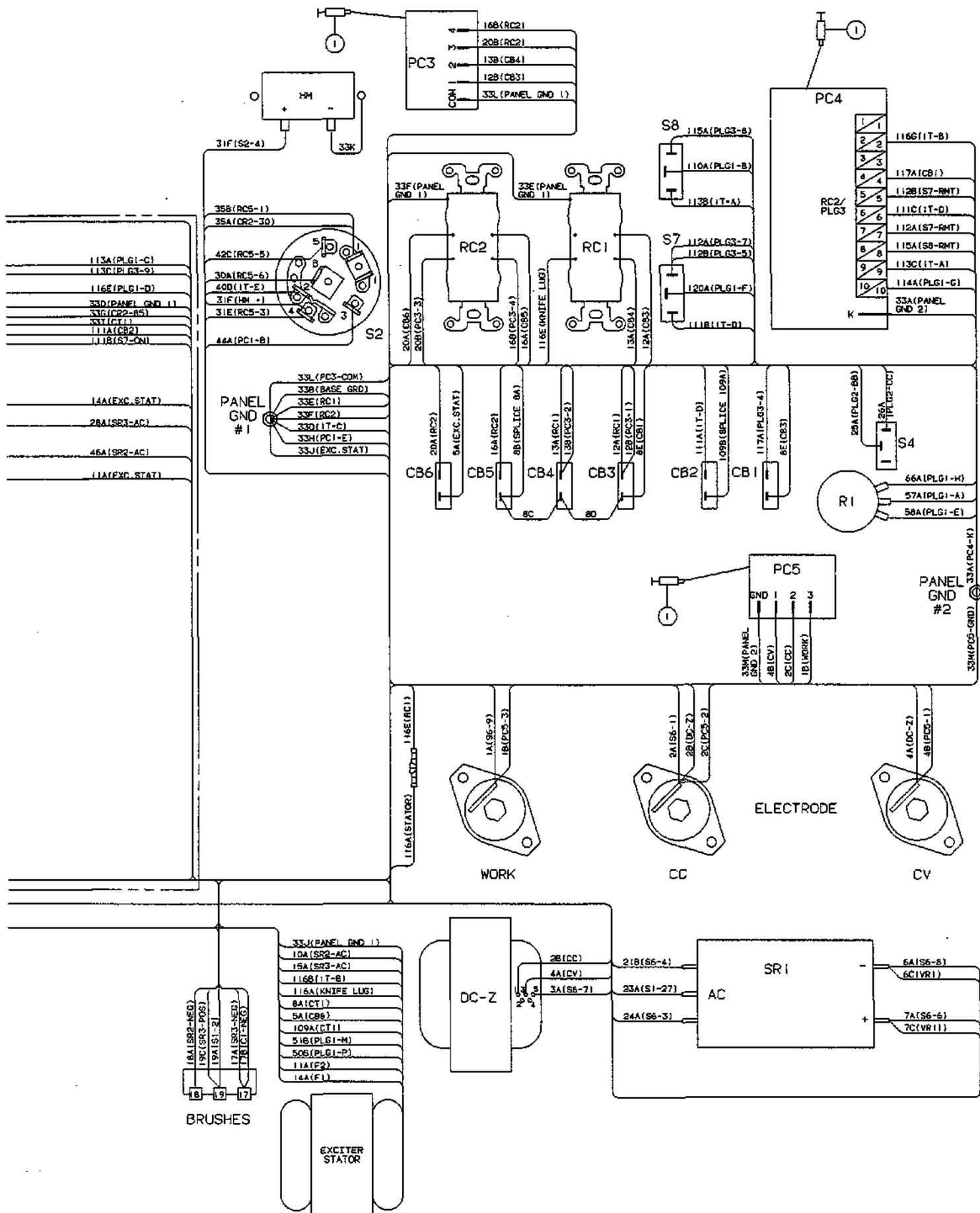


Figure 7-2. Wiring Diagram For Welding Generator



 Coat terminals with dielectric grade, nonconductive, electric grease (MILLER Part No. 146 557) or equivalent.

SD-165 831-A

SECTION 8 – AUXILIARY POWER GUIDELINES

mod 3.1 9/92

WARNING



ELECTRIC SHOCK can kill.

- Install and ground generator according to all applicable codes, such as OSHA and National Electrical Code.
- Disconnect both welding cables when using auxiliary power.
- Use all code-required methods for shock and overcurrent protection.
- Have only qualified persons make electrical connections.

8-1. How Much Power Does Equipment Require?

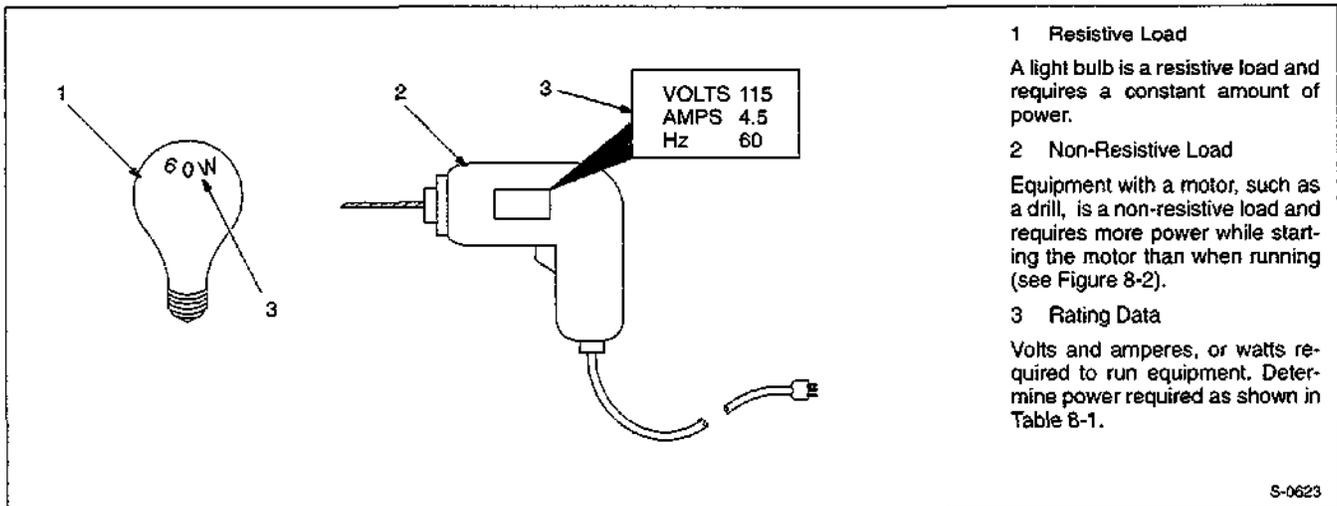


Figure 8-1. Power Required By Different Types Of Equipment (Loads)

$$\text{VOLTS} \times \text{AMPERES} = \text{WATTS}$$

This equation provides an actual power requirement for resistive loads, or an approximate running requirement for non-resistive loads.

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

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

Therefore, the individual load applied by the drill is 520 watts.

EXAMPLE 2: If a flood lamp is rated at 200 watts, the individual load applied by the lamp is 200 watts. If three 200 watt flood lamps are used with the drill from Example 1, add the individual loads to calculate total load.

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

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

Figure 8-2. Calculating Power Required To Run Equipment

Table 8-1. Approximate Power Requirements For Typical Equipment*

| Industrial Motors | | | | Farm Equipment | | | | |
|-------------------------------|-------------------------------|---------------|-------|----------------------------------|---|---------------|-------|------|
| Rating | Starting Watts | Running Watts | | Rating | Starting Watts | Running Watts | | |
| Split Phase | 1/8 HP | 800 | 300 | Stock Tank De-Icer | | 1000 | 1000 | |
| | 1/6 HP | 1225 | 500 | Grain Cleaner | 1/4 HP | 1650 | 650 | |
| | 1/4 HP | 1600 | 600 | Portable Conveyor | 1/2 HP | 3400 | 1000 | |
| | 1/3 HP | 2100 | 700 | Grain Elevator | 3/4 HP | 4400 | 1400 | |
| | 1/2 HP | 3175 | 875 | Milk Cooler | | 2900 | 1100 | |
| | Capacitor Start-Induction Run | 1/3 HP | 2020 | 720 | Milker (Vacuum Pump) | 2 HP | 10500 | 2800 |
| | | 1/2 HP | 3075 | 975 | FARM DUTY MOTORS | 1/3 HP | 1720 | 720 |
| | | 3/4 HP | 4500 | 1400 | Std. (e.g. Conveyors, Feed Augers, Air Compressors) | 1/2 HP | 2575 | 975 |
| | | 1 HP | 6100 | 1600 | | 3/4 HP | 4500 | 1400 |
| | | 1-1/2 HP | 8200 | 2200 | | 1 HP | 6100 | 1600 |
| 2 HP | | 10550 | 2850 | | 1-1/2 HP | 8200 | 2200 | |
| 3 HP | | 15900 | 3900 | | 2 HP | 10550 | 2850 | |
| 5 HP | | 23300 | 6800 | | 3 HP | 15900 | 3900 | |
| Capacitor Start-Capacitor Run | | 1-1/2 HP | 8100 | 2000 | High Torque (e.g. Barn Cleaners, Silo Unloaders, Silo Hoists, Bunk Feeders) | 5 HP | 23300 | 6000 |
| | | 5 HP | 23300 | 6000 | | 7-1/2 HP | 35000 | 8000 |
| | 7-1/2 HP | 35000 | 8000 | | 10 HP | 46700 | 10700 | |
| | 10 HP | 46700 | 10700 | | | | | |
| Fan Duty | 1/8 HP | 1000 | 400 | 3-1/2 Cu. Ft. Mixer | 1/2 HP | 3300 | 1000 | |
| | 1/6 HP | 1400 | 550 | High Pressure 1.8 Gal/Min Washer | 500 PSI | 3150 | 950 | |
| | 1/4 HP | 1850 | 650 | 2 Gal/Min | 550 PSI | 4500 | 1400 | |
| | 1/3 HP | 2400 | 800 | | 700 PSI | 6100 | 1600 | |
| | 1/2 HP | 3500 | 1100 | | | | | |

| Contractor | | | | Residential | | | |
|----------------------|----------------|---------------|------|--------------------------|----------------------|---------------|-----------|
| Rating | Starting Watts | Running Watts | | Rating | Starting Watts | Running Watts | |
| Hand Drill | 1/4" | 350 | 350 | Coffee Maker | | 1750 | 1750 Typ. |
| | 3/8" | 400 | 400 | Elec. Range | 6" Element | 1500 | 1500 |
| | 1/2" | 600 | 600 | | 8" Element | 2100 | 2100 |
| Circular Saw | 6-1/2" | 500 | 500 | Oven | | 6000 | 6000 |
| | 7-1/4" | 900 | 900 | Microwave | 625W | 2800 | 2000 |
| | 8-1/4" | 1400 | 1400 | Television (Solid-State) | B & W | 100 | 100 |
| Table Saw | 9" | 4500 | 1500 | | Color | 300 | 300 |
| | 10" | 6300 | 1800 | Radio | | 50-200 | 50-200 |
| | 14" | 2500 | 1100 | Refrig. Or Freezer | | 3100 | 800 |
| Band Saw | 6" | 1720 | 720 | Shallow Well Pump | 1/3 HP | 2150 | 750 |
| | 8" | 3900 | 1400 | | 1/2 HP | 3100 | 1000 |
| | 10" | 5200 | 1600 | Sump Pump | 1/3 HP | 2100 | 800 |
| Air Compressor | 1/2 HP | 3000 | 1000 | | 1/2 HP | 3200 | 1050 |
| | 1 HP | 6000 | 1500 | Dishwasher | (Cool Dry) | 2100 | 700 |
| | 1-1/2 HP | 8200 | 2200 | | (Hot Dry) | 2850 | 1450 |
| | 2 HP | 10500 | 2800 | Clothes Dryer | Gas | 2500 | 700 |
| Electric Chain Saw | 1-1/2 HP, 12" | 1100 | 1100 | | Electric | 7550 | 5750 |
| | 2 HP, 14" | 1100 | 1100 | Automatic Washer | | 3450 | 1150 |
| Electric Trimmer | Standard 9" | 350 | 350 | Gas Or Fuel Oil | 1/8 HP | 800 | 300 |
| | Heavy Duty 12" | 500 | 500 | Furnace Blower | 1/6 HP | 1250 | 500 |
| Electric Cultivator | 1/3 HP | 2100 | 700 | | 1/4 HP | 1600 | 600 |
| Elec. Hedge Trimmer | 16" | 400 | 400 | | 1/3 HP | 2100 | 700 |
| Flood Lights | HID | 125 | 100 | | 1/2 HP | 3225 | 975 |
| | Metal Halide | 313 | 250 | Central Air Conditioner | 10,000 BTU | 3700 | 1500 |
| | Mercury | 1000 | | | 20,000 BTU | 5800 | 2500 |
| | Sodium | 1400 | | | 24,000 BTU | 8750 | 3800 |
| | Vapor | 1250 | 1000 | | 32,000 BTU | 11500 | 5000 |
| Submersible Pump | 400 GPH | 600 | 200 | | 40,000 BTU | 13800 | 6000 |
| Centrifugal Pump | 900 GPH | 900 | 500 | Garage Door Opener | 1/4 HP | 1650 | 550 |
| Floor Polisher | 3/4 HP, 16" | 4500 | 1400 | | 1/3 HP | 2125 | 725 |
| | 1 HP, 20" | 6100 | 1600 | Electric Blanket | Portable | 400 | 400 |
| High Pressure Washer | 1/2 HP | 3150 | 950 | Dehumidifier | | 1450 | 650 |
| | 3/4 HP | 4500 | 1400 | Vacuum Cleaner | Standard | 800 | 800 |
| | 1 HP | 6100 | 1600 | | Deluxe | 1100 | 1100 |
| 55 Gal. Drum Mixer | 1/4 HP | 1900 | 700 | Lights | As Indicated On Bulb | | |
| Wet & Dry Vac | 1.7 HP | 900 | 900 | Toaster | 2 Slice | 1050 | 1050 |
| | 2-1/2 HP | 1300 | 1300 | | 4 Slice | 1650 | 1650 |
| | | | | Hair Dryer | | 300-1200 | 300-1200 |
| | | | | Iron | | 1200 | 1200 |

*Motors require up to two or three times their starting wattage when starting under load.

Table 8-2. Single-Phase Induction Motor Starting Requirements

| Motor Start Code | G | H | J | K | L | M | N | P |
|------------------|-----|-----|-----|-----|------|------|------|------|
| KVA/HP | 6.3 | 7.1 | 8.0 | 9.0 | 10.0 | 11.2 | 12.5 | 14.0 |

1 Motor Rating Label
 2 Motor Start Code
 3 Running Amperage Requirement

Determine power required to start motor using Table 8-2. Determine starting amperage required as shown in Figure 8-4.

If code is not present, multiply running requirement by six. Generator amperage output must be at least twice the motor's running amperage requirement.

S-0624

Figure 8-3. Power Required To Start Motor

$$\frac{\text{kVA/HP} \times \text{HP} \times 1000}{\text{VOLTS}} = \text{STARTING AMPERAGE}$$

EXAMPLE 3: 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 8-2, Code M results in kVA/HP = 11.2

$$\frac{11.2 \times 1/4 \times 1000}{230} = 12.2 \text{ A}$$

Therefore, starting the motor requires 12.2 amperes.

Figure 8-4. Calculating Amperage Required To Start A Motor

8-2. 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. SB-140 092-A / S-0625

Figure 8-5. Limits Of Generator

8-3. Typical Connections To Supply Standby Power

| | | |
|--|---|--|
|  WARNING |  | READ SAFETY BLOCKS at start of Section 8 before proceeding. |
|--|---|--|

Customer-supplied equipment is required if generator is to supply standby power during emergencies or power outages. Locate the power company service meter (Figure 8-6, Item 1), and main and branch overcurrent protection (2), and install equipment as shown in Figure 8-6.

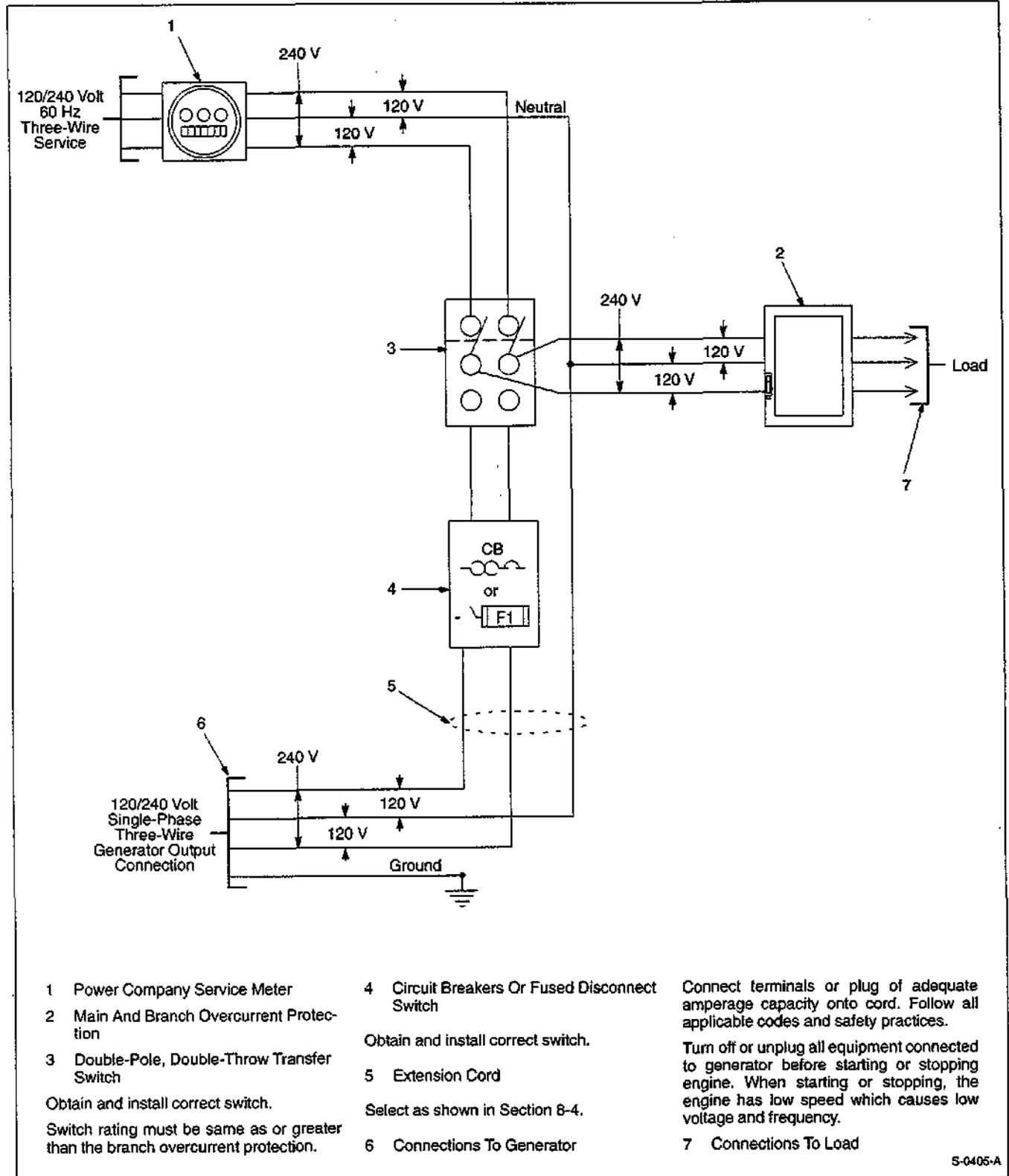


Figure 8-6. Standby Power Equipment And Connections

8-4. Selecting Extension Cord

Use Table 8-3 and Table 8-4 to select extension cords. Use shortest cords possible because long cords may reduce output or cause unit overload.

Table 8-3. Cord Lengths For 120 Volt Loads

| Current In Amperes | Load In Watts | Maximum Allowable Cord Length In Feet (Meters) 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

Table 8-4. Cord Lengths For 240 Volt Loads

| Current In Amperes | Load In Watts | Maximum Allowable Cord Length In Feet (Meters) For Conductor Size (AWG)* | | | | | |
|--------------------|---------------|---|-----------|-----------|-----------|----------|----------|
| | | 4 | 6 | 8 | 10 | 12 | 14 |
| 5 | 1200 | | | 700 (213) | 450 (137) | 225 (68) | 200 (61) |
| 7 | 1680 | | 800 (244) | 500 (152) | 300 (91) | 200 (61) | 125 (38) |
| 10 | 2400 | 800 (244) | 550 (168) | 350 (107) | 225 (69) | 125 (38) | 100 (31) |
| 15 | 3600 | 600 (183) | 350 (107) | 225 (69) | 150 (46) | 75 (23) | 60 (18) |
| 20 | 4800 | 450 (137) | 275 (84) | 175 (53) | 100 (31) | 60 (18) | |
| 25 | 6000 | 350 (107) | 225 (69) | 125 (38) | 75 (23) | | |
| 30 | 7000 | 300 (91) | 175 (53) | 100 (31) | 75 (23) | | |
| 35 | 8400 | 250 (76) | 150 (46) | 100 (31) | | | |
| 40 | 9600 | 225 (69) | 125 (38) | 75 (23) | | | |
| 45 | 10,800 | 200 (61) | 125 (38) | | | | |
| 50 | 12,000 | 175 (53) | 100 (31) | | | | |

*Conductor size is based on maximum 2% voltage drop

SECTION 9 – TUNGSTEN ELECTRODE

mod2.1 1/94

NOTE

For additional information, see your distributor for a handbook on the Gas Tungsten Arc Welding (GTAW) process.

Wear clean gloves to prevent contamination of tungsten electrode.

9-1. Selecting Tungsten Electrode

Table 9-1. Tungsten Size

| Electrode Diameter | Amperage Range - Gas Type ♦ - Polarity | | | |
|--|---|--|-----------------------------------|---|
| | DC – Argon – Electrode Negative/Straight Polarity | DC – Argon – Electrode Positive/Reverse Polarity | AC – Argon – Using High Frequency | AC – Argon – Balanced Wave Using High Freq. |
| Pure Tungsten (Green Band) | | | | |
| .010" | Up to 15 | * | Up to 15 | Up to 10 |
| .020" | 5-20 | * | 5-20 | 10-20 |
| .040" | 15-80 | * | 10-60 | 20-30 |
| 1/16" | 70-150 | 10-20 | 50-100 | 30-80 |
| 3/32" | 125-225 | 15-30 | 100-160 | 60-130 |
| 1/8" | 225-360 | 25-40 | 150-210 | 100-180 |
| 5/32" | 360-450 | 40-55 | 200-275 | 160-240 |
| 3/16" | 450-720 | 55-80 | 250-350 | 190-300 |
| 1/4" | 720-950 | 80-125 | 325-450 | 250-400 |
| 2% Thorium Alloyed Tungsten (Red Band) | | | | |
| .010" | Up to 25 | * | Up to 20 | Up to 15 |
| .020" | 15-40 | * | 15-35 | 5-20 |
| .040" | 25-85 | * | 20-80 | 20-60 |
| 1/16" | 50-160 | 10-20 | 50-150 | 60-120 |
| 3/32" | 135-235 | 15-30 | 130-250 | 100-180 |
| 1/8" | 250-400 | 25-40 | 225-360 | 160-250 |
| 5/32" | 400-500 | 40-55 | 300-450 | 200-320 |
| 3/16" | 500-750 | 55-80 | 400-500 | 290-390 |
| 1/4" | 750-1000 | 80-125 | 600-800 | 340-525 |
| Zirconium Alloyed Tungsten (Brown Band) | | | | |
| .010" | * | * | Up to 20 | Up to 15 |
| .020" | * | * | 15-35 | 5-20 |
| .040" | * | * | 20-80 | 20-60 |
| 1/16" | * | * | 50-150 | 60-120 |
| 3/32" | * | * | 130-250 | 100-180 |
| 1/8" | * | * | 225-360 | 160-250 |
| 5/32" | * | * | 300-450 | 200-320 |
| 3/16" | * | * | 400-550 | 290-390 |
| 1/4" | * | * | 600-800 | 340-525 |

♦ Typical argon shielding gas flow rates are 15 to 35 cfh (cubic feet per hour).

*Not Recommended.

The figures listed are intended as a guide and are a composite of recommendations from American Welding Society (AWS) and electrode manufacturers.

S-0009

9-2. Preparing Tungsten

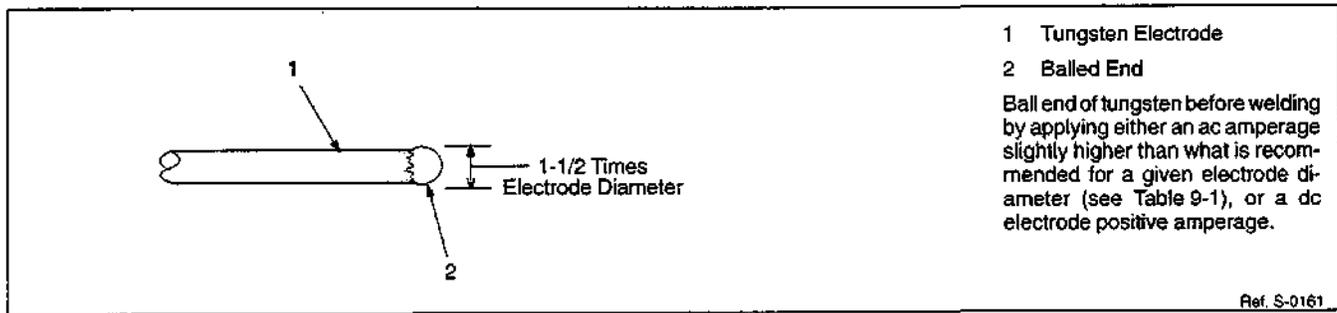


Figure 9-1. Preparing Tungsten For AC Or DC Electrode Positive (DCEP) Welding

CAUTION

FLYING SPARKS AND HOT METAL can cause injury and start fires.

- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand, and body protection.
- Keep flammables away.

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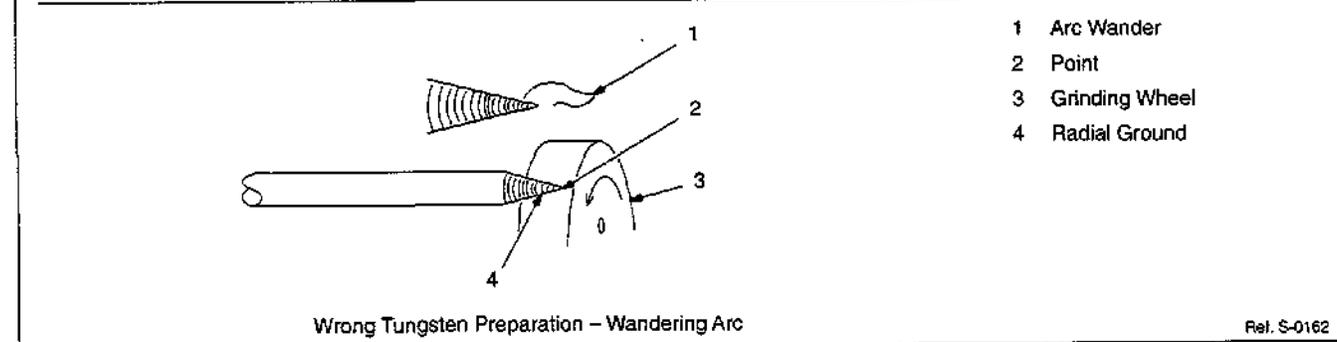
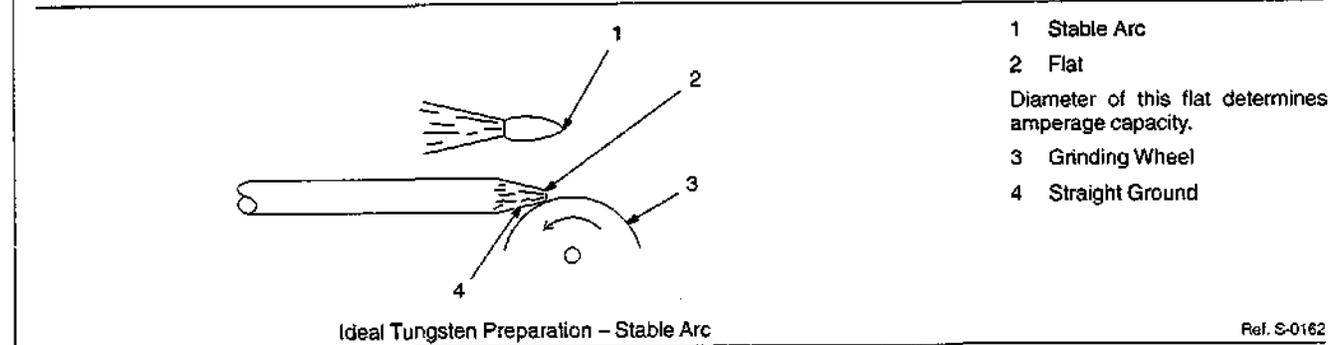
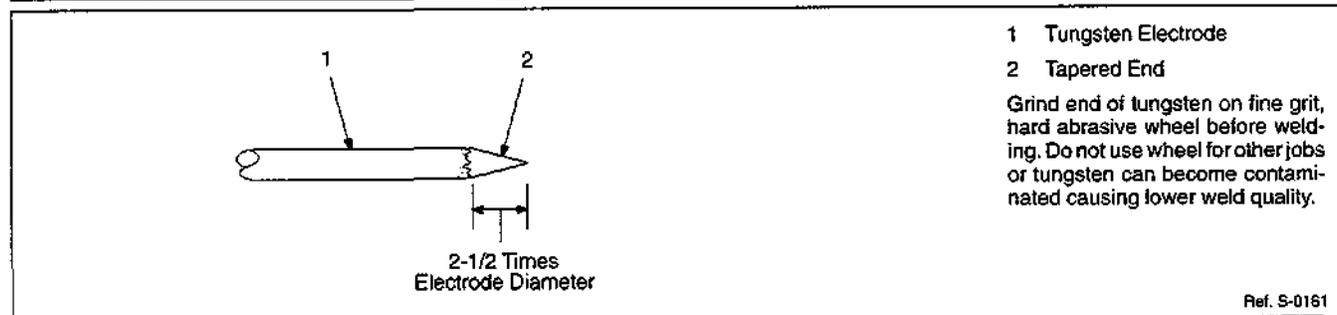


Figure 9-2. Preparing Tungsten For DC Electrode Negative (DCEN) Welding

NOTES

SECTION 10 – PARTS LIST

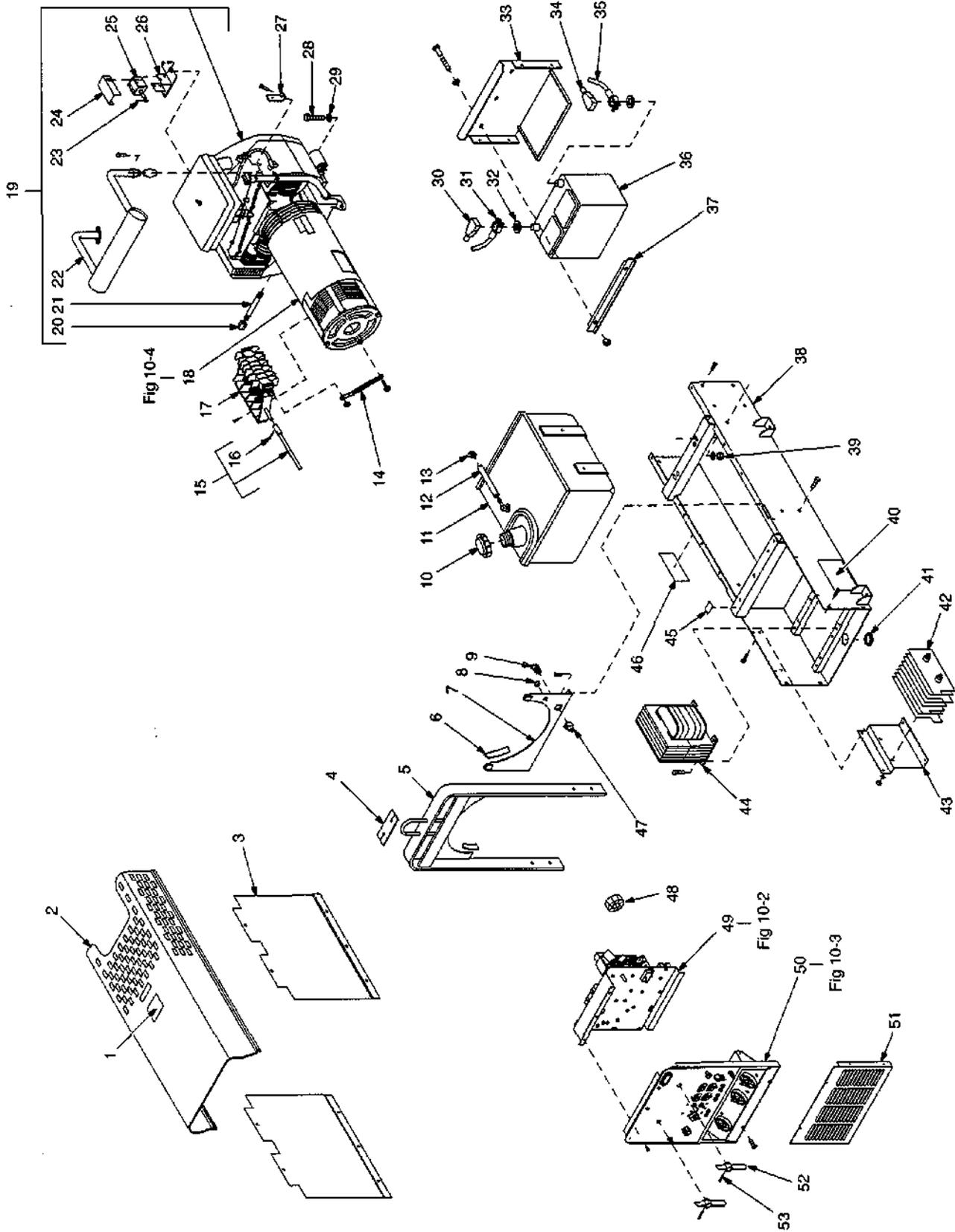


Figure 10-1. Main Assembly

SD-123 695-F

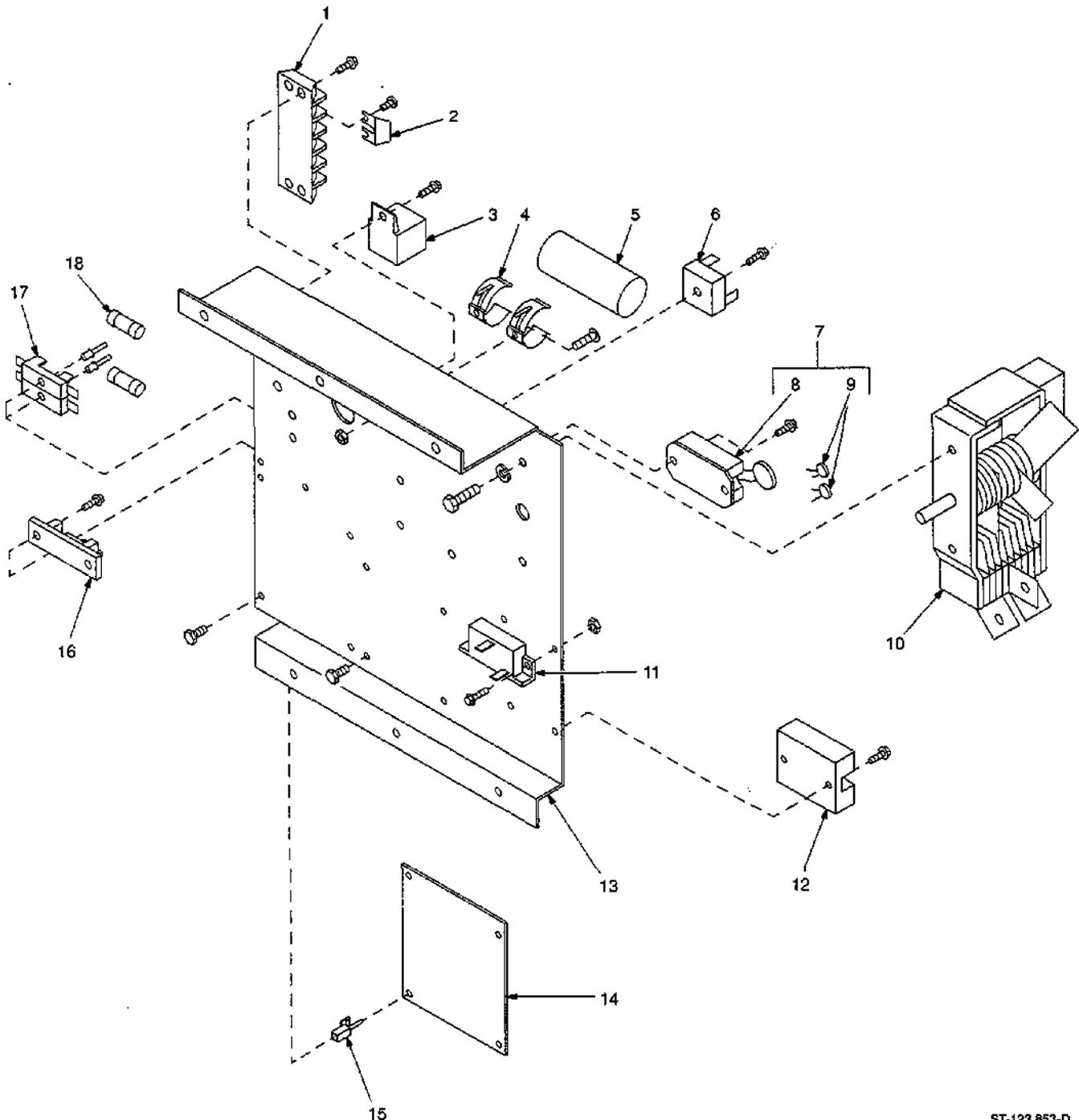
| Item No. | Dia. Mkgs. | Part No. | Description | Quantity |
|-----------------------------------|------------|----------|--|----------|
| Figure 10-1. Main Assembly | | | | |
| 1 | | 108 487 | LABEL, warning falling equipment etc | 1 |
| 2 | | +114 557 | COVER, top | 1 |
| | | 143 397 | BLANK, snap-in nyl .312mtg hole | 2 |
| 3 | | 113 303 | PANEL, side | 2 |
| 4 | | 107 342 | SEAL, lift eye | 1 |
| 5 | | 136 057 | UPRIGHT, base | 1 |
| 6 | | 095 970 | STRIP, nprn wsl eng firewall 18.000 lg | 2 |
| 7 | | 136 059 | PANEL, rear lower | 2 |
| 8 | | 088 731 | BUSHING, snap-in nyl .375 ID x .500mtg hole | 1 |
| 9 | | | CONNECTOR, included w/engine - see engine parts list | |
| 10 | | 147 601 | CAP, tank screw-on | 1 |
| 11 | | 130 123 | TANK, fuel 7.5gal | 1 |
| 12 | | 107 816 | HOSE, SAE .250 ID x .500 OD (order by ft) | 1ft |
| 13 | | 084 173 | CLAMP, hose .460-.545dia | 2 |
| 14 | | 070 217 | STRIP, mtg switch | 1 |
| 15 | | 124 630 | SHAFT & COUPLER, (consisting of) | 1 |
| 16 | | 010 651 | PIN, spring CS .156 x 1.000 | 1 |
| 17 | S1 | 122 465 | SWITCH, range/changeover | 1 |
| 18 | | Fig 10-4 | GENERATOR | 1 |
| 19 | | 145 306 | ENGINE, gas (consisting of) | 1 |
| 20 | | 113 251 | FITTING, pipe brs cap .375NPT | 1 |
| 21 | | 113 250 | FITTING, pipe galv nipple L .375NPT x 5.000 | 1 |
| 22 | | 107 297 | MUFFLER, exhaust engine | 1 |
| 23 | | 059 926 | PIN, spring CS .093 x 1.000 | 1 |
| 24 | | 113 560 | COVER, solenoid | 1 |
| 25 | | 151 485 | SOLENOID, 14VDC .53A | 1 |
| 26 | | 113 561 | BRACKET, mtg solenoid | 1 |
| | | 066 113 | FILTER, fuel in-line | 1 |
| | | 107 816 | HOSE, SAE .250 ID x .500 OD (order by ft) | 1ft |
| | | 084 173 | CLAMP, hose .460-.545clp dia | 2 |
| | | 137 046 | TUNE-UP & FILTER KIT, (consisting of) | 1 |
| | | 064 617 | ELEMENT, air cleaner | 1 |
| | | 065 251 | OIL FILTER | 1 |
| | | 121 652 | FILTER/CLAMPS, fuel | 1 |
| | | 065 709 | SPARK PLUG | 2 |
| 27 | | 115 511 | BRACKET, support cover | 2 |
| 28 | | 132 053 | SCREW, cap stl hexhd .375-16 x 1.500 | 2 |
| 29 | | 602 243 | WASHER, flat stl std .375 | 6 |
| 30 | | 071 971 | COVER, cable bat black | 1 |
| 31 | | 167 730 | CABLE, bat neg 29.000 lg | 1 |
| 32 | | 108 081 | TERMINAL PROTECTOR, bat | 2 |
| | | 020 279 | CLAMP, stl cush .750dia x .281mtg hole | 2 |
| 33 | | 107 270 | DOOR, access bat | 1 |
| 34 | | 071 970 | COVER, cable bat red | 1 |
| 35 | | 088 577 | CABLE, bat pos 24.750 lg | 1 |
| 36 | Batt | 071 678 | BATTERY, stor 12V 415crk 95rsv | 1 |
| 37 | | 146 697 | HOLD DOWN, bat | 1 |
| 38 | | +146 710 | BASE | 1 |
| 39 | | 010 909 | NUT, stl slfkg hex reg .375-16 | 3 |
| 40 | | 134 792 | LABEL, warning general precautionary | 2 |
| 41 | | 057 360 | BLANK, snap in-nyl 1.375mtg hole | 1 |
| 42 | SR1 | 145 396 | RECTIFIER, si 3ph 300A | 1 |
| 43 | | 126 890 | BRACKET, mtg rect | 1 |
| 44 | DC-Z | 122 353 | STABILIZER | 1 |
| 45 | | 013 367 | LABEL, warning moving parts can cause serious injury | 1 |
| 46 | | 109 994 | LABEL, warning engine fuel can cause fire | 1 |
| 47 | | 116 045 | HOUSING PLUG & PINS, (consisting of) | 1 |
| | | 113 633 | TERMINAL, male 1 pin .084dia 20-14 wire | 6 |
| 48 | CT1 | 105 370 | TRANSFORMER, current | 1 |
| 49 | | Fig 10-2 | CONTROL PANEL | 1 |

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

Figure 10-1. Main Assembly (Continued)

| | | | |
|----|----------|-----------------------------|---|
| 50 | Fig 10-3 | PANEL, front w/components | 1 |
| 51 | 114 544 | PANEL, lower front | 1 |
| 52 | 115 493 | HANDLE, switch | 2 |
| 53 | 010 647 | PIN, spring CS .156 x 1.250 | 2 |

+When ordering a component originally displaying a precautionary label, the label should also be ordered.
BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.



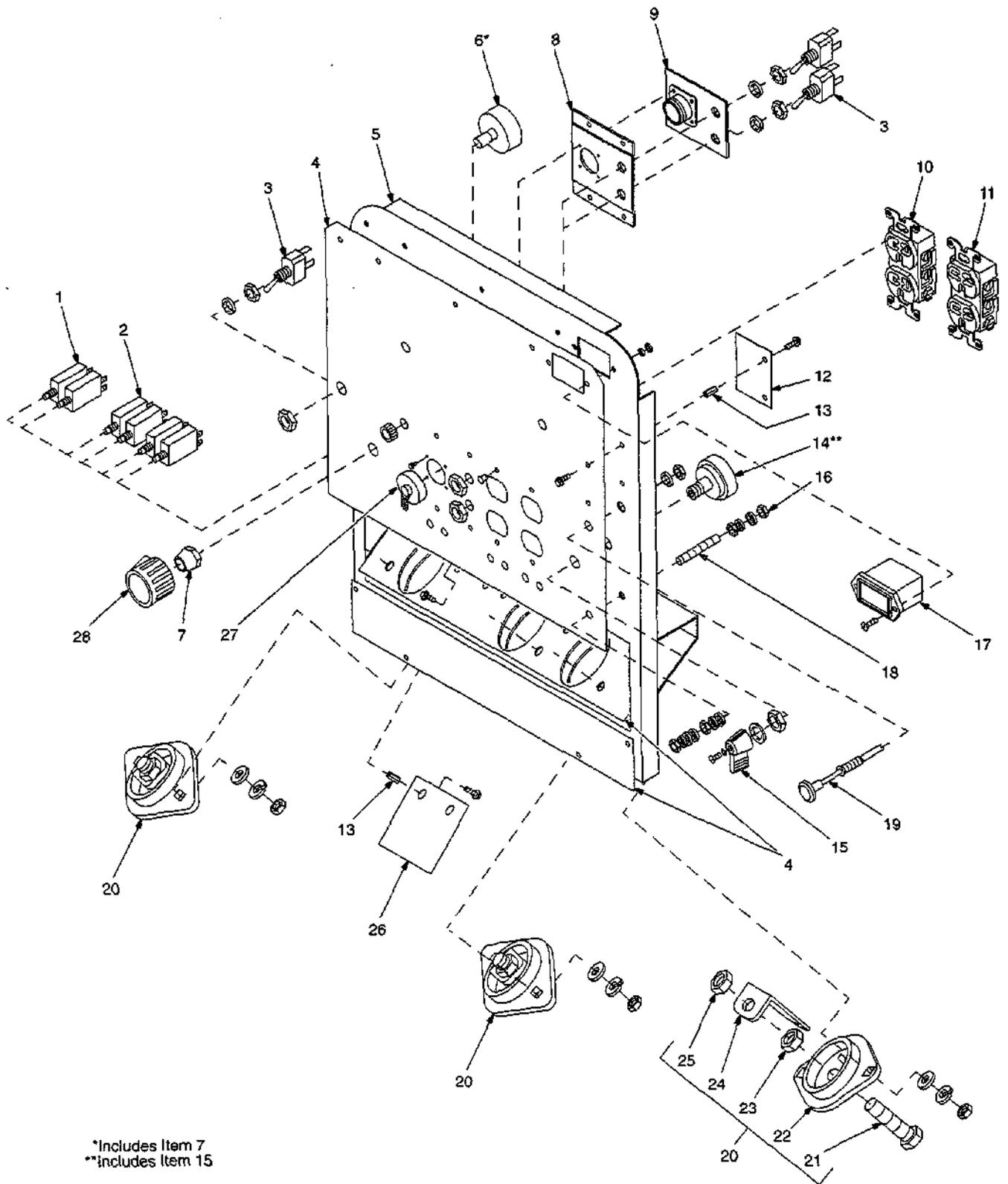
ST-123 853-D

Figure 10-2. Control Panel

| Item No. | Dia. Mkgs. | Part No. | Description | Quantity |
|--|------------|----------|---|----------|
| Figure 10-2. Control Panel (Fig 10-1 Item 49) | | | | |
| 1 | 1T | 124 887 | BLOCK, term 30A 5P | 1 |
| 2 | | 038 620 | LINK, jumper | 1 |
| 3 | CR2 | 115 693 | RELAY, encl 12VDC SPDT | 1 |
| 4 | | 087 111 | CLAMP, capacitor | 2 |
| 5 | C1 | 156 289 | CAPACITOR, elctt 240uf 250VDC | 1 |
| 6 | SR3 | 035 704 | RECTIFIER, integ 40A 800V | 1 |
| 7 | | 110 174 | DIODE/SCR/CAPACITOR, (consisting of) | 1 |
| 8 | SR2 | 097 353 | DIODE/SCR, bridge | 1 |
| 9 | C4,5 | 109 955 | CAPACITOR | 1 |
| 10 | S6 | 121 965 | SWITCH, changeover | 1 |
| 11 | CB7 | 045 061 | CIRCUIT BREAKER, auto reset 24VDC 7A | 1 |
| 12 | PC1 | 142 724 | MODULE, pull to idle 5 pin | 1 |
| 13 | | 122 649 | PANEL, control | 1 |
| 14 | PC2 | 159 150 | CIRCUIT CARD, field current | 1 |
| | PLG1 | 135 275 | HOUSING PLUG & SOCKETS, (consisting of) | 1 |
| | | 114 066 | TERMINAL, female 1skt 20-14 wire | 15 |
| | PLG2 | 136 810 | HOUSING PLUG & SOCKET, (consisting of) | 1 |
| | | 114 066 | TERMINAL, female 1skt 20-14 wire | 4 |
| 15 | | 110 375 | STAND-OFF SUPPORT, PC card No. 6scr | 4 |
| 16 | R4,VR1 | 046 819 | SUPPRESSOR | 1 |
| 17 | | 098 376 | HOLDER, fuse mintr | 1 |
| 18 | F1,2 | *012 655 | FUSE, mintr cer 10A 250V | 2 |

*Recommended Spare Parts.

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.



ST-123 696-B

Figure 10-3. Panel, Front w/Components

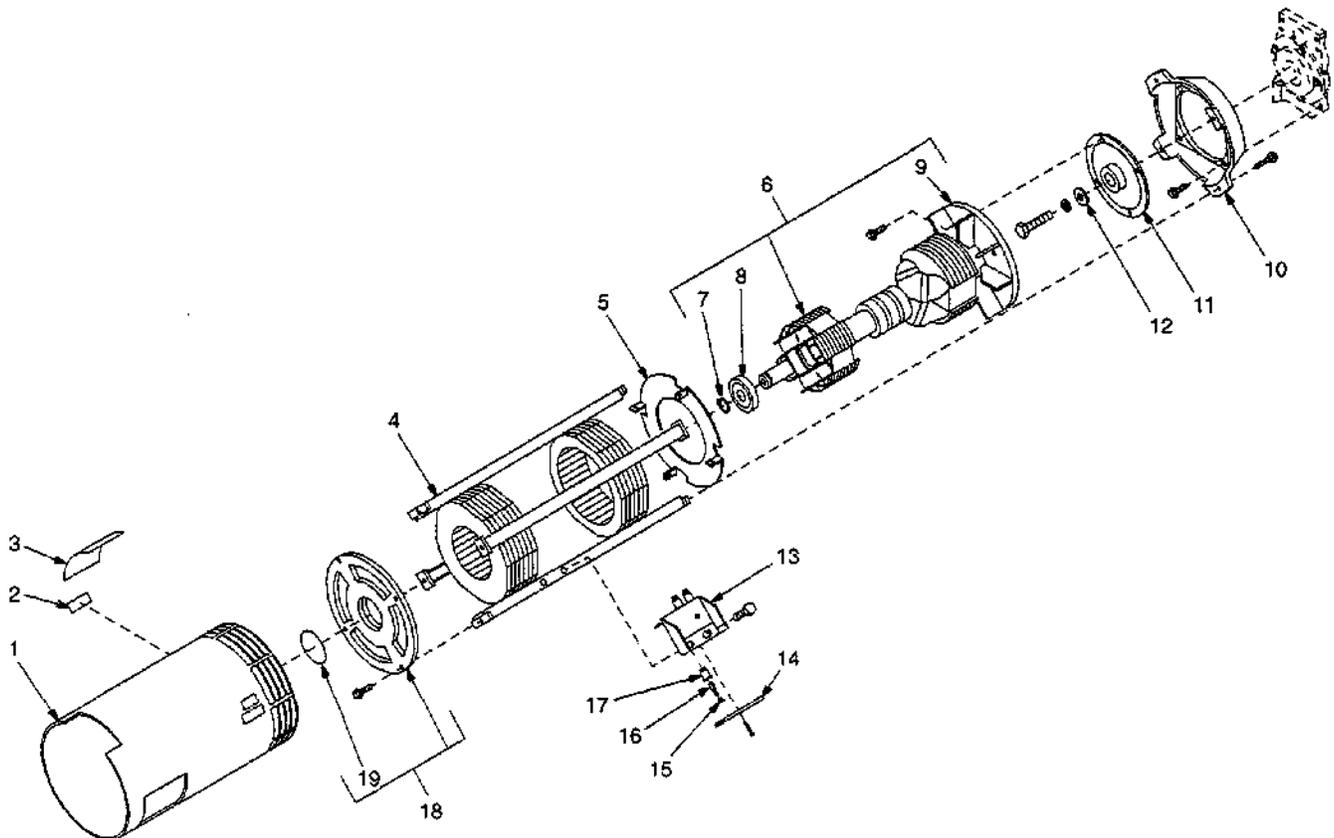
| Item No. | Dia. Mkgs. | Part No. | Description | Quantity |
|--|------------|----------|---|----------|
| Figure 10-3. Panel, Front w/Components (Fig 10-1 Item 50) | | | | |
| 1 | CB3-6 | 093 995 | CIRCUIT BREAKER, man reset 1P 15A 250V | 4 |
| 2 | CB1,2 | 083 432 | CIRCUIT BREAKER, man reset 1P 10A 250V | 2 |
| 3 | S4,7,8 | 011 609 | SWITCH, tgl SPDT 15A 125V | 3 |
| 4 | | | NAMEPLATE, (order by model and serial number) | 1 |
| 5 | | 143 395 | PANEL, front | 1 |
| 6 | R1 | 072 462 | POTENTIOMETER, w/shaft lock (consisting of) | 1 |
| 7 | | 072 590 | LOCK, shaft .375-32 x .250dia shaft | 1 |
| 8 | | 122 351 | BRACKET, panel control remote | 1 |
| 9 | PC4,RC1 | 147 554 | CIRCUIT CARD, connector/receptacle | 1 |
| | PLG3 | 165 668 | HOUSING PLUG & SOCKETS, (consisting of) | 1 |
| | | 079 534 | TERMINAL, fem 1skt 18-14 wire | 10 |
| 10 | RC1 | 604 176 | RECEPTACLE, straight duplex grd 2P3W 15A 125V | 1 |
| 11 | RC2 | 604 103 | RECEPTACLE, straight duplex grd 2P3W 15A 250V | 1 |
| 12 | PC3 | 148 021 | CIRCUIT CARD, filter HF | 1 |
| 13 | | 073 756 | STAND OFF, No. 6-32 | 4 |
| 14 | S2 | 117 797 | SWITCH, ign (consisting of) | 1 |
| 15 | | 125 707 | LEVER, switch | 1 |
| 16 | | 601 836 | NUT, brs hex jam .250-20 | 3 |
| | | 010 915 | WASHER, flat brs .250 | 2 |
| 17 | HM | 145 247 | METER, hour 10-32VDC | 1 |
| 18 | | 038 777 | STUD, brs grd .250-20 x 2.125 | 1 |
| 19 | | 116 813 | CONTROL, push pull | 1 |
| 20 | | 099 255 | TERMINAL, pwr output (consisting of) | 3 |
| 21 | | 601 976 | SCREW, cap stl hexhd .500-13 x 1.500 | 1 |
| 22 | | 039 040 | TERMINAL BOARD, neutral | 1 |
| 23 | | 601 880 | NUT, stl hex jam .500-13 | 1 |
| 24 | | 039 044 | BUS BAR, term bd | 1 |
| 25 | | 601 879 | NUT, stl hex full .500-13 | 1 |
| 26 | PC5 | 148 030 | CIRCUIT CARD, filter HF | 1 |
| 27 | | 109 993 | CAP, dust connector 9760-20 | 1 |
| 28 | | 097 924 | KNOB, pointer | 1 |

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

| Item No. | Part No. | Description | Quantity |
|----------|----------|-------------|----------|
|----------|----------|-------------|----------|

Figure 10-4. Generator (Fig 10-1 Item 18)

| | | | |
|----|----------|---|---|
| 1 | +131 047 | SHROUD, generator | 1 |
| 2 | 013 367 | LABEL, warning moving parts can cause serious injury | 3 |
| 3 | 133 602 | LABEL, engine maintenance | 1 |
| 4 | +122 252 | STATOR | 1 |
| 5 | 107 313 | BAFFLE, air | 1 |
| 6 | 107 283 | ROTOR ASSEMBLY, (consisting of) | 1 |
| 7 | 024 617 | RING, retaining external | 1 |
| 8 | 053 390 | BEARING, ball | 1 |
| 9 | 107 417 | FAN, rotor | 1 |
| 10 | 017 702 | ADAPTER, engine | 1 |
| | 086 863 | SCREW, cap stl hexhd slfkg .375-16 x 1.000 | 5 |
| 11 | 134 981 | ADAPTER, fan rotor | 1 |
| 12 | 008 917 | WASHER, flat stl .343 ID x 2.250 OD x .187thk (included w/engine) | 1 |
| 13 | 007 250 | BRACKET, mtg brushholder | 1 |
| 14 | 047 878 | BAR, retaining brushholder | 1 |
| 15 | 047 885 | CAP, brushholder | 3 |
| 16 | *126 984 | BRUSH, w/spring | 3 |
| 17 | 005 614 | HOLDER, brush | 3 |
| 18 | 153 297 | ENDBELL, (consisting of) | 1 |
| 19 | 143 220 | O-RING, 2.859 ID x .139CS | 1 |



ST-108 953-E

Figure 10-4. Generator

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

*Recommended Spare Parts.

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

OPTIONS AND ACCESSORIES

FUEL GAUGE

(#140 843 Field only)
Handy and convenient accessory designed for the 7.5 gal. fuel tank.

FA-7.5 FLAME ARRESTOR FUEL CAP - GASOLINE RED

(#042 632 Field only)

Lockable for added protection.

LP GAS CONVERSION KIT

(#042 583 Factory)
(#042 584 Field)

Liquid withdrawal with vaporizer and regulator. Does not include tanks, brackets, or hose from tank to regulator.

SPARK ARRESTOR MUFFLER

(#041 747 Field only)

Mandatory when operating on California grasslands, brush or forest-covered land, and all National Forests. For other areas, check your state and local laws.

HF-251 SERIES High Frequency Arc Starter and Stabilizer

(#042 388) HF-251D-1, 115 VAC
(#042 387) HF-251-2, 230 VAC
A portable 250 Amp high frequency arc starter and stabilizer. Operates on 50, 60, and 100 Hz input.

S-22P12 WIRE FEEDER

(#125 616)

Compact, lightweight 24 VAC constant speed semi-automatic wire feeder provides portability and access for those difficult to reach welding jobs. Accommodates .023 through 5/64 in (0.6 - 2.0 mm) hard and flux-cored wires. Plugs into 14-pin receptacle on Trailblazer 250G. For detailed information, see S-22P12 literature, Index No. M/7.0.

XR WIRE FEEDERS

(#131 342) Air-cooled feeder/control

(#137 551) XR-15A gun
(#137 550) XR-30A gun
Push-pull system designed to handle difficult-to-feed soft alloy wires such as aluminum. Accepts 12 in. (305 mm) spools of .030 in. (0.8 mm) through 1.16 in. (1.6 mm) aluminum wire. For detailed

information, see Miller XR and Spoolmatic literature, Index No. M/1.2.

SPOOLMATIC 30A SPOOL GUN

(#130 831) Air-cooled

200 Amp, 100% duty cycle, 1 lb. spool gun with 30 ft. (9.1 m) cable assembly. WC Control required. For detailed information, see Miller XR and Spoolmatic literature, Index No. M/1.2.

WC-24 CONTROL

(#137 549)

Can be mounted directly to the Trailblazer 250G welding generator. Weighs only 2 lbs. (0.9 kg).

REMOTE CONTROLS AND SWITCHES

RFC-14 FOOT CONTROL

(#129 339)

Foot current and contactor control. 20 ft. (6 m) cord and 14-pin Amphenol plug.

RHC-14 HAND CONTROL

(#129 340)

Remote hand current and contactor control with 20 ft. (6 m) cord and plug.

RMLS-14 SWITCH

(#129 337)

Momentary- and maintained- contact rocker switch for contactor control. Push forward for maintained contact and push back for momentary contact. Includes 20 ft. (6 m) cord and Amphenol plug.

FTC-14 REMOTE CONTACTOR AND CURRENT CONTROL

(#151 086)

This rotary motion fingertip control fastens to TIG torch handle using two Velcro strips. Includes 28 ft. (8.5 m) cord and current plug. Allows complete current contactor control.

EXTENSION CORDS FOR 14-PIN REMOTE CONTROLS

(#122 972) 10 ft. (3 m)
(#122 973) 25 ft. (7.6 m)
(#122 974) 50 ft. (15.2 m)
(#122 975) 75 ft. (23 m)

GAS TUNGSTEN ARC (TIG) TORCHES

Lit. Index No. TG/1.0

Rely on the Miller line of GTAW (TIG) torches for your most critical welding jobs. Miller Electric offers a complete line of TIG torches with a wide variety of features and accessories.

GAS METAL ARC (MIG) GUNS

Lit. Index Nos. M/9.11 to M/12.2

Select rugged Miller GMAW/FCAW (MIG) guns for reliability and value. Miller produces a complete line of dependable MIG guns. Check individual product literature for complete details.

EDT 1000-2 TWO-WHEEL TRAILER

(#042 878)

Rugged 1000 lb. capacity trailer designed to transport welders and equipment. Features adjustable bed for easy mounting of Miller and competitive welders and other similar construction equipment. Permits user to achieve desired tongue weight. Torsional axle, leveling jack, improved fenders with skirt and safety chains. Optional easy-to-install fender and light kit (#042 897) required for highway operation. Meets or exceeds DOT standards.

NOTE: Hitches must be ordered separately.

Specifications:

GAWR: 1300 lbs. (590 kg)
GVWR: 1300 lbs. (590 kg)
Net Payload: 1000 lbs. (454 kg)
Road Clearance: 8-1/2 in. (216 mm)
Track: 47-1/2 in. (1.2 m)
Tire Size: 4.80-12
Net Wt. 250 lbs. (113 kg)
Ship Wt. 370 lbs. (168 kg)

NOTE: When equipped with fender and light kit and 2 in. (50 mm) ball hitch, this trailer conforms to all applicable U.S. Federal motor vehicle safety standards in effect on date of manufacture. When ordering trailers without the fender and light kit and ball hitch, the purchase order must include the statement, "For off-the-road use only."

OPTIONS AND ACCESSORIES

FENDER AND LIGHT KIT FOR EDT-1000-2B (#042 897)

Includes fenders, lights, wiring harness, mounting hardware, and easy-to-use instructions. Shipping weight: 37 lbs. (17 kg)

HITCHES

2 in. (50 mm) BALL (#042 705)

Shipping weight: 5 lbs. (2 kg)

CLEVIS (Not for highway use) (#042 707)

Shipping weight: 11 lbs. (5 kg)

2-1/2 in. (64 mm) LUNETTE EYE (#042 706)

Shipping weight: 9 lbs. (4 kg)

NO. 4B RUNNING GEAR (#041 930)

Two rear wheels with 480/400x8 pneumatic tires. Two 8 in. (203 mm) solid rubber tired front wheels and 30 in. (762 mm) towing handle.

CR-4B CYLINDER RACK (#041 968)

For use with No. 4B running gear.

NO. 25 HAND RUNNING GEAR (#042 503)

Constructed of lightweight, tubular steel and large, 480/400x8 pneumatic tires, this running gear is designed for maneuverability and convenience. The weld cables can be wrapped around the handles. Protective cover can be used with this running gear.

NO. 2WA WELDING ACCESSORY PACKAGE (#040 039)

Consists of 35 ft. (10.6 m) No. 2/0 electrode cable with insulated electrode holder and lug, 30 ft. (9.1 m) No. 2/0 work cable with work clamp and lug, welding helmet, and wire scratch brush.

CC-1 SERIES CANVAS COVERS

CC-1A (#040 252) Blue

CC-1C (#042 360) Gray

Attractive, waterproof canvas covers resist stains and mildew, and protect the finish of your welder. Blue cover has Miller logo and name across side.

MILLER INDUSTRIAL SUPREME MOTOR OIL

(#150 872) SAE 10W-30

(#150 873) SAE 30W

Custom-blended to Miller specifications, Miller Industrial Supreme Motor Oil features the highest quality base stocks available today. This oil meets and exceeds all engine manufacturers' requirements as specified in the American Petroleum Institute service grade SG/CE, CD, CDII. Supplied in quart containers.