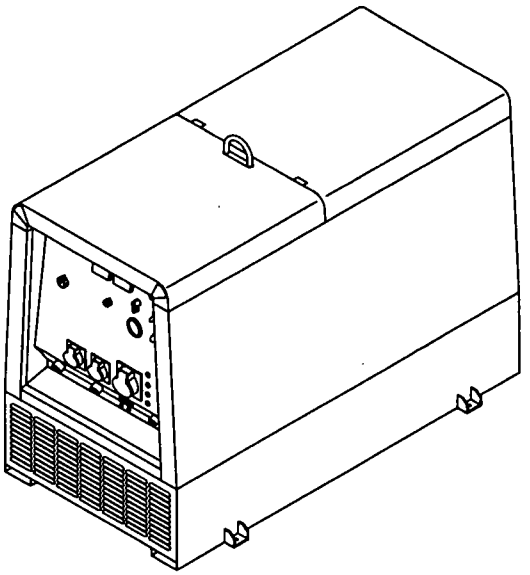
Miller®

August 1995 Form: OM-156 368B
Effective With Serial No. KF941356

OWNER'S MANUAL



CE

Metro 300DX

CC/DC Welding Generator For SMAW And GTAW Welding

Rated Welding Output	Amperage Range	Maximum Open-Circuit Voltage DC	Auxiliary Power Rating	Engine	Fuel Capacity	Sound Power	IP Rating
280 A, 31 V DC, 35% Duty Cycle 250 A, 30 V DC, 60% Duty Cycle 225 A, 29 V DC, 100% Duty Cycle	20 – 280	72 RMS (65 Average)	Single-Phase/ 3-Phase, 7/10 kVA/kW, 32/15 A, 220/380 V AC, 50 Hz	Ruggerini RD211 Air-Cooled, Two-Cylinder, 20 HP Diesel Engine	11.8 US gal (44.6 L)	98 Lwa	23

cover_om 4/95 – Ref. ST-158 934-B

PRINTED IN USA

MILLER'S TRUE BLUE® LIMITED WARRANTY

Effective January 1, 1995
(Equipment with a serial number preface of "KD" or newer)

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

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

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

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

1. 5 Years Parts – 3 Years Labor
   - Original main power rectifiers
   - Inverters (input and output rectifiers only)
2. 3 Years — Parts and Labor
   - Transformer/Rectifier Power Sources
   - Plasma Arc Cutting Power Sources
   - Semi-Automatic and Automatic Wire Feeders
   - Inverter Power Supplies
   - Intellitig
   - Robots
3. 2 Years — Parts and Labor
   - Engine Driven Welding Generators
     (NOTE: Engines are warranted separately by the engine manufacturer.)
   - Air Compressors
4. 1 Year — Parts and Labor
   - Motor Driven Guns
   - Process Controllers
   - IHPS Power Sources
   - Water Coolant Systems
   - HF Units
   - Grids
   - Spot Welders
   - Load Banks
   - SDX Transformers
   - Running Gear/Trailers
   - Plasma Cutting Torches (except APT, ZIPCUT & PLAZCUT Models)
   - Tecumseh Engines
   - Deutz Engines (outside North America)
   - 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.

WHO DO I CONTACT?

For help,
- contact your distributor

For additional information, such as
- Technical Manuals (Service And Parts)
- Engine Manuals
- Circuit And Wiring Diagrams
- Process Handbooks
- User's Guides
- Distributor Directories

- contact your distributor

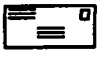
To file a claim for loss or damage during shipment,
- contact the delivering carrier

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

Miller Electric Mfg. Co.

- CALL:
  414-735-4505

- FAX:
  800-637-2348 (in USA), or
  414-735-4136 (outside USA)



- WRITE:
  Miller Electric Mfg. Co.
  P.O. Box 1079
  Appleton, WI 54912 USA

Always provide Model Name and Serial or Style Number

miller_warl 6/95

ERRATA SHEET

December 1, 1995 FORM: OM-156 368B

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 6 – ELECTRICAL DIAGRAM

Replace Figure 6-1. Circuit Diagram For Welding Generator (see Pages 2 and 3 on this Errata Sheet)

CHANGES TO SECTION 8 – PARTS LIST

Change Parts List as follows:

**	Dia. Mkgs.	Part No.	Replaced With	Description	Quantity
31-		Added	178 913	SOLENOID, module control (Eff w/KG020121)	1
31-54	TS1	176 625	178 903	SOLENOID, throttle and timing module (Eff w/KG020121)	1
31-72	FS1	176 626	178 902	SOLENOID, fuel (Eff w/KG020121)	1

**First digit represents page no – digits following dash represent item no.
BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

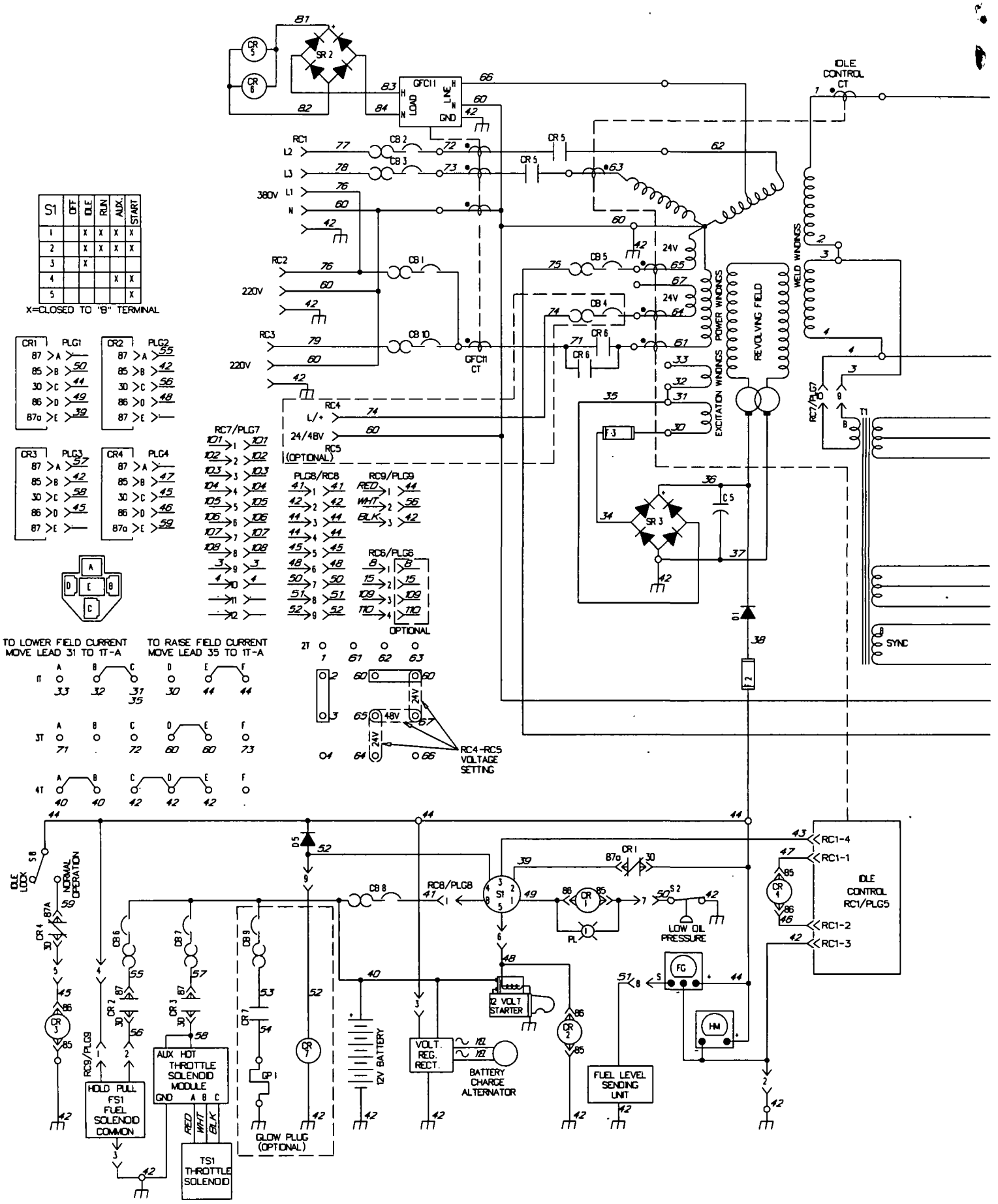
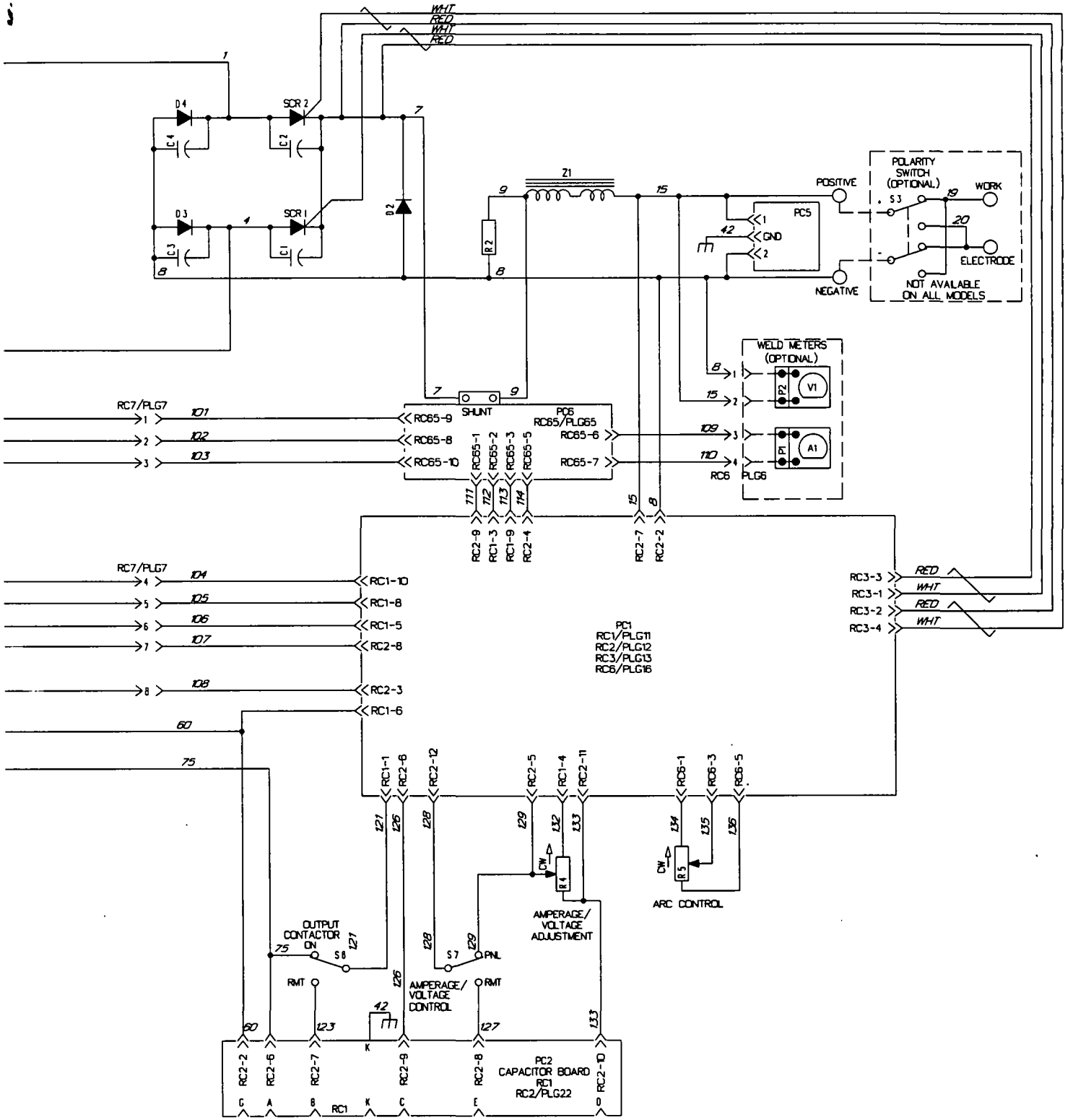


Figure 6-1. Circuit Diagram For Welding Generator



SD-178 904

Declaration of Conformity

Manufacturer's Name: Miller Electric Mfg. Co.

Manufacturer's Address: 1635 W. Spencer Street
Appleton, WI 54914 USA

Declares that the product: **METRO 300 DX**
(product name)

conforms to the following Directives and Standards:

Directives

Low Voltage Directive: 73/23/EEC

Machinery Directives: 89/392/EEC,91/368/EEC, 93/C 133/04, 93/68/EEC

Noise Emission Directive: 79/113/EEC

Noise level of Welding Generators: 84/535/EEC

Standards

Safety Requirements for Arc Welding Equipment Part 1: EN 60974-1: 1990

Rotating Electrical Machines – Part 1: Rating and Performance: IEC 34-1: 1994

Rotating Electrical Machines – Part 5: Classification of degrees of protection provided by enclosure of rotating electrical machines (IP code): IEC 34-5: 1991

Insulation coordination for equipment within low-voltage systems:
Part 1: Principles, requirements and test: IEC 664-1: 1992

European Contact: Mr. Roberto Moletto
MILLER Europe S.P.A.
Via Privata Iseo
20098 San Giuliano
Milanese, Italy

Telephone: 39(02)98290-1
Fax: 39(02)98281-552

TABLE OF CONTENTS

SECTION 1 – SAFETY PRECAUTIONS FOR ARC WELDING

safety_rom1 4/95

1-1. Symbol Usage

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

▲ **Marks a special safety message.**

☞ *Means NOTE; not safety related.*

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

1-2. Arc Welding Hazards

⚠ WARNING

The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-5. Read and follow all Safety Standards.

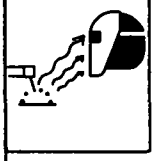
Only qualified persons should install, operate, maintain, and repair this unit.

During operation, keep everybody, especially children, away.

ELECTRIC SHOCK can kill.

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

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.

1-3. Engine Hazards

⚠ WARNING

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.

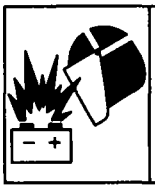
Engine fuel is highly flammable.

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.
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.

MOVING PARTS can cause injury.

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

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



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.

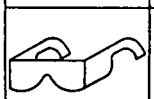
1. If the engine is warm and checking is needed, follow steps 2 and 3.
2. Wear safety glasses and gloves and put a rag over cap.
3. Turn cap slightly and let pressure escape slowly before completely removing cap.

1-4. Additional Installation, Operation, And Maintenance Hazards

⚠ WARNING

MOVING PARTS can cause injury.

1. Before working of generator, remove spark plugs or injectors to keep engine from kicking back or starting.
2. Block flywheel so that it will not turn while working on generator components.



FLYING PIECES OF METAL or DIRT can injure eyes.

1. Wear safety glasses with side shields or face shield.

STATIC ELECTRICITY can damage parts on circuit boards.

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

MAGNETIC FIELDS FROM HIGH CURRENTS can affect pacemaker operation.

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

HOT PARTS can cause severe burns.

1. .Allow cooling period before maintaining.
2. Wear protective gloves and clothing when working on a hot engine.

FALLING EQUIPMENT can cause serious personal injury and equipment damage.

1. Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
2. Use equipment of adequate capacity to lift unit.

READ INSTRUCTIONS.

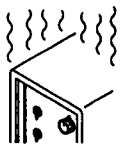
1. Use only genuine MILLER replacement parts.
2. Reinstall injectors and bleed air from fuel system according to engine manual.

DO NOT LET ENGINE EXHAUST SPARKS CAUSE FIRE.

1. Use approved engine exhaust spark arrestor in required areas – see applicable codes.

LOW VOLTAGE AND FREQUENCY CAN DAMAGE electrical equipment such as MOTORS.

1. Turn off or unplug equipment before starting or stopping engine.



OVERUSE can cause OVERHEATED EQUIPMENT.

1. Allow cooling period.
2. Reduce current or reduce duty cycle before starting to weld again.
3. Follow rated duty cycle.

TILTING OF TRAILER can cause injury.

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

BATTERY ACID can BURN SKIN AND EYES.

1. Do not tip.
2. Replace damaged battery.
3. Flush eyes and skin immediately with water.

1-5. Principal Safety Standards

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

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

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

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

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

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

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

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

1-6. EMF Information

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

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."

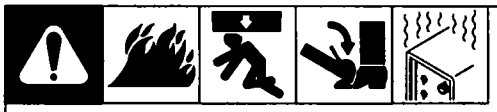
To reduce magnetic fields in the workplace, use the following procedures:

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.

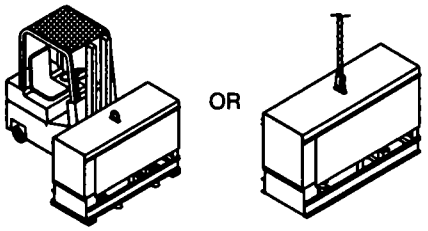
About Pacemakers:

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

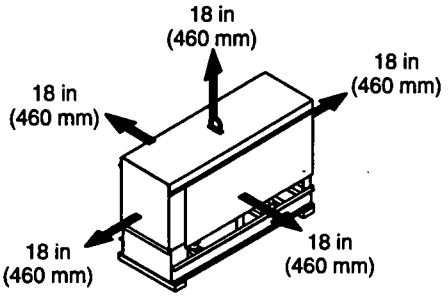
2-1. Installing Welding Generator



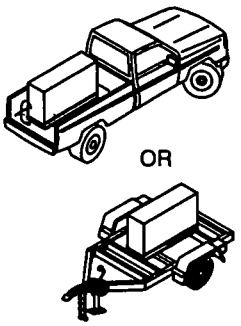
Movement



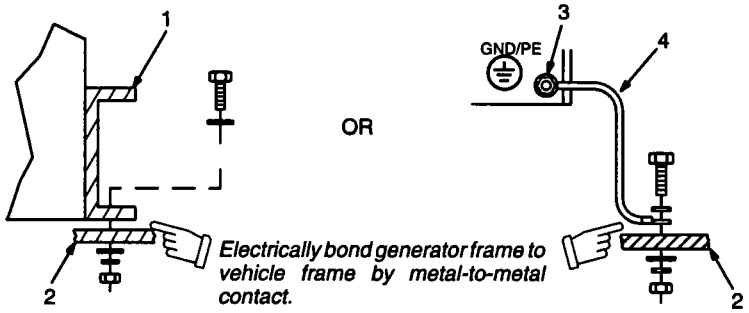
Airflow



Location



Grounding



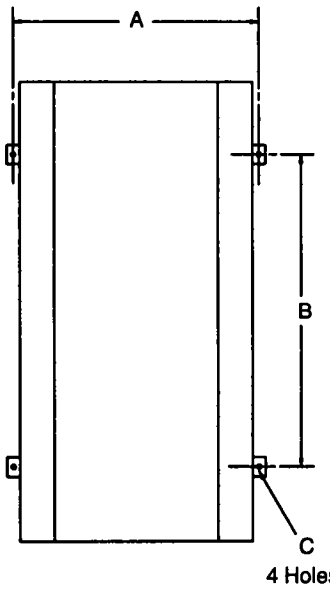
Electrically bond generator frame to vehicle frame by metal-to-metal contact.

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

Use #10 AWG or larger insulated copper wire.

Ref. ST-800 652 / Ref. ST-800 477-A / ST-158 936-A / S-0854

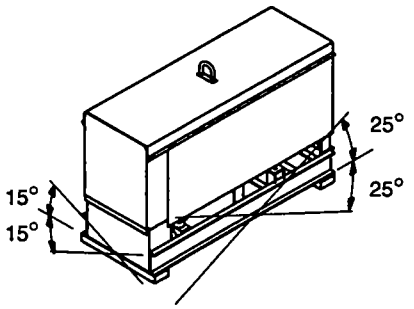
2-2. Dimensions, Weights, And Operating Angles



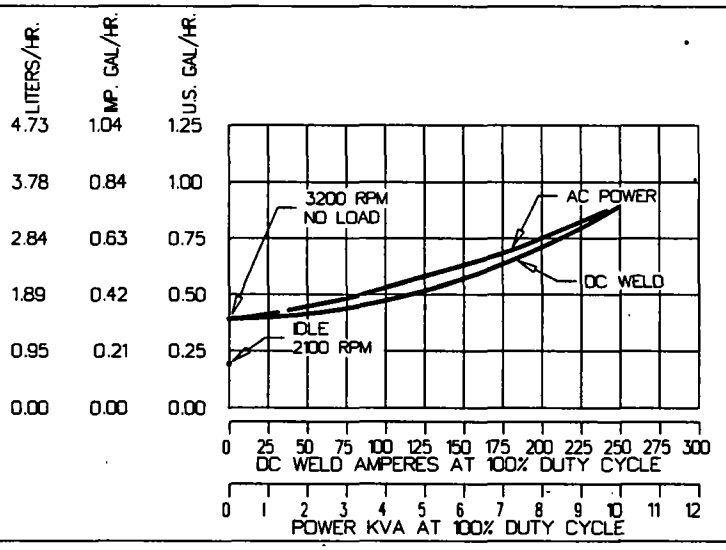
ST-158 938

Dimensions	
Height	41 in (1041 mm)
Width	30 in (762 mm)
Depth	54-1/2 in (1384 mm)
A	29 in (737 mm)
B	36-3/4 in (933 mm)
C	9/16 in (14 mm) Dia.
Weight	
Net	960 lb (435 kg)
Ship	1070 lb (485 kg)

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



2-3. Fuel Consumption



SA-175 807

2-4. Rating Label

EN 60974-1					
		20A/21V			280A/31V
		X	35%	60%	100%
	U_0 = 65V	I_2	280A	250A	225A
		U_2	31V	30V	29V
		20A/11V			280A/21V
		X	35%	60%	100%
	U_0 = 65V	I_2	280A	250A	225A
		U_2	21V	20V	19V

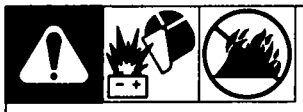
	n = 3000 RPM	
n_0 = 3200 RPM	n_1 = 2100 RPM	
	IP 23	

3 ~ 50 Hz	380V	10kVA	15A
1 ~ 50 Hz	220V	7kVA	32A
1 ~ 50 Hz	48V	2.5kVA	50A

S-176 006

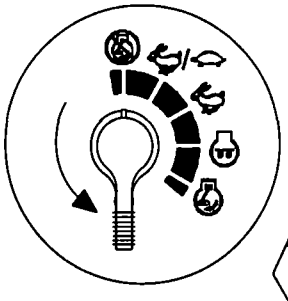
☞ *Rating label shown includes optional 48 volt dinse receptacle information.*

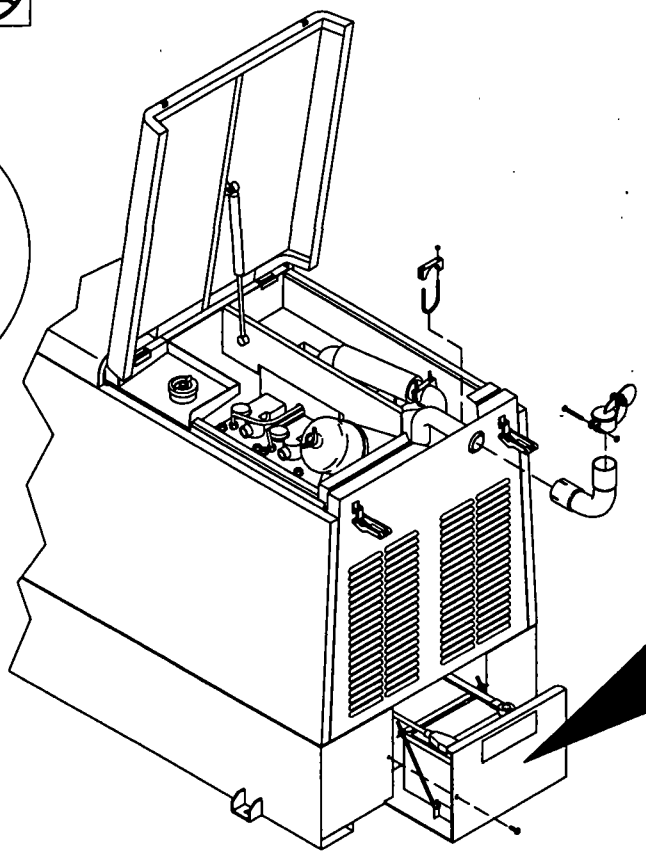
2-5. Connecting Battery And Installing Muffler Pipe

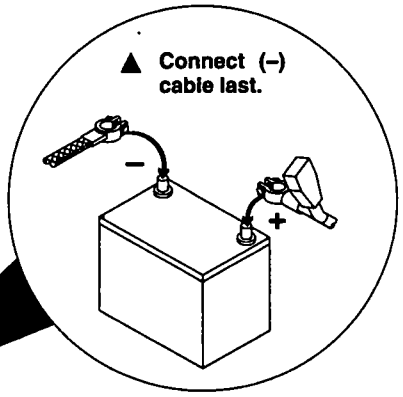


Stop engine.

☞ *Installation of muffler pipe is optional.*







Tools Needed:

3/8, 1/2 in

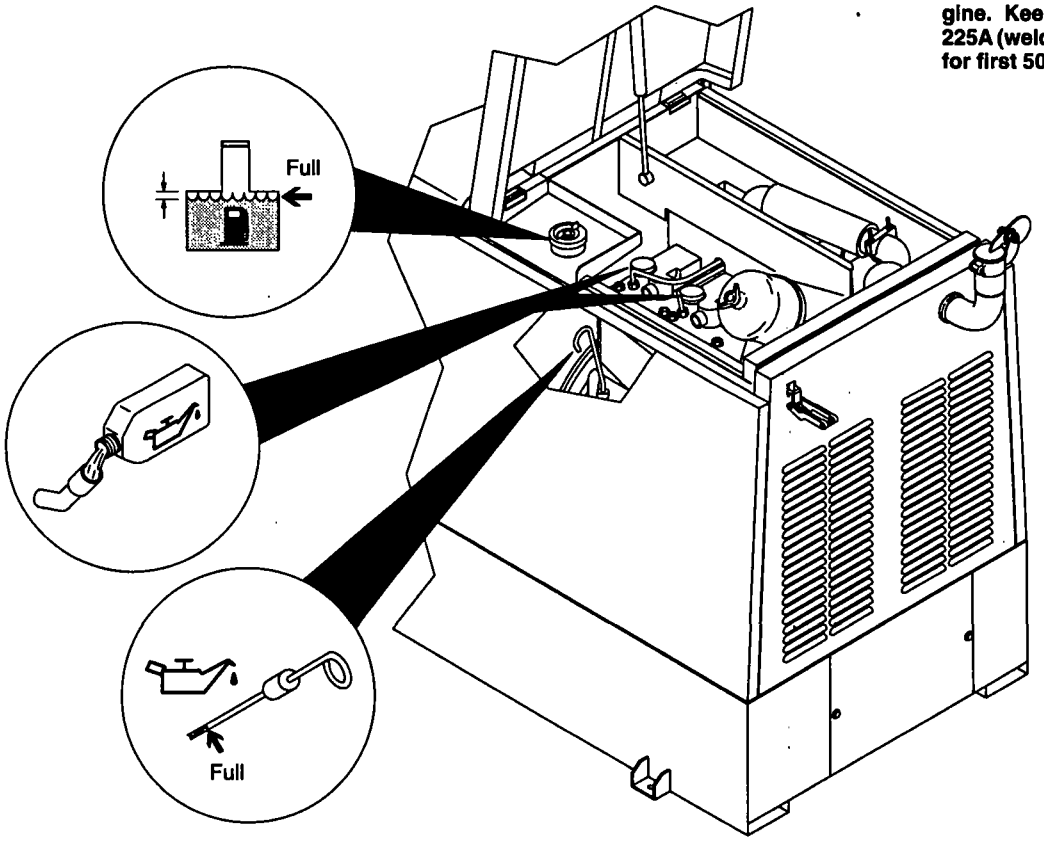
ST-801 079-A / Ref. ST-175 920-A

2-6. Engine Prestart Checks

Check all fluids daily. Engine must be cold and on a level surface.

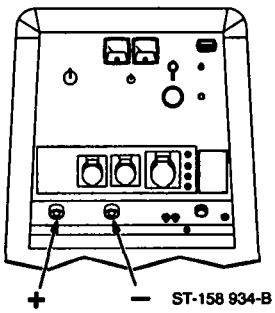
Engine stops if oil pressure is low.

▲ **Heavy loading during first 50 hours will damage engine. Keep load less than 225A (weld) or 7 kVA (power) for first 50 hours.**



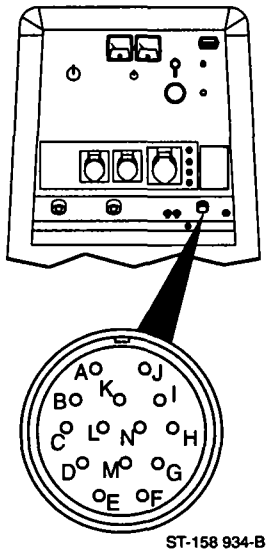
Ref. ST-159 219-D

2-7. Weld Output Terminals And Selecting Cable Sizes

Weld Output Terminals	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 – 60% Duty Cycle	60 – 100% Duty Cycle	10 – 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
+ − ST-158 934-B	400	1/0	2/0	3/0	4/0	2-2/0	2-3/0	2-4/0	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-D

2-8. Remote 14 Receptacle RC1 Information



ST-158 934-B

REMOTE 14	Socket*	Socket Information
	A	24 volts ac with respect to socket G.
	B	Contact closure to A completes 24 volts ac contactor control circuit.
	G	Circuit common for 24 volts AC circuit.
A	C	+10 volts dc output to remote control with respect to socket D.
	D	Remote control circuit common.
	E	0 to +10 volts dc input command signal from remote control with respect to socket D.
	K	Chassis common.

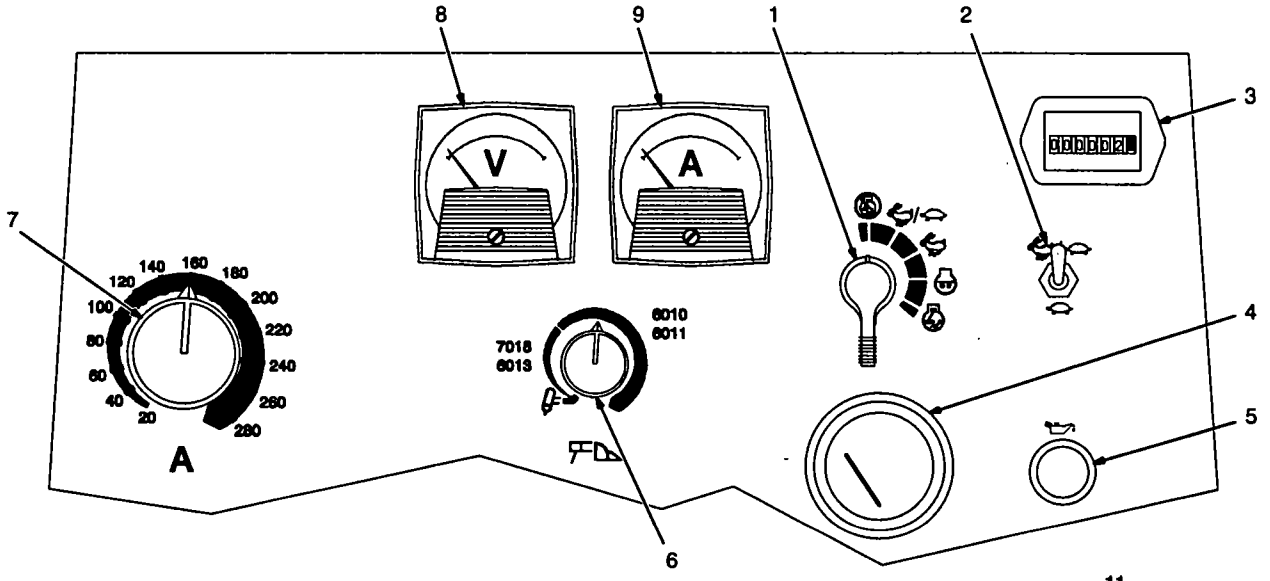
*The remaining sockets are not used.

SECTION 3 – OPERATING THE WELDING GENERATOR

3-1. Symbols And Definitions

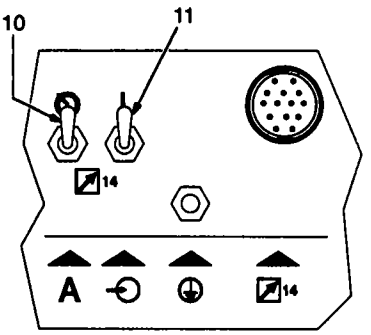
	Stop		Run Speed		Run/Idle Speed		Idle Speed
	Start		Glow Plug		Temperature		Fuel
	Oil	14	Remote 14		Amperage Control/ Panel		On
	Check Injectors/ Pump		Check Valve Clearance		Battery	V	Volts
A	Amperes		Stick Welding		Arc Force (Dig)		Tig Welding
	Engine-Driven, Single-Phase Alternator With Rectifier		Engine		Read Instructions		Circuit Breaker
+	Positive	—	Negative		Alternating Current		Direct Current
	Certified/Trained Mechanic		Time		Ground		Input
	Output	U_0	Rated No Load Voltage (Average)	U_2	Conventional Load Voltage	I_2	Rated Welding Current
n	Rated Load Speed	n_0	Rated No Load Speed	n_1	Rated Idle Speed	X	Duty Cycle

3-2. Front Panel Controls



Using Idle Lock Switch		
		2100 rpm
		2100 rpm
		2100 rpm (No Load) 3200 rpm (Load)
		3200 rpm

70°F (21°C)	0 sec.
32°F (0°C)	10 sec.
–4°F (–20°C)	20 sec.



Ref. ST-175 920-A

▲ **Heavy loading during first 50 hours will damage engine. Keep load less than 225A (weld) or 7 kVA (power) for first 50 hours.**

1 Engine Control Switch S1

Use switch to operate glow plug (optional – see table), start engine, select speed, and stop engine.

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

2 Idle Lock Switch S8

Use switch to lock engine in idle speed during start-up (see table). Do not use ac receptacles with switch in Idle position.

To Start: move Idle Lock switch to Idle position and Engine Control switch to Start position. Release Engine Control switch when engine starts. Do not crank engine while flywheel is turning. Move Idle Lock switch to Run/Idle position after engine warms.

To Stop: turn Engine Control switch to Stop position.

3 Engine Hour Meter HM

4 Fuel Gauge FG

5 Engine Oil Pressure Light PL1

Engine stops and light goes on if oil pressure is too low.

6 Arc Force (Dig) Control R5

Use control to automatically increase amperage as arc length is decreased, to assist in arc starts, and reduce the chance of the electrode freezing in the puddle. Set at minimum for Tig welding.

7 Amperage Control R4

8 Voltmeter V1 (Optional)

9 Ammeter A1 (Optional)

10 Remote Amperage Control Switch S7

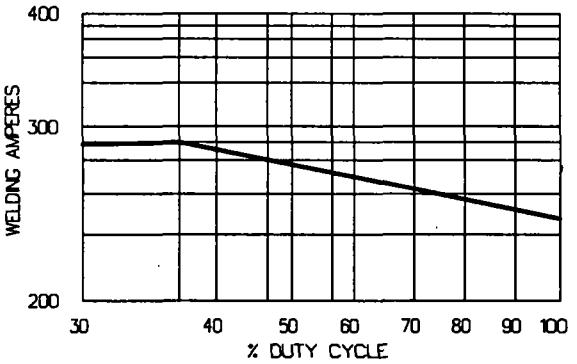
Use switch to select front panel or remote amperage control.

11 Remote Output (Contactor) Switch S6

Use switch to control remote contactor if connected to remote 14 receptacle RC1.

▲ **Weld output terminals are energized when switch S6 is On and engine is running.**

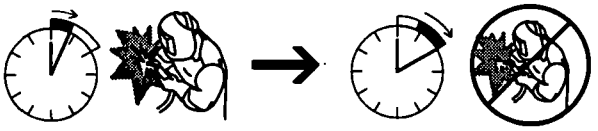
3-3. Duty Cycle And Overheating



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

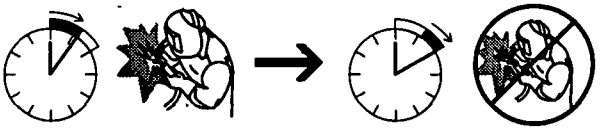
▲ **Exceeding duty cycle can damage unit and void warranty.**

35% Duty Cycle At 280 Amperes



3-1/2 Minutes Welding — 6-1/2 Minutes Resting

60% Duty Cycle At 250 Amperes



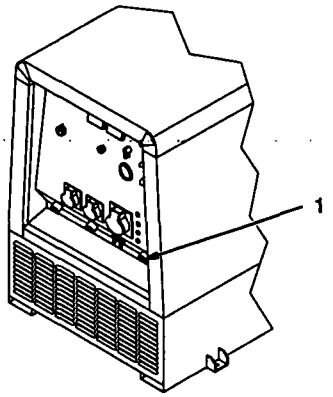
6 Minutes Welding — 4 Minutes Resting

100% Duty Cycle At 225 Amperes

Continuous Welding

duty1 5/95 / SB-176 134

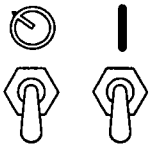
3-4. Remote Amperage Control



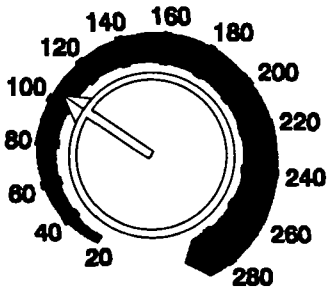
▲ **Weld output terminals are energized when Remote Output (Contactor) switch is On and engine is running.**

1 Remote 14 Receptacle RC1

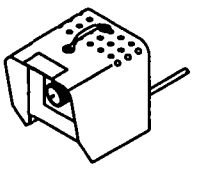
Connect optional remote control to RC1 (see Section 2-8).

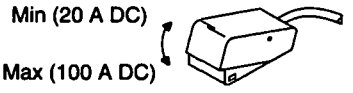


Set Switches



Set Control



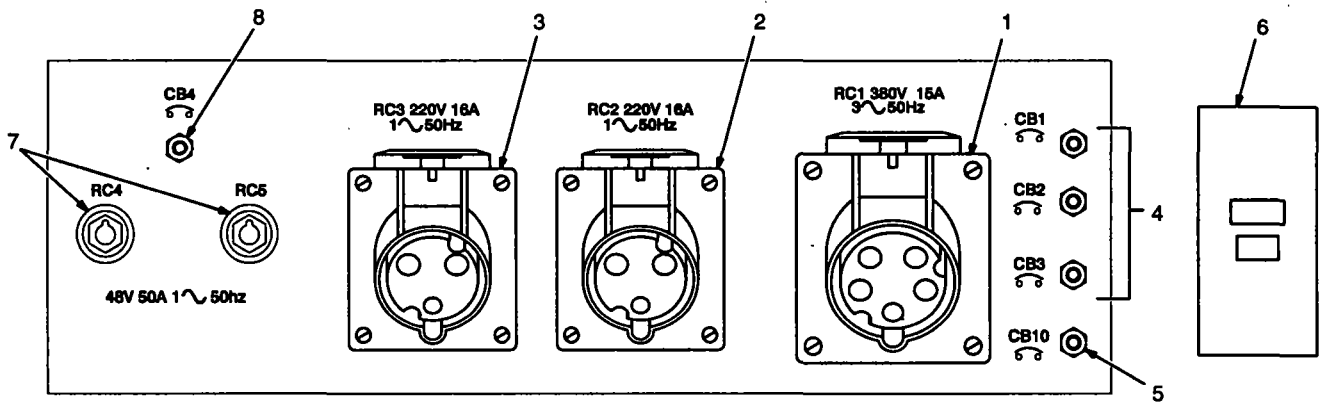


Adjust Remote Control

Ref. ST-158 934-B / Ref. ST-175 920-A

SECTION 4 – OPERATING AUXILIARY EQUIPMENT

4-1. Auxiliary Power Receptacles



	3 ~ 50 Hz 380 V		1 ~ 50 Hz 220 V	
I	P	I	P	I
280 A	0 kVA	0 A	0.7 kVA	3.2 A
250 A	1.5 kVA	2.3 A	3.0 kVA	13.6 A
200 A	3.8 kVA	5.8 A	6.0 kVA	27.3 A
150 A	6.6 kVA	10.0 A	7.0 kVA	32.0 A
100 A	8.5 kVA	13.0 A	7.0 kVA	32.0 A
50 A	10.0 kVA	15.2 A	7.0 kVA	32.0 A
0 A	10.0 kVA	15.2 A	7.0 kVA	32.0 A

S-176 126

9

Ref. SC-175 913

☞ *Auxiliary power available at ac receptacles decreases as weld amperage increases.*

1 380 V 15 A AC Receptacle RC1

2 220 V 16 A AC Receptacle RC2

3 220 V 16 A AC Receptacle RC3

RC1 supplies 50 Hz three-phase power at weld/power speed. Maximum output is 10 kVA/kW.

RC2 and RC3 supply 50 Hz single-phase power at weld/power speed. Maximum output from each receptacle is 3.3 kVA/kW.

Combined output of receptacles is limited to 10 kVA/kW output of generator. If maximum output is exceeded, auxiliary equipment will stop or not run properly.

4 Circuit Breakers CB1, CB2, And CB3

CB1 thru CB3 protect RC1 from overload. If a circuit breaker opens, power is lost on one phase and RC1 output drops. Voltage may still be present at RC1. If all circuit breakers open, RC1 output stops.

CB1 also protects RC2 from overload. If CB1 opens, RC2 output stops.

5 Circuit Breaker CB10

CB10 protects RC3 from overload. If CB10 opens, RC3 output stops.

6 Ground Fault Circuit Interrupter GFCI1

GFCI1 provides ground fault protection for RC1, RC2, and RC3.

7 48 V 50 A AC Dinse Receptacles RC4 And RC5 (Optional)

RC4 and RC5 supply 50 Hz single-phase power at weld/power speed. Maximum output is 2.5 kVA/kW.

Connect equipment neutral cable to E (RC5) receptacle and equipment load cable to L/+ (RC4) receptacle.

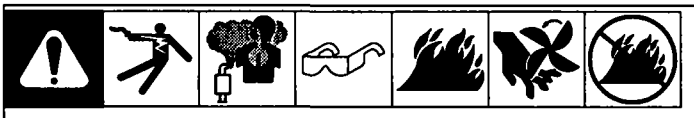
8 Circuit Breaker CB4 (Optional)

CB4 protects RC4 from overload.

9 Auxiliary Power While Welding Table

SECTION 5 – MAINTENANCE & TROUBLESHOOTING

5-1. Routine Maintenance

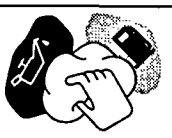


Recycle engine fluids.

▲ **Stop engine before maintaining.**

☞ *See also Engine Manual and Maintenance Label. Service engine more often during severe conditions.*

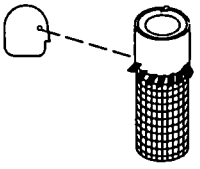
8 Hours



Wipe Up Spills

Check Fluid Levels. See Section 2-6

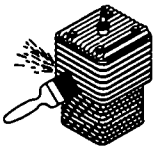
50 Hours



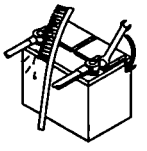
Check Air Filter Element. See Section 5-4

Clean And Tighten Weld Connections

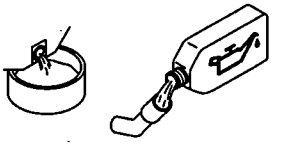
100 Hours



Clean Cooling System. See Engine Manual

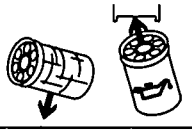


Clean And Tighten Battery Connections. See Section 2-5

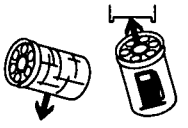


Change Oil. See Section 5-2 And Maintenance Label

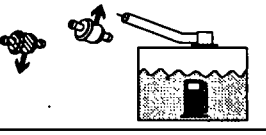
200 Hours



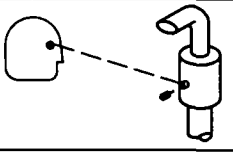
Change Oil Filter. See Section 5-2 And Maintenance Label



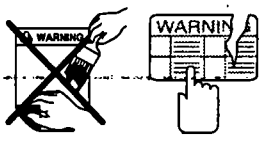
Change Fuel Filter. See Section 5-3



Change Fuel Filter. See Section 5-3

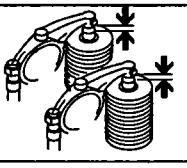


Check And Clean Spark Arrestor. See Section 5-7



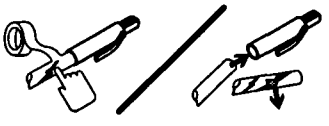
Replace Unreadable Labels

300 Hours

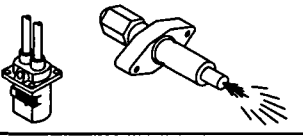


Check Valve Clearance. See Engine Manual

500 Hours

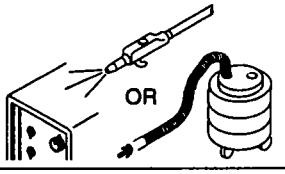


Repair Or Replace Cracked Cables



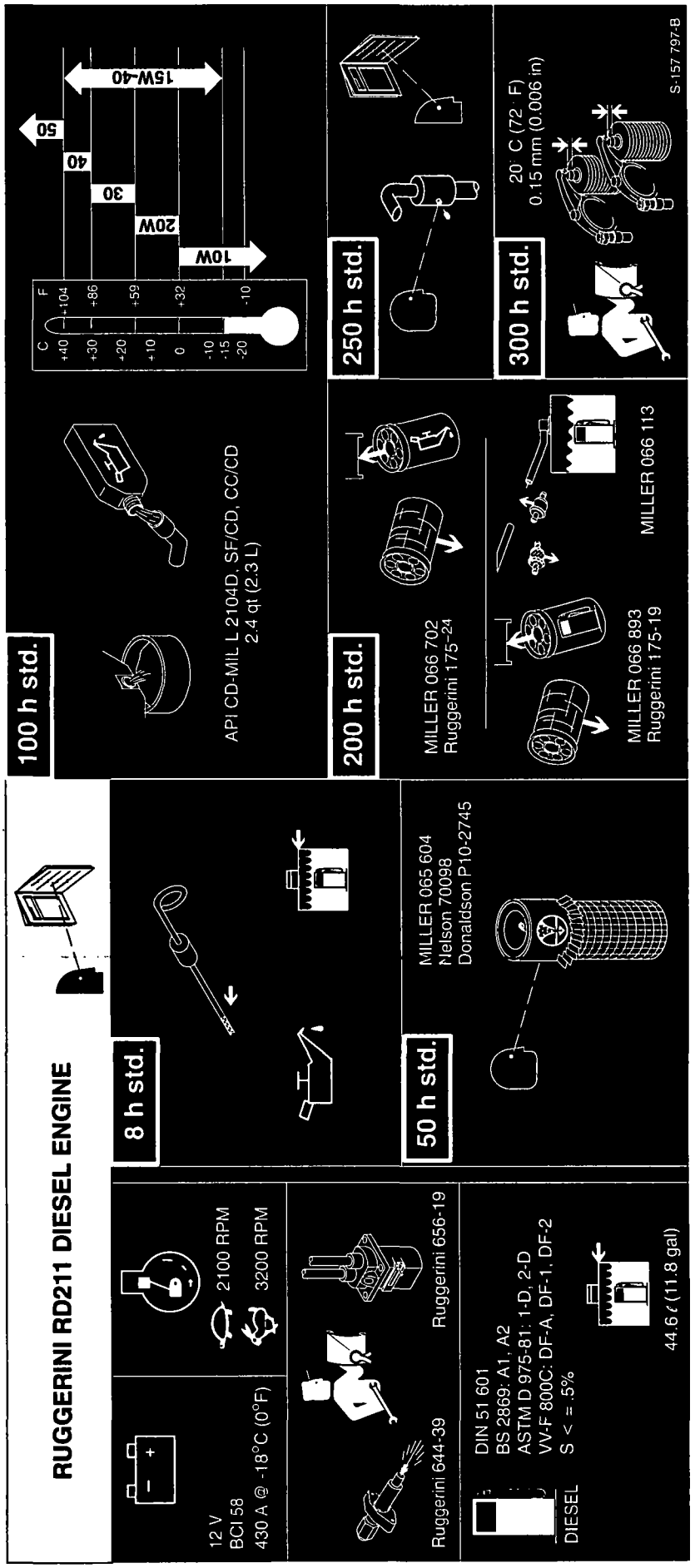
Test/Time Injectors. See Engine Manual

1000 Hours

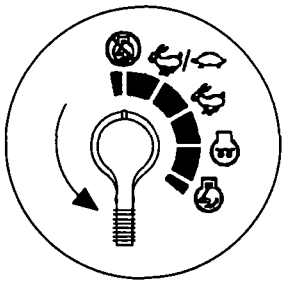


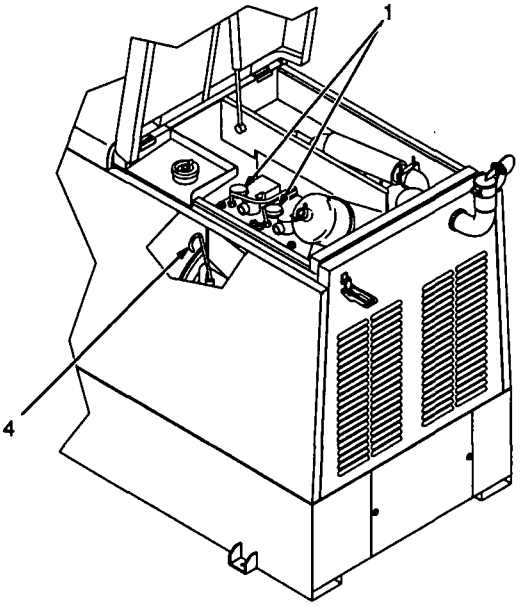
Blow Out Or Vacuum Inside. *During Heavy Service, Clean Monthly*

5-2. Maintenance Label



5-2. Changing Engine Oil And Oil Filter





Stop engine.

See engine manual for oil/filter change procedure.

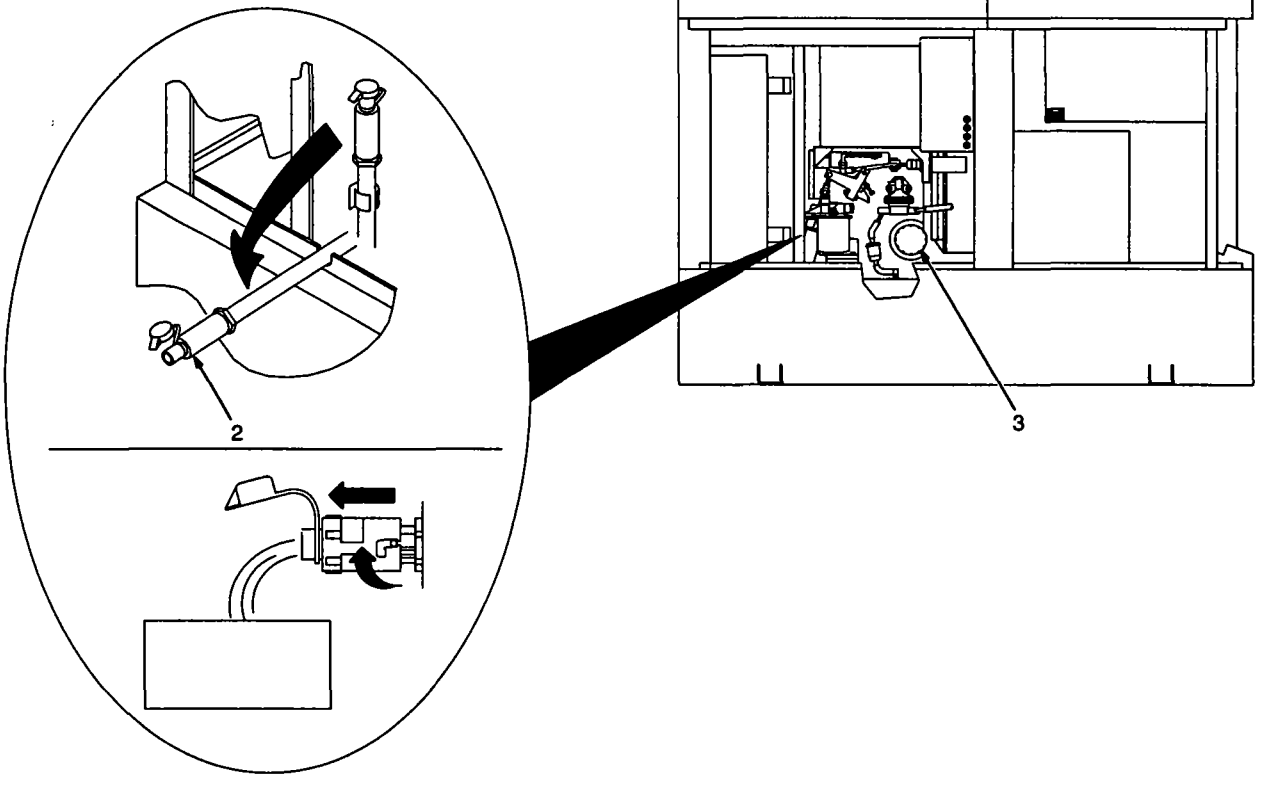
1 Oil Fill Caps (Use Either Cap)

2 Oil Drain Valve

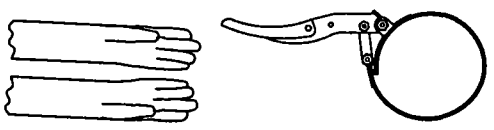
▲ **Close oil drain valve and cap before adding oil and running engine.**

3 Oil Filter

4 Dipstick

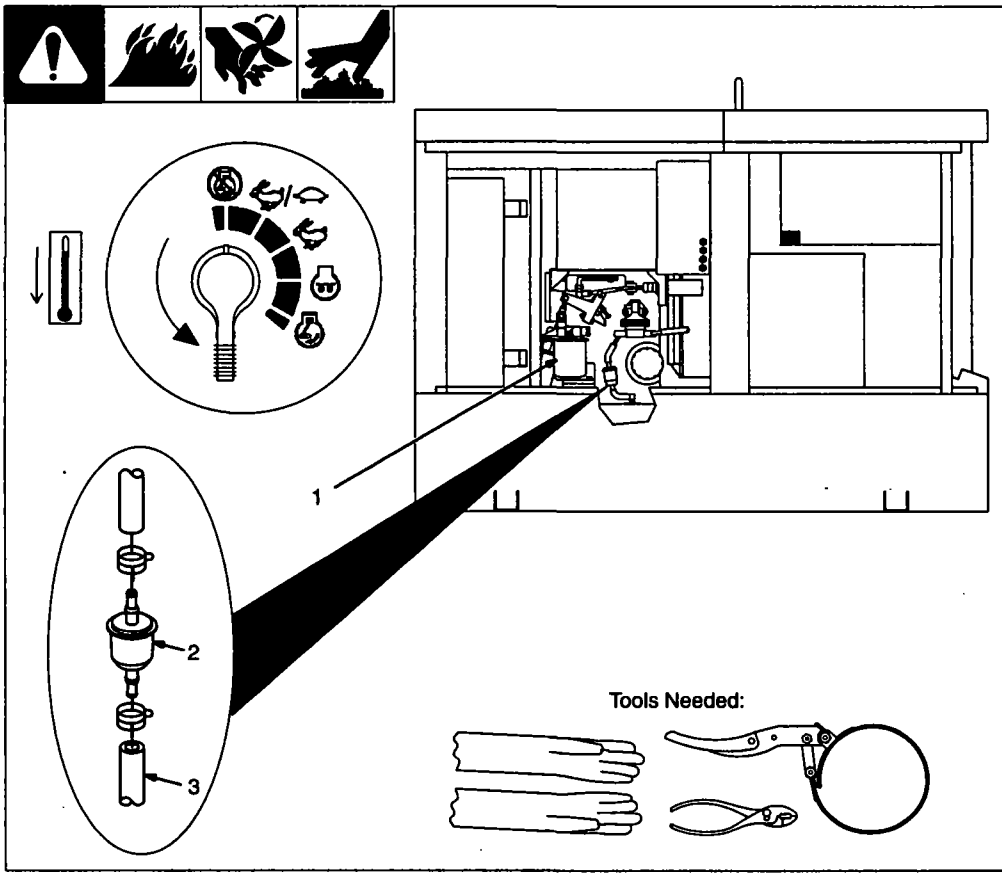


Tools Needed:



Ref. ST-159 219-D / Ref. ST-159 215-B / Ref. ST-175 920-A / Ref. S-0842

5-3. Changing Fuel Filters



Stop engine and let cool.

1 Secondary Fuel Filter

Remove filter.

Apply thin film of oil to gasket on new filter. Install filter.

2 Primary Fuel Filter

3 Fuel Line

Remove filter. Inspect all fuel lines and replace if cracked or worn.

Install new filter and clamps. Wipe up any spilled fuel.

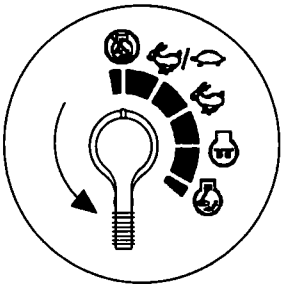
Start engine, and check for fuel leaks.

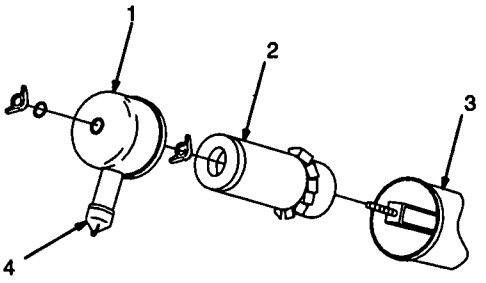
Stop engine, tighten connections as necessary.

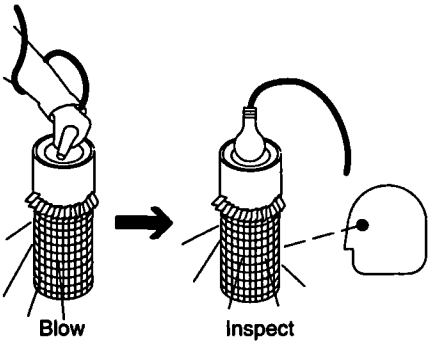
Tools Needed:

Ref. ST-159 215-B / Ref. ST-175 920-A

5-4. Servicing Air Cleaner







Stop engine.

▲ **Do not run engine without air cleaner or with dirty element.**

▲ **Use only high pulsation-type replacement filter listed on maintenance label or engine damage may occur.**

1 Dust Cap

2 Element

3 Housing

4 Dust Valve

To Clean air filter:

Wipe off cap and housing. Remove cap and dump out dust. Remove element and reinstall cap.

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

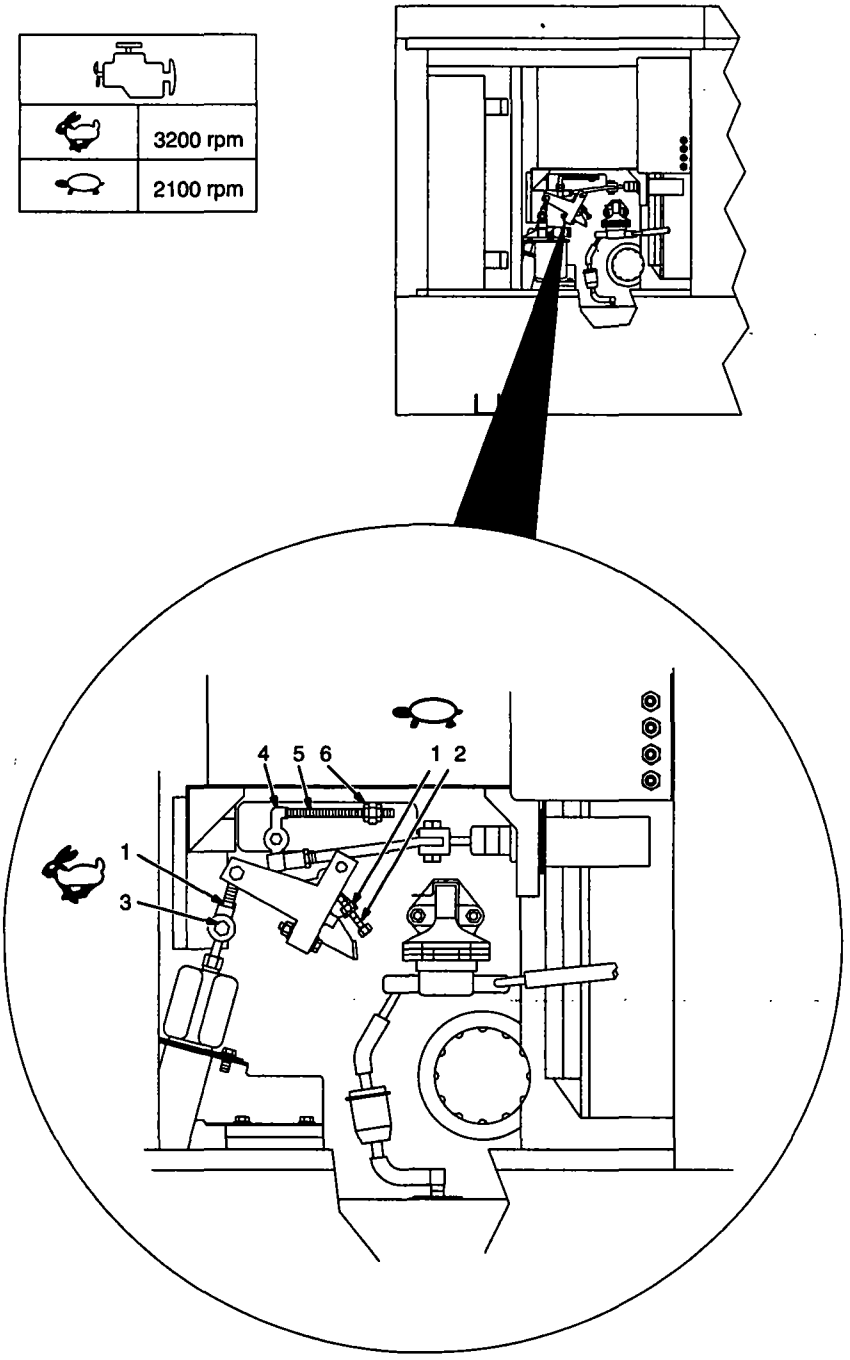
Clean element with compressed air only. Keep nozzle at least 1 in (25 mm) from inside of element. Max. air pressure: 30 psi (207 kPa). Do not remove plastic fins. Replace element and valve if damaged. Replace element yearly or after six cleanings.

Reinstall element and cap (cap arrows pointing up).

Ref. ST-175 920-A / Ref. ST-159 219-D / Ref. S-0698-B

5-5. Adjusting Engine Speed

	3200 rpm
	2100 rpm



After tuning engine, check engine speeds with a tachometer (see table for no load speeds). If necessary, adjust speeds as follows:

Start engine and run until warm.

Turn engine control switch to Run/Idle position.

1 Nut

2 Idle Speed Screw

Loosen nut. Turn screw until engine runs at idle speed. Tighten nut.

Turn engine control switch to Run position.

3 Swivel

Loosen nut and turn swivel until engine runs at run speed. Tighten nut.

4 Shutdown Lever

5 Shutdown Lever Screw

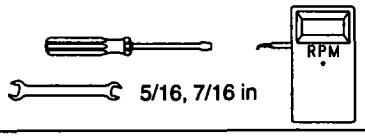
6 Nut

Shutdown lever screw normally does not require adjustment unless tampered with.

Loosen nuts. Adjust screw so lever hits screw and stops engine when engine control switch is turned to Stop position.

▲ **Do not loosen screw so much that lever hits internal stop or engine damage may occur.**

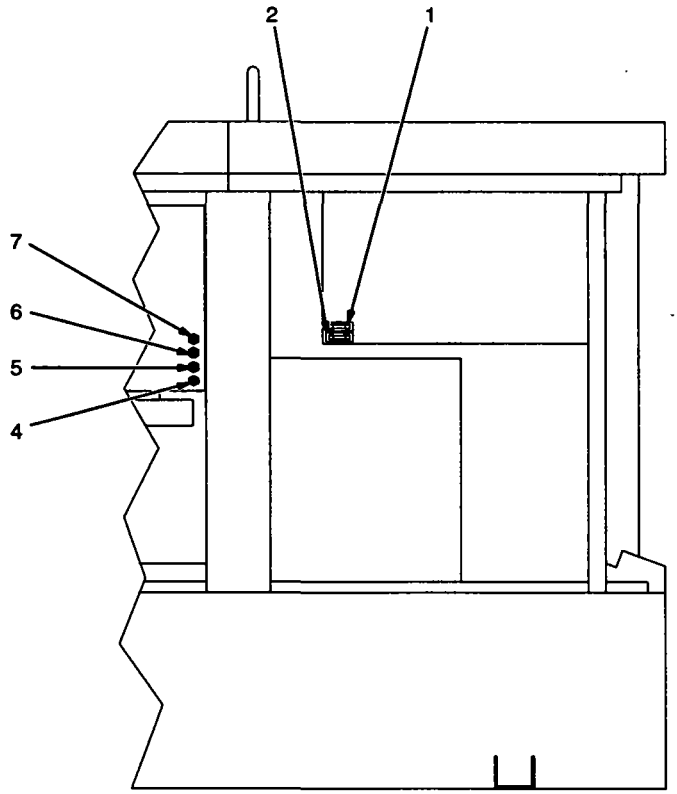
Tools Needed:

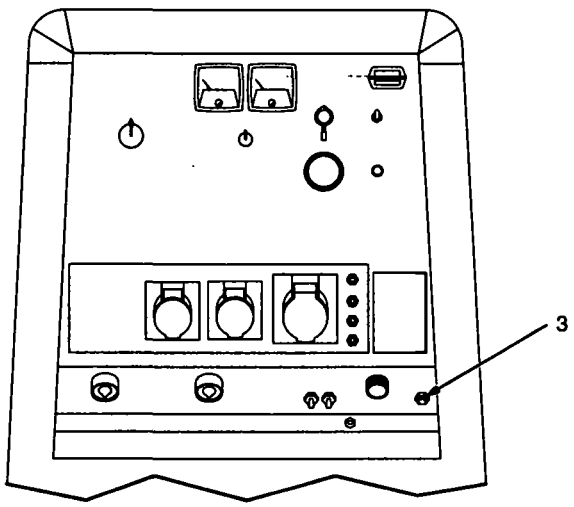


5/16, 7/16 in

Ref. ST-159 215-B

5-6. Overload Protection





☞ *If fuse or breaker continues to open, contact Factory Authorized Service Agent.*

Fuses

1 Fuse F2

F2 protects battery excitation circuit.

2 Fuse F3

F3 protects generator excitation circuit.

Replace any open fuses. Reinstall panel before operating unit.

Circuit Breakers

3 Circuit Breaker CB5

CB5 protects 24 volt ac output to Remote 14 receptacle RC1.

4 Circuit Breaker CB6

CB6 protects fuel solenoid circuit.

5 Circuit Breaker CB7

CB7 protects throttle solenoid circuit.

6 Circuit Breaker CB8

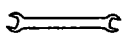
CB8 protects Engine Control switch and wiring harness.

7 Optional Circuit Breaker CB9

CB9 protects optional glow plug system.

Press button to reset breaker.

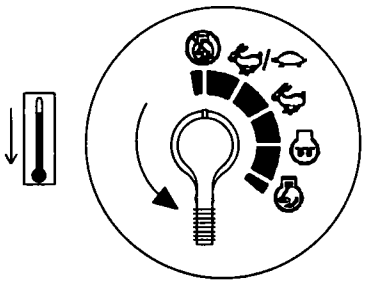
Tools Needed:

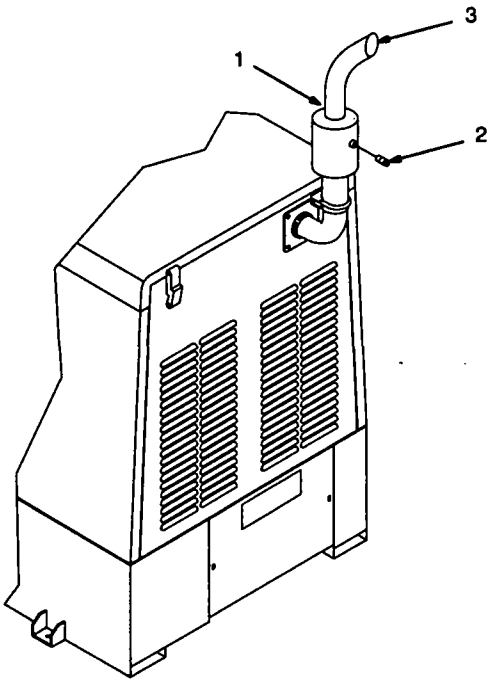


3/8, 1/2 in

Ref. ST-159 215-B / ST-158 934-B

5-7. Inspecting And Cleaning Optional Spark Arrestor





Stop engine and allow to cool.

1 Spark Arrestor

2 Cleanout Plug

Remove plug and remove any dirt covering cleanout hole.

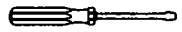
3 Exhaust Pipe

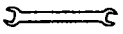
Start engine and run at idle speed to blow out cleanout hole. If nothing blows out of hole, briefly cover end of exhaust pipe with fireproof material.

Stop engine and allow to cool.

Reinstall cleanout plug.

Tools Needed:





3/8 in

ST-801 154-B / Ref. ST-175 920-A

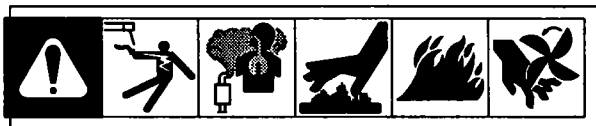
5-8. Troubleshooting

A. Welding

Trouble	Remedy
No weld output.	Check fuses F2 and F3, and replace if necessary (see Section 5-6).
	Have Factory Authorized Service Agent check main rectifier and capacitor C5.
	Check and secure connections to Remote 14 Receptacle RC1.
	Place Remote Output (Contactor) switch S6 in On position, or place switch in Remote 14 position and connect remote contactor to Remote 14 receptacle RC1 (See Section 3-2).
	Have Factory Authorized Service Agent check brushes and slip rings, and circuit board PC1.
Low weld output.	Check fuses F2 and F3, and replace if open (see Section 5-6).
	Check and adjust engine speed (see Section 5-5).
	Tune engine according to engine manual.
	Place Remote Amperage Control switch S7 in Panel position, or place switch in Remote 14 position and connect remote amperage control to Remote 14 receptacle RC1.
	Have Factory Authorized Service Agent check brushes and slip rings, main rectifier, integrated rectifier SR3, and capacitor C5.
High weld output.	Check and adjust engine speed (see Section 5-5).
	Have Factory Authorized Service Agent check main rectifier.

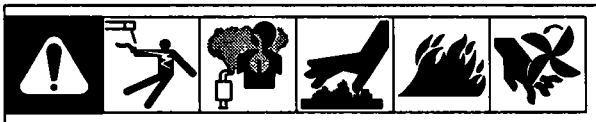
Trouble	Remedy
Erratic weld output.	Clean and tighten weld output connections inside and outside unit.
	Use dry, properly-stored electrodes.
	Be sure connection to work piece is clean and tight.
	Have Factory Authorized Service Agent check brushes, slip rings, main rectifier, integrated rectifier SR3, and capacitor C5.
No 24 volt ac output at Remote 14 receptacle RC1.	Place Remote Output (Contactor) switch S6 in Remote 14 position (see Section 3-2).
	Reset circuit breaker CB5 (see Section 5-6).

B. Auxiliary Power



Trouble	Remedy
No output at auxiliary power receptacles.	Reset ground fault circuit interrupter GFCI1 (see Section 4).
	Reset circuit breakers (see Section 4).
	Check receptacles for continuity and proper connections. Replace receptacle(s) if necessary.
	Check fuses F2 and F3, and replace if necessary (see Section 5-6).
	Disconnect equipment from receptacles.
	Have Factory Authorized Service Agent check brushes, slip rings, relay CR5, and relay CR6.
Low output at receptacles.	Check fuses F2 and F3, and replace if necessary (see Section 5-6).
	Check and adjust engine speed (see Section 5-5).
	Tune-up engine according to engine manual.
	Have Factory Authorized Service Agent check brushes, slip rings, and integrated rectifier SR3.
High output at receptacles.	Check and adjust engine speed.
Erratic output at receptacles.	Check receptacle wiring and connections.
	Have Factory Authorized Service Agent check brushes, slip rings, and integrated rectifier SR3.

C. Engine



Trouble	Remedy
Engine does not crank.	Reset circuit breaker CB8 (see Section 5-6).
	Check battery, and replace if necessary.
	Check Engine Control switch S1 and replace if necessary.
	Check engine charging and starting systems according to engine service manual.
Engine cranks but does not start.	Check fuel level (see Section 2-6).
	Reset circuit breaker CB6 (see Section 5-6).
	Check oil level. Engine stops if oil pressure gets too low (see Section 2-6).
	If equipped with glow plug (optional), reset circuit breaker CB9 (see Section 5-6).
	Check Engine Control switch S1, and replace if necessary.

Trouble	Remedy
	See engine manual.
High Or Low Engine Speed.	Check and adjust engine speed (see Section 5-5).
Engine does not return to idle speed.	Have Factory Authorized Service Agent check throttle solenoid TS1, relay CR3, relay CR4, and idle control module.
Engine idles but does not reach weld speed.	Reset circuit breaker CB7 (see Section 5-6).
	Have Factory Authorized Service Agent check throttle solenoid TS1, relay CR3, relay CR4, and idle control module.
Engine uses oil during run-in period; wetstacking occurs.	Dry engine according to engine manual run-in procedure.
Battery discharges between uses.	Clean battery, terminals, and posts with baking soda and water solution; rinse with clear water.
	Periodically recharge battery (approximately every 3 months).
	Check engine charging system according to engine service manual.
	Check Engine Control switch S1, and replace if necessary.
	Replace battery.
Engine stopped and cannot be re-started.	Check fuel level (see Section 2-6).
	Check circuit breaker CB8 (see Section 5-6).
	Check oil level. Engine stops if oil pressure gets too low (see Section 2-6).
	See engine manual.

NOTES

SECTION 6 – ELECTRICAL DIAGRAM

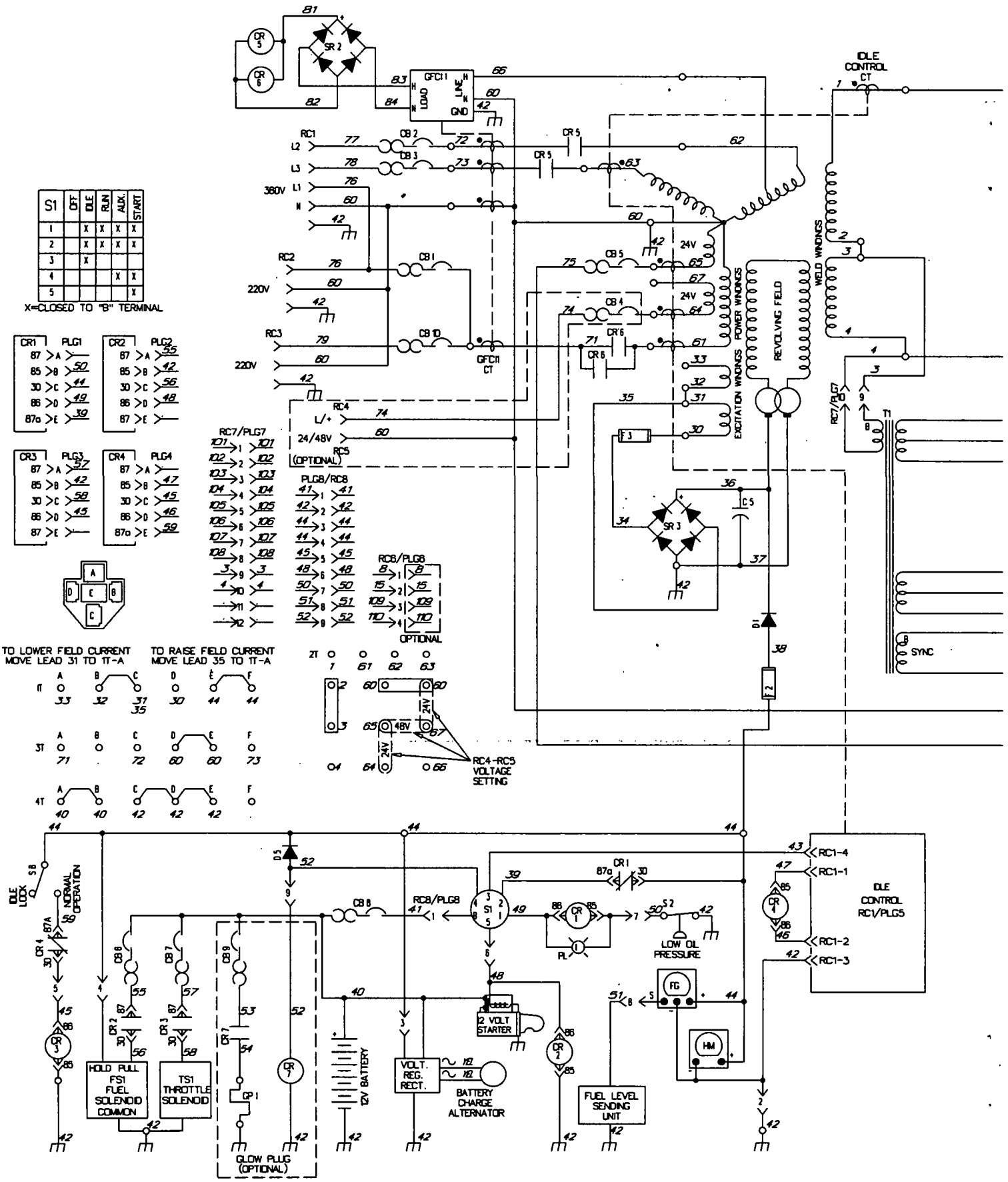
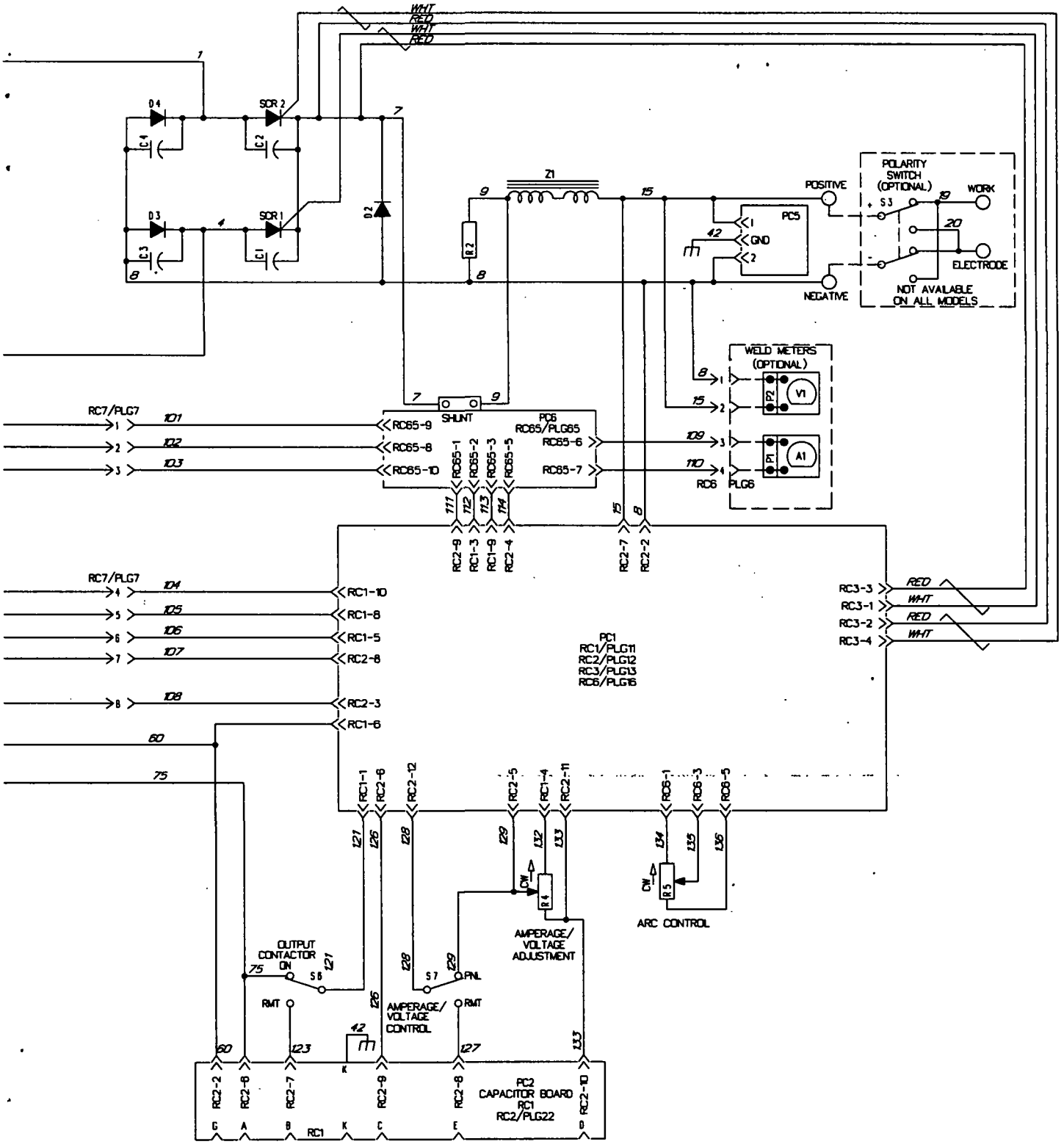
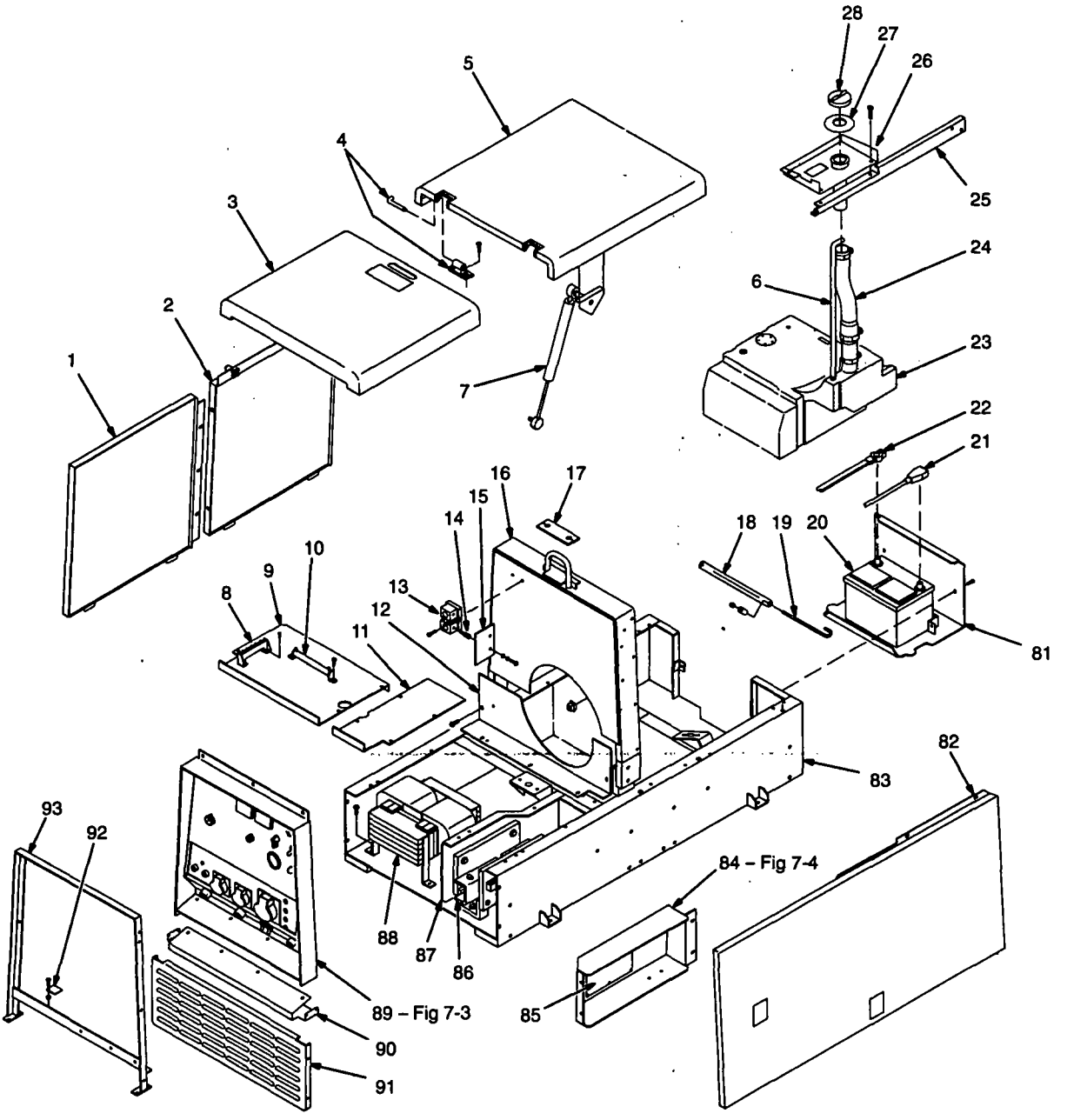


Figure 6-1. Circuit Diagram For Welding Generator

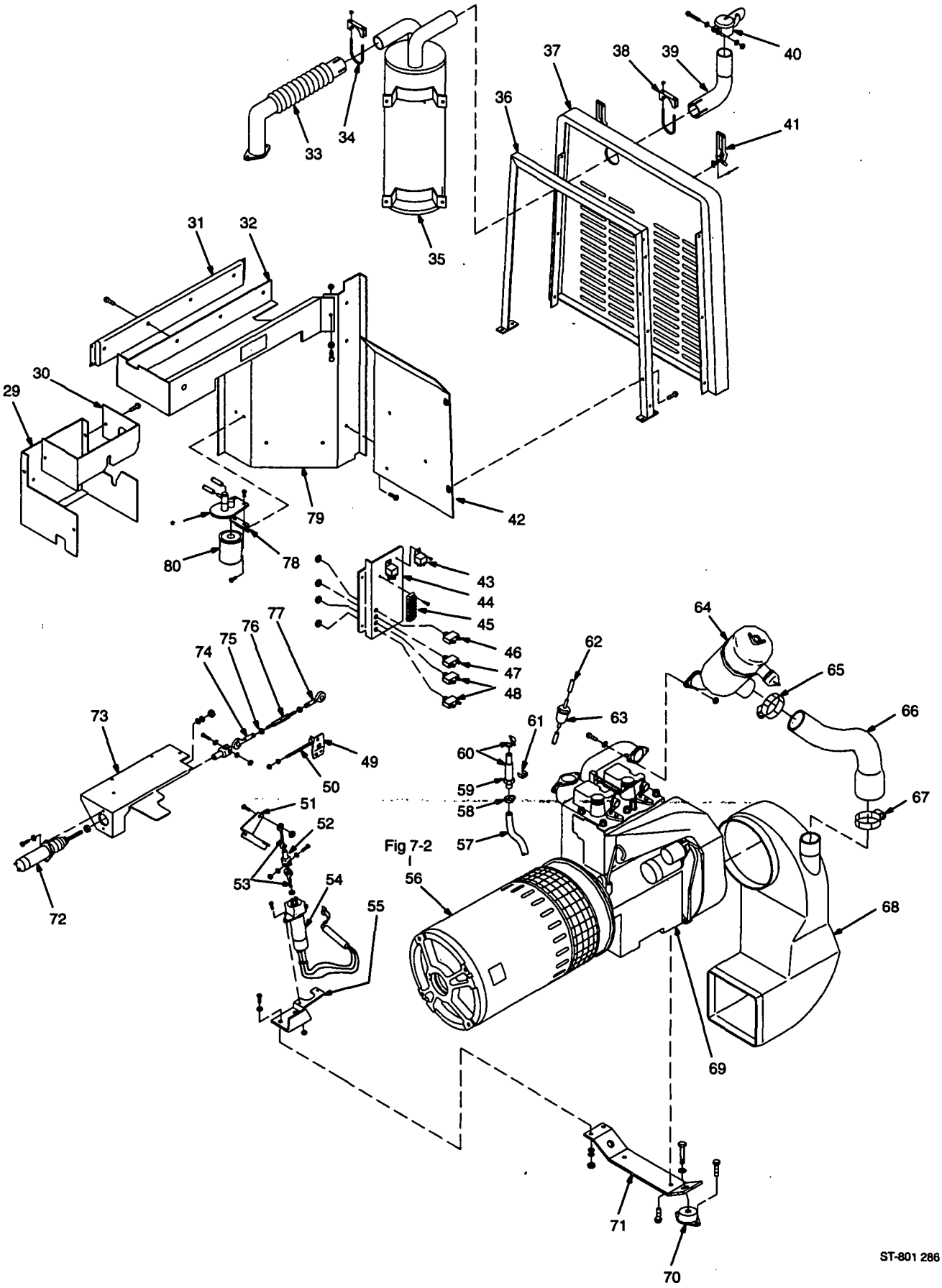


SD-172 300-D



*Included w/engine

Figure 7-1. Main Assembly



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

Figure 7-1. Main Assembly

1		+163 828	PANEL, side LH	1
2		164 507	PANEL, side LH rear	1
		171 053	SPRING, latch w/knob	2
3		+163 958	COVER, generator	1
		176 104	LABEL, warning falling equipment	1
4		165 839	HINGE, concealed	2
5		167 340	COVER, engine	1
6		107 816	HOSE, SAE .250 ID x .500 OD (order by ft)	2ft
7		172 295	GAS, spring	1
		172 297	BRACKET, flat mtg spring	1
		172 296	BALL GAS SPRING, stud	1
8	3T	172 661	BLOCK, stud connection	1
		173 734	LINK, jumper	1
9		166 215	COVER, stabilizer	1
		004 214	BUSHING, snap-in nyl 1.625 ID x 2.000mtg hole	1
10	R2	128 862	RESISTOR, WW adj 375W 50 ohm	1
11		166 214	COVER, rectifier	1
12		165 840	FIREWALL, bottom	1
		162 451	FIREWALL, top	1
13	Shunt	030 080	SHUNT, meter	1
14		109 830	STAND-OFF, No. 8-32 x .250	2
15	PC6	132 495	CIRCUIT CARD, shunt	1
16		162 636	UPRIGHT, base center	1
17		157 026	GASKET, lift eye	1
18		172 133	HOLDDOWN, battery	1
19		172 134	BOLT, J stl .250-20 x 9.500	2
20		168 037	BATTERY, stor 12V 430crk 75RSV	1
		108 081	TERMINAL PROTECTORS, battery post	2
21		082 316	CABLE, bat pos	1
		114 923	BOOT, insulator term post red	1
22		032 453	CABLE, bat neg	1
23		164 871	TANK, fuel 12gal (consisting of)	1
		172 373	.... SENDER, fuel gauge	1
		172 371	.... FITTING, stand pipe hose .250 x 8.875 lg	1
		172 372	.... FITTING, hose stl barbed M 1/4tbg	1
		124 253	.... BUSHING, tank fuel	1
24		171 348	HOSE ASSEMBLY, fuel tank	1
		089 120	CLAMP, hose .375-.450 slfttng green	1
		084 173	CLAMP, hose .460-.545 slfttng	3
25		165 355	BRACKET, brace back RH	1
26		165 354	PAN, fuel splash	1
		176 103	LABEL, use diesel fuel only	1
27		107 343	GROMMET, rbr neck filler	1
28		015 603	CAP, tank fuel	1
29		166 723	ENCLOSURE, sides lower manifold	1
30		166 638	ENCLOSURE, sides upper manifold	1
31		164 552	BRACKET, brace back LH	1
		176 109	LABEL, caution using either	1
32		166 634	DUCT, hot air	1
33		144 802	PIPE, exhaust flexible	1
34		010 875	CLAMP, muffler 2.000	1
35		142 065	MUFFLER, exhaust	1
36		162 448	UPRIGHT, base rear	1
37		164 318	PANEL, rear	1
		176 230	LABEL, hot exhaust parts do not touch	1
38		109 591	CLAMP, muffler 1.750	1
39		173 931	PIPE, exhaust elbow	1
40		603 767	CAP, weather No. 3	1

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

Figure 7-1. Main Assembly (Continued)

... 41		167 313	.. LATCH, elastic draw	2
... 42		166 722	.. BAFFLE, rear panel	1
... 43	CR2,3	090 104	.. RELAY, encl 12VDC.SPST	2
... 44		173 366	.. PANEL, mtg components	1
... 45	4T	174 901	.. BLOCK, term 30A 6P	1
		♦043 138	.. COLD WEATHER DIESEL STARTING, (consisting of)	1
... 46	CB9	147 658	.... CIRCUIT BREAKER, man reset 1P 30A 250VAC	1
	GP1	164 938	.... GLOW PLUG, 12V 65A	1
	CR7	155 309	.... CONTACTOR, solenoid 12VDC	1
... 47	CB8	115 427	.. CIRCUIT BREAKER, man reset 1P 25A 250VAC	1
... 48	CB6,7	083 432	.. CIRCUIT BREAKER, man reset 1P 10A 250VAC	2
... 49		175 897	.. LEVER, shutdown	1
... 50		170 438	.. SCREW, spot weld .250-20 x 3.000	1
... 51		172 375	.. LEVER, throttle	1
... 52		127 648	.. CLEVIS, throttle	2
... 53		175 895	.. LINKAGE, spherical rod end 1/4-28	2
... 54	TS1	176 625	.. SOLENOID, throttle & timing module	1
... 55		172 374	.. BRACKET, mtg throttle solenoid	1
... 56		Fig 7-2	.. GENERATOR	1
... 57			HOSE, oil drain (included w/engine)	1
... 58		099 542	.. CLAMP, hose .583-.688clp dia	1
... 59		176 166	.. FITTING, hose brs barbed fem 3/8tbg x 3/8NPT	1
... 60		165 271	.. VALVE, oil drain 3/8-18NPTF	1
... 61		176 244	.. SPRING CLIP, oil drain hose	1
... 62		107 816	.. HOSE, SAE .250 ID x .500 OD (order by ft)	1ft
... 63		*066 113	.. FILTER, fuel inline	1
... 64		176 541	.. AIR CLEANER, intake (consisting of)	1
		*065 604	.... AIR ELEMENT	1
... 65		010 862	.. CLAMP, hose 1.562-2.500clp dia	1
... 66		176 467	.. HOSE, air cleaner	1
... 67		010 863	.. CLAMP, hose 1.125-3.000clp dia	1
... 68		154 639	.. HOUSING, blower	1
... 69		150 706	.. ENGINE, Deutz elec Ruggerini	1
... 70		166 094	.. MOUNT, engine vibration	3
... 71		166 093	.. BRACKET, mtg engine	1
... 72	FS1	176 626	.. SOLENOID, fuel	1
... 73		166 724	.. BRACKET, mtg solenoid	1
... 74		175 893	.. LINKAGE, spherical rod end 1/4-28 LH female	1
... 75		126 388	.. NUT, .250-28 LH	1
... 76		172 392	.. LINKAGE, engine auto shutdown	1
... 77		175 894	.. LINKAGE, spherical rod end 10-32 female w/stud	1
... 78		166 726	.. BRACKET, mtg fuel filter	1
... 79		166 635	.. ENCLOSURE, muffler	1
... 80		*066 893	.. FILTER, fuel element	1
... 81		+166 952	.. BATTERY BOX	1
		176 108	.. LABEL, warning battery explosion	1
... 82		+163 074	.. PANEL, side RH	1
		176 106	.. LABEL, warning moving parts	2
		173 830	.. LABEL, EEC sound power level	2
... 83		+162 429	.. BASE	1
		157 797	.. LABEL, engine maintenance	1
		176 105	.. LABEL, warning general precautionary	1
		176 100	.. LABEL, rating (standard)	1
		176 006	.. LABEL, rating (48V optional receptacle)	1
... 84		Fig 7-4	.. CONTROL BOX w/COMPONENTS	1
... 85	PC1	173 421	.. CIRCUIT CARD, control main	1

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

Figure 7-1. Main Assembly (Continued)

... 86		162 515	.. RECTIFIER, si diode (consisting of)	1
	C1,3	048 420	.... CAPACITOR, cer disc .01uf 1000VDC	2
	C2,4	106 641	.... CAPACITOR, cer disc .01uf 500VDC	2
	D1-3	037 957	.... DIODE, rect 275A 300V RP	3
	SCR1,2	162 516	.... THYRISTOR, SCR 300A 300V	2
		028 388	.... CLAMP, thyristor	2
... 87		162 442	.. PANEL, air duct	1
... 88		163 608	.. STABILIZER	1
... 89		Fig 7-3	.. PANEL, front w/components	1
... 90		164 126	.. TRIM, panel front bottom	1
... 91		167 658	.. PANEL, front lower	1
... 92	PC5	148 608	.. CIRCUIT CARD, filter HF	1
		141 690	.. GROMMET, scr No. 8/10 panel hole	2
... 93		162 447	.. UPRIGHT, base front	1
		172 804	.. HARNESS, wiring unit	1
		173 654	.. HARNESS, engine	1
		172 802	.. HARNESS, receptacle	1
		161 058	.. KIT, label	1
		137 180	.. CLAMP, stl cushion .875dia	1

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

Item No.	Part No.	Description	Quantity

Figure 7-2. Generator (Fig 7-1 Item 56)

... 1	166 770	.. STUD, stl .375-16 x 19.750	1
... 2	160 943	.. ENDBELL	1
... 3	166 727	.. ROTOR, generator (consisting of)	1
... 4	053 390	.... BEARING, ball sgl row	1
... 5	160 566	.... FAN, rotor gen	1
... 6	+172 462	.. STATOR, generator	1
... 7	172 656	.. GUARD, generator wire mesh	1
... 8	172 674	.. SPRING, ext	2
... 9	165 850	.. ADAPTER, engine	1
... 10	176 106	.. LABEL, warning moving parts	2
... 11	170 861	.. STUD, stl .375-16 x 17.375	4
... 12	125 548	.. HOLDER, brush elect	1
... 13	005 614	.. HOLDER, brush	2
... 14	*126 984	.. BRUSH w/SPRING	2
... 15	161 306	.. CAP, brushholder	2
... 16	047 879	.. BAR, retaining brushholder	1

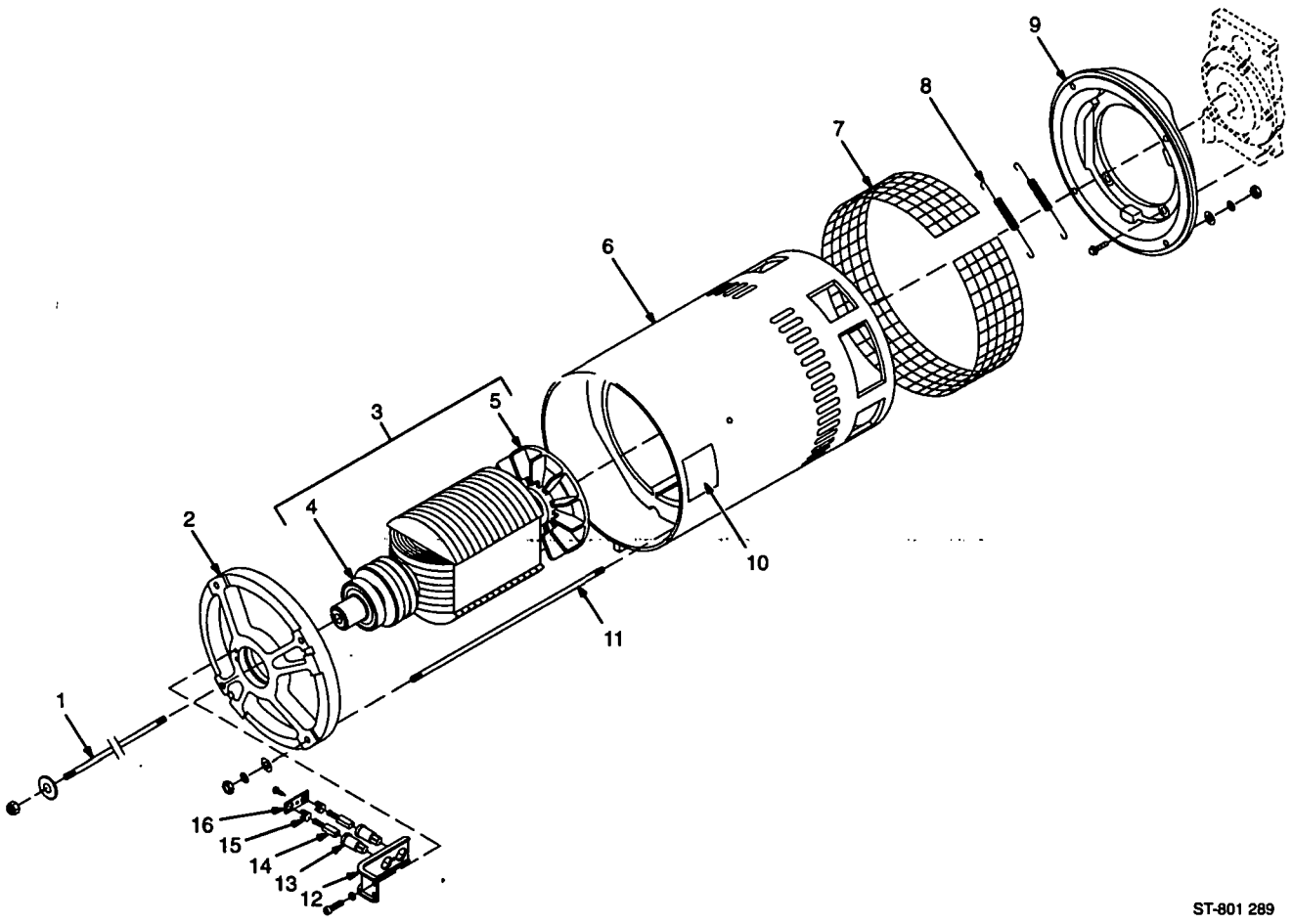


Figure 7-2. Generator

+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.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 7-3. Panel, Front w/Components (Fig 7-1 Item 89)	
1	R4,5	072 623	POTENTIOMETER, CP plain rnd 1/T 2W 1K linear	2
2	S1	172 070	SWITCH, ignition 5posn	1
3		169 299	PANEL, front	1
4	S6-8	011 609	SWITCH, tgl SPDT 15A 125VAC	3
5	RC2,3	176 355	RECEPTACLE, str 2P3W 16A 220V	2
		♦043 254	RECEPTACLE, 48V dinse (consisting of)	1
6	RC4,5	087 640	RECEPTACLE, twlk fem Dinse 25 series	2
7	CB4	141 267	CIRCUIT BREAKER, man reset 1P 50A 250VAC	1
8		175 915	PANEL, receptacle European	1
			PLATE, receptacle (order by model and serial number)	1
9	CB1-3,10	139 266	CIRCUIT BREAKER, man reset 1P 15A 250VAC	4
10	GFCI1	172 072	SENSOR, GFCI Test & Reset 50A 240V	1
11	RC1	156 830	RECEPTACLE, str 5P5W 16A 380V	1
12		154 022	COVER, receptacle GFCI	1
13	PC2	147 554	CIRCUIT CARD, connector/receptacle	1
14	CB5	083 432	CIRCUIT BREAKER, man reset 1P 10A 250VAC	1
15			NAMEPLATE, (order by model and serial number)	1
16		170 391	CONNECTOR, circ protective cap size 20	1
17		021 385	BOOT, tgl switch lever	3
18		129 525	RECEPTACLE, twlk fem Dinse 50/70 series	2
19		082 788	HOLDER, light ind	1
20	PL1	*048 155	BULB, incand min 14V	1
21		082 789	LENS, light ind red	1
22	FG	118 066	GAUGE, fuel elec 12V	1
23		119 014	LEVER, switch black	1
24		097 922	KNOB, pointer	1
25		097 924	KNOB, pointer	1
26		072 590	LOCK, shaft pot	2
27	HM	145 247	METER, hour 12-24VDC	1

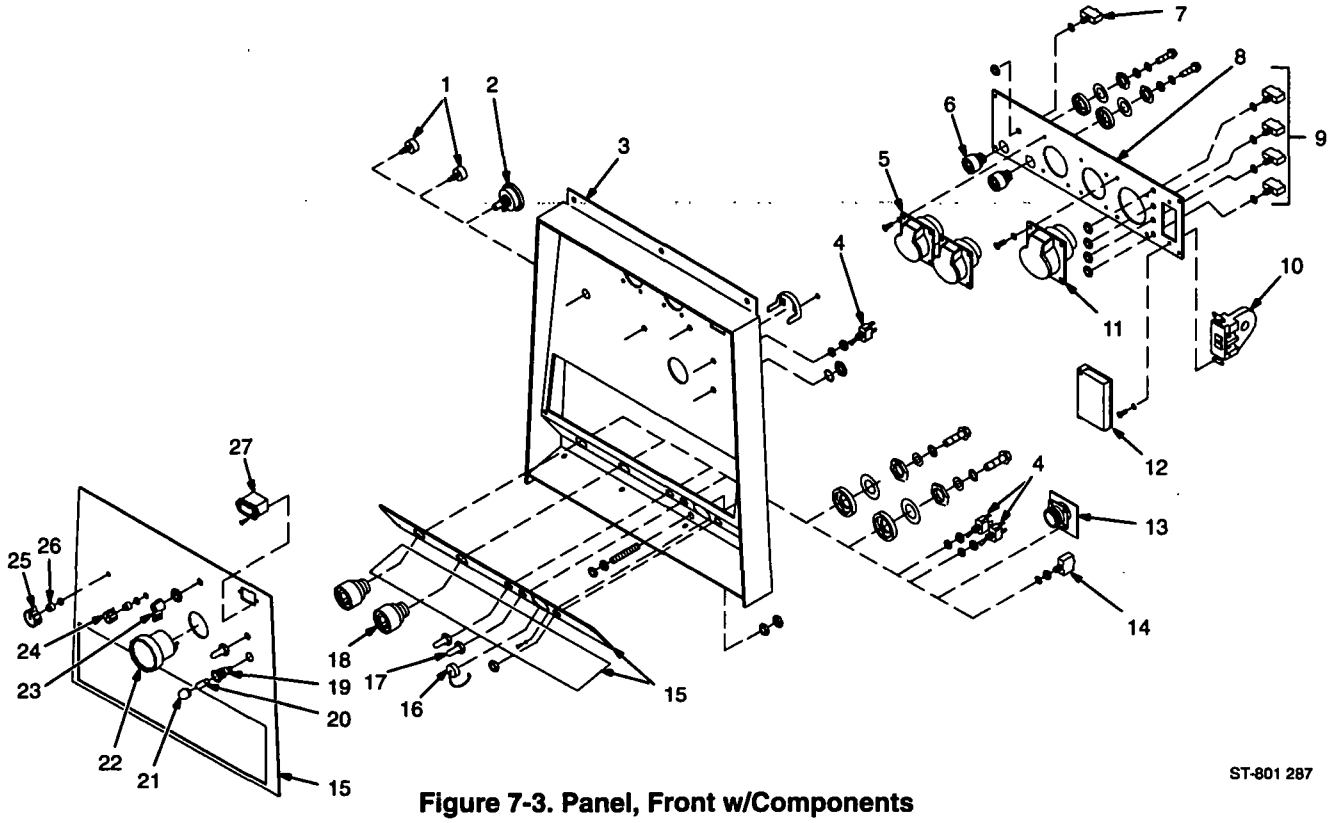


Figure 7-3. Panel, Front w/Components

♦OPTIONAL
*Recommended Spare Parts.
BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

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

Figure 7-4. Component Box (Fig 7-1 Item 84)

1	D1,5	135 184	DIODE BOARD	2
2		038 889	STUD, pri board brs .250-20 x 1.750	13
		010 915	WASHER, flat brs .257 ID x .640 OD	13
		601 836	NUT, brs .250-20	13
3	T1	156 583	TRANSFORMER, control 42/36V	1
4	SR2,3	035 704	RECTIFIER, integ 40A 800V	2
5		083 147	GROMMET, scr No. 8/10 panel hole	5
6		010 494	BUSHING, snap-in nyl 1.375 ID x 1.750mtg hole	1
7		026 947	STAND-OFF, insul .250-20 x 1.000 lg	4
8	CR5,6	174 596	RELAY, encl 110VDC DPST	2
9	CR1,4	173 069	RELAY, encl 12VDC SPDT	2
10		171 345	TERMINAL BOARD, stator hook-up	1
11		166 719	MODULE, idle	1
12		098 376	HOLDER, fuse mintr	1
13	F2	*073 426	FUSE, mintr gl slo-blo 5A 125V	1
14	F3	*142 751	FUSE, mintr cer slo-blo 30A 125V	1
15		087 111	CLAMP, capacitor	1
16	C1	087 110	CAPACITOR, elctlt 240uf 200VDC	1
17	1T	038 772	BLOCK, term 20A 6P	1
		601 219	LINK, jumper 20A	2

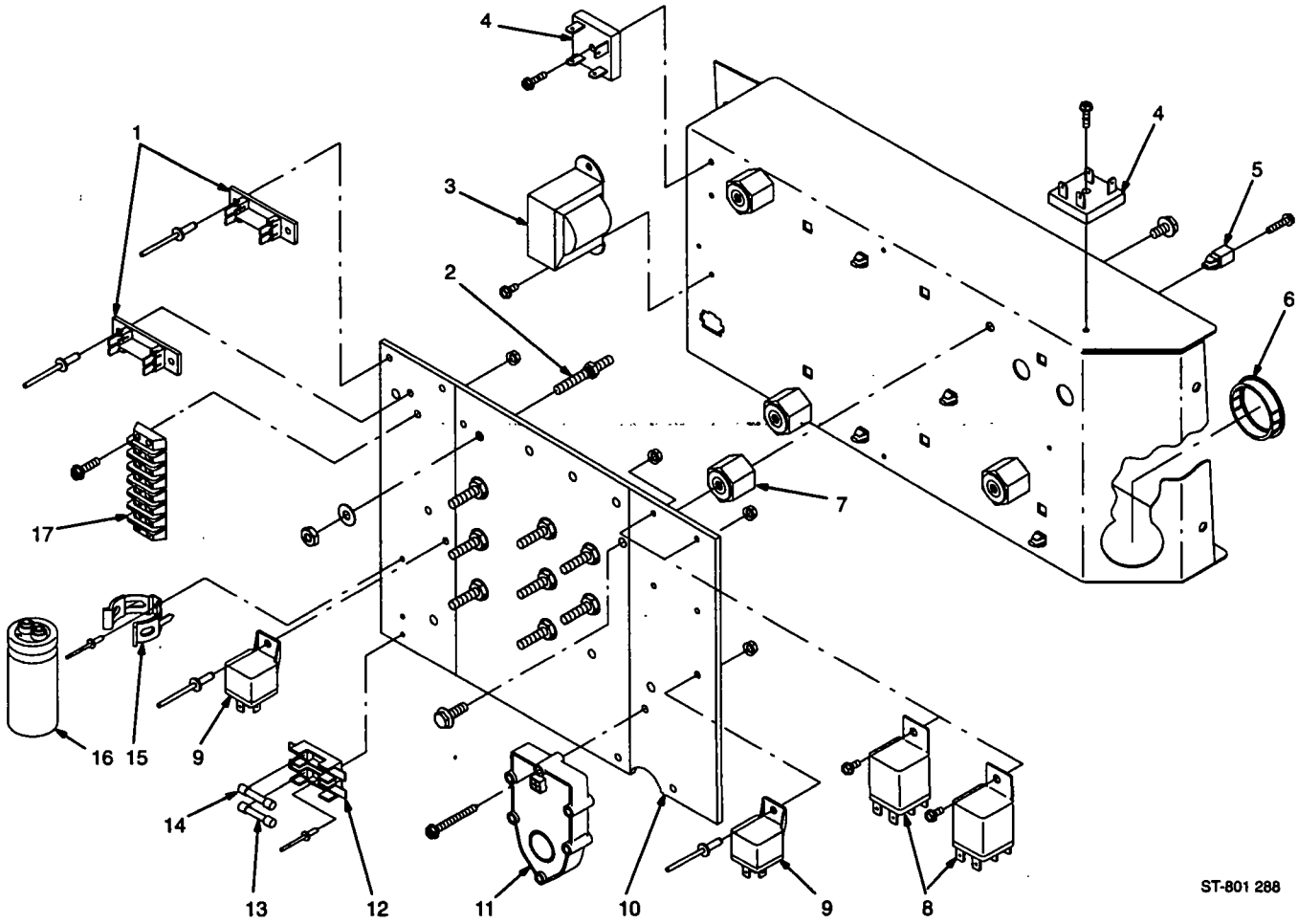


Figure 7-4. Component Box

*Recommended Spare Parts.
BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.