RED-D-ARC
Welderentals
1-800-245-3660

TM-4412 March 2002

Eff. w/Serial Number LC110463

Processes

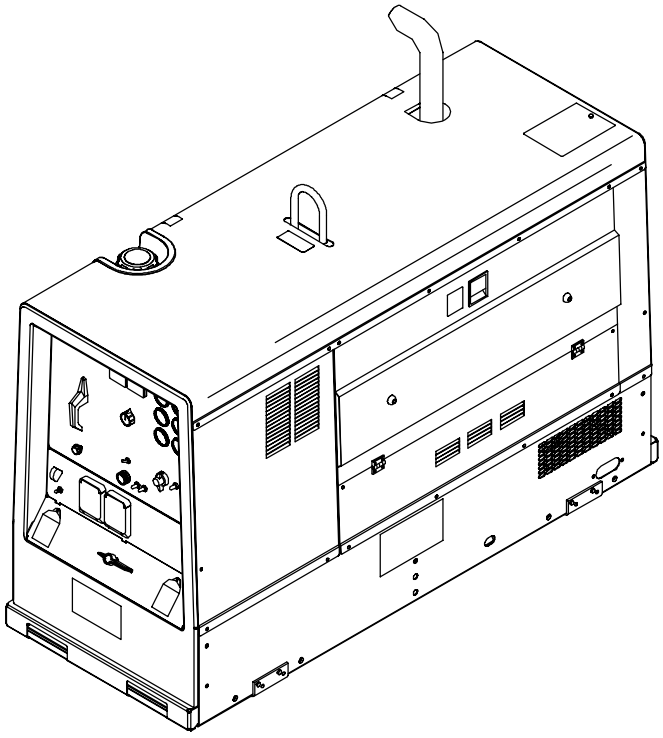
- Stick (SMAW) Welding
- TIG (GTAW) Welding
- MIG (GMAW) Welding
- Flux Cored (FCAW) Welding
- Air Carbon Arc (CAC-A) Cutting and Gouging

Description

Engine Driven Welding Generator

D502K 5+4

CC/CV DC Diesel Welder



TECHNICAL MANUAL

www.red-d-arc.com

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(Continued)

⚠ WARNING

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

⚠ WARNING

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

CALIFORNIA
Proposition 65 Warning

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

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SECTION 1 – SAFETY PRECAUTIONS FOR SERVICING

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. Servicing Hazards

▲ **The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard.**

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

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

ELECTRIC SHOCK can kill.

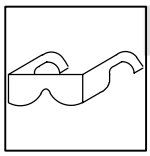
- Do not touch live electrical parts.
- Stop engine before testing or repairing unit unless the procedure specifically requires an energized unit.
- Insulate yourself from ground by standing or working on dry insulating mats big enough to prevent contact with the ground.
- Do not leave live unit unattended.
- When testing live unit, use the one-hand method. Do not put both hands inside unit. Keep one hand free.

SIGNIFICANT DC VOLTAGE exists after stopping engine on inverters.

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

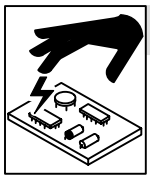
MOVING PARTS can cause injury.

- Keep away from moving parts such as fans, belts, and rotors.
- Have only qualified people remove guards or covers for maintenance and troubleshooting as necessary.
- Keep hands, hair, loose clothing, and tools away from moving parts.
- Before working on generator, remove spark plugs or injectors to keep engine from kicking back or starting.
- Block flywheel so that it will not turn while working on generator components.
- Reinstall panels or guards and close doors when servicing is finished and before starting engine.



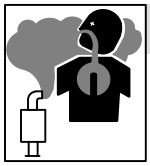
FLYING METAL can injure eyes.

- Wear safety glasses with side shields or face shield during servicing.
- Be careful not to short metal tools, parts, or wires together during testing and servicing.



STATIC (ESD) can damage PC boards.

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



ENGINE EXHAUST GASES can kill.

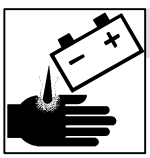
- Do not breathe exhaust fumes.
- Use in open, well-ventilated areas, or vent exhaust outside and away from any building air intakes.

FUEL can cause fire or explosion.

- Stop engine and let it cool off before checking or adding fuel.
- Do not add fuel while smoking or if unit is near any sparks or open flames.
- Do not overfill tank; clean up any spilled fuel.

BATTERY EXPLOSION can BLIND.

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

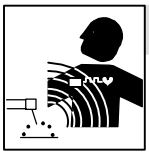


BATTERY ACID can BURN SKIN and EYES.

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

STEAM AND HOT COOLANT can burn.

- If possible, check coolant level when engine is cold to avoid scalding.
- Always check coolant level at overflow tank, if present on unit, instead of radiator.
- If the engine is warm, checking is needed, and there is no overflow tank, follow the next two statements.
- Wear safety glasses and gloves and put a rag over radiator cap.
- Turn cap slightly and let pressure escape slowly before completely removing cap.



MAGNETIC FIELDS can affect pacemakers.

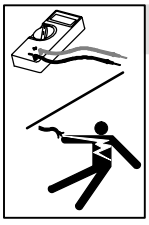
- Pacemaker wearers keep away from servicing areas until consulting your doctor.

FALLING UNIT can cause injury.

- Use equipment of adequate capacity to lift and support unit and components.
- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Securely attach components to lifting equipment.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.

HOT PARTS can cause severe burns.

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



SHOCK HAZARD from testing.

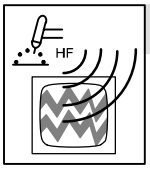
- Stop engine before making or changing meter lead connections.
- Use at least one meter lead that has a self-retaining spring clip such as an alligator clip.
- Read instructions for test equipment.

TILTING OR TIPPING can cause injury.

- Do not put any body part under unit while lifting.
- Always use proper equipment (hoists, slings, chains, blocks, etc.) of adequate capacity to lift and support components (stator, rotor, engine, etc.) as needed during job.

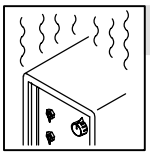
PINCH POINTS can injure.

- Be careful when working on stator and rotor assemblies.



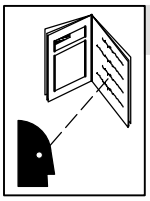
H.F. RADIATION can cause interference.

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



OVERUSE can cause OVERHEATING.

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



READ INSTRUCTIONS.

- Use Testing Booklet (Part No. 150 853) when servicing this unit.
- Consult the Owner's Manual for welding safety precautions.
- Use only genuine replacement parts.
- Reinstall injectors and bleed air from fuel system according to engine manual.

1-3. EMF Information

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

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

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

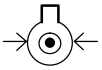
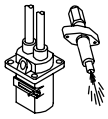
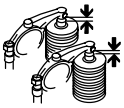
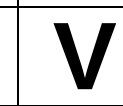
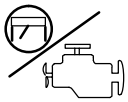
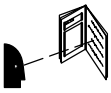
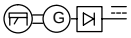
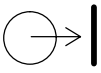
1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld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

About Pacemakers:

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

SECTION 2 – DEFINITIONS

2-1. Symbols And Definitions

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

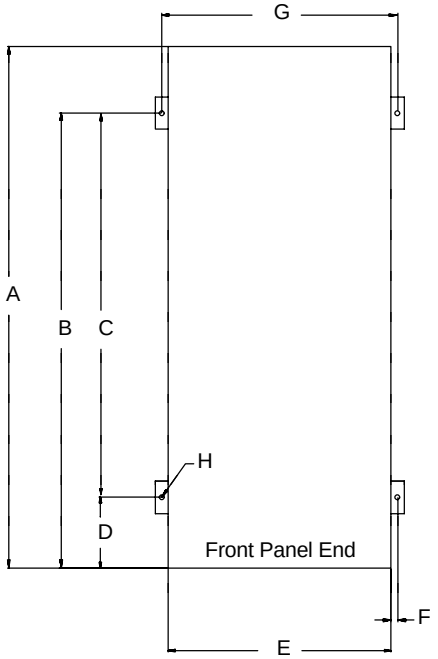
SECTION 3 – SPECIFICATIONS

3-1. Weld, Power, And Engine Specifications

Welding Mode	Weld Output Range	Rated Welding Output	Maximum Open-Circuit Voltage	Auxiliary Power Rating	Engine	Fuel Capacity
CC/DC	20 – 600 A	500 A, 40 Volts DC, 100% Duty Cycle	95	**Standard**: Single-Phase, 4 kVA/kW, 20/17 A, 120/240 V AC, 50/60 Hz	Kubota V3300-B Water-Cooled, Four Cylinder, 49 HP Diesel Engine	25 gal (95 L)
CV/DC	14 – 40 V	600 A, 44 Volts DC, 40% Duty Cycle	56			

3-2. Dimensions, Weights, And Operating Angles

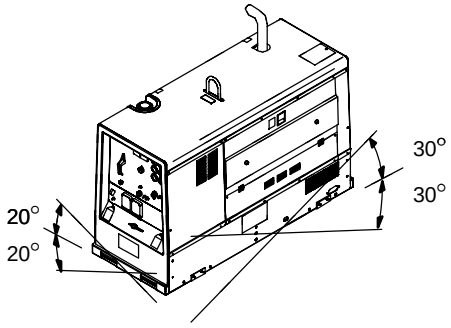
Dimensions	
Height	50 in (1270 mm) (to top of muffler)
Width	28-1/2 in (724 mm) (mtg. brackets turned in) 30-3/4 in (781 mm) (mtg. brackets turned out)
Depth	69-1/2 in (1765 mm)
A	69-1/2 in (1765 mm)
B*	55-7/8 in (1419 mm)
C*	46-3/8 in (1178)
D*	9-1/2 in (241 mm)
E	27-1/2 in (699 mm)
F	1 in (25 mm)
G	29-1/2 in (749 mm)
H	9/16 in (14 mm) Dia. 4 Holes
* With mounting brackets in center position. Dimensions vary with location of mounting brackets.	
Weight	
No fuel: 1808 lb (820 kg)	



802 161-A

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

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



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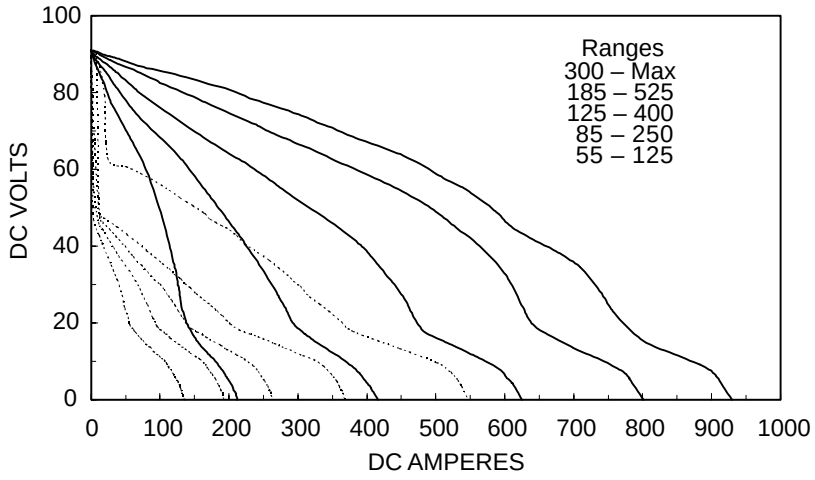
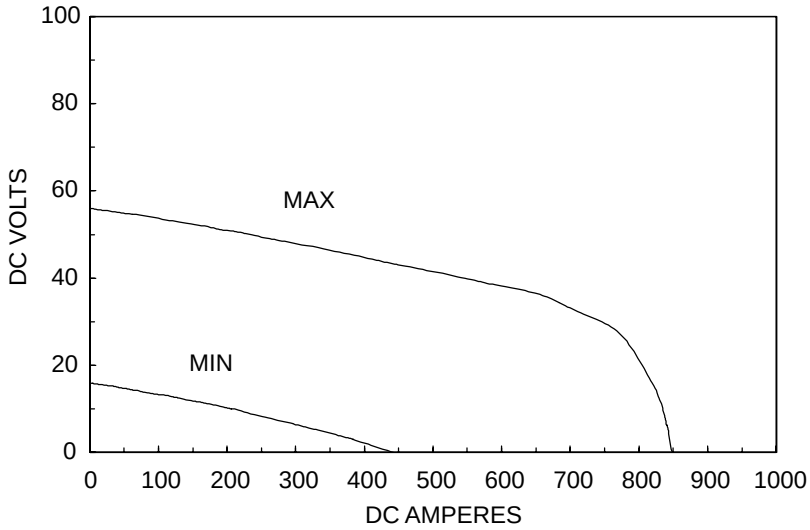
3-3. Volt-Ampere Curves

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

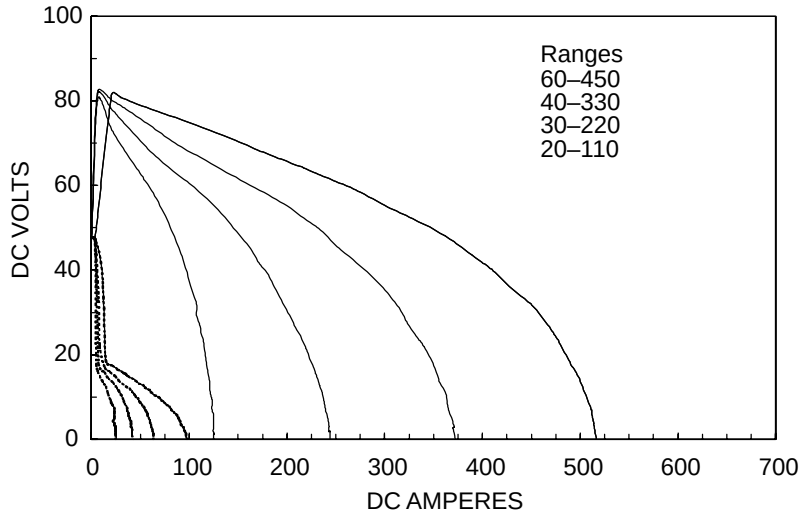
A. Stick Mode



B. MIG Mode



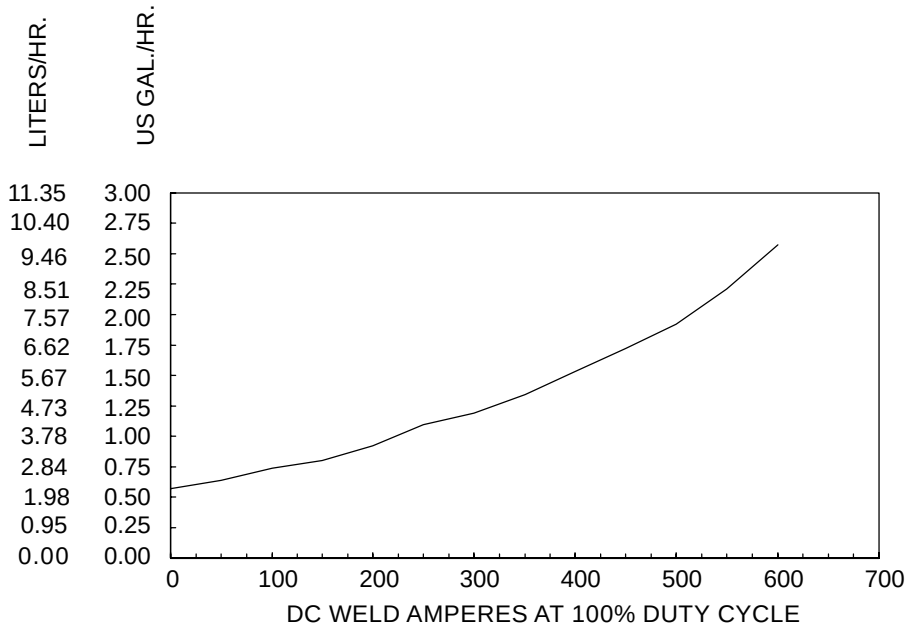
C. TIG Mode



208 135 / 203 415 / 208 136

3-4. Fuel Consumption

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



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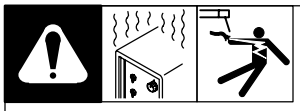
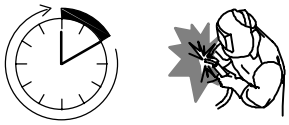
3-5. Duty Cycle And Overheating



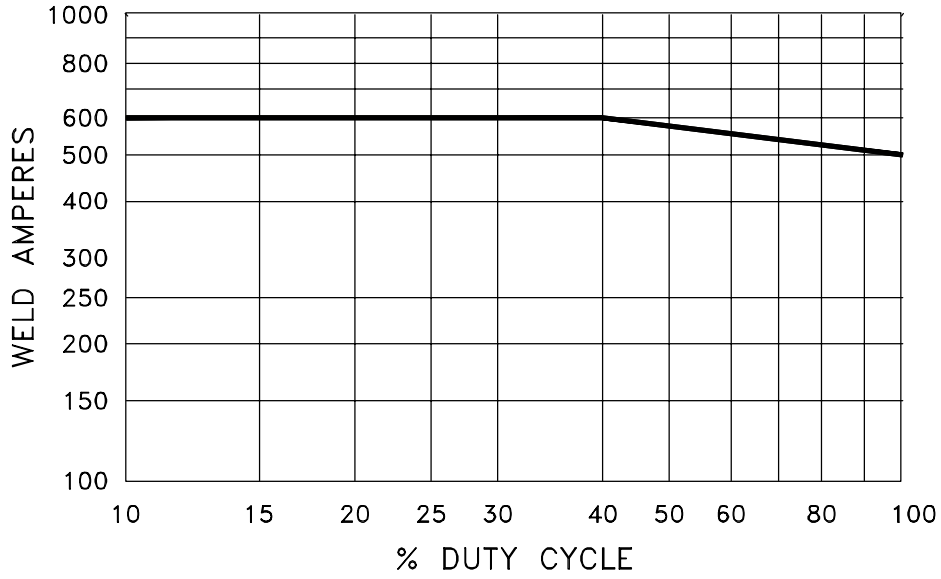
100% Duty Cycle At 500 Amperes



Continuous Welding

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

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



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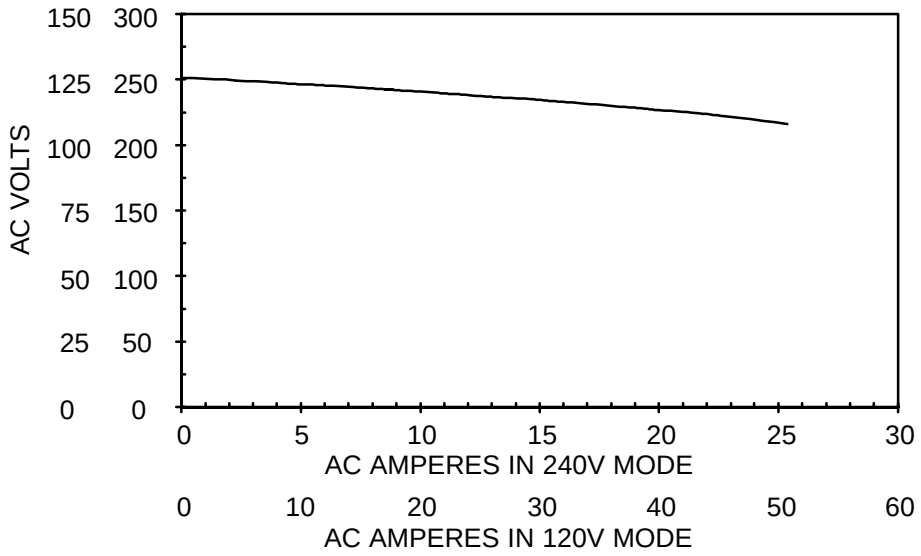
3-6. AC Auxiliary Power Curve

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



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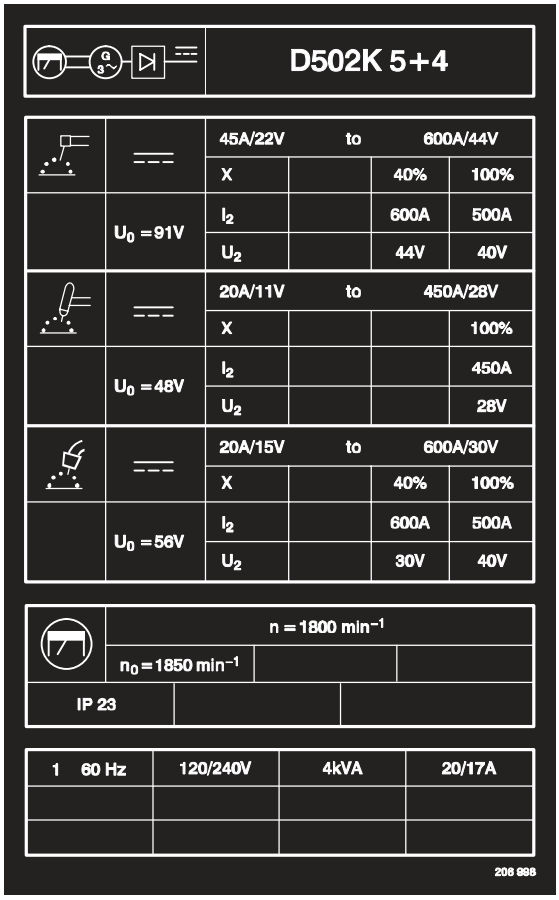
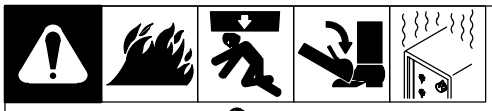
3-7. Manufacturer's Rating Label

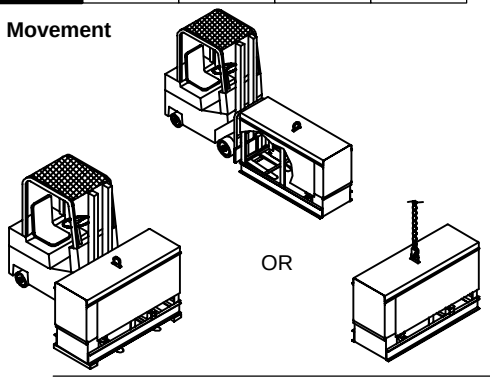


SECTION 4 – INSTALLATION

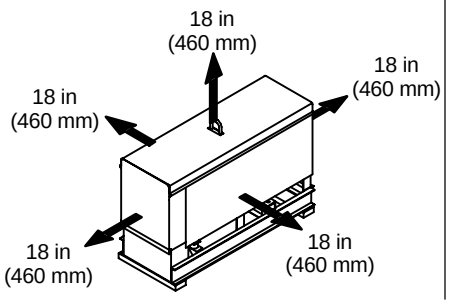
4-1. Installing Welding Generator (See Section 4-3)



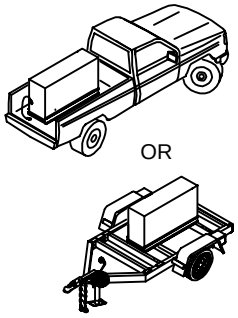
Movement



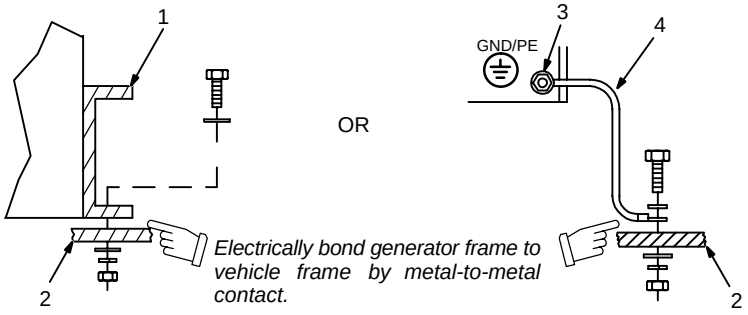
Airflow Clearance



Location



Grounding



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

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

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

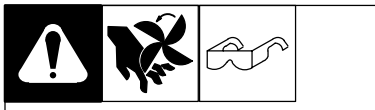
1 Generator Base
2 Metal Vehicle Frame
3 Equipment Grounding Terminal
4 Grounding Cable

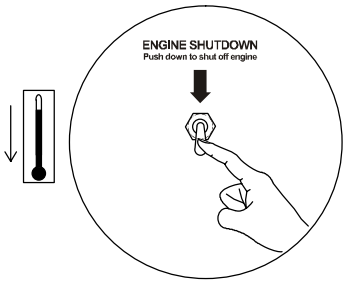
Use #10 AWG or larger insulated copper wire.

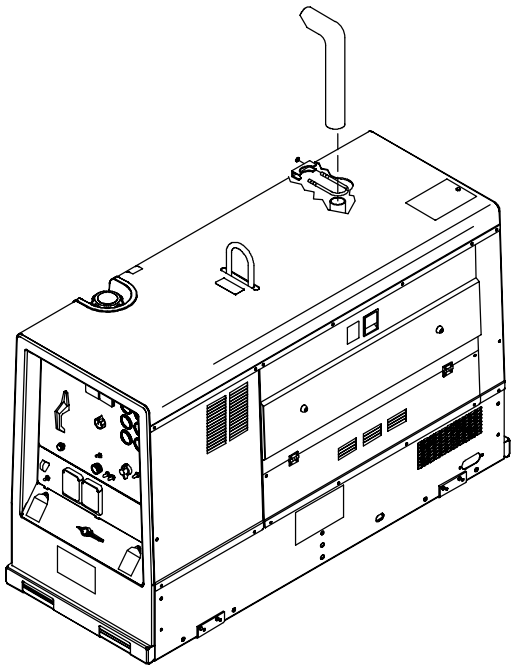
▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

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

4-2. Installing Exhaust Pipe







▲ **Stop engine and let cool.**

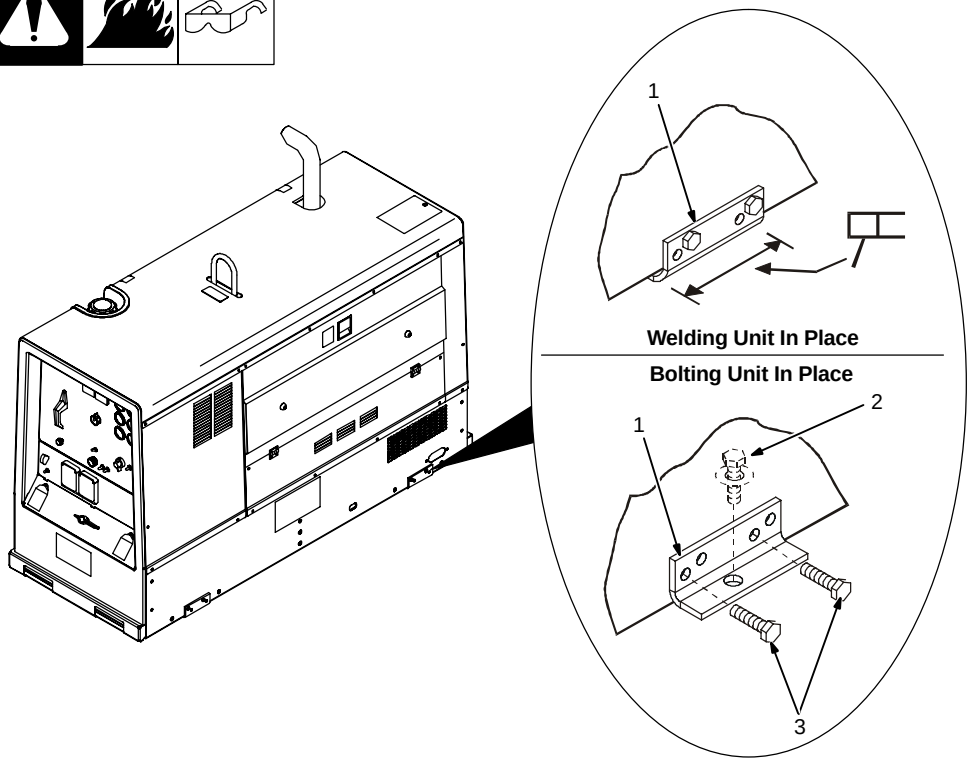
☞ *Point exhaust pipe in desired direction but always away from front panel and direction of travel.*

Tools Needed:

1/2 in

803 122 / Ref. 802 169 / Ref. 202 705

4-3. Mounting Welding Generator



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

1 Mounting Bracket

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

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

To Weld Unit In Place:

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

To Bolt Unit In Place:

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

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

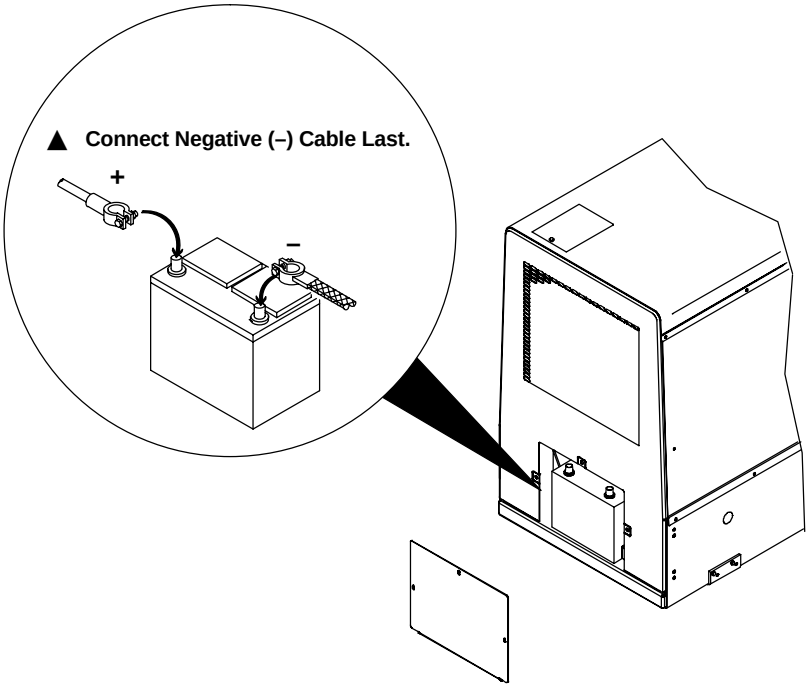
Tools Needed:

9/16 in

803 122 / Ref. 802 169-B

4-4. Connecting The Battery

☞ *Reinstall cover after connecting battery.*

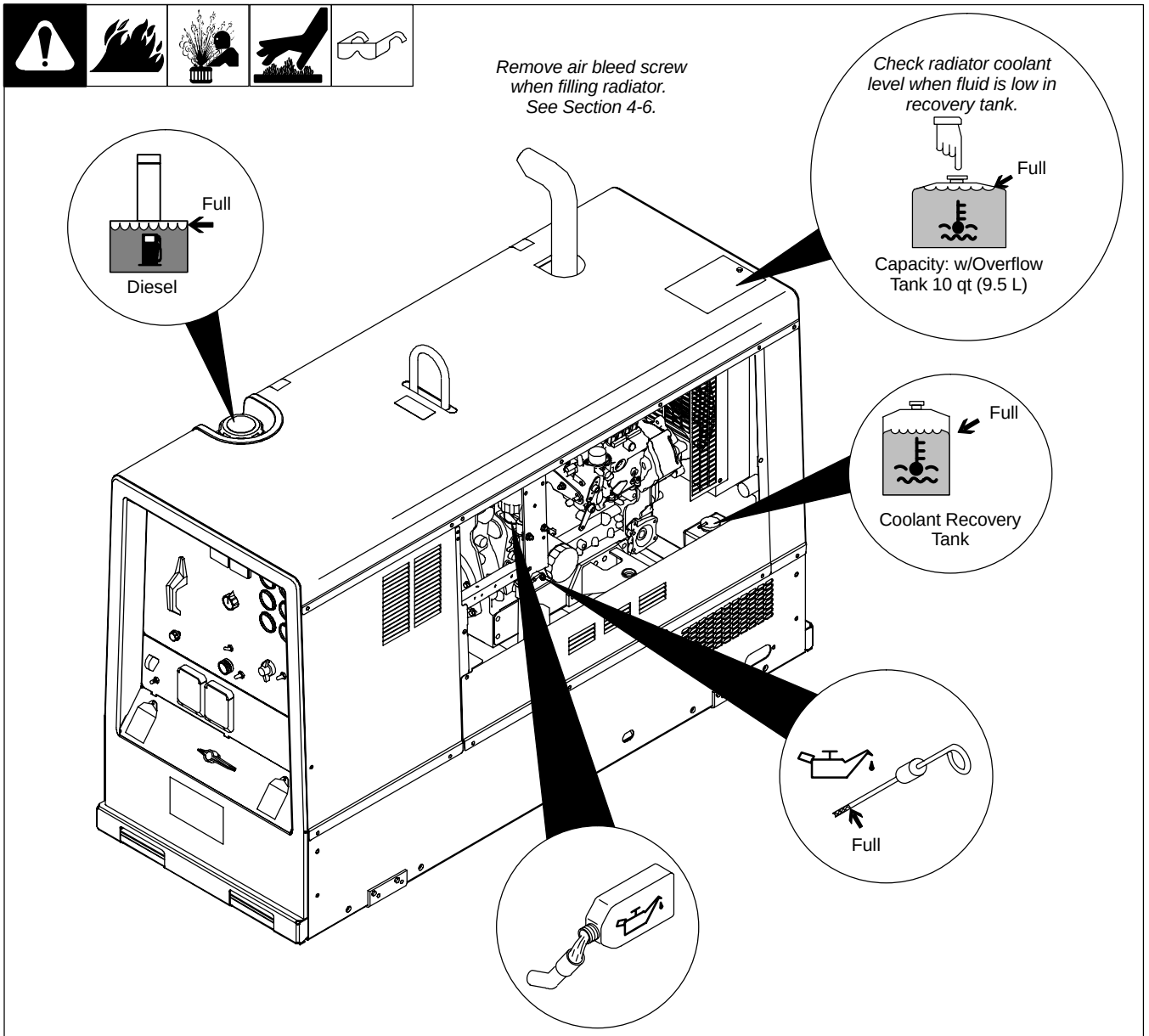


Tools Needed:

1/2 in

802 168-E / Ref. 202 705 / 802 313 / S-0756-C

4-5. Engine Prestart Checks



☞ *Check all engine fluids daily.*

Engine must be cold and on a level surface. Unit is shipped with 20W break-in oil. The Automatic shutdown system stops engine if oil pressure is too low or coolant temperature is too high.

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

Follow run-in procedure in engine manual. If unburned fuel and oil collect in exhaust pipe during run-in, see Section 13.

Fuel

▲ **Do not use gasoline. Gasoline will damage engine.**

▲ **Do not use ether to start engine.**

Add fresh diesel fuel before starting to prevent air from entering the fuel system (see engine maintenance label for fuel specifications). Leave filler neck empty to allow room for expansion.

Do not run out of fuel or air may enter fuel system and cause starting problems. See engine manual to bleed air from fuel system.

Oil

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

▲ **Engine may use oil and wetstacking may occur during run-in. Check oil several times daily during run-in.**

Coolant

Check coolant level in radiator before starting unit the first time. Add coolant if below bottom of filler neck (see Section 4-6 for radiator filling instructions).

Check coolant level in recovery tank daily. If coolant is below Cold Full level, add coolant until level in tank is between Cold Full and Hot Full levels. If recovery tank coolant level was low, check coolant level in radiator (see Section 4-6).

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

Keep radiator and air intake clean.

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

☞ *To improve cold weather starting:*

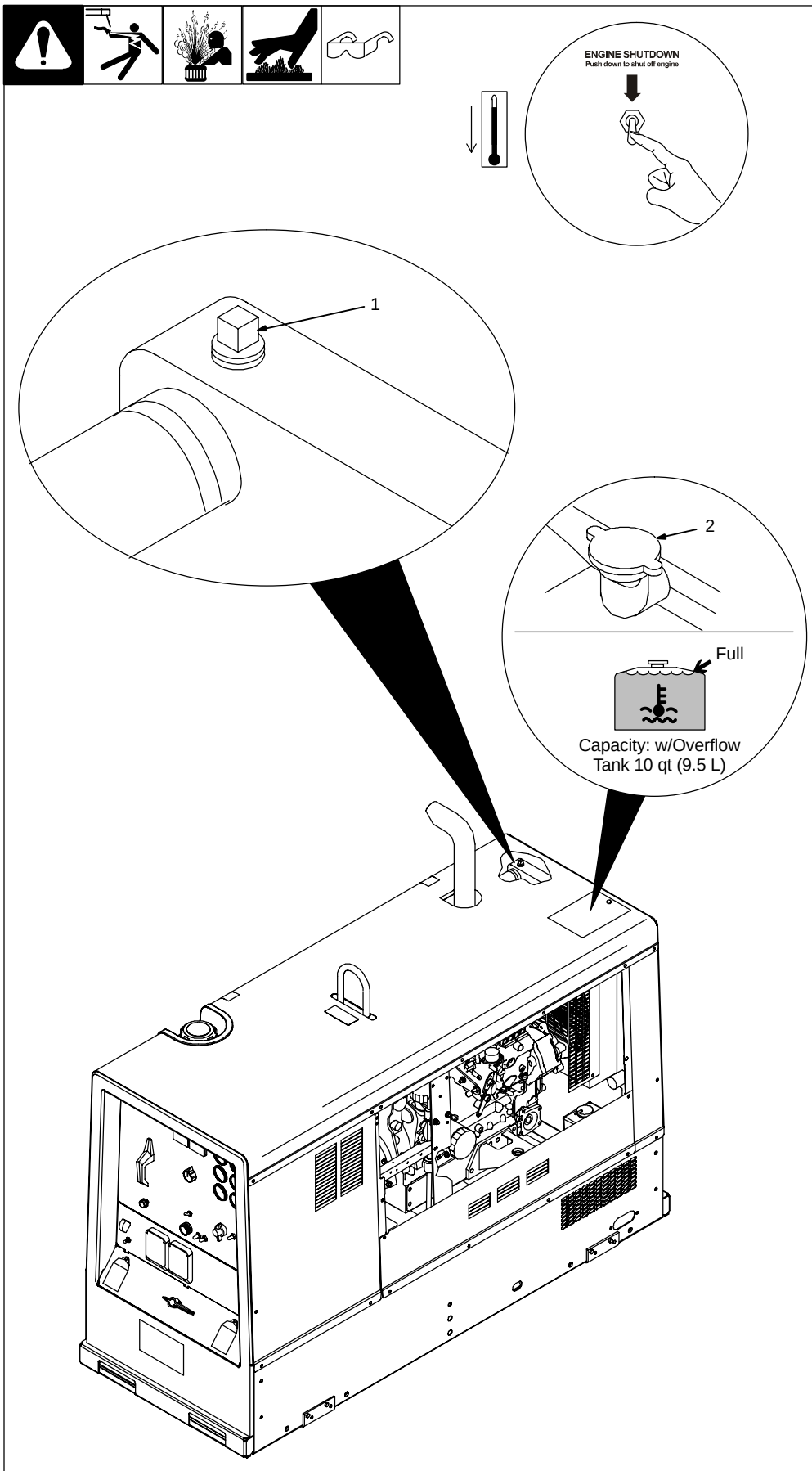
Use Engine Start/Preheat switch to operate glow plug (see Section 5-1).

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

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

Use correct grade oil for cold weather (see Section 7-1).

4-6. Adding Coolant To Radiator



▲ **Stop engine and let cool.**

☞ *Check coolant level according to Section 4-5 before starting this procedure.*

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

If coolant level is below bottom of radiator filler neck, add coolant as follows:

1 Radiator Air Bleed Screw

2 Radiator Cap

Remove air bleed screw. Add coolant to radiator until coolant is at bottom of filler neck. This ensures all air is purged from the system.

Reinstall air bleed screw and radiator cap. Check coolant level in recovery tank (see Section 4-5).

Tools Needed:

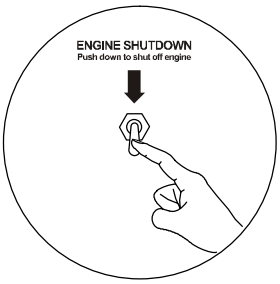
3/8 in

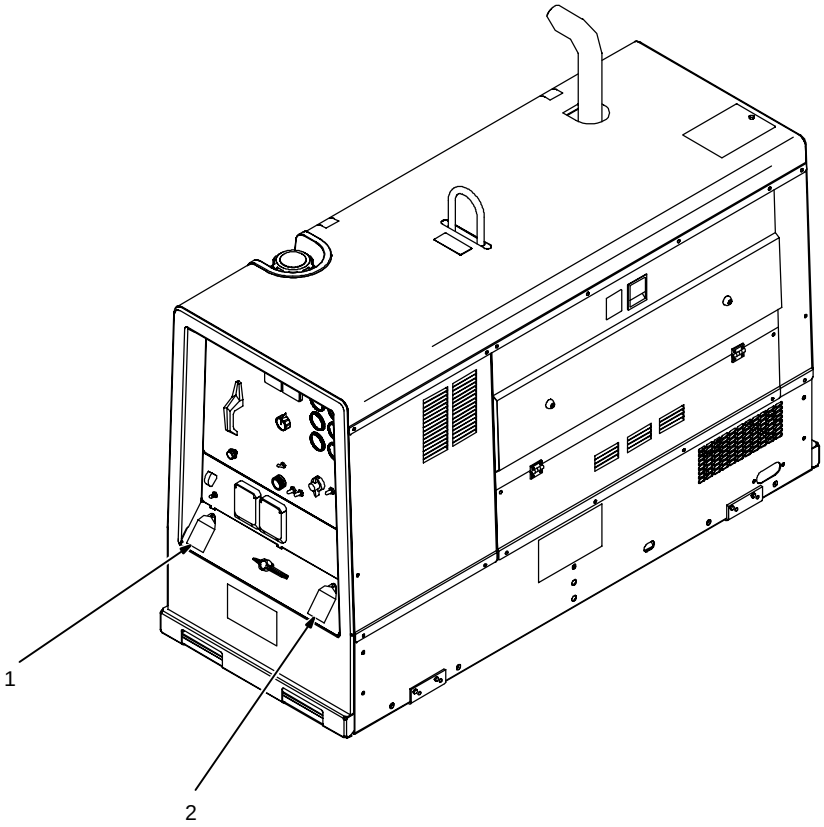
803 123-A / 206 580

4-7. Connecting To Weld Output Terminals

Tools Needed:

3/4 in





803 122

▲ **Stop engine.**

1 Positive (+) Weld Output Terminal

2 Negative (–) Weld Output Terminal

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

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

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

For MIG and FCAW welding Direct Current Electrode Positive (DCEP) on CC/CV models, connect wire feeder cable to Positive (+) terminal on left and work cable to Negative (–) terminal on right. Use Process/Contactor Control switch to select type of weld output (see Section 5-3).

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

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

4-8. Selecting Weld Cable Sizes*

 **Weld Output Terminals** ▲ **Stop engine before connecting to weld output terminals.** ▲ **Do not use worn, damaged, undersized, or poorly spliced cables.**	**Welding Amperes**	**Weld Cable Size** and Total Cable (Copper) Length in Weld Circuit Not Exceeding***							
		100 ft (30 m) or Less		**150 ft (45 m)**	**200 ft (60 m)**	**250 ft (70 m)**	**300 ft (90 m)**	**350 ft (105 m)**	**400 ft (120 m)**
		10 – 60% Duty Cycle	**60 – 100% Duty Cycle**	**10 – 100% Duty Cycle**					
	100	4 (20)	4 (20)	4 (20)	3 (30)	2 (35)	1 (50)	1/0 (60)	1/0 (60)
	150	3 (30)	3 (30)	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	3/0 (95)
	200	3 (30)	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	4/0 (120)
	250	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 2/0 (2x70)
	300	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 3/0 (2x95)
	350	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)
	400	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)	2 ea. 4/0 (2x120)
	500	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)	3 ea. 3/0 (3x95)	3 ea. 3/0 (3x95)
	600	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)	3 ea. 3/0 (3x95)	3 ea. 4/0 (3x120)	3 ea. 4/0 (3x120)
	700	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)	3 ea. 3/0 (3x95)	3 ea. 4/0 (3x120)	3 ea. 4/0 (3x120)	4 ea. 4/0 (4x120)

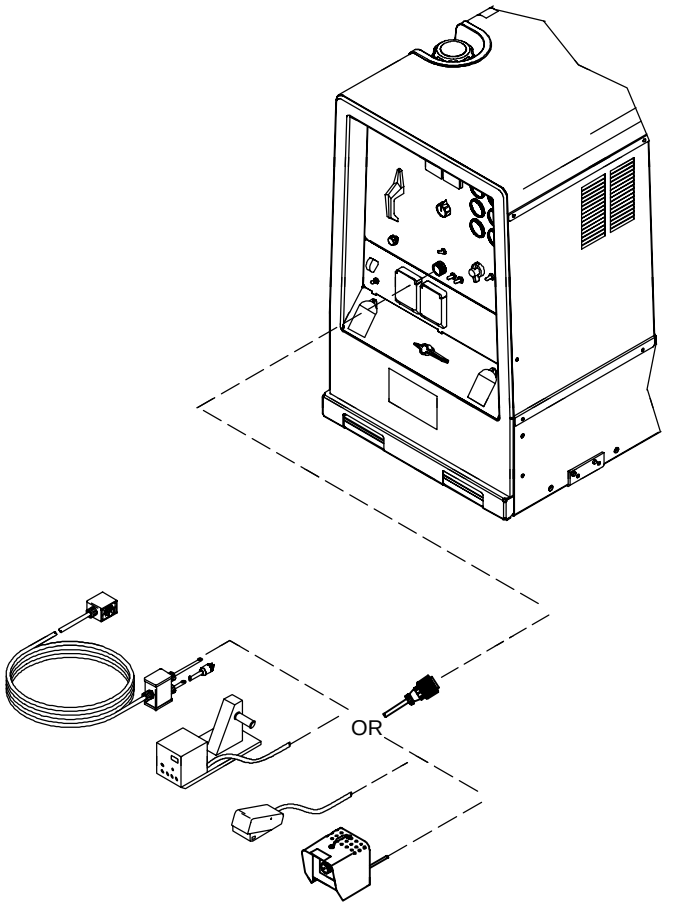
* This chart is a general guideline and may not suit all applications. If cable overheating occurs (normally you can smell it), use next size larger cable.

**Weld cable size (AWG) is based on either a 4 volts or less drop or a current density of at least 300 circular mils per ampere.
( ) = mm^2 for metric use

S-0007-E

***For distances longer than those shown in this guide, call a factory applications representative.

4-9. Connecting To Remote 14 Receptacle RC14

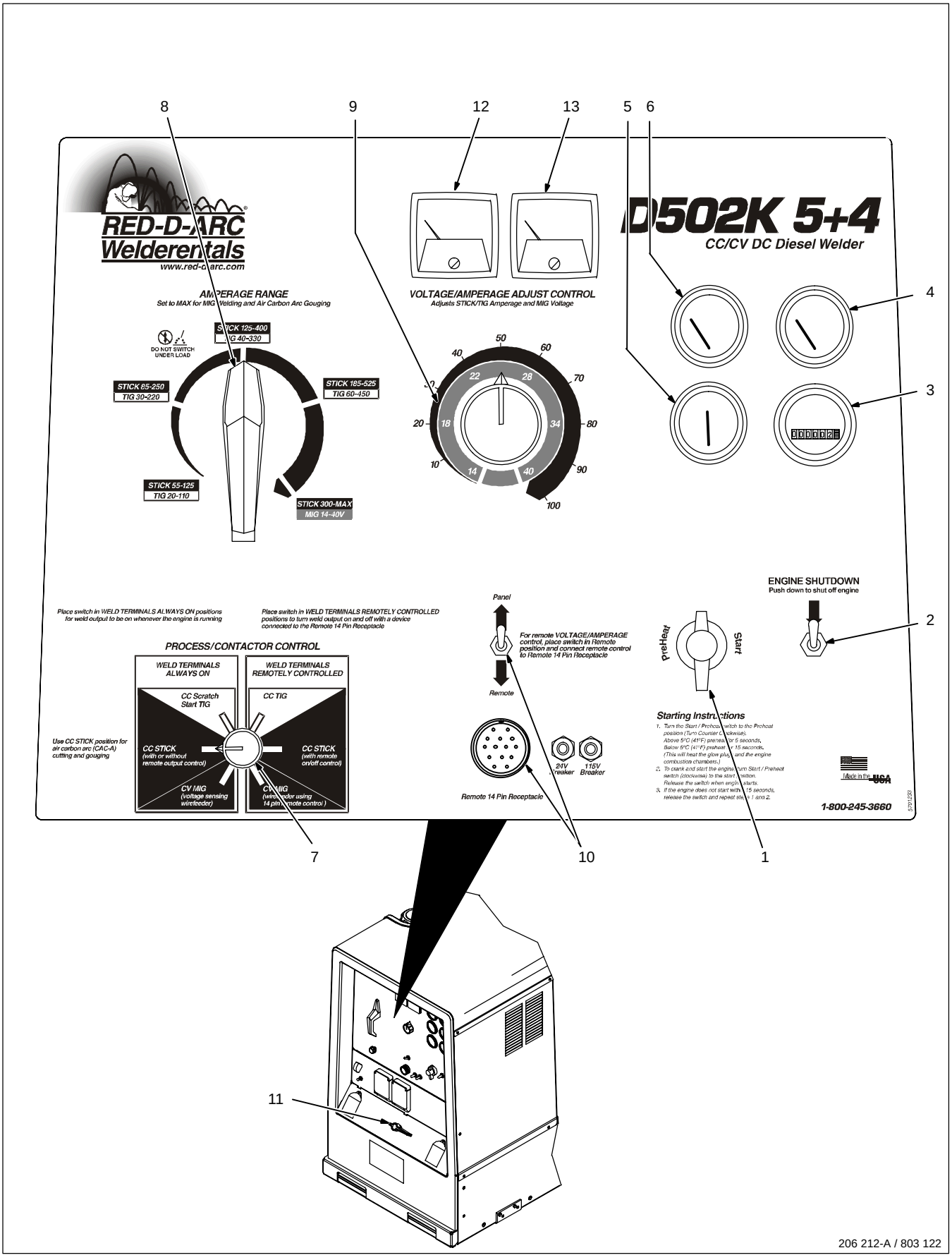


REMOTE 14	Socket*	Socket Information
24 VOLTS AC OUTPUT (CONTACTOR)	A	24 volts ac. Protected by circuit breaker CB5.
	B	Contact closure to A completes 24 volt ac contactor control circuit.
REMOTE OUTPUT CONTROL	C	Output to remote control:+10 volts dc in MIG or Stick mode; 0 to +10 volts dc in TIG mode.
	D	Remote control circuit common.
	E	DC input command signal: 0 to +10 volts from min. to max. of remote control with Voltage/ Amperage Adjust control at max.
115 VOLTS AC OUTPUT (CONTACTOR)	I	115 volts, 10 amperes, 60 Hz ac. Protected by circuit breaker CB13.
	J	Contact closure to I completes 115 volt ac contactor control circuit.
GND	K	Chassis common.
NEUTRAL	G	Circuit common for 24 and 115 volt ac circuit.

*The remaining sockets are not used.

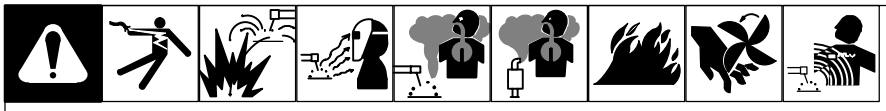
Notes

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



206 212-A / 803 122

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



Engine Starting Controls

1 Start/Preheat Switch

Use switch to start engine and operate glow plug for cold weather starting.

Engine runs at weld/power speed continuously.

Turn switch to Preheat position to operate the glow plug and heat the combustion chambers before cranking engine (see starting instructions following).

2 Engine Shutdown Switch

Push switch down to stop engine.

To Start:

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

Above 41° F (5° C): turn Start/Preheat switch to Preheat position for 5 seconds and then turn switch to Start position. Release Start/Preheat switch when engine starts.

Below 41° F (5° C):
Turn Start/Preheat switch to Preheat position for 15 seconds and then turn switch to Start. Release Start/Preheat switch when engine starts.

To Stop:

Push Engine Shutdown switch down to stop engine.

3 Engine Hour Meter

Use meter to monitor engine running time for scheduling maintenance.

Engine Gauges

☞ *To read gauges with engine off, turn Start/Preheat switch to Preheat position.*

4 Fuel Gauge

Use gauge to check fuel level when engine is running.

5 Battery Ammeter

Use gauge to check amperage output to the battery. The gauge reads near 0 (zero) when the engine is running. If gauge is at a negative number, the battery is discharging.

▲ **Stop engine, and do not run engine until problem is fixed.**

6 Engine Temperature Gauge

Normal temperature is 170 - 205° F (77 - 96° C). Engine stops if temperature exceeds 221° F (105° C).

Weld Controls

7 Process/Contactor Control Switch

See Section 5-3 for Process/Contactor Control switch information.

8 Amperage Range Switch

▲ **Do not switch under load.**

Use switch to select weld amperage range.

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

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

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

9 Voltage/Amperage Adjust Control

With Process/Contactor Control switch in any Stick or TIG setting, use control to adjust amperage within range selected by Amperage Range switch. With Process/Contactor Control switch in any MIG position, use control to adjust voltage. With Voltage/Amperage Adjust Control switch (item 10) in Remote position, control limits the remote amperage in TIG mode, but has no effect in Stick and MIG modes.

Weld output would be about 263 A DC with controls set as shown (50% of 125 to 400 A).

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

10 Voltage/Amperage Adjust Control Switch And Remote 14 Receptacle

Use switch to select front panel or remote voltage/amperage control. For remote control, place switch in Remote position and connect remote control to Remote 14 receptacle RC14 (see Sections 4-9 and 5-4).

11 Polarity/AC Selector Switch (Optional)

▲ **Do not switch under load.**

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

Weld Meters

12 DC Voltmeter (Optional)

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

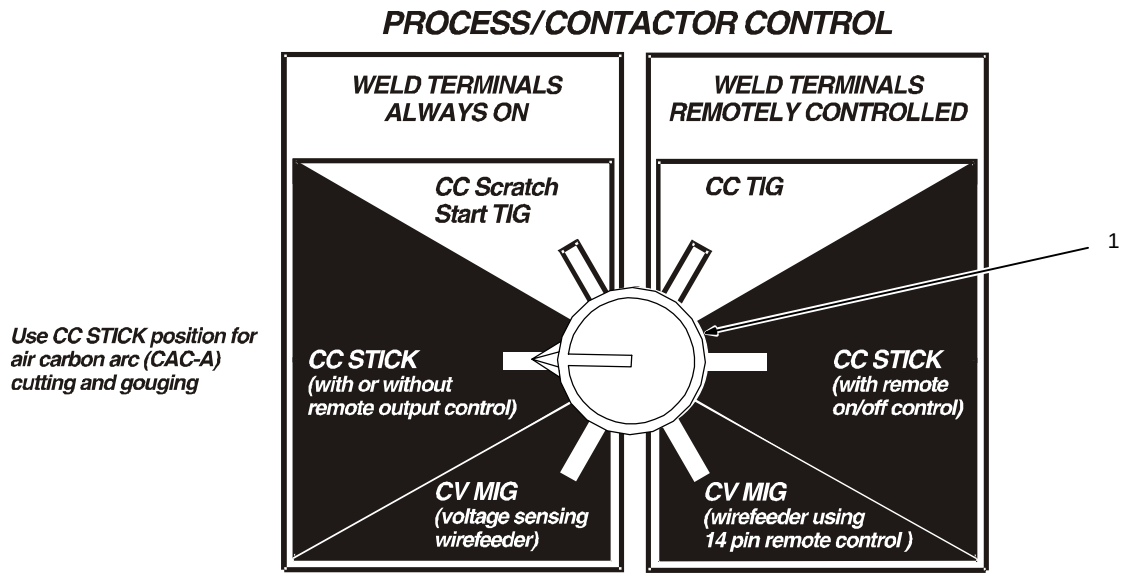
13 DC Ammeter (Optional)

Ammeter displays amperage output of the unit.

5-3. Process/Contactor Control Switch

Place switch in WELD TERMINALS ALWAYS ON positions for weld output to be on whenever the engine is running

Place switch in WELD TERMINALS REMOTELY CONTROLLED positions to turn weld output on and off with a device connected to the Remote 14 Pin Receptacle



206 212-A

1 Process/Contactor Control Switch (See Section 5-1 For Location)

▲ **Weld output terminals are energized when Process/Contactor Control switch is in a Weld Terminals Always On position and the engine is running.**

Use switch to select weld process and weld output on/off control (see table below and Section 5-4).

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

Place switch in Weld Terminals Always On positions for weld output to be on whenever the engine is running.

Use Weld Terminals Always On – CC Stick position for air carbon arc (CAC-A) cutting and gouging.

When switch is in a Weld Terminals Always On – CC Stick position, the arc drive (dig) circuit provides additional amperage during low voltage (short arc length conditions) to prevent “sticking” electrodes.

The arc drive (dig) circuit is disabled when switch is in MIG, TIG, and CC stick (With Remote On/Off Control) positions.

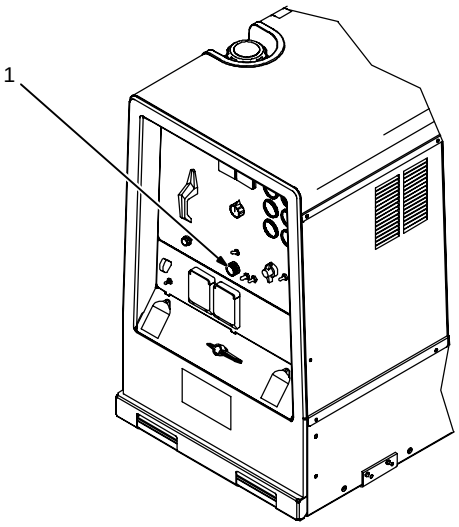
Process/Contactor Control Switch Settings

Switch Setting	Process	Output On/Off Control
Weld Terminals Remotely Controlled – CC TIG	GTAW With HF Unit, Pulsing Device, Or Remote Control	At Remote 14 Receptacle
Weld Terminals Remotely Controlled – CC Stick	Stick (SMAW) With Remote On/Off	At Remote 14 Receptacle
Weld Terminals Remotely Controlled – CV MIG	MIG (GMAW)	At Remote 14 Receptacle
Weld Terminals Always On – CV MIG	MIG (GMAW)	Electrode Hot
Weld Terminals Always On – CC Stick	Stick (SMAW), Air Carbon Arc (CAC-A) Cutting And Gouging	Electrode Hot
Weld Terminals Always On – CC Scratch Start TIG	Scratch Start TIG (GTAW)	Electrode Hot

5-4. Remote Voltage/Amperage Control

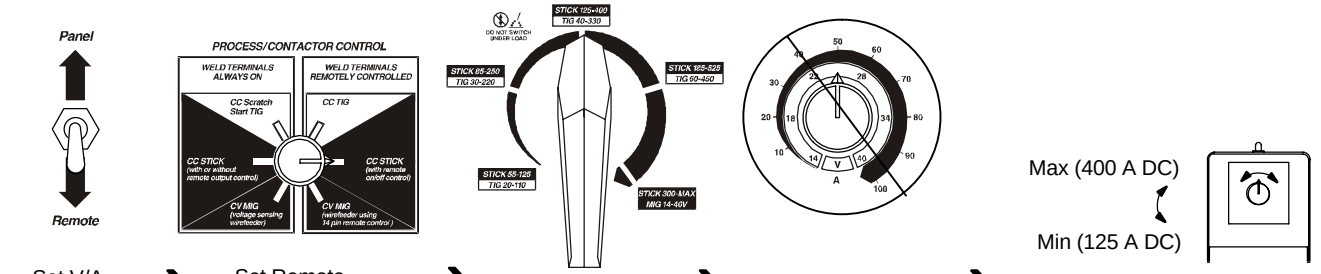
1 Remote 14 Receptacle RC14

Connect optional remote control to RC14 (see Section 4-9).



Example: Combination Remote Amperage Control (Stick) With Remote On/Off Control

In Example:
Process = Stick (Using Remote On/Off)
Range = 125 to 400 A DC
Min = 125 A DC
Max = 400 A DC



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

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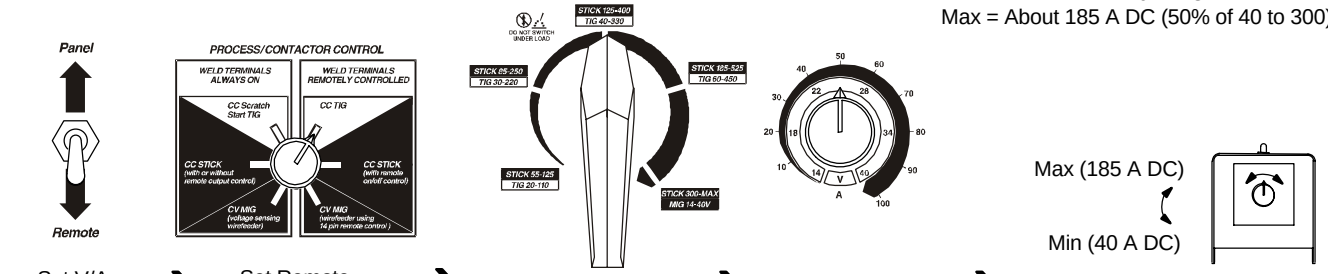
Example: Combination Remote Amperage Control (TIG) With Remote On/Off Control

In Example:
Process = TIG (Using Remote On/Off)
Range = 40 to 330 A DC
Percentage Of Range = 50%
Min = 40 A DC
Max = About 185 A DC (50% of 40 to 300)

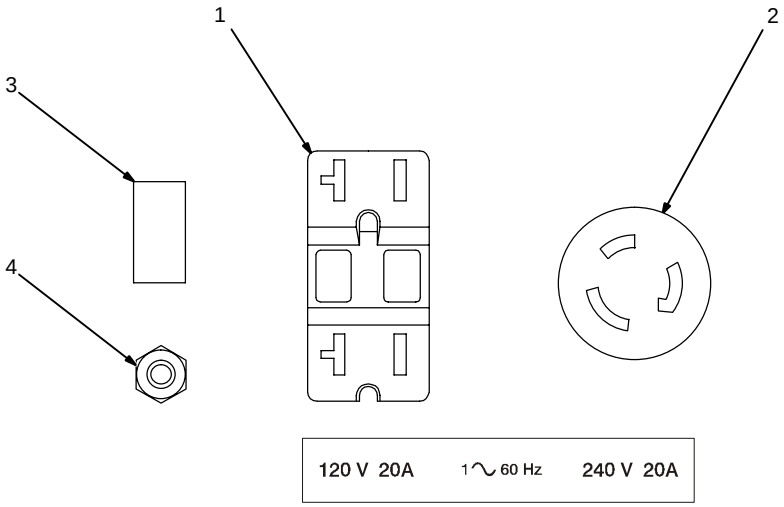


Set V/A Adjust Switch → Set Remote Process → Set Range → Set Control → Adjust Optional Remote Control

0774 / Ref. 192 895-A / 802 311-A

SECTION 6 – OPERATING AUXILIARY EQUIPMENT

6-1. 120 Volt And 240 Volt Receptacles



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

1 120 V 20 A AC GFCI Receptacle GFCI1

2 240 V 30 A AC Twistlock Receptacle RC1

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

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

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

3 Circuit Breaker CB1

4 Circuit Breaker CB2

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

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

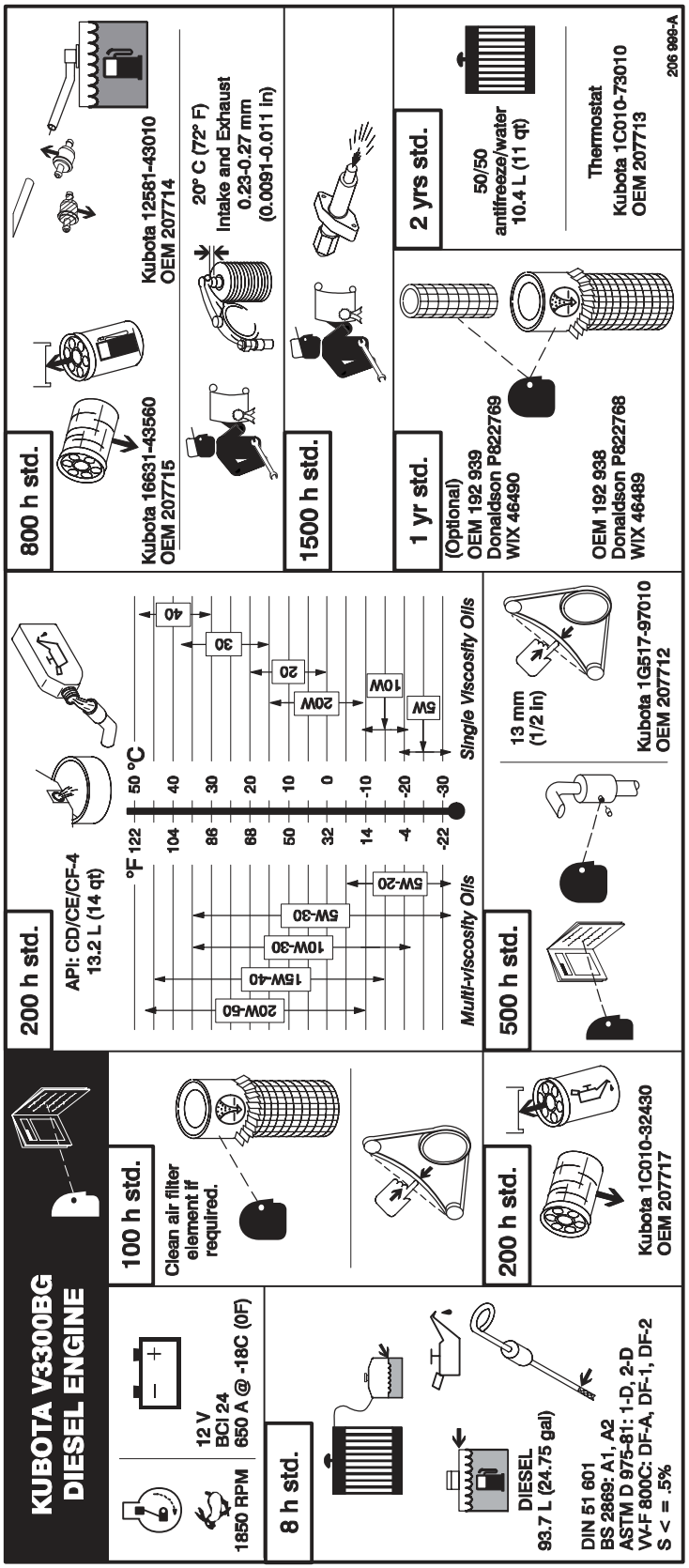
Maximum output is 2.4 kVA/kW from GFCI1 and 4 kVA/kW from RC1. Maximum output from all receptacles is 4 kVA/kW.

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

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

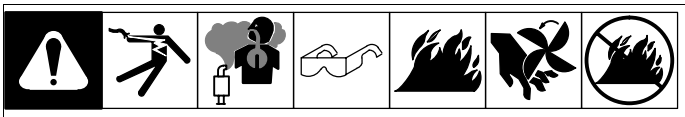
191 624

7-1. Maintenance Label



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

7-2. Routine Maintenance



Recycle engine fluids.

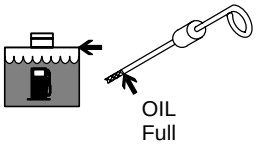
▲ **Stop engine before maintaining.**

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

* To be done by Factory Authorized Service Agent.

8 h

Wipe Up Spills.

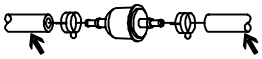


OIL Full

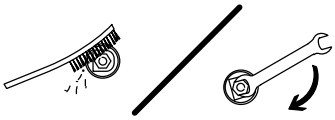
Coolant Full

Check Fluid Levels. See Section 4-5.

50 h



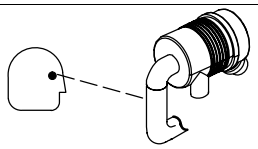
Check Fuel Lines And Connections.



Clean And Tighten Weld Terminals.

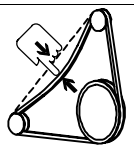
100 h

Clean Air Filter. See Section 7-3.

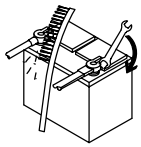


Check Air Cleaner Hoses For Cracks And Loose Clamps.

1/2 in. (13 mm)

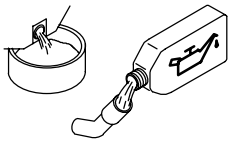


Check Belt Tension.

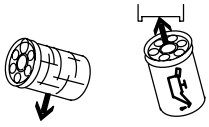


Clean And Tighten Battery Connections.

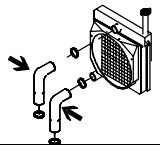
200 h



Change Oil. See Section 7-6.

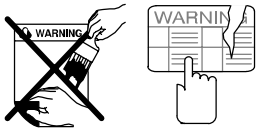


Change Oil Filter. See Section 7-6. Service More Often In Dirty Conditions.



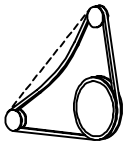
Check Radiator Hoses And Clamps.

250 h

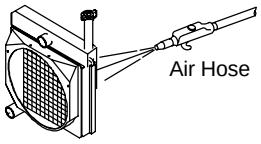


Replace Unreadable Labels.

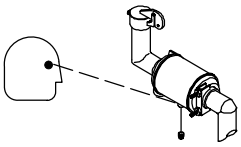
500 h



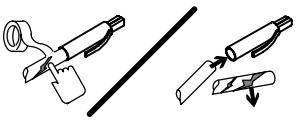
Replace Fan Belt.



Clean Radiator Exterior.

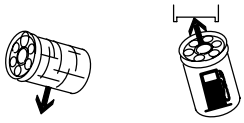


Check And Clean Spark Arrestor. See Section 7-4.

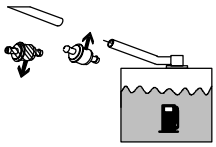


Repair Or Replace Cracked Cables.

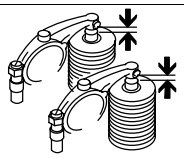
800 h



Replace Secondary Fuel Filter. See Section 7-6.

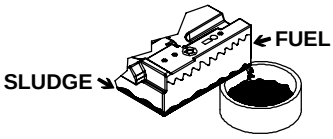


Replace Primary Fuel Filter. See Section 7-6.

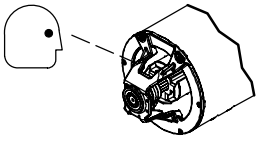


Check Valve Clearance.*

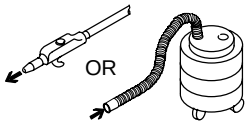
1000 h



Drain Sludge From Fuel Tank. See Section 7-6.

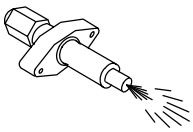


Service Welding Generator Brushes And Slip Rings. Service More Often In Dirty Conditions.*



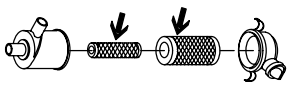
Blow Out Or Vacuum Inside. During Heavy Service, Clean Monthly.

1500 h



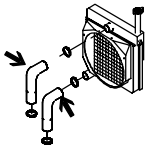
Clean/Set Injectors.*

1 Year



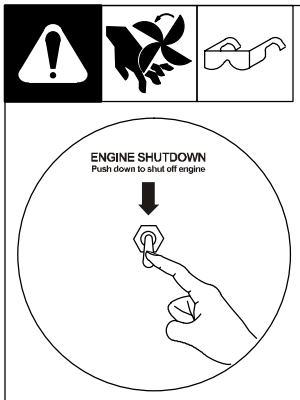
Replace Air Filter Element(s). See Section 7-3.

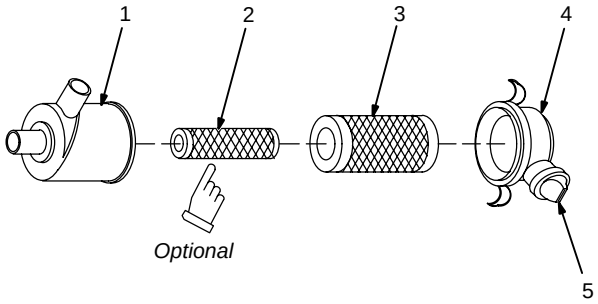
2 Years



Replace Radiator Coolant And Hoses. See Section 7-7.

7-3. Servicing Air Cleaner





▲ **Stop engine.**

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

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

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

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

1 Housing

2 Safety Element (Optional)

3 Primary Element

4 Dust Cap

5 Dust Ejector

To clean air filter:

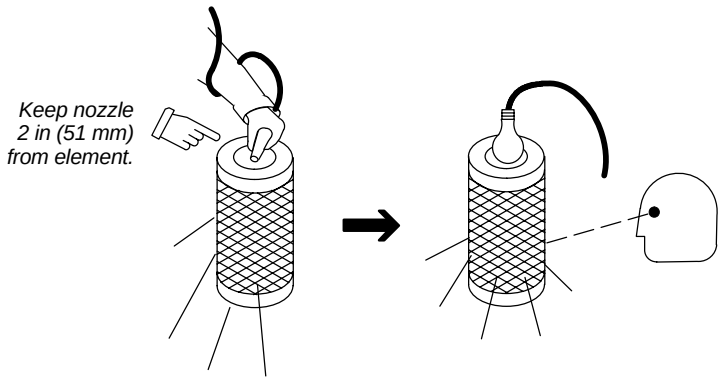
Wipe off cap and housing. Remove cap and dump out dust. Remove element(s). Wipe dust from inside cap and housing with damp cloth. Reinstall safety element (if present). Reinstall cap.

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

Clean primary element with compressed air only.

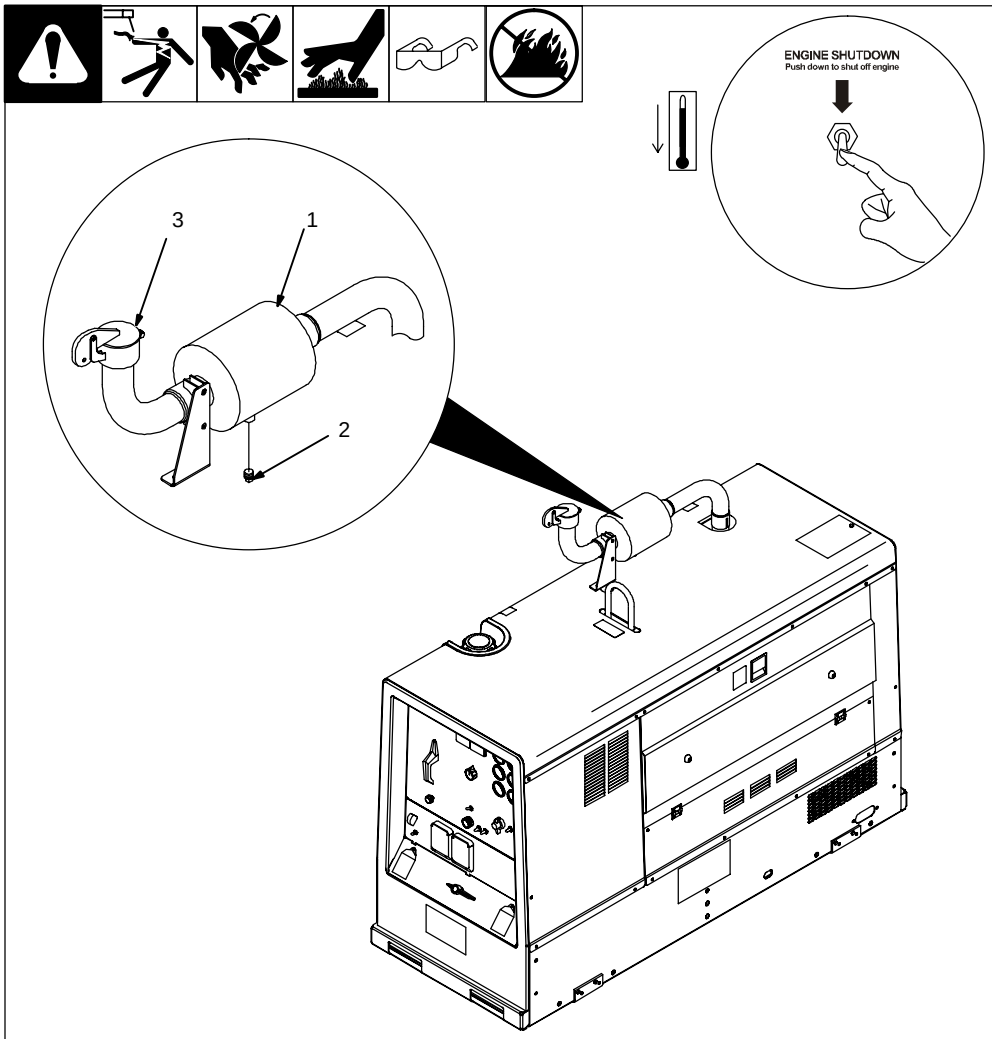
Air pressure must not exceed 100 psi (690 kPa). Use 1/8 in (3 mm) nozzle and keep nozzle at least 2 in (51 mm) from inside of element. Replace primary element if it has holes or damaged gaskets.

Reinstall primary element and cap (dust ejector down).



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

7-4. Inspecting/Cleaning Optional Spark Arrestor



▲ **Stop engine and let cool.**

1 Spark Arrestor Muffler

2 Cleanout Plug

Remove plug and remove any dirt covering cleanout hole.

3 Exhaust Pipe With Raincap

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

▲ **Stop engine and let cool.**

Reinstall cleanout plug.

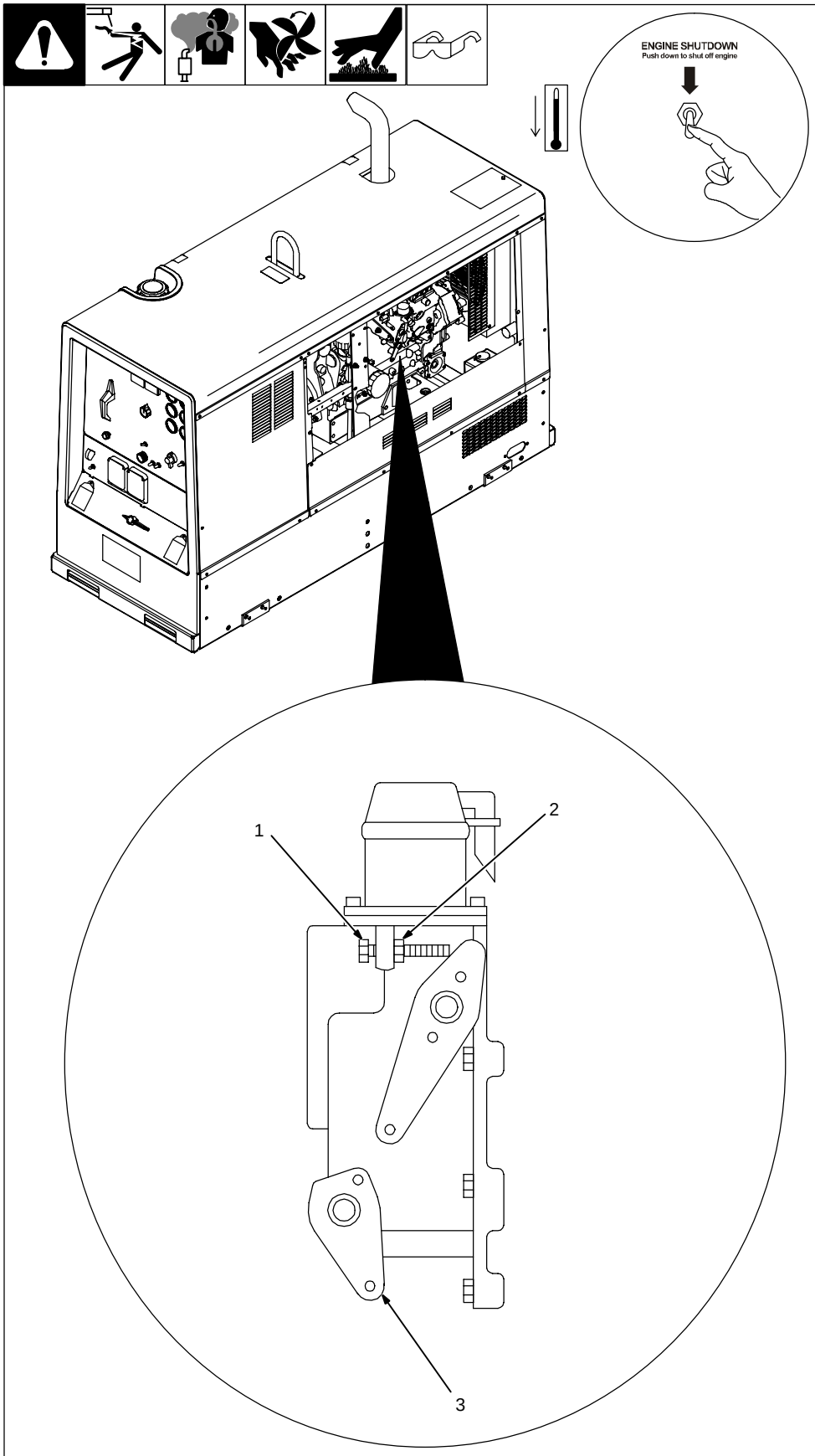
Tools Needed:

3/8 in

Ref. 206 212-A / 803 122

Notes

7-5. Adjusting Engine Speed



▲ **Stop engine and let cool.**

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

Start engine and run until warm.

Turn Process/Contactor Control switch to Stick – Electrode Hot position.

1 Engine Speed Adjustment Screw

2 Locking Nut

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

☞ *Do not set engine speed higher than specified.*

3 Engine Shutdown Lever

Use lever to stop engine if Engine Shutdown switch does not work.

▲ **Stop engine.**

Close door.

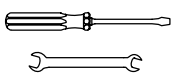
	1850 rpm Max. (61.6 Hz)

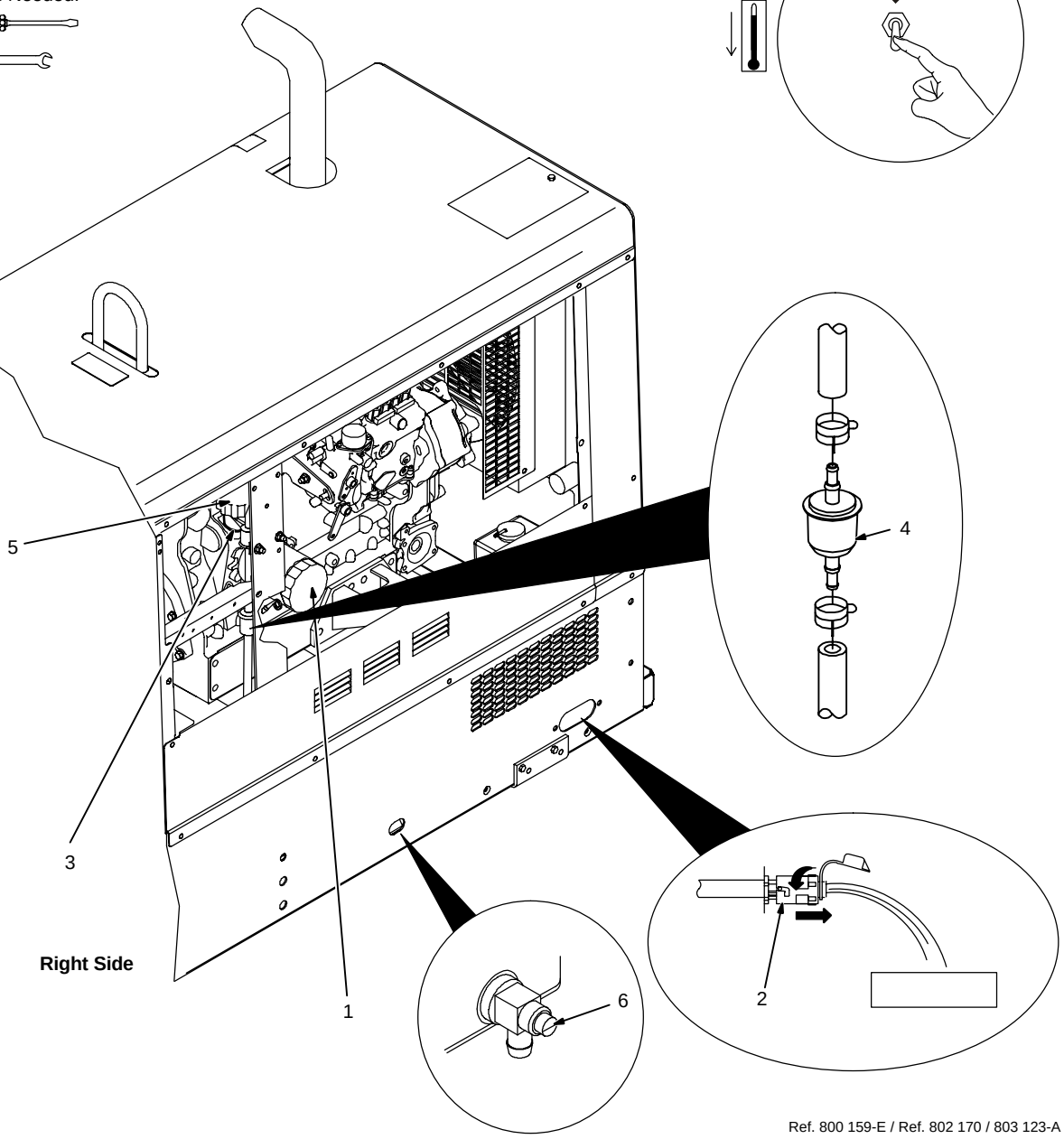
Tools Needed:

803 123-A

7-6. Servicing Fuel And Lubrication Systems

Tools Needed:





Ref. 800 159-E / Ref. 802 170 / 803 123-A

▲ **Stop engine and let cool.**

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

1 Oil Filter
2 Oil Drain Valve And Hose
3 Oil Fill Cap
4 Primary Fuel Filter (In-Line)
5 Secondary Fuel Filter
6 Fuel Tank Sludge Drain Valve

To change oil and filter:

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

To drain water from fuel system:

Open primary fuel filter petcock and drain water into metal container. Close petcock when water-free fuel flows.

To replace primary fuel filter:

Turn filter counterclockwise. Remove filter.

Apply thin coat of fuel to gasket on new filter. Fill filter with fuel. Install filter and turn clockwise. Bleed air from fuel system according to engine manual.

Inspect fuel line, and replace if cracked or worn.

To replace secondary fuel filter:

See engine manual.

Close doors.

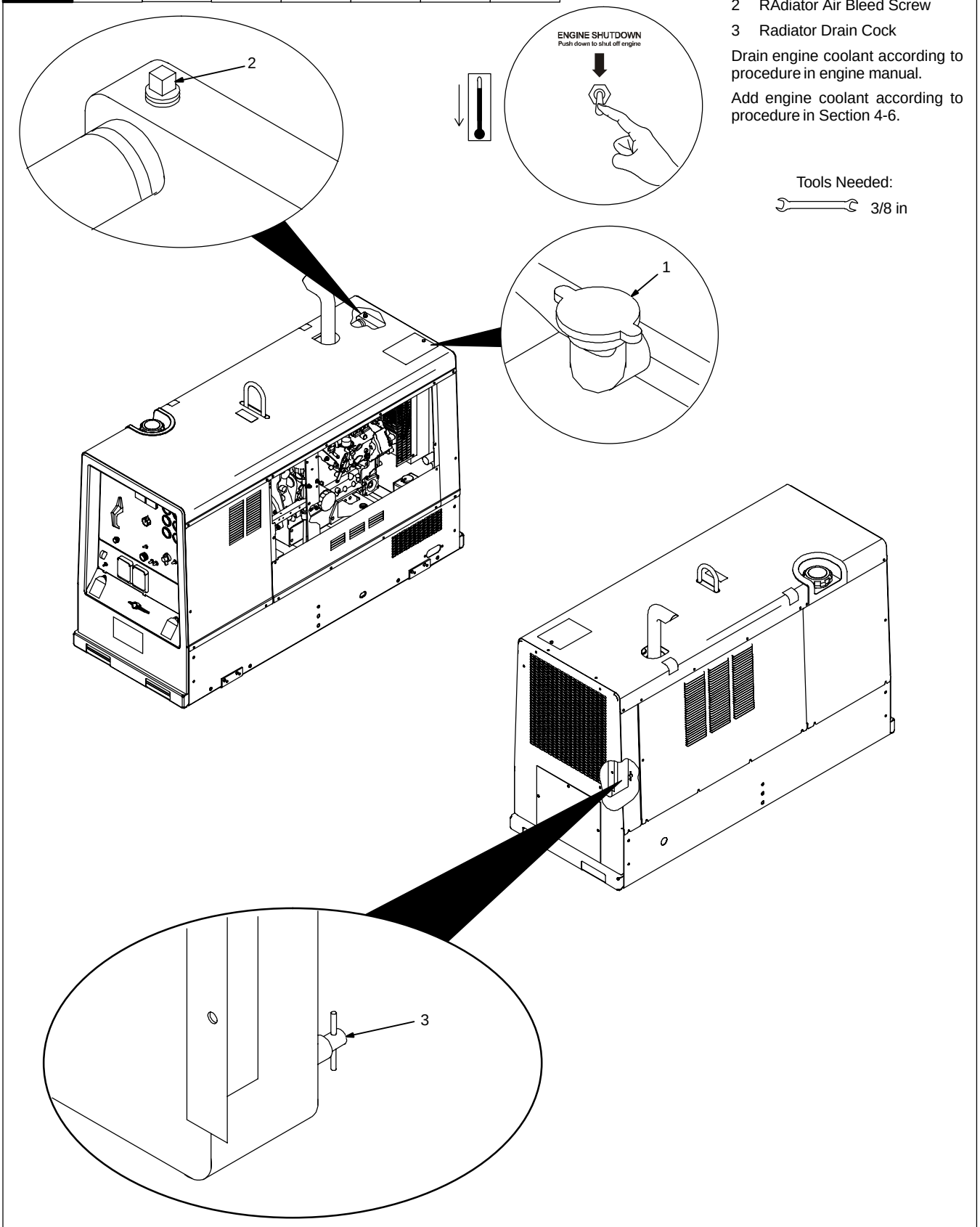
To drain sludge from fuel tank:

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

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

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

7-7. Servicing Engine Cooling System



▲ **Stop engine and let cool.**

1 Radiator Cap

2 RAdiator Air Bleed Screw

3 Radiator Drain Cock

Drain engine coolant according to procedure in engine manual.

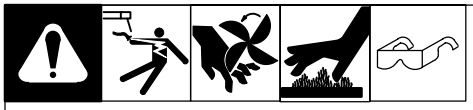
Add engine coolant according to procedure in Section 4-6.

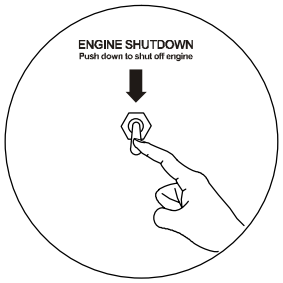
Tools Needed:

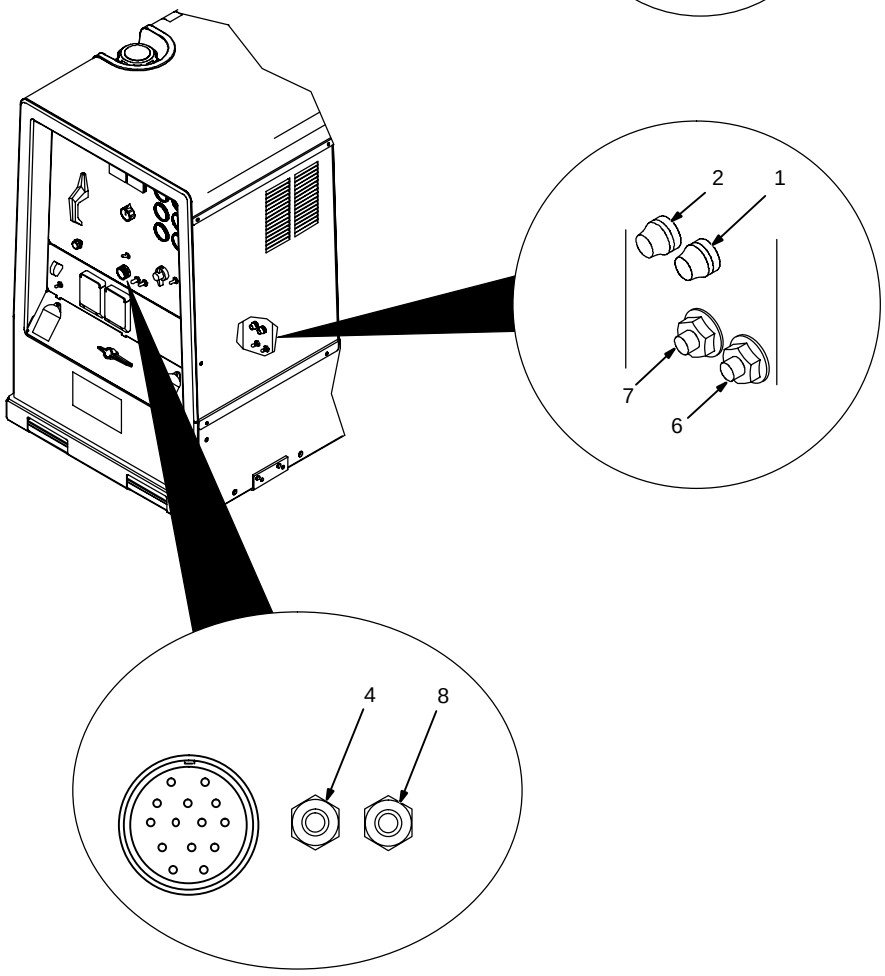
3/8 in

Ref. 803 123-A / 803 136

7-8. Overload Protection







▲ **Stop engine.**

1 Fuse F1

2 Fuse F2

F1 and F2 protect the stator exciter winding from overload. If F1 opens, weld and auxiliary power is low or stops entirely. If F1 continues to open, check integrated rectifier SR1, capacitor C9, the rotor, and brush connections.

If F2 opens, weld output stops. 4 kVA/kW auxiliary power is still available. If F2 continues to open, check field current regulator board PC1, the rotor, and brush connections.

3 Circuit Breaker CB4 (Not Shown)

4 Circuit Breaker CB5

5 Circuit Breaker CB10 (Not Shown)

6 Circuit Breaker CB11

7 Circuit Breaker CB12

8 Circuit Breaker CB13

CB4 protects the welding arc drive (dig) circuit. If CB4 opens, the electrode may stick to the workpiece more frequently during low voltage (short arc length) conditions. CB4 automatically resets when the fault is corrected. If CB4 continues to open, check transformer T1, and integrated rectifiers SR4 and SR5.

CB5 protects the 24 volt ac output to remote receptacle RC14, and 24 volt output to field current regulator board PC1. If CB5 opens, weld output and 24 volt output to RC14 stops. If CB5 continues to open, check remote controls connected to RC14, and circuit board PC6 (see Section 10-5).

CB10 protects the engine battery circuit. If CB10 opens, the engine will not crank. CB10 automatically resets when the fault is corrected. If CB10 continues to open, check fuel solenoid FS1. Also check for wire(s) shorted to ground.

CB11 protects the control box wiring harness. If CB11 opens, weld output stops (auxiliary power is still available). If CB11 continues to open, check field current regulator board PC1, and also verify wire 113 is not shorted to ground (see Section 10-7).

CB12 protects the field flashing circuit. If CB12 opens, the generator may not excite at start-up and weld and auxiliary power output may not be available. If CB12 continues to open, check field current regulator board PC1 (see Section 10-7).

CB13 protects the 115 volt ac output to remote receptacle RC14. If CB13 opens, 115 volt output to RC14 stops. If CB13 continues to open, check remote controls connected to RC14, and circuit board PC6 (see Section 10-5).

Press button to reset breaker.

803 123-A / 802 170-D / Ref. 802 313

1 Engine

Supplies force to turn revolving fields.

2 Control Relays CR2, CR5

CR2 energizes at start-up to supply power to the fuel solenoid.

CR5 energizes at start-up to supply power to PC1.

3 Main/Exciter Revolving Fields

Turn at 1850 rpm maximum for weld and power. The speed and excitation current of the field coils determine voltages in stator windings.

4 Stator Windings

Supply power to exciter, auxiliary power, and weld circuits.

5 Fuses F1, F2

Protect aux. stator (exciter) windings from overload.

6 Integrated Rectifier SR1

Changes ac output of stator windings to dc to supply excitation current to the exciter revolving field.

7 Voltage/Amperage Adjust Control R1

Adjusts voltage/amperage within range selected by S3.

8 Field Current Regulator Board PC1

Adjust weld output by changing revolving filed current after comparing feedback to voltage/amperage setting of R1.

9 LED Board PC9

Monitors power, remote control, command, engine rpm, and field excitation inputs to PC1.

10 Circuit Breakers CB5, CB13

Protects PC6/RC14 from overload.

11 Filter Board PC6/Remote 14 Receptacle RC14

PC6 protects unit from high frequency and excess voltage caused by a damaged remote control cable. RC14 connects remote voltage/amperage and contactor control to unit.

12 Process/Contactor Control Switch S6

Selects weld process and weld output on/off control (Weld Terminals Always On or Weld Terminals Remotely Controlled).

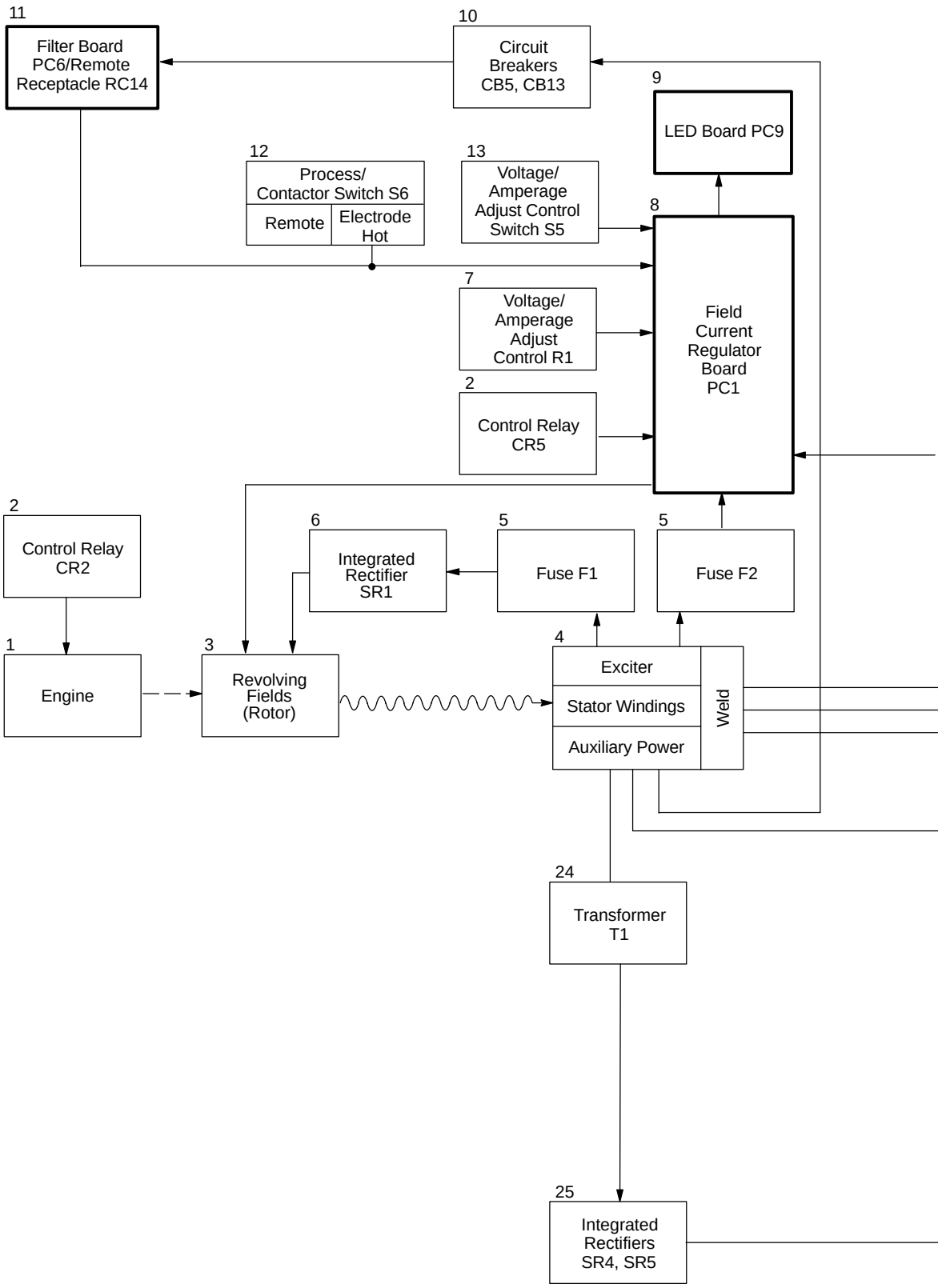
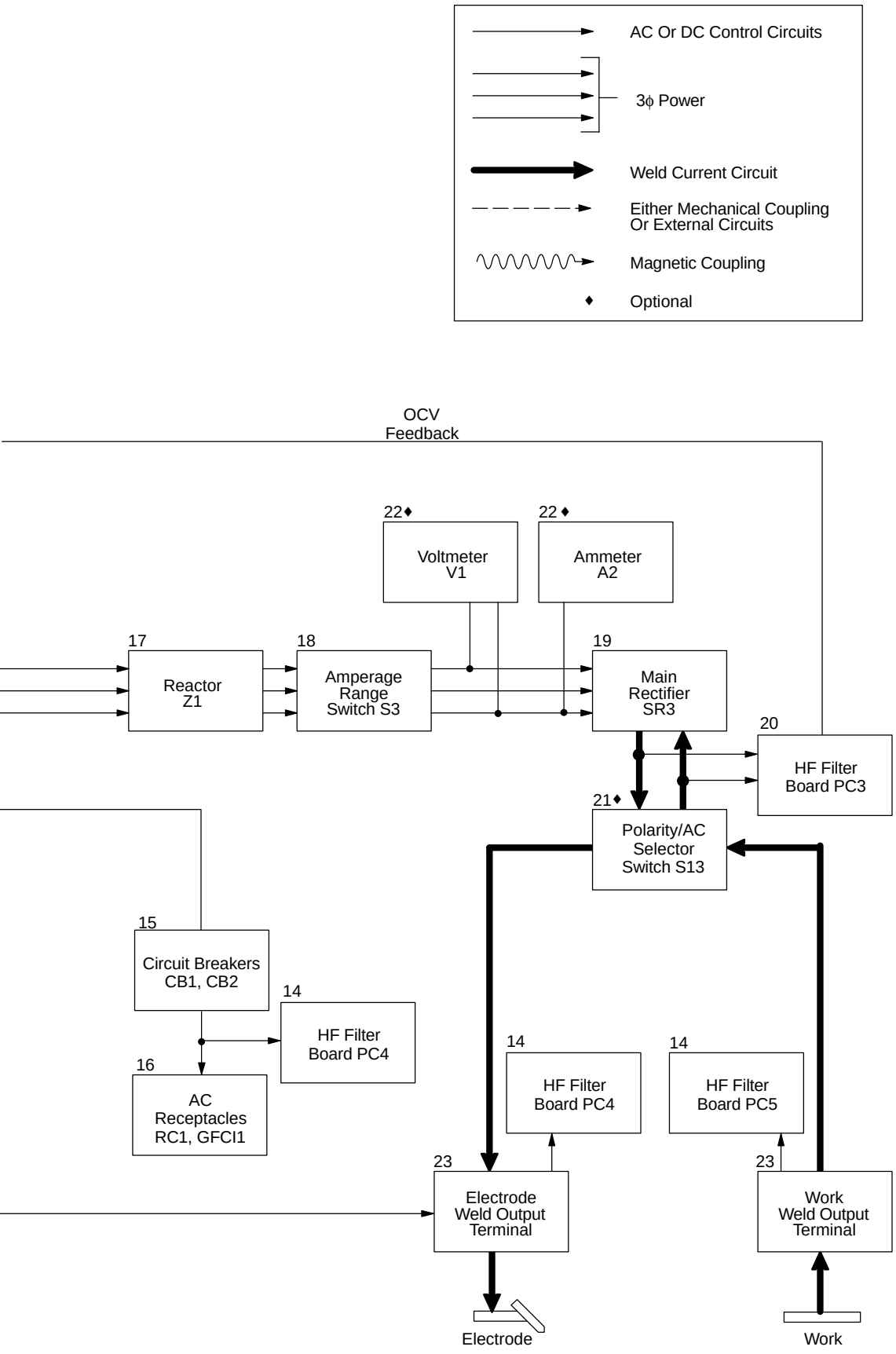


Figure 10-1. Functional Diagram



13 Voltage/Amperage Adjust Control Switch S5

Selects Panel or Remote voltage/amperage control.

14 HF Filter Boards PC4, PC5

Protect unit from high frequency.

15 Circuit Breakers CB1 And CB2

Protect AC receptacles RC1 and GFCI1 from overload.

16 AC Receptacles RC1 And GFCI1

Provide connection points and power for auxiliary equipment.

17 Reactor Z1

Tapped reactor limits weld output and provides coarse ranges.

18 Amperage Range Switch S3

Selects coarse range of weld output from Z1.

19 Main Rectifier SR3

Changes ac weld output to dc.

20 HF Filter Board PC3

Protects main rectifier from high frequency and voltage spikes, and provides OCV feedback signal to PC1.

21 Polarity/AC Selector Switch S13

Selects ac weld output or polarity of dc weld output.

22 Voltmeter V1, Ammeter A1

Display weld voltage and current.

23 Electrode And Work Weld Output Terminals

Provide weld output. Without optional Polarity/AC Selector switch S13 terminals are labeled negative (–) and positive (+).

24 Transformer T1

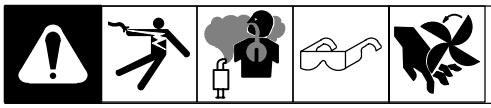
Supplies power to arc drive (dig) circuit. Arc drive circuit only active in Stick mode.

25 Integrated Rectifiers SR4, SR5

Change ac output of stator windings to dc to supply power to arc drive (dig) circuit.

SECTION 9 – EXPLANATION OF ELECTRICAL PARTS

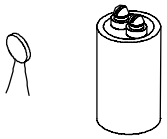
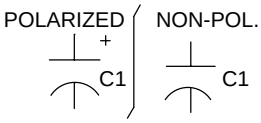
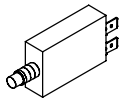
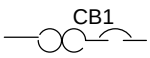
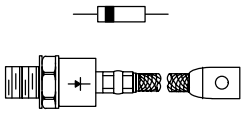
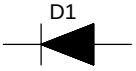
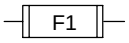
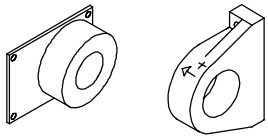
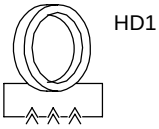
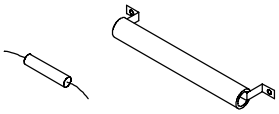
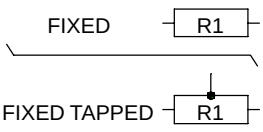
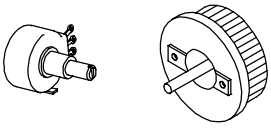
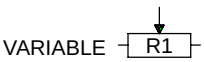
9-1. Safety Precautions – Read Before Using This Guide

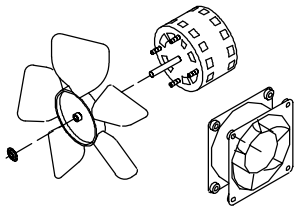
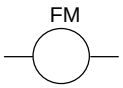
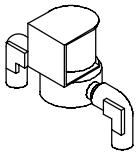
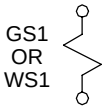
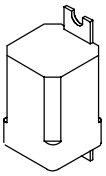
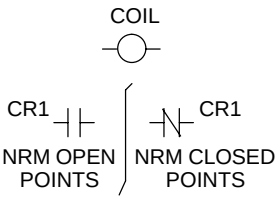
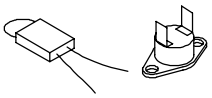
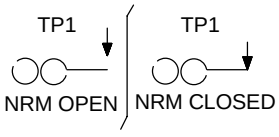
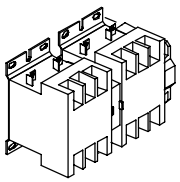
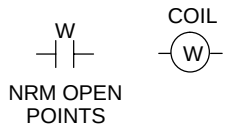
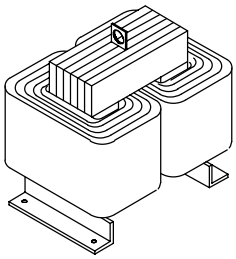
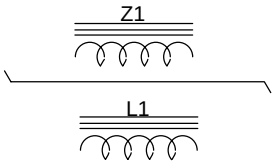


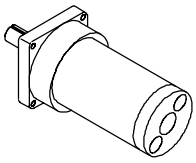
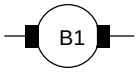
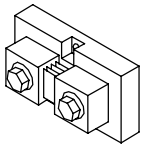
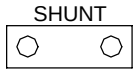
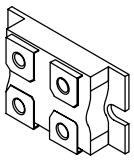
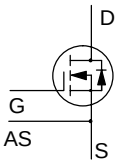
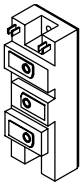
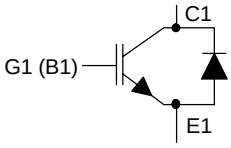
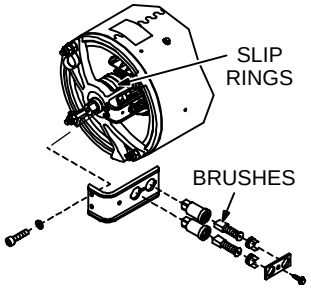
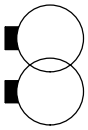
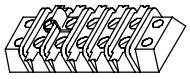
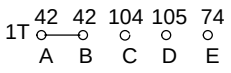
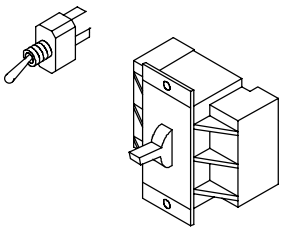
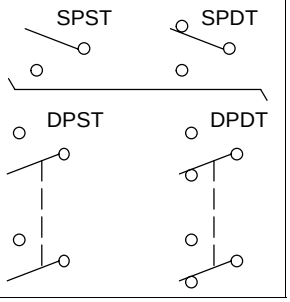
▲ **WARNING: ELECTRIC SHOCK can kill.**

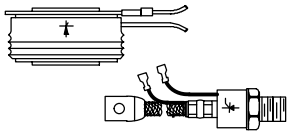
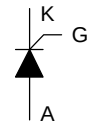
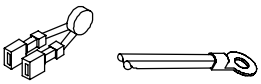
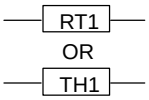
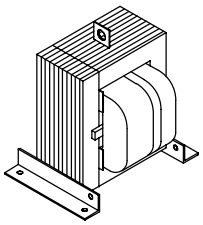
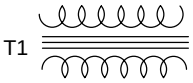
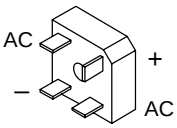
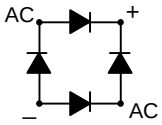
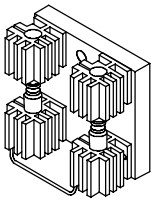
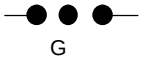
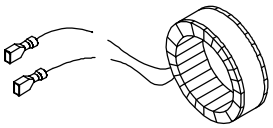
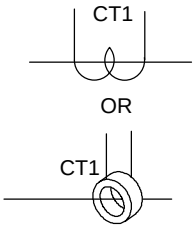
- Disconnect input power or stop engine before servicing.
- Do not touch live electrical parts.
- Do not operate machines with covers removed.
- Have only qualified persons install, use, or service equipment.

9-2. Explanation Of Electrical Parts

PART NAME	FUNCTION	PICTURE	CIRCUIT SYMBOL
CAPACITOR	A device that stores electrical energy. Large capacitors or a "bank" of capacitors can be used to "smooth out" the DC welding arc in a MIG welding power source. Smaller "disk" capacitors can be used for HF protection.		
CIRCUIT BREAKER	A protection device that breaks a circuit when current levels exceed its rating. Unlike a fuse that needs to be replaced when blown, a circuit breaker can be reset.		
DIODE	A device that allows current to flow in one direction only. Most common use is to change AC to DC.		
FUSE	A protection device, usually an enclosed piece of wire that melts and breaks the circuit when the current exceeds the fuse rating.		
HALL DEVICE	Produces a small DC voltage proportional to the current it is sensing (usually welding current). This feedback signal can be used to regulate the welding output (line voltage compensation). It may even be used to drive an ammeter.		
RESISTOR	A device which resists the flow of electric current. Uses include limiting the current for a motor brake circuit in a wire feeder and for discharging a capacitor.		
POTENTIOMETER OR RHEOSTAT	Both devices have a moveable brush that makes contact along a resistor, allowing you to easily change the resistance measured at the brush (sometimes referred to as a wiper). Their primary purpose is to give the operator a way to adjust welding parameters such as wire speed, preflow time, voltage, inductance, etc.		

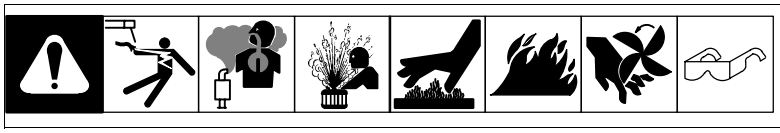
PART NAME	FUNCTION	PICTURE	CIRCUIT SYMBOL
FAN MOTOR	This device provides cooling of the internal parts of a welding power source.		
VARISTOR	A protection device whose resistance is dependent on the voltage applied to it. In normal operation it has a high resistance; however, a surge of voltage (voltage spike) will cause its resistance to go way down and absorb the spike. These devices are most often found in rectifying circuits, where they are used to protect the diodes.		
GAS OR WATER SOLENOID (VALVE)	These are electromechanical devices used to start or stop the flow of shielding gas or water.		
RELAY—COIL AND CONTACTS, NORMALLY OPEN AND NORMALLY CLOSED	This is an electromechanical device whose contacts change state (the normally open points close and the normally closed points open) when proper voltage is applied to the coil. These contact points in turn may control a fan motor, gas solenoid, contactor, etc. Circuit diagrams (schematics) always show the contact points in the power off state.		
THERMOSTAT, NORMALLY OPEN AND NORMALLY CLOSED	This is a switch that closes its normally open contacts (or opens its normally closed contacts) when a preset temperature is reached. When the temperature goes back down, it will reset itself. Uses of these devices include turning on a fan motor when needed and shutting off the output of a welding power source if it is overheating.		
CONTACTOR	A heavy duty relay. Usually used to make and break the welding arc or primary power.		
PILOT LIGHT	A light located on the front panel which indicates if the machine is on or off.		
STABILIZER/ REACTOR	When placed in a DC circuit, the inductor or stabilizer as it is usually called, will oppose any change in existing current. It is therefore widely used to “stabilize” the welding arc. When the inductor is placed in an AC circuit it is referred to as a reactor where it now acts to restrict the flow of current. A “tapped reactor” is used to create current ranges for welding.		

PART NAME	FUNCTION	PICTURE	CIRCUIT SYMBOL
MOTOR	A device that is typically used to feed wire in a MIG welding system.		
SHUNT	A precision low-value resistor typically used to supply a small voltage to drive an ammeter.		
MOSFET	A device that is used as an “electronic switch.” When a signal is applied to the gate (G), current is allowed to flow from the source (S) to the drain (D). This device can be used to control a relay, the speed of a motor, or even the output of a welding machine.		
IGBT	A device that is used as an “electronic switch.” When a signal is applied to the gate (G), current is allowed to flow from the emitter (E) to the collector (C). This device is typically used in “Invertor” designed welding machines to control the welding output.		
BRUSHES/SLIP RINGS	Components that allow electrical connections between stationary and rotating contacts.		
TERMINAL STRIP	An insulated connection point for wires. They are used for the ease of making multiple connections and can be a convenient point for making electrical checks when troubleshooting. (Notice the “jumper link” connecting terminals A and B together.)		
SWITCH	A mechanical device that completes or breaks the path of the current or sends it over a different path.		

PART NAME	FUNCTION	PICTURE	CIRCUIT SYMBOL
SCR	A Silicon Controlled Rectifier (SCR) is an electrical device with three connections, anode, cathode, and gate. It will allow current to flow in only one direction and will only do so after receiving a signal on the gate lead. SCR's are used to change AC to DC and to control the output to a load such as a welding arc.		
THERMISTOR	A thermally sensitive resistor. The resistance of a thermistor changes with a change in temperature. Primarily used for "Fan on Demand" and "Thermal Shutdown" circuits.		
TRANSFORMER	A device that changes AC voltage from one magnitude to another. Typically used to reduce high primary voltages to lower welding voltages.		
INTEGRATED BRIDGE RECTIFIER	An arrangement of four diodes used to change AC to DC.		
SPARK GAP	The arrangement of two electrodes between which a discharge of electricity will occur. Typically used to produce " high frequency" which can be used for arc starting when TIG welding.		
CURRENT TRANSFORMER	A transformer that produces an AC voltage used for measuring purposes. The primary winding is in series with the circuit carrying the current to be measured. Its main use in engine-driven equipment is to activate the "Automatic Idle" circuit by sensing welding current or auxiliary power current.		

SECTION 10 – TROUBLESHOOTING

10-1. Troubleshooting Tables



☞ *See Section 10-2 for test points and values and Section 14 and following for parts location.*

A. Welding

Trouble	Remedy
No weld output; auxiliary power output okay.	Place Process/Contactor switch S6 in a Weld Terminals Always On position, or place switch in a Weld Terminals Remotely Controlled position and connect remote contactor to optional Remote 14 receptacle RC14 (see Sections 4-9, 5-3 and 5-4).
	Check position of Amperage Range switch S3.
	Check position of optional Polarity/AC Selector switch S13.
	Reset circuit breaker CB11 (see Section 7-8).
	Reset circuit breaker CB5 (see Section 7-8). Check for faulty remote device connected to RC14.
	Check fuse F2, and replace if open (see Section 7-8).
	Check and secure connections to Remote 14 receptacle RC14 (see Section 4-9).
	Check connector board PC6 and connections, and replace PC6 if necessary (see Section 10-5).
	Clean slip rings, and install new brushes if necessary (see Section 10-11).
	Check field current regulator board PC1 and connections, and replace PC1 if necessary (see Section 10-7).
	Disconnect leads 105 and 108 from rotor, and check continuity across slip rings. Replace rotor if necessary.
No weld output or auxiliary power output.	Disconnect equipment from auxiliary power receptacles during start-up.
	Reset circuit breaker CB12 (see Section 7-8).
	Check fuses F1 and F2, and replace if open (see Section 7-8).
	Check integrated rectifier SR1, and replace if necessary.
	Check capacitor C9, and replace if necessary.
	Clean slip rings, and install new brushes if necessary (see Section 10-11).
	Disconnect leads 105 and 106 from the rotor, and check continuity across slip rings. Replace rotor if necessary.
	Disconnect stator excitation leads 100 and 101, and check continuity between leads. Replace stator if necessary.
	Check resistance and connections of resistor R3; full resistance of R3 (end to end) is 10 ohms ±10%. Replace R3 if necessary. If R3 is replaced, adjust R3 (see Section 10-12).
	Check field current regulator board PC1 and connection, and replace PC1 if necessary (see Section 10-7).
Erratic weld output.	Use dry, properly stored electrodes.
	Be sure connection to work piece is clean and tight.
	Remove excessive coils from weld cables.
	Check and tighten connections inside and outside unit.
	Clean slip rings, and install new brushes if necessary (see Section 10-11).
	Check main rectifier SR3, and replace if necessary.

Trouble	Remedy
High weld output.	Check position of Amperage Range switch S3 and Voltage/Amperage Adjust control R1.
	Check engine speed, and adjust if necessary (see Section 7-5).
	Check field current regulator board PC1 and connection, and replace PC1 if necessary (see Section 10-7).
Electrode sticks to the workpiece more frequently during low voltage (short arc length) conditions.	Circuit breaker CB4 may be open. CB4 automatically resets when the fault is corrected (see Section 7-8).
	Check transformer T1 for signs of winding failure. Check continuity across windings, and check for proper connections. Check secondary voltages. Replace T1 if necessary.
	Check integrated rectifiers SR4 and SR5, and replace if necessary.
Low weld output.	Check engine speed, and adjust if necessary (see Section 7-5).
	Check fuses F1 and F2, and replace if open (see Section 7-8).
	Check integrated rectifier SR1, and replace if necessary.
	Check capacitor C9, and replace if necessary.
	Check field current regulator board PC1 and connection, and replace PC1 if necessary (see Section 10-7).
	Clean slip rings, and install new brushes if necessary (see Section 10-11).
	Disconnect leads 105 and 108 from the rotor, and check continuity across slip rings. Replace rotor if necessary.
Low open-circuit voltage.	Check engine speed, and adjust if necessary (see Section 7-5).
No remote fine amperage or voltage control.	Place Voltage/Amperage Adjust Control switch S5 in Weld Terminals Remotely Controlled position.
	Check and secure connections to Remote 14 receptacle RC14 (see Section 4-9).
	Repair or replace remote control device.
Wire feeder does not work with welding generator.	Reset circuit breaker CB5 or CB6 (see Section 7-8).
	Check and secure connections to Remote 14 receptacle RC14 (see Section 4-9).
	Repair or replace wire feeder.
Low CV weld output.	Set Amperage Range switch S3 to highest range.
Min or max CV weld output only.	Check position of Voltage/Amperage Adjust control R1 and Voltage/Amperage Adjust Control switch S5.
	Repair or replace remote control device.
	Check field current regulator board PC1 and connection, and replace PC1 if necessary (see Section 10-7).
	Max CV weld output only: disconnect leads 19 and 30 at PC3 and check voltage feedback circuit. Feedback voltage should be the same as weld terminal open circuit voltage (see Section 10-2).

B. Auxiliary Power

Trouble	Remedy
No auxiliary power output; weld output okay.	Reset receptacle circuit breakers.
	Check resistance of auxiliary power windings between leads 81 and 84. Replace exciter stator (aux. stator) if necessary.

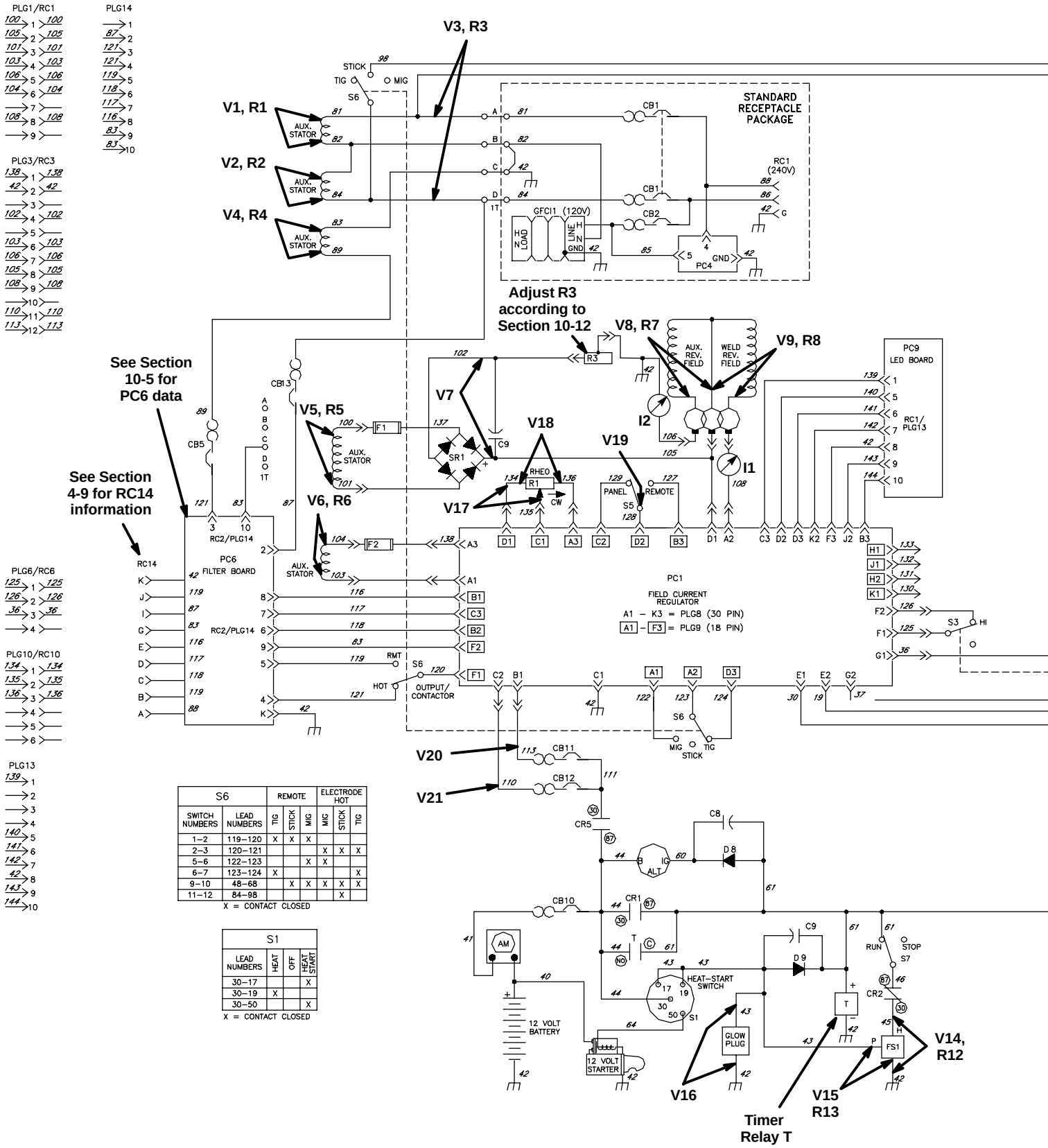
Trouble	Remedy
No auxiliary power output or weld output.	Disconnect equipment from auxiliary power receptacles during start-up.
	Reset circuit breaker CB12 (see Section 7-8).
	Check fuses F1 and F2, and replace if open (see Section 7-8).
	Check integrated rectifier SR1, and replace if necessary.
	Check capacitor C9, and replace if necessary.
	Clean slip rings, and install new brushes if necessary (see Section 10-11).
	Disconnect leads 105 and 106 from the rotor, and check continuity across slip rings. Replace rotor if necessary.
	Disconnect stator excitation leads 100 and 101, and check continuity between leads. Replace stator if necessary.
	Check resistance and connections of resistor R3; full resistance of R3 (end to end) is 10 ohms ±10%. Replace R3 if necessary. If R3 is replaced, adjust R3 (see Section 10-12).
	Check field current regulator board PC1 and connection, and replace PC1 if necessary (see Section 10-7).
High output at auxiliary power receptacles.	Check engine speed, and adjust if necessary (see Section 7-5).
	Check resistance and connections of resistor R3; full resistance of R3 (end to end) is 10 ohms ±10%. Replace R3 if necessary. If R3 is replaced, adjust R3 (see Section 10-12).
Low output at auxiliary power receptacles.	Check engine speed, and adjust if necessary (see Section 7-5).
	Check fuse F1, and replace if open (see Section 7-8).
	Check integrated rectifier SR1, and replace if necessary.
	Check capacitor C9, and replace if necessary.
	Check resistance and connections of resistor R3; full resistance of R3 (end to end) is 10 ohms ±10%. Replace R3 if necessary. If R3 is replaced, adjust R3 (see Section 10-12).

C. Engine

Trouble	Remedy
Engine will not crank.	Check battery, and replace if necessary.
	Check battery connections and tighten if necessary.
	Circuit breaker CB10 may be open. CB10 automatically resets when fault is corrected (see Section 7-8). Check engine wiring harness and components.
	Check engine wiring harness plug connections.
	Check continuity of Engine Start/Preheat switch S1, and replace if necessary.
Engine cranks but does not start.	Check fuel level.
	Check battery and replace if necessary. Check engine charging system according to engine manual.
	Check control relay CR2 for proper coil voltage and connections. Check continuity of coil and condition of contacts. Replace CR2 if necessary.
	Check fuel solenoid FS1 for proper coil voltage and connections. Check continuity of coils. Replace FS1 if necessary.
	Check fuel pump (see engine manual).
	Air in fuel system. See engine manual.

Trouble	Remedy
Engine starts, but stops when Start/Preheat switch S1 is released.	Check coolant level. Automatic shutdown system stops engine if engine temperature is too high (see Sections 4-5).
	Check timer relay T for proper coil voltage and connections. Check continuity of coil and condition of contacts. Replace timer relay T if necessary.
	Check control relay CR1 for proper coil voltage and connections. Check continuity of coil and condition of contacts. Replace CR1 if necessary.
Engine hard to start in cold weather.	Turn Start/Preheat switch S1 to Preheat position before starting (see Section or 5-1).
	Check glow plug and related wiring (see engine manual).
	Keep battery in good condition. Store battery in warm area off cold surface.
	Use fuel formulated for cold weather (diesel fuel can gel in cold weather). Contact local fuel supplier for fuel information.
	Use correct grade oil for cold weather (see Section 7-1).
Engine suddenly stops.	Check oil level. Automatic shutdown system stops engine if oil pressure is too low (see Sections 4-5).
	Check coolant level. Automatic shutdown system stops engine if engine temperature is too high (see Sections 4-5).
	Check control relay CR2 for proper coil voltage and connections. Check continuity of coil and condition of contacts. Replace CR2 if necessary.
	Check fuel solenoid FS1 for proper coil voltage and connections. Check continuity of coils. Replace FS1 if necessary.
Engine slowly stopped and cannot be restarted.	Check fuel level.
	Check engine air and fuel filters (see Sections 7-3 and 7-6).
	See engine manual.
Battery discharges between uses.	Clean top of battery with baking soda and water solution; rinse with clear water.
	Recharge or replace battery if necessary.
	Periodically recharge battery (approximately every 3 months).
Engine uses oil during run-in period; wetstacking occurs.	Dry engine (see Section 13).

10-2. Troubleshooting Circuit Diagram For Welding Generator (Use With Section 10-3)

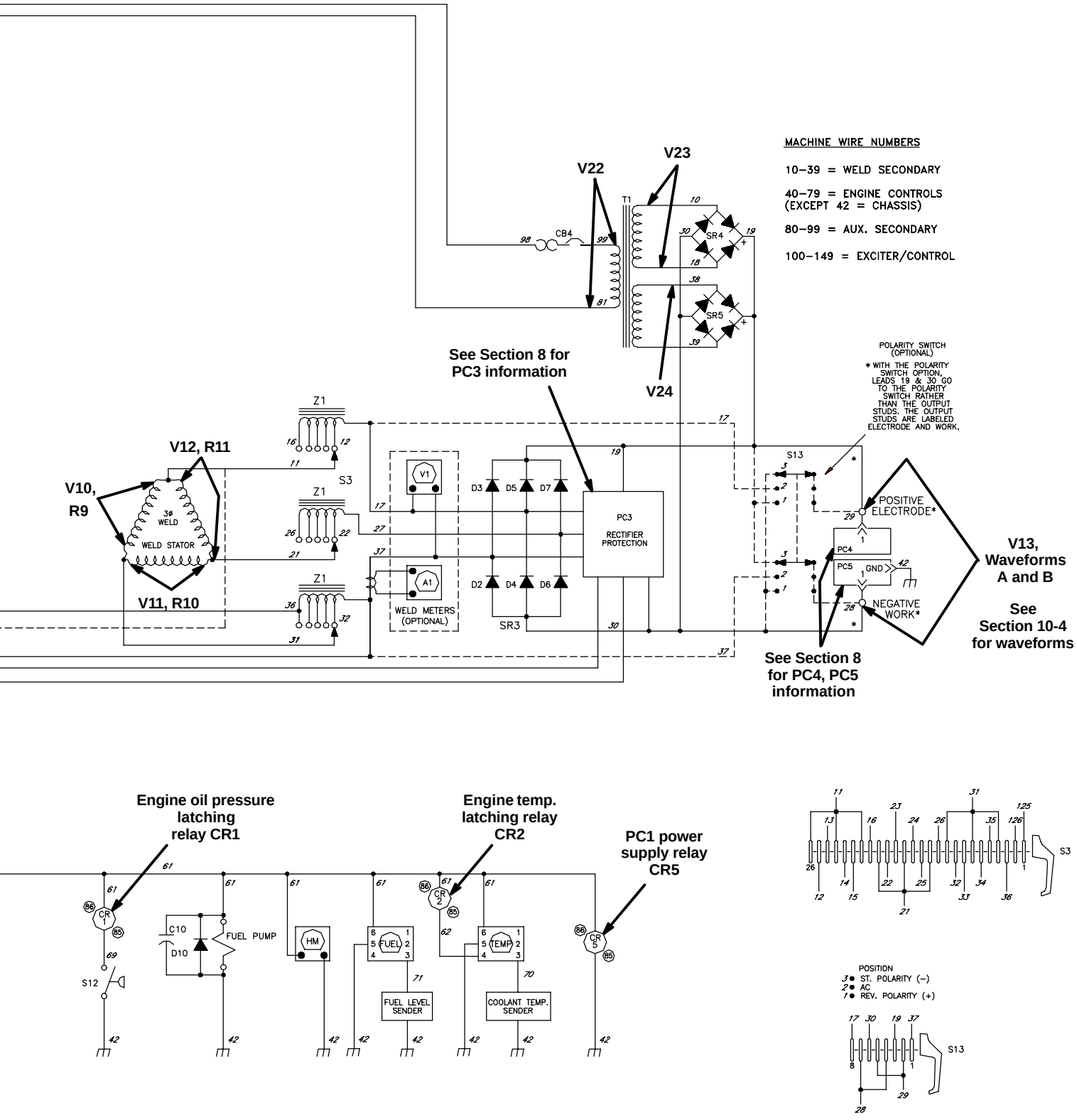


S6		REMOTE			ELECTRODE HOT		
SWITCH NUMBERS	LEAD NUMBERS	TIG	STICK	MIG	MIG	STICK	TIG
1–2	119–120	X	X	X			
2–3	120–121				X	X	X
5–6	122–123			X	X		
6–7	123–124	X					X
9–10	48–68		X	X	X	X	X
11–12	84–98					X	

X = CONTACT CLOSED

S1			
LEAD NUMBERS	HEAT	OFF	HEAT START
30–17			X
30–19	X		
30–50			X

X = CONTACT CLOSED


MACHINE WIRE NUMBERS
10–39 = WELD SECONDARY
40–79 = ENGINE CONTROLS (EXCEPT 42 = CHASSIS)
80–99 = AUX. SECONDARY
100–149 = EXCITER/CONTROL
V22
V23
V24
T1
CB4
SR4
SR5
See Section 8 for PC3 information
POLARITY SWITCH (OPTIONAL)
* WITH THE POLARITY SWITCH OPTION, LEADS 19 & 30 GO TO THE POLARITY SWITCH RATHER THAN THE OUTPUT STUDS. THE OUTPUT STUDS ARE LABELED ELECTRODE AND WORK.
V12, R11
V10, R9
V11, R10
Z1
S3
3ø WELD
WELD STATOR
V1
A1
WELD METERS (OPTIONAL)
D3 D5 D7
D2 D4 D6
SR3
PC3
RECTIFIER PROTECTION
S13
POSITIVE ELECTRODE*
NEGATIVE WORK*
PC4
PC5
GND
V13, Waveforms A and B
See Section 10-4 for waveforms
See Section 8 for PC4, PC5 information
Engine oil pressure latching relay CR1
Engine temp. latching relay CR2
PC1 power supply relay CR5
CR 1
CR 2
CR 5
C10
D10
FUEL PUMP
S12
HM
FUEL
TEMP
FUEL LEVEL SENDER
COOLANT TEMP. SENDER
POSITION
3 ST. POLARITY (–)
2 AC
1 REV. POLARITY (+)

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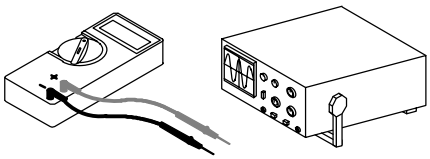
10-3. Troubleshooting Values For Circuit Diagram (Use With Section 10-2)

Test Equipment Needed:

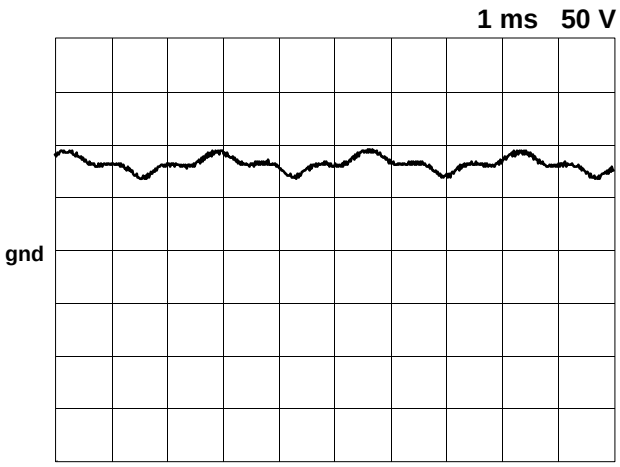


Voltage Readings	
a) Tolerance – ±10% unless specified	
b) Condition – 70°F (21°C); cold machine (no warm-up); no load	
c) Reference – single arrow: reference to circuit common (lead 42); double arrow: reference to points indicated	
d) Process/Contactor Control switch S6 in Weld Terminals Always On – CC Stick position unless noted	
e) Wiring Connections – see Section 12	
V1	126 – 130 volts ac
V2	126 – 130 volts ac
V3	252 – 260 volts ac
V4	27 volts ac
V5	101 volts ac
V6	175 volts ac
V7	+135 volts dc
V8	+ 89 volts dc
V9	+89 volts dc (S6 in Weld Terminals Always On –Stick position) +33 volts dc (S6 in Weld Terminals Always On–Scratch Start TIG position) +11.5 to 40.5 volts dc from min to max of R1 (S6 in Weld Terminals Always On – MIG position)
V10	69 volts ac (R1 at max.)
V11	69 volts ac (R1 at max.)
V12	69 volts ac (R1 at max.)
V13	+89 volts dc (S6 in Weld Terminals Always On – Stick position) 47 volts dc (S6 in Weld Terminals Always On – Scratch Start Tig position) +16 to 56 volts dc from min to max of R1 (S6 in Weld Terminals Always On – MIG position)
V14, V15, V16	+12 volts dc with Start/Preheat switch S1 in Preheat position
V17	0 to +10 volts dc from min to max of R1
V18	+12 volts dc
V19	0 to +10 volts dc from min to max of R1
V20	+12 volts dc
V21	+12 volts dc
V22	258 volts ac with Process/Contactor Controlswitch S6 in Stick position
V23, V24	18 volts ac with Process/Contactor Control switch S6 in Stick position

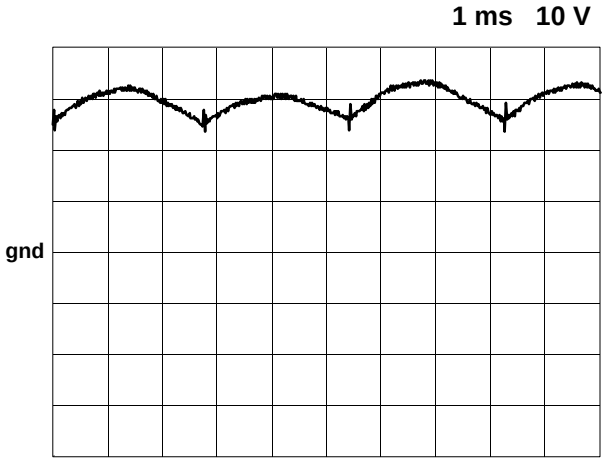
Resistance Values	
a) Tolerance – ±10% unless specified	
b) Condition – 70°F (21°C); cold machine (no warm-up)	
c) Wiring Connections – see Section 12	
d) Stop engine before checking resistance	
R1 thru R6	Less than 1 ohm
R7	18.5 ohms
R8	14.2 ohms
R9 thru R11	Less than 1 ohm
R12	15 ohms
R13	Less than 1 ohm

Amperage Readings	
a) Tolerance – ±5% unless specified	
b) Condition – 70°F (21°C); cold machine (no warm-up); no load	
c) Process/Contactor Control switch S6 in Weld Terminals Always On – CC Stick position unless noted	
I1	6.3 amps dc
I2	4.3 – 4.6 amps dc

10-4. Waveforms For Section 10-2

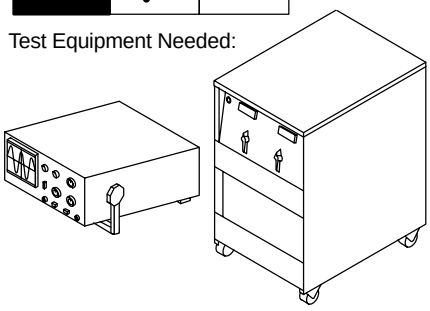


A. DC/CC Open-Circuit Voltage, Voltage/ Amperage Adjust Control R1 At Maximum

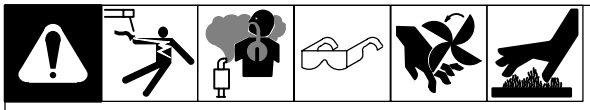


B. DC/CC Output, 28 Volts DC, 200 Amperes, Amperage Range Switch S3 At 125-400 Position (Resistive Load)

Test Equipment Needed:

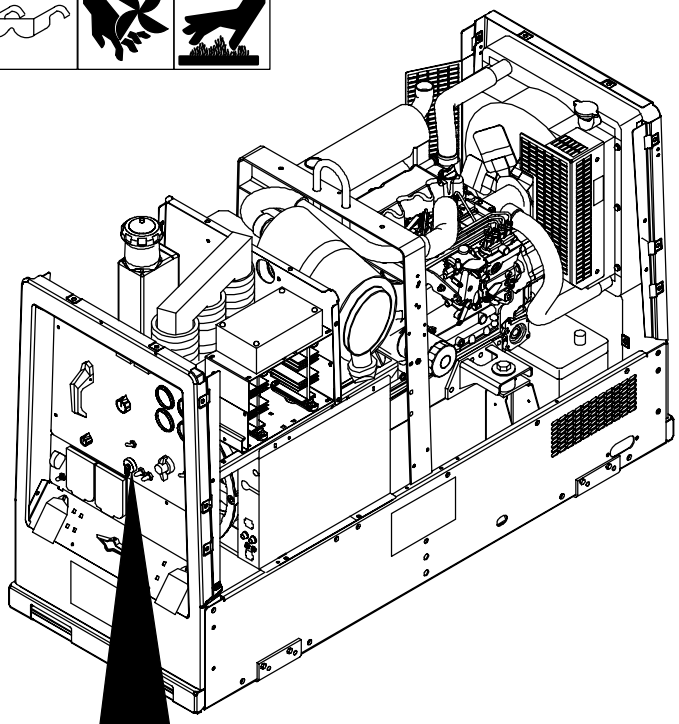


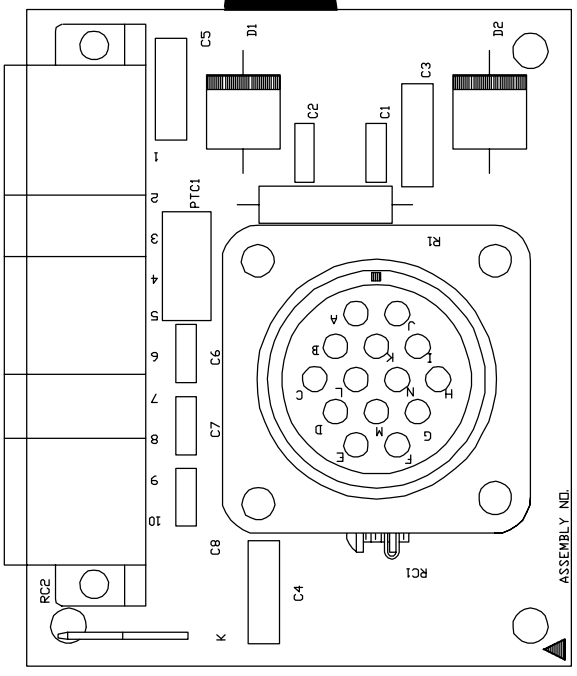
10-5. Filter Board PC6 Testing Information



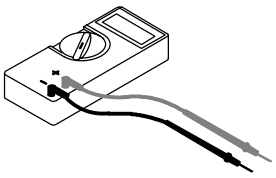
▲ **Stop engine.**

See Section 10-6 for specific values during testing. Voltage readings tolerance ±10%.





Test Equipment Needed:



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10-6. Filter Board PC6 Test Point Values

PC6 Voltage Readings

a) Tolerance – ±10% unless specified

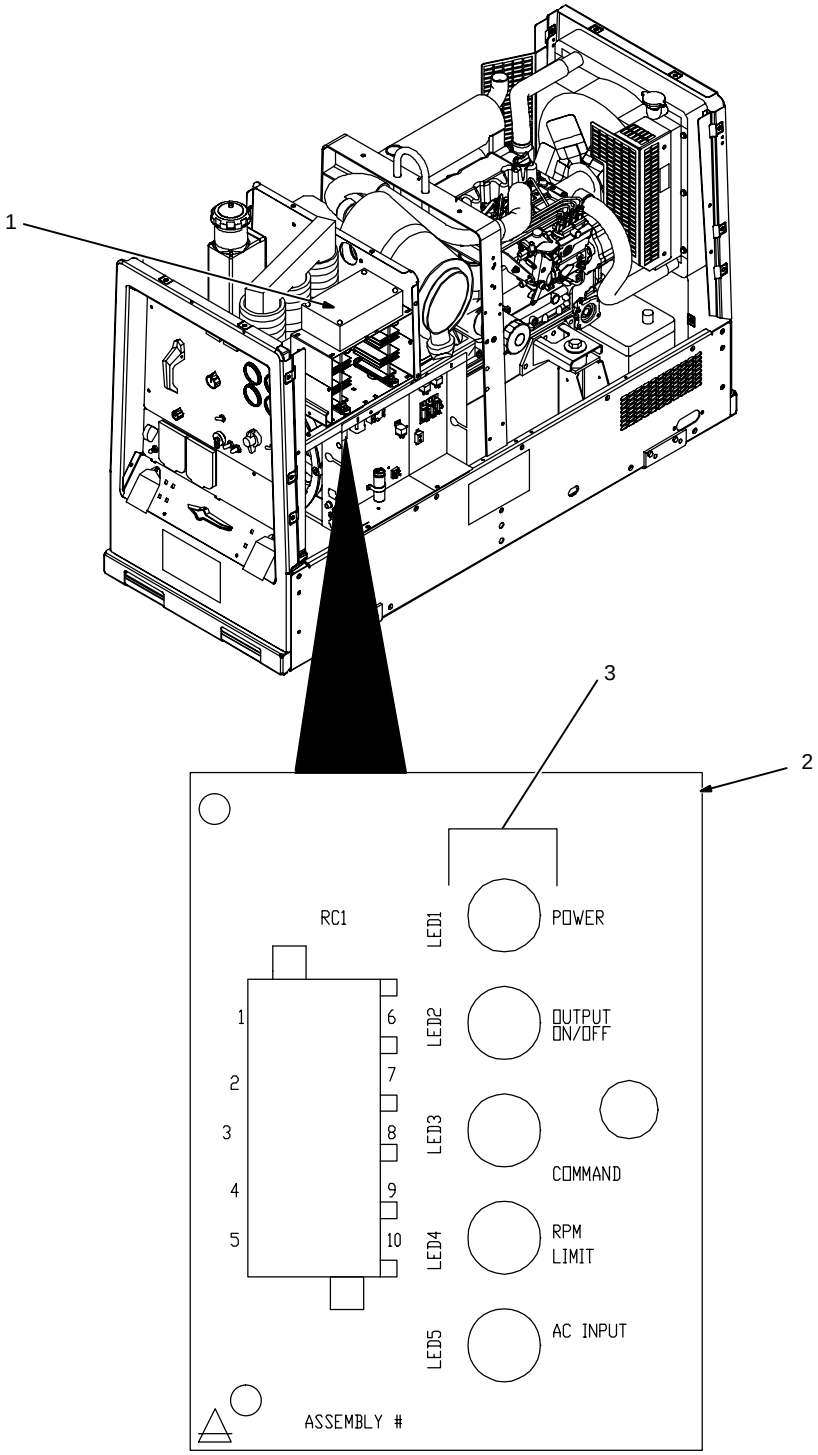
b) Reference – to circuit common (lead 42) unless noted

c) Condition – no load

d) Process/Contactor Control switch S6 in Weld Terminals Always On – CC Stick position

Receptacle	Pin	Value
RC2	1	Not used
	2	115 volt ac input with respect to pin RC2-10
	3	24 volt ac input with respect to pin RC2-10
	4	24 volt ac output with respect to pin RC2-10
	5	Contactor control circuit, 24 volt ac input with contact closure to pin RC2-9 and closure on RC14 between pins A and B or pins I and J
	6	Command reference, 10 volt dc input
	7	Command common
	8	Remote command signal output, 0 to +10 volts dc input from min to max of remote voltage/amperage control
	9	Circuit common for 24 and 115 volt ac contactor control circuits
	10	Circuit common for 24 and 115 volt ac circuits

10-7. Field Current Regulator Board PC1 Testing Using LED Board PC9



Determine the condition of field current regulator board PC1 by observing the LED's on LED board PC9 (in control box).

☞ *Do not open the PC1 sealed case to service PC1. If PC1 is not working properly, replace the entire PC1 module.*

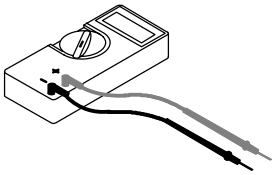
Be sure plugs are secure. See Section 10-8 for diagnostic information and specific values during testing.

1 Field Current Regulator Board PC1 Module

2 LED Board PC9

3 Diagnostic LED's (See Section 10-8)

Test Equipment Needed:



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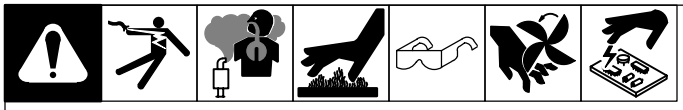
10-8. Using Diagnostic LED's On LED Board PC9

NOTE ☞

The LED's on circuit board PC9 monitor all critical input voltages to field current regulator board PC1.

If PC9 Power LED, Output On/Off LED, and AC Input LED are on with Process/Contactor Control switch S6 in Weld Terminals Always On - CC Stick mode and engine running at weld/power speed, 89 volts dc should be present at brush leads 105 and 108. This indicates field current regulator board PC1 is functioning normally.



a) Condition – no load; weld/power rpm unless noted

b) Voltage/Amperage Adjust Control switch S5 in Panel position

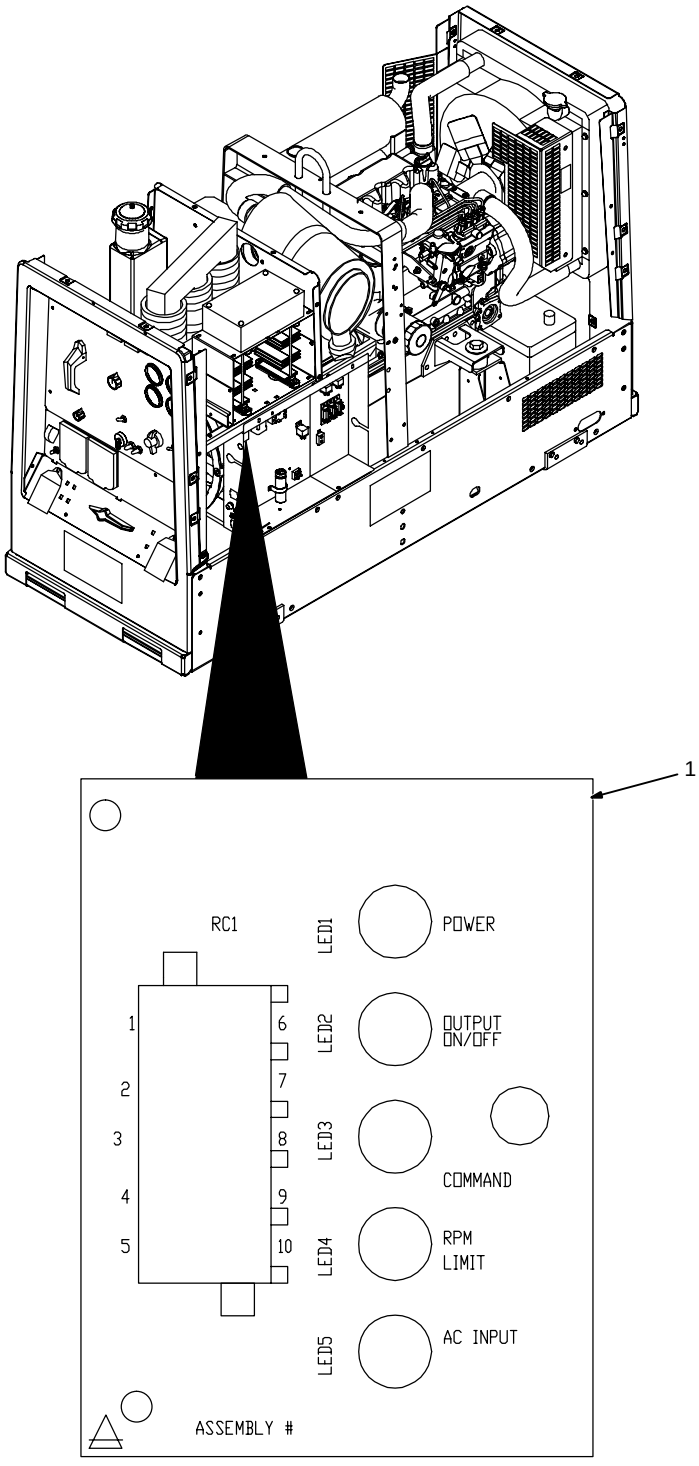
b) Reference – to circuit common (lead 42) unless noted

LED	Status	Self-Test
POWER	On	Indicates +12 volts dc is present to energize PC1.
	Off	If LED is off: Check control relay CR5 for proper coil voltage and connections. Check continuity of coil and condition of contacts. Replace CR5 if necessary. Reset circuit breaker CB10 and/or CB11. Check for loose electrical connections to PC1. Check for 12 volt dc supply voltage to PC1. If voltage is low, check battery or engine charging system.
OUTPUT ON/OFF	On	Indicates 24 volts ac input with Process/Contactor Control switch S6 in Weld Terminals Always On position, or with S6 in a Weld Terminals Remotely Controlled position with remote contactor closed.
	Off	If LED is off: Place Process/Contactor Control switch S6 in Weld Terminals Always On position, or place S6 in Weld Terminals Remotely Controlled position and connect remote contactor to remote receptacle RC14. Reset circuit breaker CB5. Check filter board PC6 and connections, and replace if necessary (see Section 10-5).
COMMAND	On	Indicates 0 to +10 volts dc input from min. to max. of Voltage/Amperage Adjust control R1 with Voltage/Voltage/Amperage Adjust Control switch S5 in Panel position.
	Off	If LED is off: And Power LED is on, check that Voltage/Amperage Adjust control R1 is not at min. And Power LED is on, check and tighten connections to Voltage/Amperage Adjust control R1. And Power LED is on, check voltage at Voltage/Amperage Adjust control R1 (see Section 10-2). If correct voltage is not present, check connections to PC1. And Power LED is on, check resistance and connections of Voltage/Amperage Adjust control R1; R1 is 0 to 1000 ohms ±10%. Replace R1 if necessary.
RPM LIMIT ☞ *LED normally off at weld/ power speed)*	On	Indicates engine speed is less than 1704 rpm (approximately). If LED is on: And AC Input LED is on, check engine weld/power speed and adjust if necessary. And AC Input LED is off, check fuse F2, and replace if open. And AC Input LED is off, reset circuit breaker CB12.
	Off	Indicates engine speed is above 1704 rpm (normal operation).
AC INPUT	On	Indicates + 175 volts ac input from field excitation circuit.
	Dim or Off	If LED is off, power LED is on, and normal ac voltage is present at ac receptacles (see Section 10-2): Check fuse F2, and replace if open. Reset circuit breaker CB12.

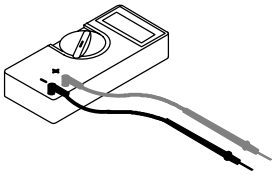
10-9. LED Board PC9 Testing

Be sure plugs are secure. See Section 10-10 for specific values during testing.

1 LED Board PC9



Test Equipment Needed:



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10-10. Diagnostic LED's On LED Board PC9

PC9 Voltage Readings

a) Tolerance – ±10% unless specified

b) Reference – to circuit common (lead 42) unless noted

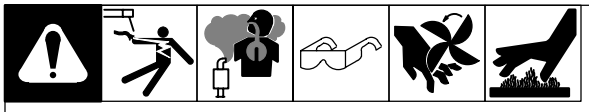
c) Condition – no load; weld/power rpm unless noted

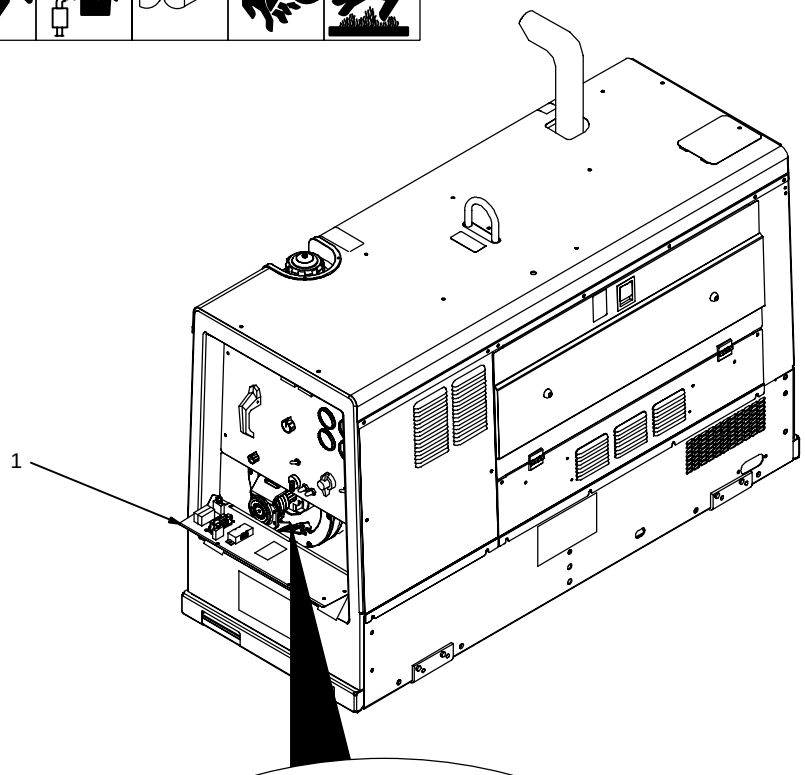
d) Process/Contactor Control switch S6 in Weld Terminals Always On – CC Stick position

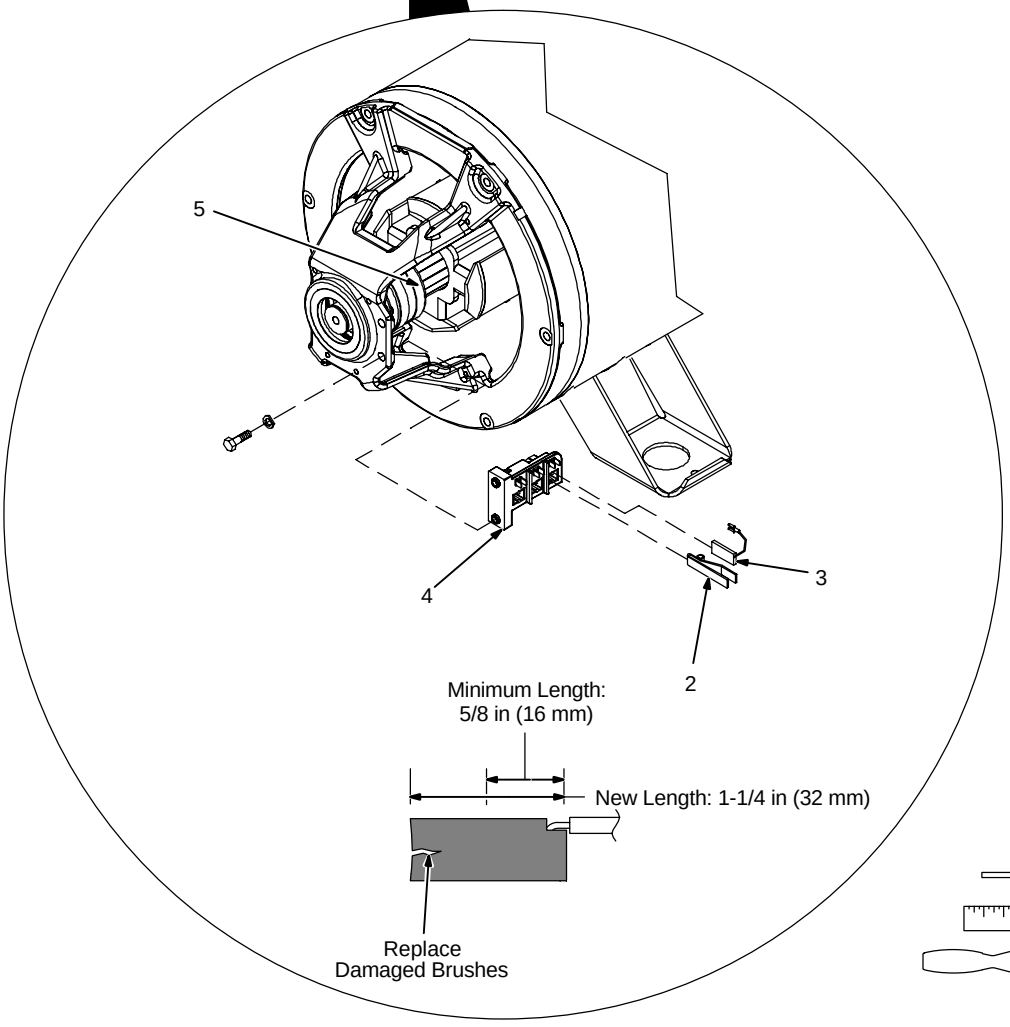
☞ *Do not exceed recommended voltage when testing LED's or circuit board may be damaged.*

Receptacle	Pin	Value
PLG13	1	Power LED, +2 volts dc input To test power LED, apply +2 volts dc to PLG13-1 and connect negative (–) side of power supply to PLG13-8. LED lights if okay.
	2	Not used
	3	Not used
	4	Not used
	5	AC input LED, +1.85 volts dc input with respect to pin PLG13-10 when weld exciter voltage is present. To test ac input LED, apply +1.85 volts dc to PLG13-10 and connect negative (–) side of power supply to PLG13-5. LED lights if okay.
	6	Output on/off LED, 0.13 volts dc input with contactor off; + 2 volts dc input with contactor on. To test output on/off LED, apply +2 volts dc to PLG13-6 and connect negative (–) side of power supply to PLG13-8. LED lights if okay.
	7	Command LED, 0 to 2 volts dc input from min to max of Voltage/Amperage Adjust control R1. To test command LED, apply +2 volts dc to PLG13-7 and connect negative (–) side of power supply to PLG13-8. LED lights if okay.
	8	Circuit common
	9	RPM Limit LED, +10.5 volts dc input at 1850 rpm; voltage decreases as engine speed decreases. LED goes on when engine speed is less than 1704 rpm (approximately). To test rpm limit LED, apply +2 volts dc to PLG13-8 and connect negative (–) side of power supply to PLG13-9. LED lights if okay.
	10	AC Input LED, +1.85 volts dc input with respect to pin PLG13-5 when weld exciter voltage is present. To test ac input LED, apply +1.85 volts dc to PLG13-10 and connect negative (–) side of power supply to PLG13-5. LED lights if okay.

10-11. Replacing Brushes And Cleaning Slip Rings







▲ **Stop engine.**

1 Auxiliary Power Panel

Remove screws from panel. Tilt panel forward.

2 Spring Clip

3 Brush

4 Brush Holder Assembly

Squeeze end of spring clip to remove clip and brush from brush holder assembly. Remove and inspect all three brushes.

Replace brushes if damaged, or if brush is at or near minimum length.

5 Slip Rings

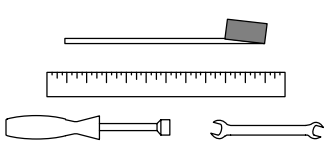
Visually inspect slip rings. Under normal use, rings turn dark brown.

If slip rings are corroded or surface is uneven, insulate brush leads, start engine, and clean rings with a commutator stone. Remove as little material as possible.

Reinstall auxiliary power panel.

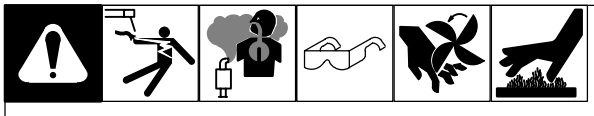
▲ **Stop engine.**

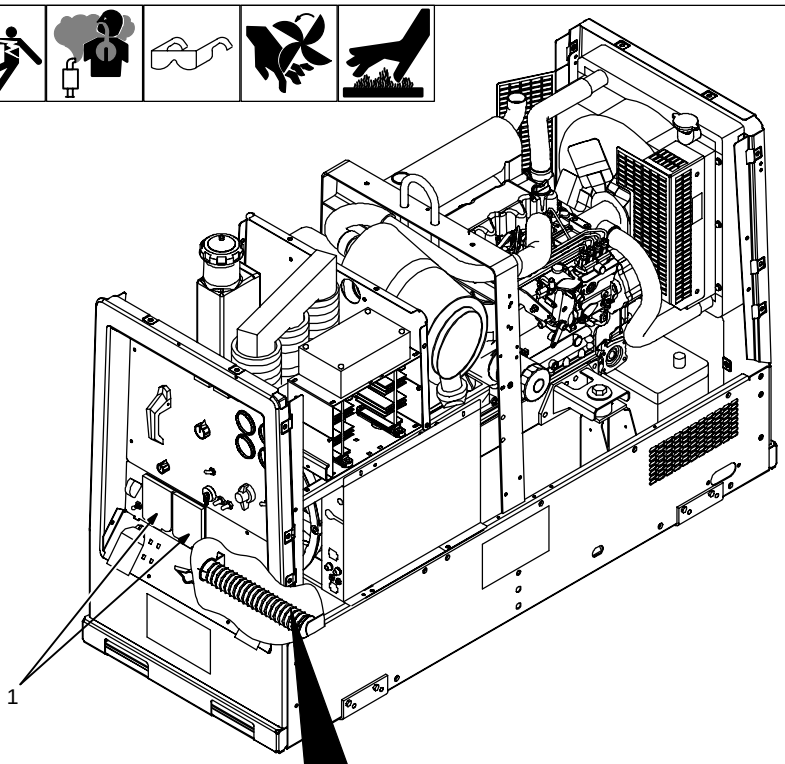
Tools Needed:



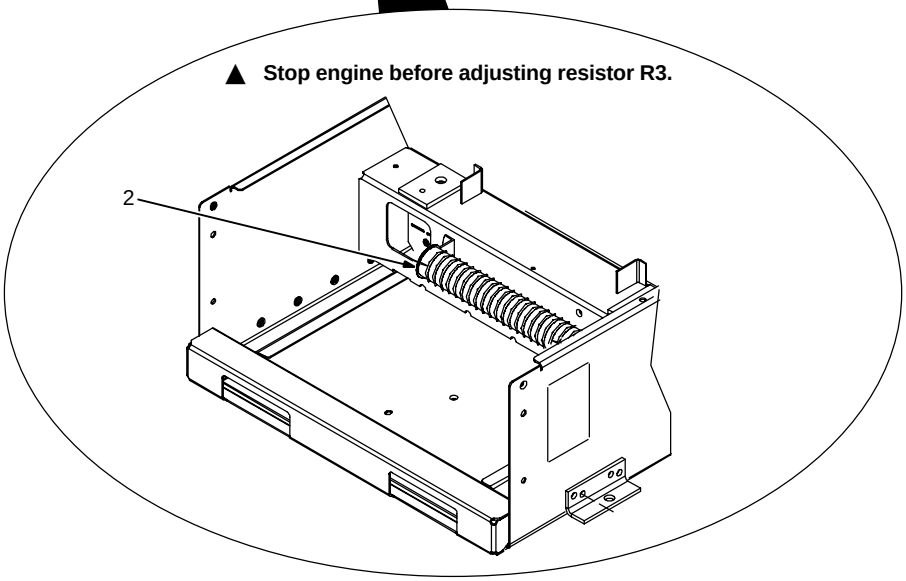
803 209

10-12. Checking Unit Output After Servicing





▲ **Stop engine before adjusting resistor R3.**



Start engine and check engine speed. Adjust engine speed if necessary (see Section 7-5).

1 Duplex Receptacles GFCI1 And RC1

2 Resistor R3

Turn Voltage/Amperage Adjust control R1 to max. Place Process/ Contactor Control switch S6 in Weld Terminals Always On – CC Stick position.

Check voltage at each receptacle. With no load applied, there should be 126 to 130 volts ac present at GFCI1 and 252 to 260 volts ac at RC1.

If correct voltage is not present, stop engine and reconnect lead 102 and/or lead 106 to different taps on R3.

☞ *Connect R3 so at least half of resistor length is in circuit.*

Start engine and check GFCI1 and RC1 voltage. If necessary, change R3 connections until correct voltage is obtained at receptacles without exceeding 4.6 amperes dc exciter revolving field current (see Section 10-2).

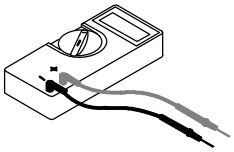
Check open-circuit voltage across weld output terminals. There should be 90 volts dc present. If correct voltages are not present, repeat troubleshooting procedures in Section 10-1.

▲ **Stop engine.**

Allow engine to cool, and then complete pre-operational checks in table.

Pre-Operational Checks
Wipe engine surfaces clean.
Check labels; replace labels that are unreadable or damaged.
Check fuel and oil (see Section 4-5).
Check and correct any fluid leaks.
Clean weld output and battery terminals. Tighten connections.
Clean outside of entire unit.

Test Equipment Needed:

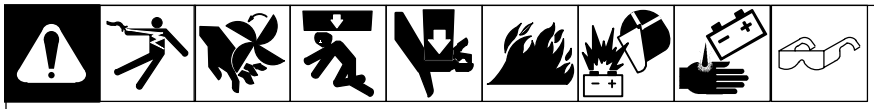


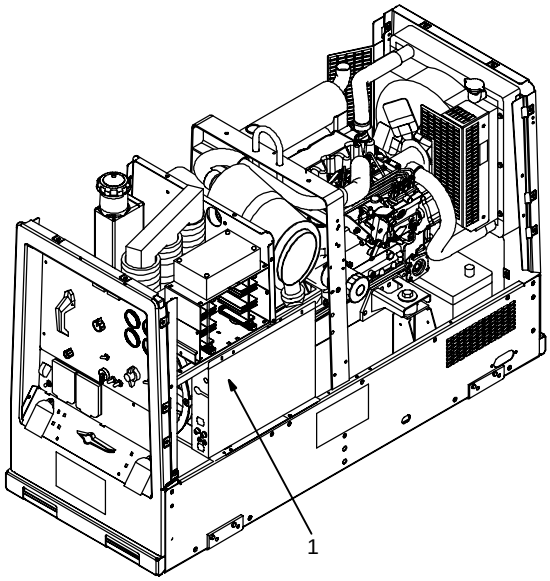
Tools Needed:

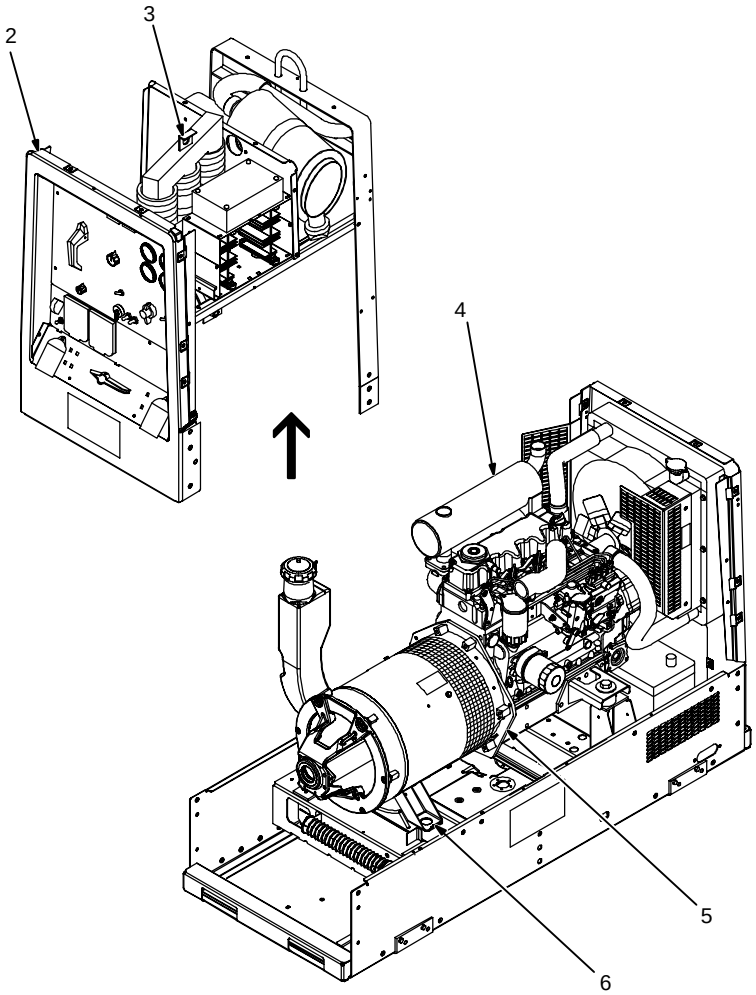
803 210 / 803 201

SECTION 11 – DISASSEMBLY AND REASSEMBLY

11-1. Disassembly Of Unit







Use Section 10 to determine if trouble is in exciter stator, stator, rotor, engine or combination of these components.

▲ **Stop engine and let cool. Disconnect battery negative (–) cable.**

Remove exhaust pipe, fuel cap, and top cover. Reinstall fuel cap. Remove side panels and door(s). Retain all hardware.

1 Control Box

Disconnect plugs from control box. Remove box.

☞ *To aid in reassembly, mark leads before disconnecting. See lead list summary in Section 12 for connection information.*

Disconnect:

- stator weld leads from Amperage Range switch S3
- stator exciter leads from terminal strip 1T
- resistor R3 leads
- weld output terminal leads

2 Front And Center Upright Assembly

3 Reactor Z1 Lifting Eye

The entire assembly will be removed together. Remove bolts securing uprights to base. While supporting assembly at front panel and reactor lifting eye, evenly lift and remove assembly.

4 Engine

5 Flywheel Housing

6 Front Generator Mounts

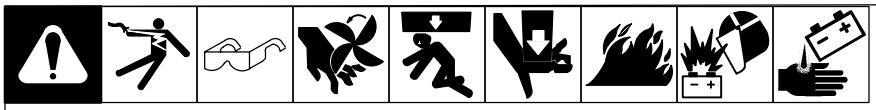
Support engine under flywheel housing with a 1 x 3 x 30 in (25 x 76 x 762 mm) metal bar.

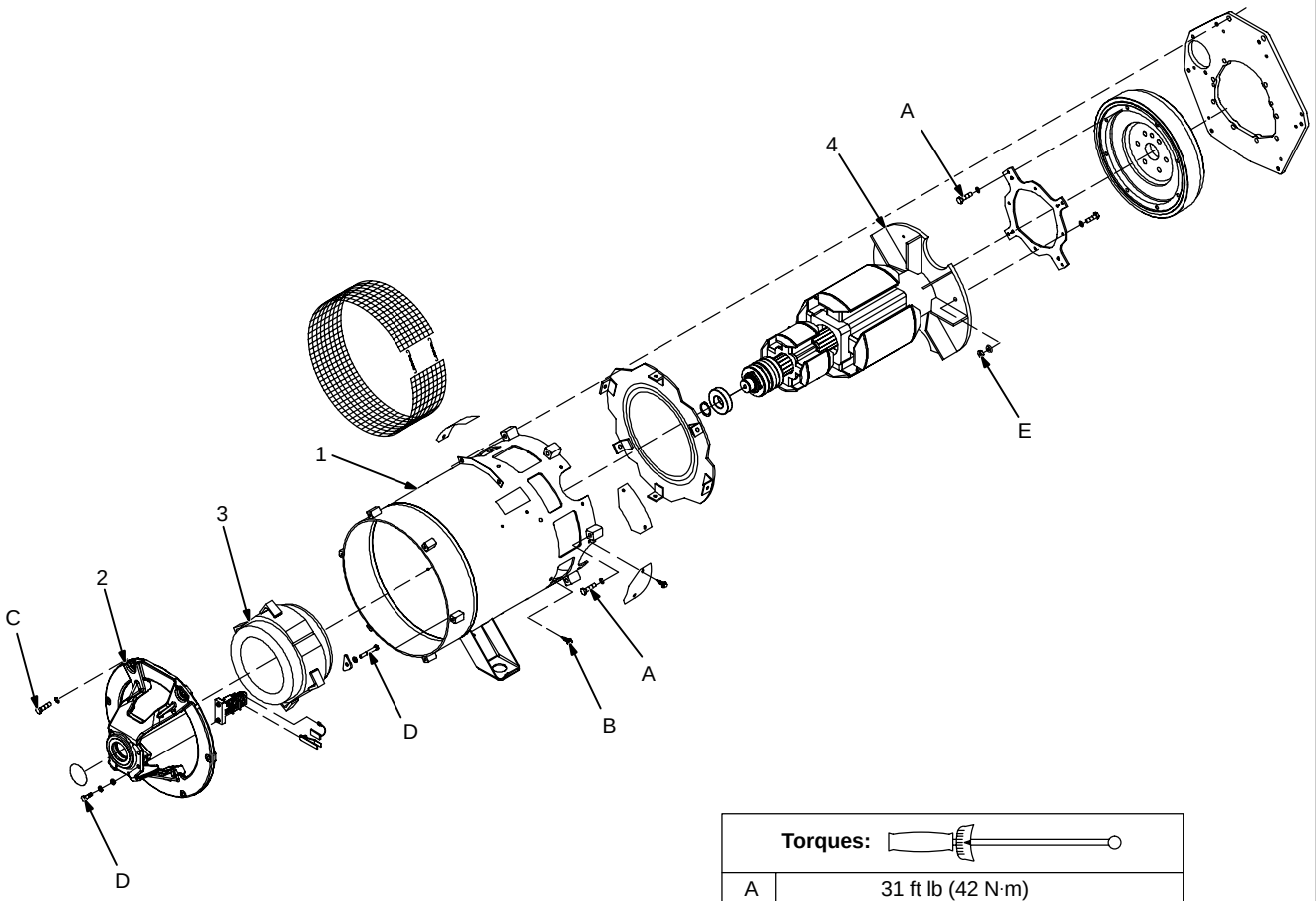
☞ *Do not support engine on fuel tank or under oil pan.*

Remove front generator mounts. Go to Section 11-2.

802 431-C

11-2. Disassembly Of Generator





Torques:	
A	31 ft lb (42 N·m)
B	100 in lb (11 N·m)
C	25 ft lb (34 N·m)
D	12 ft lb (16 N·m)
E	42 ft lb (57 N·m)

803 204-A

▲ **Do not damage stator or rotor windings during this procedure.**

1 Stator

With engine properly supported with metal bar (see Section 11-1), remove hardware securing stator to engine. Remove the following parts as needed:

2 Endbell

3 Exciter Stator

Exciter stator comes off with endbell.

4 Rotor

If engine must also be removed, remove engine from base mounts.

Reassembly Instructions:

Reinstall engine and generator parts as needed using torque values in table.

Reinstall upright assembly. Reconnect fuel line.

Reconnect all leads. Use cable ties to secure leads in existing wiring harness and away from moving and hot parts.

Reconnect negative (–) battery cable. Reinstall panels, door, and exhaust pipe.

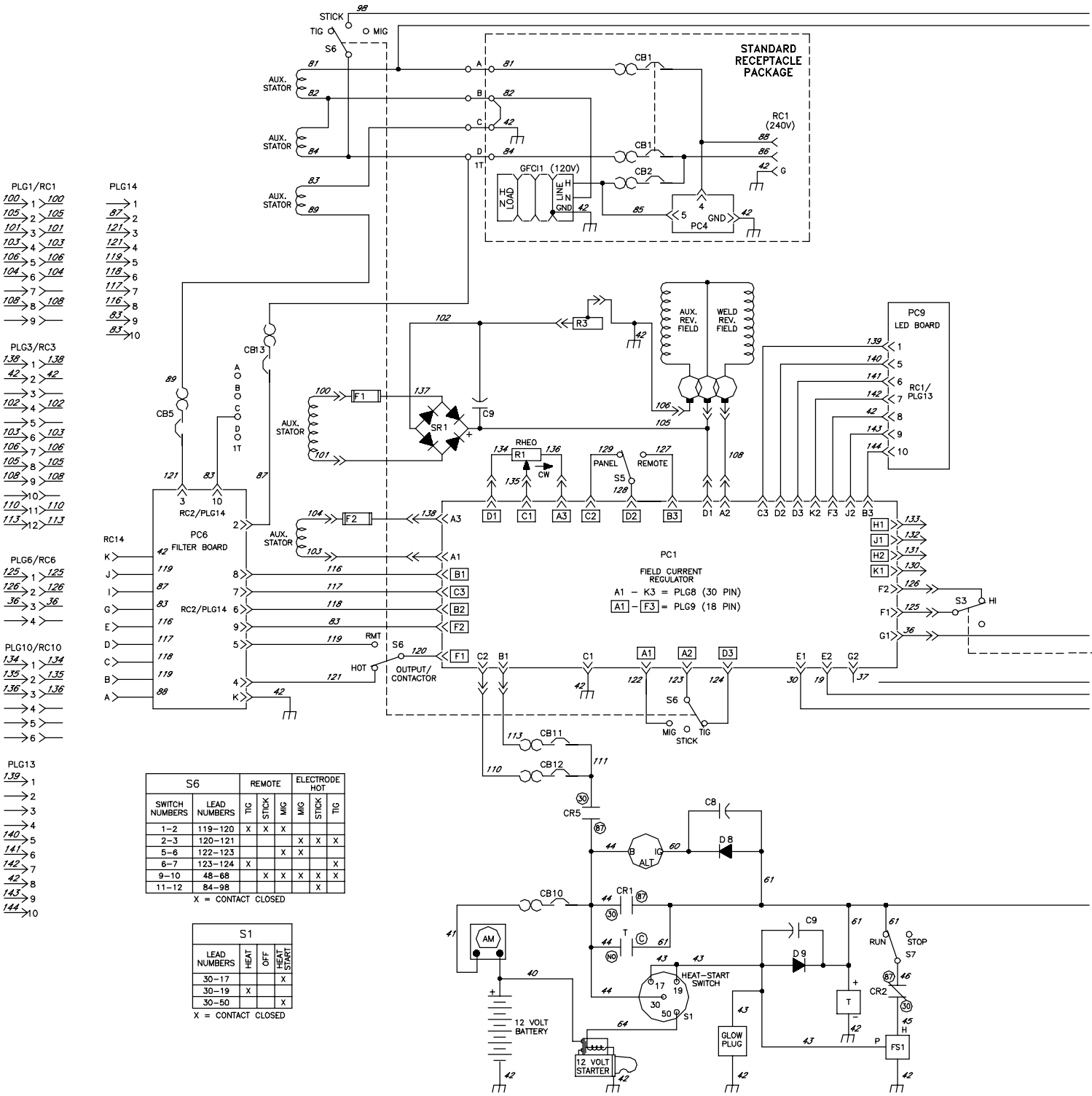
Notes

SECTION 12 – ELECTRICAL DIAGRAMS

☞ *The circuits in this manual can be used for troubleshooting, but there might be minor circuit differences from your machine. Use circuit inside machine case or contact distributor for more information.*

The following is a list of all diagrams for models covered by this manual. To order a copy, proceed as follows:

Model	Serial Or Style Number	Circuit Diagram	Wiring Diagram
D502K 5+4	LC110463 and following	206 628-A	See Table 12-1
Circuit Board PC4, PC5 (HF Filter)	LC110463 and following	189 746	
Circuit Board PC3 (HF Filter)	LC110463 and following	188 607	
Circuit Board PC6 (HF Filter)	LC110463 and following	192 997	
Circuit Board PC9 (LED)	LC110463 and following	192 227-A	



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

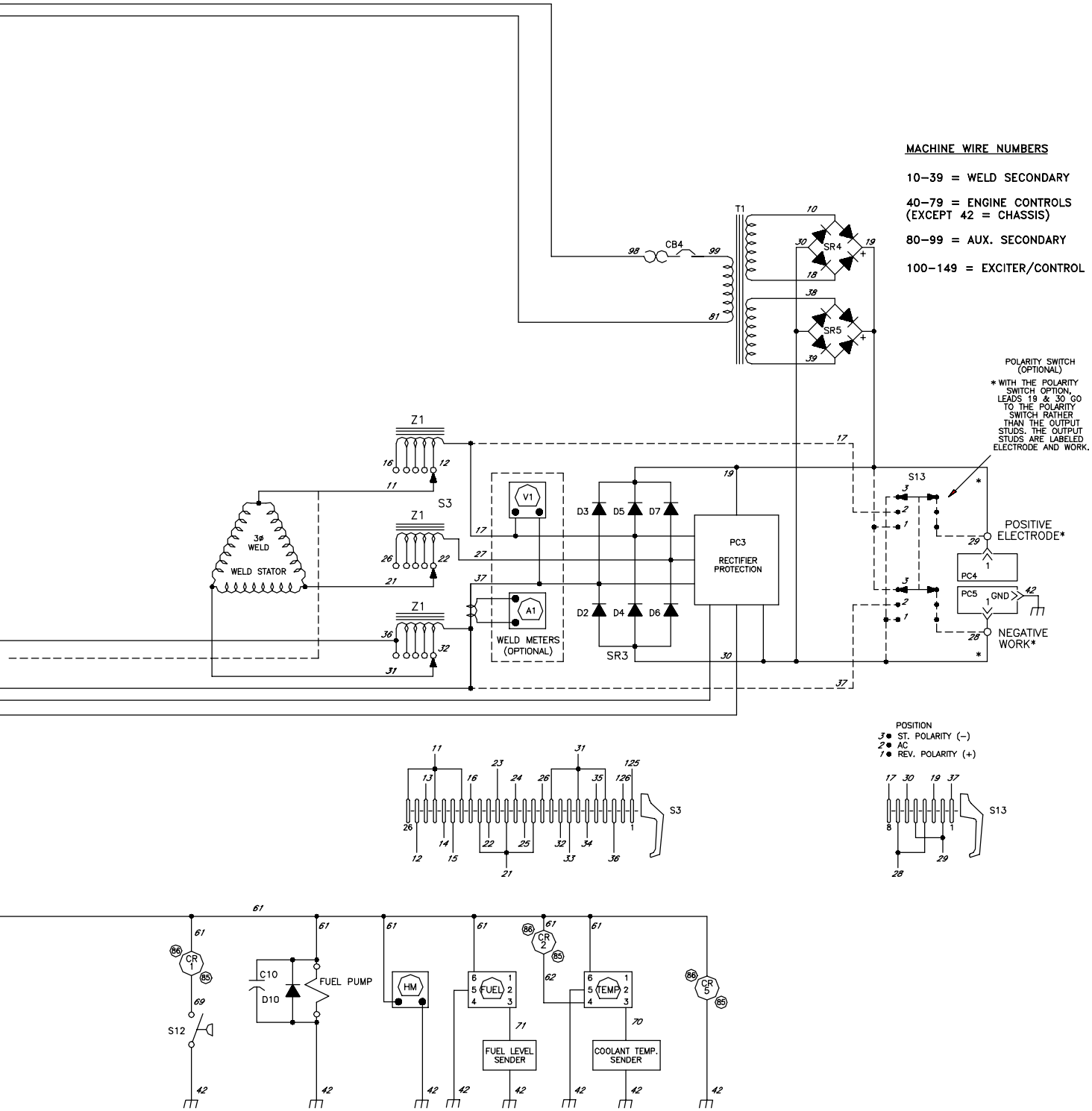
X = CONTACT CLOSED

S1			
LEAD NUMBERS	HEAT	OFF	HEAT START
30–17			X
30–19	X		
30–50			X

X = CONTACT CLOSED

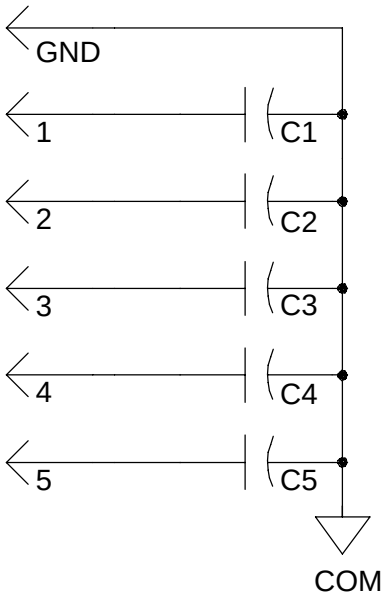
Figure 12-1. Circuit Diagram For D502K 5+4 Effective With Serial No. LC110463 And Following

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



206 628-A

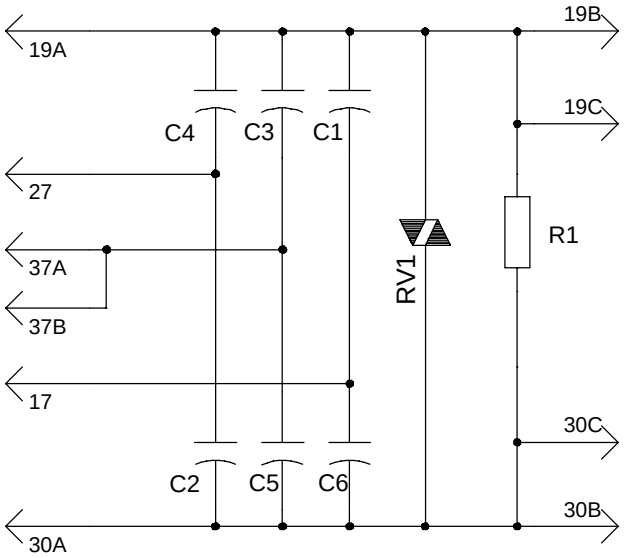
⚠ WARNING	• Do not touch live electrical parts. • Disconnect input power or stop engine before servicing. • Do not operate with covers removed. • Have only qualified persons install, use, or service this unit.
ELECTRIC SHOCK HAZARD	



189 746

Figure 12-2. Circuit Board PC4, PC5 (HF Filter) Effective With Serial No. LC110463 And Following

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



188 607

Figure 12-3. Circuit Board PC3 (HF Filter) Effective With Serial No. LC110463 And Following

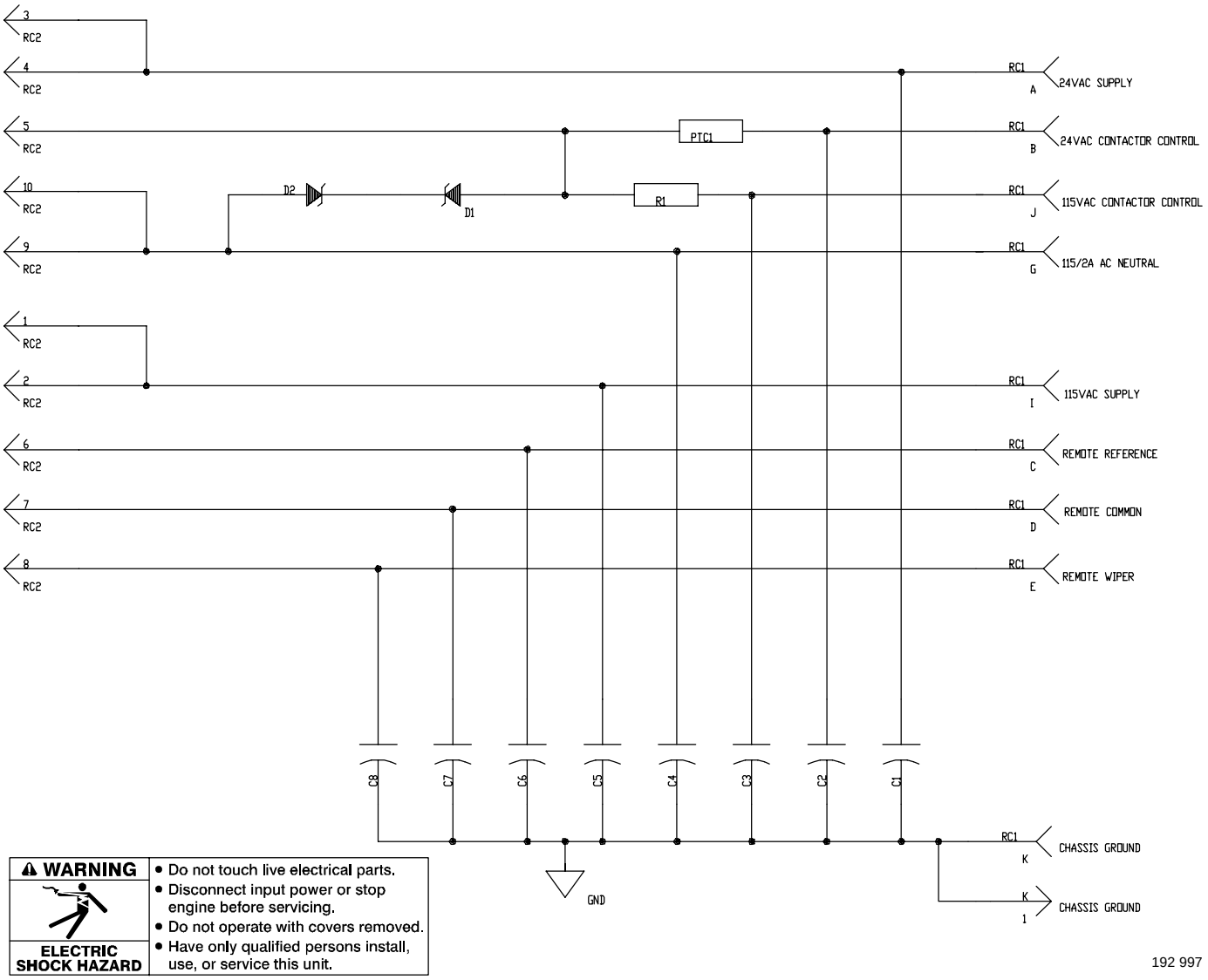


Figure 12-4. Circuit Board PC6 (HF Filter) Effective With Serial No. LC110463 And Following

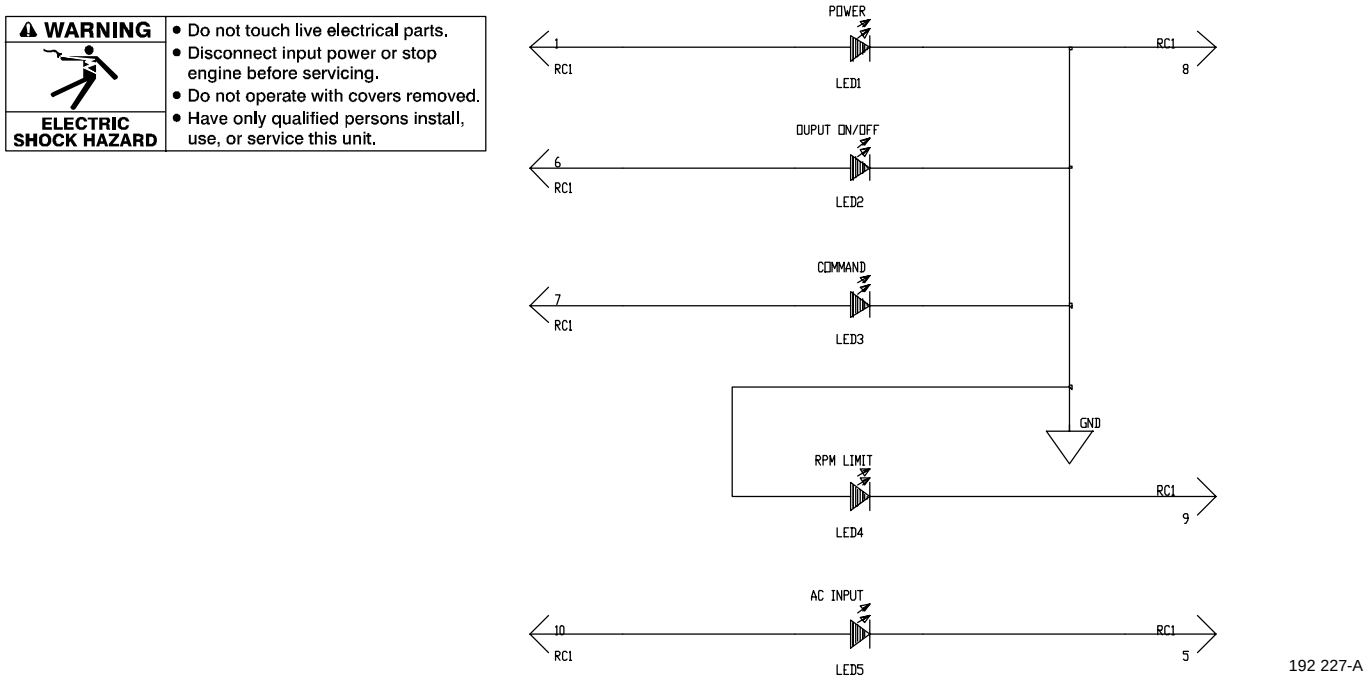


Figure 12-5. Circuit Board PC9 (LED) Effective With Serial No. LC110463 And Following

Table 12-1. Lead List Summary For D502K 5+4 Eff w/LC110463 And Following

☞ *Table shows physical lead connections and should be used with circuit diagram (table replaces wiring diagram).*

⊢▭⊣ *Apply small amount of dielectric grade, nonconductive electric grease (Miller Part No. 146 557) to connectors where factory-applied grease had been present.*

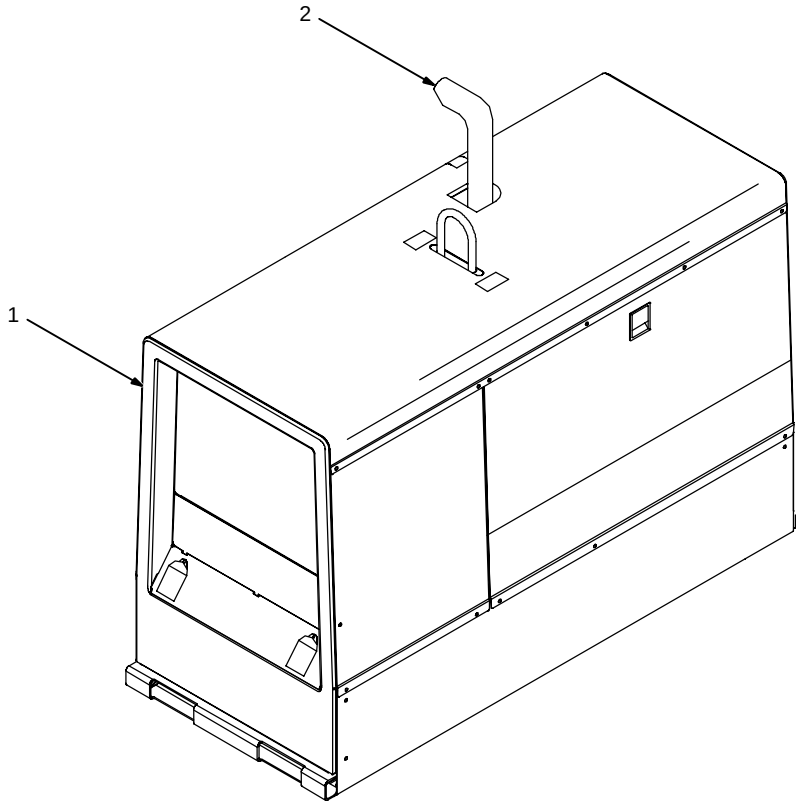
Lead	Connections
——B	RC6 (2) – S3 (2)
——H	RC6 (1) – S3 (1)
0010A	T1 SEC TO SR4 (AC)
0011A	STATOR TO EXIT
0012A	#1 COIL TO RANGE SWITCH
0013A	#1 COIL TO RANGE SWITCH
0014A	#1 COIL TO RANGE SWITCH
0015A	#1 COIL TO RANGE SWITCH
0016A	#1 COIL TO RANGE SWITCH
0017A	#1 COIL TO RECTIFIER
0017A	PC3 TO BUS BAR
0018A	T1 SEC TO SR4 (AC)
0019A	PC3 TO HEAT SINK (+)
0019B	PC3 TO LEAD 19 FROM PC1 (E2)
0019C	PC3 TO LEAD 19 FROM VOLTMETER (+)
0019D	SR3 (+) TO WELD TERMINAL (+)
0019E	SR4 (+) TO SR3 (+)
0019F	SR5 (+) TO SR3 (+)
0019J	PC1 (PLG8–E2) TO LEAD 19 FROM PC3
0021A	STATOR TO EXIT
0022A	#2 COIL TO RANGE SWITCH
0023A	#2 COIL TO RANGE SWITCH
0024A	#2 COIL TO RANGE SWITCH
0025A	#2 COIL TO RANGE SWITCH
0026A	#2 COIL TO RANGE SWITCH
0027A	#2 COIL TO RECTIFIER
0027A	PC3 TO BUS BAR
0030A	PC3 TO HEAT SINK (–)
0030B	PC3 TO LEAD 30 FROM PC1 (E1)
0030C	PC3 TO LEAD 30 FROM VOLTMETER (–)
0030D	SHUNT (OUTSIDE) TO LEAD 30 FROM AMMETER
0030E	SHUNT (INSIDE) TO LEAD 30 FROM AMMETER
0030F	SR3 (–) TO WELD TERMINAL (–)
0030G	SR4 (–) TO SR3 (–)
0030H	SR5 (–) TO SR3 (–)
0030J	PC1 (PLG8–E1) TO LEAD 30 FROM PC3
0031A	STATOR TO EXIT
0032A	#3 COIL TO RANGE SWITCH
0033A	#3 COIL TO RANGE SWITCH
0034A	#3 COIL TO RANGE SWITCH
0035A	#3 COIL TO RANGE SWITCH
0036A	#3 COIL TO RANGE SWITCH
0036A	PC8 (PLG1–G1) TO PLG6 (3)
0036C	RC6 (3) – S3 (3)
0037A	#3 COIL TO RECTIFIER
0037A	PC1 (PLG8–G2) TO LEAD 37 FROM SR3
0037A	PC3 TO BUS BAR
0037B	PC3 TO LEAD 37 FROM PLG3 (2)
0038A	T1 SEC TO SR5 (AC)
0039A	T1 SEC TO SR5 (AC)
0040A	STARTER TO AMP METER (POS)
0041A	AMP METER (NEG) TO CB10 (COPPER)
0042AB	BASE GROUND TO D10 (–)
0042AC	CR5 (85) TO D10 (–)
0042AD	FUEL SENDER TO BASE GROUND
0042AE	GROUND CABLE TO OIL PRESSURE SWITCH
0042AF	FUEL PUMP TO FUEL SENDER
0042BA	SPLICE A TO SPLICE B
0042BB	SPLICE TO D10 (NEG)
0042CC	RC3 (2) TO LEAD 42JJ
0042DD	SPLICE TO TIMER (NEG)
0042EE	SPLICE TO HOUR MTER (NEG)
0042H	PC1 (PLG8–F3) TO PC8 (PLG13–8)
0042JJ	SPLICE TO LEAD 42 CC
0042K	PC1 (PLG8–C1) TO PLG3 (2)
0042KK	SPLICE TO LEAD 42 SS
0042L	END BELL (BOTTOM–LEFT) – PC4 (GND)
0042L	END BELL (BOTTOM–RIGHT) – PC5 (GND)
0042L	END BELL (TOP–LEFT) – PC6(GND)
0042M	ASSY TO TEMP GAUGE (5)
0042N	GND STD (BASE) TO GND STUD (AUX PANEL)
0042P	1T (C–RIGHT) – GND STUD
0042R	GFCI (GND) – GND STUD
0042S	RC1 (GND) – GND STUD
0042SS	SPLICE TO 42KK
0042T	076 (K) TO LEAD 42 FROM END BELL
0042U	ASSY TO HOUR METER (–)
0042V	ASSY TO FUEL GAUGE (5)
0043A	START SWITCH (17) TO GLOW PLUGS
0043B	START SWITCH JUMPER #17 TO #19
0043D	S1 (19) TO D9 (–)
0043E	GLOW PLUG TO FS1 (PULL)
0044A	CR5 (87A) TO CB10 (SILVER)
0044B	CB10 (SILVER) TO START SW (30)
0044C	CB10 (SILVER) TO ALT (B)
0044H	CR5 (87) TO TIMER (N.O.)
0044J	CB10 (SILVER) TO CR1 (30)
0045A	CR2 (30) TO FS1
0046A	STOP SW (CENTER) TO CR 2 (87A)
0048A	LEAD 48B TO S6 (9)
0054A	CT2 TO CT1
0055A	CT2 TO CT1
0060A	D8 (POS) TO ALT (IND)
0061A	D10 (+) TO CR1 (86)
0061B	D8 (–) TO D9 (+)
0061C	SPLICE TO HOUR METER (+)
0061CA	D9 (+) TO D10 (+)
0061D	SPLICE TO FUEL GAUGE (6)
0061E	D8 (–) TO CR5 (86)
0061F	TIMER (+) TO STOP SW (BOTTOM)
0061H	SPLICE TO TEMP GAUGE (6)
0061J	SPLICE TO TEMP GAUGE (2)
0061K	FUEL PUMP TO CR1 (87A)

Table 12-1. Lead List Summary For D502K 5+4 Models Eff w/LC110463 And Following (Continued)

Lead	Connections
0061M	TIMER (C) TO D8 (NEG)
0061N	D8 (–) TO CR2 (86)
0061P	TIMER (POS) TO TIMER ”C” (COMMON)
0061Q	STOP SW BOTTOM TO HOUR METER (POS)
0061R	CR1 (87) TO D10 (POS)
0062A	TEMP GAUGE (4) TO CR2 (85)
0064A	STARTER SOLENOID TO START SW (50)
0066B	LEAD FROM CT1 TO PC7 (D)
0067B	LEAD FROM CT1 TO PC7 (G)
0068B	S6 (10) TO CR6 (30)
0069A	CR1 (85) TO OIL SENDER (S12)
0070A	COOLENT SENDER TO TEMP GAUGE (3)
0071A	FUEL GAUGE (3) TO FUEL SENDER
0081A	EXCITER STATOR – 1T (A–LEFT)
0081B	CB1 (BOTTOM) – 1T (A–RIGHT)
0081D	EXCITER TO T1
0081E	T1 PRI TO EXCITER STATOR
0082A	EXCITER STATOR – 1T (B–LEFT)
0082B	GFCI (N) – 1T (B–RIGHT)
0083A	EXCITER STATOR – 1T (C–LEFT)
0083B	PC6 (PLG14–10) TO (1T–83C)
0083D	PC6 (PLG14–9) TO PC1 (PLG9–F2)
0084A	EXCITER STATOR – 1T (D–LEFT)
0084B	CB1 (BOTTOM) – 1T (D–RIGHT)
0084D	EXCITER TO S6
0084E	AUX STATOR TO S6 (11)
0084F	1TD TO CB23
0085A	CB2 (BOTTOM) – GFCI (HOT)
0085B	CB2 (BOTTOM) – PC4 (5)
0086A	CB1 (TOP) – RC1 (BOTTOM–RIGHT)
0086D	CB1 (TOP) – CB2 (TOP)
0087AA	CB23 TO PLG14 (2)
0088A	CB1 (TOP) – RC1 (BOTTOM–LEFT)
0088B	CB1 (TOP) – PC4 (4)
0089A	EXCITER TO CB5 (TOP)
0098A	S6 (12) TO CB4
0099A	T1 PRI TO CB4
0100A	EXCITER STATOR – PLG1 (1)
0100B	RC1 (1) TO F1
0101A	EXCITER STATOR – PLG1 (3)
0101B	RC1 (3) TO SR1 (AC)
0102C	SR1 (–) TO C9 (–)
0102D	RC3 (4) TO C9 (–)
0102E	R3 TO PLG3 (4)
0103A	EXCITER STATOR – PLG1 (4)
0103B	PC1 (PLG8–A1) TO PLG3 (6)
0103D	RC3 (6) TO RC1 (4)
0104A	EXCITER STATOR – PLG1 (6)
0104B	RC1 (6) TO F2
0105A	BRUSH (CENTER) – PLG1 (2)
0105B	SR1 (+) TO C9
0105D	RC3 (8) TO C9 (+)
0105E	PC1 (PLG8–D1) TO PLG3 (8)
0105F	RC1 (2) TO SR1 (+)
0106A	BRUSH (FRONT) – PLG1 (5)
0106B	RC1 (5) TO SPLICE
0106C	RC3 (7) TO SPLICE
0106D	CR4 (6) TO SPLICE
0106D	R3 TO PLG3 (7)
0106E	SPLICE (A) TO SPLICE (B)
0108A	BRUSH (REAR) – PLG1 (8)
0108B	RC1 (8) TO RC3 (9)
0108C	PC1 (PLG8–A2) TO PLG3 (9)
0110A	CB12 TO RC3 (11)
0110B	PC1 (PLG8–C2) TO PLG3 (11)
0111A	CB12 TO CB11
0111B	CB12 TO CR5 (30)
0113A	CB11 TO RC3 (12)
0113B	PC1 (PLG8–B1) TO PLG3 (12)
0116A	PC6 (PLG14–8) TO PC1 (PLG9–B1)
0117A	PC6 (PLG14–7) TO PC1 (PLG9–C3)
0118A	PC6 (PLG14–6) TO PC1 (PLG9–B2)
0119A	S6 (1) TO PC6 (PLG14–5)
0120A	S6 (2) TO PC1 (PLG9–F1)
0121A	S6 (3) TO PC6 (PLG14–4)
0121B	PC6 (PLG14–3) TO CB5
0122A	PC1 (PLG9–A1) TO S6 (5)
0123A	PC1 (PLG9–A2) TO S6 (6)
0124A	S6 (7) TO PC1 (PLG9–D3)
0125A	PC1 (PLG8–F1) TO PLG6 (1)
0126A	PC1 (PLG8–F2) TO PLG6 (2)
0127A	S5 (TOP) TO PC1 (PLG9–B3)
0128A	S5 (CENTER) TO PC1 (PLG9–D2)
0129A	S5 (BOTTOM) TO PC1 (PLG9–2)
0134A	R1 (PLG10–1) TO PC1 (PLG9–D1)
0135A	R1 (PLG10–2) TO PC1 (PLG9–C1)
0136A	R1 (PLG10–3) TO PC1 (PLG9–A3)
0137A	SR1 (AC) TO F1
0138A	RC3 (1) TO F2
0138B	PC1 (PLG8–A3) TO PLG3 (1)
0139A	PC1 (PLG8–C3) TO PC8 (PLG13–1)
0140A	PC1 (PLG8–D2) TO PC8 (PLG13–5)
0141A	PC1 (PLG8–D3) TO PC8 (PLG13–6)
0142A	PC1 (PLG8–K2) TO PC8 (PLG13–7)
0143A	PC1 (PLG8–J2) TO PC8 (PLG13–9)
0144A	PC1 (PLG8–B3) TO PC8 (PLG13–10)

SECTION 13 – RUN-IN PROCEDURE

13-1. Wetstacking



▲ **Do not perform run-in procedure at less than 20 volts weld output and do not exceed duty cycle or equipment damage may occur.**

1 Welding Generator

Run diesel engines near rated voltage and current during run-in period to properly seat piston rings and prevent wetstacking. See nameplate, rating label, or specifications section in this manual to find rated voltage and current.

☞ *Do not idle engine longer than necessary. Piston rings seat faster if engine runs at weld/ power rpm, and the welding generator is kept loaded during run-in.*

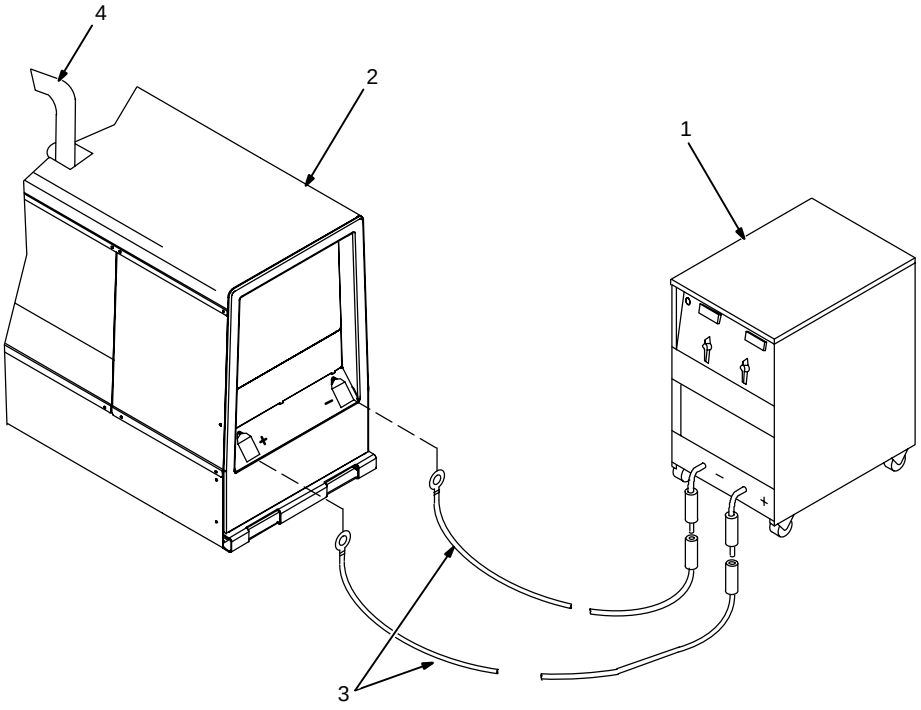
2 Engine Exhaust Pipe

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

If exhaust pipe is coated with a wet, black, tar-like substance, dry the engine using one of the following run-in procedures.

See the engine manual for additional engine run-in information.

13-2. Run-In Procedure Using Load Bank



▲ **Stop engine.**

▲ **Do not touch hot exhaust pipe, engine parts, or load bank/grid.**

▲ **Keep exhaust and pipe away from flammables.**

▲ **Do not perform run-in procedure at less than 20 volts weld output and do not exceed duty cycle or equipment damage may occur.**

1 Load Bank

Turn all load bank switches Off. If needed, connect load bank to 115 volts ac wall receptacle or generator auxiliary power receptacle.

2 Welding Generator

Place A/V range switch in maximum position, A/V control in minimum position, and Output Selector switch (if present) in either DC position.

3 Weld Cables

Connect load bank to generator weld output terminals using proper size weld cables with correct connectors. Observe correct polarity.

Start engine and run for several minutes.

Set load bank switches and then adjust generator A/V control so load equals rated voltage and current of generator (see nameplate, rating label, or the specifications section in this manual).

Check generator and load bank meters after first five minutes then every fifteen minutes to be sure generator is loaded properly.

☞ *Check oil level frequently during run-in; add oil if needed.*

After one hour (minimum) place A/V control in minimum position, then turn off load bank to remove load. Run engine several minutes at no load.

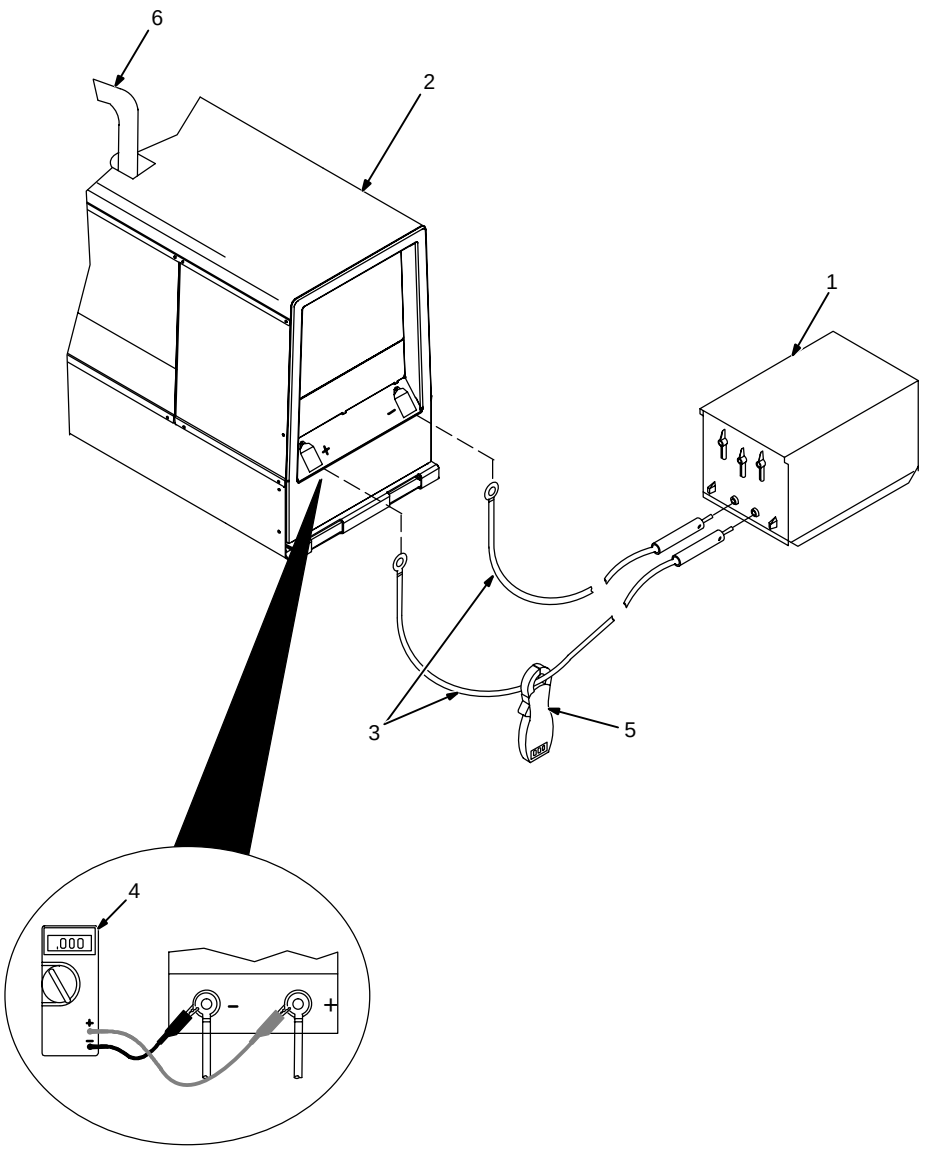
▲ **Stop engine and let cool.**

4 Engine Exhaust Pipe

Repeat procedure if wetstacking is present.

S-0683

13-3. Run-In Procedure Using Resistance Grid



▲ **Stop engine.**

▲ **Do not touch hot exhaust pipe, engine parts, or load bank/grid.**

▲ **Keep exhaust and pipe away from flammables.**

▲ **Do not perform run-in procedure at less than 20 volts weld output and do not exceed duty cycle or equipment damage may occur.**

1 Resistance Grid

Use grid sized for generator rated output.

Turn Off grid.

2 Welding Generator

Place A/V range switch in maximum position, A/V control in minimum position, and Output Selector switch (if present) in either DC position.

3 Weld Cables

Connect grid to generator weld output terminals using proper size weld cables with correct connectors (polarity is not important).

4 Voltmeter

5 Clamp-On Ammeter

Connect voltmeter and ammeter as shown, if not provided on generator.

Start engine and run for several minutes.

Set grid switches and then adjust generator A/V control so load equals rated voltage and current of the generator (see nameplate, rating label, or the specifications section in this manual).

Check generator and meters after first five minutes then every fifteen minutes to be sure generator is loaded properly.

☞ *Check oil level frequently during run-in; add oil if needed.*

After one hour (minimum), place A/V control in minimum position, then shut down grid to remove load. Run engine several minutes at no load.

▲ **Stop engine and let cool.**

6 Engine Exhaust Pipe

Repeat procedure if wetstacking is present.

S-0684

RED-D-ARC
Welderentals
1-800-245-3660

TM-4412 March 2002

Processes

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

Description

Engine Driven Welding Generator

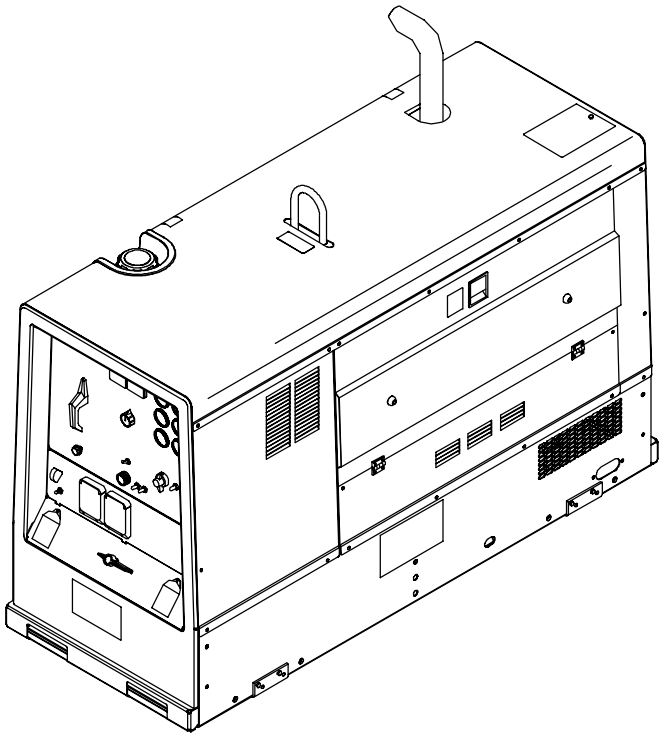
D502K 5+4

CC/CV DC Diesel Welder

PARTS LIST

Eff w/LC110463 And Following

For OM-4412 (206 995)



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SECTION 14 – PARTS LIST FOR LC110463 AND FOLLOWING

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

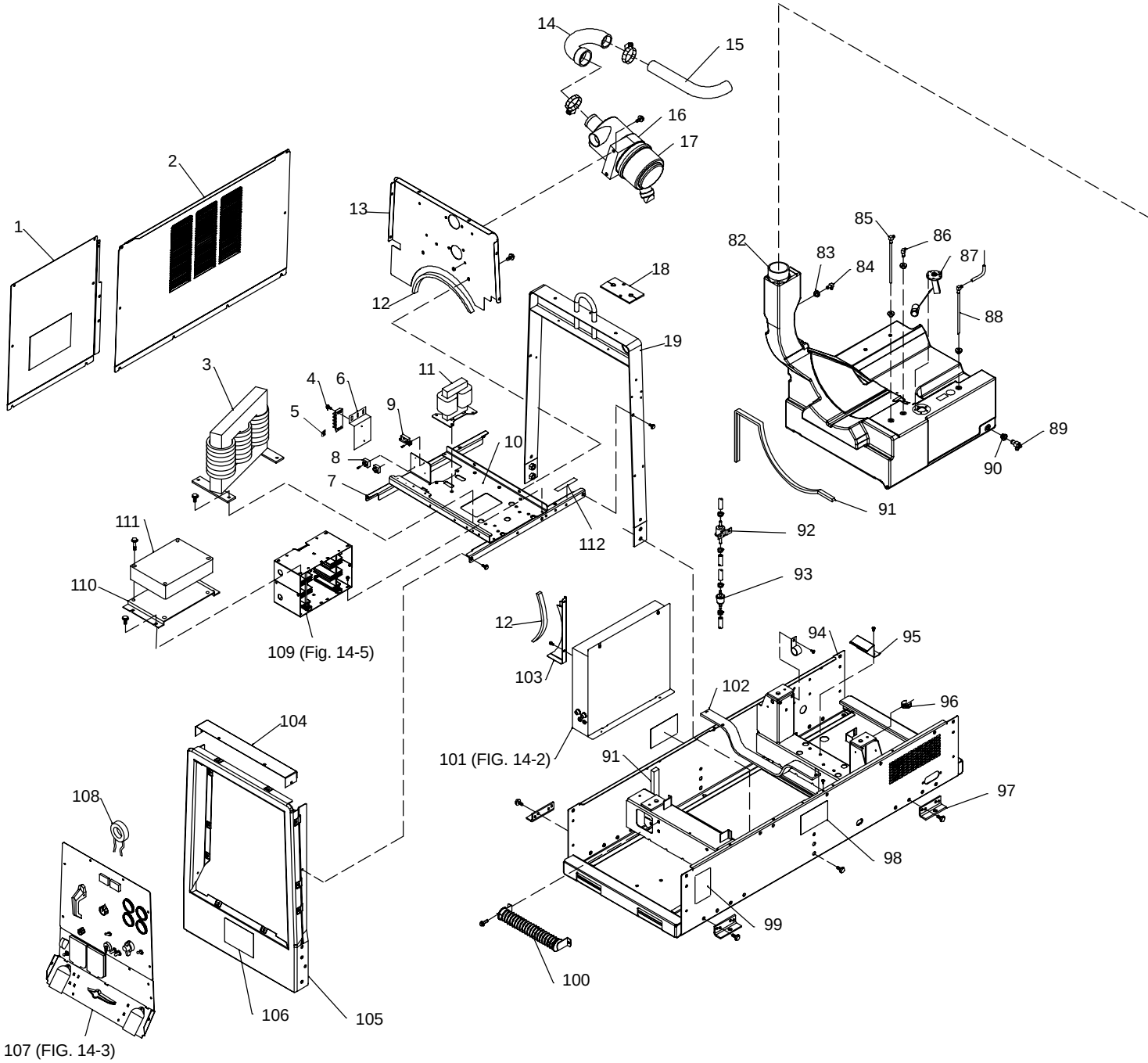
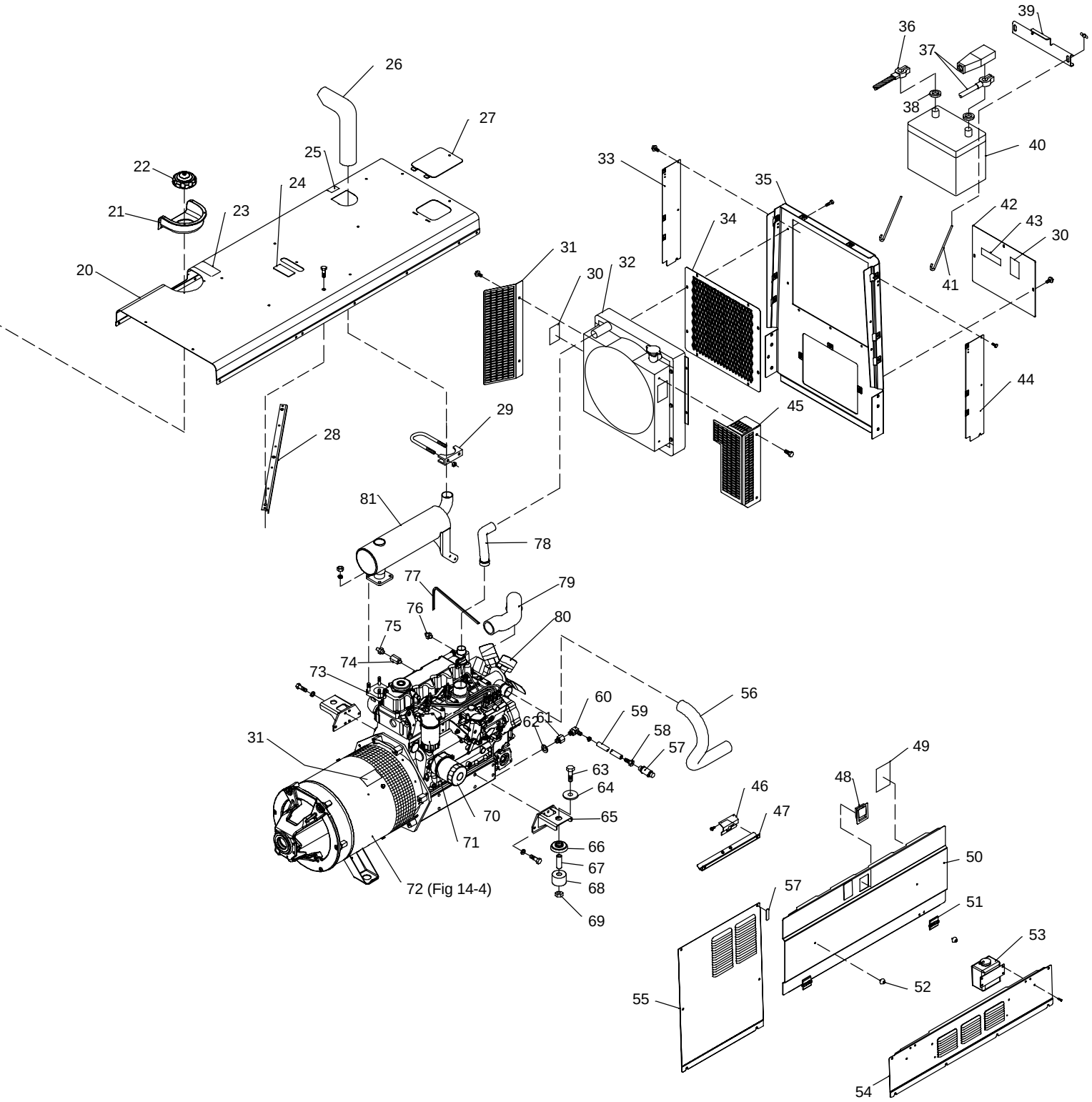


Figure 14-1. Main Assembly

Eff w/LC110463 And Following



803 201

Eff w/LC110463 And Following

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

Figure 14-1. Main Assembly

1		+199294	Panel, Gen Lh Stainless	1
2		+199301	Panel, Engine Side Stainless Stl	1
3	Z1	202647	Reactor, AC Environmental	1
4	1T	038621	Block, Term 30 Amp 4 Pole Frict Term Str Both Side	1
5		038620	Link, Jumper Term Blk 30 Amp	1
6		081499	Bracket, Mtg Terminal Strip	1
7		206352	Brace, Front To Center Upright	2
8	SR4, SR5	035704	Rectifier, Integ Bridge 40 Amp 800v	2
9	CB4	045061	Circuit Breaker, Auto Reset 24vdc 7 Amp	1
10		201697	Pan, Reactor & rectifier	1
11	T1	205636	Transformer, W/Brkt Environmental	1
12		173352	Extrusion, Rubber Clamp/Bulb	2.75 ft
13		189708	Firewall, Top	1
14		200968	Hose, Elbow Air Cleaner	1
15		206393	Pipe, Air Cleaner Intake Kubota V3300	1
16		189763	Bracket, Mtg Air Cleaner	1
17		189764	Air Cleaner, Intake (consisting of)	1
		192938	Filter, Air Element Primary	1
		♦192939	Filter, Air Element Safety	1
18		189464	Seal, Weather Lift Eye	1
19		206351	Upright, Center Assy	1
20		+206541	Cover, Top Stainless Steel	1
21		189052	Grommet, Plastic Neck Filler Fuel	1
22		190198	Cap, Tank Screw–on 3.500 In W/Vent W/Lanyard (included w/tank)	1
23		176103	Label, Use Diesel Fuel Only	1
24		176104	Label, Warning Falling Equipment Can Cause Serious	1
25		176230	Label, Hot Exhaust Parts Do Not Touch	1
26		105734	Pipe, Muffler Extension Elbow 1.750 Od	1
27		202629	Cover, Radiator Access Stainless	1
28		202633	Support, Cover E–coat	1
29		010875	Clamp, Muffler 2.000 Dia U Pld	1
30		176106	Label, Warning Moving Parts Can Cause Serious	6
31		206388	Guard, Fan (Left)	1
32		206517	Radiator, W/Shroud & 7# Cap 4row Core Assy Rda (consisting of)	1
		206518	Radiator, Big Blue Air Pak	1
		605982	Cap, Radiator Pressure 7 Lb	1
		206384	Shroud, Radiator Kubota	1
33		207192	Panel, Engine Extension L.h. Stainless	1
34		207005	Grill, Rear Panel Stainless Kubota	1
35		207188	Upright, Rear Radiator Stainless	1
36		190206	Cable, Bat Neg 42 In Lg 2 Awg W/Clamp & .375 Rng	1
37		190207	Cable, Bat Pos 45 In Lg No 1 Awg W/Clamp & .406 Rng	1
38		108081	Terminal Protector, Battery Post Mtg	2
39		203430	Bracket, Battery Holddown	1
40	BATT	190896	Battery, Stor 12v 650 Crk 110 Rsv Gp 24 Low Mainte (Dry)	1
41		201006	Bolt, J Stl .312–18 X 7.750 Pld	2
42		+202639	Cover, Battery Access Stainless	1
43		176108	Label, Warning Battery Explosion Can Blind	1
44		207193	Panel, Engine Extension R.h. Stainless	1
45		206387	Guard, Fan (Right)	1
46		190992	Keeper, Latch Engine Access Door	1
47		206604	Channel, Stiffener Engine Access	1
48		190126	Latch, Paddle Series 20 (Ss)	1
49		206999	Label, Maintenance D502k 5+4 Kubota	1
50		199338	Door, Engine Access Stainless	1

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

Figure 14-1. Main Assembly (Continued)

51		189975	Hinge, Door Access 180 Deg.	2
52		087341	Stop, Door	2
53		190190	Tank, Coolant Recovery	1
54		199298	Panel, Rocker Stainless	1
		191626	Bumper, Door Engine Access	2
55		199300	Panel, Gen Rh Stainless	1
56		206391	Hose, Radiator Lower	1
		199507	Hose Assy, Oil Drain 20”lg (consisting of)	1
57		165271	Valve, Oil Drain 3/8–18 Nptf	1
58		176529	Ftg, Hose Brs Barbed Fem 1/2 Tbg X 3/8 Npt	1
59		113854	Hose, Sae .500 Id X .780 Od Xcoil	1.666
60		176528	Ftg, Hose Brs Barbed Elbow M 1/2 Tbg X 1/2 Npt	1
61		206906	Adapter, Oil Drain Fitting	1
62			Washer, Oil Drain (Available Through Engine Manufacturer)	1
63		199849	Screw, 625–11x4.00 Hex Hd–pln Gr5 Pld	4
64		071731	Washer, Flat .656idx2.250odx.187t Stl Pld	4
65		206396	Bracket, Mtg Engine Kubota V3300	2
66		071890	Retainer, Mount Eng/Gen	4
67		071730	Tubing, Stl .875 Od X12ga Wall X 2.500	4
68		083476	Mount, Eng/Gen Nprn .875id X 2.500od X 2.000 60 Dur	4
69		135205	Nut, 625–11 .94hex .77h Stl Pld Elastic Stop Nut	4
70		*207717	Filter, Oil (Spin-On Cartridge Type)	1
71		*207715	Filter, Fuel Secondary (Spin–on, Cartrige Type)	1
72	Figure 14-4		Generator	1
73		206399	Engine, Kubota Dsl Elec V3300 (Consisting Of)	1
		206380	Adapter, Engine Kubota V3300 (See Figure 14-4)	1
		206907	Plug Assy, W/Leads Elec Kubota	1
		*207713	Thermostat, 170f (76.5c) W/Gasket	1
		206379	Flywheel, Kubota V3300	1
74		198990	Adapter, Oil Pressure Sender	1
75	S12	187542	Switch, Pressure Oil 11psi No Cont Frict Term	1
76	TEMP SNDR	193231	Sender, Coolant Temp 300 Deg F 1/2–14 Npt	1
77		*207712	Belt, Fan 13 X 1200mm V–belt	1
78		206390	Hose, Radiator Upper	1
79		206392	Hose, Air Cleaner Intake Kubota V3300	1
80		207719	Fan, Engine Cooling 430mm, 6 Blade Pusher	1
81		206383	Manifold, Exhaust Muffler Kubota V3300	1
		207722	Gasket, Exhaust Manifold Metal	1
82		189245	Tank, Fuel 23.0 Gal (includes fuel cap) (consisting of)	1
83		124253	Bushing, Tank Fuel	4
84		189912	Ftg, Stl Barbed Elbow W/.047in Orifice Zinc Pld	1
85		189909	Ftg, Stand Pipe Hose .250 X 9.265lg 90 Deg Zinc	1
86		189913	Ftg, Stl Barbed Elbow Zinc Pld	1
87		190142	Sender, Fuel Gauge 9.750 Deep Tank	1
88		189910	Ftg, Stand Pipe Hose .3125 X 9.260lg 90 Deg Zinc	1
89		189908	Valve, Drain Fuel 180 Deg Zinc Pld	1
90		181572	Bushing, Tank Fuel	1
		107816	Hose, Sae .250 Id X .500 Od Xcoil	4.1 ft
91		191446	Extrusion, Rubber W/Adhesive 1.000 X 1.000 ”d”	4.6 ft
92	FUEL PUMP	207721	Pump, Fuel Electric 12vdc 1.5a 400 Cc/Min 5psi	1
93		*207714	Filter, Fuel Pre (In–line)	1
94		+206350	Base	1
95		196220	Bracket, Holddown Fuel Tank Rear	1
96		192362	Bracket, Mtg Nyl 1/2 Conduit	1
97		191897	Bracket, Mtg Unit	4
98		200864	Label, Do Not Weld On Base Ce	2
99		206998	Label, Manufacturing Rating D502k 5+4 Kubota	1

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

Figure 14-1. Main Assembly (Continued)

100	R3	189699	Resistor, WW Tap 375 W 10 Ohm W/Mtg Bkt	1
101	Figure 14-2		Control Box	1
102		191512	Bracket, Holddown Fuel Tank	1
103		189731	Firewall, Bottom	1
104		199305	Cover, Top Front Upright Stainless	1
105		202637	Upright, Front Stainless	1
106		200910	Label, Warning Electric Shock And Moving Parts CE	1
107	Figure 14-3		Panel, Front w/Components	1
108	♦		Transformer, Current	1
109	SR3 Figure 14-5		Main Rectifier Assembly	1
110		193453	Bracket, Mtg Box Fcr	1
111	PC1	207397	Module, Field Current Regulator	1
112		203260	Label, Caution Do Not Use Ether	1
		191819	Hose, Sae .312 Id X .560 Od X 14.000	1
		095636	Hose, Sae .187 Id X .410 Od X 30.000	1
		198584	Hose, Sae .312 Id X .560 Od X 4.500	1
		049525	Nut, 312–18 U–nut Multi–thread	10
		190058	Nut, 250–20 U–nut Multi–thread	2
		206993	Kit, Label (Includes safety and informational labels)	1

\+ When ordering a component originally displaying a precautionary label, the label should also be ordered. Order label individually or as part of Label Kit 206 993.

*Recommended Spare Parts.

♦Optional

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

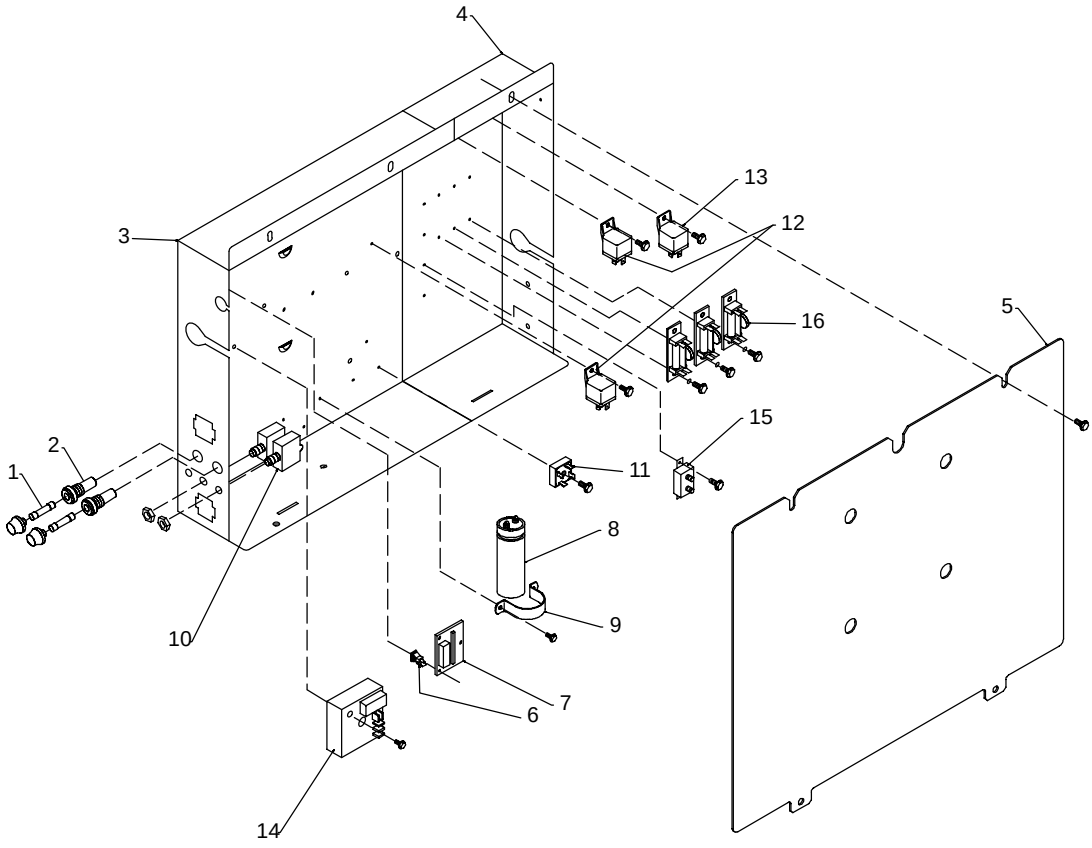


Figure 14-2. Control Box Assembly

Eff w/LC110463 And Following

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

Figure 14-2. Control Box Assembly (Figure 14-1 Item 101)

1	F1, F2	085874	Fuse, Mintr Cer Slo–blo 10. Amp 250 Volt	2
2		046432	Holder, Fuse Mintr .250 X 1.250 Panel Mtg	2
3		201077	Control Box, Lh	1
4		201078	Control Box, Rh	1
5		201079	Cover, Control Box	1
6		134201	Stand–off Support, Pc Card .312/.375w/Post&lock .43	3
7	PC9	192224	Circuit Card Assy, Display	1
8	C9	087110	Capacitor, Elctlt 240 Uf 200 Vdc Can 1.39 Di	1
9		177136	Clamp, Capacitor 1.375 Dia	1
		206736	Harness, Control Box,Weld Control L.h. (consisting of)	1
10	CB11, CB12	139266	Circuit Breaker, Man Reset 1p 15a 250vac Frict	2
11	SR1	035704	Rectifier, Integ Bridge 40. Amp 800v	1
	RC3	158466	Conn, Rect Univ 084 12p/S 3row Rcpt Cable/Panel Lkg	1
	RC1	135133	Conn, Rect Univ 084 9p/S 3row Rcpt Cable/Panel Lkg	1
12	CR1, CR5	090104	Relay, Encl 12vdc Spst 30a/15vdc 5pin Flange Mtg	2
13	CR2	173069	Relay, Encl 12vdc Spdt 30a/20a 5pin Flange Mtg	1
14	T	207139	Timer, Delay On Make/Break Open 3–60 Sec 12vdc	1
		206398	Harness, Engine Kubota V3300 (consisting of)	1
	S7	199691	Switch, Tgl Spdt 6a 125vac On–none–mc Spd Term (located on front panel, see Figure 14-3)	1
15	CB10	190374	Circuit Breaker, Auto Reset 12vdc 40 Amp	1
		148850	Socket, Relay 5 Pin	3
	PLG10	150316	Conn, Rect Univ 039 6p/S 3row Plug Cable Lkg	2
16	D8/C8 D9/C9 D10/C10	189701	Diode/Capacitor Board	3

*Recommended Spare Parts.

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

Eff w/LC110463 And Following

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

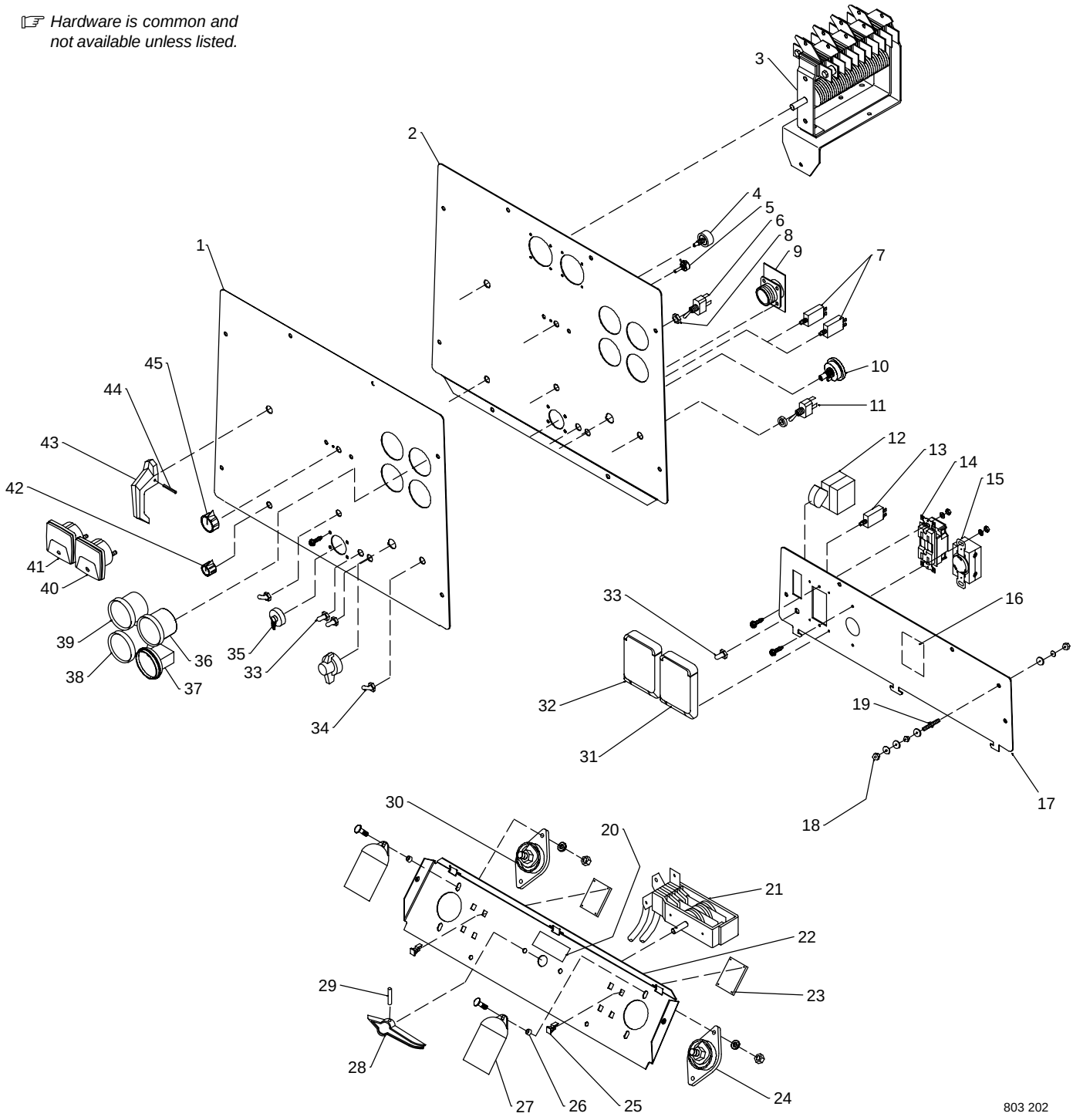


Figure 14-3. Panel, Front w/Components

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 14-3. Panel, Front w/Components (Figure 14-1 Item 107)				
1		206212	Plate, Screened Ident Control	1
2		206382	Panel, Engine/Weld Control Stainless	1
3	S3	208278	Switch, Range/Changeover	1
		192558	Harness, Range Switch (consisting of)	1
	RC6	148389	Conn,Rect Univ 084 4p/S 1row Rcpt Cable/Panel Lkg	1
4	R1	193118	Pot, Cp Flat 1t 2. W 1k Ohm Linear	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 14-3. Panel, Front w/Components (Continued)	
		206809	Harness, Weld Control (consisting of)	1
5	S6	193234	Switch, Rotary 6 Position Gold Contacts	1
6	S5	011609	Switch, Tgl Spdt 15a 125vac On–none–on Spd Term Chr	1
	PLG9	193183	Conn, Rect Cinch 18 Pin	1
		196603	Seal, Switch 6 Position Rotary .250 Shaft	1
	PLG14	141450	Conn, Rect Metrmate 10skt 1row Plug Cable Lkg	1
		164617	Clip, Wiring Straight	2
	RC10	150316	Conn, Rect Univ 039 6p/S 3row Plug Cable Lkg	1
7	CB5	139266	Circuit Breaker, Man Reset 1p 10a 250vac Frict	1
	CB13	139266	Circuit Breaker, Man Reset 1p 10a 250vac Frict	1
8		202209	Spacer, Nylon	2
9	PC6	192995	Circuit Card Assy, Connector/Receptacle	1
10	S1	207720	Switch, Ignition 3 Position (Mom–off–mom) W/Handle	1
11	S7	199691	Switch, Tgl Spdt 6a 125vac On–none–mc Spd Term (included in engine harness, see Figure 14-2)	1
12	CB1	201083	Circuit Breaker, Man Reset 2p 20a 250vac	1
		201553	Clip, Retaining Circuit Breaker	1
		201109	Harness, Receptacle Auxillary Power (consisting of)	1
13	CB2	093996	Circuit Breaker, Man Reset 1p 20a 250vac Frict	1
14	GFCI-1	151981	Rcpt, Str Dx Grd 2p3w 15/20a 125v *5–20r Gfi	1
15	RC1	147632	Rcpt, Tw Lk Grd 2p3w 30a 250v *L6–30r	1
		010146	Clamp, Nyl .625 Clamp Dia X.500 Wide .203 Mtg Hole	2
16		200910	Label, Warning Electric Shock And Moving Parts CE	1
17		+202641	Panel, Auxiliary Power Stainless	1
18		601836	Nut, 250–20 .50hex .19h Brs	3
19		083030	Stud, Brs .250–20 X 1.750 W/Hex Collar	1
20		♦196073	Label, Do Not Switch While Welding	1
21		♦	Switch, Polarity	1
22		199303	Panel, Mtg Terminal Power Output Stainless	1
23	PC4, PC5	189744	Circuit Card Assy, Filter Hf	2
24	NEGATIVE	039046	Terminal, Pwr Output Black	1
25		134201	Stand–off Support, Pc Card .312/.375w/Post&lock .43	8
26		181169	Spacer, Output Stud	2
27		186621	Boot, Generic Output Stud	2
28		♦	Handle, Switch	1
29		♦	Pin, Spring cs .156 x 1.250	1
30	POSITIVE	039047	Terminal, Pwr Output Red	1
31		193260	Cover, Receptacle 2.250 Dia. Lexan	1
32		193258	Cover, Receptacle Gfci Lexan	1
33		190323	Boot, Circuit Breaker Clear Hex Nut	3
34		021385	Boot, Toggle Switch Lever	2
35		170391	Conn, Circ Ms Protective Cap Size 20 Nylon	1
36	FUEL	192265	Gauge, Fuel Elec Switch W/O Switchgage Sensor	1
37	HM	118058	Meter, Hour 12–24vdc 2.25 Dia High Profile Stainles	1
38	AM	118060	Meter, Amp Dc 60–0–60 2.250 Dia High Profile Stainl	1
39	TEMP	193229	Gauge, Coolant Temp 0– 300 Deg F Electric Switch	1
40		♦	Meter, Weld Amps	1
41		♦	Meter, Weld Volts	1
42		097922	Knob, Pointer .875 Dia X .250 Id W/Set Screwsplstc	1
43		189161	Handle, Switch Range	1
44		010647	Pin, Spring Cs .156 X 1.250	1
45		097924	Knob, Pointer 1.625 Dia X .250 Id W/Set Screwsplstc	1

Eff w/LC110463 And Following

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

Figure 14-3. Panel, Front w/Components (Continued)

. . . . .		193158	. . Harness, Unit Weld Control – CV (consisting of)	1
. . . . .	PLG6	114063	. . . . Conn, Rect Univ 084 4p/S 1row Plug Cable Lkg	1
. . . . .	PLG8	193184	. . . . Conn, Rect Cinch 30 Pin	1
. . . . .	PLG13	147992	. . . . Conn, Rect Univ 039 10p/S 2row Plug Cable Lkg	1
. . . . .	PLG3	158465	. . . . Conn, Rect Univ 084 12p/S 3row Plug Cable Lkg	1
. . . . .		088731	. . . . Bushing, Snap–in Nyl .375 Id X .500 Mtg Hole	1
. . . . .		135873	. . . . Clip, Conduit Convoluted 1/2 In 6.35mm Mtg Hole	2
. . . . .		187654	. . . . Seal, Wire Univ 12p/S 3row	1
. . . . .		196602	. . . . Plug, Cavity 18, 30 Position Cinch Connector	10
. . . . .		024103	. . Blank, Snap–in Nyl .750 Mtg Hole Black	1
. . . . .		120304	. . Blank, Snap–in Nyl .250 Mtg Hole Black	2

♦Optional

\+ When ordering a component originally displaying a precautionary label, the label should also be ordered. Order label individually or as part of Label Kit 206 993.

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

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

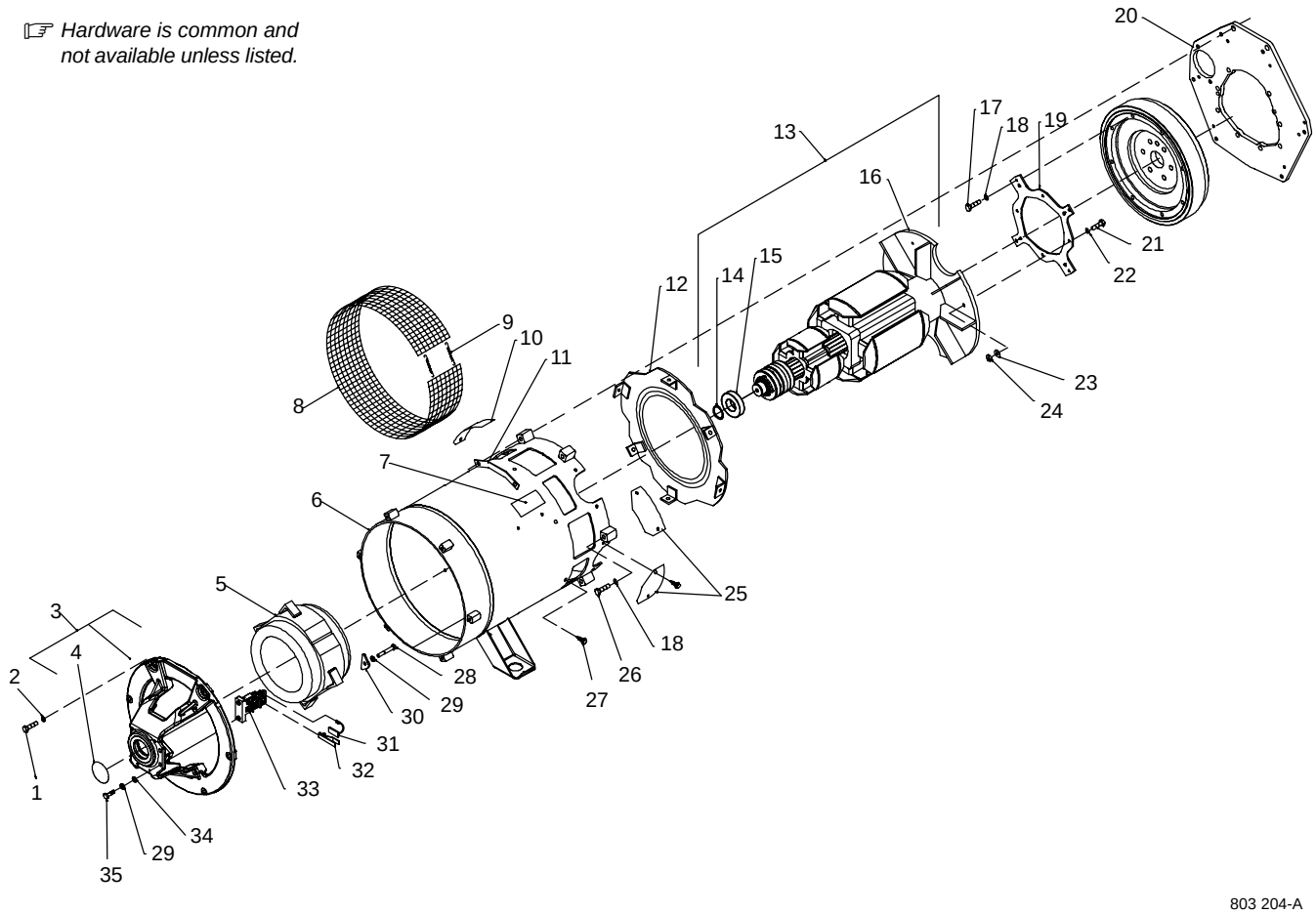


Figure 14-4. Generator

Eff w/LC110463 And Following

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

Figure 14-4. Generator (Figure 14-1 Item 72)

1		132053	Screw, 375-16 X 1.50hexhd Pln Gr 5pld	6
2		183387	Washer, Conical Spring .406 Id X .875 Od Pltd	6
3		195911	Endbell, Gen (Consisting Of)	14
4		143220	O-ring, 2.859 Id X .139cs	1
5	AUX STATOR	201099	Stator, Exciter/Aux Pwr	1
6	WELD STATOR	+208287	Stator, Weld Assembly Complete	1
7		013367	Label, Warning Moving Parts	2
8		190197	Guard, Generator Wire Mesh	1
9		172674	Spring, Ext .240 Od X .041 Wire X 3.500pld	2
10		191580	Cover, Starter Hole	1
11		208216	Spacer, Stl Kubota V3300 18ga Generator	1
12		039207	Baffle, Air	1
13	REV FLD	202452	Rotor, Gen (Consisting Of)	1
14		024617	Ring, Rtng Ext 1.375 Shaft X .050thk	1
15		053390	Bearing, Ball Rdl Sgl Row 1.370 X 2.830 X .6	1
16		195547	Fan, Rotor Gen	1
17		049026	Screw, M10-1.5 X 25hexhd Pln 8.8pln	8
18		083883	Washer, Lock .042 Id X 0.709 Od	8
19		202302	Plate, Flex	1
20		206380	Adapter, engine	1
21		605231	Screw, M10-1.5 X 35hexhd Pln 8.8pln	4
22		194512	Washer, Flat 1.250 Od X .406 Id X 7 Ga Thk Stal Pld	4
23		183387	Washer, Cone .380 Id X .860od X .109t Stl Pld 4000lbs	4
24		198631	Nut, M10 Hex Lock Nut Stl Pld	4
25		191579	Cover, Starter Hole	2
26		172555	Screw, M10-1.5 X 50hexhd Pln 8.8pld	6
27		602159	Screw, .312-18 X .75hexwhd	2
28		604950	Screw, .312-18 X 2.25hexhd Pln Gr 5pld	4
29		602211	Washer, Lock .318 Id X 0.586	4
30		139341	Washer, Exciter	4
31		*190823	Brush, Contact	3
32		188560	Clip, Spring	3
33		189142	Brushholder Assembly, Gen	1
34		602242	Washer, Flat .375idx0.875odx.083t Stl Pld	2
35		604534	Screw, 312–18x1.25 Hex Hd–pln Gr5 Pld	2
		190259	Harness, Brush (Consisting Of)	1
	PLG1	168071	Connector, (Kit) Rect Univ 084 9p/S 3 Row Plug Cable Lkg	1
		187651	Seal, Wire Univ 9p/S 3 Row	1

\+ When ordering a component originally displaying a precautionary label, the label should also be ordered. Order label individually or as part of Label Kit 206 993.

*Recommended Spare Parts.

♦Optional

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

Eff w/LC110463 And Following

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

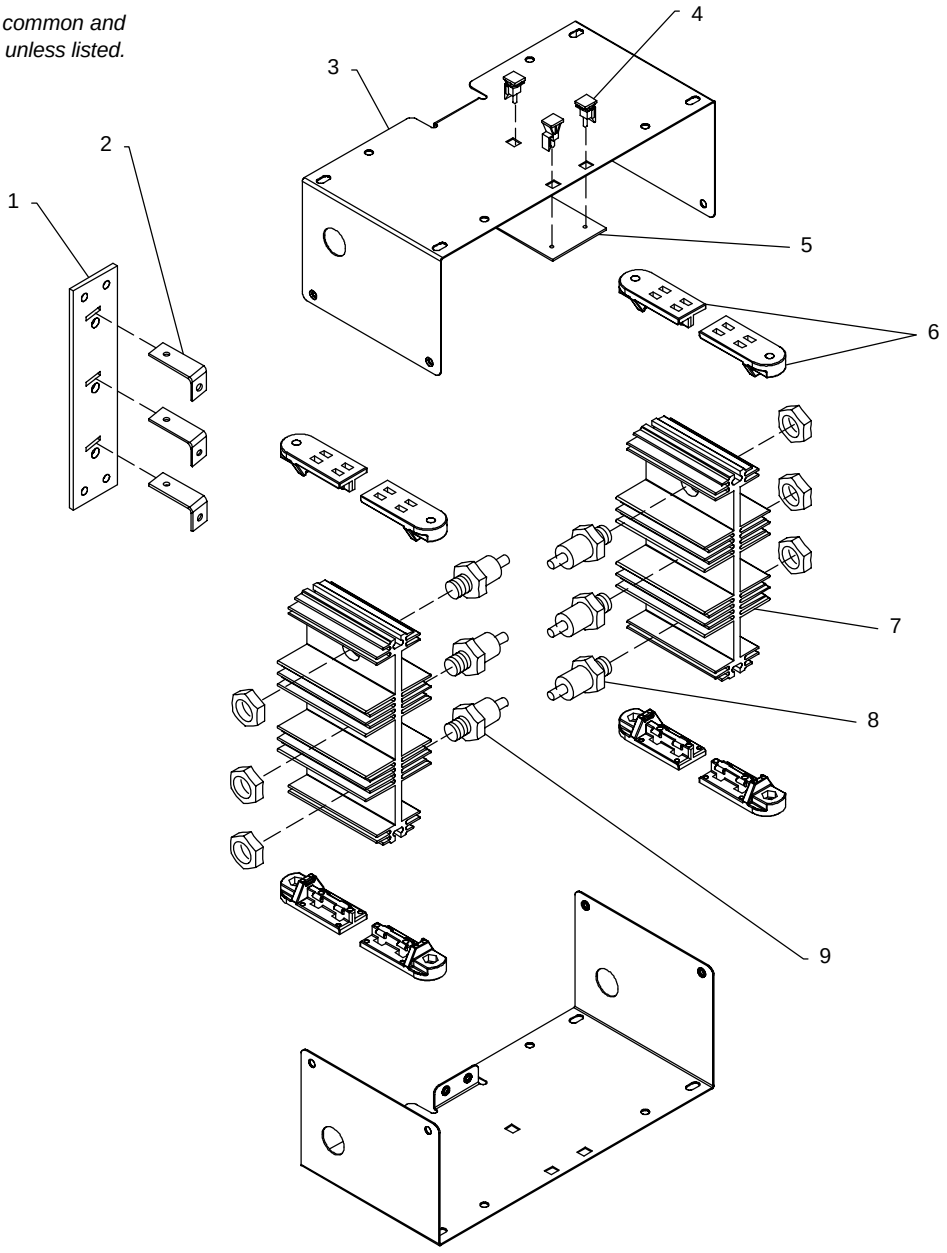


Figure 14-5. Main Rectifier Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 14-5. Main Rectifier Assembly (Figure 14-1 Item 109)	
. . . . .	SR3	208279	RECTIFIER, environmental (consisting of)	1
. . . 1		188137	CONNECTION BOARD, rectifier AC	1
. . . 2		188517	BUS BAR, connection board	3
. . . 3		188135	ENCLOSURE, rectifier	2
. . . 4		134201	STAND-OFF, support	3
. . . 5	PC3	201449	CIRCUIT CARD ASSEMBLY, protection	1
. . . 6		188136	INSULATOR, heat sink	8
. . . 7		188493	HEAT SINK, rectifier al	2
. . . 8	D3, D5, D7	208334	DIODE, rect 275A 300V SP	3
. . . 9	D2, D4, D6	208335	DIODE, rect 275A 300V RP	3

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

Owner's Record

Please complete and retain with your personal records.

Model Name Serial/Style Number

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

Distributor

Address

City

State Zip

RED-D-ARC®
Welderentals
1-800-245-3660

www.red-d-arc.com

Contact the Delivering Carrier for:

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

File a claim for loss or damage during shipment.

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