



TM-4411A

March 2003

Eff. w/Serial Number LC357086

Processes



Stick (SMAW) Welding



TIG (GTAW) Welding



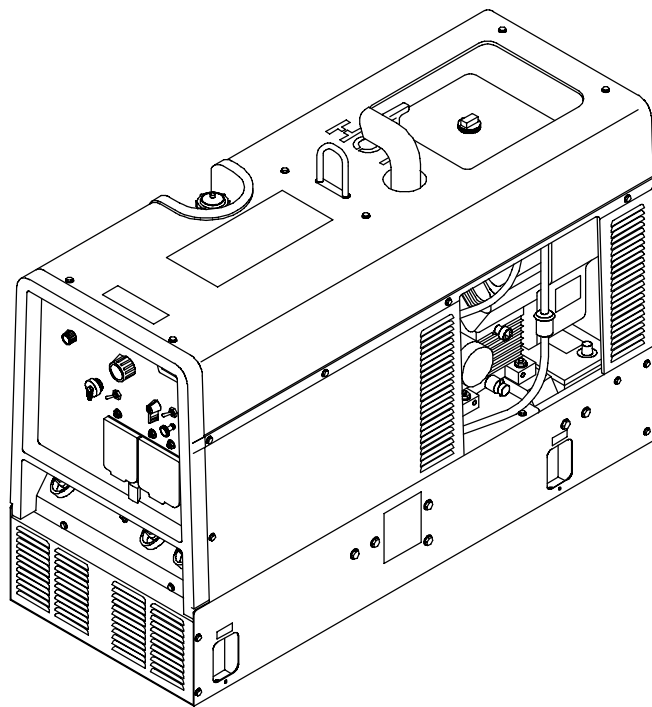
MIG (GMAW) Welding &
Flux Cored (FCAW) Welding-
With Voltage Sensing Feeder

Description



Engine Driven Welding Generator

Miller Legend[®] 301 G



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www.MillerWelds.com

TECHNICAL MANUAL

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WARNING

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

WARNING

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

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.

(Continued)

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SECTION 1 – SAFETY PRECAUTIONS FOR SERVICING

safety_rtm 7/99 / OM-4411B

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.

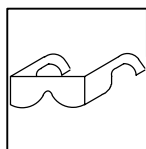
- Stop engine on inverter and discharge input capacitors according to instructions in Maintenance Section before touching any parts.



MOVING PARTS can cause injury.

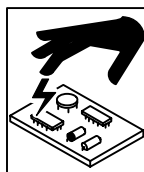
- Keep away from moving parts such as fans, belts, and rotors.
- Have only qualified people remove guards or covers for maintenance and troubleshooting as necessary.

- 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.



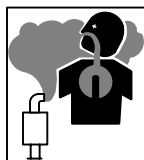
FLYING METAL can injure eyes.

- 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.

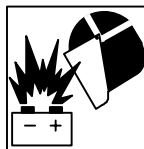
- Do not breathe exhaust fumes.
- Use in open, well-ventilated areas, or vent exhaust outside and away from any building air intakes.



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.



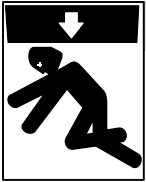
STEAM AND HOT COOLANT can burn.

- 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.



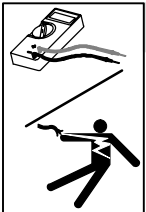
FALLING UNIT can cause injury.

- 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.

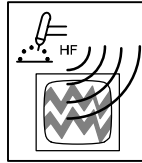


TILTING OR TIPPING can cause injury.

- 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.

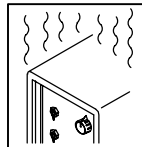
PINCH POINTS can injure.

- Be careful when working on stator and rotor assemblies.



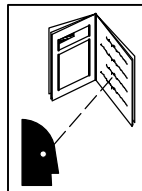
H.F. RADIATION can cause interference.

- 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:

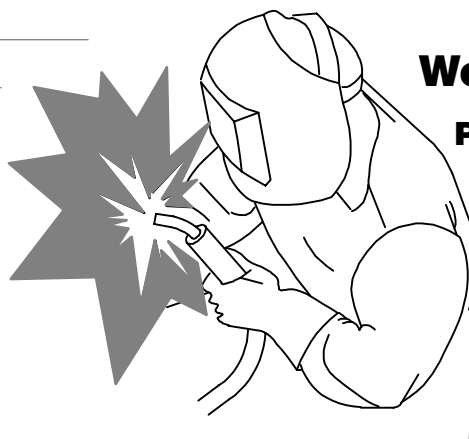
Pacemaker wearers consult your doctor first. If cleared by your doctor, then following the above procedures is recommended.

SECTION 2 – DEFINITIONS

2-1. Symbol Definitions

	Stop Engine		Fast (Run, Weld/Power)		Fast/Slow (Run/Idle)		Slow (Idle)
	Start Engine		Panel/Local		Temperature		Fuel
	Engine Oil		Engine Choke		Check Valve Clearance		Battery (Engine)
	Engine		Read Operator's Manual	A	Amperes	V	Volts
	MIG (GMAW), Wire		Stick (SMAW)		TIG (GTAW)		Circuit Breaker
+	Positive	—	Negative		Alternating Current (AC)		Output
	Time	h	Hours	s	Seconds		Protective Earth (Ground)
	Do not switch while welding		Remote Receptacle		Work Connection	CC	Constant Current
	Wire Feed		Electrode Positive		Electrode Negative	CV	Constant Voltage

Notes



Work like a Pro!

Pros weld and cut safely. Read the safety rules at the beginning of this manual.

SECTION 3 – SPECIFICATIONS

3-1. Description

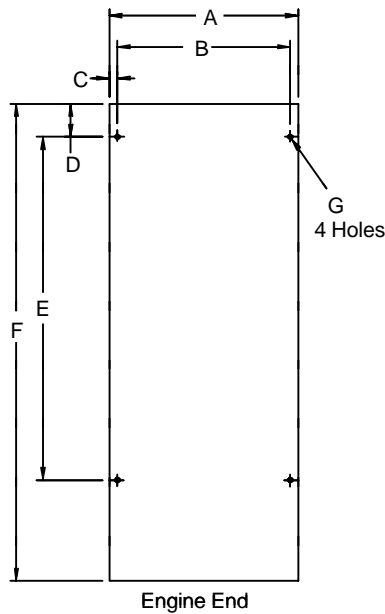
This multiprocess engine-driven welder and AC generator provides low speed generator AC power and DC weld output for quiet, fuel-efficient operation. At 1800 rpm, this unit produces 5 kW/kVA 60 Hz 120/240 Volt AC generator power. Achieve high quality Stick and TIG welding results at either 3000 or 3600 rpm. A special variable frequency (60-120 Hz) receptacle provides 2.4 kW/kVA 120 Volt AC generator power continuously.

3-2. Weld, Power, And Engine Specifications


Welding Mode	Rated Welding Output	Maximum Open-Circuit Voltage	Amperage Range In CC Mode	Voltage Range In CV Mode	Generator Power Rating	Fuel Capacity	Engine
CC/DC	280 A, 25 V, 100% Duty Cycle	72	20 – 300 A	10 – 33 V	5.5 kVA/kW (Peak) 5 kVA/kW (Continuous) 42/21 A, 120/240 V AC, 60 Hz, Single-Phase at 1800 rpm	10 gal (38 L) Tank	Kohler CH-20 Air-Cooled, Two-Cylinder, Four-Cycle, 20 HP Gasoline/LP Engine w/Electronic Governor
CV/DC	300 A, 25 V, 100% Duty Cycle	50	--		And 2.4 kVA/kW, 20 A, 120 V AC, 60-120 Hz, Single-Phase At All Speeds		

3-3. Dimensions, Weights, and Operating Angles

Dimensions	
Height	33 in (838 mm)
Width	18-3/4 in (476 mm)
Depth	45-1/2 in (1156 mm)
A	18 in (457 mm)
B	16-1/2 in (419 mm)
C	3/4 in (19 mm)
D	3-1/8 in (79 mm)
E	32-3/4 in (832 mm)
F	45-1/2 in (1156 mm)
G	13/32 in (10 mm) Dia.
Weight	
590 lb (267 kg)	

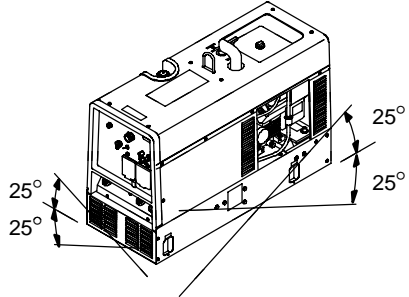


Engine End



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

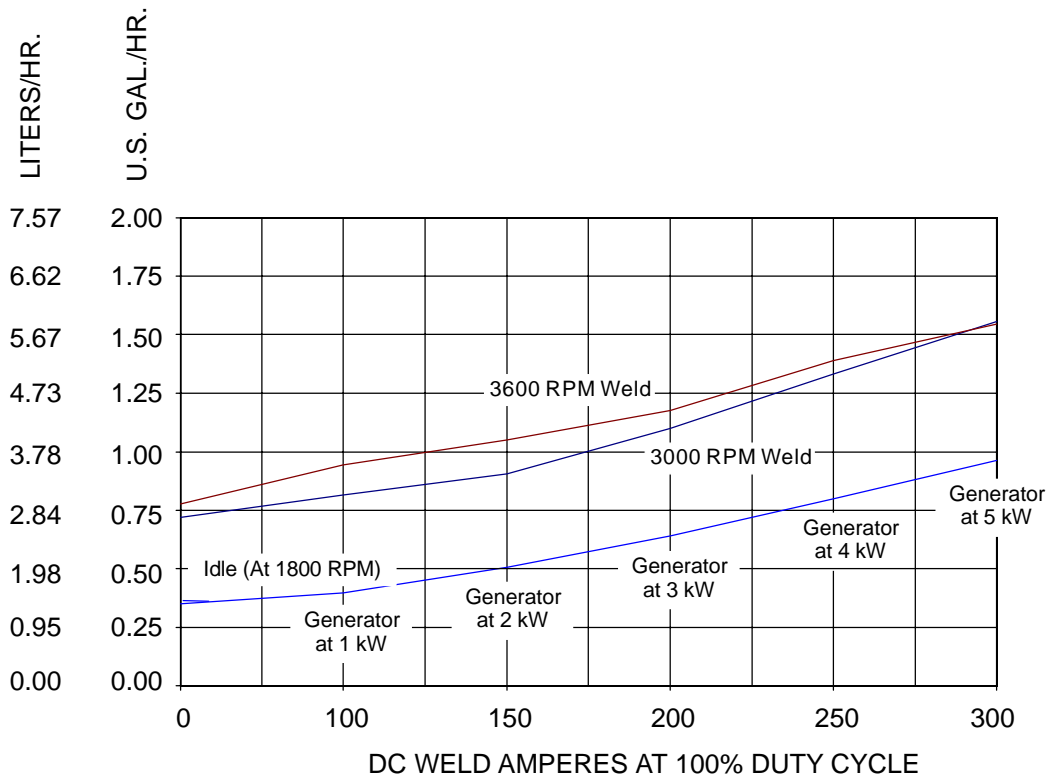
▲ Do not move or operate unit where it could tip.



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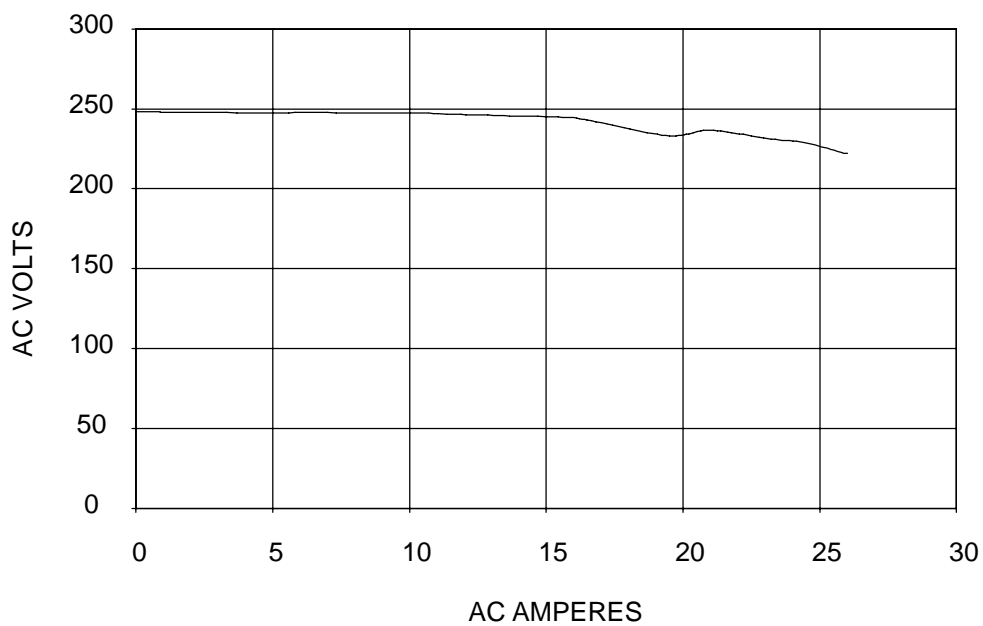
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3-4. Fuel Consumption While Welding And Using Generator Power



207 967

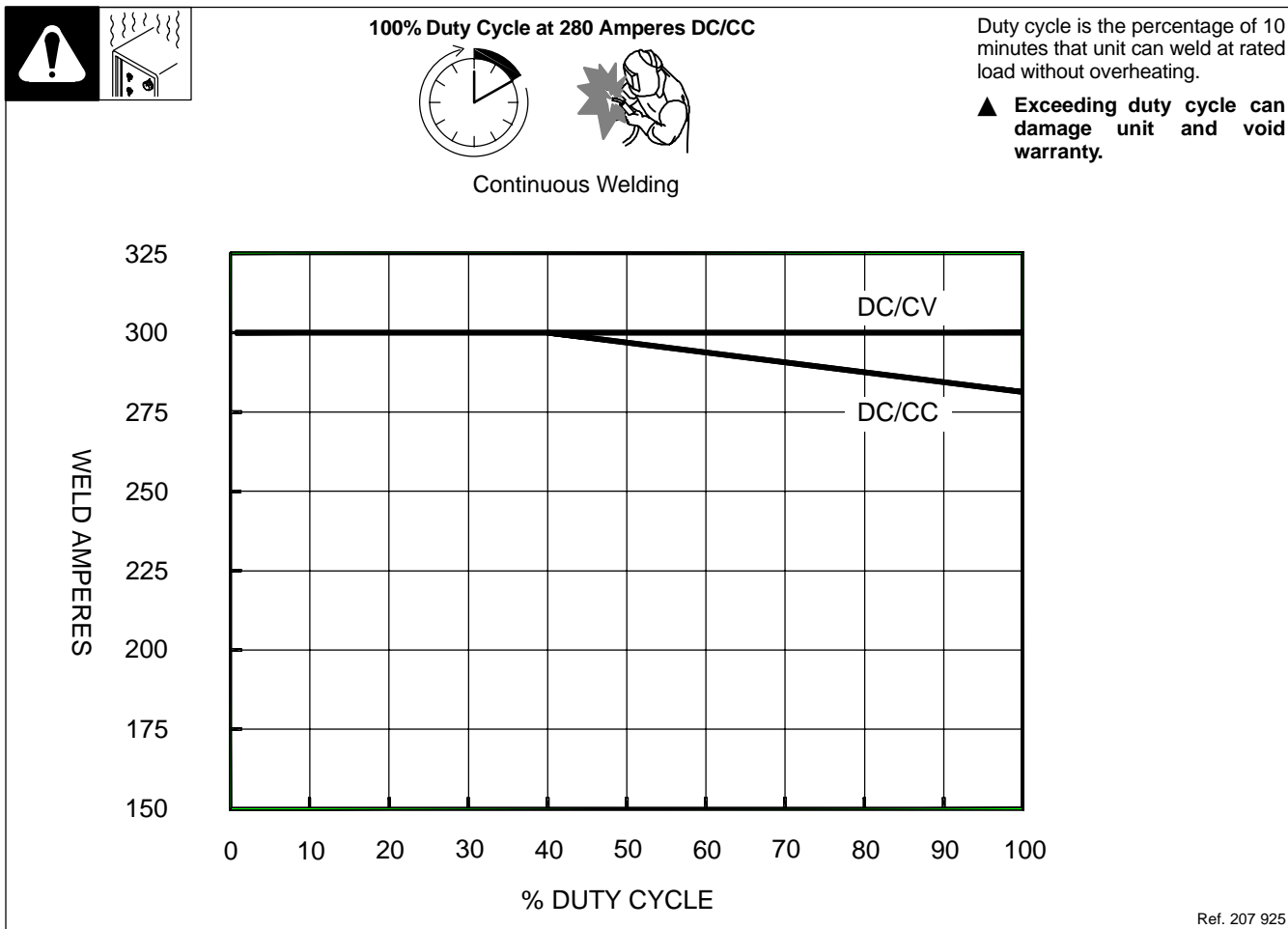
3-5. Generator Power Curve



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

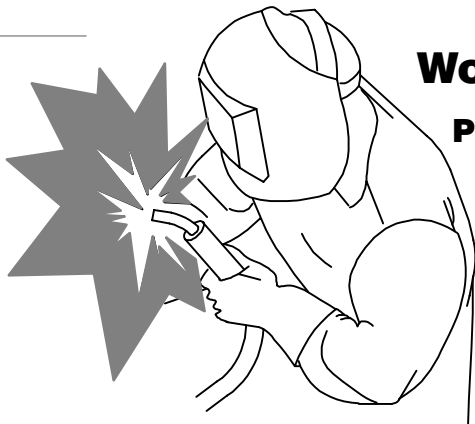
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3-6. Duty Cycle



Notes

Notes section with horizontal lines for writing.



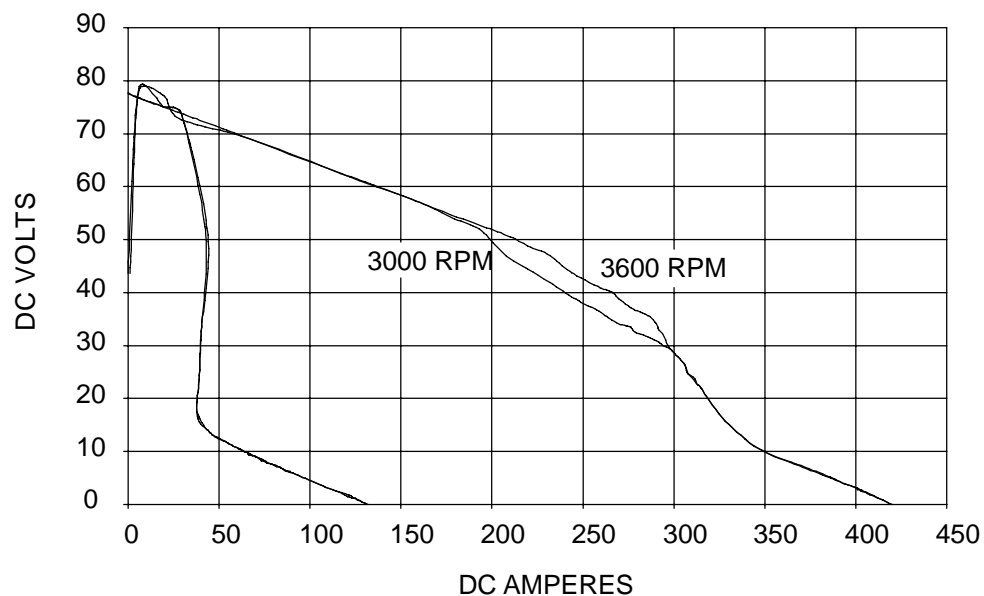
Work like a Pro!

Pros weld and cut safely. Read the safety rules at the beginning of this manual.

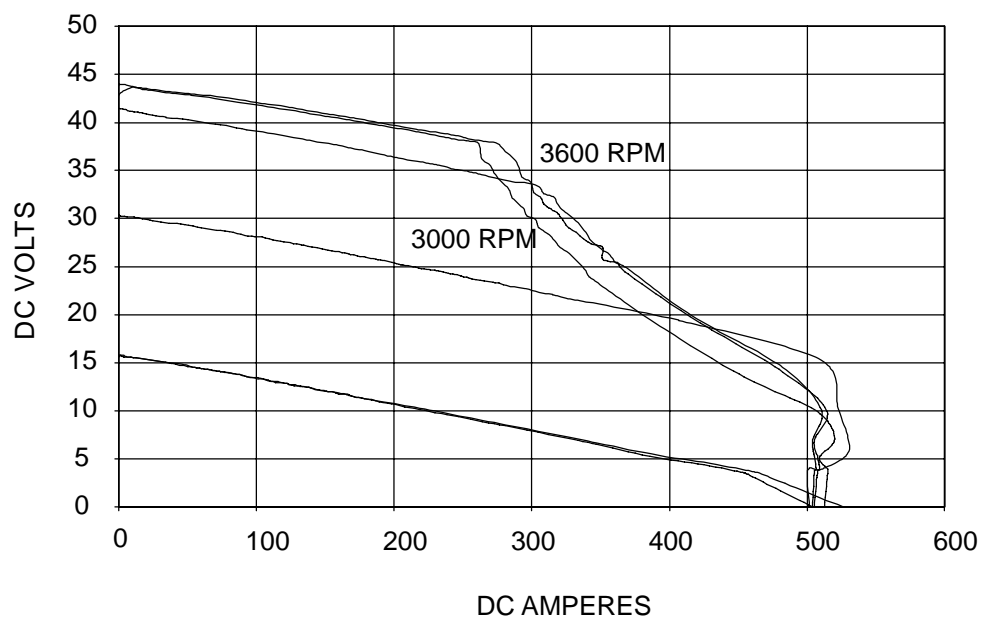
3-7. Stick And MIG Mode Volt-Ampere Curves

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

A. CC/DC Stick Mode

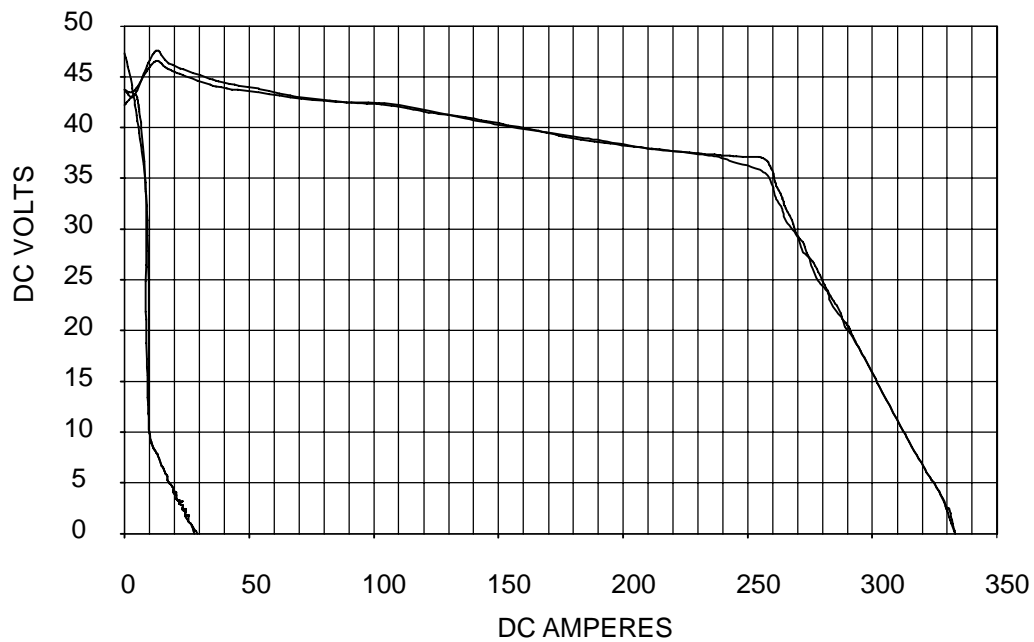


B. CV/DC MIG Mode



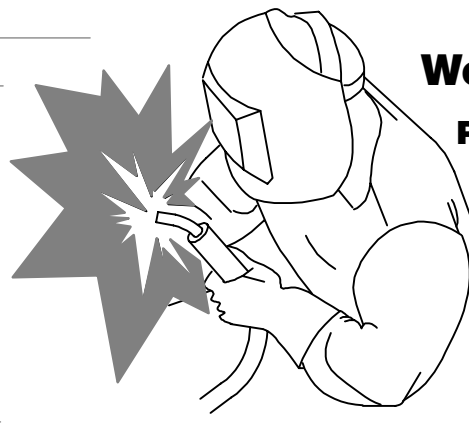
3-8. DC TIG Mode Volt-Ampere Curves

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



204 930

Notes



Work like a Pro!

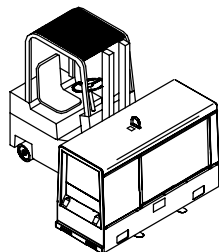
Pros weld and cut safely. Read the safety rules at the beginning of this manual.

SECTION 4 – INSTALLATION

4-1. Installing Welding Generator

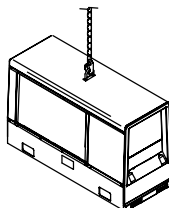


Movement

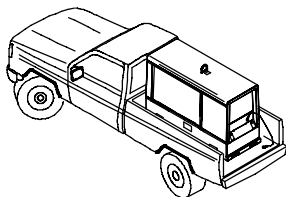


▲ Do not lift unit from end.

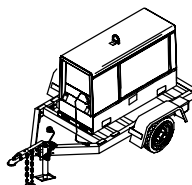
OR



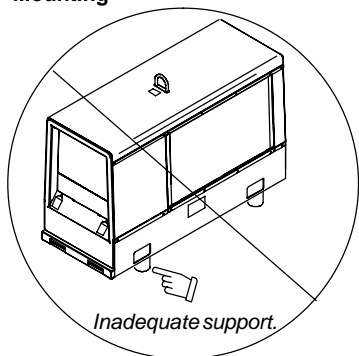
Location



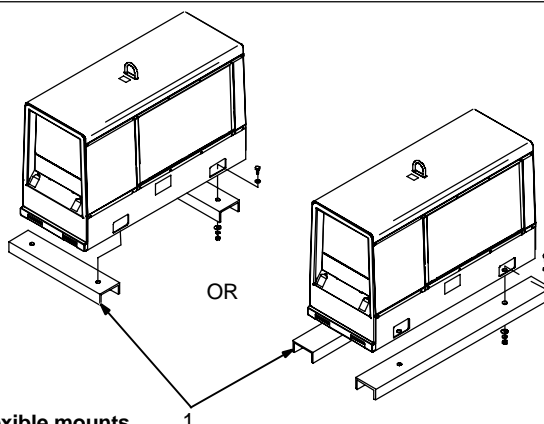
OR



Mounting



▲ Do not use flexible mounts.



OR

- ▲ Do not weld on base. Welding on base can cause fuel tank fire or explosion. Bolt unit down using holes provided in base.
- ▲ Always securely fasten welding generator onto transport vehicle or trailer and comply with all DOT and other applicable codes.
- ▲ Do not mount unit by supporting the base only at the four mounting holes. Use cross-supports to adequately support unit and prevent damage to base.
- ▲ Always ground generator frame to vehicle frame to prevent electric shock and static electricity hazards.
- ▲ If unit does not have GFCI receptacles, use GFCI-protected extension cord.

Mounting:

- 1 Cross-Supports

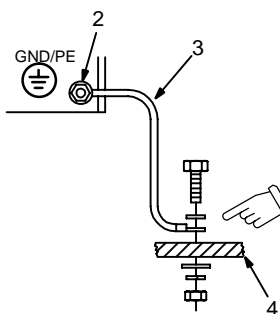
Mount unit on flat surface or use cross-supports to support base.

Grounding:

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

Connect cable from equipment ground terminal to metal vehicle frame. Use #10 AWG or larger insulated copper wire.

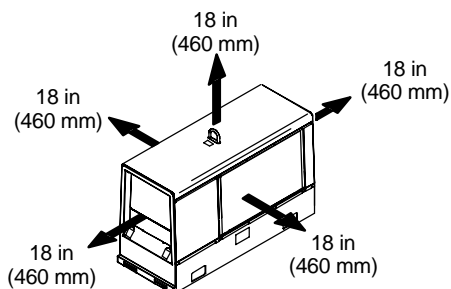
Grounding



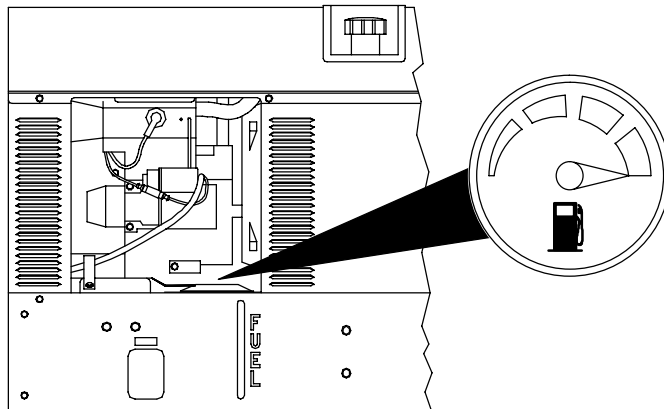
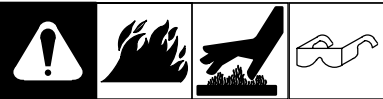
Electrically bond generator frame to vehicle frame by metal-to-metal contact.

- ▲ Bed liners, shipping skids, and some running gear insulate the welding generator from the vehicle frame. Always connect a ground wire from the generator equipment grounding terminal to bare metal on the vehicle frame as shown.

Airflow Clearance



4-2. Engine Prestart Checks



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

Follow run-in procedure in engine manual.

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

Fuel

Add fresh fuel before starting engine the first time (see maintenance label for specifications). Always leave filler neck empty to allow room for expansion. Check fuel level on a cold engine before use each day.

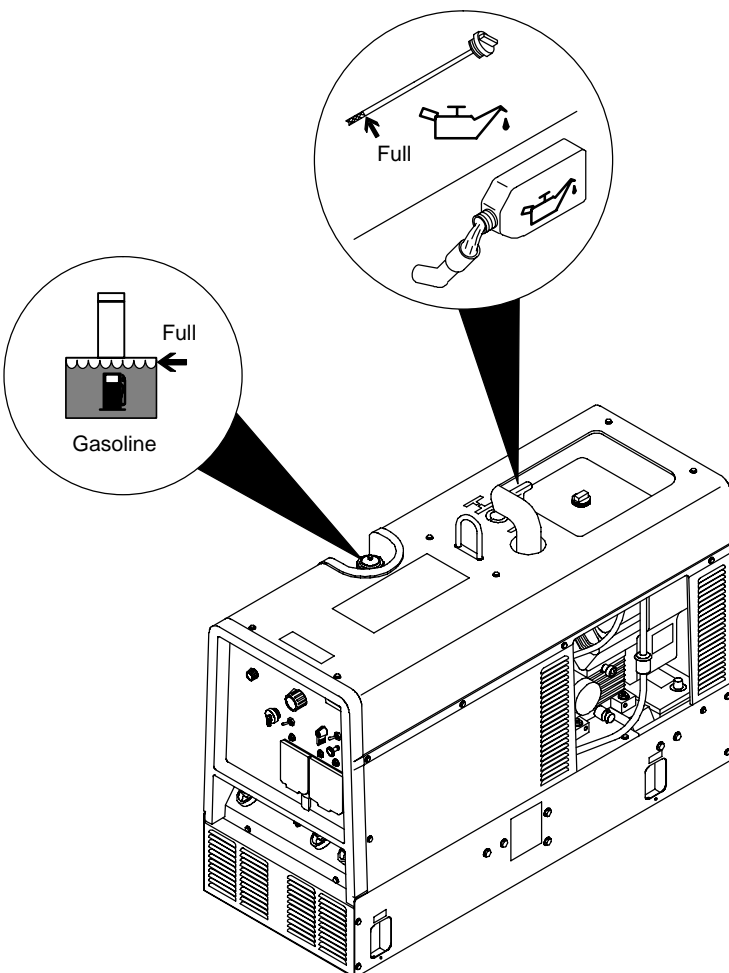
Oil

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

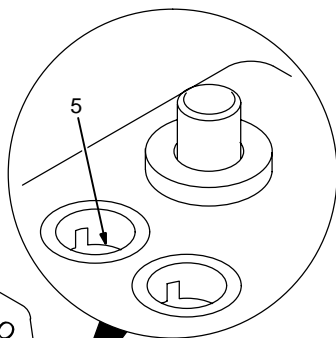
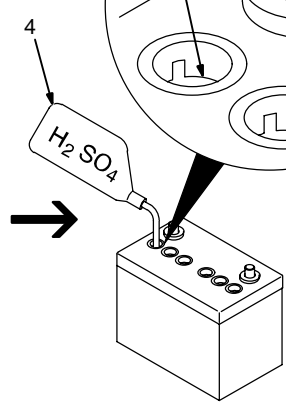
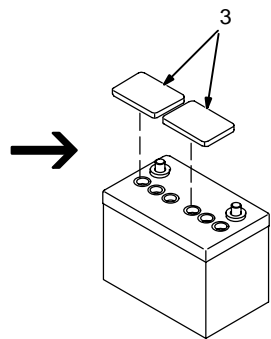
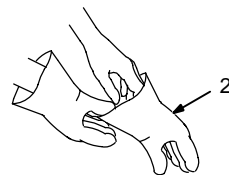
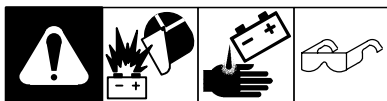
To improve cold weather starting:

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

Use correct grade oil for cold weather.



4-3. Activating The Dry Charge Battery (If Applicable)



Remove battery from unit.

- 1 Eye Protection – Safety Glasses Or Face Shield
- 2 Rubber Gloves
- 3 Vent Caps
- 4 Sulfuric Acid Electrolyte (1.265 Specific Gravity)
- 5 Well

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

▲ **Do not overfill battery cells.**

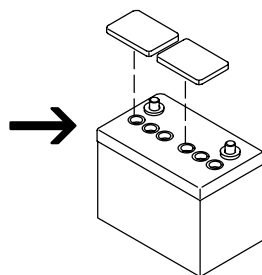
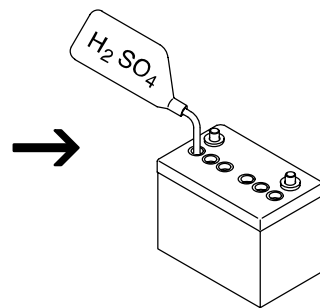
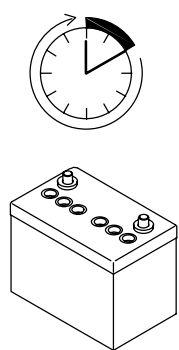
Wait ten minutes and check electrolyte level. If necessary, add electrolyte to raise to proper level. Reinstall vent caps.

- 6 Battery Charger

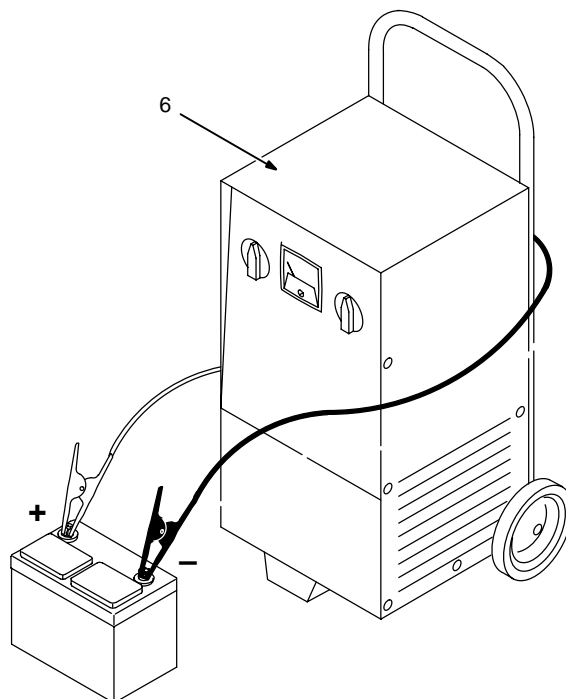
▲ **Read and follow all instructions supplied with battery charger.**

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

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



OR



Tools Needed:



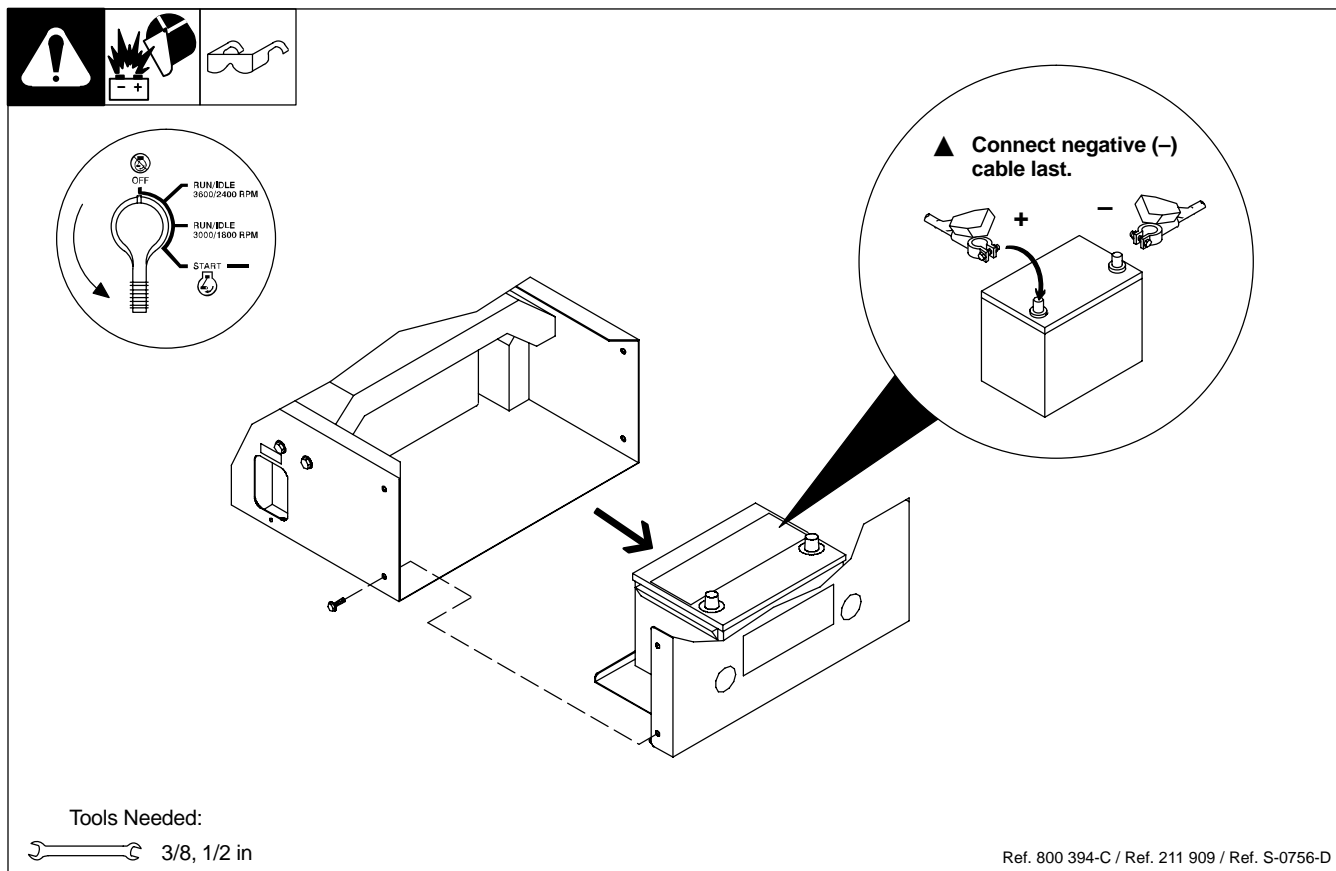
rubbergloves



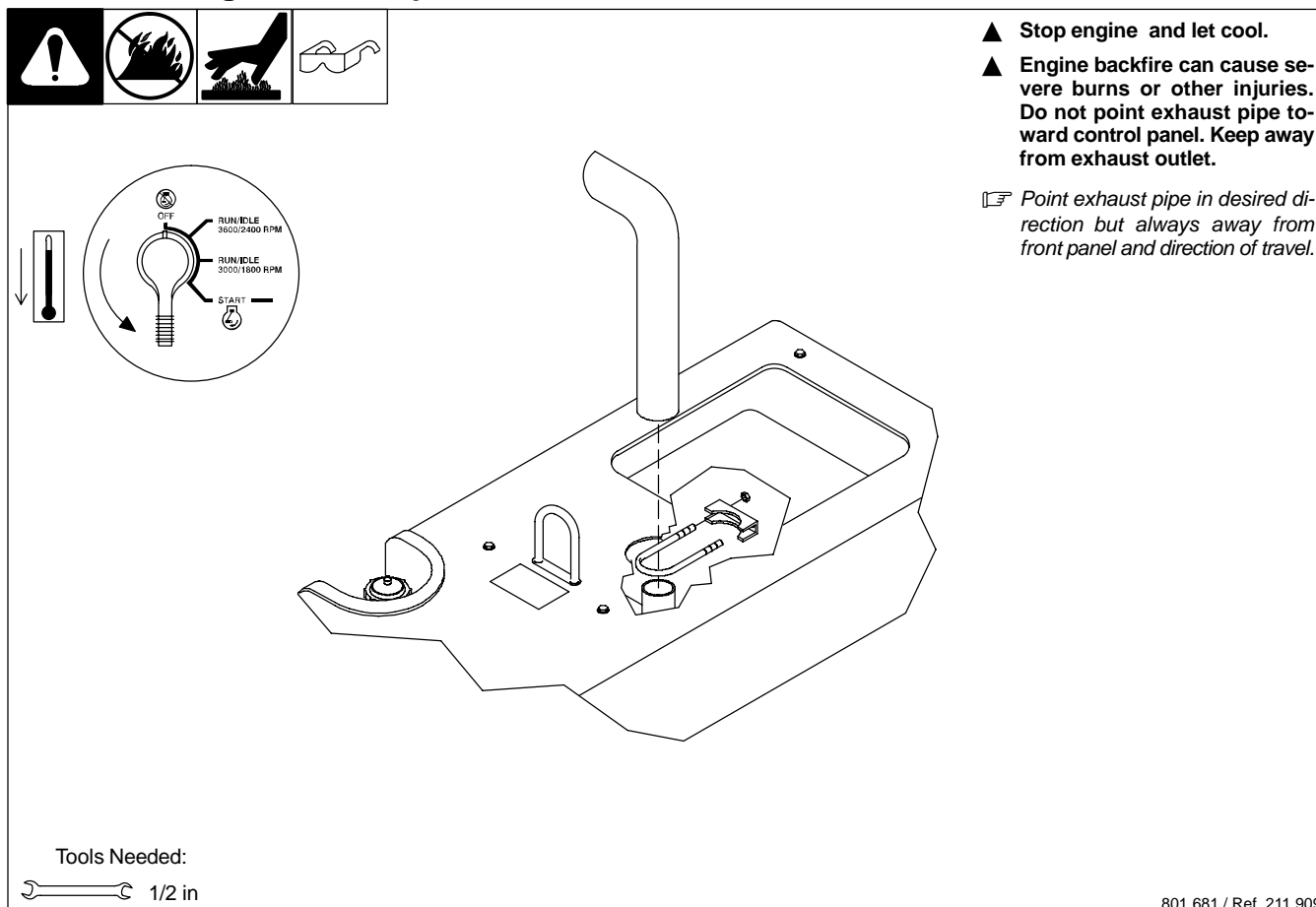
glasses

drybatt1 1/98 – S-0886


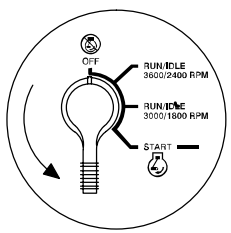
4-4. Connecting The Battery

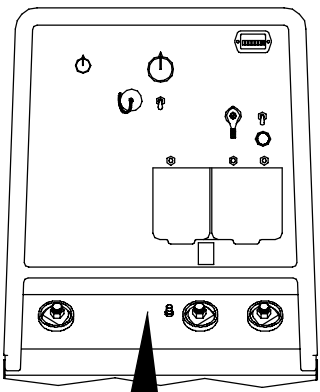


4-5. Installing Exhaust Pipe



4-6. Connecting To Weld Output Terminals



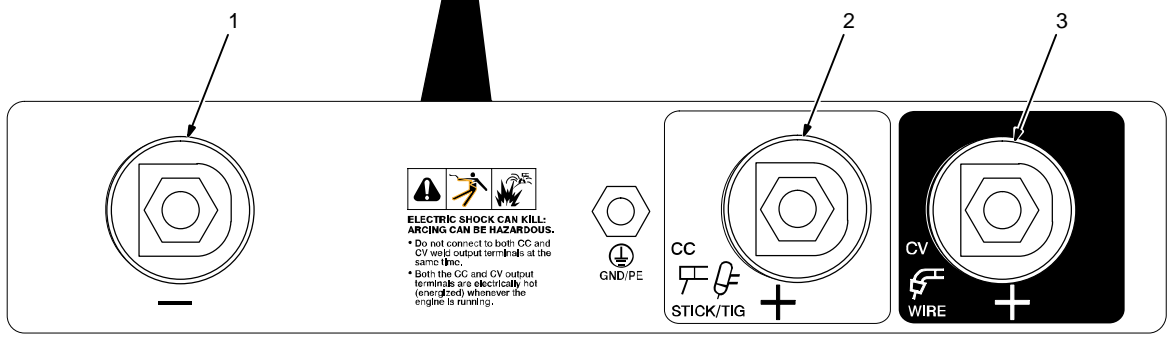
▲ Stop engine.

▲ Do not connect to CC and CV terminals at the same time.

- 1 Negative (–) Weld Output Terminal
- 2 Stick/TIG (CC) Weld Output Terminal
- 3 Wire /CV Weld Output Terminal


For MIG welding, connect work cable to Negative (–) terminal and wire feeder cable to Wire (CV) terminal.

For Stick/TIG welding, connect work cable to Negative (–) terminal and electrode holder cable to Stick/TIG (CC) terminal.



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4-7. Selecting Weld Cable Sizes*

 <p>Weld Output Terminals</p> <p>▲ Stop engine before connecting to weld output terminals.</p> <p>▲ Do not use worn, damaged, undersized, or poorly spliced cables.</p>		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)

* 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.
() = mm² for metric use

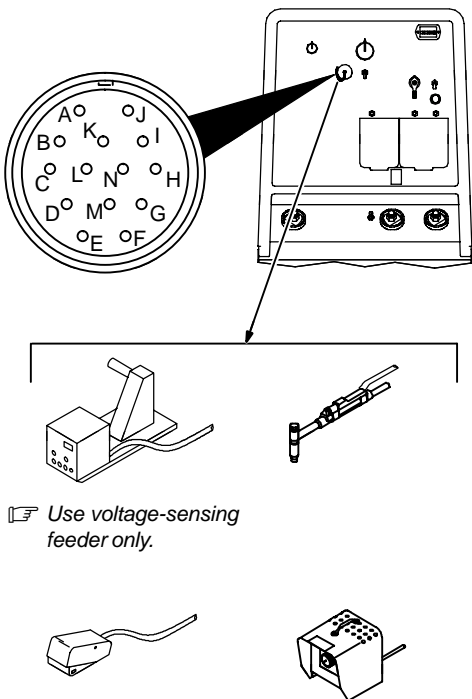



***For distances longer than those shown in this guide, call a factory applications representative at 920-735-4505.

S-0007-E

4-8. Remote Receptacle Information

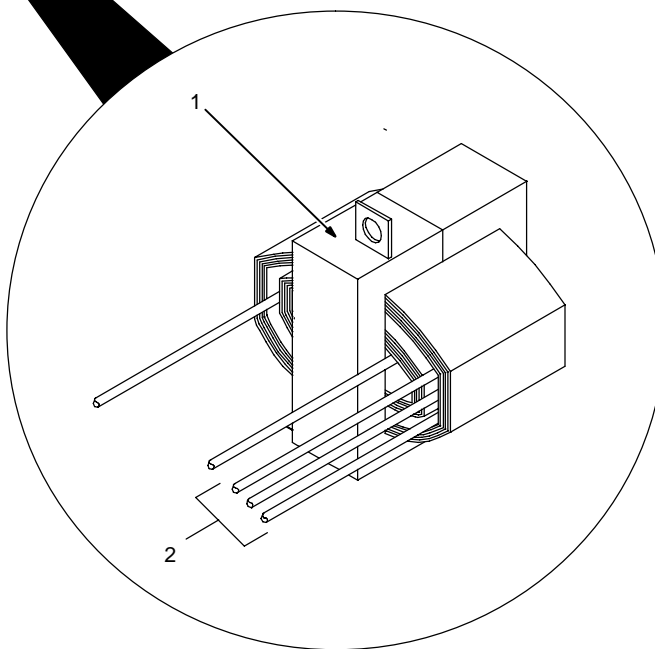
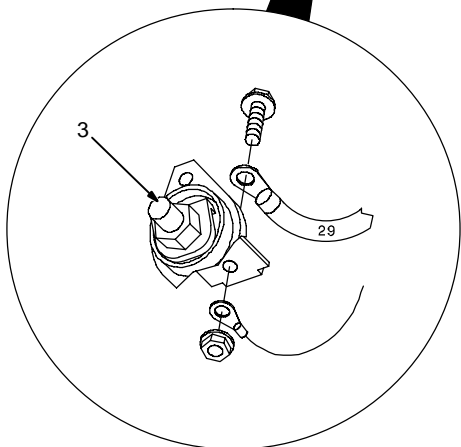
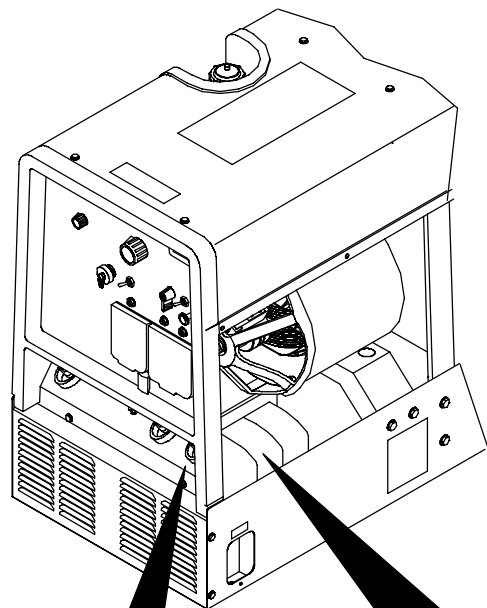
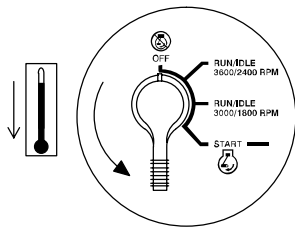
NOTE

Engine runs at weld speed (3000 or 3600 rpm) whenever a device connected to the remote receptacle is running.

 <p>Use voltage-sensing feeder only.</p>	 REMOTE 14	Socket*	Socket Information
	24 VOLTS AC  OUTPUT (CONTACTOR)	A	24 volts ac. Protected by circuit breaker CB5.
		B	Not used.
	115 VOLTS AC  OUTPUT (CONTACTOR)	I	115 volts ac. Protected by fuse F2
		J	Not used.
	A/V AMPERAGE VOLTAGE	C	Output to remote control: 0 to +10 volts dc output to remote control in Stick and TIG modes. +10 volts dc output to remote control in Wire mode.
		D	Remote control circuit common.
		E	DC input command signal: 0 to +10 volts dc from min. to max of remote control with front panel V/A control at max.
	GND	G	Circuit common for 24 volt ac circuits.
		K	Chassis common.
*The remaining sockets are not used.			

Notes

4-9. Adjusting Wire (MIG) Weld Puddle Consistency



Tools Needed:



3/8, 7/16 in

▲ Stop engine and let cool.

Stabilizer DC-Z is factory connected to suit most Wire (MIG) welding applications.

To change Wire (MIG) weld puddle consistency, proceed as follows:

Remove cover and right side panel.

- 1 Stabilizer DC-Z
- 2 Wire /CV Weld Output Terminal
- 3 Stabilizer Leads 29, 28, And 27

Lead 29 – provides stiffest weld puddle

Lead 28 – provides wetter weld puddle (for mild steel)

Lead 27 – provides wettest weld puddle (for stainless steel)

Lead 29 is connected to the Wire/CV weld output terminal at the factory.

Disconnect lead 29 from the Wire/CV weld output terminal.

For wetter weld puddle (for mild steel):

Remove insulated sleeving from lead 28. Connect lead 28 to Wire/CV weld output terminal, reusing hardware. Insulate lead 29 with sleeving removed from lead 28. Secure sleeving with cable ties.

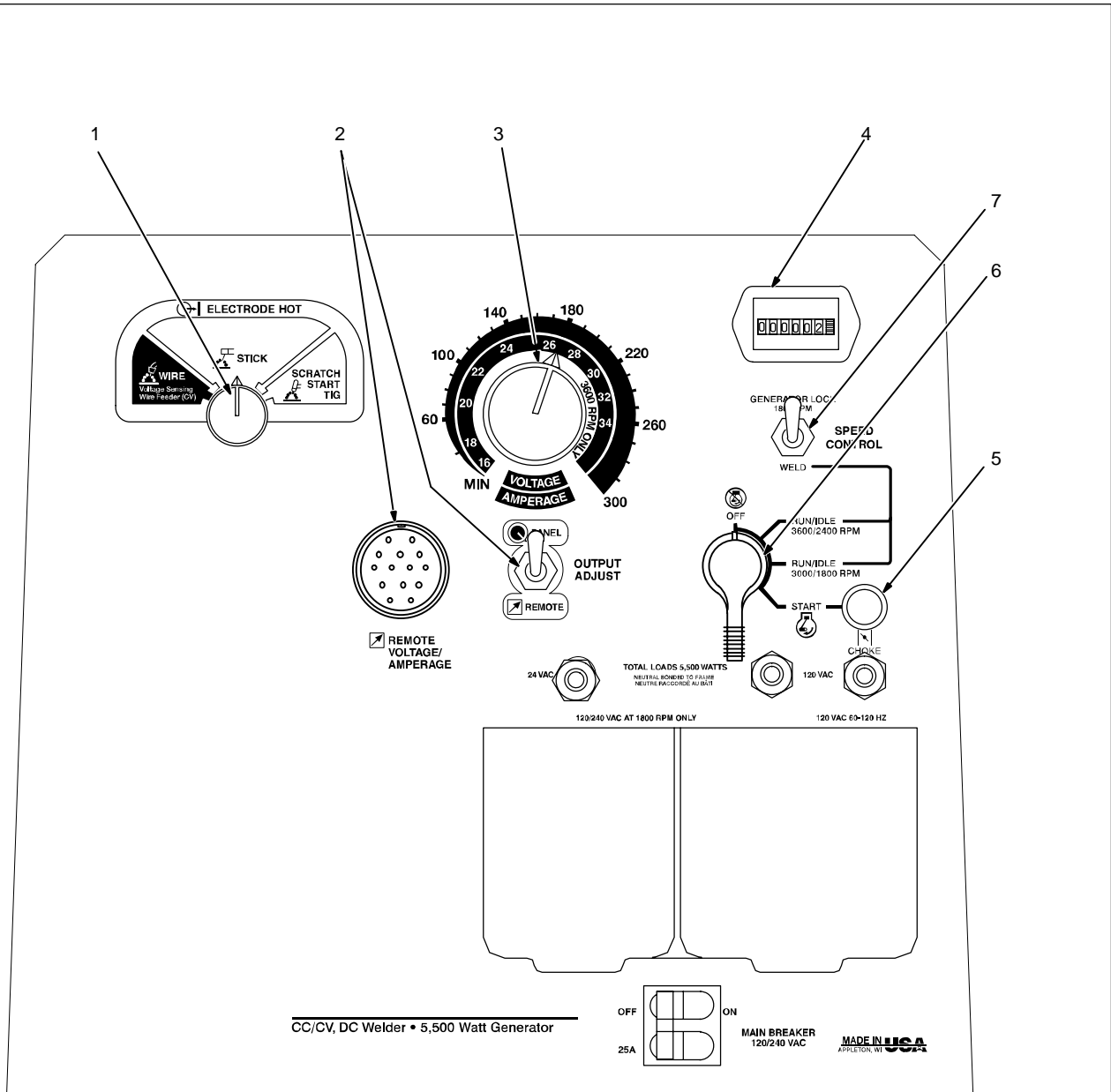
For wettest weld puddle (for stainless steel):

Remove insulated sleeving from lead 27. Connect lead 27 to Wire/CV weld output terminal, reusing hardware. Insulate lead 29 with sleeving removed from lead 27. Secure sleeving with cable ties.

Reinstall side panel.

SECTION 5 – OPERATING WELDING GENERATOR

5-1. Front Panel Controls



5-2. Description Of Front Panel Controls



1 Process Switch

See Section 5-3 for Process switch information.

2 Output Adjust Switch And Remote 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 receptacle RC4 (see Sections 4-8 and 5-4).

3 V/A Control

Use control to select weld voltage or amperage. Control may be adjusted while welding.

For maximum weld output (above 220 Amps), run unit at 3600 rpm. For weld output below 220 Amps, operate unit at 3000 or 3600 rpm.

With Process/Contactor switch in Stick or TIG setting, use control to adjust amperage. With Process/Contactor switch in Wire position, use control to adjust voltage. With V/A Adjust Switch in Remote position, control limits the remote amperage in Stick and TIG modes, but has no effect in MIG modes.

4 Engine Hour Meter

Use hour meter to help schedule routine maintenance (see Section 7-1).

5 Engine Choke Control

Use control to change engine air-fuel mix when starting engine. Pull control out when starting a cold engine. Push control in when engine starts.

Do not run engine with Choke control partially on or spark plugs will foul.

6 Engine Control Switch

Use switch to start engine, stop engine, and select engine speed. (Use switch in combination with Speed Control switch to select engine speed.) In Run/Idle 3600/2400 RPM position, engine runs at 2400 rpm at no weld load, and 3600 rpm under weld load. In Run/Idle 3000/1800 RPM position, engine runs at 1800 rpm at no weld load, and 3000 rpm under weld load. In either position, engine speed is determined by weld load and position of Speed Control switch (see item 7 and table below).

Generator power is available at receptacles RC1 and RC2 only at 1800 rpm. If generator is not locked at 1800 rpm,

engine speed increases in response to weld load and generator power output stops at receptacles RC1 and RC2. Generator power load does not affect engine speed.

7 Speed Control Switch

Use switch to control engine auto idle function. Place switch in Generator Lock position when not welding to lock engine speed at 1800 rpm for generator power at 60 Hz ac receptacles RC1 and RC2. (Generator power is always available at 60-120 Hz receptacle RC3.)


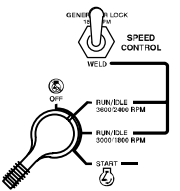
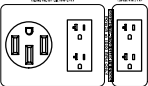
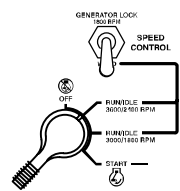
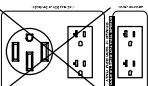
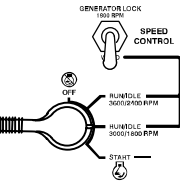
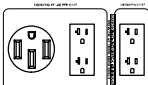
Place switch in Weld position to allow engine speeds to be determined by position of Engine Control switch. The Speed Control switch is not needed at start-up.

To Start: pull out choke and turn Engine Control switch to Start position. Release switch and slowly push choke in when engine starts.

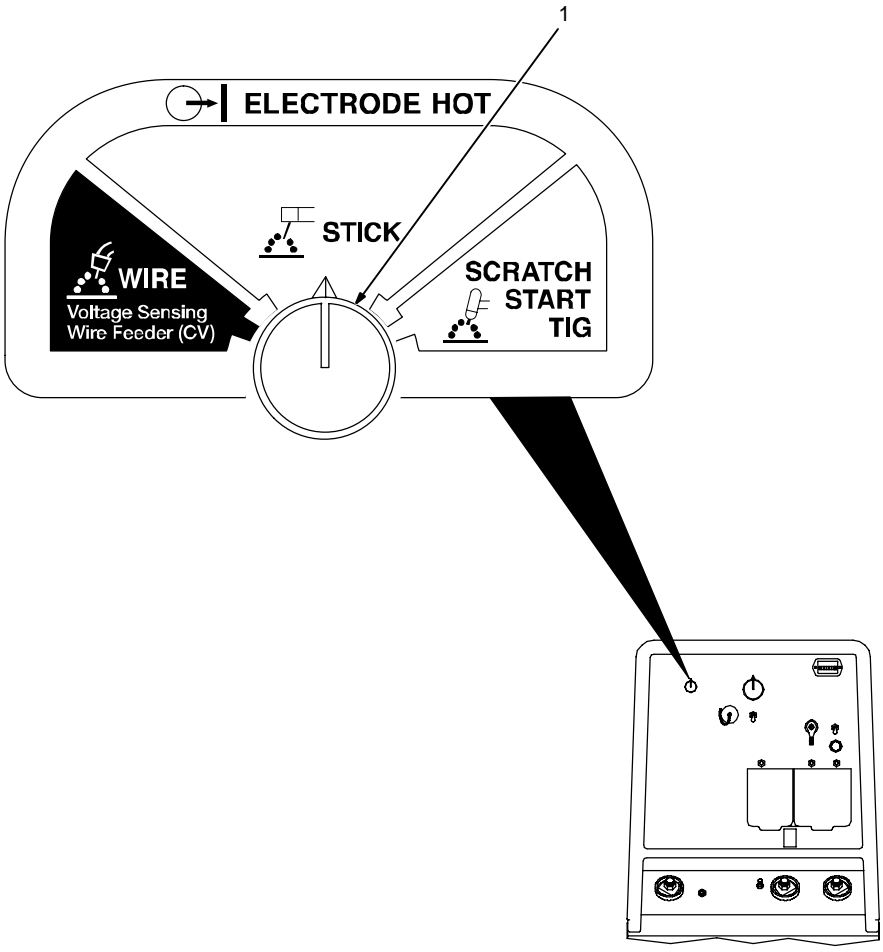
If the engine does not start, let the engine come to a complete stop before attempting restart.

To Stop: turn Engine Control switch to Off position.

Controlling Engine Speed And Weld/Generator Power Output

Engine Controls	Engine Speed 	Generator Power Output	Weld Output
 <p><i>Speed Control Switch In Generator Lock. Engine Control Switch in either Run/Idle position.</i></p>	1800 rpm (Power Speed) Continuous	 <p>5 kW/kVA Total From All AC Receptacles</p>	Welding Not Recommended
 <p><i>Speed Control Switch In Weld. Engine Control Switch in 3600/2400 RPM.</i></p>	No Load: 2400 rpm (Idle Speed) Load: 3600 rpm (Weld Speed)	 <p>2.4 kW/kVA at 60-120 Hz From AC Receptacle RC3 Only</p>	3600 rpm: 20 – 300 A
 <p><i>Speed Control Switch In Weld. Engine Control Switch in 3000/1800 RPM.</i></p>	No Load: 1800 rpm (Idle Speed) Load: 3000 rpm (Weld Speed)	 <p>5 kW/kVA Total From All AC Receptacles At 1800 rpm. At 3000 rpm, Output Available Only At 2.4 kW/kVA 60-120 Hz AC Receptacle RC3</p>	3000 rpm: 20 – 220 A

5-3. Process Switch



1 Process Switch

▲ **Weld output terminals are energized whenever the engine is running.**

☞ *The unit will not return to idle speed when the remote contactor is on (closure between pins A and B on remote receptacle).*

Use switch to select weld process (see table below and Section 4-8).

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

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

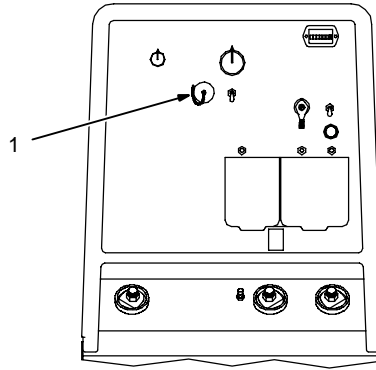
The dig circuit is disabled when switch is in Wire or TIG position.

803 128

Process Switch Settings

Switch Setting	Process	Output On/Off Control
Electrode Hot – Wire	MIG (GMAW)	Electrode Hot
Electrode Hot – Stick	Stick (SMAW), Air Carbon Arc (CAC-A) Cutting And Gouging	Electrode Hot
Electrode Hot – Scratch Start TIG	Scratch Start TIG (GTAW)	Electrode Hot

5-4. Remote Amperage/Voltage Control

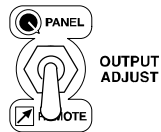


- 1 Remote Receptacle RC4
Connect optional remote control to RC4 (see Section 4-8).
- 2 Remote Hand Control (Optional)
- 3 Remote Foot Control (Optional)

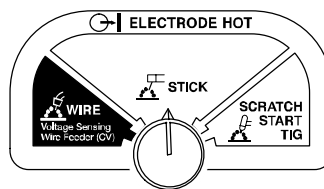
Engine runs at weld speed when a device connected to the remote receptacle makes closure between pins A and B (example: trigger pull on MIG gun).

Example: Combination Remote Amperage Control (Stick)

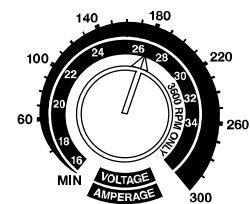
In Example:
Process = Stick
Min = 40 A CC/DC
Max = 180 A CC/DC



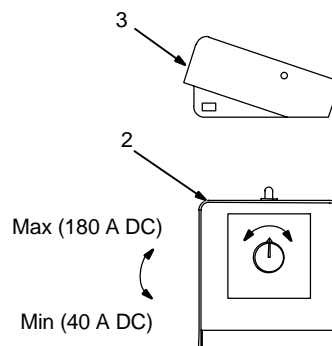
Set V/A Adjust
Switch



Set Process



Set
V/A Control



Adjust Remote Control
(Stick Welding Only)

This unit does not have remote con-
tactor control. Output is always on.

SECTION 6 – OPERATING AUXILIARY EQUIPMENT

6-1. 60 Hz Generator Power Receptacles And Circuit Breakers

TOTAL LOADS 5,500 WATTS
NEUTRAL BONDED TO FRAME
NEUTRE BACCORDE AU BÂTI

120/240 VAC AT 1800 RPM ONLY

120 VAC 60-120 HZ

POWER at 1800 RPM ONLY

TOOLS & LIGHTS ONLY-ALL SPEEDS

OFF

25A

ON

MAIN BREAKER 120/240 VAC

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

✎ Weld output and 60 Hz generator power output at receptacles RC1 and RC2 are not available at the same time. When welding, generator power is available from AC receptacle RC3 only (see Section 6-2).

✎ Generator power is available at receptacles RC1 and RC2 only at 1800 rpm. If generator is not locked at 1800 rpm, engine speed increases in response to weld load and generator power output stops at receptacles RC1 and RC2. Generator power load does not affect engine speed.

1 240 V 50 A AC Receptacle RC1

RC1 supplies 60 Hz single-phase power at 1800 rpm. Maximum output is 5 kVA/kW (20 A at 240 volts ac). For 60 Hz generator power at RC1, set controls as shown in table.

2 120 V 20 A AC Duplex Receptacle RC2

RC2 supplies 60 Hz single-phase power at 1800 rpm. Maximum output from RC2 is 2.4 kVA/kW (20 A at 120 volts ac).

3 Circuit Breaker CB1

CB1 protects receptacles RC1 and RC2 from overload. If CB1 opens, the receptacles do not work. Place switch in On position to reset breaker.

4 Circuit Breaker CB3

CB3 protects RC2 from overload. If CB3 opens, the receptacle does not work. Press button to reset breaker.

Combined output of all receptacles limited to 5 kVA/kW continuous rating of the generator.


EXAMPLE: If 10 A is drawn from 120 V duplex receptacle RC2, only 16 A is available at 240 V receptacle RC1.
 $(120\text{ V} \times 10\text{ A}) + (240\text{ V} \times 16\text{ A}) = 5\text{ kVA/kW}$

Controlling Engine Speed And Weld/Generator Power Output

Engine Controls	Engine Speed	Generator Power Output	Weld Output
<p>Either Run/Idle position.</p>	<p>1800 rpm (Power Speed) Continuous</p>	<p>5 kW/kVA Total From All AC Receptacles</p>	<p>Welding Not Recommended</p>
	<p>No Load: 2400 rpm (Idle Speed) Load: 3600 rpm (Weld Speed)</p>	<p>2.4 kW/kVA at 60-120 Hz From AC Receptacle RC3 Only</p>	<p>3600 rpm: 20 – 300 A</p>
	<p>No Load: 1800 rpm (Idle Speed) Load: 3000 rpm (Weld Speed)</p>	<p>5 kW/kVA Total From All AC Receptacles At 1800 rpm. At 3000 rpm, Output Available Only At 2.4 kW/kVA 60-120 Hz AC Receptacle RC3</p>	<p>3000 rpm: 20 – 220 A</p>

Ref. 211 909

6-2. Variable Frequency (Hz) Generator Power Receptacle RC3



TOTAL LOADS 5,500 WATTS
NEUTRAL BONDED TO FRAME
NEUTRE RACCORDE AU BÂTI

120/240 VAC AT 1800 RPM ONLY

120 VAC 60-120 HZ

120 VAC

1

2

TOOL & LIGHTS ONLY-ALL SPEEDS
POWER at 1800 RPM ONLY

OFF 25A ON MAIN BREAKER 120/240 VAC


▲ Do not operate equipment requiring a constant frequency from variable frequency receptacle RC3.

1 120 V 20 A Variable Frequency AC Receptacle RC3

Receptacle supplies single-phase power continuously. Frequency (Hz) of generator power output changes with engine speed. Total output available is 2.4 kVA/kW.


2 Circuit Breaker CB4

CB4 protects the receptacle from overload. If CB4 opens, the receptacle does not work.

 Press button to reset circuit breaker.

Ref. 203 096

6-3. Wiring Optional 240 Volt Plug



Current Available in Amperes

240 V Receptacle*	Each 120 V Duplex Receptacle
20	0
15	5
10	10
5	15
0	20

V x A = Watts

*One 240 V load or two 120 V loads.

1 Plug Wired for 120/240 V, 3-Wire Load

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

2 Plug Wired for 240 V, 2-Wire Load

3 Neutral (Silver) Terminal

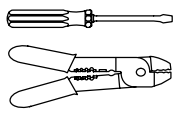
4 Load 1 (Brass) Terminal

5 Load 2 (Brass) Terminal

6 Ground (Green) Terminal

7 Amperes Available using 120/240 V Plug










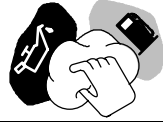
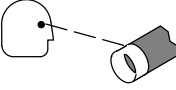
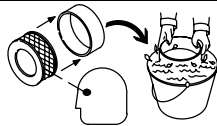
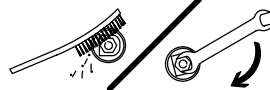
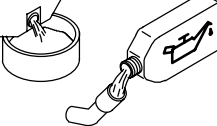
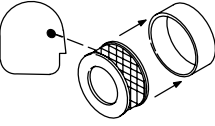
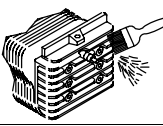
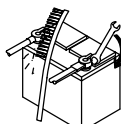
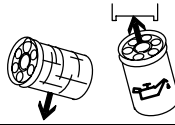
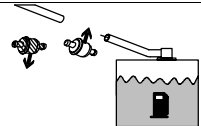
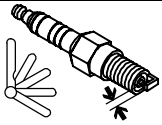
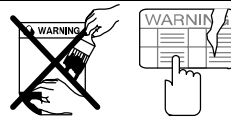
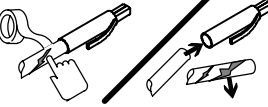
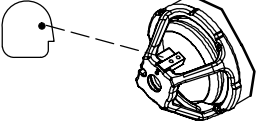
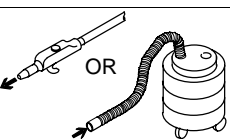
Tools Needed:



120 813-D

SECTION 7 – MAINTENANCE

7-1. Routine Maintenance

      						 Recycle engine fluids.	<p>▲ Stop engine before maintaining.</p> <p>☞ See Engine Manual and Maintenance Label. Service more often if used in severe conditions.</p> <p>* To be done by Factory Authorized Service Agent.</p>
<div>⌚ Every 8 h</div>							
Check fluid levels. See Section 4-2.		 OIL Full	Wipe up spills.				
<div>⌚ 20 h</div>			<div>⌚ 25 h</div>				
Check and clean spark arrestor screen. See Section 7-3.			Service air filter wrapper (foam element). See Section 7-4.				
<div>⌚ Every 50 h</div>							
Clean and tighten weld terminals.							
<div>⌚ Every 100 h</div>							
Change oil. See Section 7-5 and maintenance label.			Service air filter element. See Section 7-4.				
Clean cooling system. See engine manual.			Clean and tighten battery connections.				
<div>⌚ Every 200 h</div>							
Change oil filter. See Section 7-5 and maintenance label.			Replace fuel filter. See Section 7-5.				
Check spark plugs, and replace if fouled. Operation at low speed (1800 rpm) may increase fouling.			Replace unreadable labels.				
<div>⌚ Every 500 h</div>							
Repair or replace cracked cables.			Service welding generator brushes and slip rings. Service more often in dirty conditions.*				
<div>⌚ Every 1000 h</div>							
Blow out or vacuum inside. During heavy service, clean monthly.							

7-2. Maintenance Label

NOTE



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

KOHLER CH20/CH23 GAS ENGINE

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

Check daily.

To Drain Oil:

Push And Turn CCW

1/2 in. ID Hose

Pull

Recommended Oil . . . API Service Classification SF-SG/CC-CD
(If using optional LP fuel, use synthetic oil after first oil change)

Oil Change 100 hours

Oil Filter Change 200 hours

Oil Filter MILLER 066 698, Kohler 1205001

Oil Capacity 52 oz (1.54L) with filter change

DO NOT OVERFILL OIL.
KEEP LEVEL BETWEEN L & F MARKS ON THE DIPSTICK.

Fuel Grade Unleaded, 87 Octane min.

Fuel Filter MILLER 066 113, Kohler 2505003

Gasoline

Air Filter Service 100 hours or less – see Owner's Manual

Air Filter Element MILLER 067 272, Kohler 4708303

Air Filter Wrapper MILLER 067 273, Kohler 2408302

12 Volt Battery BCI Group 58

Cranking Performance at 0°F (-18°C) . . . 430 Amps min.

Engine RPM No Load

Trailblazer

Miller Legend 301 G
(Reference only – engine is not adjustable)

Weld/Power . . 3700⁺⁵⁰/₂₅

Idle 2200⁺¹⁰⁰/₋₀

Max Weld . . 3600

Weld 3000

Idle 1860

Spark Plug Gap 0.030 In. (.762 mm)

Spark Plug Champion RC-12YC

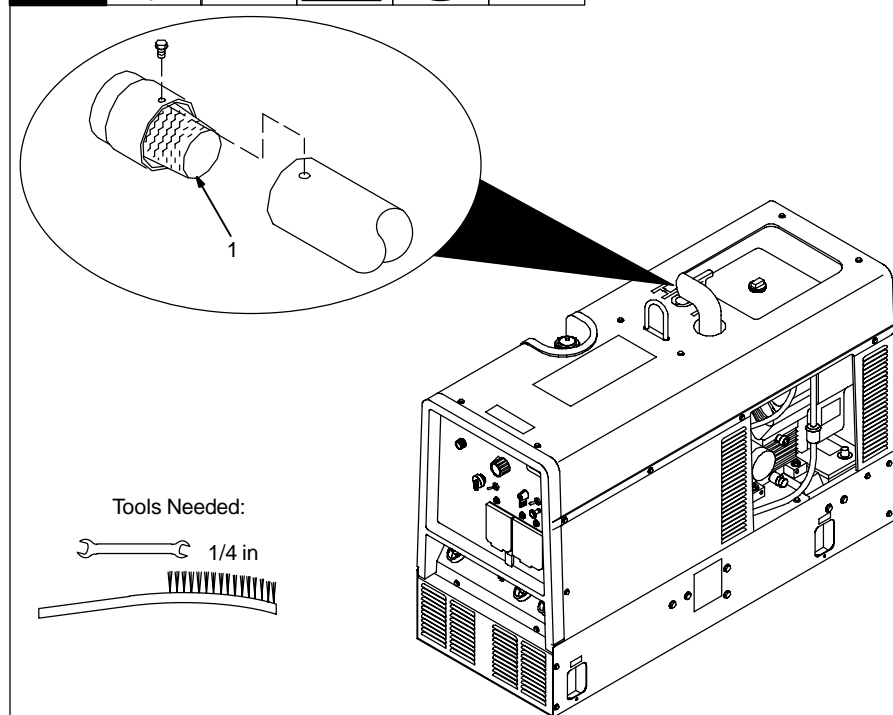
Use only resistor spark plugs and wires.

Tune-Up And Filter Kit MILLER 180 096

Consisting of Air, Oil, and Fuel Filters, Air Filter Wrapper, and 2 Spark Plugs.

207 884-B

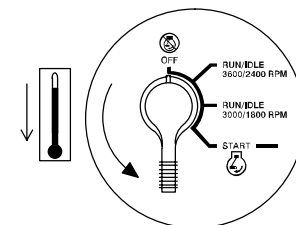
7-3. Servicing Optional Spark Arrestor



▲ **Stop engine and let cool.**

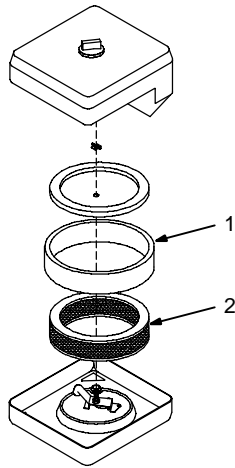
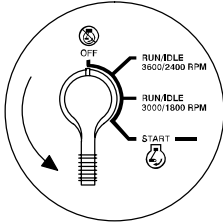
1 Spark Arrestor Screen

Clean and inspect screen. Replace spark arrestor if screen wires are broken or missing.



803 127 / Ref. 211 909

7-4. Servicing Air Cleaner



▲ Stop engine.

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

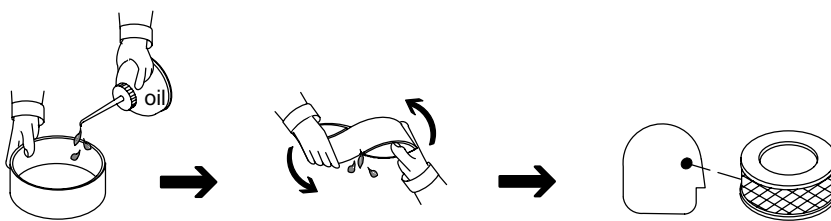
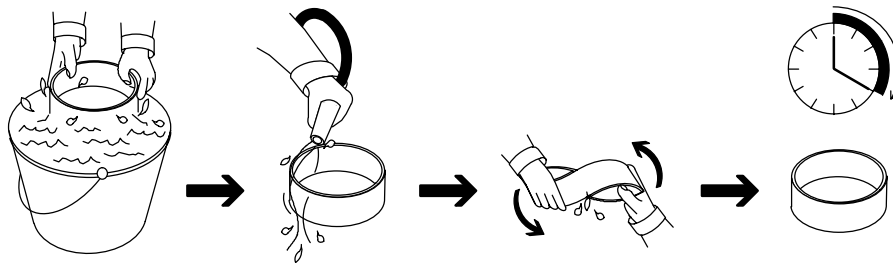
1 Wrapper (Foam Element)

Wash wrapper with soap and water solution. Allow wrapper to air dry completely.

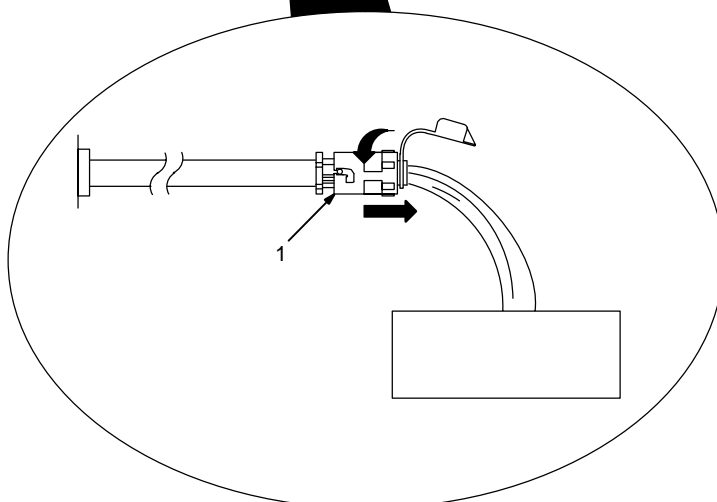
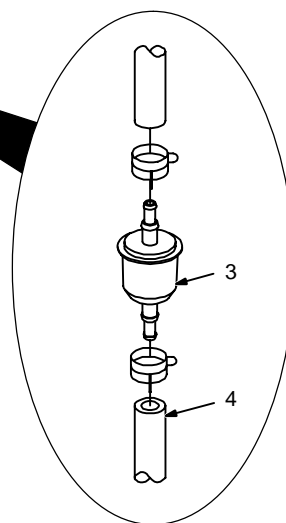
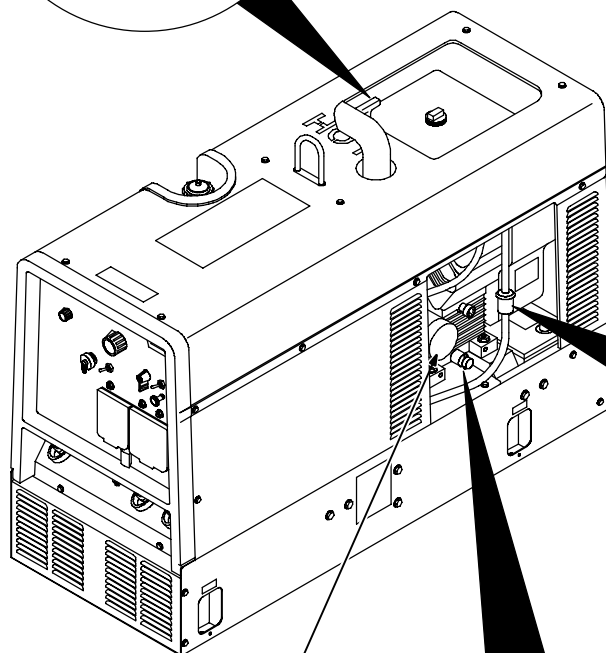
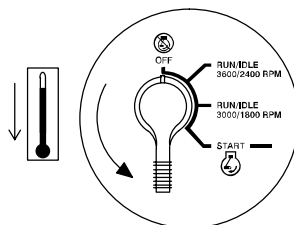
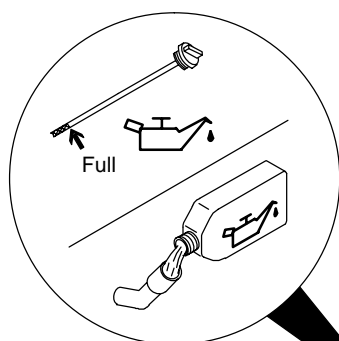
Spread 1 tablespoon SAE 30 oil evenly into wrapper. Squeeze out excess oil.

2 Element

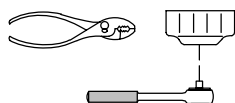
Replace element if damaged, dirty, or oily.



7-5. Changing Engine Oil, Oil Filter, And Fuel Filter



Tools Needed:



▲ Stop engine and let cool.

- 1 Oil Drain Valve
- 2 Oil Filter

Change engine oil and filter according to engine manual.

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

Fill crankcase with new oil to full mark on dipstick (see Section 7-2).

- 3 Fuel Filter
- 4 Fuel Line

Replace line if cracked or worn. Install new filter. Wipe up any spilled fuel.

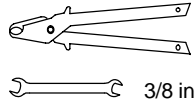
Start engine, and check for fuel leaks.

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

7-6. Overload Protection



Tools Needed:



▲ Stop engine.

- 1 Circuit Breaker CB5

CB5 protects the 24 volt ac output to Remote receptacle RC4. If CB5 opens, 24 volt ac output to RC4 stops.

Press button to reset breaker. If CB5 continues to open, check 24 volt device connected to RC4.

- 2 Fuse F1 (See Parts List)

- 3 Fuse F2 (See Parts List)

Remove cover.

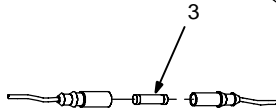
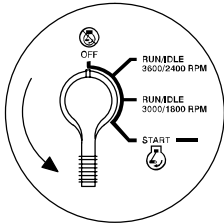
Fuse F1 is located on power board PC7. F1 protects the exciter stator from overload. If F1 opens, weld and generator power output stops.

Fuse F2 is located behind front panel. F2 protects the 115 volt ac output to Remote receptacle RC4. If F2 opens, 115 volt ac output to RC4 stops.

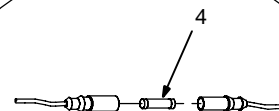
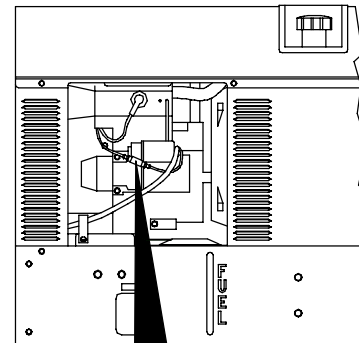
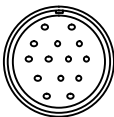
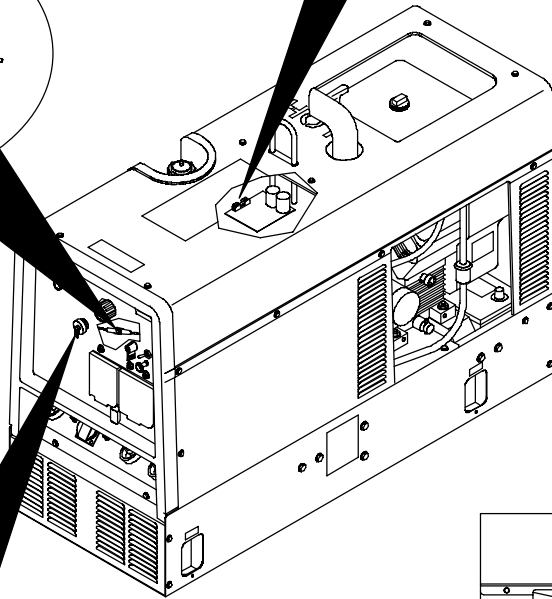
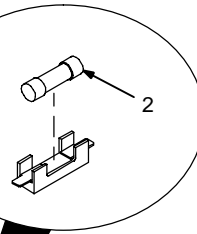
Replace fuse(s) if open. If F1 continues to open, check check circuit board PC7, and the rotor. If F2 continues to open, check 115 volt device connected to RC4. Reinstall cover before operating unit.

- 4 Fuse F6 (See Parts List)

F6 protects the engine wiring system from overload. If F6 opens, the engine will not crank. Replace fuse if open. If F6 continues to open, check Engine Control switch S2, and diode D1.









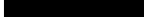


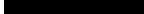

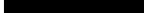
Located behind front panel.



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MATERIAL THICKNESS REFERENCE CHART

	24 Gauge (.025 in)
	22 Gauge (.031 in)
	20 Gauge (.037 in)
	18 Gauge (.050 in)
	16 Gauge (.063 in)
	14 Gauge (.078 in)
	1/8 in (.125 in)
	3/16 in (.188 in)
	1/4 in (.25 in)
	5/16 in (.313 in)
	3/8 in (.375 in)
	1/2 in (.5 in)

SECTION 8 – THEORY OF OPERATION

1 Engine

Supplies force to turn revolving field.

2 Revolving Fields (Rotor)

Turn at 3000 or 3600 rpm maximum for welding. The speed and excitation current of the field coils determine voltages in stator windings.

3 Stator Windings

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

4 Fuse F1 (On PC7)

Protects exciter excitation winding from overload.

5 Power Board PC7

Adjusts generator power output by changing revolving field current after receiving feedback signal from PC1.

6 Weld Power Board PC1

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

Monitors generator power voltage and signals PC7 to maintain proper generator power output by changing revolving field current.

Controls engine speed through electronic governor. When Speed Control switch S4 is in Generator Lock position, PC1 lowers engine speed to 1800 rpm. When S4 is in Weld position, it lowers engine speed to 1800 or 2400 rpm when no signal is received from CT1.

7 Control Board PC2

Works with PC1 to control engine idle and weld process functions. The Voltage/Amperage control and Process switch are located on PC2.

8 Current Transformer CT1

Senses output from weld windings and signals PC1 and PC2 to increase to or maintain weld speed (3000 or 3600 rpm).

9 Remote Receptacle RC4

Connects remote amperage/voltage control to unit.

10 Circuit Breaker CB5 And Fuse F2

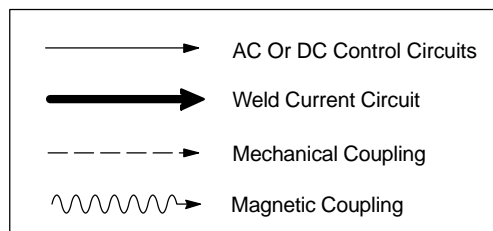
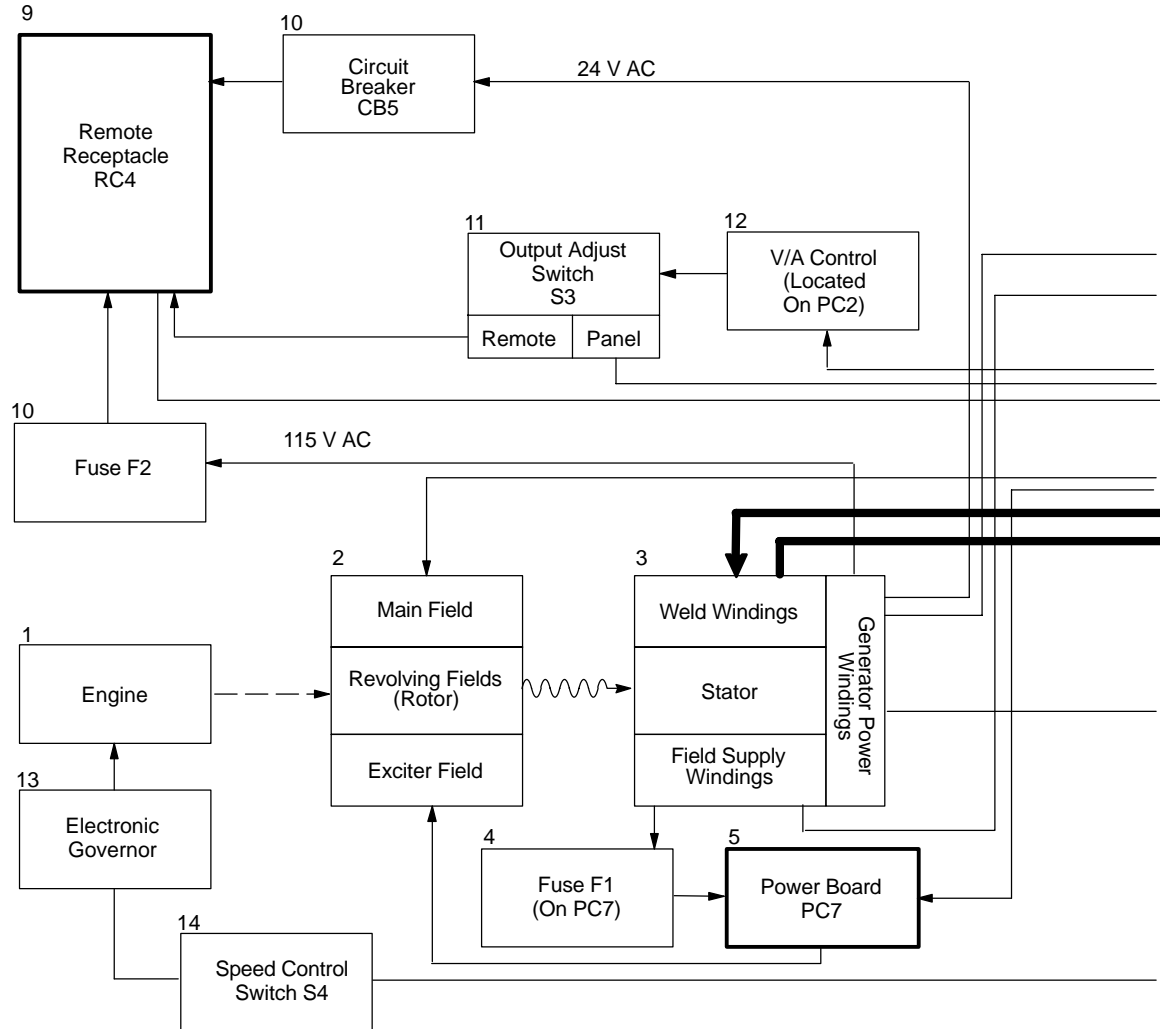
Protect Remote receptacle RC4 from overload.

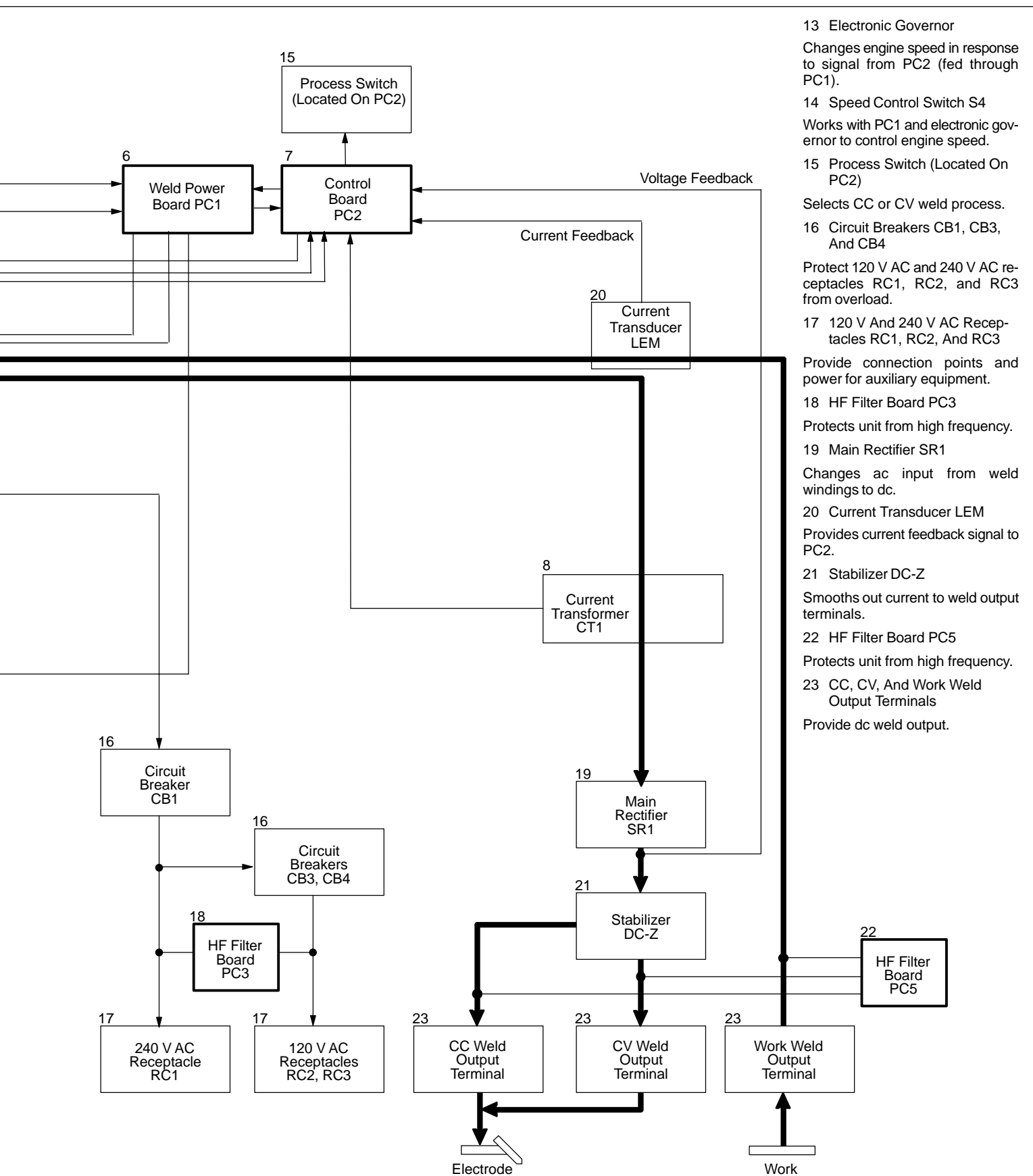
11 Output Adjust Switch S3

Selects Panel or Remote voltage/amperage control.

12 V/A Control

Changes output of stator weld windings by adjusting field current level in revolving field.





- 13 Electronic Governor
Changes engine speed in response to signal from PC2 (fed through PC1).
- 14 Speed Control Switch S4
Works with PC1 and electronic governor to control engine speed.
- 15 Process Switch (Located On PC2)
Selects CC or CV weld process.
- 16 Circuit Breakers CB1, CB3, And CB4
Protect 120 V AC and 240 V AC receptacles RC1, RC2, and RC3 from overload.
- 17 120 V And 240 V AC Receptacles RC1, RC2, And RC3
Provide connection points and power for auxiliary equipment.
- 18 HF Filter Board PC3
Protects unit from high frequency.
- 19 Main Rectifier SR1
Changes ac input from weld windings to dc.
- 20 Current Transducer LEM
Provides current feedback signal to PC2.
- 21 Stabilizer DC-Z
Smooths out current to weld output terminals.
- 22 HF Filter Board PC5
Protects unit from high frequency.
- 23 CC, CV, And Work Weld Output Terminals
Provide dc weld output.

SECTION 9 – EXPLANATION OF ELECTRICAL PARTS

elect_parts 2/02

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



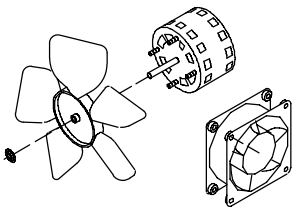
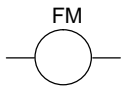


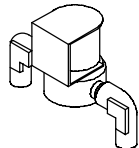
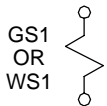
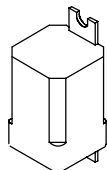
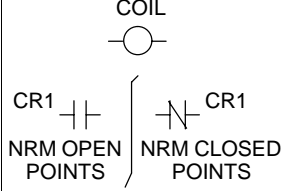
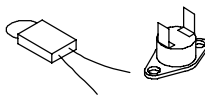
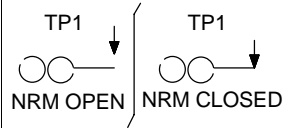
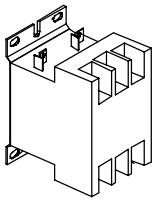
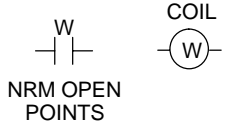
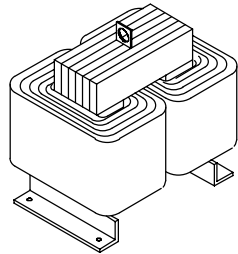
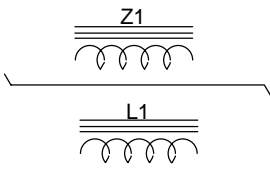


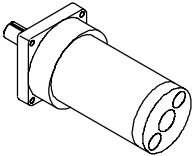
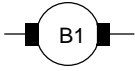
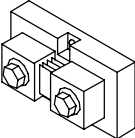
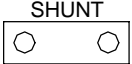
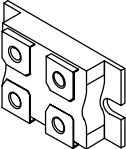
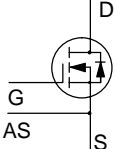
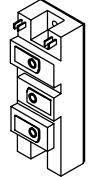
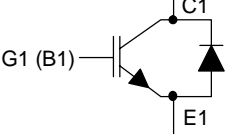
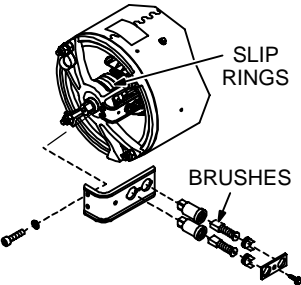
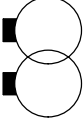

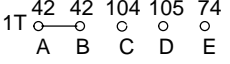
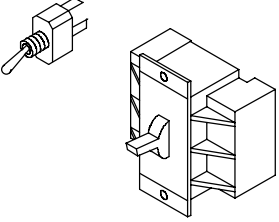
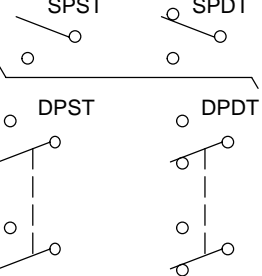
▲ WARNING: ELECTRIC SHOCK can kill.

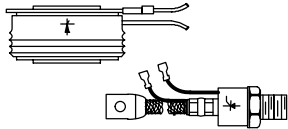
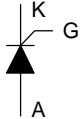
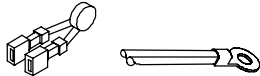
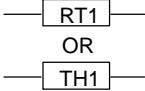
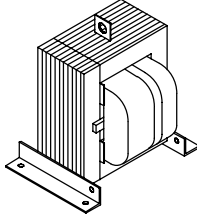
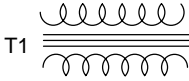
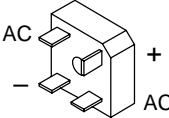
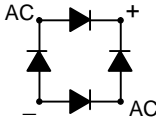
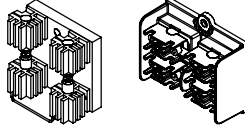

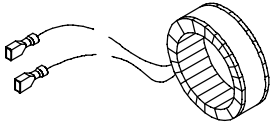
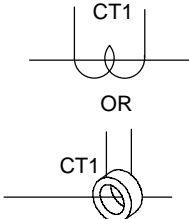
- Disconnect input power or stop engine before servicing.
- Do not touch live electrical parts.
- Do not operate machines with covers removed.
- Have only qualified persons install, use, or service equipment.

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.		<div> Polarized: C1 Non-Pol.: C1 </div>
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.		<div> Fixed: R1 Fixed Tapped: R1 </div>
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
PILOT LIGHT	A light located on the front panel which indicates if the machine is on or off.		
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.		
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 “Inverter” 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 13 and following for parts location.

A. Welding Trouble

Trouble	Remedy
No weld output; generator power output okay at ac receptacles.	Check weld connections.
	Check control settings.
	Place Output Adjust switch S3 in Panel position, or move switch to Remote position and connect remote control to Remote receptacle RC4 (see Sections 4-8 and 5-4).
	Check main rectifier SR1, and replace if necessary.
	Check current transducer LEM, and replace if necessary.
	Clean slip rings, and install new brushes if necessary (see Section 10-11).
	Disconnect leads 131 and 132 from brushes, and check continuity across slip rings. Replace rotor if necessary.
	Disconnect stator weld excitation leads 91 and 92, and check continuity between leads. Replace stator if necessary.
	Check stabilizer DC-Z for signs of winding failure. Check continuity across windings, and check for proper connections. Replace DC-Z if necessary.
	Check weld power board PC1 and connections, and replace if necessary (see Section 10-5). LED5 and LED6 on PC1 light when PC1 is energized.
	Check control board PC2 and connections, and replace if necessary (see Section 10-7). LED3 on PC2 lights when PC2 is energized.
No weld output; no generator power output at ac receptacles.	Disconnect equipment from generator power receptacles during start-up.
	Check fuse F1 (on PC7), and replace if necessary (see Section 7-6).
	Clean slip rings, and install new brushes if necessary (see Section 10-11).
	Disconnect leads 132 and 133 from brushes, and check continuity across slip rings. Replace rotor if necessary.
	Disconnect field excitation leads 93 and 94, and check continuity between leads. Replace stator if necessary.
	Check generator power board PC7 and connections, and replace if necessary (see Section 10-9).
	Check weld power board PC1 and connections, and replace if necessary (see Section 10-5). LED5 and LED6 on PC1 light when PC1 is energized.
	Check control board PC2 and connections, and replace if necessary (see Section 10-7). LED3 on PC2 lights when PC2 is energized.
Low weld output.	Check control settings.
	Check weld connections.
	Check air cleaner element. Clean or replace element as necessary (See Section 7-4).
	Check engine speed, and adjust if necessary (see Section 10-12).
	Check capacitor C25 for shorts or opens, and check for proper connections. Replace C25 if necessary.
	Clean slip rings, and install new brushes if necessary (see Section 10-11).
	Disconnect stator leads 93 and 94, and check for continuity between leads. Replace stator if necessary.
	Disconnect leads 132 and 133 from brushes, and check continuity across slip rings. Replace rotor if necessary.
	Check main rectifier SR1, and replace if necessary.
	Check current transducer LEM, and replace if necessary.
	Check remote receptacle RC4 for continuity and proper connections, and replace RC4 if necessary (see Section 4-8).

Trouble	Remedy
Low weld output (continued).	Check weld power board PC1 and connections, and replace if necessary (see Section 10-5). LED5 and LED6 on PC1 light when PC1 is energized.
	Check control board PC2 and connections, and replace if necessary (see Section 10-7). LED3 on PC2 lights when PC2 is energized.
High weld output.	Check control settings.
	Check engine speed, and adjust if necessary (see Section 10-12).
	Check for obstructed movement of throttle solenoid TS1 linkage (see Section 10-12).
	Check resistance and connections of suppressor R3/VR1 if high open-circuit voltage is present. R3 is 1000 ohms $\pm 10\%$. Replace suppressor R3 if necessary.
	Check current transducer LEM, and replace if necessary.
	Check weld power board PC1 and connections, and replace if necessary (see Section 10-5). LED5 and LED6 on PC1 light when PC1 is energized.
	Check control board PC2 and connections, and replace if necessary (see Section 10-7). LED3 on PC2 lights when PC2 is energized.
Erratic weld output.	Check control settings.
	Be sure electrode is dry and proper type for SMAW and GTAW.
	Tighten and/or clean connections to electrode and workpiece.
	Use correct wire and gas.
	Check internal and external connections to weld output terminals.
	Remove excessive coils from weld cables.
	Clean slip rings, and install new brushes if necessary (see Section 10-11).
	Check main rectifier SR1, and replace if necessary.
	Check stabilizer DC-Z for signs of failure. Check continuity across windings, and check for proper connections. Replace DC-Z if necessary.
	Check weld power board PC1 and connections, and replace if necessary (see Section 10-5). LED5 and LED6 on PC1 light when PC1 is energized.
	Check control board PC2 and connections, and replace if necessary (see Section 10-7). LED3 on PC2 lights when PC2 is energized.
Weld output cannot be adjusted.	Check position of Output Adjust switch S3.
	Check current transducer LEM, and replace if necessary.
	Check control board PC2 and connections, and replace if necessary (see Section 10-7). LED3 on PC2 lights when PC2 is energized.
No remote fine amperage control.	Place Output Adjust switch S3 in correct position (see Section 10-5).
	Check and tighten connections to remote receptacle RC4 (see Section 4-8).
No 24 volt ac power output at Remote receptacle RC4.	Reset circuit breaker CB5 (see Section 7-6).
	Check internal and external connections to Remote receptacle RC4 (see Section 4-8).
No 115 volt ac power output at Remote receptacle RC4.	Check fuse F2, and replace if open (see Section 7-6).
	Check internal and external connections to Remote receptacle RC4 (see Section 4-8).
Lack of high frequency; difficulty in establishing Gas Tungsten Arc Welding arc.	Use proper size tungsten for welding amperage.
	Reduce leakage of high frequency from torch or work cable (check grounding, remove excessive coils from weld cables, use shorter weld cables, etc.).
	Be sure torch cable is not close to any grounded metal.
	Check cables and torch for cracked insulation or bad connection. Repair or replace necessary parts.
Wandering arc – poor control of arc direction.	Use proper size tungsten.
	Properly prepare tungsten.
	Reduce gas flow rate.

Trouble	Remedy
Tungsten electrode oxidizing and not remaining bright after conclusion of weld.	Check and tighten all gas fittings.
	Increase postflow time.
	Shield weld zone from drafts.
	Use clean filler rod or material.
	Replace torch parts if water has leaked into torch.

B. 60 Hz Generator Power Receptacles RC1 And RC2

Trouble	Remedy
No power output at 60 Hz ac receptacles RC1 or RC2; weld output okay.	Reset circuit breakers CB1 and/or CB3 (see Section 6-1).
	Stop welding, or place Speed Control switch S4 in Generator Lock position to run engine at 1800 rpm. (60 Hz receptacles RC1 and RC2 work only at 1800 rpm.)
	Check receptacle wiring and connections.
	Check fuse F1 on circuit board PC7, and replace if necessary (see Section 7-6).
	Disconnect stator leads 80 and 81, and leads 82 and 90 and check for continuity between leads. Replace stator if necessary.
	Clean slip rings, and install new brushes if necessary (see Section 10-11).
	Check weld power board PC1 and connections, and replace if necessary (see Section 10-5). LED5 and LED6 on PC1 light when PC1 is energized.
	Check control board PC2 and connections, and replace if necessary (see Section 10-7). LED3 on PC2 lights when PC2 is energized.
	Check generator power board PC7 and connections, and replace if necessary (see Section 10-9).
No generator power output at 60 Hz ac receptacles RC1 and RC2; no weld output.	Disconnect equipment from generator power receptacles during start-up.
	Check fuse F1 (on PC7), and replace if necessary (see Section 7-6).
	Clean slip rings, and install new brushes if necessary (see Section 10-11).
	Disconnect leads 132 and 133 from brushes, and check continuity across slip rings. Replace rotor if necessary.
	Disconnect field excitation leads 93 and 94, and check continuity between leads. Replace stator if necessary.
	Check weld power board PC1 and connections, and replace if necessary (see Section 10-5). LED5 and LED6 on PC1 light when PC1 is energized.
	Check control board PC2 and connections, and replace if necessary (see Section 10-7). LED3 on PC2 lights when PC2 is energized.
	Check generator power board PC7 and connections, and replace if necessary (see Section 10-9).
Low power output at 60 Hz ac receptacles RC1 or RC2.	Check air cleaner, and clean if necessary.
	Check engine speed, and adjust if necessary (see Section 10-12).
High power output at 60 Hz ac receptacles RC1 or RC2.	Check engine speed, and adjust if necessary (see Section 10-12).
Erratic power output at 60 Hz ac receptacles RC1 or RC2.	Check receptacle wiring and connections.
	Check governor according to engine manual.
	Clean slip rings, and install new brushes if necessary (see Section 10-11).
	Check weld power board PC1 and connections, and replace if necessary (see Section 10-5). LED5 and LED6 on PC1 light when PC1 is energized.
	Check control board PC2 and connections, and replace if necessary (see Section 10-7). LED3 on PC2 lights when PC2 is energized.
	Check generator power board PC7 and connections, and replace if necessary (see Section 10-9).

C. Variable Frequency Generator Power Receptacle RC3

Trouble	Remedy
No generator power output at ac receptacle RC3.	Reset circuit breaker CB4 (see Section 6-2).
	Check receptacle RC3 for continuity and proper connections. Replace receptacle if necessary.
	Check fuse F1 on circuit board PC7 and replace if necessary (see Section 7-6).
	Clean slip rings, and install new brushes if necessary (see Section 10-11).
	Check weld power board PC1 and connections, and replace if necessary (see Section 10-5). LED5 and LED6 on PC1 light when PC1 is energized.
	Check control board PC2 and connections, and replace if necessary (see Section 10-7). LED3 on PC2 lights when PC2 is energized.
	Check generator power board PC7 and connections, and replace if necessary (see Section 10-9).
Low generator power output at ac receptacle RC3.	Check fuse F1 on circuit board PC7 and replace if necessary (see Section 7-6).
	Place Speed Control switch S4 in Weld position.

D. Engine Trouble

Engine will not crank.	Check fuse F6, and replace if open (see Section 7-6).
	Check battery voltage.
	Check battery connections and tighten if necessary.
	Check plug PLG5 and plug PLG8 connections.
	Check continuity and connections of Engine Control switch S2. Repair or replace if necessary.
Engine cranks, but does not start.	Check fuel level (see Section 4-2).
	Check battery and replace if necessary.
	Check engine charging system according to engine manual.
	LP-fueled units only: Check fuel shutoff lock-off solenoid according to engine manual.
	See engine manual.
Engine starts but stops when Engine Control switch S2 returns to either Run/Idle position.	Check oil level (see Section 4-2). Low oil pressure shutdown stops engine if oil pressure is too low.
	Use correct grade oil for operating temperature. (see Section 7-2).
	Check low oil pressure shutdown switch S5.
Battery discharges between uses.	Place Engine Control switch S2 in Off position when unit is not running.
	Clean top of battery with baking soda and water solution; rinse with clear water.
	Periodically recharge battery (approximately every 3 months).
	Replace battery.
	Check voltage regulator according to engine manual.
Engine stopped during normal operation.	Check fuel level (see Section 4-2).
	Check oil level (see Section 4-2). Low oil pressure shutdown stops engine if oil pressure is too low.
	Check low oil pressure shutdown switch S5.

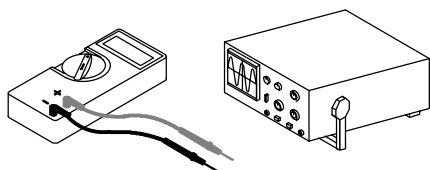
Notes

DECIMAL EQUIVALENTS

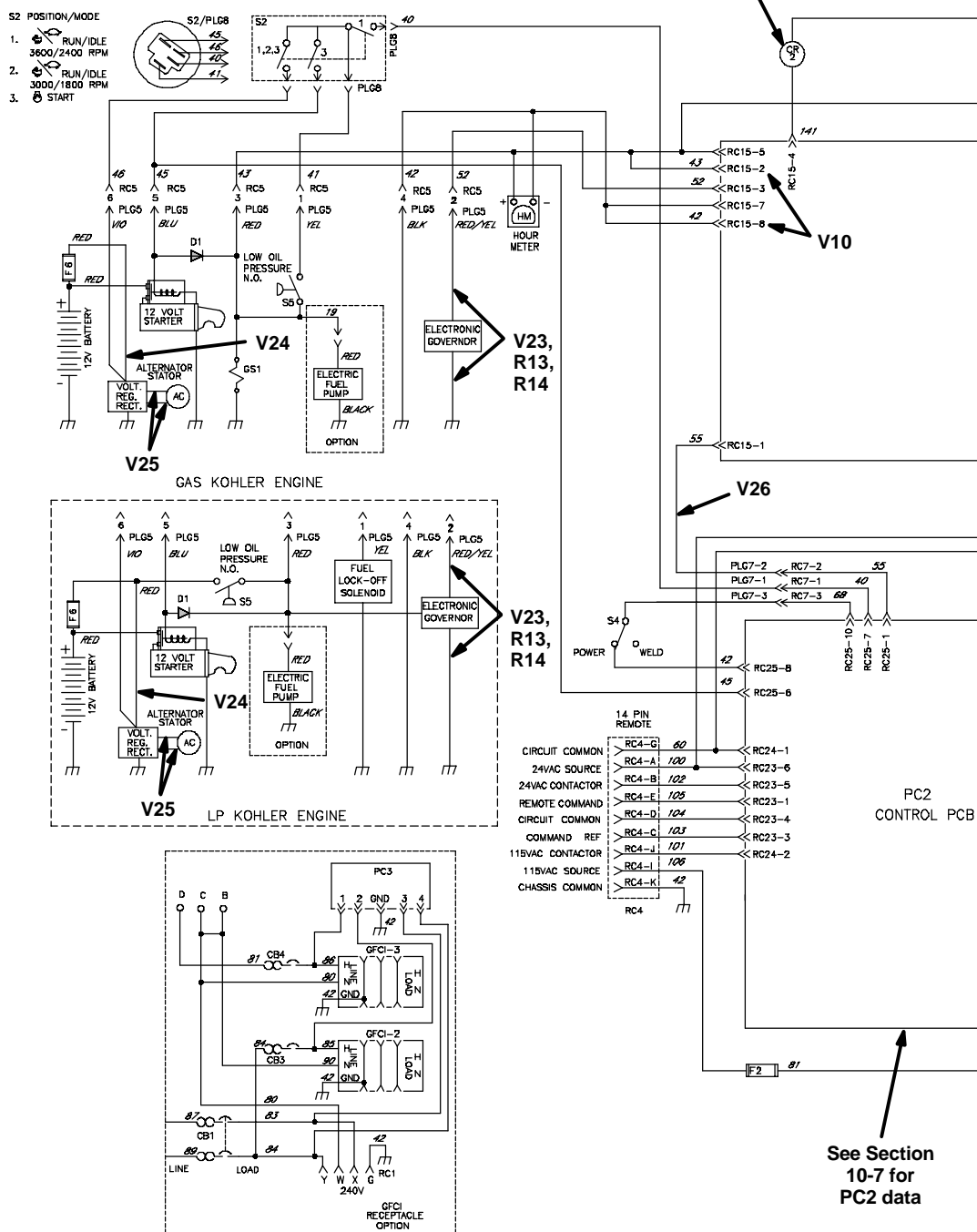
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	$\frac{5}{64}$.046875
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	$\frac{9}{64}$.078125
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	$\frac{13}{64}$.109375
$\frac{1}{8}$	$\frac{15}{64}$.125
	$\frac{17}{64}$.140625
$\frac{5}{32}$	$\frac{19}{64}$.15625
	$\frac{21}{64}$.171875
$\frac{3}{16}$	$\frac{23}{64}$.1875
	$\frac{25}{64}$.203125
$\frac{7}{32}$	$\frac{27}{64}$.21875
	$\frac{29}{64}$.234375
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	$\frac{33}{64}$.265625
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	$\frac{37}{64}$.296875
$\frac{5}{16}$	$\frac{39}{64}$.3125
	$\frac{41}{64}$.328125
$\frac{11}{32}$	$\frac{43}{64}$.34375
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$\frac{3}{8}$	$\frac{47}{64}$.375
	$\frac{49}{64}$.390625
$\frac{13}{32}$	$\frac{51}{64}$.40625
	$\frac{53}{64}$.421875
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		.546875
$\frac{9}{16}$.5625
		.578125
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		.953125
$\frac{31}{32}$.96875
		.984375
1		1.

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

Test Equipment Needed:

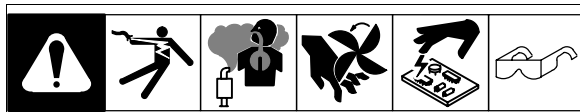


**Generator Power
Control Relay CR2
(energized at 1800 rpm)**



**See Section
10-7 for
PC2 data**

10-3. Troubleshooting Values For Circuit Diagram (AC/DC Models) (Use With Section 10-2)



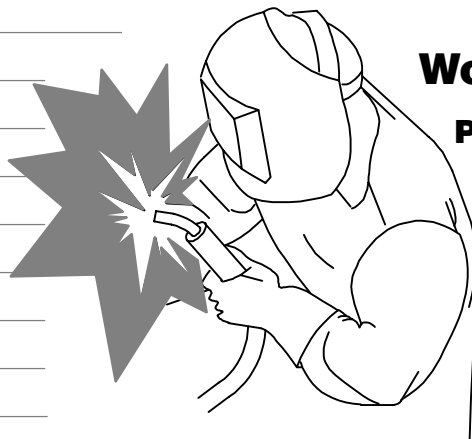
Voltage Readings

- a) Tolerance – $\pm 10\%$ 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) Wiring Diagram – see Section 12

				Under Small Weld Load	
		1800 RPM	2400 RPM	3000 RPM	3600 RPM
V1	CC/DC OCV: Stick mode	+43.0 volts dc	+43.6 volts dc	+75.3 volts dc	+75.4 volts dc
V2	CC/DC OCV: TIG mode	+43.5 volts dc	+43.8 volts dc	+47.7 volts dc	+48.5 volts dc
V3	CV/DC OCV: MIG mode at min	+15.6 volts dc	+15.7 volts dc	+15.7 volts dc	+15.8 volts dc
V4	CV/DC OCV: MIG mode at max	+41.6 volts dc	+42.2 volts dc	+42.4 volts dc	+42.5 volts dc
V5	Weld Exciter Winding	157 volts ac	157 volts ac	153 volts ac	155 volts ac
V6	Exciter Winding	143.4 volts ac	143 volts ac	142 volts ac	141 volts ac
V7	24 V AC Winding	21.7 volts ac	21.5 volts ac	21.3 volts ac	21.3 volts ac
V8	Generator Power Winding	119.5 volts ac	119.5 volts ac	119.0 volts ac	119.3 volts ac
V9	Generator Power Winding	120.5 volts ac	120.2 volts ac	120 volts ac	120.2 volts ac
V10	Battery Input	+14 volts dc	+14 volts dc	+14 volts dc	+14 volts dc
V11	Power Supply	+14.7 volts dc	+14.7 volts dc	+14.7 volts dc	+14.7 volts dc
V12	Power Supply	-14.8 volts dc	-14.8 volts dc	-14.8 volts dc	-14.8 volts dc
V13, V14, V15	Weld Windings Stick mode	32.6 volts ac	33 volts ac	56 volts ac	56 volts ac
	Weld Windings TIG mode	32.6 volts ac	33 volts ac	36 volts ac	36 volts ac
	Weld Windings Wire mode at max	31.4 volts ac	31.8 volts ac	32 volts ac	32 volts ac
V16	Exciter Rotor	65 volts dc	42 volts dc	30 volts dc	25 volts dc
V17	Weld Rotor: Stick mode	+95 volts dc	+53 volts dc	+120 volts dc	+66 volts dc
	Weld Rotor: TIG mode	+100 volts dc	+53 volts dc	+45 volts dc	+36 volts dc
	Weld Rotor: Wire mode at max	+81 volts dc	+50 volts dc	+40 volts dc	+32 volts dc
V18	Current Transformer	No Load = 0 volts ac, 100 A Load = greater than 1 volt ac			
V19	LEM Power	+15 volts dc	+15 volts dc	+15 volts dc	+15 volts dc
V20	LEM Power	-15 volts dc	-15 volts dc	-15 volts dc	-15 volts dc
V21	Current Feedback	+1 volt dc per 100 Amps of Weld Output			
V22	Voltage Feedback	Same as Weld Output Voltage at Weld Terminals			
V23	Electronic Governor	+0.8 volts dc	+3.3 volts dc	+6.5 volts dc	+11.75 volts dc
V24	Voltage Regulator Output	+14 volts dc	+14 volts dc	+14 volts dc	+14 volts dc
V25	Alternator Stator Output	25 volts ac	31 volts ac	40 volts ac	47 volts ac
V26	Safety Circuit	-13 volts dc (not tripped), +11 volts dc (tripped)			
V27	Speed Control	+0.1 volt dc	+2.7 volts dc	+7.2 volts dc	+12.5 volts dc
V28	Command Reference	0 to +10 volts dc min to max of V/A control pot with S3 in Panel position			
V29	Capacitor C25 Stick mode	+208 volts dc	+217 volts dc	+190 volts dc	+208 volts dc
	Capacitor C25 TIG mode	+207 volts dc	+217 volts dc	+220 volts dc	+220 volts dc
	Capacitor C25 Wire mode at max	+210 volts dc	+217 volts dc	+220 volts dc	+222 volts dc
V30	Generator Power Voltage Feedback	240 volts ac	240 volts ac	240 volts ac	240 volts ac

Resistance Values		Amperage Readings				
a) Tolerance – $\pm 10\%$ unless specified		a) Tolerance – $\pm 5\%$ unless specified				
b) Condition – 70°F (21°C); cold machine (no warm-up)		b) Condition – 70°F (21°C); cold machine (no warm-up)				
c) Wiring Diagram – see Section 12		I1	RPM: 1800	2400	3000	3600
d) Stop engine before checking resistance		OCV – Stick Mode	amps dc: 1.9	1.3	1	0.8
R1	Exciter Rotor: 32 ohms	200 A, 25 V Load, Stick Mode	amps dc: 1.9	—	1	0.8
R2	Weld Rotor: 33 ohms	3 kW/240 V Gen. Pwr. Load	amps dc: 2.4	—	—	—
R3 thru R12	Stator Windings, Stabilizer: Less than 1 ohm	I2	RPM: 1800	2400	3000	3600
R13	Electronic Governor Module: 14 K ohms	OCV – Stick Mode	amps dc: 2.6	1.4	3.3	1.8
R14	Throttle Actuator: Pins 1 and 2 on Governor Module connector (orange-gray): 53 ohms; Pins 6 and 7 on Governor Module connector (brown-pink): 53 ohms	200 A, 25 V Load, Stick Mode	amps dc: 2.4	—	2	1.9
		3 kW/240 V Gen. Pwr. Load	amps dc: 2.6	—	—	—

Notes

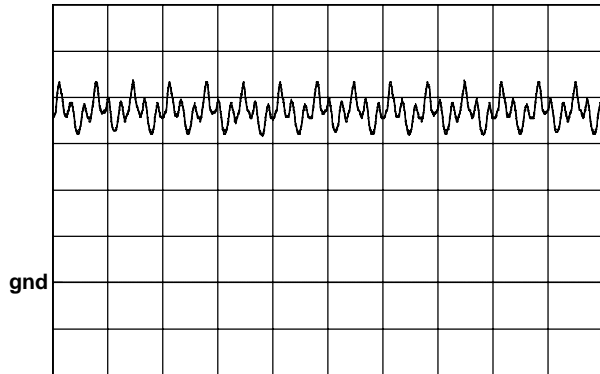


Work like a Pro!

Pros weld and cut safely. Read the safety rules at the beginning of this manual.

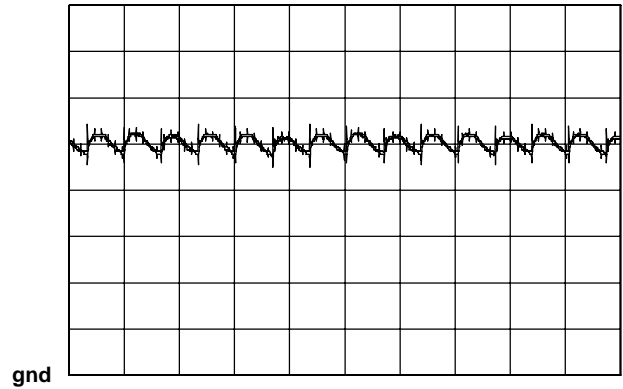
10-4. Waveforms For Section 10-2

2 ms 20 V



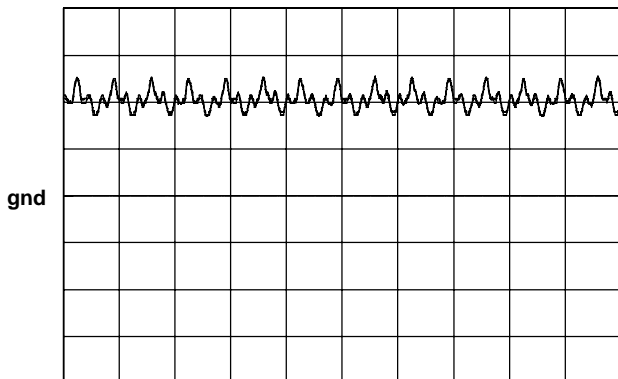
A. CC/DC Mode, DC Open-Circuit Voltage At 3600 RPM

2 ms 5 V



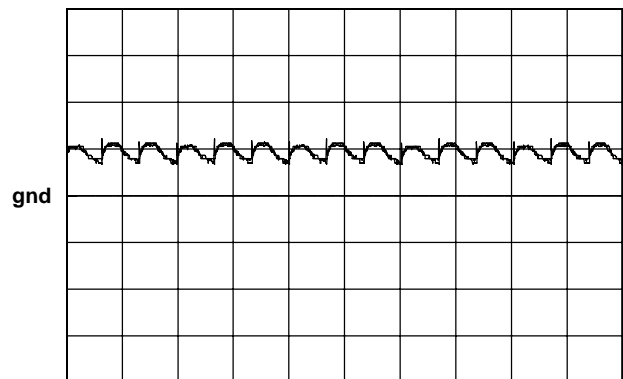
B. CC/DC Mode, 25 Volts DC, 175 Amperes, (Resistive Load)

2 ms 20 V

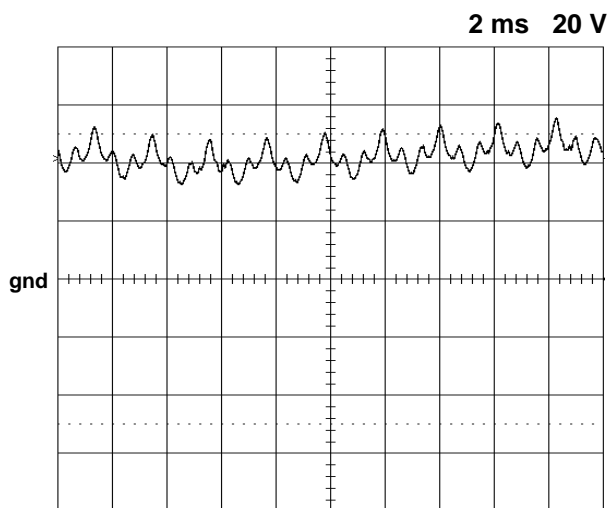


C. CV/DC Mode, DC Open-Circuit Voltage, V/A Control In Max Position At 3600 RPM

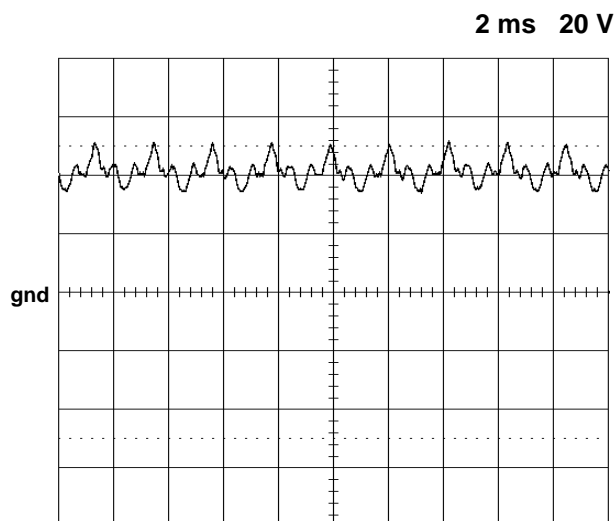
2 ms 20 V



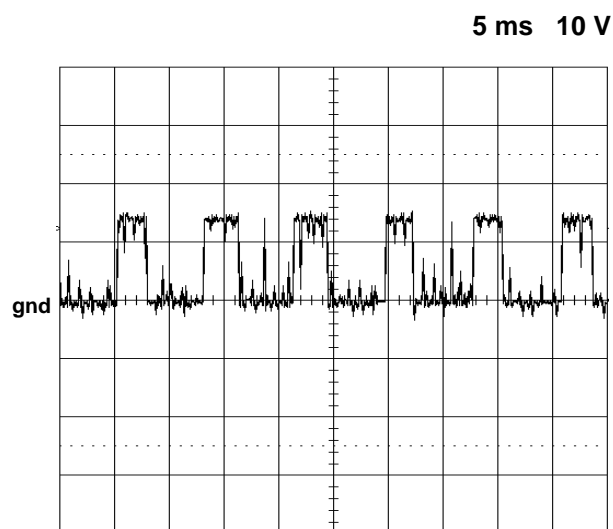
D. CV/DC Mode, 20 Volts DC, 170 Amperes, (Resistive Load)



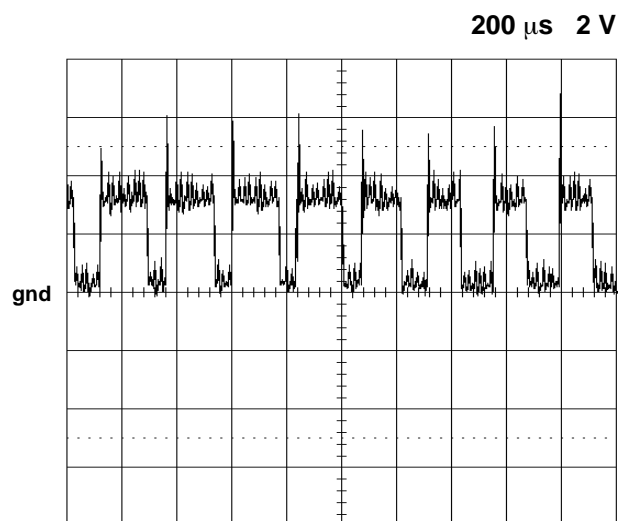
E. CC/DC Mode, Open-Circuit Voltage At 2400 RPM



F. CV/DC Mode, Open-Circuit Voltage At 2400 RPM



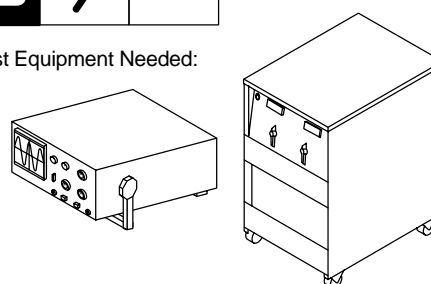
G. Pulse Width Modulation Signal Between Weld Power Board PC1 And Generator Power Board PC7



H. Pulse Width Modulation Signal Between Weld Power Board PC1 And Control Board PC2



Test Equipment Needed:

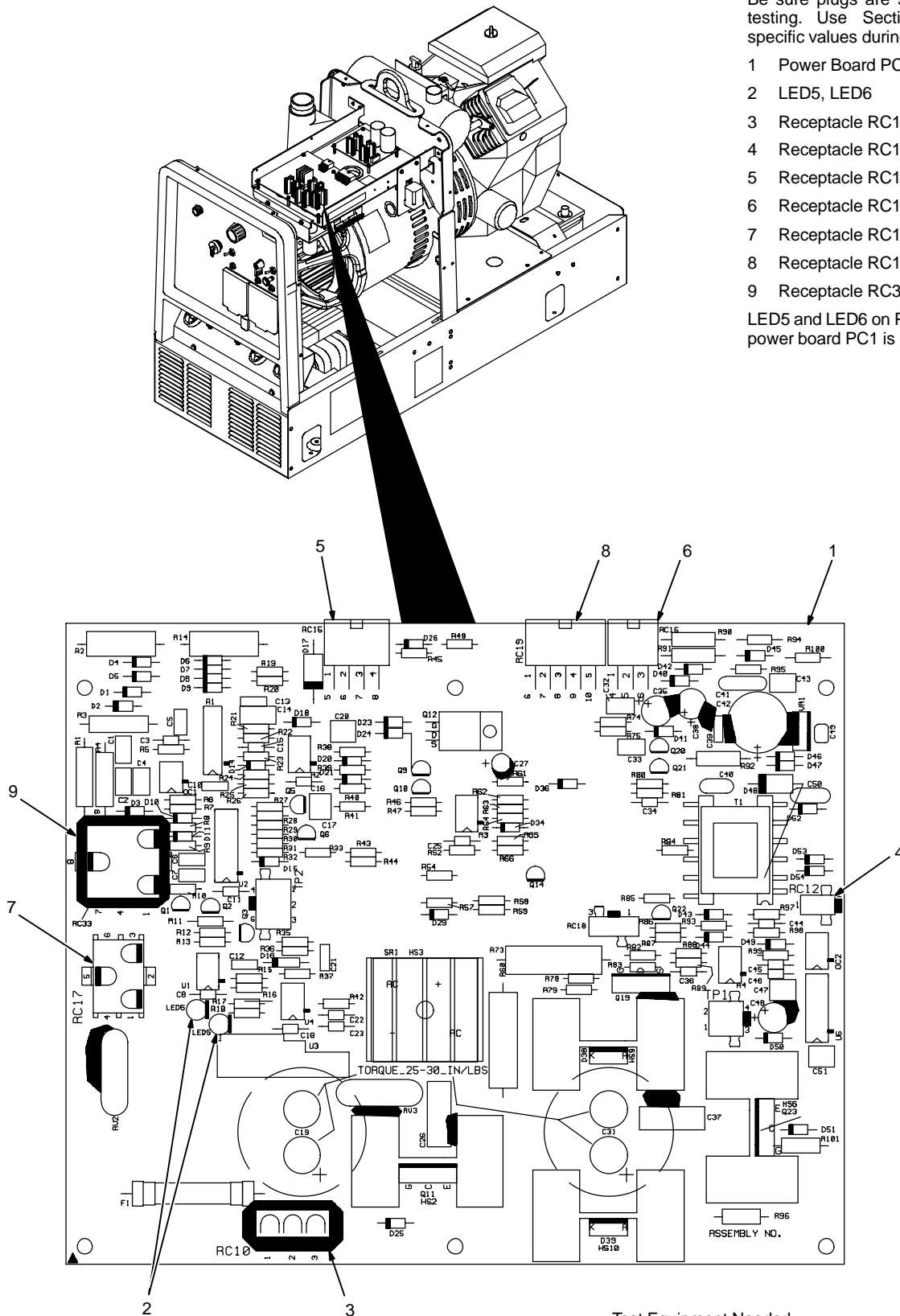


10-5. Power Board PC1 Testing Information

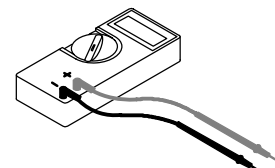
Be sure plugs are secure before testing. Use Section 10-6 for specific values during testing.

- 1 Power Board PC1
- 2 LED5, LED6
- 3 Receptacle RC10
- 4 Receptacle RC12
- 5 Receptacle RC15
- 6 Receptacle RC16
- 7 Receptacle RC17
- 8 Receptacle RC19
- 9 Receptacle RC33

LED5 and LED6 on PC1 light when power board PC1 is energized.

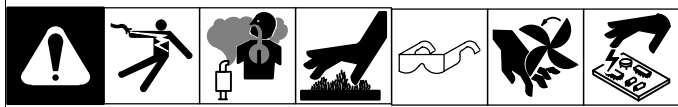


Test Equipment Needed:



803 483 / 211 277

10-6. Power Board PC1 Test Point Values



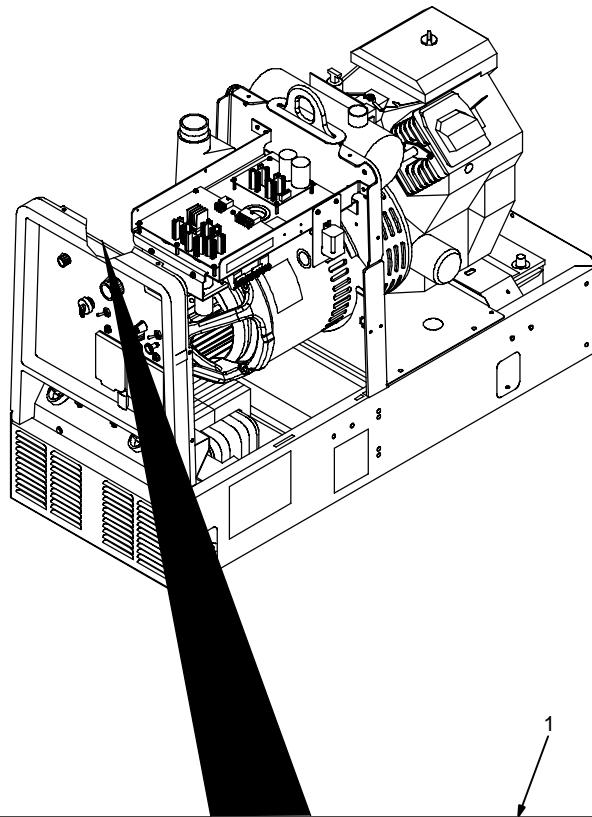
a) Tolerance – $\pm 10\%$ unless specified

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

PC1 Voltage Readings

Receptacle	Pin	Value
RC10	1	Weld Exciter Winding: 155 volts ac input with respect to RC10-3 at all speeds
	2	Not used
	3	Weld Exciter Winding: 155 volts ac input with respect to RC10-1 at all speeds
RC12	1	Weld Pulse Width Modulation input signal (see waveforms in Section 10-4)
	2	Weld Pulse Width Modulation signal (see waveforms in Section 10-4)
RC15	1	Safety Shutdown: 0 volts dc input when safety circuit is not tripped, +11 volts dc input when safety circuit is tripped
	2	+14 volts dc input (battery voltage)
	3	Idle Control: less than +1 volt dc output at 1800 rpm, +3 volts dc output at 2400 rpm, +6.5 volts dc output at 3000 rpm, greater than +10 volts dc output at 3600 rpm
	4	Receptacle (RC1, RC2) Enable Control: 0 volts dc output at 1800 rpm (5 second delay), +12 volts dc output at all other speeds
	5	+12 volts dc input
	6	Not used
	7	Circuit common
	8	Circuit common
RC16	1	Power Supply Circuit Board: +15 volts dc output
	2	Not used
	3	Not used
	4	Idle Control: less than +1 volt dc input at 1800 rpm, +2.5 volts dc input at 2400 rpm, +7 volts dc input at 3000 rpm, +12.5 volts dc input at 3600 rpm
	5	Power Supply: –15 volts dc output
	6	Circuit common
RC17	1	Not used
	2	Not used
	3	Weld Rotor: same as V17 in Section 10-3 with respect to RC17-4
	4	Weld Rotor: same as V17 in Section 10-3 with respect to RC17-3
	5	Not used
	6	Not used
RC19	1	Not used
	2	Not used
	3	Not used
	4	Not used
	5	Not used
	6	Not used
	7	Not used
	8	Not used
	9	Safety Shutdown: 0 volts dc input when safety circuit is not tripped, +14 volts dc input when safety circuit is tripped
	10	Not used

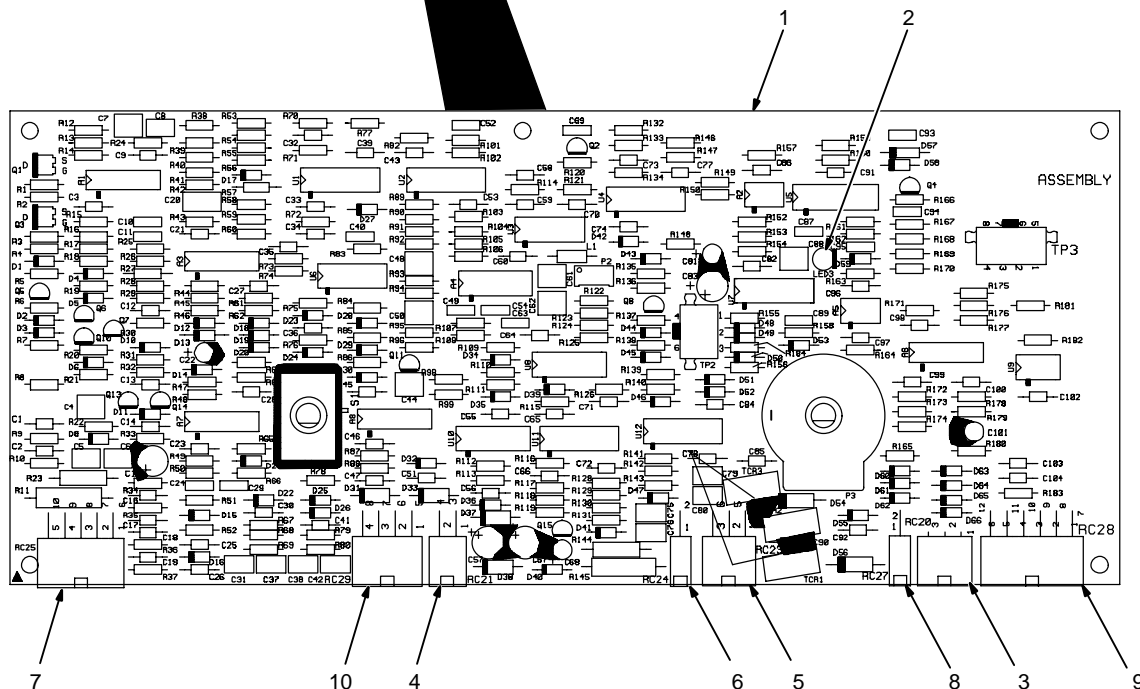
10-7. Control Board PC2 Testing Information



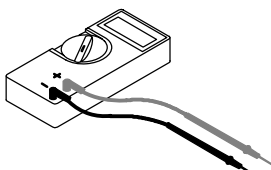
Be sure plugs are secure before testing. Use Section 10-8 for specific values during testing.

- 1 Control Board PC2
- 2 LED3
- 3 Receptacle RC20
- 4 Receptacle RC21
- 5 Receptacle RC23
- 6 Receptacle RC24
- 7 Receptacle RC25
- 8 Receptacle RC27
- 9 Receptacle RC28
- 10 Receptacle RC29

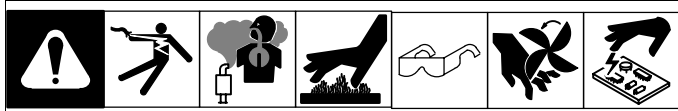
LED3 on PC2 lights when the pulse width modulation (PWM) signal is present at PC2.



Test Equipment Needed:



10-8. Control Board PC2 Test Point Values



a) Tolerance – $\pm 10\%$ unless specified

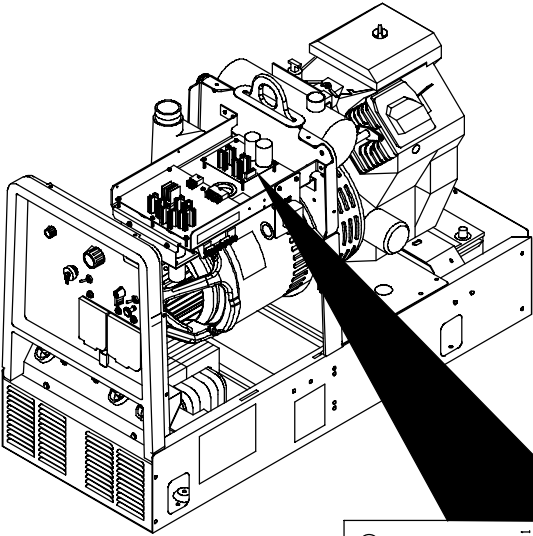
b) Reference – to circuit common (lead 42) unless noted

PC2 Voltage Readings

Receptacle	Pin	Value
RC20	1	0-10 volts dc output from min to max of V/A control
	2	0 volts dc output when a remote control is not connected; 0 volts to voltage set by front panel V/A control from min to max of remote control with Process switch in Stick mode; 0 to +10 volts dc output from min to max of remote control with Process switch in MIG mode; 0 to voltage set by front panel V/A control from min to max of remote control with Process switch in TIG mode
	3	Output Adjust switch S3 in Panel position: 0 to + 10 volts dc input from min to max of V/A control Output Adjust switch S3 in Remote position: same as RC20 Pin 2 explanation above
RC21	1	Power Supply Circuit Board: –15 volts dc input
	2	Circuit common
	3	Power Supply: +15 volts dc input
	4	Speed Control: less than +1 volt dc output at 1800 rpm, +3 volts dc output at 2400 rpm, +7 volts dc output at 3000 rpm, +12.5 volts dc output at 3600 rpm
RC23	1	0 volts dc input when a remote control is not connected; 0 volts to voltage set by front panel V/A control from min to max of remote control with Process switch in Stick mode 0 to +10 volts dc input from min to max of remote control with Process switch in MIG mode; 0 to voltage set by front panel V/A control from min to max of remote control with Process switch in TIG mode
	2	Circuit common (not used)
	3	0 to +10 volts dc output from min to max of V/A control with Process switch in Stick or TIG mode; +10 volts dc output with Process switch in MIG mode
	4	Circuit common
	5	0 volts ac input with remote contactor switch open; 21.5 volts ac input with remote contactor closed
	6	21.5 volts ac input at all speeds
RC24	1	Circuit common
	2	0 volts ac input with remote contactor switch open; 120 volts ac with remote contactor switch closed (at all speeds)
RC25	1	Safety Shutdown: 0 volts dc output when safety circuit is not tripped, +11 volts dc output when safety circuit is tripped
	2	Circuit common
	3	Not used
	4	Circuit common (not used)
	5	No load: 0 volts ac input; 100 Amp load: greater than 1 volt ac input
	6	+12 volts dc input with Engine Control switch S2 in Start position; 0 volts dc input with S2 in any other position
	7	+14 volts dc input with Engine Control switch S2 in Run/Idle position at 3600/2400 rpm; 0 volts dc input with Engine Control switch S2 in any other position
	8	Circuit common
	9	Not used
	10	+15 volts dc input with Speed Control switch S4 in Weld position, 0 volts dc input with Speed Control switch S4 in Power (Gen. Lock) position

Receptacle	Pin	Value
RC27	1	Weld Pulse Width Modulation signal: 1 volt dc output in all speeds (see waveforms in Section 10-4)
	2	Circuit common
RC28	1	Not used
	2	Not used
	3	Not used
	4	Not used
	5	Circuit common
	6	Circuit common
	7	Not used
	8	Not used
	9	Not used
	10	Not used
	11	Not used
	12	Not used
RC29	1	Weld Voltage Feedback Input: same as voltage across output studs with respect to RC29-4
	2	Not used
	3	Not used
	4	Weld Voltage Feedback Input: same as voltage across output studs with respect to RC29-1
	5	LEM Power Supply: +15 volts dc output
	6	LEM Power Supply: -15 volts dc output
	7	Circuit common
	8	LEM Feedback signal: 1 volt dc input per 100 Amps of weld output

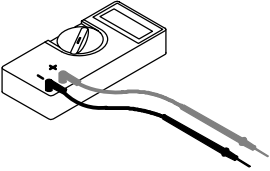
10-9. Power Board PC7 Testing Information



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








- 1 Power Board PC7
- 2 Receptacle RC31
- 3 Fuse F1

Test Equipment Needed:

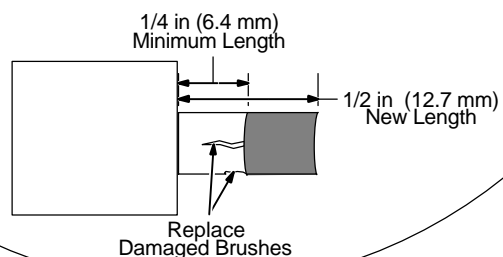
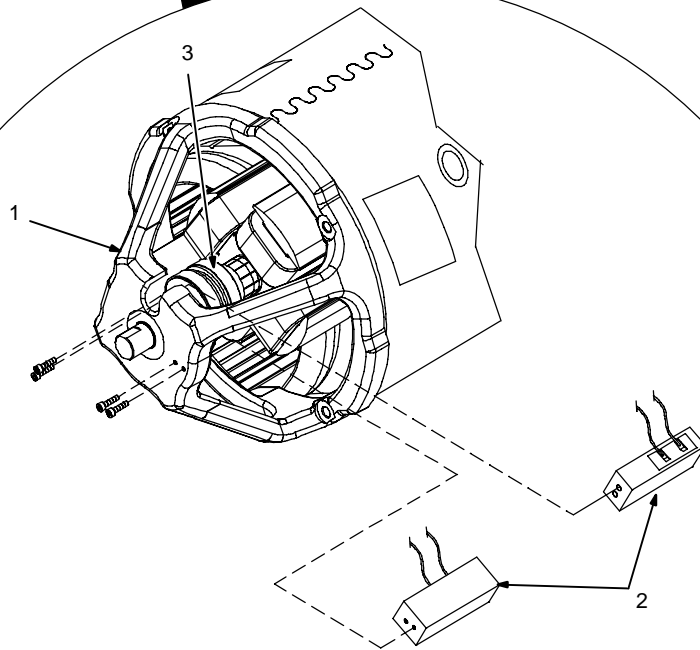
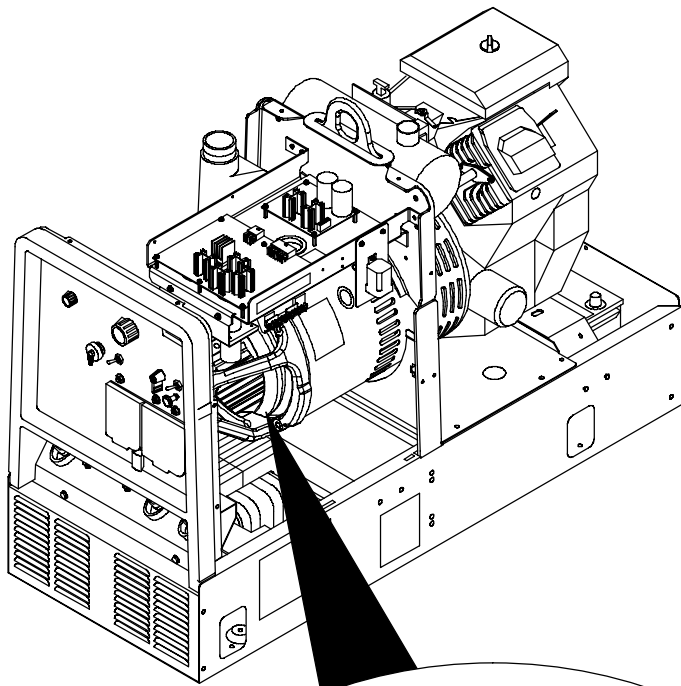


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10-10. Power Board PC7 Test Point Values

<div></div>						<div><p>a) Tolerance – $\pm 10\%$ unless specified</p><p>b) Reference – to circuit common (lead 42) unless noted</p></div>
PC7 Voltage Readings						
Receptacle	Pin	Value				
RC31	1	Generator Power Pulse Width Modulation (PWM) input signal (see waveforms in Section 10-4)				
	2	Generator Power Exciter Safety Shutdown: 0 volts dc input when safety circuit is not tripped, +14 volts dc input when safety circuit is tripped				
	3	Flash excitation and safety circuit power: +14 volts dc input				
	4	Same as V16 in Section 10-3 with respect to RC33-7 on PC1				
	5	+14 volts dc input				
	6	Same as V16 in Section 10-3 with respect to RC31-4 on PC7				
	7	Circuit common				
	8	Exciter Winding: 143 volts ac input at all speeds with respect to RC31-9 on PC7				
	9	Exciter Winding: 143 volts ac input at all speeds with respect to RC31-8 on PC7				

10-11. Replacing Brushes And Cleaning Slip Rings



▲ Stop engine and let cool.

- 1 Endbell
- 2 Brush Holder Assemblies

Remove brush holder assemblies. Keep hardware for reinstallation.

Do not remove brushes from holder. Replace brush holder assembly if brushes are damaged, or at or near minimum length.

- 3 Slip Rings

Inspect slip rings. Under normal use, rings turn dark brown.

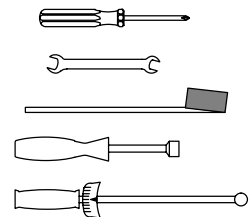
If slip rings are corroded or surface is uneven, insulate brush leads, start engine and clean rings with a commutator stone. Remove as little material as possible.

▲ Stop engine.

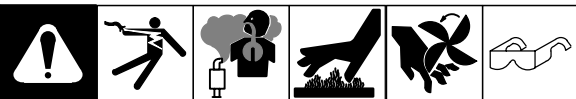
Install brush holder assemblies and remaining generator parts (see Section 11-2 for torque values).

Reinstall side panels and cover.

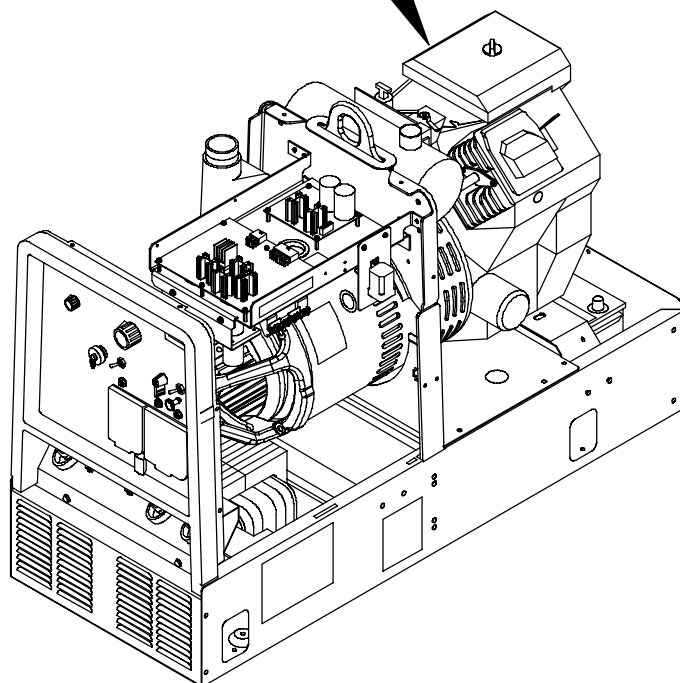
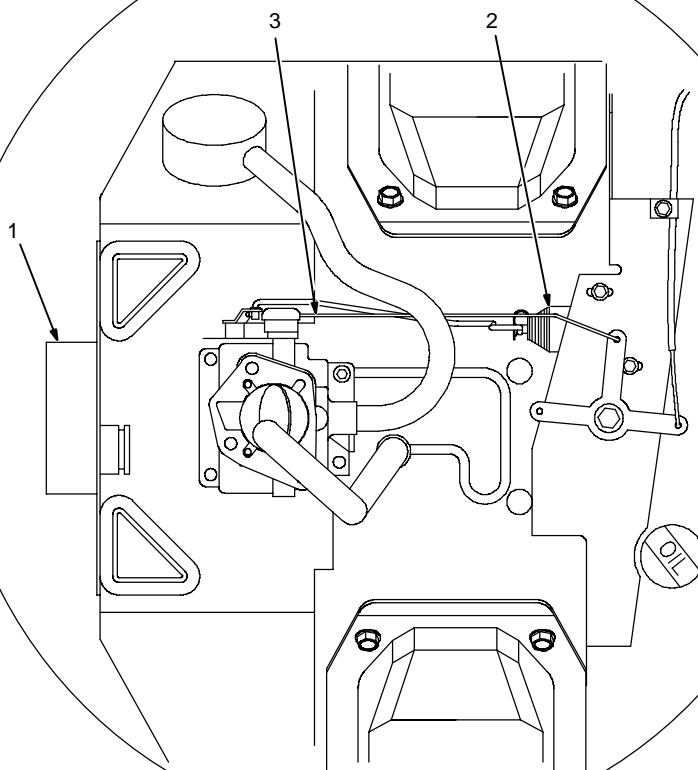
Tools Needed:



10-12. Adjusting Electronic Governor



Top View



▲ Stop engine, and let cool.

The electronic governor regulates engine speed under varying loads. The system consists of an electronic governor module, actuator, and linkage.

The module senses engine speed, compares it to front panel engine speed settings (0 – 12 volts dc input signal), and correspondingly changes the position of the throttle actuator and linkage. The actuator must be correctly adjusted for the engine to run at the full range of speeds.

The governor is factory-set and should not require adjustment. After tuning engine, check engine speeds with a tachometer. When properly adjusted, the engine speeds are 1800, 2400, 3000, or 3600 rpm (± 35 rpm), depending on weld load and engine control settings (see Section 5-2). Adjust the governor **only** if engine speeds are outside this range.

Adjustment Procedure

Remove top cover and air cleaner assembly.

- 1 Governor Module
- 2 Actuator
- 3 Linkage

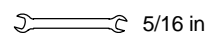
Fully compress the actuator plunger.

Loosen the actuator mounting screws. Slide the bracket assembly back (toward front panel) until the throttle is wide open.

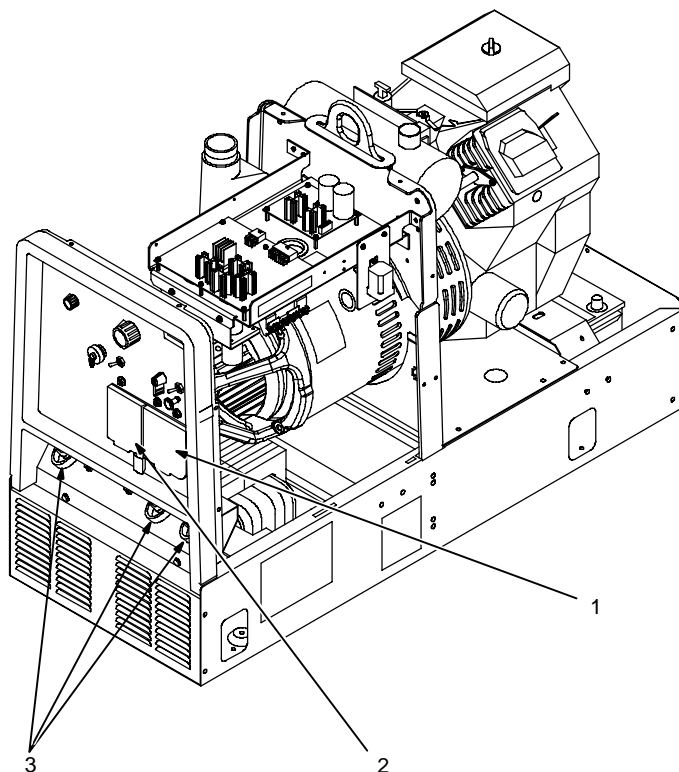
Tighten mounting screws to 2.5 N·m (22 in lb). Reinstall air cleaner and top cover.

See the engine manual for additional information.

Tools Needed:



10-13. Checking Unit Output After Servicing



Check engine speeds, and adjust if necessary (see Section 10-12).

1 120 Volt AC Receptacles RC2 And RC3

2 240 Volt AC Receptacle RC1

Check voltage at receptacles with Speed Control switch in Generator Lock (1800 rpm) position. With no load applied, there should be 125 – 132 volts ac present at RC2 and RC3, and 228 – 264 volts present at RC1.

3 Weld Output Terminals

Check open-circuit voltages between terminals according to Section 10-2 (voltages V1, V2, V3, and V4).

If correct voltages are not present, repeat troubleshooting procedures in Section 10-1.

▲ Stop engine and let cool.

Complete pre-operational checks in table. Reinstall cover and side panels.

Pre-Operational Check

Wipe engine surfaces clean.

Check labels; replace labels that are unreadable or damaged (see Parts List).

Check Fuel and oil (see Section 4-2).

Check and correct any fluid leaks.

Clean weld output and battery terminals. Tighten connections.

Clean outside of entire unit.

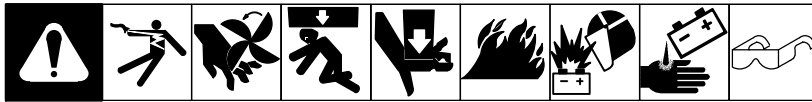
Tools Needed:



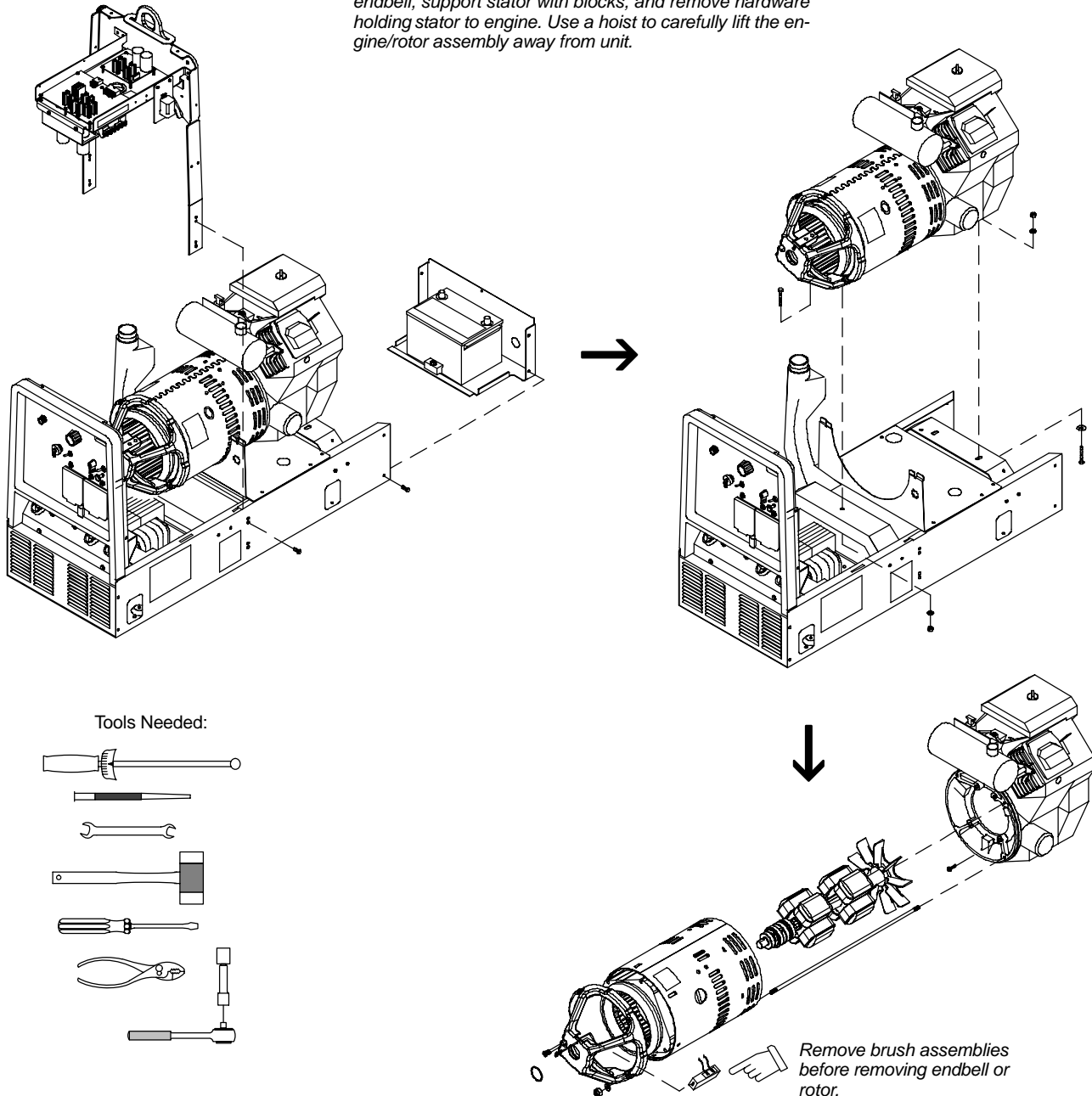
3/8 in

SECTION 11 – DISASSEMBLY AND REASSEMBLY

11-1. Disassembly Of Unit



As an alternative to the complete disassembly procedure shown, the engine and rotor can be removed as one assembly from the engine end. Remove brush assemblies from endbell, support stator with blocks, and remove hardware holding stator to engine. Use a hoist to carefully lift the engine/rotor assembly away from unit.



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Disassembly

▲ Do not damage rotor or stator.

Disconnect battery cables, fuel line, choke cable, and base ground cable. Remove

spark plugs.

Mark and disconnect stator leads.

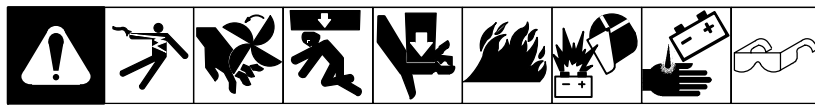
Remove engine and rotor by removing nuts from studs and separating stator from engine adapter.

Disassemble in sequence shown.

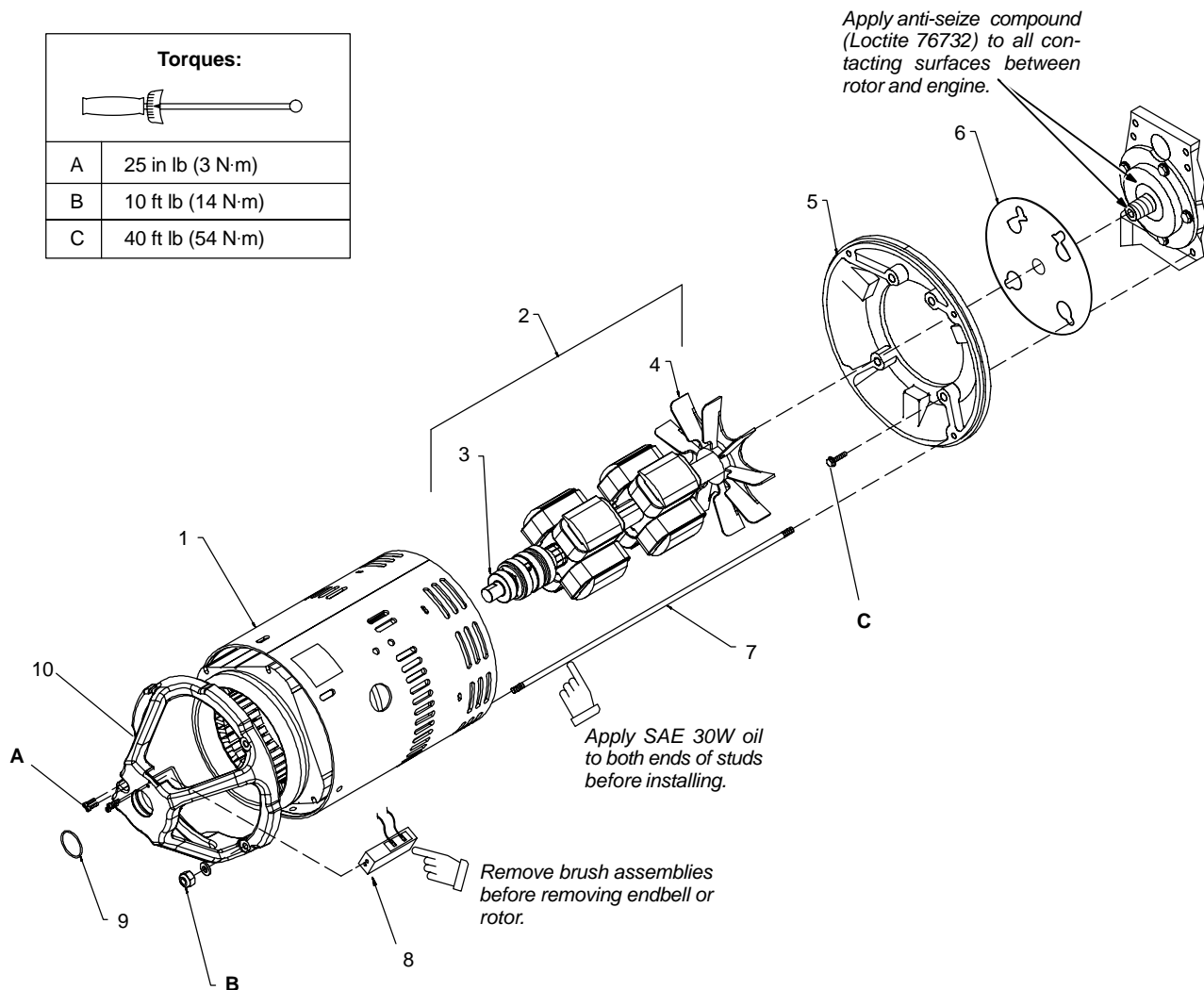
▲ Use hoist and lifting strap to carefully remove engine/generator assembly.

Go to Section 11-2.

11-2. Disassembly Of Generator



Torques:	
A	25 in lb (3 N·m)
B	10 ft lb (14 N·m)
C	40 ft lb (54 N·m)



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▲ **Do not damage rotor or stator windings.**

☞ *Remove brush assemblies before removing endbell.*

Disassembly

With engine properly supported with blocks, remove hardware securing stator to engine.

1 Stator

2 Rotor Assembly

3 Bearing

4 Rotor Fan

5 Engine Adapter

6 Baffle

7 Stud

8 Brush Holder Assembly (One Of Two Assemblies Shown)

9 O-Ring

10 Endbell

Reassembly

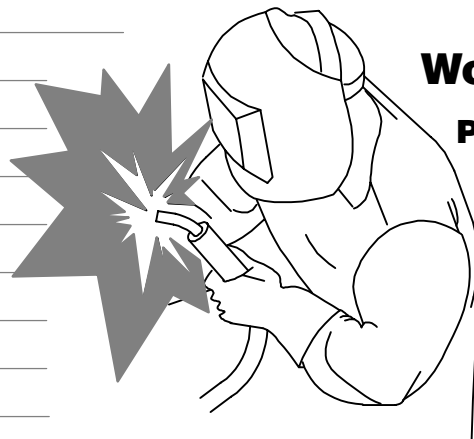
Reassemble unit in reverse order of disassembly.

Torque hardware as specified in table above.

Reconnect stator leads as marked. Use cable ties to keep leads from sharp edges, and hot or moving parts.

Reconnect fuel line, choke cable, and base ground cable. Reinstall spark plugs, battery and tray, panels, and cover. Reconnect battery cables.

Notes













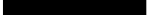

Work like a Pro!

Pros weld and cut safely. Read the safety rules at the beginning of this manual.


The following is a list of all diagrams for models covered by this manual.

Model	Serial Or Style Number	Circuit Diagram	Wiring Diagram
Miller Legend 301 G	LC357086 And following	211 395-A	See Table 12-1
Circuit Board PC1 (Weld Power Board)	LC357086 And following	211 278-A	
Circuit Board PC2 (Control Board)	LC357086 And following	211 275-B	
Circuit Board PC7 (Generator Power Board)	LC357086 And following	203 132-A	
Circuit Board PC3 (HF Board)	LC357086 And following	148 024-A	
Circuit Board PC5 (HF Board)	LC357086 And following	148 033-A	

[illegible]

	24 Gauge (.025 in)
	22 Gauge (.031 in)
	20 Gauge (.037 in)
	18 Gauge (.050 in)
	16 Gauge (.063 in)
	14 Gauge (.078 in)
	1/8 in (.125 in)
	3/16 in (.188 in)
	1/4 in (.25 in)
	5/16 in (.313 in)
	3/8 in (.375 in)
	1/2 in (.5 in)

⚠ WARNING



ELECTRIC SHOCK HAZARD

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

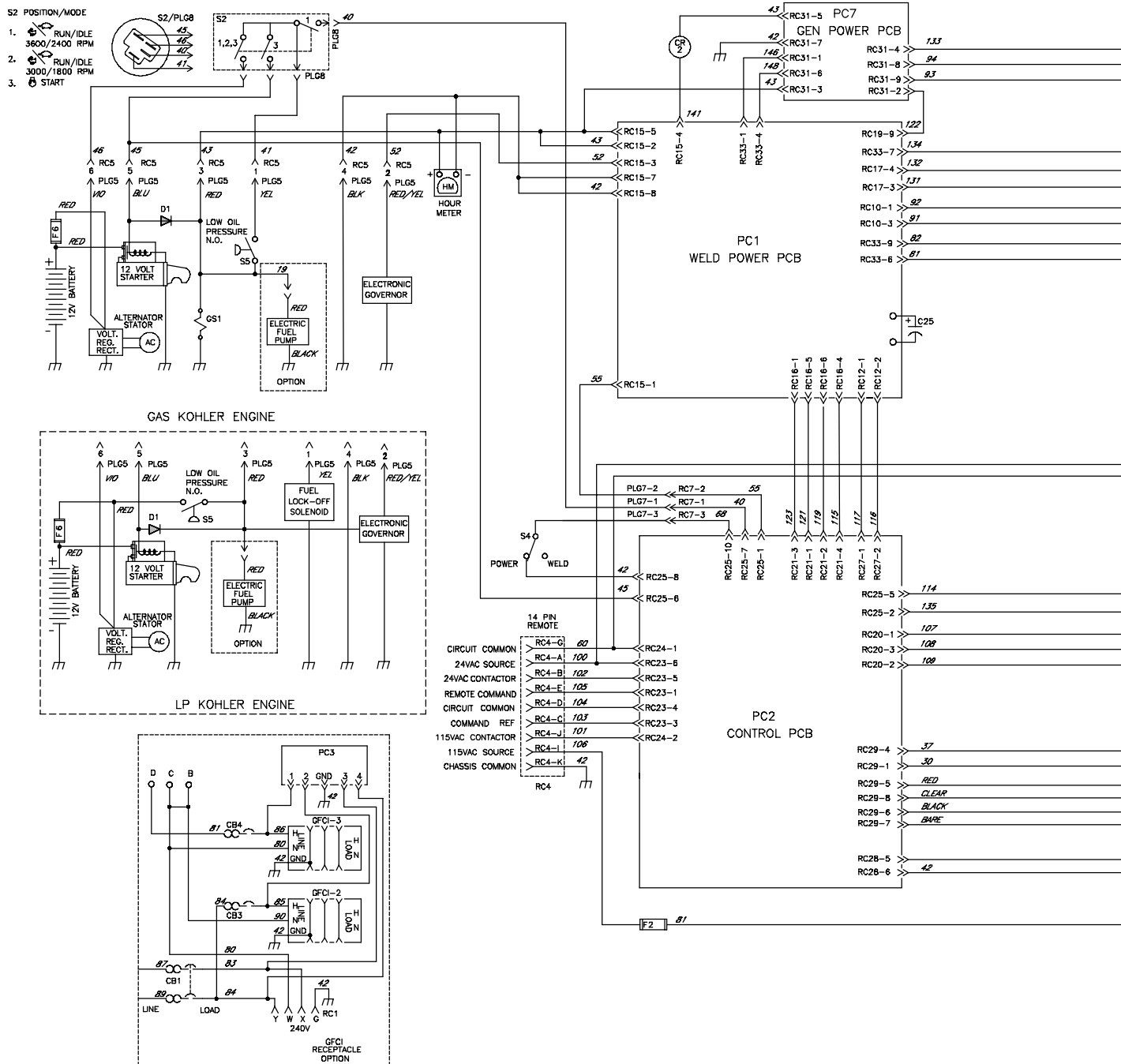


Figure 12-1. Circuit Diagram For Miller Legend 301 G Eff w/ Serial No. LC357086 And Following

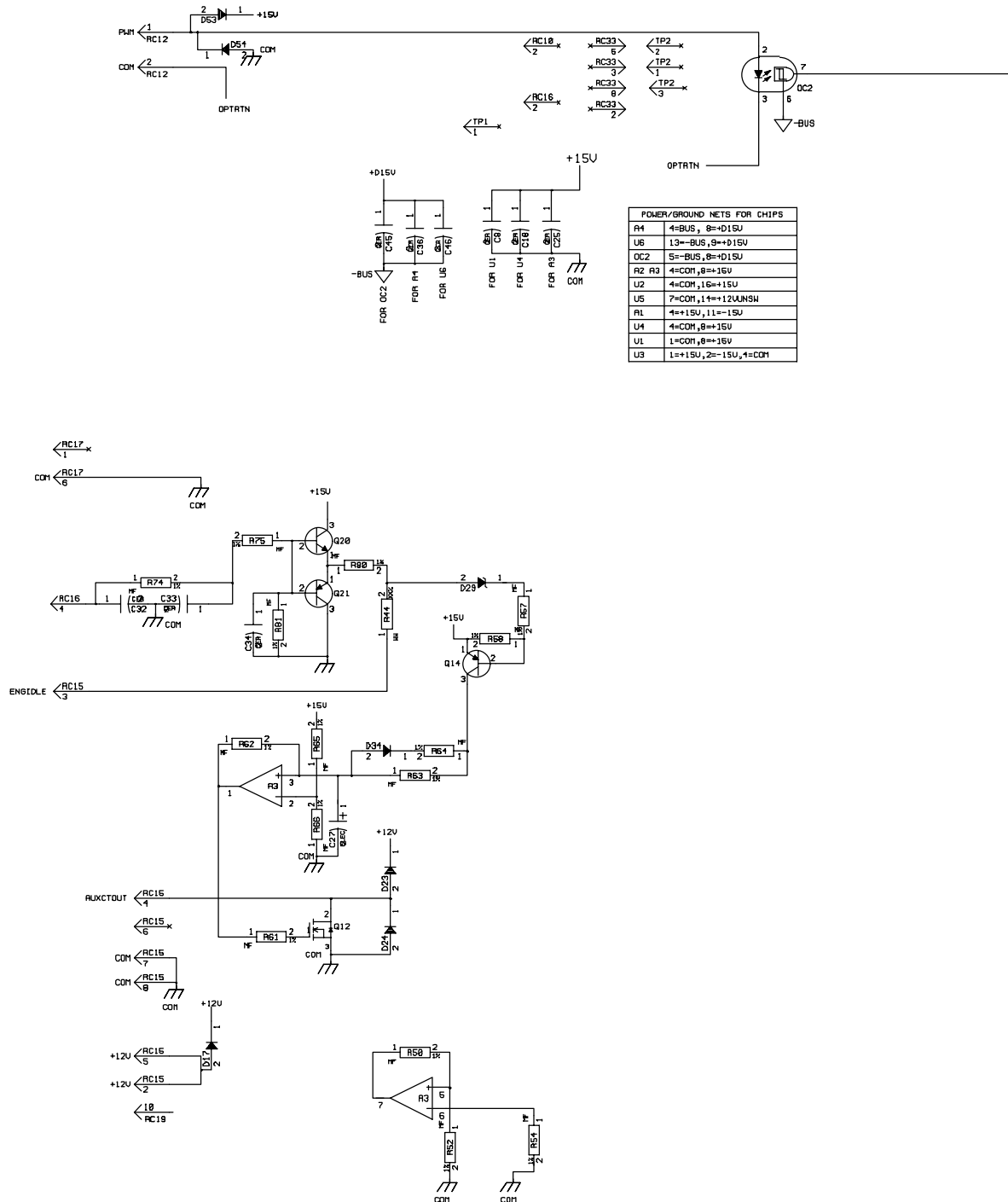
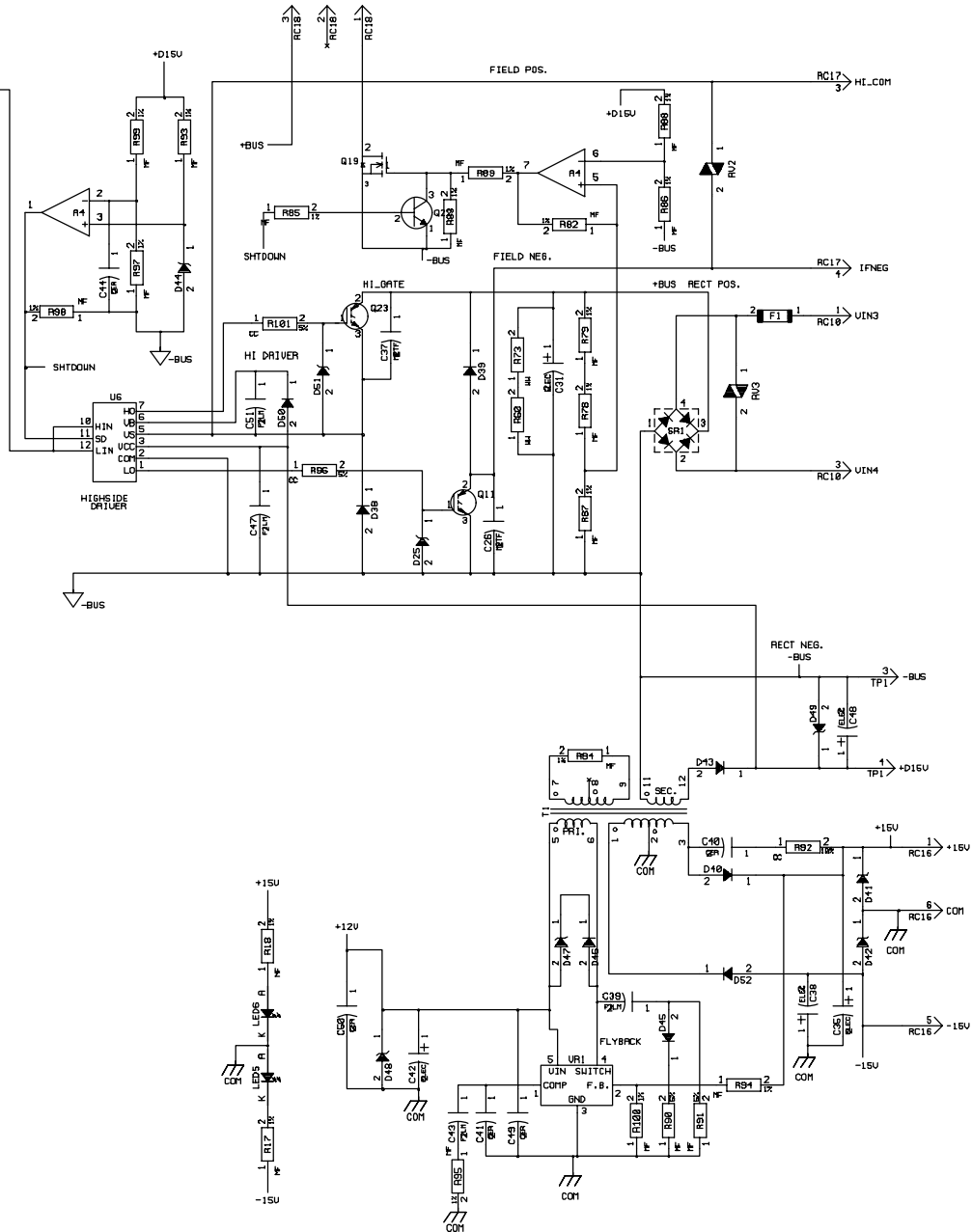
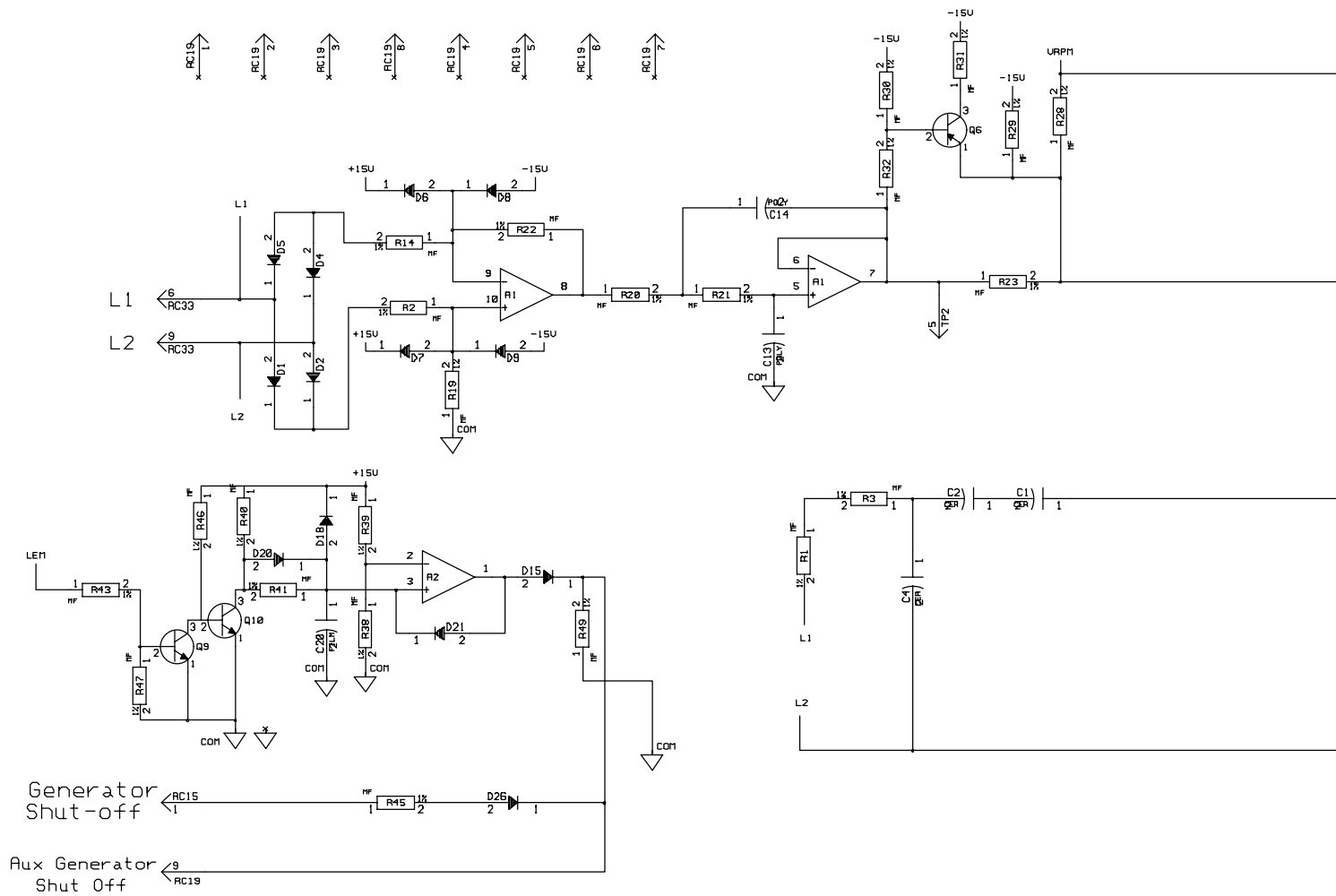


Figure 12-2. Circuit Diagram For Weld Power Board PC1
Eff w/ Serial No. LC357086 And Following (1 of 2)




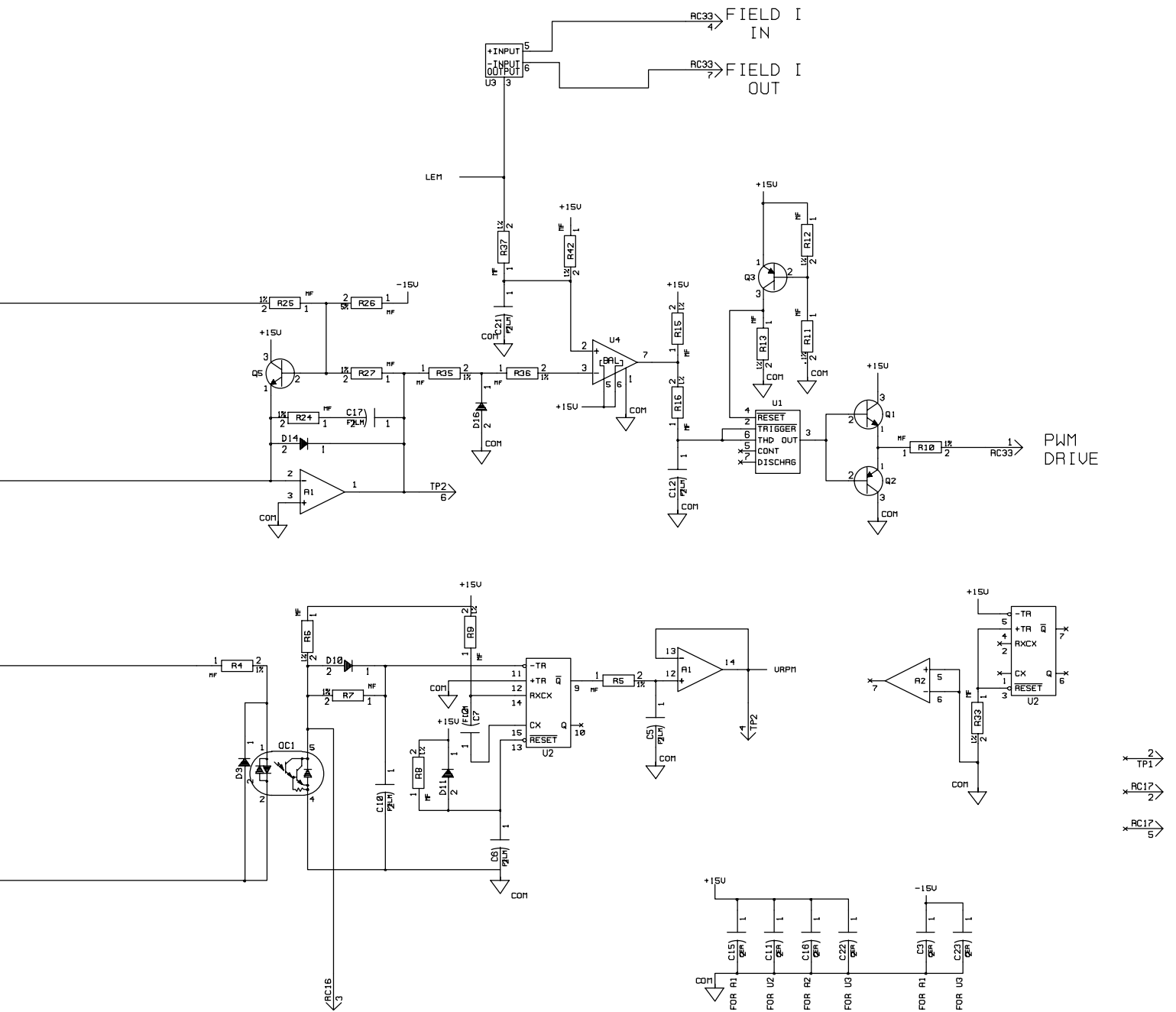
- Do not touch live electrical parts.
- Disconnect input power or stop engine before servicing.
- Do not operate with covers removed.
- Have only qualified persons install, use, or service this unit.




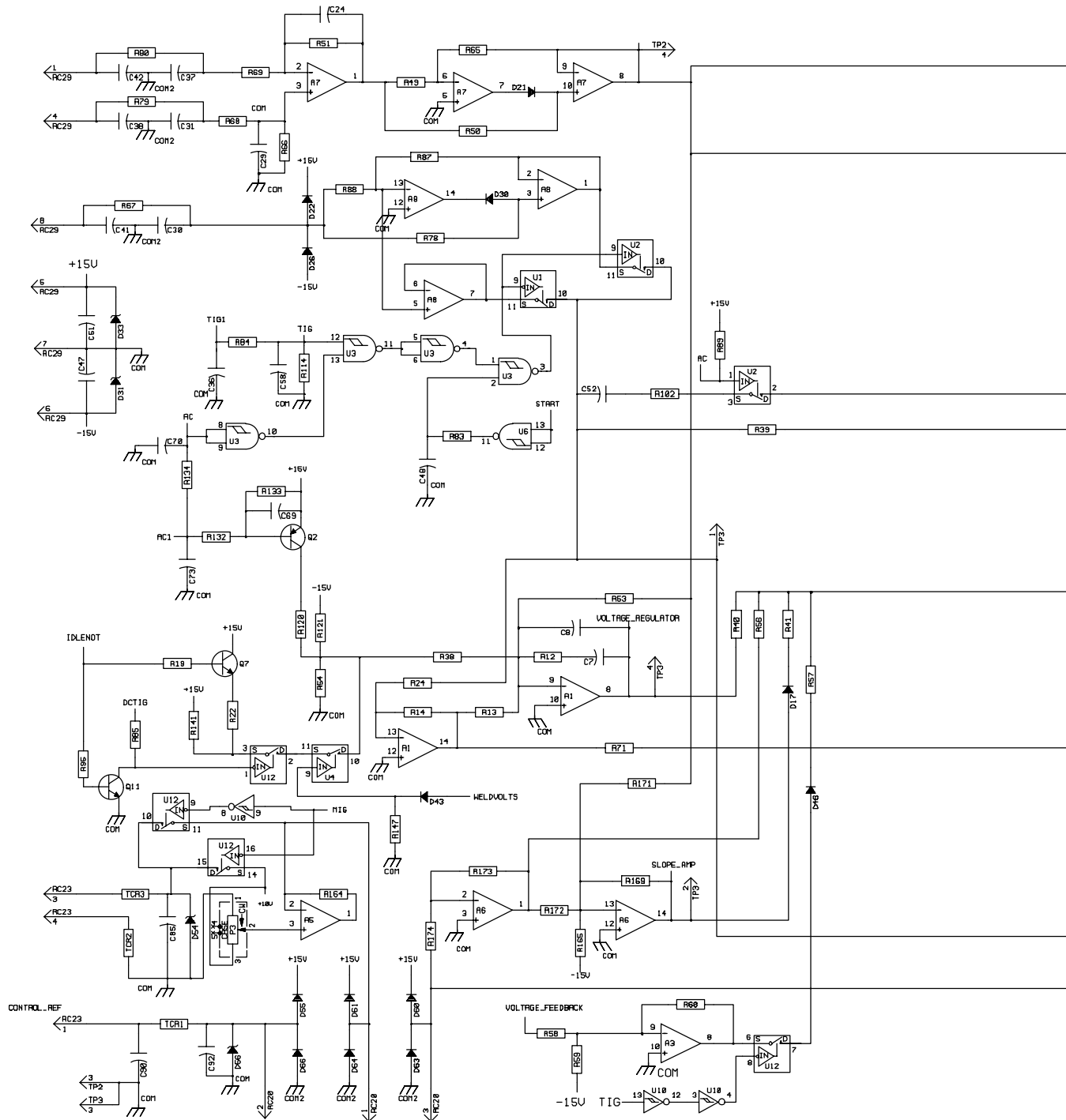


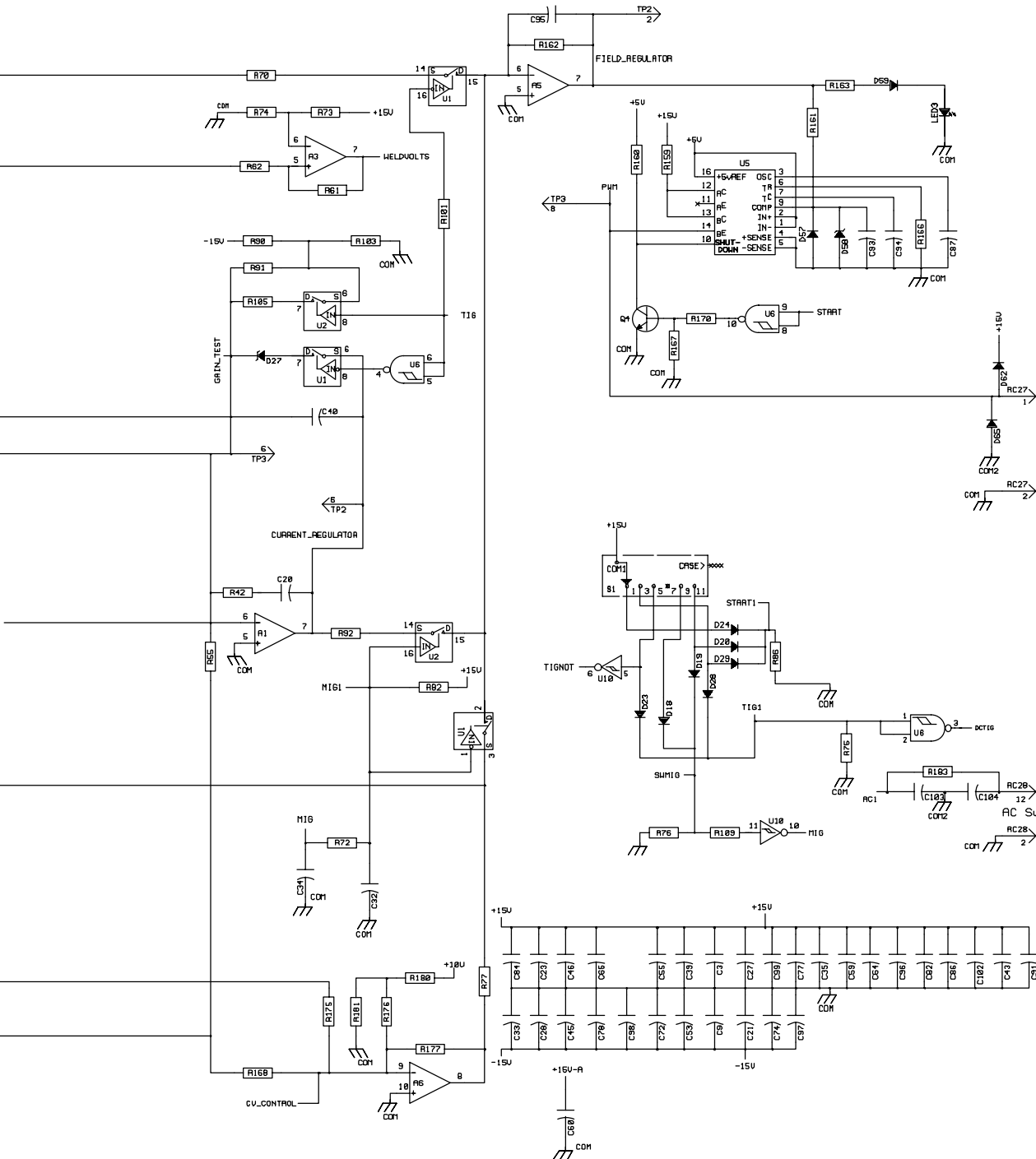
**Figure 12-3. Circuit Diagram For Weld Power Board PC1
Eff w/ Serial No. LC357086 And Following (2 of 2)**

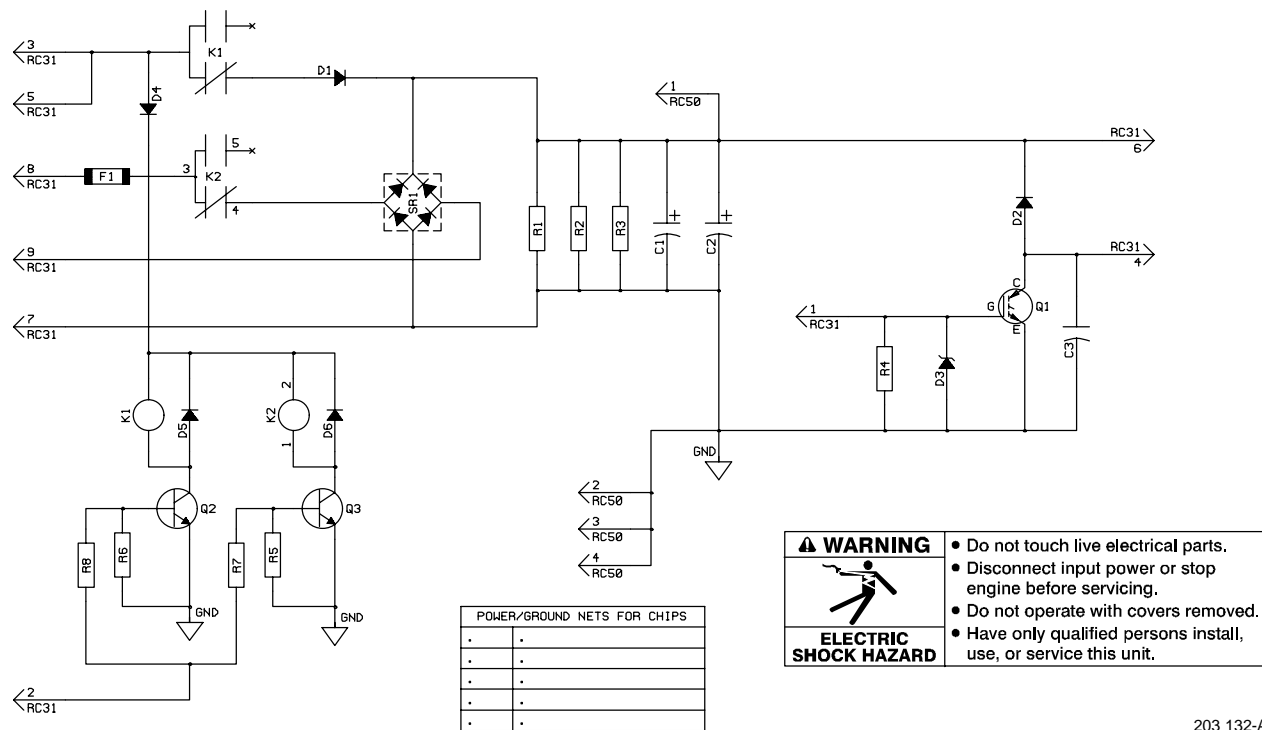
	WARNING Do not touch live electrical parts. Disconnect input power or stop engine before servicing. Do not operate with covers removed. Have only qualified persons install, use, or service this unit.
	ELECTRIC SHOCK HAZARD



	⚠ WARNING
	<ul style="list-style-type: none"> • 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	

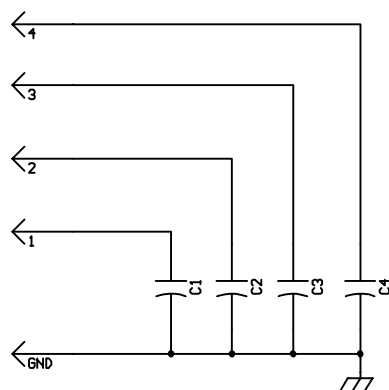






203 132-A

**Figure 12-6. Circuit Diagram For Generator Power Board PC7
Eff w/ Serial No. LC357086 And Following**



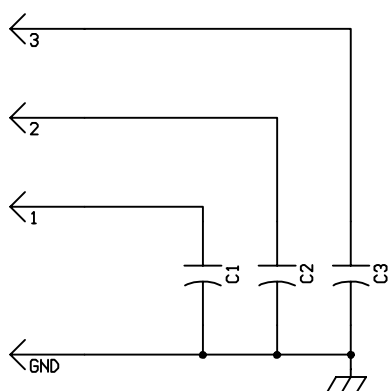
⚠ WARNING

ELECTRIC SHOCK HAZARD

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

148 024-A

Figure 12-7. Circuit Diagram For HF Filter Board PC3 Effective With Serial No. LC357086 And Following



⚠ WARNING


ELECTRIC SHOCK HAZARD

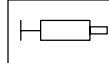
- Do not touch live electrical parts.
- Disconnect input power or stop engine before servicing.
- Do not operate with covers removed.
- Have only qualified persons install, use, or service this unit.

148 033-A

Figure 12-8. Circuit Diagram For HF Filter Board PC5 Effective With Serial No. LC357086 And Following

Table 12-1. Lead List Summary For Miller Legend 301 G Models Eff w/ Serial No. LC357086

 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.

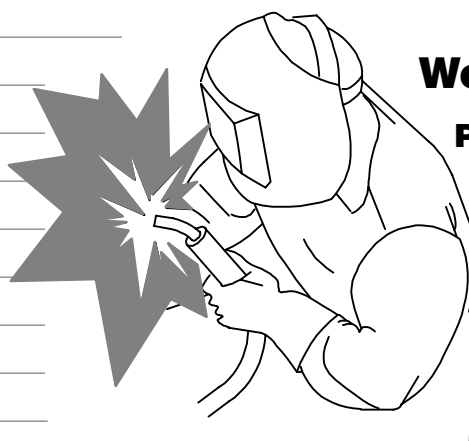
Lead	Connections	Lead	Connections
0010A	STATOR TO SR1 (AC)	0068B	PLG7 (3) TO S4 WIPER
0012A	STATOR TO AC/DC-S1 (5) OR DC-SR1 (AC W/10)	0080A	STATOR TO 1T (C)
0014A	STATOR TO SR1 (AC)	0080B	RC1 (W) TO RC3 (W)
0016A	STATOR TO SR1 (AC)	0080C	RC1 (W) TO 1T (C)
0026A	STAB (BEG) TO ELECT (CC)	0081A	STATOR TO 1T (D)
0026C	ELECT.(CC) TO PC5(2)	0081B	IT (D) TO CR2 (7)
0027A	STAB (TAP1) TO TIED OFF	0081C	PLUG 33 (6) TO 1T (D)
0028A	STAB (TAP2) TO TIED OFF	0081D	1T (D) TO CB4
0029A	STAB (TAP3) TO ELECT (CV)	0082A	STATOR TO 1T (A)
0029B	ELECT.(CV) TO PC5 (1)	0082B	IT(A) TO CR2 (9)
0030A	SR1 (NEG) TO WORK	0082C	PLUG 33 (9) TO 1T (A)
0030B	WORK TO PC5(3)	0083A	RC1 (X) TO PC3 (3)
0030C	PLG29 (1) TO RC30 (2)	0083C	RC1 (X) TO CB1 (LOAD)
0030D	PLG30 (1)TO SR1 (NEG)	0084A	RC1 (Y) TO PC3 (4)
0037A	STAB (END) TO S6 (9) OR SR1 (POS)	0084B	CB3 TO CB1 (LOAD)
0037B	PLG29 (4) TO RC30 (1)	0084C	RC1 (Y) TO CB1 (LOAD)
0037C	PLG30 (2) TO SR1 (POS)	0085A	RC2 (Y) TO CB3
0040A	PLG8 TO PLG7 (1)	0085B	RC2 (Y) TO PC3 (2)
0040B	PLG25 (7) TO RC7 (1)	0086A	RC3 (Y) TO CB4
0041A	RC5 (1) TO PLG8	0086B	RC3 (Y) TO PC3 (1)
0042B	PLG15 (7) TO RC5 (4)	0087A	CR2 (4) TO CB1 LINE
0042C	RC1 (GR) TO GRD STUD	0088A	STATOR TO CB5
0042D	PLG25(8)TO FRONT PANEL GND(TB301D)OR S4 BOT (LEGEN	0089A	CR2 (6) TO CB1 LINE
0042E	RC2 TO GND STRIP	0090A	STATOR TO 1T (B)
0042F	RC4 (K) TO GROUND 1T (F)	0090B	RC2 (W) TO 1T (B)
0042G	1T (F) TO CHASSIS GRD.	0091A	STATOR TO PLG10 (3)
0042H	GRD. TO GRD.	0092A	STATOR TO PLG10 (1)
0042J	RC3 TO GND STRIP	0093A	STATOR TO SPLICE
0042K	PLG28 (5) TO GND	0093B	SPLICE TO PLUG 31 (9)
0042L	GRD. STRIP TO PC3 (GRD)	0094A	STATOR TO SPLICE
0042M	GRD. STRIP TO PC5 (GRD)	0094B	SPLICE TO PLUG 31 (8)
0042N	GND. STRIP TO GND. STUD	0100A	RC4 (A) TO CB5
0042P	PLG28 (6) TO GND	0100B	CB5 TO PLG23 (6)
0042R	PLG15 (8) TO HR METER	0101A	RC4 (J) TO PLG24 (2)
0042S	PLUG 31 (7) TO HM	0102A	RC4 (B) TO PLG23 (5)
0043A	RC5 (3) TO PLG15 (2)	0103A	RC4 (C) TO PLG23 (3)
0043B	CR2 (B) TO SPLICE	0104A	RC4 (D) TO PLG23 (4)
0043C	PLUG 31 (3) TO HM POS	0105A	RC4 (E) TO PLG23 (1)
0043E	PLG15 (5) TO HR METER +	0107A	PLG20 (1) TO S3 PNL
0043F	SPLICE TO PLUG 31 (5)	0108A	PLG20 (3) TO S3 WIPER
0045A	RC5 (5) TO SPLICE	0109A	PLG20 (2) TO S3 RMT
0045B	SPLICE TO PLG 8	0114A	PLG25 (5) TO RC9 (1)
0045C	SPLICE TO PLG25 (6)	0115A	PLG16 (4) TO PLG21 (4)
0046A	RC5 (6) TO PLG8	0116A	PLG12 (2) TO PLG27 (2)
0052A	RC5 (2) TO PLG15 (3)	0117A	PLG12 (1) TO PLG27 (1)
0055A	PLG25 (1) TO RC7 (2)	0119A	PLG16 (6) TO PLG21 (2)
0055B	PLG7 (2) TO PLG15 (1)	0121A	PLG16 (5) TO PLG21 (1)
0060A	STATOR TO 1T (E)	0122A	PLUG 31 (2) TO PLUG 19 (9)
0060B	RC4 (G) TO 1T (E)	0123A	PLG16 (1) TO PLG21 (3)
0060C	1T (E) TO PLG24 (1)	0131B	PLG17 (3) TO COM BRUSH
0068A	PLG25 (10) TO RC7 (3)	0132B	PLG17 (4) TO MAIN BRUSH
		0133A	RC22 (2) TO EXCITER BRUSH
		0133C	PLG 22 (2) TO PLUG 31 (4)

Table 12-1. Lead List Summary For Miller Legend 301 G Models Eff w/ Serial No. LC357086 (Continued)

Lead	Connections
0134A	RC22 (1) TO COM BRUSH
0134B	PLG 22 (1) TO PLUG 33 (7)
0135A	PLG25 (2) TO RC9 (2)
0141A	PLG15 (4) TO SPLICE

Lead	Connections
0141B	CR2 (A) TO SPLICE
0146A	PLUG 31 (1) TO PLUG 33 (1)
0148A	PLUG 31 (6) TO PLUG 33 (4)
JUMPA	JUMPER 1T (B TO F)

Notes



Work like a Pro!

Pros weld and cut safely. Read the safety rules at the beginning of this manual.



TM-4411A

March 2003

Processes



Stick (SMAW) Welding



TIG (GTAW) Welding



MIG (GMAW) Welding &
Flux Cored (FCAW) Welding-
With Voltage Sensing Feeder

Description



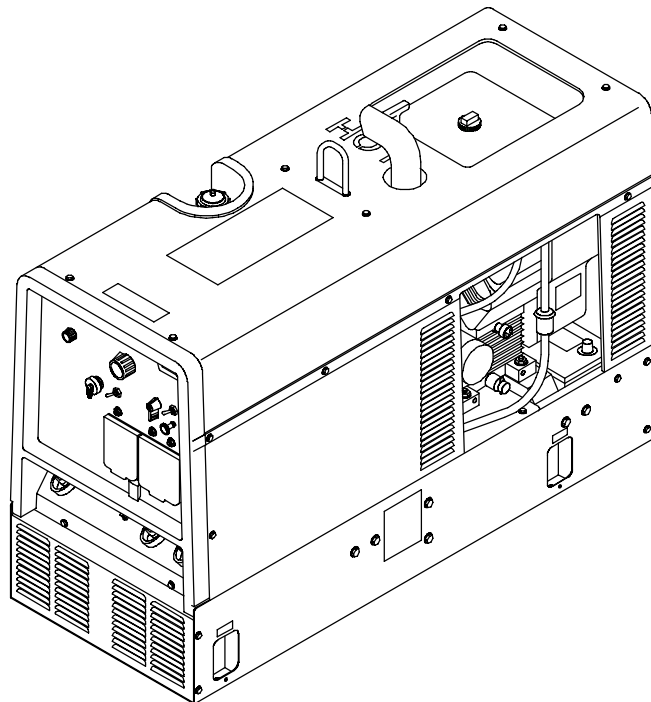
Engine Driven Welding Generator

Miller Legend[®] 301 G

PARTS LIST

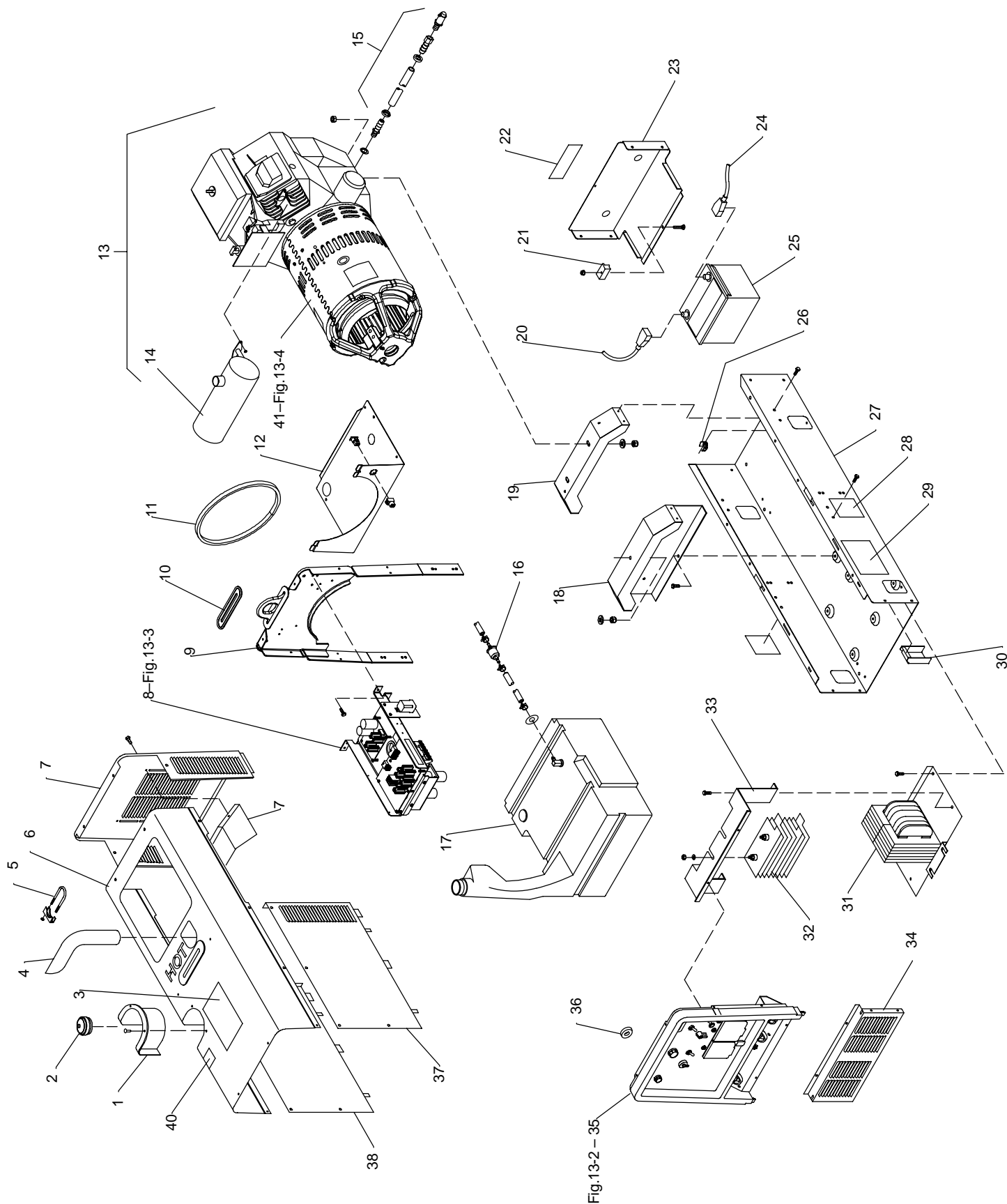
Eff w/LC357086 And Following

For OM-4411 (207 283) Revisions A And B



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SECTION 13 – PARTS LIST FOR LC357086 AND FOLLOWING



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Figure 13-1. Main Assembly

Eff w/LC357086 And Following

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 13-1. Main Assembly				
1		181881	Grommet, Plastic Neck Filler Fuel	1
2		147601	Cap, Tank Screw-on W/Vent	1
3		182761	Label, Warning General Precautionary Csa	1
4		205609	Pipe, Exhaust Elbow Stainless	1
5		183314	Clamp, Muffler 1.625 Dia U Pld	1
6		+205762	Cover, Top	1
7		182365	Panel, Rear Upper	1
8	Figure 13-3		Bracket w/Components	1
9		205736	Upright, Base	1
10		205734	Seal, Weather Lift Eye	1
11		181789	Seal, Barrel	1
12		186667	Cover, Tank Fuel	1
13		208463	Engine, Koh Gas Elec Ch20s-ps-64663 (Includes)	1
14		207458	Muffler, Exhaust Engine W/Heat Shield	1
		189477	Muffler Gasket	1
15		208003	Hose, Oil W/Fittings And Valve (Includes)	1
		207490	Hose, Oil W/Fitting 11.750 Lg	1
		165271	Valve, Oil Drain 3/8-18 Nptf	1
		206402	Ftg, Hose Brs Barbed M 1/2 Tbg X 3/8 Npt	1
		023562	Clamp, Hose .312 - .875 Clp Dia	1
16		*066113	Filter, Fuel In-line .250	1
		135556	Housing Plug+Skts, (Service Kit)	1
	F6	021718	Fuse, Mintr Gl 30. Amp 32 Volt	1
		180096	Tune-up & Filter Kit, Kohler (Includes)	1
		*067272	Air Filter Element, Kohler	1
		*066698	Oil Filter, Kohler	1
		*121652	Filter/Clamps, Fuel, 1/4" Line	1
		*067007	Spark Plug,	2
		*067273	Air Filter Wrapper	1
17		182079	Tank, Fuel 10.0 Gal (Includes)	1
		124253	Bushing, Tank Fuel	1
		187502	Ftg, Stand Pipe .250 X 7.375 Lg 90 Degree	1
		182922	Bushing, Tank Fuel 1.210id	1
		182925	Gauge, Fuel Float Type 5.50 Float Travel	1
		161860	Hose, Sae .250 Id X .500 Od X 8.000	1
18		182928	Bracket, Mtg Generator	1
19		173043	Bracket, Mtg Engine	1
20		082319	Cable, Bat Neg 17.750 No 4 Awg W/Clamp & .343 Rng	1
		172669	Cable, Bat Neg 11.000 6ga W/.250 Rng & .375 Rng	1
21		182935	Hold Down, Battery	1
22		168385	Label, Warning Battery Explosion Can Blind	1
23		+201174	Door, Access Battery	1
24		173921	Cable, Bat Pos 28.000 No 4 Awg W/Clamp & .312 Rng	1
25	BATT	168037	Battery, Stor 12v 430 Crk 75 Rsv Gp 58 Dry	1
26		192362	Bracket, Mtg Nyl 1/2 Conduit	1
27		+201280	Pan, Base	1
28		197930	Label, Warning Do Not Weld On Base	2
29		207864	Label, Engine Maintenance Kohler Ch20/Ch23	1
30		181057	Cover, Base	2
31	DCZ	202337	Stabilizer, Assy	1
32	SR1	202222	Rectifier, Si 3ph 300 Amp 400 Piv 100% Duty Cycle	1
	R3/VR1	212336	Kit, Suppressor	1
33		202339	Baffle, Air	1
34		180628	Panel, Front Lower	1
35	Figure 13-2		Panel, Front w/Components	1
36	CT1	207812	Xfmr, Current Sensing	1
37		182367	Panel, Side Rh	1
38		182366	Panel, Side Lh	1
39		deleted		
40		192042	Label, Use Gasoline Only	1
41	GEN	Figure 13-4	Generator Assembly	1

Eff w/LC357086 And Following

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 13-1. Main Assembly (Continued)				
.....		209831 ..	Connectors, W/Leads (Includes)	1
..... PLG29 ..		113751	Conn, Rect Mini 045 8skt 2row Plug Cable Lkg	1
.....		204640	Cable, LEM	1
..... RC30 ..		136924	Conn, Rect Comm 093 2p/S 1row Rcpt Cable Lkg	1
.....		204664 ..	Plug, W/Leads (Includes)	1
..... PLG28 ..		116513	Conn, Rect Mini 045 12skt 2row Plug Cable Lkg	1
.....		202883 ..	Harness, Control Power Board Interconnecting (Includes)	1
..... PLG16 ..		114655	Conn, Rect Mini 045 6skt 2row Plug Cable Lkg	1
..... PLG12,PLG27 ..		117037	Conn, Rect Mini 045 2skt 2row Plug Cable Lkg	2
..... PLG21 ..		113750	Conn, Rect Mini 045 4skt 2row Plug Cable Lkg	1
.....		206534 ..	Harness, Wrg Interconnecting (Includes)	1
..... RC9 ..		136924	Conn, Rect Comm 093 2p/S 1row Rcpt Cable Lkg	1
..... PLG25 ..		113752	Conn, Rect Mini 045 10skt 2row Plug Cable Lkg	1
..... RC7 ..		092670	Conn, Rect Univ 084 3p/S 1row Plug Cable Lkg	1
.....		211421 ..	Harness, Wrg Interconnecting (Includes)	1
..... PLG31 ..		135134	Conn, Rect Univ 084 9p/S 3row Plug Cable Lkg	2
..... PLG22 ..		136925	Conn, Rect Comm 093 2p/S 1row Plug Cable Lkg	1
..... PLG19 ..		113752	Conn, Rect Mini 045 10skt 2row Plug Cable Lkg	1

◆ Optional

* Recommended Spare Parts.

+ When ordering a component originally displaying a precautionary label, the label should also be ordered. Order label individually or as part of Label Kit 207 019.

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.

Notes



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Hardware is common and not available unless listed.

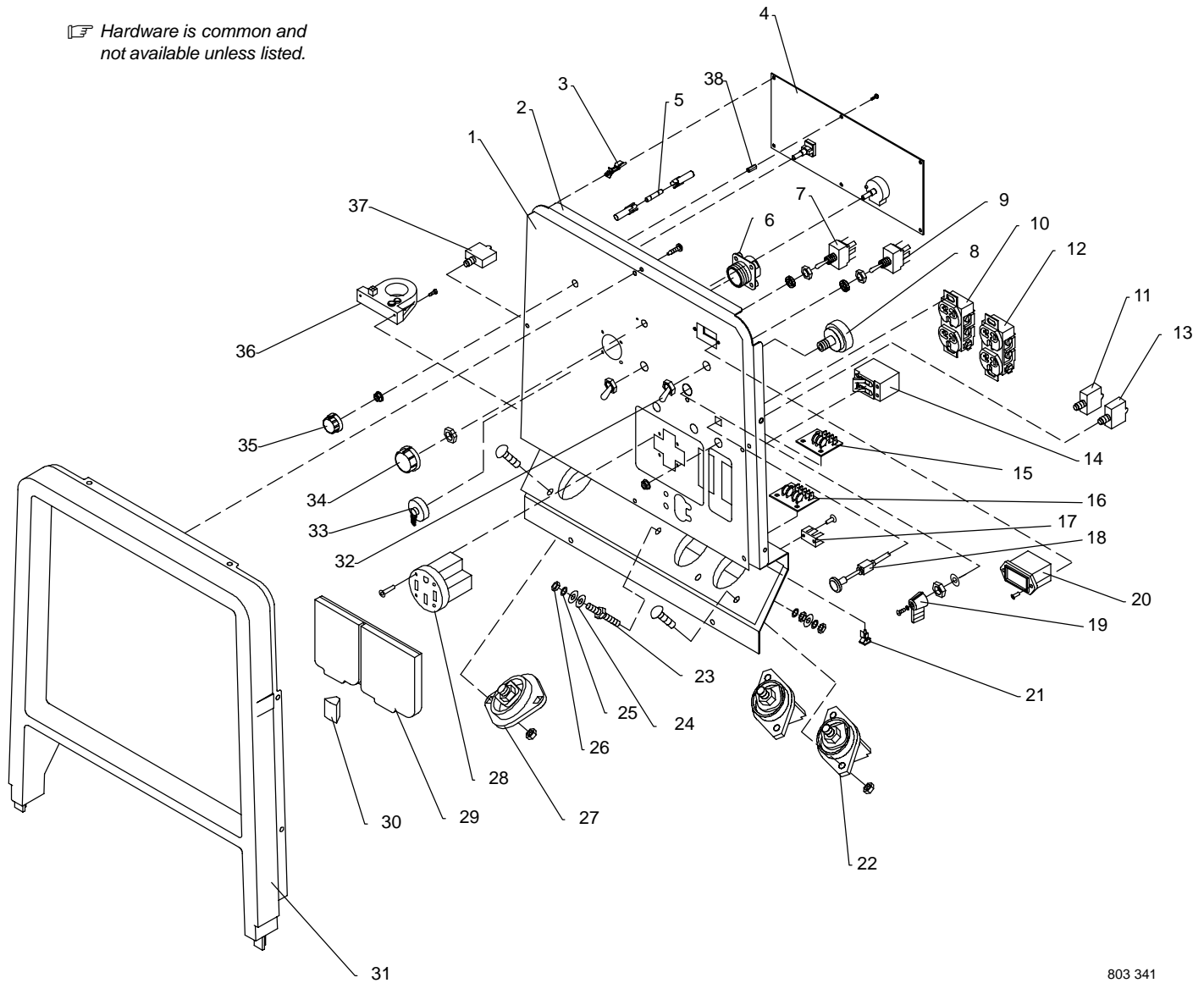


Figure 13-2. Panel, Front w/Components

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Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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Figure 13-2. Panel, Front w/Components (Figure 13-1 Item 35)

...	1	Nameplate (Order By Model And Serial Number)	1
...	2	206854	Panel, Front	1
...	3	203401	Stand-off Support, Pc Card .187 Dia W/P&I .625	2
...	4	PC2 211273	Circuit Card Assy, Control	1
.....		206794	Shield, Pcb Protective Anti Static 4.813x12.750	1
.....		209618	Harness, Remote Control 14pin (Includes)	1
...	5	209617	Holder, Fuse W/10A Fuse (Includes)	1
.....	F2	085874	Fuse, Mintr Cer Slo-blo 10. Amp 250 Volt	1
...	6	RC4 143976	Conn, Circ Ms/Cpc 14skt Size 20 Rcpt Panel Pushin (Service Kit)	1
.....	PLG23	115093	Conn, Rect Mini 045 6skt 2row Plug Cable Lkg (Service Kit)	1
.....	PLG24	131054	Conn, Rect Mini 045 2skt 2row Plug Cable Lkg	1
.....		202884	Harness, Switch Control (Includes)	1
.....	PLG20	131198	Conn, Rect Mini 045 3skt 1row Plug Cable Lkg	1
...	7	S3 011609	Switch, Tgl Spdt 15a 125vac On-none-on Spd Term Chr	1
...	8	S2 176606	Switch, Ignition 4 Position W/Out Handle	1

Eff w/LC357086And Following

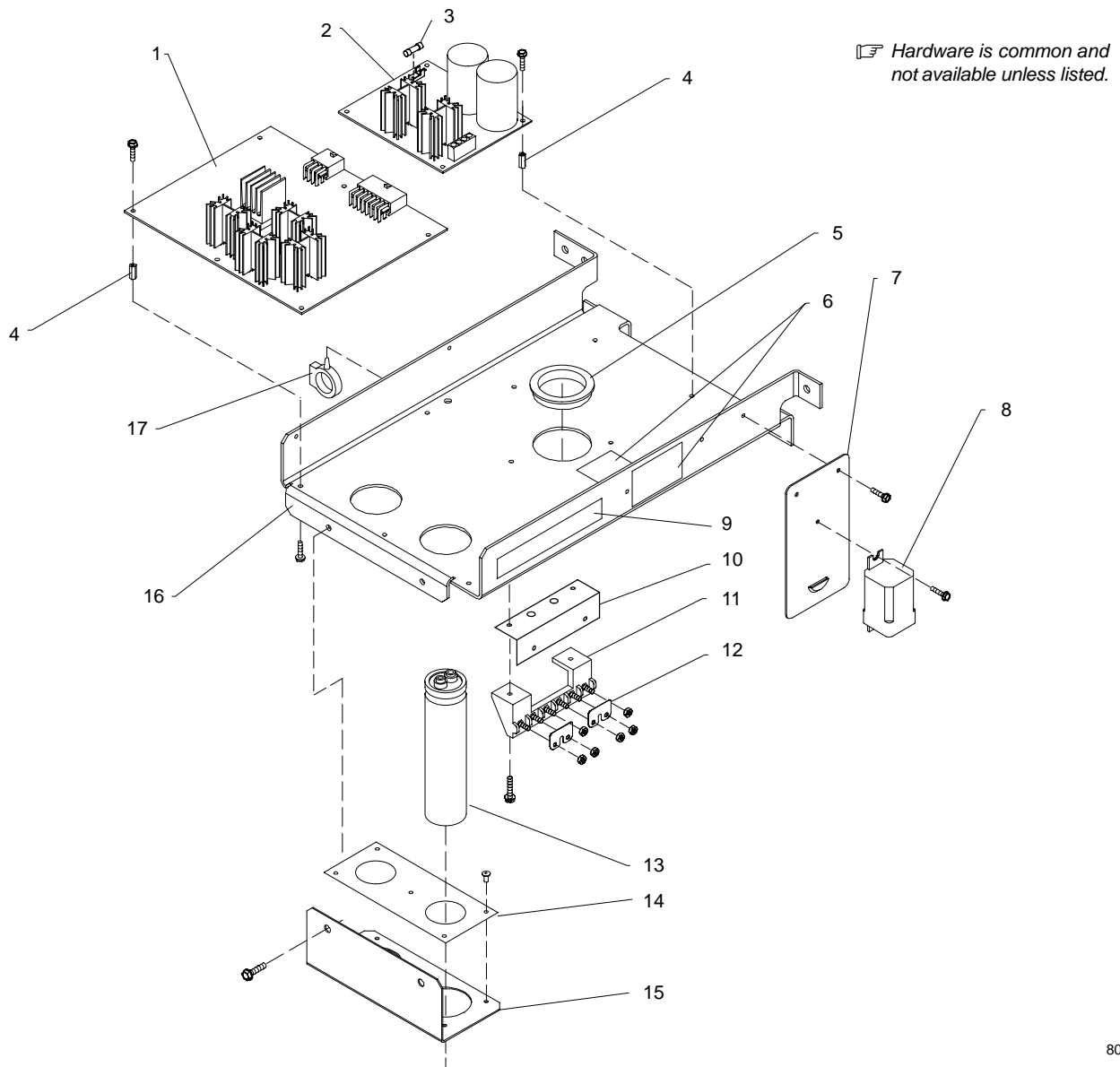
Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 13-2. Panel, Front w/Components (Continued)				
.....		206886	.. Harness, Wrg Ignition (Includes)	1
... 9	S4	011609	... Switch, Tgl Spdt 15a 125vac On—none—on Spd Term Chr	1
.....	PLG15	113751	... Conn, Rect Mini 045 8skt 2row Plug Cable Lkg	1
.....	RC5	113634	... Conn, Rect Univ 084 6p/S 3row Rcpt Cable/Panel Lkg	1
.....	PLG7	166380	... Conn, Rect Univ 084 3p/S 1row Rcpt Cable/Panel Lkg	1
.....	PLG8	177859	... Conn, Body 5 Terminal	1
.....		202660	... Conn, Push 4 Wire 12—16strnd 12—18sld 16—22tinstnd	1
.....		211429	.. Receptacle/Circuit Breaker, W/Leads (Includes)	1
... 10	RC2	141432	... Rcpt, Str Dx Grd 2p3w 20a 125v *5—20r	1
... 11	CB3	093996	... Circuit Breaker, Man Reset 1p 20a 250vac Frict	1
.....		211431	.. Receptacle/Circuit Breaker, W/Leads (Ivory) (Includes)	1
... 12	RC3	211224	... Rcpt, Str Dx Grd 2p3w 20a 125v *5—20r Ivory	1
... 13	CB4	093996	... Circuit Breaker, Man Reset 1p 20a 250vac Frict	1
... 14	CB1	203095	... Circuit Breaker, Man Reset 2p 25a 240vac Screw—90	1
... 15	PC5	148030	... Circuit Card Assy, Filter Hf	1
... 16	PC3	148021	... Circuit Card Assy, Filter Hf	1
... 17		129524	.. Term, Frict 250x032 Uninsul Male .130 Stud Mtg 3pr	1
... 18		211452	.. Control, Push/Pull Snap—in 42.000 W/1.750 Extension	1
... 19		119014	.. Lever, Switch Black	1
... 20	HM	145247	.. Meter, Hour 12—24vdc 1.25 X 2.12 Rect	1
... 21		134201	.. Stand—off Support, Pc Card .312/.375w/Post&lock .43	6
... 22	CC/CV	039047	.. Terminal, Pwr Output Red	2
.....	GRD	197203	.. Grounding Stud Assy, Brass (Includes)	1
... 23		083030	.. Stud, Brs .250—20 X 1.750 W/Hex Collar	1
... 24		010915	.. Washer, Flat .257idx0.640odx.031t Brs	2
... 25		602207	.. Washer, Lock .255idx0.489odx.062t Stl Pld Split.250	1
... 26		601836	.. Nut, 250—20 .50hex .19h Brs	1
... 27	WORK	039046	.. Terminal, Pwr Output Black	1
.....		211425	.. Receptacle, W/Leads (Includes)	1
... 28	RC1	182954	... Rcpt, Str 3p4w 50a 125/250v Flush Mtg *14—50	1
... 29		188039	.. Cover, Receptacle w/Gasket	1
... 30		203016	.. Boot, Circuit Breaker 2 Pole	1
... 31		159921	.. Bezel	1
... 32		021385	.. Boot, Toggle Switch Lever	2
... 33		170391	.. Conn, Circ Ms Protective Cap Size 20 Nylon	1
... 34		097924	.. Knob, Pointer 1.625 Dia X .250 Id W/Set Screwsplstc	1
... 35		097922	.. Knob, Pointer .875 Dia X .250 Id W/Set Screwsplstc	1
... 36	LEM	168829	.. Transducer, Current 1000a Module Max Open Loop	1
.....		204777	.. Plug, W/Leads (Includes)	1
.....	PLG30	136925	... Conn, Rect Comm 093 2p/S 1row Plug Cable Lkg	1
... 37	CB5	083432	... Circuit Breaker, Man Reset 1p 10a 250vac Frict	1
... 38		073756	.. Stand—off, No 6—32 X .625 Lg .250 Hex Al Fem	1

◆ 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 207 019.

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/LC357086 And Following



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Figure 13-3. Bracket w/Components

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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Figure 13-2. Bracket w/Components (Figure 13-1 Item 8)


...	1	...	PC1	...	211276	..	Circuit Card Assy, Power	...	1
...	2	...	PC7	...	203130	..	Circuit Card Assy, Gen Power (Includes)	...	1
...	3	...	F1	...	027660	...	Fuse, Mintr Cer 20. Amp 250 Volt	...	1
...	4	...		...	115440	..	Stand-off, No 6-32 X .687 Lg .250 Hex Al Fem	...	10
...	5	...		...	004214	..	Bushing, Snap-in Nyl 1.625 Id X 2.000 Mtg Hole	...	1
...	6	...		...	200263	..	Label, Warning Electric Shock Hazard	...	2
...	7	...		...	206901	..	Bracket, Mtg Relay	...	1
...	8	...	CR2	...	113247	..	Relay, Encl 12vdc Dpdt 20a/120vac 8pin Flange Mtg	...	1
...	9	...		...	204769	..	Label, Term Mkg Stator Connections	...	1
...	10	...		...	196180	..	Insulator, Terminal Block	...	1
...	11	...	1T	...	172661	..	Block, Stud Connection 6 Position	...	1
...	12	...		...	173734	..	Link, Jumper	...	2
...	13	...	C25	...	176007	..	Capacitor, Elctlt 1200 Uf 300 Vdc Can 1.37 Dia	...	1
...	14	...		...	202331	..	Gasket, Capacitor Support	...	1
...	15	...		...	204166	..	Bracket, Capacitor Support	...	1
...	16	...		...	+204148	..	Bracket, Mtg Pc Board	...	1
...	17	...		...	165437	..	Clip, Snap In .472 Bundle .250hole .020-.197 Thk	...	1

Eff w/LC357086 And Following

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 13-4. Generator (Figure 13-1 Item 41)				
... 1 ..	STATOR	+206890 ..	Stator, Generator	1
... 2		182092 ..	Label, Warning Moving Parts Can Cause Serious Etc	3
... 3 ...	ROTOR	207126 ..	Rotor, Generator (Includes)	1
... 4		181143	Bearing,Ball Rdl Sgl Row .984 X 2.047 X .591	1
... 5		160566	Fan, Rotor	1
... 6		172683 ..	Adapter, Engine	1
... 7		202771 ..	Baffle, Engine Adapter	1
... 8		170861 ..	Stud, Stl .375-16 X 17.375	4
... 9		205725 ..	Brushholder Assy, Generator	2
...		206894 ..	Harness, Wrg Brushholder (Includes)	1
...	PLG17	066104	Conn, Rect Univ 084 6p/S 3row Plug Cable Lkg	1
...	RC22	136924	Conn, Rect Comm 093 2p/S 1row Rcpt Cable Lkg	1
... 10		010910 ..	Washer, Flat .406idx0.812odx.065t Stl Pld Ansi.375	4
... 11		010909 ..	Nut, .375-16 .56hex .46h Stl Pld Elastic Stop Nut	4
... 12		210438 ..	Endbell (Includes)	1
... 13		183419	O-ring, 1.984 Id X .139 Cs 70 Duro Viton	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 207 019.

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.

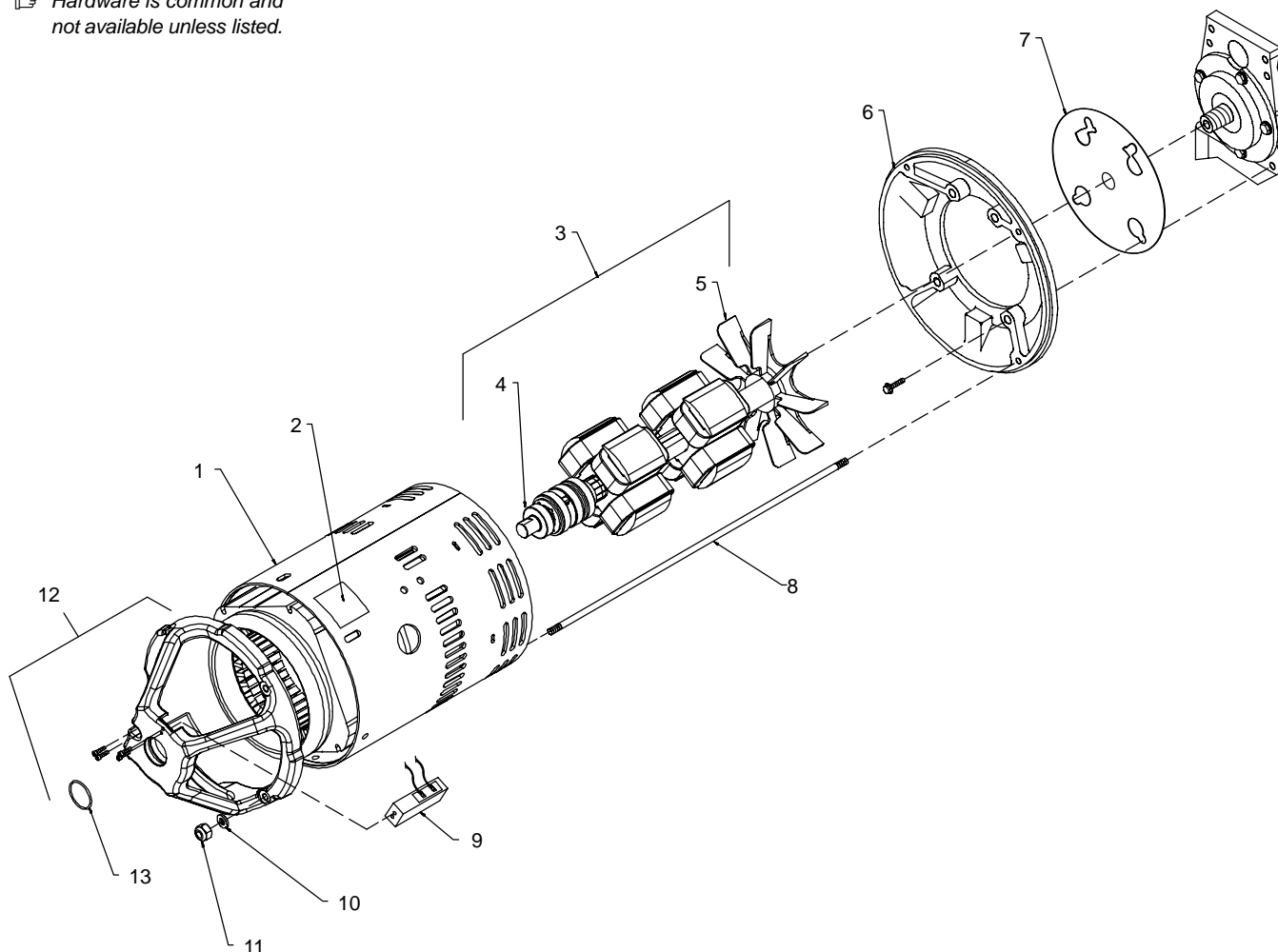


Figure 13-4. Generator

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Notes

DECIMAL EQUIVALENTS

	$\frac{1}{64}$.015625
$\frac{1}{32}$	$\frac{2}{64}$.03125
	$\frac{3}{64}$.046875
$\frac{1}{16}$	$\frac{4}{64}$.0625
	$\frac{5}{64}$	.078125
$\frac{3}{32}$	$\frac{6}{64}$	.09375
	$\frac{7}{64}$	.109375
$\frac{1}{8}$	$\frac{8}{64}$	.125
	$\frac{9}{64}$	.140625
$\frac{5}{32}$	$\frac{10}{64}$	.15625
	$\frac{11}{64}$	.171875
$\frac{3}{16}$	$\frac{12}{64}$	.1875
	$\frac{13}{64}$	.203125
$\frac{7}{32}$	$\frac{14}{64}$	.21875
	$\frac{15}{64}$	.234375
$\frac{1}{4}$	$\frac{16}{64}$	.25
	$\frac{17}{64}$	.265625
$\frac{9}{32}$	$\frac{18}{64}$	.28125
	$\frac{19}{64}$	.296875
$\frac{5}{16}$	$\frac{20}{64}$	.3125
	$\frac{21}{64}$	.328125
$\frac{11}{32}$	$\frac{22}{64}$	.34375
	$\frac{23}{64}$	.359375
$\frac{3}{8}$	$\frac{24}{64}$	.375
	$\frac{25}{64}$	.390625
$\frac{13}{32}$	$\frac{26}{64}$	.40625
	$\frac{27}{64}$	.421875
$\frac{7}{16}$	$\frac{28}{64}$	.4375
	$\frac{29}{64}$	.453125
$\frac{15}{32}$	$\frac{30}{64}$	.46875
	$\frac{31}{64}$	.484375
$\frac{1}{2}$	$\frac{32}{64}$	.5
	$\frac{33}{64}$	.515625
$\frac{17}{32}$	$\frac{34}{64}$	.53125
	$\frac{35}{64}$	.546875
$\frac{9}{16}$	$\frac{36}{64}$	.5625
	$\frac{37}{64}$	.578125
$\frac{19}{32}$	$\frac{38}{64}$	.59375
	$\frac{39}{64}$	.609375
$\frac{5}{8}$	$\frac{40}{64}$	.625
	$\frac{41}{64}$	.640625
$\frac{21}{32}$	$\frac{42}{64}$	.65625
	$\frac{43}{64}$	.671875
$\frac{11}{16}$	$\frac{44}{64}$	.6875
	$\frac{45}{64}$	.703125
$\frac{23}{32}$	$\frac{46}{64}$	.71875
	$\frac{47}{64}$	.734375
$\frac{3}{4}$	$\frac{48}{64}$	.75
	$\frac{49}{64}$	.765625
$\frac{25}{32}$	$\frac{50}{64}$	.78125
	$\frac{51}{64}$	.796875
$\frac{13}{16}$	$\frac{52}{64}$	.8125
	$\frac{53}{64}$	.828125
$\frac{27}{32}$	$\frac{54}{64}$	.84375
	$\frac{55}{64}$	.859375
$\frac{7}{8}$	$\frac{56}{64}$	.875
	$\frac{57}{64}$	.890625
$\frac{29}{32}$	$\frac{58}{64}$.90625
	$\frac{59}{64}$.921875
$\frac{15}{16}$	$\frac{60}{64}$.9375
	$\frac{61}{64}$.953125
$\frac{31}{32}$	$\frac{62}{64}$.96875
	$\frac{63}{64}$.984375
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