TM-246193K 2021–11

Eff w/Serial No. MA021803A

Processes

MIG (GMAW) and Pulsed MIG (GMAW-P) Welding

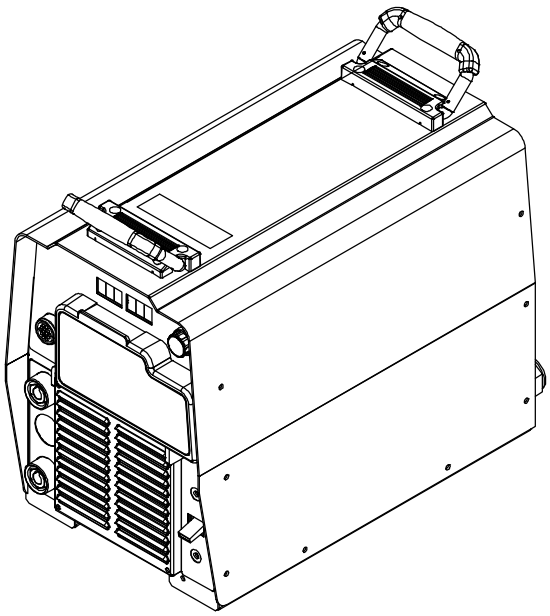
Air Carbon Arc (CAC-A) Cutting and Gouging

Description

3 Phase | 1 Phase | DC | CC CV

Arc Welding Power Source

Invision™ 352 MPa Auto-Line™



TECHNICAL MANUAL

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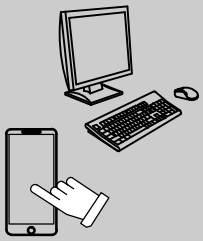

For product information, Owner's Manual translations, and more, visit

www.MillerWelds.com

INFORMATION ON OLDER UNITS

☞ *This manual includes operating information for current units. To obtain specific operating information for older models, download the applicable Owner's Manual from www.MillerWelds.com*

☞ *Effective with ME100269U, IGBT Module Kit No. 217 625 was discontinued. See Parts List and Service Memo 1233 for additional information.*

☞ *Effective with ME224001U, 115 volts AC is no longer available at remote 14 receptacle RC50.*

☞ *See the Miller Extranet for service memos that may aid in the repair of this product.*

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SECTION 1 – SAFETY PRECAUTIONS FOR SERVICING

Protect yourself and others from injury — read, follow, and save these important safety precautions and operating instructions.

1-1. Symbol Usage

OM-246193-U, safety_stm 2020-02

DANGER! – Indicates a hazardous situation which, if not avoided, will result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

Indicates a hazardous situation which, if not avoided, could result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

NOTICE *– Indicates statements not related to personal injury.*

☞ *Indicates special instructions.*

This group of symbols means Warning! Watch Out! ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid these 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 install, operate, maintain, and repair this equipment. A qualified person is defined as one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter, the work, or the project and has received safety training to recognize and avoid the hazards involved.

During servicing, keep everybody, especially children, away.

ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Turn Off welding power source and wire feeder and disconnect and lockout input power using line disconnect switch, circuit breakers, or by removing plug from receptacle, or stop engine before servicing unless the procedure specifically requires an energized unit.
- Do not work on equipment unless it has been verified that the machine case is not energized.
- 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.
- If this procedure requires an energized unit, have only personnel familiar with and following standard safety practices do the job.
- When testing a live unit, use the one-hand method. Do not put both hands inside unit. Keep one hand free.
- Disconnect input power conductors from deenergized supply line BEFORE moving a welding power source.

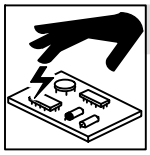
SIGNIFICANT DC VOLTAGE exists in inverter welding power sources AFTER removal of input power.

- Turn off unit, disconnect input power, and discharge input capacitors according to instructions in Manual before touching any parts.

ARC FLASH can kill.

Arc flash is the rapid and violent release of energy that occurs when electric current leaves its intended path and arcs to other conductors or to ground. Arc flash can be caused by equipment failure (faulty insulation, corrosion, dust) improper installation, human error (improper tool placement), and other factors. Conductive vapors can sustain the arc until over-current devices open the circuit. Individuals within the arc flash boundary are at risk.

- Do not work on energized equipment unless an assessment of arc flash risk from the electrical supply circuit has been conducted by a qualified person and you have been trained in safe work practices by your employer.
- Follow requirements in NFPA 70E for safe work practices and Personal Protective Equipment (PPE).

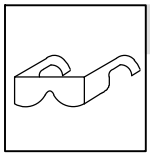


STATIC (ESD) can damage PC boards.

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

FIRE OR EXPLOSION hazard.

- Do not place unit on, over, or near combustible surfaces.
- Do not service unit near flammables.



FLYING METAL or DIRT 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.

HOT PARTS can burn.

- Do not touch hot parts bare handed.
- Allow cooling period before working on equipment.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.

EXPLODING PARTS can injure.

- Failed parts can explode or cause other parts to explode when power is applied to inverters.
- Always wear a face shield and long sleeves when servicing inverters.

SHOCK HAZARD from testing.

- Turn Off welding power source and wire feeder or 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.

FALLING EQUIPMENT can injure.

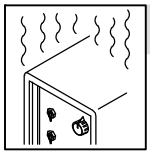
- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use correct procedures and equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.
- Follow the guidelines in the Applications Manual for the Revised NIOSH Lifting Equation (Publication No. 94–110) when manually lifting heavy parts or equipment.

MOVING PARTS can injure.

- Keep away from moving parts such as fans.
- Keep away from pinch points such as drive rolls.
- Have only qualified persons remove doors, panels, covers, or guards for maintenance and troubleshooting as necessary.
- Keep hands, hair, loose clothing, and tools away from moving parts.
- Reinstall doors, panels, covers, or guards when maintenance is finished and before reconnecting input power.

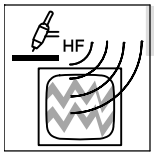
ELECTRIC AND MAGNETIC FIELDS (EMF) can affect Implanted Medical Devices.

- Wearers of Pacemakers and other Implanted Medical Devices should keep away from servicing areas until consulting their doctor and the device manufacturer.



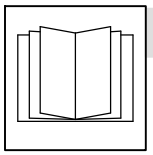
OVERUSE can cause OVERHEATING.

- 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.



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 install, test, and service H.F. producing units.
- 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.



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 from the manufacturer.
- Read and follow all labels and the Technical Manual carefully before installing, operating, or servicing unit. Read the safety information at the beginning of the manual and in each section.
- Perform installation, maintenance, and service according to the Technical Manual, industry standards, and national, state, and local codes.

1-3. California Proposition 65 Warnings

WARNING: This product can expose you to chemicals including lead, which are known to the state of California to cause cancer and birth defects or other reproductive harm.

For more information, go to www.P65Warnings.ca.gov.

1-4. EMF Information

Electric current flowing through any conductor causes localized electric and magnetic fields (EMF). The current from arc welding (and allied processes including spot welding, gouging, plasma arc cutting, and induction heating operations) creates an EMF field around the welding circuit. EMF fields can interfere with some medical implants, e.g. pacemakers. Protective measures for persons wearing medical implants have to be taken. For example, restrict access for passers–by or conduct individual risk assessment for welders. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

1. Keep cables close together by twisting or taping them, or using a cable cover.
2. Do not place your body between welding cables. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep head and trunk as far away from the equipment in the welding circuit as possible.
5. Connect work clamp to workpiece as close to the weld as possible.
6. Do not work next to, sit or lean on the welding power source.
7. Do not weld whilst carrying the welding power source or wire feeder.

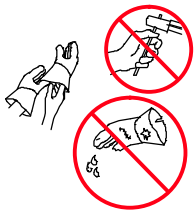
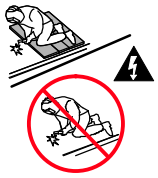
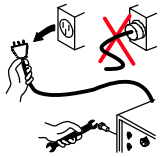
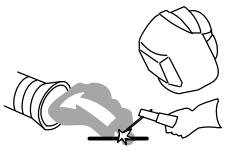
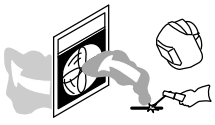
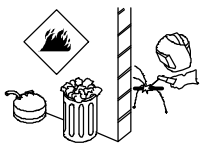
About Implanted Medical Devices:

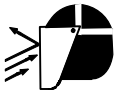
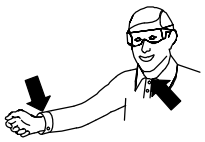
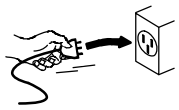
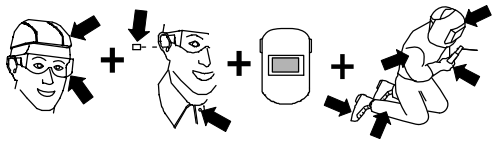
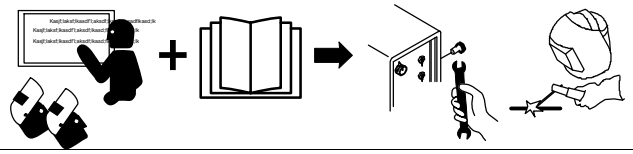
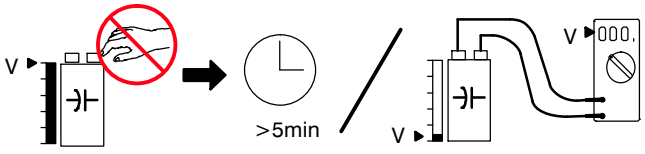
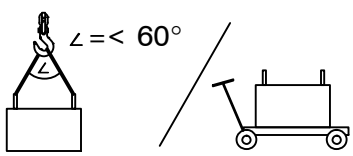
Implanted Medical Device wearers should consult their doctor and the device manufacturer before performing or going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations. If cleared by your doctor, then following the above procedures is recommended.

SECTION 2 – DEFINITIONS

2-1. Manufacturer Safety Symbols And Definitions

☞ *Some symbols are found only on CE products.*

	Warning! Watch Out! There are possible hazards as shown by the symbols. Safe1 2012-05
	When power is applied failed parts can explode or cause other parts to explode. Safe26 2012-05
	Wear dry insulating gloves. Do not touch electrode with bare hand. Do not wear wet or damaged gloves. Safe2 2017-04
	Protect yourself from electric shock by insulating yourself from work and ground. Safe3 2017-04
	Disconnect input plug or power before working on machine. Safe5 2017-04
	Keep your head out of the fumes. Safe6 2017-04
	Use forced ventilation or local exhaust to remove the fumes. Safe8 2012-05
	Use ventilating fan to remove fumes. Safe10 2012-05
	Keep flammables away from welding. Do not weld near flammables. Safe12 2012-05

	Welding sparks can cause fires. Have a fire extinguisher nearby, and have a watchperson ready to use it. Safe14 2012–05
	Do not weld on drums or any closed containers. Safe16 2017–04
	Do not remove or paint over (cover) the label. Safe20 2017–04
	Flying pieces of parts can cause injury. Always wear a face shield when servicing unit. Safe27 2012–05
	Always wear long sleeves and button your collar when servicing unit. Safe28 2012–05
	After taking proper precautions as shown, connect power to unit. Safe29 2012–05
	Do not use one handle to lift or support unit. Safe31 2017–04
	Wear hat and safety glasses. Use ear protection and button shirt collar. Use welding helmet with correct shade of filter. Wear complete body protection. Safe38 2012–05
	Become trained and read the instructions before working on the machine or welding. Safe40 2012–05
	Hazardous voltage remains on input capacitors after power is turned off. Do not touch fully charged capacitors. Always wait 5 minutes after power is turned off before working on unit, AND check input capacitor voltage, and be sure it is near 0 before touching any parts. Safe43 2017–04
	Always lift and support unit using both handles. Keep angle of lifting device less than 60 degrees. Use a proper cart to move unit. Safe44 2012–05

2-2. Miscellaneous Symbols And Definitions

☞ *Some symbols are found only on CE products.*

	Increase
	Press
	Percent
	Input Power Or Input Voltage
	On

	Three Phase
	Remote
	Off
	Single Phase
	Arc Control
	Volts

	Read Instructions
	Positive
	Amperes
	Output
	Negative

Notes

SECTION 3 – SPECIFICATIONS

3-1. Features And Benefits

Auto-Line™ Power Management Technology is circuitry that automatically adapts the power source to the primary voltage being applied (see Sections 4-7 and 4-8).

LVC™ Line Voltage Compensation is circuitry that keeps the power source output constant regardless of input power fluctuation.

Wind Tunnel Technology™ circulates air over components that require cooling, not over electronic circuitry, which reduces contaminants and improves reliability in harsh welding environments.

Fan-On-Demand™ cooling system operates only when needed, reducing noise, energy use and the amount of contaminants pulled through the machine.

Thermal Overload Protection automatically shuts down the unit, only when necessary to prevent damage to internal components if the duty cycle is exceeded or air flow and cooling are restricted (see Section 3-9).

Auto Remote Sense enables the unit to automatically sense the connection of a remote control.

Synergic Pulsed MIG Operation With A Synergic Feeder allows single knob control of the arc. As wirefeed speed is increased or decreased, the pulse parameters increase or decrease matching the power output to the wire speed.

3-2. Arc Controls

Inductance influences the arc stiffness, bead width and appearance, and puddle fluidity in MIG Welding Mode

(see Section 6-2).

SharpArc™ optimizes the size and shape of the arc cone, bead width and appearance, and puddle fluidity in Pulsed MIG Welding Mode (see Section 6-4).

3-3. Serial Number And Rating Label Location

The serial number and rating information for this product is located inside the case. Use rating label to determine input power requirements and/or rated output. For future reference, write serial number in space provided on back cover of this manual.

3-4. Software Licensing Agreement

The End User License Agreement and any third-party notices and terms and conditions pertaining to third-party software can be found at https://www.millerwelds.com/eula and are incorporated by reference herein.

3-5. Information About Default Weld Parameters And Settings

NOTICE *– Each welding application is unique. Although certain Miller Electric products are designed to determine and default to certain typical welding parameters and settings based upon specific and relatively limited application variables input by the end user, such default settings are for reference purposes only; and final weld results can be affected by other variables and application-specific circumstances. The appropriateness of all parameters and settings should be evaluated and modified by the end user as necessary based upon application-specific requirements. The end user is solely responsible for selection and coordination of appropriate equipment, adoption or adjustment of default weld parameters and settings, and ultimate quality and durability of all resultant welds. Miller Electric expressly disclaims any and all implied warranties including any implied warranty of fitness for a particular purpose.*

3-6. Unit Specifications

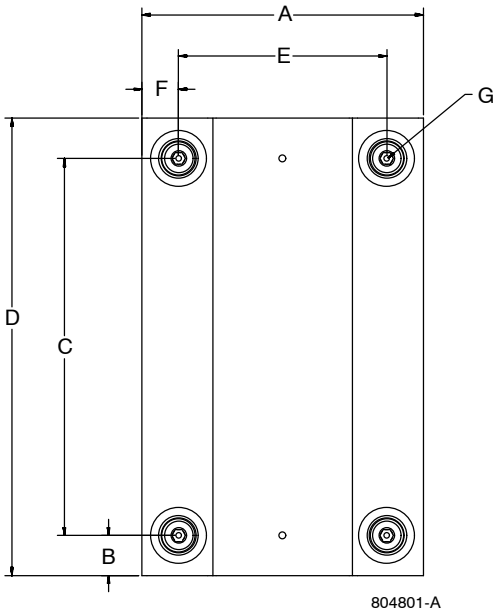
☞ *Do not use information in unit specifications table to determine electrical service requirements. See Sections 4-6 and 4-8 for information on connecting input power.*

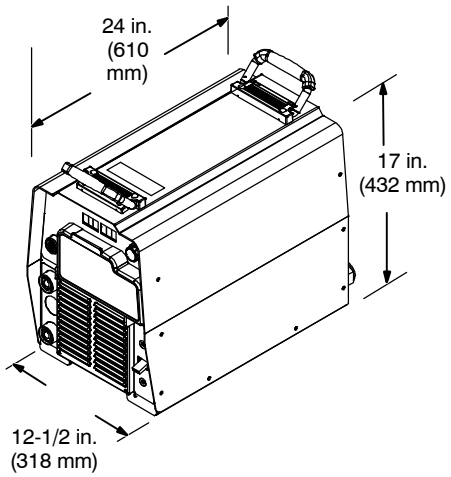
☞ *This equipment will deliver rated output at an ambient air temperature up to 104°F (40°C).*

Input Power	Rated Output	Voltage Range in CV Mode	Amperage Range in CC Mode	Max. Open-Circuit Voltage	RMS Amps Input at Rated Load Output, 60 Hz 3-Phase at NEMA Load Voltages and Class I Rating					KVA	KW
					208 V	230 V	400 V	460 V	575 V		
3-Phase	350 A at 34 VDC, 60% Duty Cycle	10–38 V	5–425 A	75 VDC	40.4	36.1	20.6	17.8	14.1	14.2	13.6
1-Phase	300 A at 32 VDC, 60% Duty Cycle*				60.8	54.6	29.7	25.4	19.9	11.7	11.2
*See Section 3-9 for Duty Cycle Rating.											

3-7. Dimensions And Weight

Hole Layout Dimensions	
A	11-3/4 in. (298 mm)
B	1-11/16 in. (42 mm)
C	15-3/4 in. (400 mm)
D	19-3/32 in. (485 mm)
E	8-11/16 in. (221 mm)
F	1-17/32 in. (39 mm)
G	1/4-20 UNC -2B thread
Weight	
80 lb (36.3 kg) 93.5 lb (42.4 kg) w/optional 115 VAC	





3-8. Environmental Specifications

A. Temperature Specifications

Operating Temperature Range*	Storage/Transportation Temperature Range
14 to 104°F (–10 to 40°C) *Output is derated at temperatures above 104°F (40°C).	–4 to 131°F (–20 to 55°C) Temp1_016-08

Notes

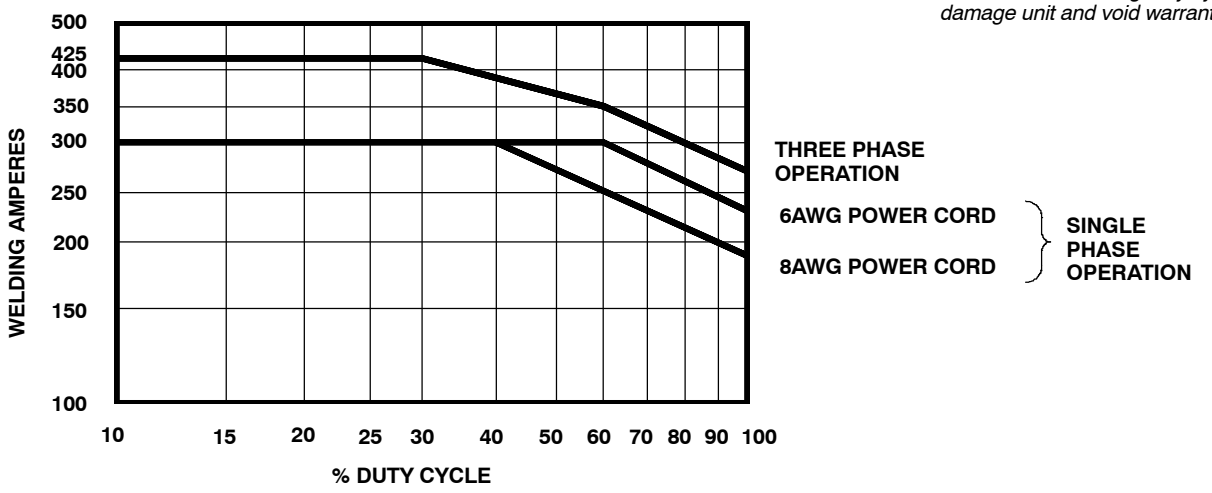
3-9. Duty Cycle And Overheating

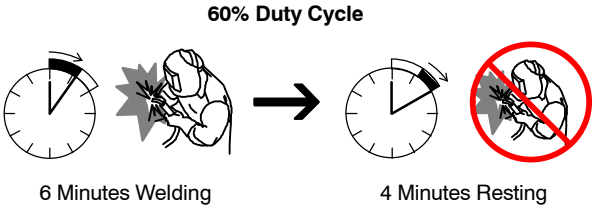
Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

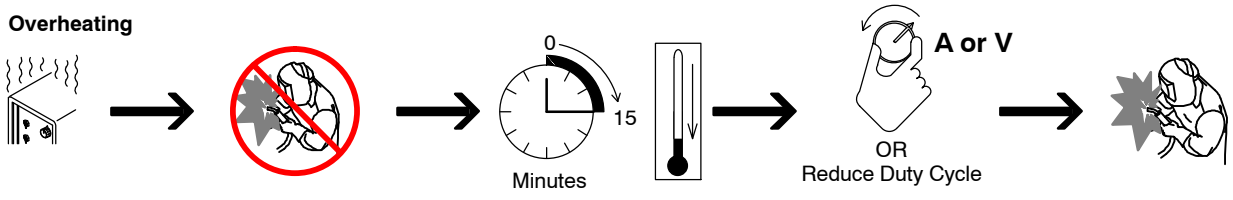
If unit overheats, output stops, a Help message is displayed and cooling fan runs. Wait fifteen minutes for unit to cool. Reduce amperage or voltage, or duty cycle before welding.

☞ *Single Phase Operation: The unit is supplied with a 8 AWG power cord. The rated output with 8 AWG is 300 amps, 32 volts at 40% duty cycle. To achieve 60% duty cycle change cord to 6 AWG.*

NOTICE *– Exceeding duty cycle can damage unit and void warranty.*





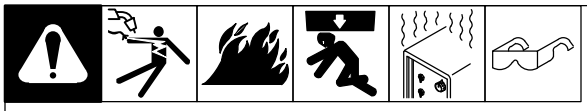


Ref. 216568-A

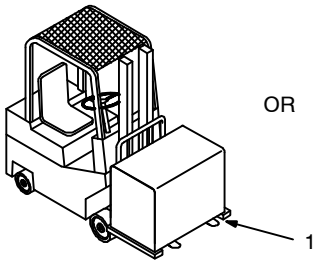
3-10. Static Output Characteristics

The static (output) characteristics of the welding power source can be described as *flat* during the GMAW process and *drooping* during the SMAW and GTAW processes. Static characteristics are also affected by control settings (including software), electrode, shielding gas, weldment material, and other factors. Contact the factory for specific information on the static characteristics of the welding power source.

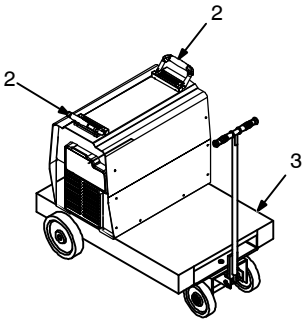
4-1. Selecting A Location



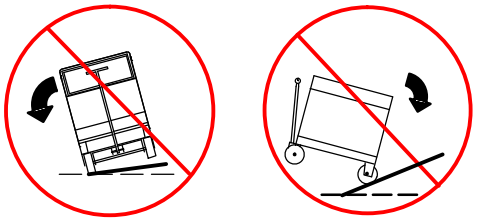
Movement



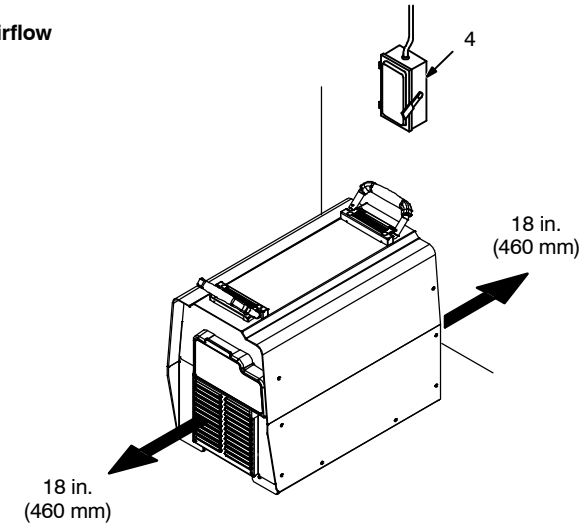
OR



Do not move or operate unit where it could tip.



Location And Airflow



Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.

1 Lifting Forks

Extend forks beyond opposite side of unit.

2 Lifting Handles

Use handles to lift unit.

3 Hand Cart

Use cart or similar device to move unit.

4 Line Disconnect Device

Locate unit near correct input power supply.

loc_med 2015-04

Notes

4-2. Selecting Cable Sizes*

NOTICE *– The Total Cable Length in Weld Circuit (see table below) is the combined length of both weld cables. For example, if the power source is 100 ft (30 m) from the workpiece, the total cable length in the weld circuit is 200 ft (2 cables x 100 ft). Use the 200 ft (60 m) column to determine cable size.*

Welding Amperes	Weld Cable Size** and Total Cable (Copper) Length in Weld Circuit Not Exceeding***							
	100 ft (30 m) or Less		150 ft (45 m)	200 ft (60 m)	250 ft (70 m)	300 ft (90 m)	350 ft (105 m)	400 ft (120 m)
	10 – 60% Duty Cycle AWG (mm^2)	60 – 100% Duty Cycle AWG (mm^2)	10 – 100% Duty Cycle AWG (mm^2)					
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)	2x2/0 (2x70)	2x2/0 (2x70)
300	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2x2/0 (2x70)	2x3/0 (2x95)	2x3/0 (2x95)
350	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2x2/0 (2x70)	2x3/0 (2x95)	2x3/0 (2x95)	2x4/0 (2x120)
400	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2x2/0 (2x70)	2x3/0 (2x95)	2x4/0 (2x120)	2x4/0 (2x120)
500	2/0 (70)	3/0 (95)	4/0 (120)	2x2/0 (2x70)	2x3/0 (2x95)	2x4/0 (2x120)	3x3/0 (3x95)	3x3/0 (3x95)
600	3/0 (95)	4/0 (120)	2x2/0 (2x70)	2x3/0 (2x95)	2x4/0 (2x120)	3x3/0 (3x95)	3x4/0 (3x120)	3x4/0 (3x120)
700	4/0 (120)	2x2/0 (2x70)	2x3/0 (2x95)	2x4/0 (2x120)	3x3/0 (3x95)	3x4/0 (3x120)	3x4/0 (3x120)	4x4/0 (4x120)
800	4/0 (120)	2x2/0 (2x70)	2x3/0 (2x95)	2x4/0 (2x120)	3x4/0 (3x120)	3x4/0 (3x120)	4x4/0 (4x120)	4x4/0 (4x120)
900	2x2/0 (2x70)	2x3/0 (2x95)	2x4/0 (2x120)	3x3/0 (3x95)				

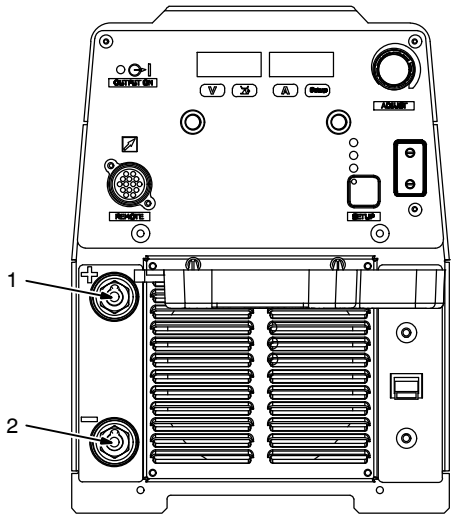
* This chart is a general guideline and may not suit all applications. If cable overheats, use next size larger cable.

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

***For distances longer than those shown in this guide, see AWS Fact Sheet No. 39, Welding Cables, available from the American Welding Society at http://www.aws.org.

Ref. S-0007-M 2017–08

4-3. Weld Output Terminals



Turn off power before connecting to weld output terminals.

Do not use worn, damaged, undersized, or repaired cables.

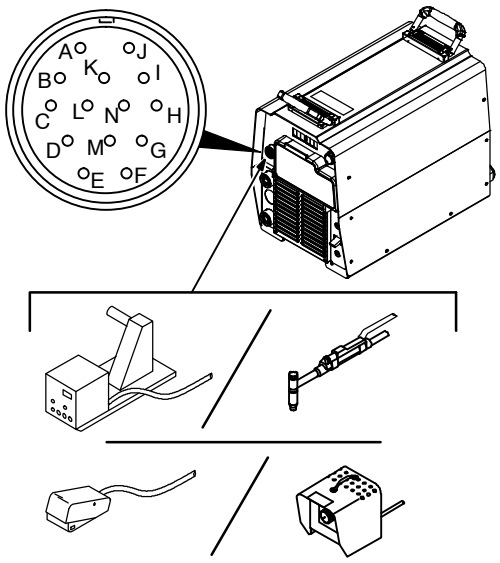
1 Positive (+) Weld Output Terminal

2 Negative (–) Weld Output Terminal

☞ *See Section 6-1 for standard connection diagrams.*

Ref. 804772-B / output term1 2015–02

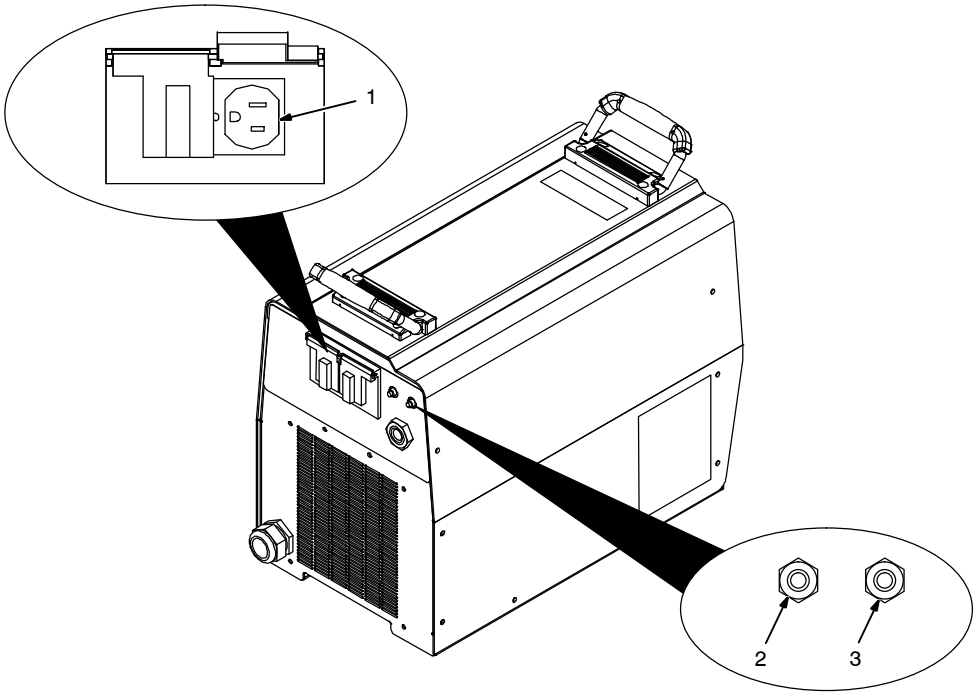
4-4. Remote 14 Receptacle Information



REMOTE 14	Socket*	Socket Information
24 VOLTS AC OUTPUT (CONTACTOR)	A	24 volts AC. Protected by supplementary protector CB2.
	B	Contact closure to A completes 24 volts AC contactor control circuit.
REMOTE OUTPUT CONTROL	C	Output to remote control; 0 to +10 volts DC, +10 volts DC in MIG mode.
	D	Remote control circuit common.
	E	0 to +10 volts DC input command signal from remote control.
	L	Wirefeed speed command, 0 to +10 volts DC output signal from wire feeder.
	M	CC/CV select 0 to +10 volts DC.
	N	Wirefeed speed common.
A/V AMPERAGE VOLTAGE	F	Current feedback; +1 volt DC per 100 amperes.
	H	Voltage feedback; +1 volt DC per 10 output receptacle volts.
GND	G	Circuit common for 24 volts AC circuits.
	K	Chassis common.

*The remaining sockets are not used.

4-5. Optional 115 Volts AC Duplex Receptacle And Supplementary Protectors



1 115 V 10 Amp AC Receptacle

2 Supplementary Protector CB1

3 Supplementary Protector CB2

CB1 protects duplex receptacle from overload.

CB2 protects 24 volts AC portion of Remote 14 receptacle from overload.

Press button to reset supplementary protector.

803691-E

4-6. Electrical Service Guide

NOTICE *− INCORRECT INPUT POWER can damage this welding power source. Phase to ground voltage shall not exceed +10% of rated input voltage.*

NOTICE *− Actual input voltage should not be 10% less than minimum and/or 10% more than maximum input voltages listed in table. If actual input voltage is outside this range, output may not be be available.*

Failure to follow these electrical service guide recommendations could create an electric shock or fire hazard. These recommendations are for a dedicated circuit sized for the rated output and duty cycle of the welding power source.

In dedicated circuit installations, the National Electrical Code (NEC) allows the receptacle or conductor rating to be less than the rating of the circuit protection device. All components of the circuit must be physically compatible. See NEC articles 210.21, 630.11, and 630.12.

	60 Hz 1-Phase				
Rated Supply Voltage (V)	208	230	400	460	575
Rated Maximum Supply Current I_{1max} (A)	54.1	48.4	26.6	22.8	17.8
Maximum Effective Supply Current I_{1eff} (A)	34.2	30.6	16.8	14.4	11.3
Maximum Recommended Standard Fuse Rating In Amperes [1]					
Time-Delay Fuses [2]	60	60	30	25	20
Normal Operating Fuses [3]	80	70	40	30	25
Maximum Recommended Supply Conductor Length In Feet (Meters) [4]	78 (24)	96 (29)	118 (36)	103 (31)	161 (49)
Raceway Installation					
Minimum Supply Conductor Size In AWG (mm^2) [5]	8 (10)	8 (10)	12 (4.0)	14 (2.5)	14 (2.5)
Minimum Grounding Conductor Size In AWG (mm^2) [5]	8 (10)	8 (10)	12 (4.0)	14 (2.5)	14 (2.5)

	60 Hz 3-Phase				
Rated Supply Voltage (V)	208	230	400	460	575
Rated Maximum Supply Current I_{1max} (A)	51.5	46.5	26.3	22.6	18
Maximum Effective Supply Current I_{1eff} (A)	28.7	26.3	14.9	13.0	10.1
Maximum Recommended Standard Fuse Rating In Amperes [1]					
Time-Delay Fuses [2]	60	50	30	25	20
Normal Operating Fuses [3]	70	60	35	30	25
Maximum Recommended Supply Conductor Length In Feet (Meters) [4]	60 (18)	73 (22)	88 (27)	118 (36)	185 (56)
Raceway Installation					
Minimum Supply Conductor Size In AWG (mm^2) [5]	10 (6.0)	10 (6.0)	14 (2.5)	14 (2.5)	14 (2.5)
Minimum Grounding Conductor Size In AWG (mm^2) [5]	10 (6.0)	10 (6.0)	14 (2.5)	14 (2.5)	14 (2.5)

Reference: 2020 National Electrical Code (NEC) (including article 630)

1 If a circuit breaker is used in place of a fuse, choose a circuit breaker with time-current curves comparable to the recommended fuse.

2 “Time-Delay” fuses are UL class “RK5” . See UL 248.

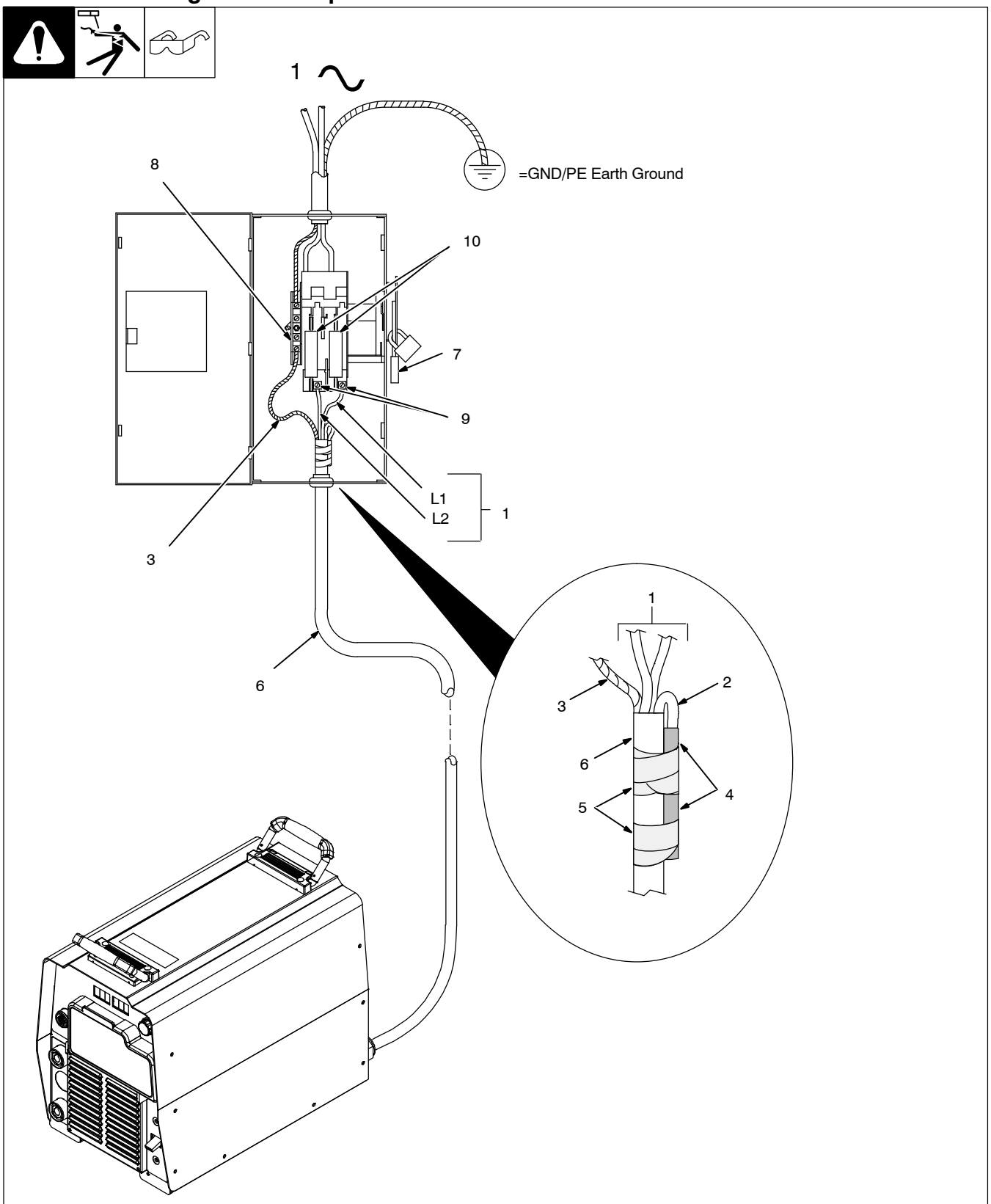
3 “Normal Operating” (general purpose - no intentional delay) fuses are UL class “K5” (up to and including 60 amps), and UL class “H” (65 amps and above).

4 Maximum total length of copper input conductors in entire installation, raceway and/or flexible cord.

5 Raceway conductor data in this section specifies conductor size (excluding flexible cord or cable) between the panelboard and the equipment per NEC Table 310.15(B)(16) and is based on allowable ampacities of insulated copper conductors having a temperature rating of 75°C (167°F) with not more than three single current−carrying conductors in a raceway.

Notes

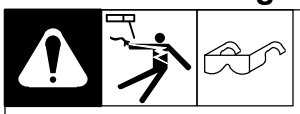
4-7. Connecting 1-Phase Input Power



Tools Needed:

input1 2012–05 – Ref. 803766-C / 803691-E

4-7. Connecting 1-Phase Input Power (Continued)



Installation must meet all National and Local Codes – have only qualified persons make this installation.

Disconnect and lockout/tagout input power before connecting input conductors from unit. Follow established procedures regarding the installation and removal of lockout/tagout devices.

Always connect green or green/yellow conductor to supply grounding terminal first, and never to a line terminal.

NOTICE *– The Auto-Line circuitry in this unit automatically adapts the power source to the primary voltage being applied. Check input voltage available at site. This unit can be connected to any input power between 208 and 575 VAC without removing cover to relink the power source.*

See rating label on unit and check input voltage available at site.

1 Black And White Input Conductor (L1 And L2)

2 Red Input Conductor

3 Green Or Green/Yellow Grounding Conductor

4 Insulation Sleeving

5 Electrical Tape

Insulate and isolate red conductor as shown.

6 Input Power Cord.

7 Disconnect Device (switch shown in the OFF position)

8 Disconnect Device Grounding Terminal

9 Disconnect Device Line Terminals

Connect green or green/yellow grounding conductor to disconnect device grounding terminal first.

Connect input conductors L1 and L2 to disconnect device line terminals.

10 Over-Current Protection

Select type and size of over-current protection using Section 4-6 (fused disconnect switch shown).

Close and secure door on disconnect device. Follow established lockout/tagout procedures to put unit in service.

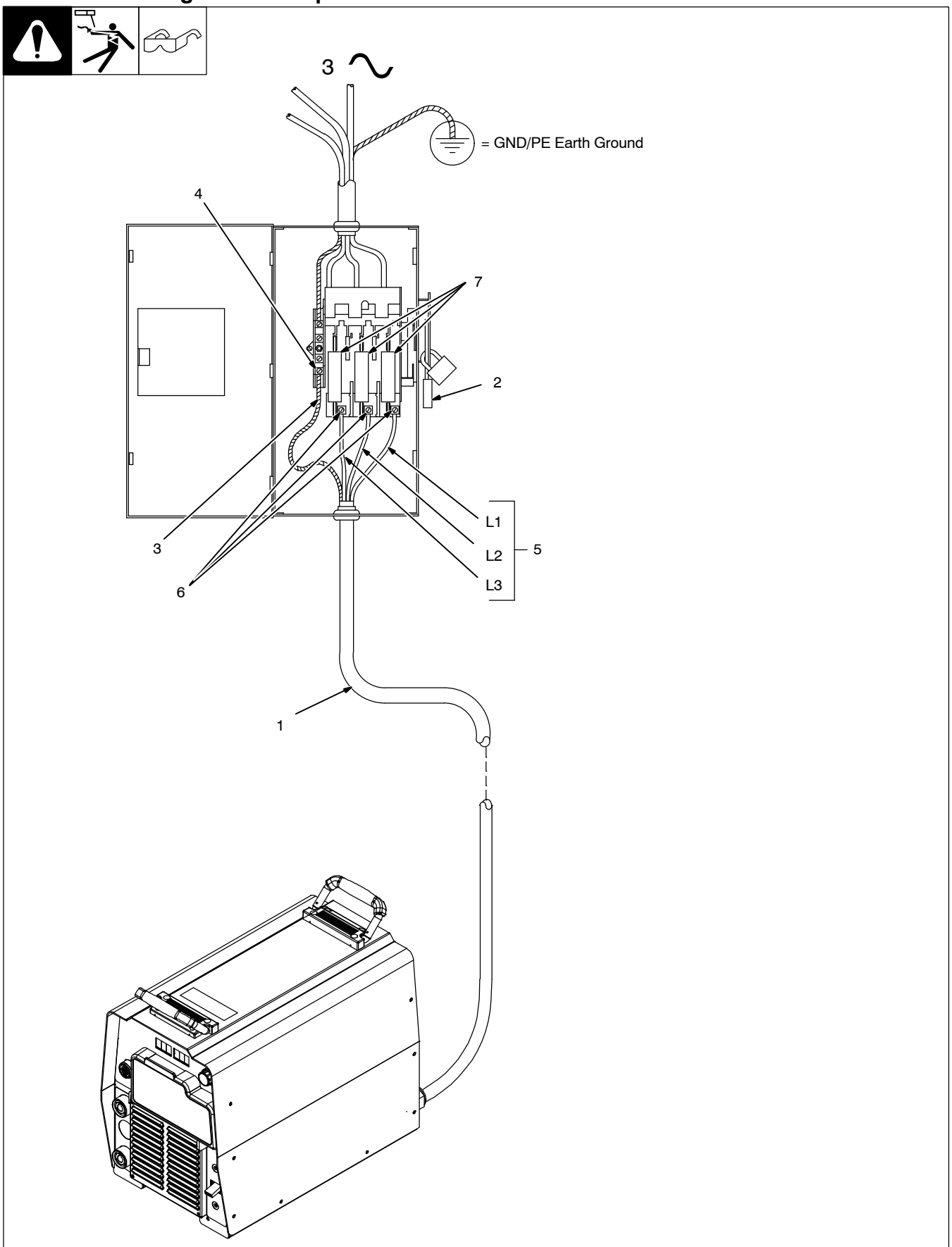
input1 2012–05

Notes

Work like a Pro!

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

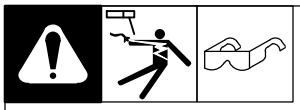
4-8. Connecting 3-Phase Input Power



Tools Needed:

input2 2012–05 – Ref. 803766-C / 803691-E

4-8. Connecting 3-Phase Input Power (Continued)



Installation must meet all National and Local Codes – have only qualified persons make this installation.

Disconnect and lockout/tagout input power before connecting input conductors from unit. Follow established procedures regarding the installation and removal of lockout/tagout devices.

Always connect green or green/yellow conductor to supply grounding terminal first, and never to a line terminal.

NOTICE *– The Auto-Line circuitry in this unit automatically adapts the power source to the primary voltage being applied. Check input voltage available at site. This unit can be connected to any input power between 208 and 575 VAC without removing cover to relink the power source.*

See rating label on unit and check input voltage available at site.

For Three-Phase Operation

1 Input Power Cord.

2 Disconnect Device (switch shown in the OFF position)

3 Green Or Green/Yellow Grounding Conductor

4 Disconnect Device Grounding Terminal

5 Input Conductors (L1, L2 And L3)

6 Disconnect Device Line Terminals

Connect green or green/yellow grounding conductor to disconnect device grounding terminal first.

Connect input conductors L1, L2, and L3 to disconnect device line terminals.

7 Over-Current Protection

Select type and size of over-current protection using Section 4-6 (fused disconnect switch shown).

Close and secure door on disconnect device. Follow established lockout/tagout procedures to put unit in service.

input2 2012–05

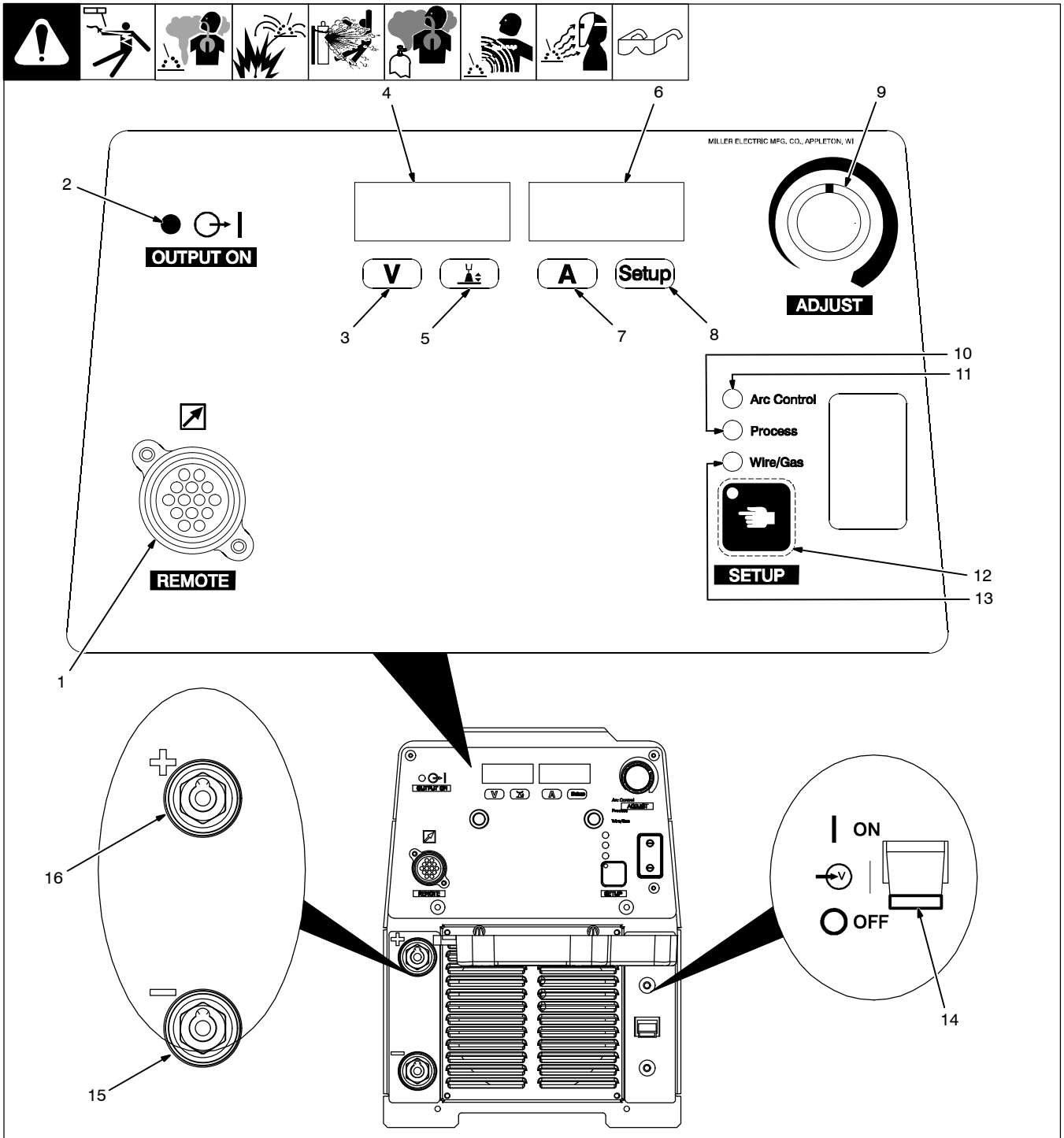
Notes

Work like a Pro!

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

SECTION 5 – GENERAL OPERATION

5-1. Front Panel



Ref. 804772-B / 235550-A

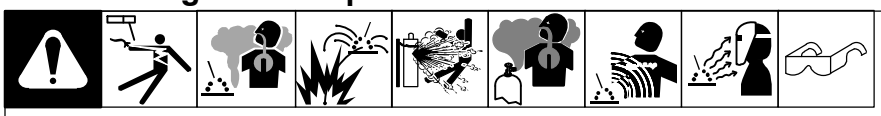
☞ *Weld process operation sections describe functionality of the identified items.*

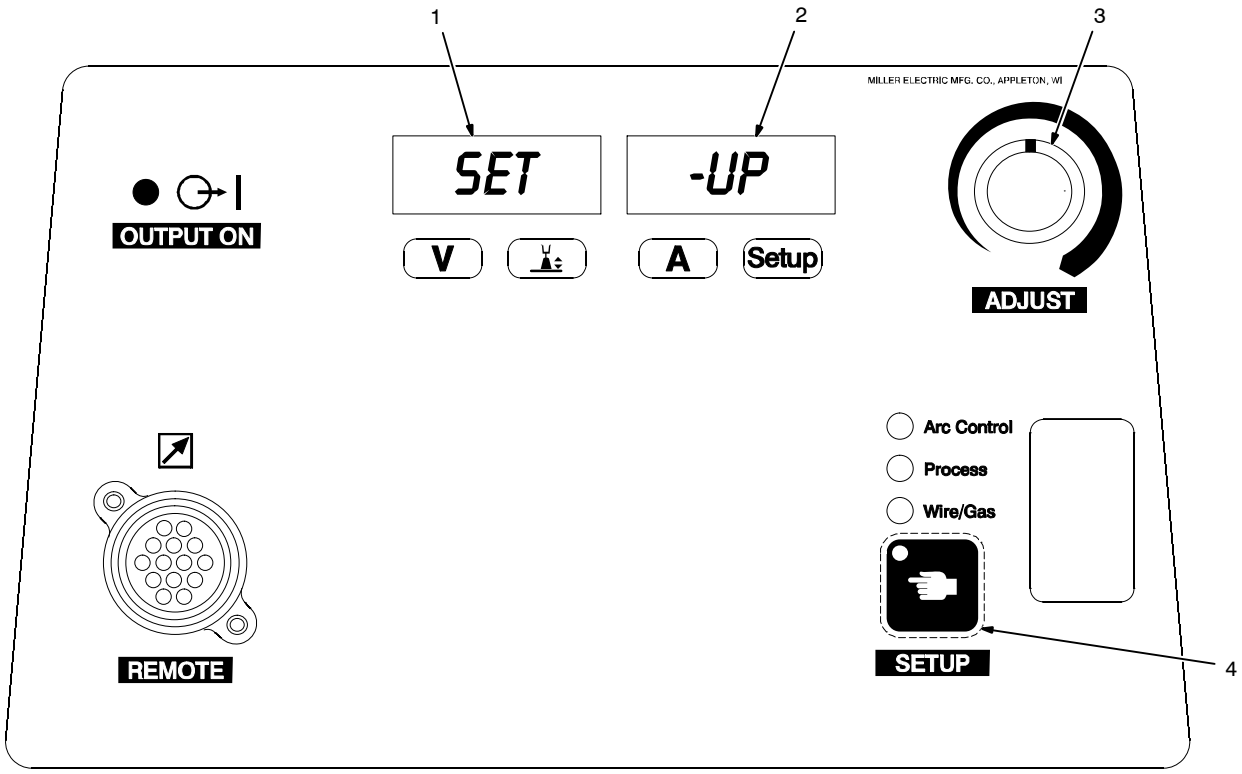
1 Remote 14 Receptacle
2 Output ON Indicator Light
3 Volts Indicator
4 Left Display
5 Arc Length Indicator
6 Right Display

☞ *The meters display the actual weld output values after arc initiation and remains displayed for approximately three seconds after the arc is broken.*

7 Amps Indicator
8 Setup Indicator
9 Adjust Control
10 Process Indicator
11 Arc Control Indicator
12 Setup Button
13 Wire/Gas Type Indicator
14 Power Switch
15 Weld Output Terminal (–)
16 Weld Output Terminal (+)

5-2. Configuration Option Menu





Ref. 235550-A

1 Left Display
2 Right Display
3 Adjustment Control
4 Setup Button

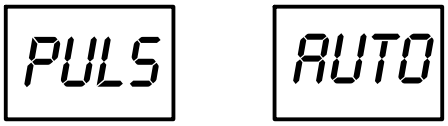
Setup

The Configuration Option Menu provides a means to customize some machine features for desired operation.

To enter the Configuration Option Menu, hold the Setup Button down during power up while the unit is displaying *8888* on the Left and Right Displays. *SET–UP* will be displayed momentarily.

Configuration options are displayed in the Left Display. Settings are displayed in the Right Display. Settings can be changed by turning the Adjust Control. If a setting does not change when the Adjust Control is turned, the option is not configurable. Pressing the Setup Button moves to the next configuration option.

5-2 Configuration Option Menu (Continued)



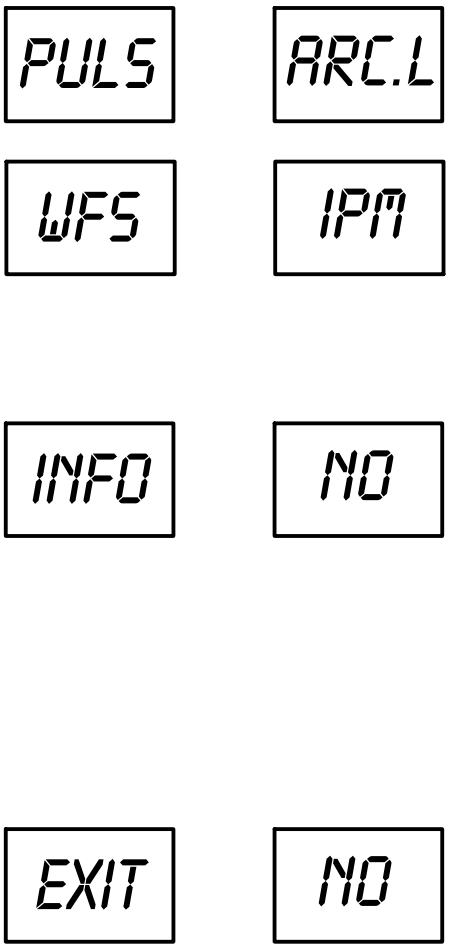
Pulsed MIG Manual/Auto Control

This option sets the Pulsed MIG control as manual (*PULS MAN)* or Auto *(PULS AUTO)* operation. When set to manual operation, the arc length setting on power source and wire speed setting on wire feeder need to be adjusted independently to achieve the desired arc length. When set to Auto operation, once arc length is determined it is not necessary to change the arc length value with changes in wirefeed speed.

The Invision 352 MPa and S-74 MPa are synergic allowing single knob control of the arc. As wirefeed speed is increased or decreased, the pulse parameters increase or decrease matching the power output to the wire speed.

☞ *Auto Operation will only work with the S-74 MPa wire feeder. All other wire feeders will only operate as manual control. Even when Auto is displayed, operation will be manual when any other feeder is connected.*

5-2 Configuration Option Menu (Continued)



Pulsed MIG Adjustment

This option allows adjusting the Pulsed MIG process in units of Arc Length (*PULS ARC.L*) or preset voltage (*PULS VOLT*).

Wire Feed Speed And Wire Diameter Units

WFS IPM:
WFS is displayed in inches per minute
Diameter is displayed in inches

WFS MPM:
WFS is displayed in meters per minute
Diameter is displayed in millimeters

Revision Information

This option identifies the unit's weld library (*INFO LIB*) and firmware revision (*INFO REV*).

Press the Setup Button while the unit is displaying *INFO LIB* to identify the unit's weld library.

Press the Setup Button while the unit is displaying *INFO REV* to identify the unit's firmware revision.

Pressing the Setup Button while the unit is displaying *INFO NO* will move to the next configuration option.

Exit Configuration Option Menu

Press the Setup Button while the unit is displaying *EXIT NO* to return to the first configuration option. Press the Setup Button while the unit is displaying *EXIT YES* to exit the Configuration Option Menu.

☞ *The Configuration Option Menu can be exited at any time by turning the unit off. Only if the unit is turned off after EXIT NO is displayed will configuration option changes be saved.*

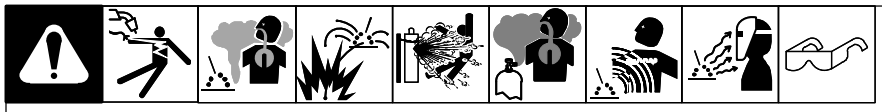
5-3. Factory Reset Procedure

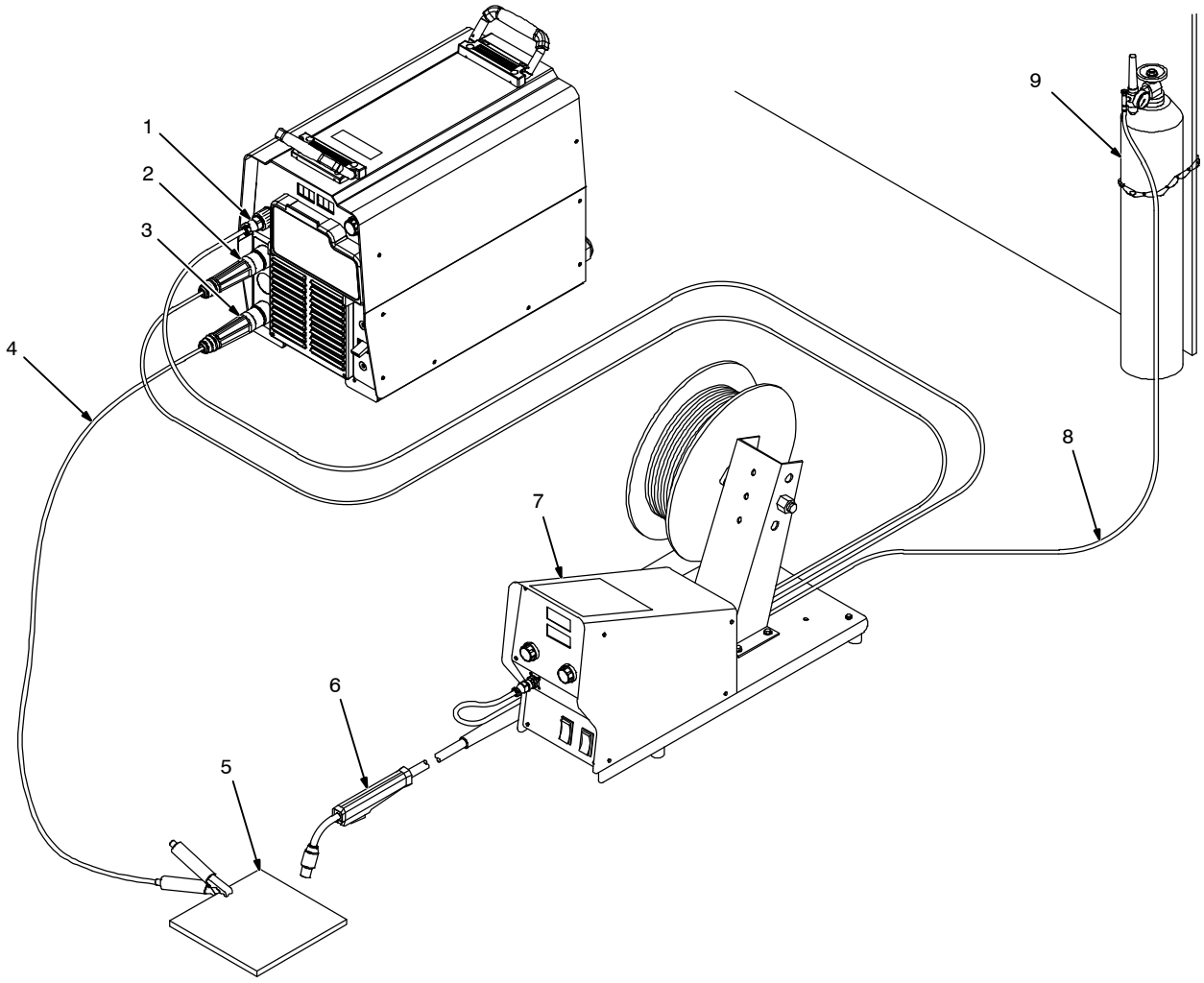
☞ *Start with the welder OFF.*

1 Press and hold the Setup button while turning the power on.
2 The display will now read SETUP and you can release the button.
3 Press and release the Setup button until the display reads INFO NO.
4 Press and hold the Setup button. The display will change to EXIT NO, but continue holding the button. The display will change to *FACTORY.
5 Release the Setup button. The display will now read LIFE NO.
6 Press and release the Setup button and the display will read TASK NO.
7 Use the Adjust knob and turn until FAC.RESET is displayed.
8 Press and hold the Setup button while the display counts down from 5. The display will show TASK DONE. Release the Setup button, and the display will go back to FAC.RESET.
9 Turn the Adjustment knob to display TASK NO.
10 Press and release the Setup button two times until the display shows EXIT NO.
11 Change the menu. To EXIT YES.
12 Press and release the Setup button one last time. The front display will illuminate as if it were turned on.

Reset is now complete.

6-1. Typical Connection For Remote Control Feeder GMAW/GMAW-P/FCAW Process





805058-B

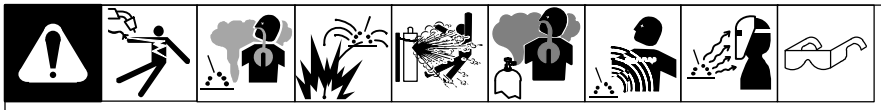
⚠ **Turn off power before making connections.**

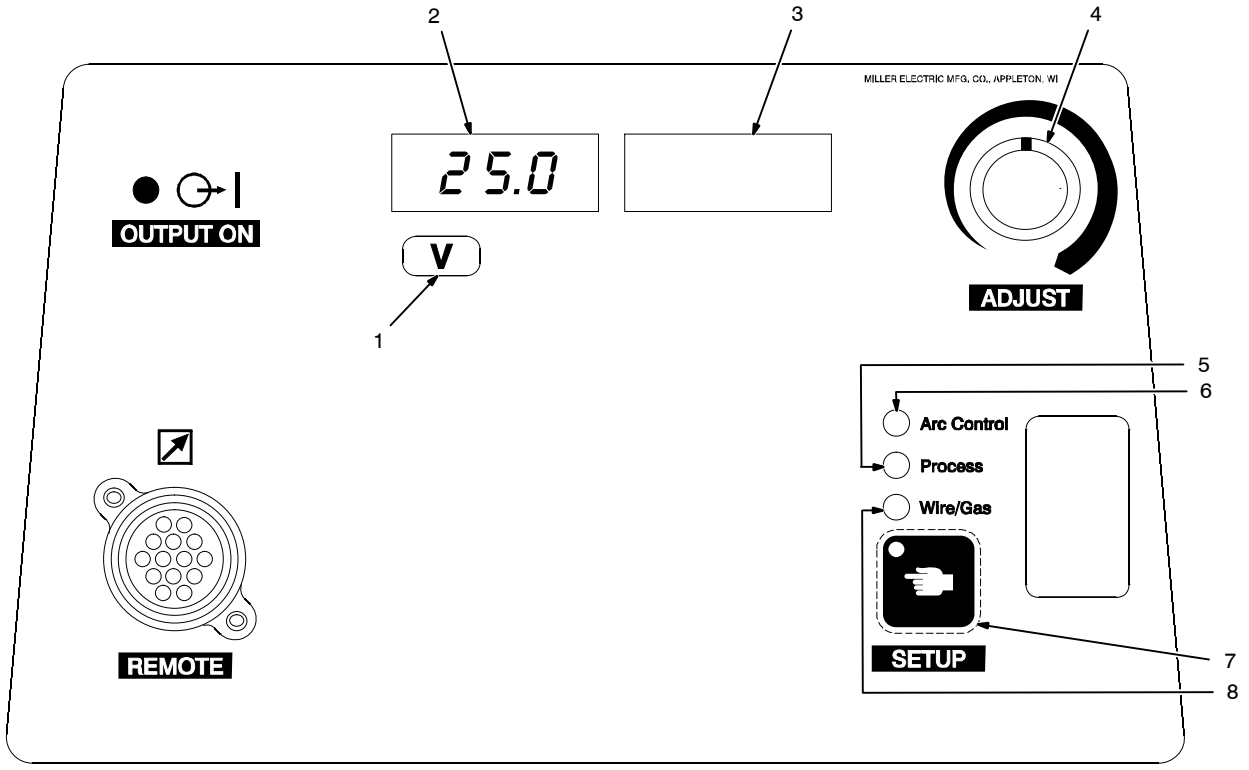
1 Remote 14-Receptacle
2 Positive (+) Weld Output Terminal
3 Negative (–) Weld Output Terminal
4 Ground Cable to Workpiece
5 Workpiece
6 Gun
7 Synergic Wire Feeder
8 Gas Hose
9 Gas Cylinder

Use of shielding gas is dependant on Wire Type.

☞ *The connection diagram illustrates DCEP (reverse polarity) suitable for all wires except self-shielded FCAW. The majority of self-shielded FCAW wires require DCEN (straight polarity).*

6-2. MIG Welding Mode - GMAW/FCAW Process





Ref. 235550-A

⚠ **Weld terminals are energized through the remote control in MIG welding mode.**

1 Volts Indicator
2 Left Display
3 Right Display
4 Adjust Control
5 Process Indicator
6 Arc Control Indicator
7 Setup Button
8 Wire/Gas Indicator

Setup

For typical system connections refer to Section 6-1.

Press Setup Button twice. The Process Indicator will be lit. Rotate Adjust Control to select *MIG*.

Press the Setup Button again. The Wire/Gas Indicator will be lit. The active wire type will appear in the Left and Right Display.

Rotate Adjust Control to select desired wire.

Press the Setup Button again. Wire/Gas Indicator is lit. The active gas type will appear in the Left and Right Display.

Rotate Adjust Control to select desired gas.

Press the Setup Button to confirm the selection. The unit will acknowledge a change of wire and gas information by displaying *PROG LOAD* momentarily.

☞ *For best results, select the appropriate Wire and Gas Type to match the actual wire and gas being used. Refer to the MIG – Wire and Gas Selection Table for available wires and gases (see Section 6-3).*

Operation

While the Volts Indicator is lit under the Left Display, the Adjust Control is used to set desired preset voltage.

☞ *The preset voltage can be adjusted remotely at the wire feeder if the feeder has a voltage control. This voltage control will override the Adjust Control of preset voltage on the welding power source.*

Pressing the Setup Button allows adjustment of Arc Control, Wire Type, Gas Type and preset voltage.

Arc Control (Inductance)

Press the Setup Button until the Arc Control Indicator is lit. *INDU* appears on the Left Display, and the corresponding inductance setting appears on the Right Display.

Rotate Adjust Control to select desired inductance setting from 0 to 100. Use lower inductance settings to stiffen the arc and reduce puddle fluidity. Use higher inductance settings to soften the arc and increase puddle fluidity.

Refer to the MIG – Wire and Gas Selection Table (see Section 6-3) for suggested inductance setting for the specific wire and gas being used.

Press the Setup Button to return to adjustment of preset voltage.

☞ *Each Wire and Gas Type combination has independent preset voltage and inductance settings. These settings are preserved when the unit is turned off.*

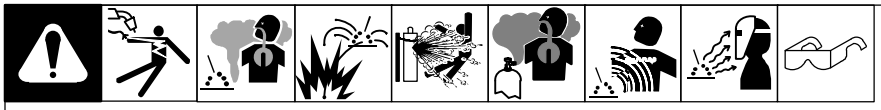
6-3. MIG - Wire and Gas Selection Table

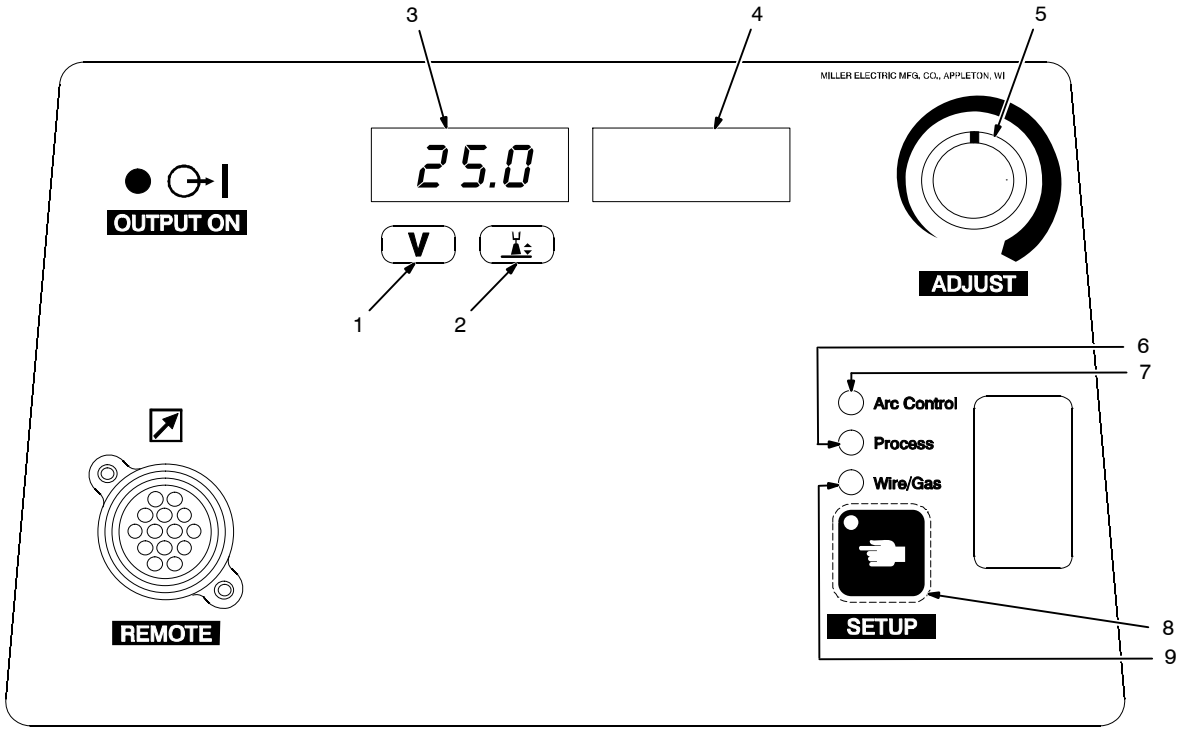
WIRE TYPES**		GAS TYPES	DEFAULT INDUCTANCE
Steel	.035 (0.9) STL .045 (1.2) STL .052 (1.4) STL	ARGN CO2 (75 ARGON / 25 CARBON DIOXIDE) ARGN OXY (98 ARGON / 2 OXYGEN)	30
	.035 (0.9) STL .045 (1.2) STL	CO2 (CARBON DIOXIDE)	10
Flux Core	.035 (0.9) FCAW .045 (1.2) FCAW .052 (1.4) FCAW 1/16 (1.6) FCAW	ARGN CO2 (75 ARGON / 25 CARBON DIOXIDE) * CO2 (CARBON DIOXIDE)	30 *
Metal Core	.045 (1.2) MCOR .052 (1.4) MCOR 1/16 (1.6) MCOR	ARGN CO2 (90 ARGON / 10 CARBON DIOXIDE)	30
Stainless Steel	.035 (0.9) SSTL .045 (1.2) SSTL	TRI MIX (90 HELIUM / 7.5 ARGON / 2.5 CARBON DIOXIDE) ARGN OXY (98 ARGON / 2 OXYGEN)	70
Aluminum	.035 (0.9) AL4X (4000 Series) .040 (1.0) AL4X (4000 Series) 3/64 (1.2) AL4X (4000 Series) 1/16 (1.6) AL4X (4000 Series) .035 (0.9) AL5X (5000 Series) .040 (1.0) AL5X (5000 Series) 3/64 (1.2) AL5X (5000 Series) 1/16 (1.6) AL5X (5000 Series)	ARGN (ARGON)	10

*For self-shielded FCAW wires use the ARGN CO2 gas selection and set inductance to less than 10.
**Wire diameter in inches (mm). Refer to section 5-2 to change displayed units.

Notes

6-4. Pulsed MIG Welding Mode - GMAW-P Process





Ref. 235550-A

⚠ **Weld terminals are energized through the remote control in Pulsed MIG welding mode.**

1 Volts Indicator
2 Arc Length Indicator
3 Left Display
4 Right Display
5 Adjust Control
6 Process Indicator
7 Arc Control Indicator
8 Setup Button
9 Wire/Gas Indicator

Setup

For typical system connections refer to Section 6-1.

Press Setup Button twice. The Process Indicator will be lit. Rotate Adjust Control to select *PULS*.

Press the Setup Button until the Wire/Gas Indicator is lit. The active wire type will appear in the Left and Right Display.

Rotate Adjust Control to select desired wire.

Press the Setup Button again. Wire/Gas Indicator is lit. The active gas type will appear in the Left and Right Display.

Rotate Adjust Control to select desired gas.

Press the Setup Button again to confirm the selection. The unit will acknowledge a change of wire and gas information by displaying *PROG LOAD* momentarily.

☞ *For best results, select the appropriate Wire and Gas Type to match the actual wire and gas being used. Refer to Pulsed MIG – Wire and Gas Selection Table for available wires and gases (see Section 6-5).*

Operation

While the Arc Length Indicator is lit under the Left Display, the Adjust Control is used to set desired arc length setting.

☞ *The arc length will be adjusted remotely at the wire feeder if the feeder has a voltage control. This voltage control will override the Adjust Control on the welding power source.*

Arc Control (SharpArc)

Press the Setup Button until the Arc Control Indicator is lit. *SHRP* appears on the Left Display, and the corresponding SharpArc setting appears on the Right Display.

Rotate Adjust Control to select desired SharpArc setting from 0 to 50, default is 25. Adjusting the SharpArc setting changes the welding arc cone. Lower settings widen the arc cone, increases puddle fluidity and flattens the weld bead appearance.

Higher settings narrow the arc cone, reduces puddle fluidity and crowns the weld bead appearance.

☞ *Each Wire and Gas Type combination has independent Arc Length and SharpArc settings. These settings are preserved when the unit is turned off.*

Arc Length - Pulse MIG Manual Control (see Section 5-2)

Arc length corresponds to the level of energy needed to burn off the welding electrode. As wire feed speed increases, a higher arc length setting is required to burn off the additional wire. The arc length setting appears in the Left Display when the Arc Length Indicator is lit. Arc length can be adjusted from 0 to 100.

After the welding output terminals are energized, but prior to arc initiation, the unit displays the letter "*R*" and a reference wire speed (IPM) on the Right Display. The reference wire speed can be used as a starting point for the wire speed setting at the feeder. The wire speed and arc length setting can then be further adjusted to achieve the desired arc length.

The Configuration Option Menu (see Section 5-2) can be used to change the arc length setting (0 to 100) to average arc voltage. Average arc voltage can be used as an alternative method to set the Pulsed MIG welding arc with the same parameters (voltage and wire speed) as a conventional MIG arc. Lower voltage settings correspond to tighter arc lengths while higher voltage settings correspond to longer arc lengths. If the voltage mode is selected, the average voltage preset will be displayed on the Left Display with the Volts Indicator lit.

Arc Length - Pulse MIG Auto Control (see Section 5-2)

In Auto operation the arc length setting is 0-100. The programs have been developed at 50 arc length setting. Increasing or decreasing the arc length setting from 50 will change the arc length. It is not necessary to change the arc length value when changing wire feed speed settings.

☞ *Auto Operation will only work with the S-74 MPa wire feeder. All other wire feeders will only operate as manual control.*

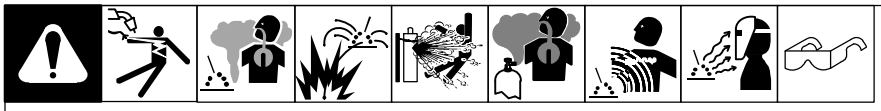
6-5. Pulsed MIG - Wire and Gas Selection Table

WIRE TYPES**		GAS TYPES
Steel	.035 (0.9) STL .045 (1.2) STL	ARGN CO2 (ARGON / CARBON DIOXIDE) 80 ARGN CO2 (ARGON / CARBON DIOXIDE) ARGN OXY (ARGON / OXYGEN)
Steel 100S	.035 (0.9) STL .045 (1.2) STL	100S C5 (95 ARGON / 5 CARBON DIOXIDE)
Metal Core	.045 (1.2) MCOR .052 (1.4) MCOR	ARGN CO2 (ARGON / CARBON DIOXIDE)
Stainless Steel	.035 (0.9) SSTL .045 (1.2) SSTL	TRI MIX (TRI-GAS MIXTURE) ARGN OXY (ARGON / OXYGEN) ARGN CO2 (ARGON / CARBON DIOXIDE)
Aluminum	.035 (0.9) AL4X (4000 Series) .040 (1.0) AL4X (4000 Series) 3/64 (1.2) AL4X (4000 Series) 1/16 (1.6) AL4X (4000 Series)	ARGN (ARGON)
	.035 (0.9) AL49 (4943) .040 (1.0) AL49 (4943) 3/64 (1.2) AL49 (4943) 1/16 (1.6) AL49 (4943)	
	.035 (0.9) AL5X (5000 Series) .040 (1.0) AL5X (5000 Series) 3/64 (1.2) AL5X (5000 Series) 1/16 (1.6) AL5X (5000 Series)	ARGN (ARGON) HE AR25 (HELIUM/ARGON)
Nickel	.035 (0.9) NI .045 (1.2) NI	ARGN HE (ARGON / HELIUM) ARGN (ARGON)
Copper Nickel	.035 (0.9) CUNI .045 (1.2) CUNI	HE ARGN (HELIUM / ARGON)
Silicon Bronze	.035 (0.9) SIBR .045 (1.2) SIBR	ARGN (ARGON)
Titanium	.035 (0.9) TI-5 .045 (1.2) TI-5	ARGN HE25 (75 ARGON / 25 HELIUM)
	.035 (0.9) TI-5 .045 (1.2) TI-5	ARGN HE50 (50 ARGON / 50 HELIUM)
**Wire diameter in inches (mm). Refer to section 5-2 to change displayed units.		

☞ *Other normal gas mixtures can be used by adjusting arc length and sharp arc. Use the program closest to your gas mixture and wire type and size.*

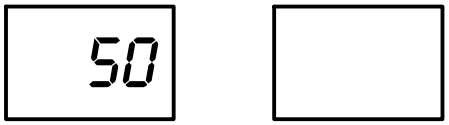
Notes

6-6. Remote Process Select



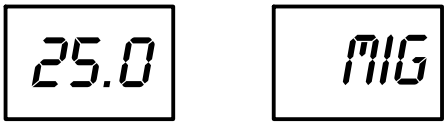
This power source can be used with wire feeders that support Remote Process Select. This feature allows the operator to switch the active welding process between MIG and Pulsed MIG at the wire feeder. To determine if the welding system is Remote Process Select capable, connect the wire feeder to the power source and review the power source display variations shown below.

☞ *When used with an XMT power source, the Process Select knob must be set to Pulsed MIG for Remote Process Select to be active.*



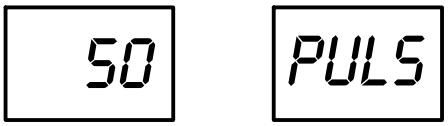
Power Source Display – Wire Feeder with Remote Process Select Not Detected

When the power source Right Display is blank, a wire feeder with Remote Process Select is not detected. Set the active weld process at the power source.



Power Source Display – Wire Feeder with Remote Process Select Detected

When the power source Right Display is MIG, a wire feeder with Remote Process Select is detected and set for MIG operation. The active weld process can **only** be changed at the wire feeder.

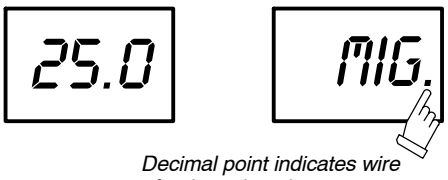


Power Source Display – Wire Feeder with Remote Process Select Detected and Set for Pulsed MIG

When the power source Right Display is PULS, a Remote Process Select wire feeder is detected and is set for Pulsed MIG operation. The active weld process can **only** be changed at the wire feeder.

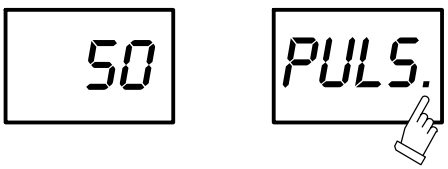
Using a Dual Wire Feeder with Remote Process Select

When using a dual wire feeder with Remote Process Select, different weld programs for the left and right side can be selected. The power source MIG and Pulsed MIG programs for the left side of wire feeder are selected with the left side of the wire feeder active. The power source MIG and Pulsed MIG programs for the right side are selected with the right side of the wire feeder active. When the right side of the wire feeder is active, the power source Right Display will show a decimal point in the lower right hand corner as shown.



Power Source Display – Dual Wire Feeder with Right Side Active and Set for MIG

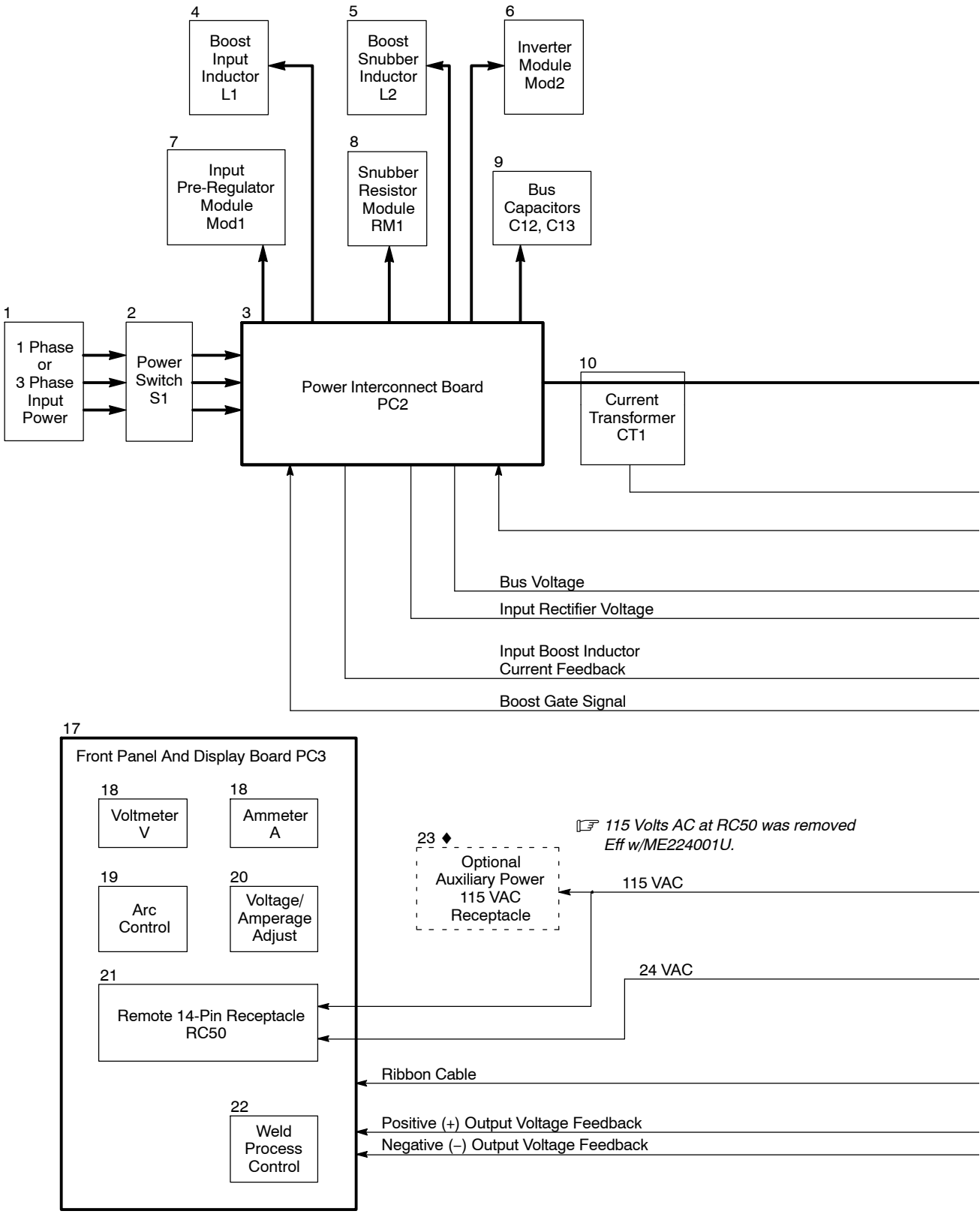
Decimal point indicates wire feeder right side is active.

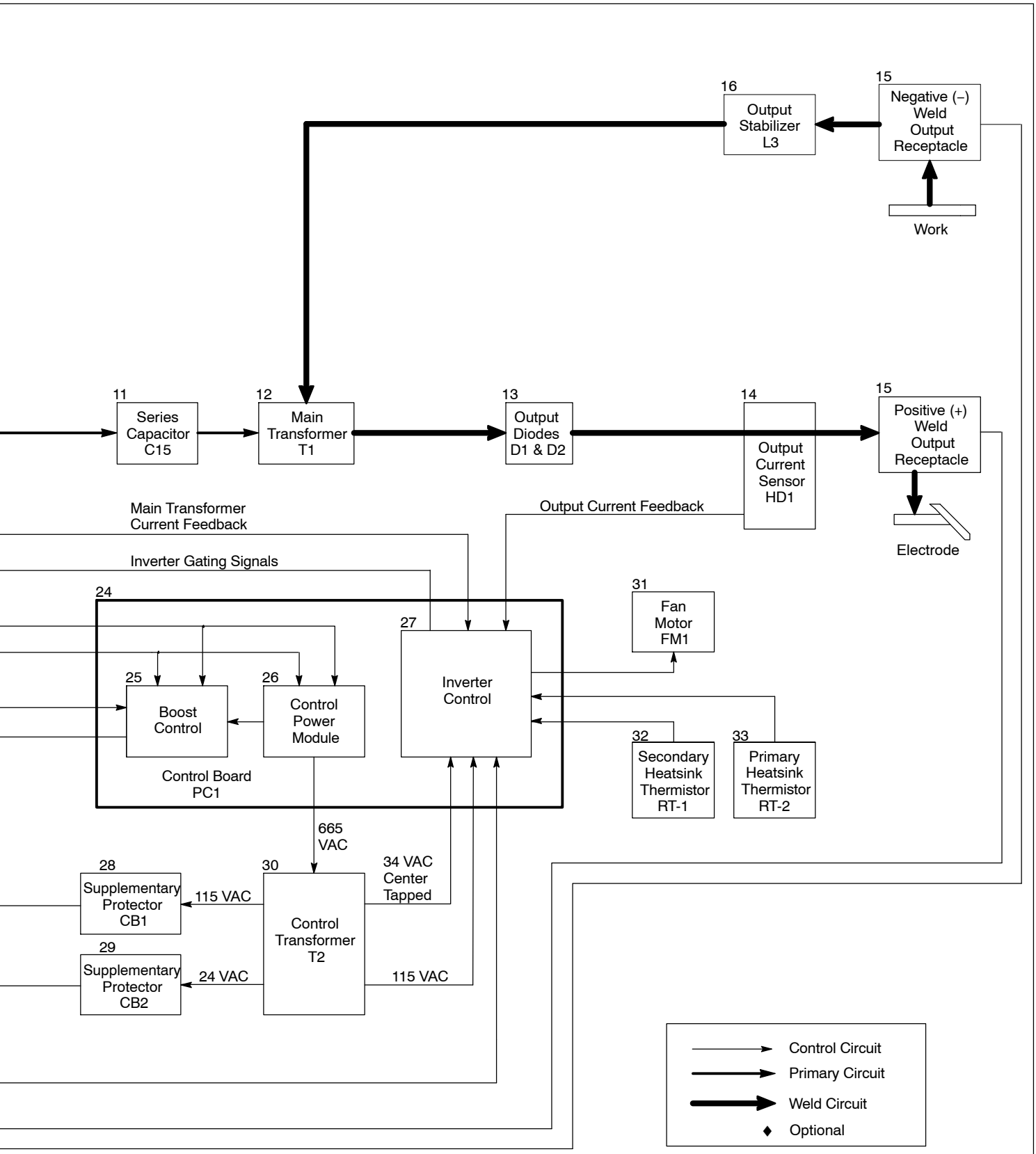


Power Source Display – Dual Wire Feeder with Right Side Active and Set for Pulsed MIG

Decimal point indicates wire feeder right side is active.

Notes


4
Boost Input Inductor L1
5
Boost Snubber Inductor L2
6
Inverter Module Mod2
7
Input Pre-Regulator Module Mod1
8
Snubber Resistor Module RM1
9
Bus Capacitors C12, C13
1
1 Phase or 3 Phase Input Power
2
Power Switch S1
3
Power Interconnect Board PC2
10
Current Transformer CT1
Bus Voltage
Input Rectifier Voltage
Input Boost Inductor Current Feedback
Boost Gate Signal
17
Front Panel And Display Board PC3
18
Voltmeter V
18
Ammeter A
19
Arc Control
20
Voltage/ Amperage Adjust
21
Remote 14-Pin Receptacle RC50
22
Weld Process Control
23 ♦
Optional Auxiliary Power 115 VAC Receptacle
☞ 115 Volts AC at RC50 was removed Eff w/ME224001U.
115 VAC
24 VAC
Ribbon Cable
Positive (+) Output Voltage Feedback
Negative (–) Output Voltage Feedback


16
Output Stabilizer L3
15
Negative (–) Weld Output Receptacle
Work
11
Series Capacitor C15
12
Main Transformer T1
13
Output Diodes D1 & D2
14
Output Current Sensor HD1
15
Positive (+) Weld Output Receptacle
Electrode
Main Transformer Current Feedback
Output Current Feedback
Inverter Gating Signals
24
27
Inverter Control
31
Fan Motor FM1
25
Boost Control
26
Control Power Module
Control Board PC1
32
Secondary Heatsink Thermistor RT-1
33
Primary Heatsink Thermistor RT-2
665 VAC
28
Supplementary Protector CB1
115 VAC
30
Control Transformer T2
34 VAC Center Tapped
29
Supplementary Protector CB2
24 VAC
115 VAC
Control Circuit
Primary Circuit
Weld Circuit
Optional

Theory Of Operation Components

1 Primary Input Power

Single or Three-Phase AC primary power supply.

2 Power Switch S1

Provides on/off control of primary input power to welding power source.

3 Power Interconnect Board PC2

Provides electrical connections for L1, L2, MOD1, MOD2, RM1, C12 & C13. Precharge and bleeder resistors and snubber capacitors are mounted on PC2.

4 Boost Input Inductor L1

Required to boost input rectifier voltage to bus voltage.

5 Boost Snubber Inductor L2

Required to ensure soft−switching of the boost IGBT located in MOD1.

6 Inverter Module MOD2

Contains the main inverter IGBTs, snubber IGBTs, main boost diode, and two boost snubber diodes.

7 Input Pre−Regulator Module MOD1

Contains the input rectifier diodes, boost IGBT, and one boost snubber diode.

8 Snubber Resistor Module RM1

Contains one boost snubber resistor and one inverter snubber resistor.

9 Bus Capacitors C12 & C13

Stores energy and filters the DC bus voltage for input boost and inverter.

10 Current Transformer CT1

Provides T1 current feedback to PC1. Used to protect inverter IGBTs in case of T1 primary overcurrent.

11 Series Capacitor C15

Provides protection against T1 saturation. Saturation occurs when the voltage across the transformer is not balanced. The unbalanced voltage appears as a DC offset voltage across the transformer and can cause a T1 primary overcurrent. The capacitor protects against this condition by blocking the DC offset.

12 Main Transformer T1

Switching action of IGBTs in MOD2 creates the AC voltage source for T1 primary. T1 secondary outputs supply power to the weld circuit.

13 Output Diodes D1, D2

Rectifies the main secondary output of T1.

14 Output Current Sensor HD1

Provides weld output current feedback to PC1.

15 Positive (+) and Negative (−) Weld Output Receptacles

Provide weld output and allow changing of output polarity.

16 Output Stabilizer L3

Filters or smooths the DC weld output current.

17 User Interface Board PC3

Consists of Voltmeter V, Ammeter A, Arc Control, Voltage/Amperage Adjust, Remote 14−pin receptacle, Process Selector Switch, and Weld Process Control.

18 Voltmeter V, Ammeter A

See Section 5-1, Front Panel.

19 Arc Control

Controls Dig in Stick process or Inductance in MIG process. See Section 5-1 Front Panel.

20 Voltage/Amperage Adjust

Selects weld output voltage or amperage level. See Section 5-1.

21 Remote 14-Pin Receptacle RC50

Provides connection for accessory equipment. See Sections 5-1, Front Panel, and 4-4, Remote 14 Receptacle Information.

22 Weld Process Control

Controls weld output by automatically adjusting output current command signal to Inverter Control.

23 Optional Auxiliary Power 115 VAC Receptacle

Provides connection for auxiliary equipment to welding power source.

24 Control Board PC1

Contains the boost control, control power module, and inverter control.

25 Boost Control

Controls switching of boost IGBT in MOD1 to regulate L1 current and the DC bus voltage.

26 Control Power Module

Contains power supply for boost control power, and inverter IGBTs to create AC voltage source for T2 primary.

27 Inverter Control

Controls the main inverter and snubber IGBTs within MOD2. Regulates the weld output current to the value received from weld process controller. Provides power to PC3. Drives fan motor and gas valve. Provides interface between primary and secondary thermistors and PC3.

☞ *115 Volts AC at RC50 was removed Eff w/ME224001U.*

28 Supplementary Protector CB1

Provides overload protection for remote 14-pin 115 VAC power, and optional 115 VAC receptacle.

29 Supplementary Protector CB2

Provides overload protection for remote 14-pin 24 VAC power.

30 Control Transformer T2

Provides power to inverter control on PC1, remote 14-pin receptacle, and optional 115 VAC receptacle.

31 Fan Motor FM1

Provides cooling of heatsinks and components mounted inside wind tunnel. The fan motor is thermostatically controlled and only runs when cooling is needed. Once unit is cooled to proper temperature, fan will continue to run for ten minutes.

32 Secondary Heatsink Thermistor RT-1

Monitors temperature of secondary heatsink for fan motor control and overtemperature shutdown.

33 Primary Heatsink Thermistor RT-2

Monitors temperature of primary heatsink for fan motor control and overtemperature shutdown.

SECTION 8 – TROUBLESHOOTING

8-1. Troubleshooting Flowchart

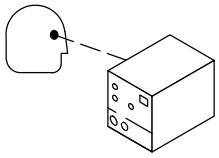
This flowchart is intended as a general guide only. Always read and follow the safety information and specific instructions given elsewhere in this Technical Manual.

Gather Information

Note stock number and serial number of machine.
What does the operator say is wrong?
What was the operator doing?
When and where does the problem occur?
Has any part of the system recently changed?

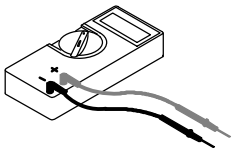
Visual Inspection

Check for signs of damage and for proper connections, gas supply, cable routing, consumables, and wire feed system.



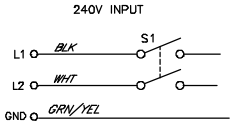
Pre-Power Checks

For inverter power sources that have unknown problems or are not powering up.



Check Input Power

Check for required input voltage, phases, and frequency.
Make sure power source and plugs are wired correctly.
Make sure engine speed is set to correct RPM.

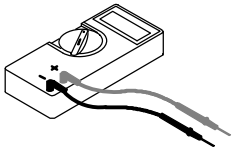


Check Extranet

For important service memos and software updates.
It is possible the issue has already been identified and addressed by Miller.

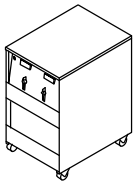
Check OCV

Check open-circuit voltage for each process and polarity.
Check auxiliary power output if available.



Load/Function Test

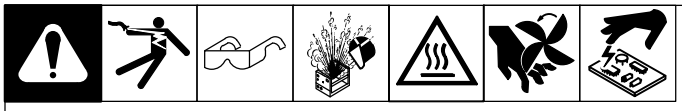
Test machine under load with a load bank.
Test all system functions.
Perform a weld test when possible.



Trouble1_2018-04

PRE-POWER CHECKS

8-2. Checking Unit Before Applying Power



Measure voltage of input capacitors according to Section 8-3 and be sure voltage is near zero before touching any parts.

Before applying power to unit, complete the following checks to avoid causing further damage.

Although control board PC1 and power interconnect board PC2 are briefly checked here, more complete tests may be needed later for these parts. This procedure is simply to get a basic okay to power up unit.

☞ *See Section 8-18 for test points and values.*

☞ *Use Miller Testing Booklet (Part No. 150853) when servicing this unit.*

☞ *See the Miller Extranet for service memos that may aid in the repair of this product.*

Follow the pre-power checklist if any of the following conditions exist:

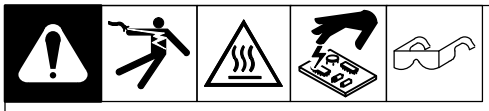
- The symptoms are unknown
- The unit is completely inoperative
- Visual damage is found on any internal components: capacitors C12 and C13, control board PC1, modules MOD1 and MOD2 or interconnecting board PC2
- There is no output or limited output

prepower 2018-08

Notes

PRE-POWER CHECKS

8-3. Measuring/Discharging Input Capacitor Voltage Before Working On Unit



Turn Off welding power source, and disconnect input power.

Significant DC voltage can remain on capacitors after unit is Off. Always check the voltage as shown to be sure the input capacitors have discharged before working on unit.

Remove cover

1 Power Interconnect Board PC2

2 Voltmeter

3 Capacitor C12

Measure the DC voltage across C12 (+) Positive Terminal and C12 (–) Negative Terminal on PC2 as shown until voltage drops to near 0 (zero) volts.

4 Capacitor C13

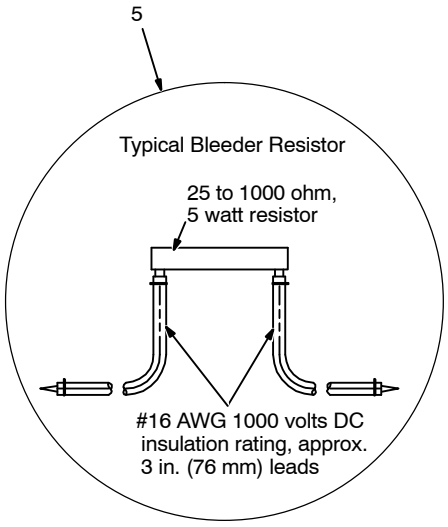
Measure the DC voltage across C13 (+) Positive Terminal and C13 (–) Negative Terminal on PC2 as shown until voltage drops to near 0 (zero) volts.

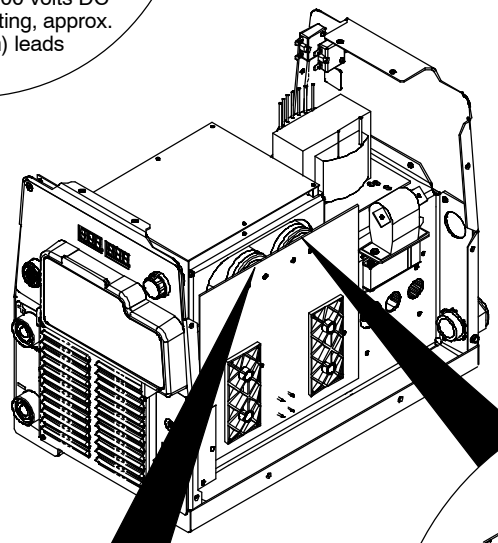
☞ *If the capacitor voltage does not drop to near zero after several minutes, use a bleeder resistor of between 25 and 1000 ohms, at least 5 watts, #16 AWG 1000 volts DC insulating rating wire to discharge the capacitor(s) .*

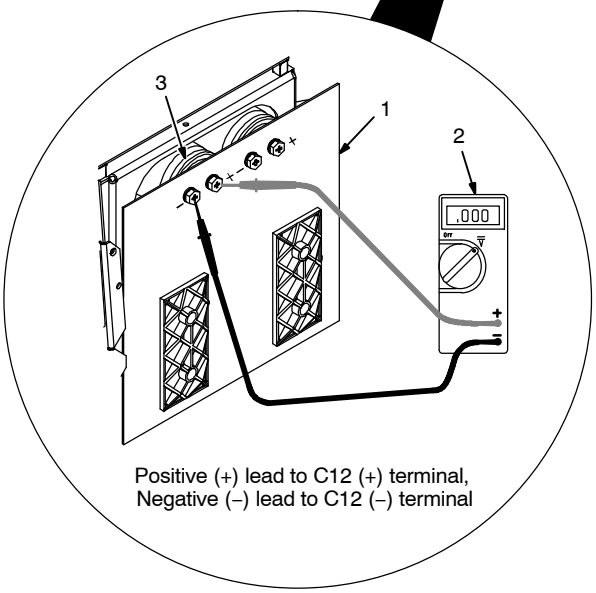
5 Typical Bleeder Resistor

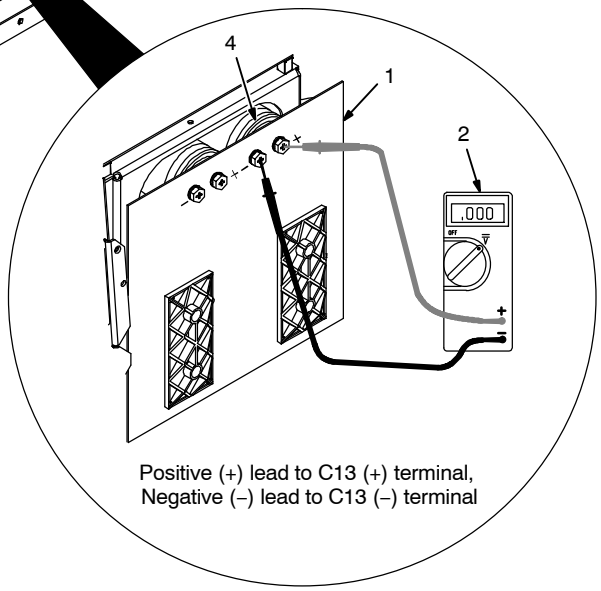
An example of a typical bleeder resistor is shown on this page.

Proceed with pre-power checks.

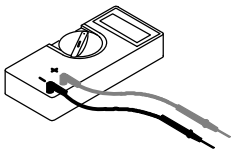






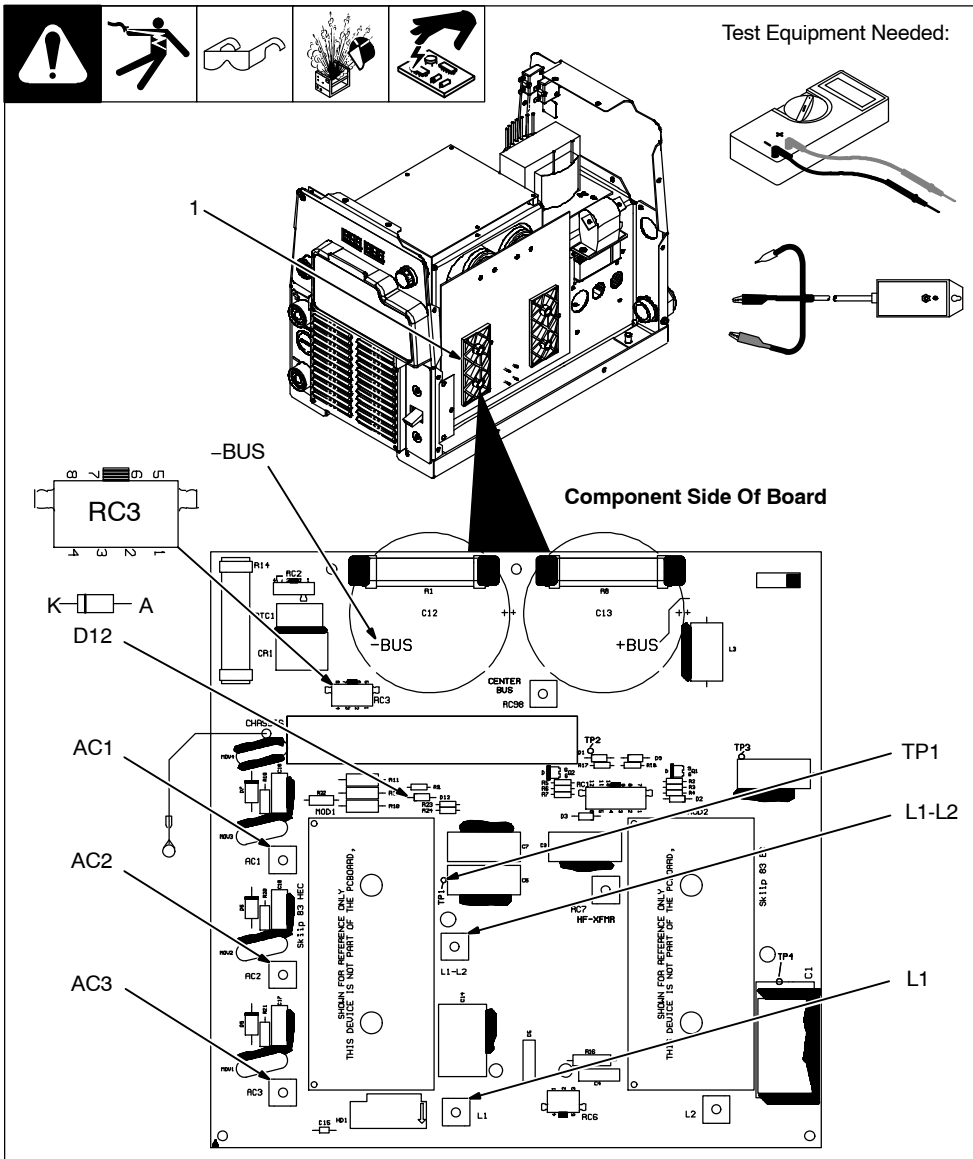


Test Equipment Needed:



Ref. 803721-B / 907161

8-4. Input Pre-Regulator Module (MOD1)



Read and follow safety information in Section 8-2 before proceeding.

Wear an earth grounded wrist strap when performing pre-power and power off checks. Remove wrist strap before performing any checks or procedures with power applied to the machine.

☞ *Board layout may differ from that shown.*

1 MOD1

Visually inspect MOD1 for damage.

Check all measurements for MOD1. (see Section 8-5).

☞ *If any of the measurements do not read correctly, replace MOD1 and MOD2. If an input SCR measures short also replace PC2.*

NOTICE *– MOD1 and MOD2 are different and must be installed in the proper location.*

Match the number on the side of each module to the number on PC2.
- MOD1 is skiip 83 HEC
- MOD2 is skiip 83 EC

The modules come as a kit with installation instructions that need to be followed entirely.

Continue to the end of the pre-power checks.

Ref. 907161 / 258043-C

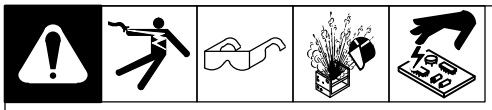
8-5. Input Pre-Regulator Module (MOD1) Test Point Values

☞ *If any of the measurements do not read correctly, replace MOD1 and MOD2. If an input SCR is shorted, also replace PC2.*

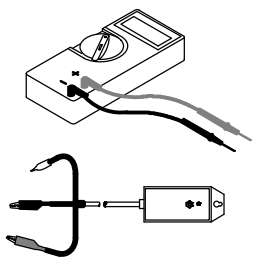
Input Pre-Regulator Module MOD1	DMM Positive Lead	DMM Negative Lead	DMM Diode	DMM Ohms
Boost IGBT	–BUS	L1-L2	0.20 - 0.90	N/A
Boost IGBT **(w/Plug Removed From RC3)**	D12 Left	–BUS	N/A	100k
Boost Snubber Diode	L1-L2	TP1	0.20 - 0.90	N/A
Input SCR	L1	AC1	OL	N/A
Input SCR	L1	AC2	OL	N/A
Input SCR	L1	AC3	OL	N/A
Input Diode	–BUS	AC1	0.20 - 0.90	N/A
Input Diode	–BUS	AC2	0.20 - 0.90	N/A
Input Diode	–BUS	AC3	0.20 - 0.90	N/A

Input Pre-Regulator Module MOD1	IGBT Tester Positive Lead - RED	IGBT Tester Negative Lead - BLACK	Gate
Boost IGBT **(w/Plug Removed From RC3)**	L1-L2	–BUS	RC3-2

8-6. Inverter Module (MOD2)



Test Equipment Needed:



Read and follow safety information in Section 8-2 before proceeding.

Wear an earth grounded wrist strap when performing pre-power and power off checks. Remove wrist strap before performing any checks or procedures with power applied to the machine.

☞ *Board layout may differ from that shown.*

1 MOD2

Visually inspect MOD2 for damage.

Check all measurements for MOD2 (see Section 8-7).

☞ *If any of the measurements do not read correctly, replace MOD2, MOD1.*

NOTICE *– MOD1 and MOD2 are different and must be installed in the proper location.*

Match the number on the side of each module to the number on PC2.
- MOD1 is skiip 83 HEC
- MOD2 is skiip 83 EC

The modules come as a kit with installation instructions that need to be followed entirely.

Continue to the end of the pre-power checks.

Ref. 907161 / 258043-C

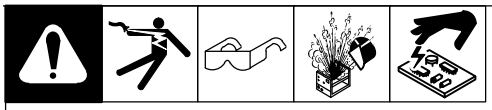
8-7. Inverter Module (MOD2) Test Point Values

☞ *If any of the measurements do not read correctly, replace MOD2, MOD1.*

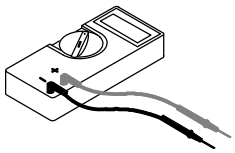
Inverter Module MOD2	**DMM Positive Lead**	**DMM Negative Lead**	**DMM Diode**	**DMM Ohms**
Boost Snubber Diode	TP1	TP4	0.20 - 0.90	N/A
Boost Snubber Diode	L2	TP4	0.20 - 0.90	N/A
Main Boost Diode	TP4	+BUS	0.20 - 0.90	N/A
Inverter IGBT	HF-XFMR	+BUS	0.20 - 0.90	N/A
Inverter IGBT	–BUS	HF-XFMR	0.20 - 0.90	N/A
Snubber IGBT	TP2	HF-XFMR	0.20 - 0.90	N/A
Snubber IGBT	TP2	TP3	0.20 - 0.90	N/A
Inverter IGBT Gate **(w/Plug Removed From RC1)**	RC1-1	HF-XFMR	N/A	100k
Inverter IGBT Gate **(w/Plug Removed From RC1)**	RC1-6	–BUS	N/A	100k
Snubber IGBT Gate **(w/Plug Removed From RC1)**	RC1-10	TP2	N/A	100k
Snubber IGBT Gate **(w/Plug Removed From RC1)**	RC1-9	TP2	N/A	100k

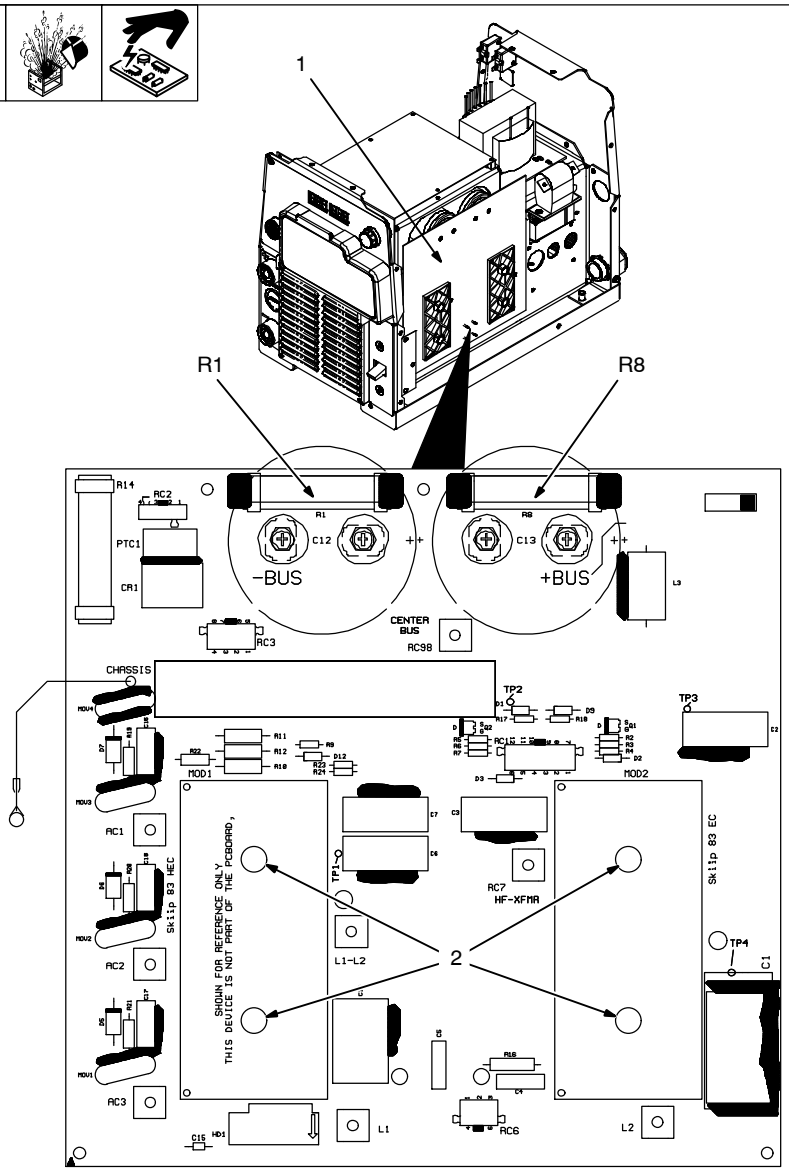
Input Pre-Regulator Module MOD2	**IGBT Tester Positive Lead - RED**	**IGBT Tester Negative Lead - BLACK**	**Gate**
Inverter IGBT **(w/Plug Removed From RC1)**	HF-XFMR	–BUS	RC1-6
Inverter IGBT **(w/Plug Removed From RC1)**	+BUS	HF-XFMR	RC1-1
Snubber IGBT **(w/Plug Removed From RC1)**	HF-XFMR	D9 Left	RC1-10
Snubber IGBT **(w/Plug Removed From RC1)**	TP3	D9 Left	RC1-9

8-8. Power Interconnect Board PC2



Test Equipment Needed:





Ref. 907161 / 258043-C

⚠ **Read and follow safety information in Section 8-2 before proceeding.**

⚠ **Wear an earth grounded wrist strap when performing pre-power and power off checks. Remove wrist strap before performing any checks or procedures with power applied to the machine.**

1 Power Interconnect Board PC2

2 MOD1 And MOD2 Connecting Screws Initial Torque to (9 in. lbs (1 N·m) Final Torque to (20 in. lbs (2.3 N·m) All other connecting screws torque to (20 in. lbs (2.3 N·m)

Visually inspect PC2 for damage.

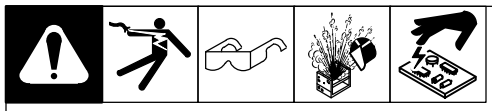
Check all measurements for PC2 (see Section 8-9).

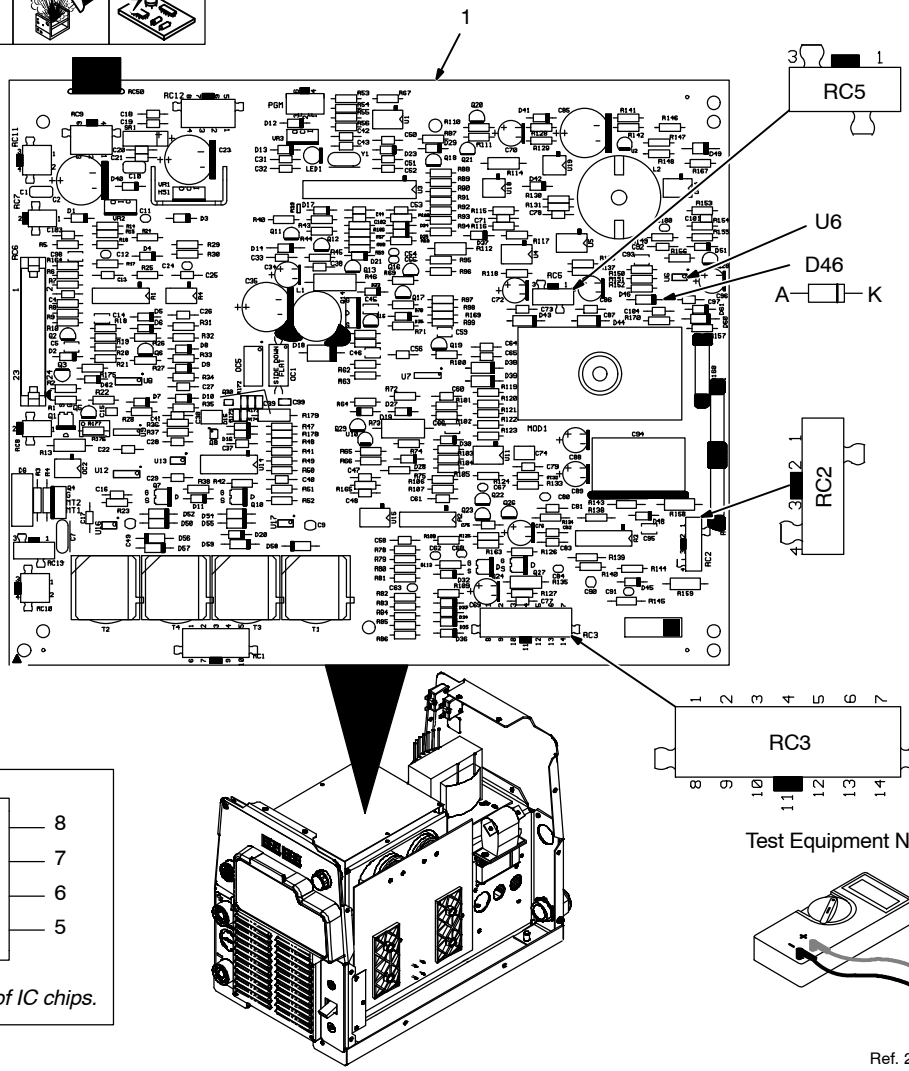
☞ *If any measurements failed, replace PC2 and bus capacitors.*

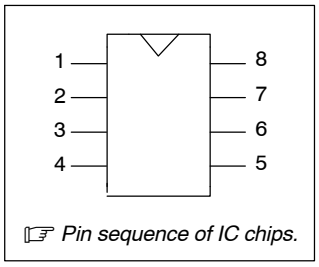
8-9. Power Interconnect Board PC2 Test Point Values

Power Interconnect Board PC2	DMM Positive Lead	DMM Negative Lead	DMM Diode	DMM Ohms
Bleeder Resistor R1	Center Bus	–BUS	N/A	37k - 41k
Bleeder Resistor R8	+BUS	Center Bus	N/A	37k - 41k
Because R1 and R8 are connected to capacitors C12 and C13 the resistance measurements will require several minutes to complete. A more precise method would be to isolate R1 and R8 from the circuit. Perform this by removing the four connecting screws to C12 and C13 then slide paper between the capacitors and PC2. If any of the measurements do not read correctly, replace PC2, capacitors C12 and C13. Continue to the end of the pre-power checks.				

8-10. Control Board PC1







☞ *Pin sequence of IC chips.*

Test Equipment Needed:

Ref. 276639-A / 907161

⚠ **Read and follow safety information in Section 8-2 before proceeding.**

⚠ **Wear an earth grounded wrist strap when performing pre-power and power off checks. Remove wrist strap before performing any checks or procedures with power applied to the machine.**

☞ *Remove all plugs from PC1 before testing.*

1 Control Board PC1

Visually inspect PC1 for damage.

Check all measurements for PC1. (see Section 8-11).

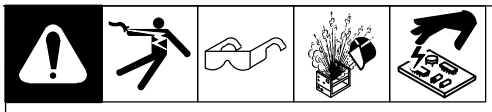
☞ *If any of the measurements do not read correctly, replace PC1.*

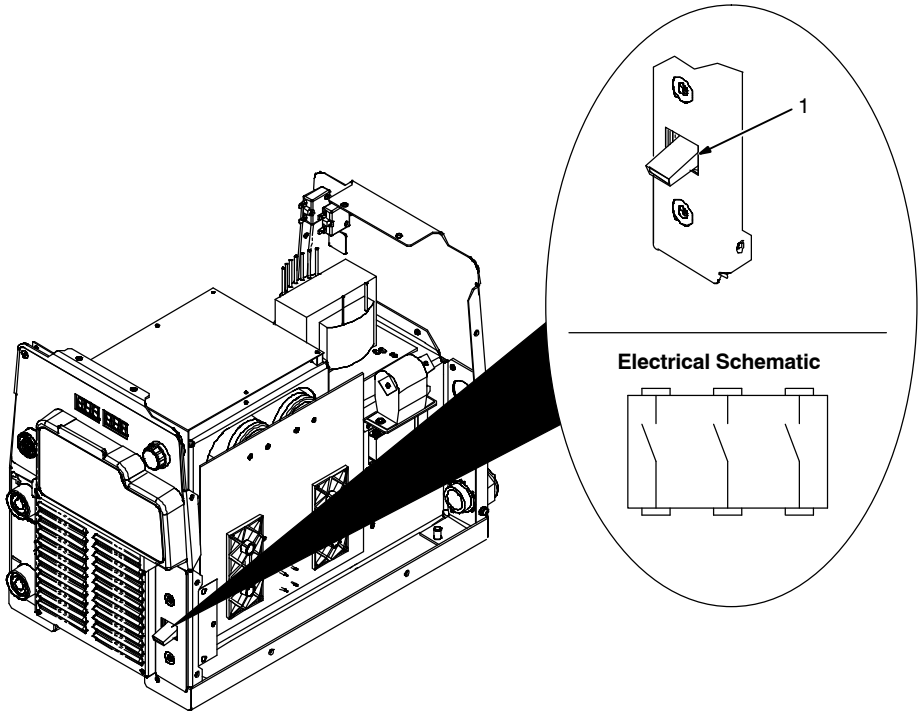
Continue to the end of the pre-power checks.

8-11. Control Board PC1 – Test Point Values

Pre-Regulator Control	**DMM Positive Lead**	**DMM Negative Lead**	**DMM Diode**	**DMM Ohms**
Buck IGBT	D46 Anode	RC2 Pin 1	0.20 - 0.90	N/A
Buck Diode	RC3 Pin 6	U6 Pin 5	0.20 - 0.90	N/A
Boost IGBT Gate Drive	RC3 Pin 4	RC3 Pin 2	0.20 - 1.5	N/A
Boost IGBT Gate Drive	RC3 Pin 4	RC3 Pin 3	N/A	1.9k - 2.1k
Boost IGBT Gate Drive	RC3 Pin 3	RC3 Pin 4	0.20 - 0.90	N/A
60Hz Auxiliary Power Bridge	**DMM Positive Lead**	**DMM Negative Lead**	**DMM Diode**	**DMM Ohms**
Auxiliary Bridge IGBT	RC5 Pin 3	RC2 Pin 1	0.20 - 0.90	N/A
Auxiliary Bridge IGBT	RC5 Pin 1	RC2 Pin 1	0.20 - 0.90	N/A
Auxiliary Bridge IGBT	RC3 Pin 6	RC5 Pin 3	0.20 - 0.90	N/A
Auxiliary Bridge IGBT	RC3 Pin 6	RC5 Pin 1	0.20 - 0.90	N/A

8-12. Power Switch (S1)





⚠ **Read and follow safety information in Section 8-2 before proceeding.**

⚠ **Wear an earth grounded wrist strap when performing pre-power checks. Remove wrist strap before performing any checks or procedures with power applied to the machine.**

1 Power Switch S1

Visually inspect S1 for damage.

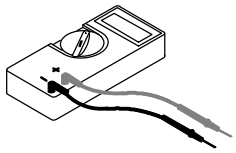
Check switch mechanical operation by turning switch On and Off several times. Switch should snap sharply between the On and Off positions.

Check switch electrical operation by checking continuity across S1 contacts with switch in the On position. With switch in the Off position, ohmmeter should read open.

Replace switch if necessary.

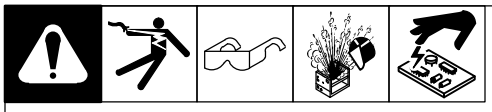
Continue to the end of the pre–power checks.

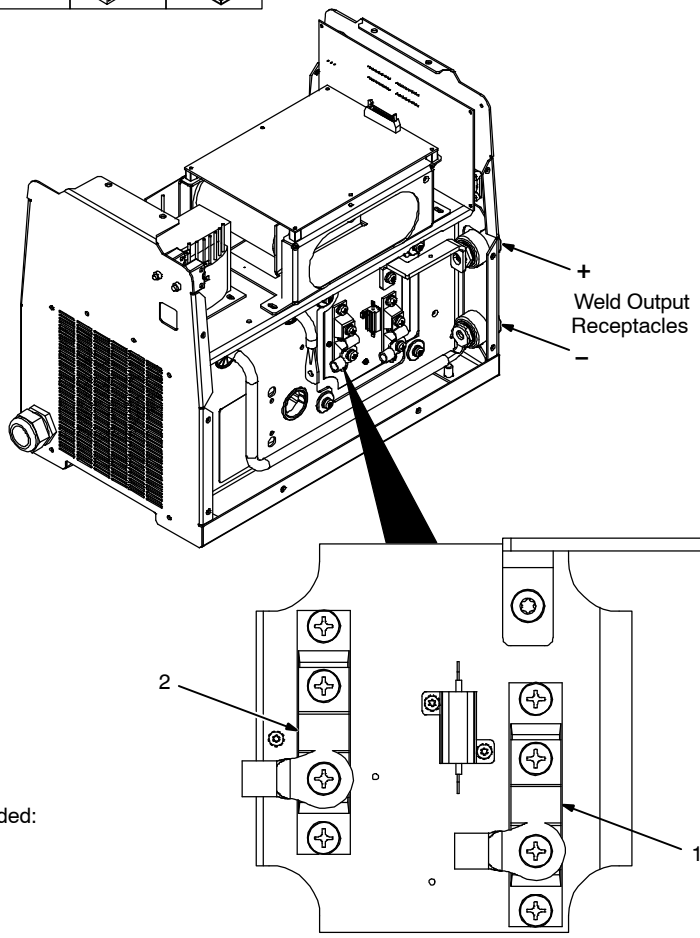
Test Equipment Needed:



Ref. 907161 / Ref. 183484

8-13. Output Diodes D1, D2





Diodes D1, D2

Read and follow safety information in Section 8-2 before proceeding.

Wear an earth grounded wrist strap when performing pre-power checks. Remove wrist strap before performing any checks or procedures with power applied to the machine.

1 Diode D1

2 Diode D2

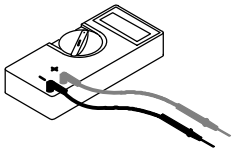
Visually inspect D1 and D2 for damage.

Check all measurements for output diodes D1 and D2 (see Section 8-14).

If all measurements passed, the output diodes D1 and D2 are OK.

Pre-power checks are now complete. Remove earth grounded wrist strap before performing any checks or procedures with power applied to the machine.

Test Equipment Needed:

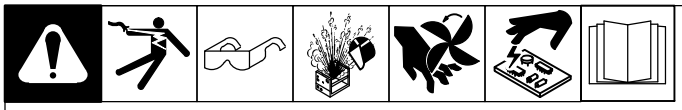


Ref. 805136-A / 805137-A

8-14. Output Diodes D1, D2 Test Point Values

Output Diodes D1 And D2	DMM Positive Lead	DMM Negative Lead	DMM Diode	DMM Ohms
D1	Terminal Anode	Secondary Heatsink	0.10 - 0.90	N/A
D2	Terminal Anode	Secondary Heatsink	0.10 - 0.90	N/A

8-15. Troubleshooting Table



Before connecting welding equipment to input (primary) power for servicing, be sure the input-power circuit protection is correct for the welding equipment. Connect equipment to a dedicated circuit sized and fused for the rated output and duty cycle of the welding equipment you are servicing. See the Electrical Service Guide section in this manual and National Electrical Code (NEC) article 630, Electric Welders.

Remove earth grounded wrist strap before performing any checks or procedures with power applied to the machine.

☞ *Equipment serviced may need to meet additional requirements as specified in IEC60974–4, Arc Welding Equipment - Part 4: Periodic Inspection and Testing.*

☞ *See Section 8-18 for test points and values.*

☞ *Use MILLER Testing Booklet (Part No. 150853) when servicing this unit.*

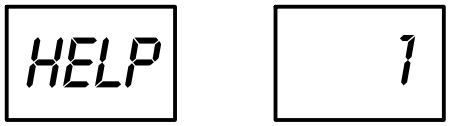
☞ *See the Miller Extranet for service memos that may aid in the repair of this product.*

Trouble	Remedy
No weld output; unit completely inoperative.	Place line disconnect switch in On position (see Section 4-7 or 4-8).
	Check and replace line fuse(s), if necessary, or reset circuit breaker (see Sections 4-7 and 4-8).
	Check for proper input power connections and check condition of power cord (see Section 4-7 or 4-8).
	Check continuity of Power switch S1 and replace if necessary (see Section 8-12).
	Check control transformer T2 for signs of winding failure. Check continuity across windings, and check for proper connections. Check secondary voltages. Replace T2 if necessary.
	Check control board PC1 and connections, and replace if necessary (see Pre-Power Checks in Sections 8-21 thru 8-22, and also see Section 8-19).
	Check power interconnect board PC2 and connections, and replace if necessary (see Pre-Power Checks in Sections 8-25 thru 8-26, and also see Section 8-23).
	Check front panel/display board PC3 and connections, and replace if necessary (see Section 8-31).
No weld output; meter display On.	Unit overheated and HELP 3 or HELP 5 screen is displayed. Allow unit to cool with fan On (see Section 8-16).
	If a remote accessory is connected to remote 14 receptacle RC50: Check accessory contact closure (continuity), and replace accessory if necessary. Check accessory amperage control potentiometer resistance and connections, and replace accessory if necessary.
	Check input and output voltages of hall device HD1 (see Section 8-18). Replace HD1 if necessary.
	Check control board PC1 and connections, and replace if necessary (see Pre-Power Checks in Sections 8-21 thru 8-22, and also see Section 8-19).
	Check front panel/display board PC3 and connections, and replace if necessary (see Section 8-31).
Low weld output with no control.	Check input and output voltages of hall device HD1 (see Section 8-18). Replace HD1 if necessary.
	Check control board PC1 and connections, and replace if necessary (see Pre-Power Checks in Sections 8-21 thru 8-22, and also see Section 8-19).
	Check front panel/display board PC3 and connections, and replace if necessary (see Section 8-31).
Maximum weld output with no control.	Check input and output voltages of hall device HD1 (see Section 8-18). Replace HD1 if necessary.
	Check control board PC1 and connections, and replace if necessary (see Pre-Power Checks in Sections 8-21 thru 8-22, and also see Section 8-19).
	Check front panel/display board PC3 and connections, and replace if necessary (see Section 8-31).
No weld output; Unit displays HELP 25.	Unit exceeded duty cycle. Leave power on so fan cools unit. If HELP 25 does not clear after 15 minutes with power on, check current feedback on HD1. Replace HD1 if necessary.

Trouble	Remedy
Limited output and low open circuit voltage (OCV).	Check for proper input and output connections
	If a remote accessory is connected to remote 14 receptacle RC50: Check accessory contact closure (continuity), and replace accessory if necessary. Check accessory amperage control potentiometer resistance and connections, and replace accessory if necessary.
	Check input and output voltages of hall device HD1 (see Section 8-18). Replace HD1 if necessary.
	Check control board PC1 and connections, and replace if necessary (see Pre-Power Checks in Sections 8-21 thru 8-22, and also see Section 8-19).
	Check front panel/display board PC3 and connections, and replace if necessary (see Section 8-31).
Erratic or improper weld output.	Use proper size and type of weld cable (see Section 4-2).
	Clean and tighten all weld connections.
	Check for proper input and output connections.
	Replace electrode.
	If a remote accessory is connected to remote 14 receptacle RC50: Check all remote accessory connections (proper pin/socket alignment). Check accessory amperage control potentiometer resistance and connections, and replace if necessary.
	Check input and output voltages of hall device HD1 (see Section 8-18). Replace HD1 if necessary.
	Check control board PC1 and connections, and replace if necessary (see Pre-Power Checks in Sections 8-21 thru 8-22, and also see Section 8-19).
	Check front panel/display board PC3 and connections, and replace if necessary (see Section 8-31).
Arc length is too long, no restrictions are present, and a reduction of the arc length setting is unresponsive.	Perform factory reset function (see Section 8-17).
The full voltage range of 10V to 38V is unattainable.	
Undesired changes in the arc.	
The wire feeder and power source displays do not agree. For example, one display shows arc length while the other display shows volts.	
No 24 volt AC output at Remote 14 receptacle RC50.	Reset supplementary protector CB2 if necessary (see Section 4-5).
	Check receptacle wiring and connections.
No 115 volt AC output at Remote 14 receptacle RC50 or optional duplex receptacle RC2.	Reset supplementary protector CB1 if necessary (see Section 4-5). Eff w/ME224001U, 115 volts AC is not available at RC50.
	Check receptacle wiring and connections.
Fan motor does not run after approximately four minutes of operation at rated load.	Check and clear blocked fan blade
	Check receptacle wiring and connections. Check thermistors RT-1 and RT-2 (see Section 8-18). ☞ *Fan motor FM1 starts and meters display HELP-2 when RT-1 or RT-2 is disconnected from PC1. When RT-1 or RT-2 is reconnected, the meter displays change but the fan continues to run (see Section 8-16).*
	Check fan motor FM (see Section 8-18) and replace fan motor if necessary.

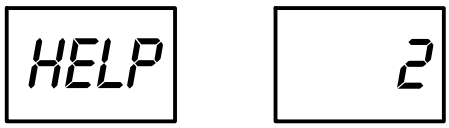
8-16. Help Displays

☞ *All directions are in reference to the front of the unit. All circuitry referred to is located inside the unit.*



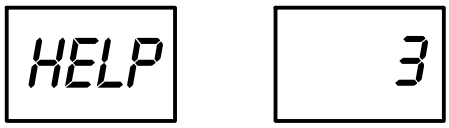
Help 1 Display

Indicates a malfunction in the primary power circuit. If this display is shown, contact a Factory Authorized Service Agent.



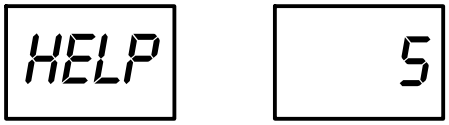
Help 2 Display

Indicates a malfunction in the thermal protection circuitry. If this display is shown, contact a Factory Authorized Service Agent.



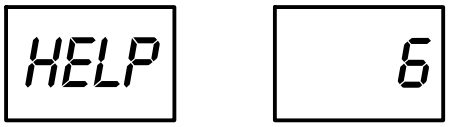
Help 3 Display

Indicates the left side of the unit has overheated. The unit has shut down to allow the fan to cool it (see Section 3-9). Operation will continue when the unit has cooled.



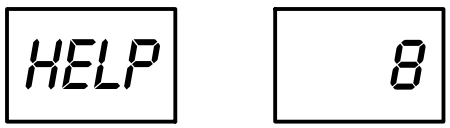
Help 5 Display

Indicates the right side of the unit has overheated. The unit has shut down to allow the fan to cool it (see Section 3-9). Operation will continue when the unit has cooled.



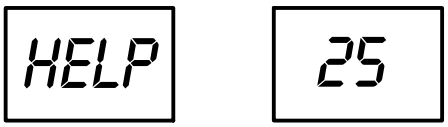
Help 6 Display

Indicates operation at maximum input current. The unit has a maximum allowable input current limit. As the line voltage decreases, the required input current increases. If the line voltage is too low, the output power is limited by the input current. When this limit is reached, the unit automatically reduces output power to continue operation. If this display is shown, have a qualified electrician check the input voltage.



Help 8 Display

Indicates a malfunction in the secondary power circuit of the unit. If this display is shown, contact a Factory Authorized Service Agent.



Help 25 Display

Indicates machine has reached duty cycle limits (see Section 3-9). Unit must be left on to power the fan for cooling. Operation will continue when unit has cooled.

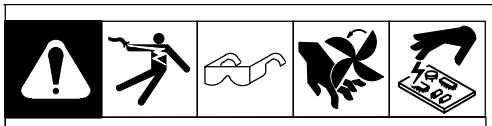
8-17. Factory Reset Procedure

☞ *Start procedure with welding power source off.*

1 Press and hold Setup button while turning power On.
2 When SETUP is displayed, release the Setup button.
3 Press and release Setup button until INFO NO is displayed.
4 Press and hold Setup button; EXIT NO. is displayed. Continue holding the Setup button; until FACTORY is displayed.
5 Release Setup button; LIFE NO is displayed.
6 Press and release Setup button; TASK NO is displayed.
7 Turn Adjustment knob until FAC. RESET is displayed.
8 Press and hold Setup button while display counts down from 5. When TASK DONE is displayed, release the Setup button. FAC. RESET is displayed.
9 Turn Adjustment knob to display TASK NO.
10 Press and release Setup button two times; EXIT NO is displayed.
11 Turn adjustment knob on menu to display EXIT YES.
12 Press and release Setup button. Front display illuminates.
13 Reset procedure is complete.

Notes

8-18. Troubleshooting Circuit Diagram



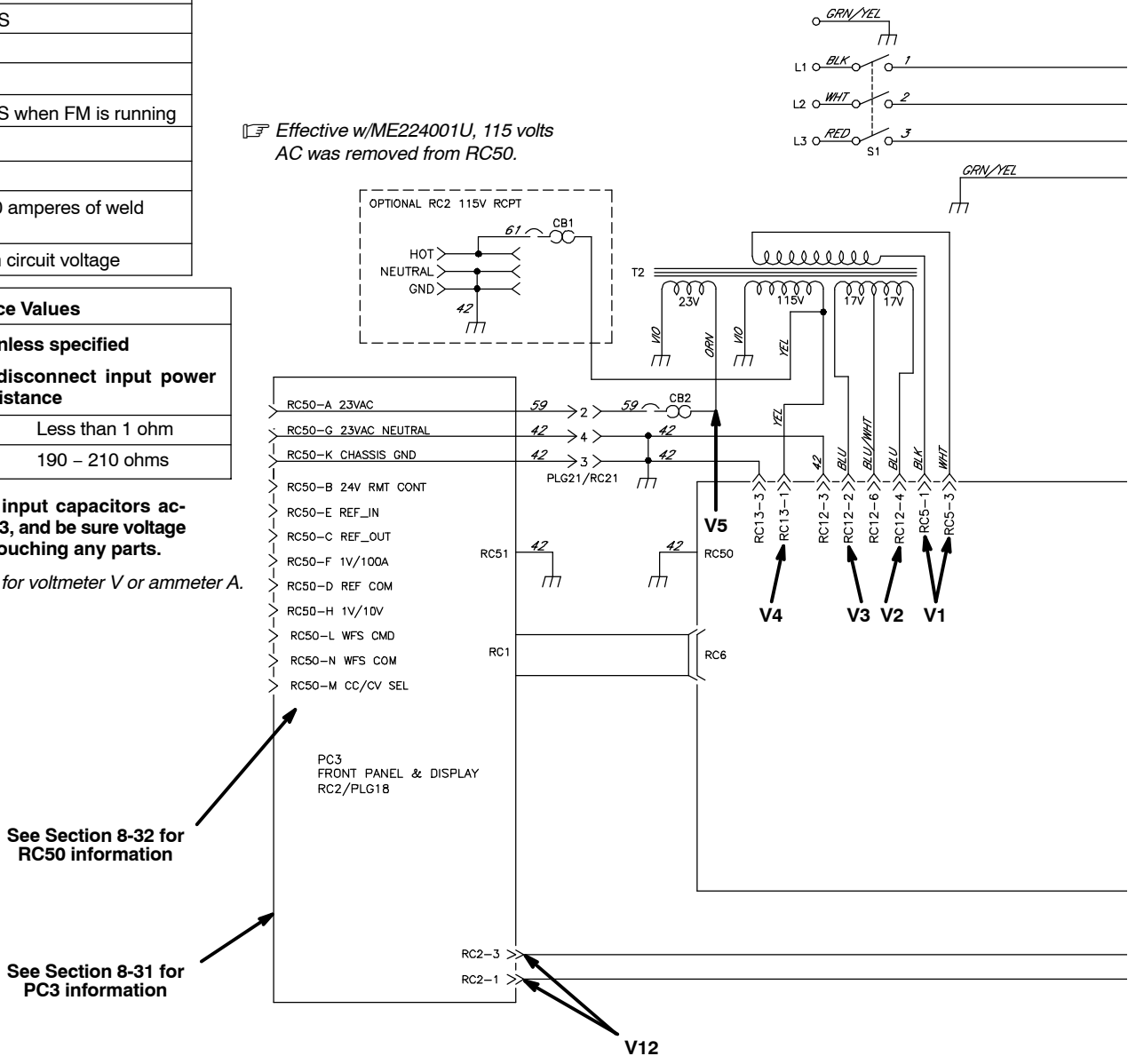
Voltage Readings	
a) Tolerance – ±10% unless specified	
b) Reference – single arrow: reference to circuit common (lead 42); double arrow: reference to points indicated	
c) Wiring Diagram – see Section 10	
V1	665 volts AC RMS
V2, V3	17 volts AC RMS
V4	115 volts AC RMS
V5	24 volts AC RMS
V6, V7	470 volts DC
V8	115 volts AC RMS when FM is running
V9	+15 volts DC
V10	–15 volts DC
V11	1 volt DC per 100 amperes of weld output
V12	72 volts DC open circuit voltage

Resistance Values	
a) Tolerance – ±10% unless specified	
b) Turn Off unit and disconnect input power before checking resistance	
R1 thru R5	Less than 1 ohm
R6 and R7	190 – 210 ohms

Measure voltage of input capacitors according to Section 8-3, and be sure voltage is near zero before touching any parts.

☞ *No calibration available for voltmeter V or ammeter A.*

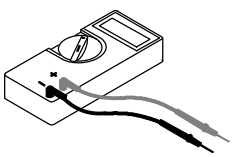
☞ *Effective w/ME224001U, 115 volts AC was removed from RC50.*



See Section 8-32 for RC50 information

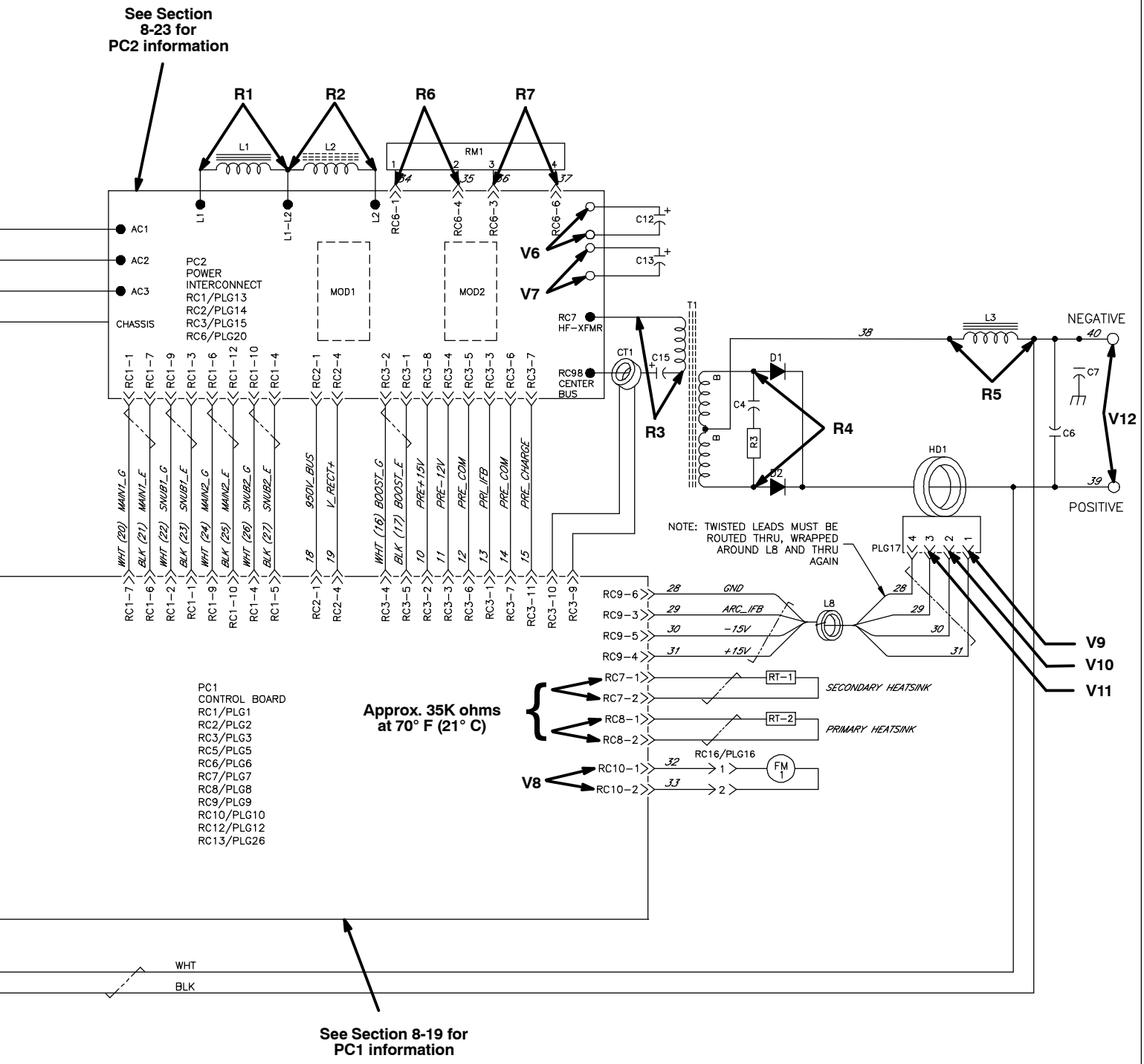
See Section 8-31 for PC3 information

Test Equipment Needed:



HIGH VOLTAGE: Do not measure without proper instrumentation.

☞ *V1 thru V5 and V8 – use only true RMS meter to obtain correct voltage reading.*



⚠ 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	

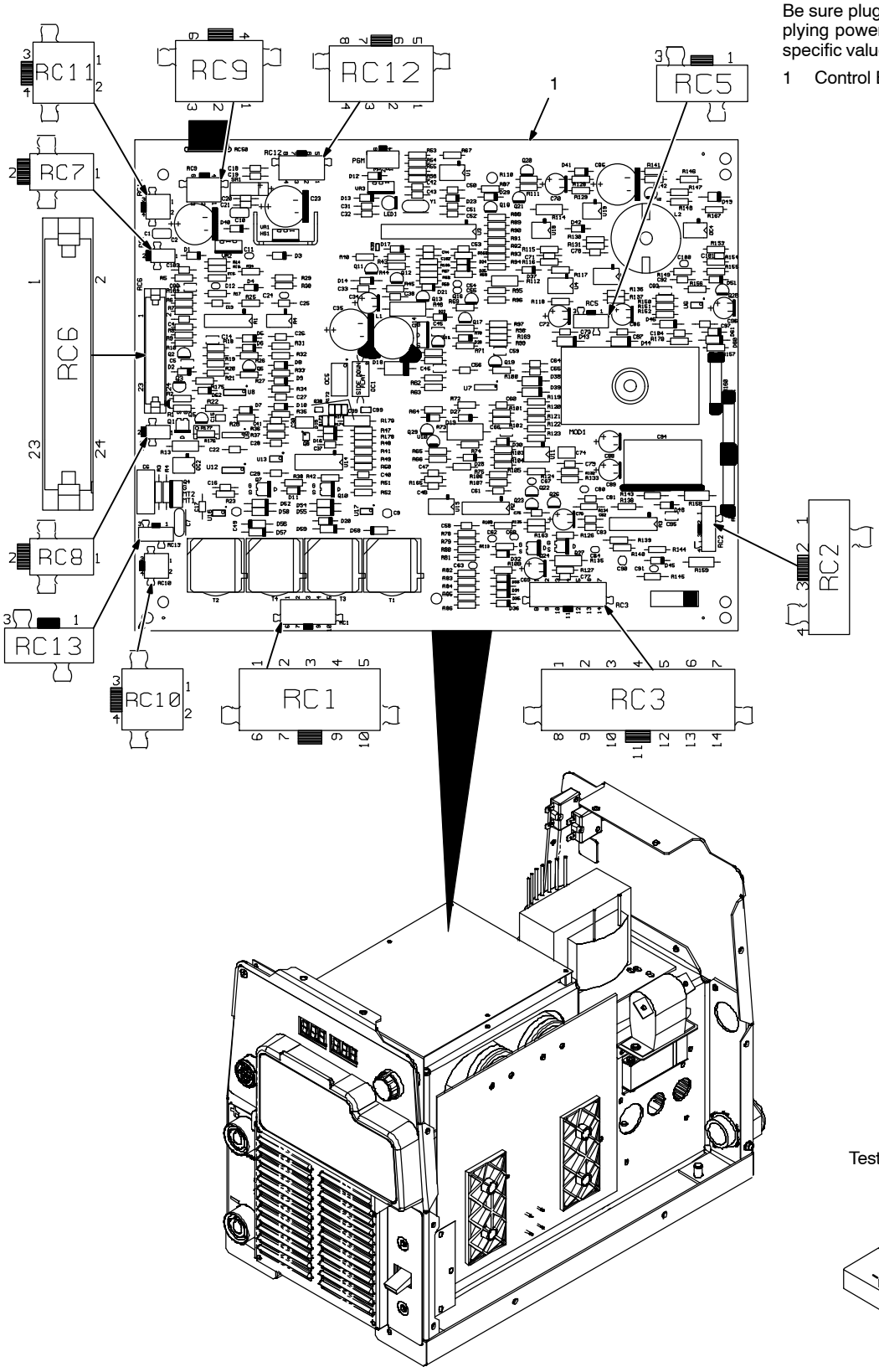
271737-B

8-19. Control Board PC1 Testing Information (Use with Section 8-20)

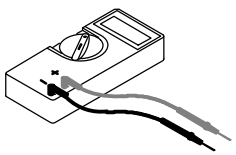
⚠ Measure voltage of input capacitors according to Section 8-3, and be sure voltage is near zero before touching any parts.

Be sure plugs are secure before applying power. See Section 8-20 for specific values during testing.

1 Control Board PC1

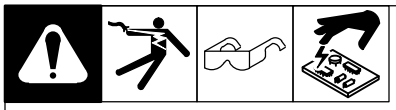


Test Equipment Needed:



Ref. 276639-A / 907161

8-20. Control Board PC1 Test Point Values



PC1 Voltage Readings

a) Tolerance – ±10% unless specified

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

Receptacle	Pin	Type	Value
RC1	⚠ **Do not measure – high voltage present.**		
RC2	⚠ **High voltage present. Voltages on this receptacle can exceed 900 volts DC from chassis (GND).**		
	NOTE: All pins on this receptacle are referenced to the primary – Bus		
	1	Input	Primary (+) bus; regulated to 940 volts DC with respect to primary (–) bus.
	2		Not used
	3		Not used
	4	Input	Primary (+) rectifier; rectified primary line volts.
RC3	⚠ **High voltage present. Voltages on this receptacle can exceed 900 volts DC from chassis (GND).**		
	NOTE: All pins on this receptacle are referenced to the primary – Bus		
	1	Input	Do not measure – Boost inductor current feedback; 1 volt DC per 16 amps of boost inductor current
	2	Output	+15 volts DC; regulated with respect to primary (–) bus
	3	Output	–12 volts DC; regulated with respect to primary (–) bus
	4	Output	Do not measure – Boost IGBT gate drive signal
	5		Do not measure – Boost IGBT gate drive signal return
	6	Precom	Circuit common referenced to primary (–) bus
	7	Precom	Circuit common referenced to primary (–) bus
	8	Precom	Circuit common referenced to primary (–) bus
	9	Input	Do not measure – Main transformer current sense CT; senses overcurrent in T1 transformer primary
	10		Do not measure – Main transformer current sense CT return
	11	Output	Precharge relay coil return; 0 volts DC = relay contacts open, –12 volts DC = relay contacts closed with respect to primary (–) bus
	12		Not used
	13	Input	Do not measure – Test point, used to test board only
	14	Input	Do not measure – Test point, used to test board only
RC5	⚠ **High voltage present. Voltages on this receptacle can exceed 900 volts DC from chassis (GND).**		
	NOTE: All pins on this receptacle are referenced to the primary – Bus		
	1	Output	Control transformer primary; 665 volts AC RMS with respect to RC5 pin 3
	2		Not Used
	3	Output	Control transformer primary; 665 volts AC RMS with respect to RC5 pin 1

Section 8-20. Control Board PC1 Test Point Values (Continued)

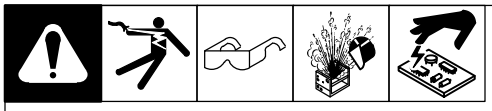
Receptacle	Pin	Type	Value
RC6	1	Input	Output reference; 1 volt DC per 42.5 amperes of weld output when machine is under load; when machine at idle, process set to MIG with .035 STL wire and ARGN CO2 gas selected; adjust control set to 10V preset = 8.2V; adjust control set 38V preset = 9.4V
	2	Input	Voltage feedback; 1 volt DC per 10 volts DC of weld output
	3	Output	Current feedback; 1 volt DC per 100 amperes of weld output
	4		Not Used
	5	Input	Output enable; 0 volts DC = ON, +12.5 volts DC = OFF
	6		Not Used
	7		Not Used
	8		Not Used
	9	Input	Fan enable; +5 volts DC = fan on, –15 volts DC = fan off
	10		Not Used
	11	Output	Main transformer overcurrent detect; +.7 volts DC = OK, +3.3 volts DC = T1 primary overcurrent = HELP 1
	12		Not Used
	13	Input	+3.0 volts DC reference voltage for thermistors
	14	GND	Circuit common referenced to chassis
	15	Output	Secondary side thermistor return; +1.2 volts DC at 25˚C thermistor temperature
	16	GND	Circuit common referenced to chassis
	17	Output	Primary side thermistor return; +1.2 volts DC at 25˚C thermistor temperature
	18	GND	Circuit common referenced to chassis
	19	Output	Foldback; decreases weld output if input bus voltage drops, 0 volts = OK, +15 volts DC 15Khz pwm squarewave = foldback
	20	GND	Circuit common referenced to chassis
	21	Output	+24 volts DC, unregulated DC voltage with respect to GND
	22	Output	+24 volts DC, unregulated DC voltage with respect to GND
	23	Output	–24 volts DC, unregulated DC voltage with respect to GND
	24	Output	–24 volts DC, unregulated DC voltage with respect to GND
RC7	1	Output	+3 volts DC reference voltage for secondary side thermistor
	2	Input	Secondary side thermistor return; +1.2 volts DC at 25˚C thermistor temperature
RC8	1	Output	+3 volts DC reference voltage for primary side thermistor
	2	Input	Primary side thermistor return; +1.2 volts DC at 25˚C thermistor temperature

Section 8-20. Control Board PC1 Test Point Values (Continued)

RC9	1	Output	Do not measure – Test point, used to test board only
	2	Output	Do not measure – Test point, used to test board only
	3	Input	Do not measure – Weld output current sensor signal
	4	Output	+15 volts DC power to current sensor
	5	Output	–15 volts DC power to current sensor
	6	GND	Weld output current sensor signal common
RC10	1	Output	115 volts AC RMS with respect to GND; power feed to fan
	2	Output	Fan power return; measure with respect to RC10–1, 115 volts AC RMS = fan on, less than 20 volts AC RMS = fan off
	3	Output	Do not measure – Test point, used to test board only
	4	Output	Do not measure – Test point, used to test board only
RC11	1		Not Used
	2		Not Used
	3		Not Used
	4		Not Used
RC12	1		Not Used
	2	Input	34 volts AC RMS; measure with respect to RC12 pin 4, power supply used to create +24/–24 volts DC
	3	Chassis	Power source chassis; circuit common (GND) on this pin bonded to chassis thru wire
	4	Input	34 volts AC RMS; measure with respect to RC12 pin 2, power supply used to create +24/–24 volts DC
	5		Not Used
	6	Input	Center tap of 34 volt AC connected to circuit common (GND) on board
	7		Not Used
	8		Not Used
RC13	1	Input	115 volts AC RMS
	2		Not Used
	3	GND	Circuit common referenced to chassis
☞ *No testing required for remaining plugs and receptacles.*			

Notes

8-21. Control Board PC1 - Power Off Checks



☞ *Board layouts are slightly different in older units.*

☞ *Pin sequence of IC chips.*

Test Equipment Needed:

Ref. 276639-A / 907161

⚠ **Read and follow safety information in Section 8-2 before proceeding.**

⚠ **Wear an earth grounded wrist strap when performing power off checks. Remove wrist strap before performing any checks or procedures with power applied to the machine.**

☞ *Remove all plugs from PC1 before testing.*

1 Control Board PC1

Check all measurements for PC1.

☞ *If any measurements failed, replace PC1.*

8-22. Control Board PC1 – Power Off Checks

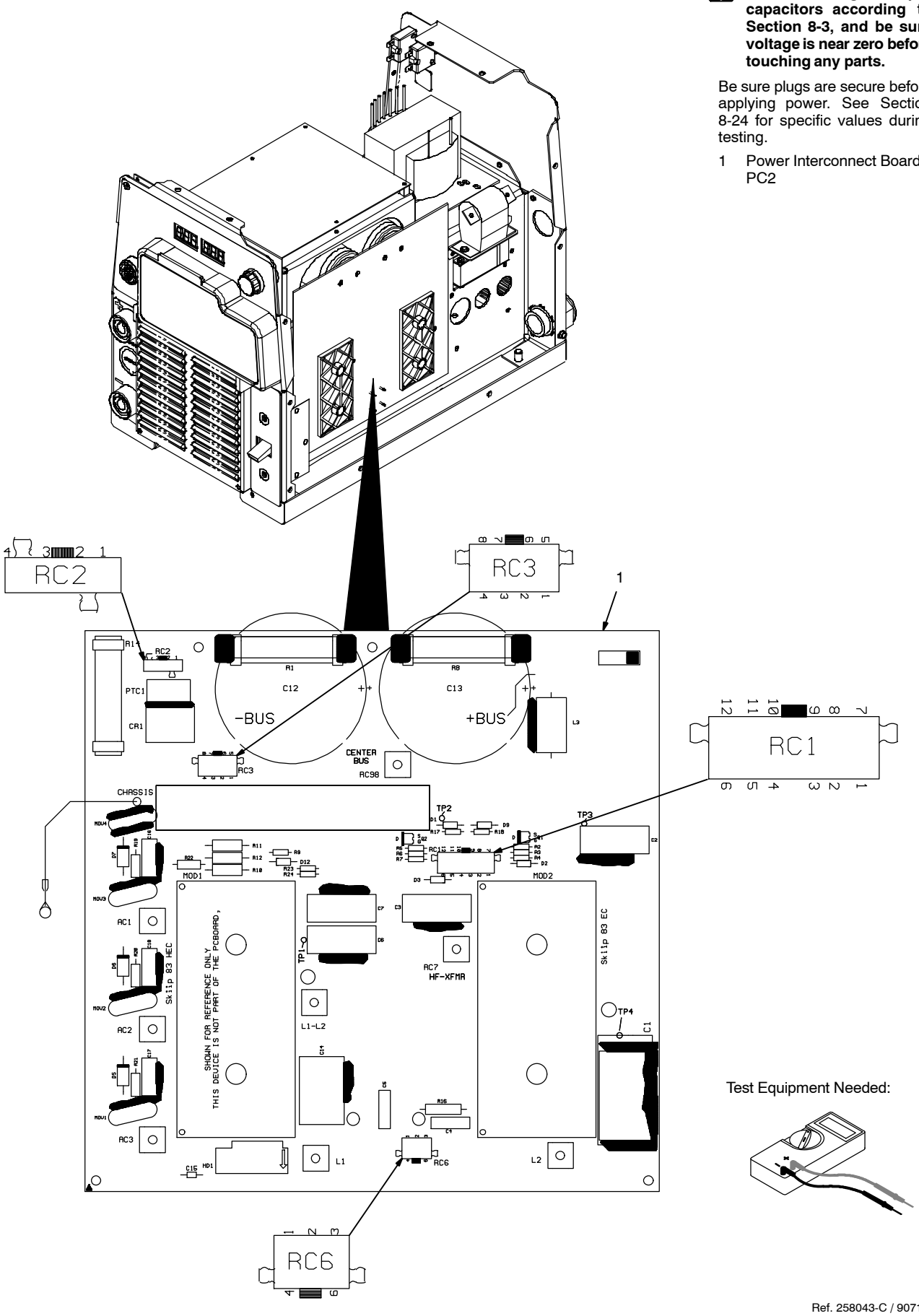
Pre-Regulator Control	**DMM Positive Lead**	**DMM Negative Lead**	**DMM Diode**	**DMM Ohms**
Buck IGBT Gate Drive IC U6	U6 Pin 6	U6 Pin 7	0.10 - 0.30	N/A
Inverter Control	**DMM Positive Lead**	**DMM Negative Lead**	**DMM Diode**	**DMM Ohms**
Inverter IGBT Gate Drive IC U16	RC9 Pin 6	U16 Pin 5	0.10 - 0.30	N/A
Inverter IGBT Gate Drive IC U16	RC9 Pin 6	U16 Pin 7	0.10 - 0.30	N/A
Inverter IGBT Gate Drive IC U17	RC9 Pin 6	U17 Pin 5	0.10 - 0.30	N/A
Inverter IGBT Gate Drive IC U17	RC9 Pin 6	U17 Pin 7	0.10 - 0.30	N/A
Snubber IGBT Gate Drive IC U13	RC9 Pin 6	U13 Pin 5	0.10 - 0.30	N/A
Snubber IGBT Gate Drive IC U13	RC9 Pin 6	U13 Pin 7	0.10 - 0.30	N/A
Inverter IGBT Gate Drive IC U16	U16 Pin 5	RC9 Pin 4	0.10 - 0.30	N/A
Inverter IGBT Gate Drive IC U16	U16 Pin 7	RC9 Pin 4	0.10 - 0.30	N/A
Inverter IGBT Gate Drive IC U17	U17 Pin 5	RC9 Pin 4	0.10 - 0.30	N/A
Inverter IGBT Gate Drive IC U17	U17 Pin 7	RC9 Pin 4	0.10 - 0.30	N/A
Snubber IGBT Gate Drive IC U13	U13 Pin 5	RC9 Pin 4	0.10 - 0.30	N/A
Snubber IGBT Gate Drive IC U13	U13 Pin 7	RC9 Pin 4	0.10 - 0.30	N/A
60Hz Auxiliary Power Bridge	**DMM Positive Lead**	**DMM Negative Lead**	**DMM Diode**	**DMM Ohms**
Auxiliary Bridge IGBT Gate Drive IC U1	RC3 Pin 6 (PRECOM)	U1 Pin 5	0.20 - 0.90	N/A
Auxiliary Bridge IGBT Gate Drive IC U1	U1 Pin 5	U1 Pin 6	0.20 - 0.90	N/A
Auxiliary Bridge IGBT Gate Drive IC U1	RC3 Pin 6 (PRECOM)	U1 Pin 7	0.20 - 0.90	N/A
Auxiliary Bridge IGBT Gate Drive IC U1	U1 Pin 7	U1 Pin 6	0.20 - 0.90	N/A
Auxiliary Bridge IGBT Gate Drive IC U4	RC5 Pin 1	U5 Pin 7	0.20 - 0.90	N/A
Auxiliary Bridge IGBT Gate Drive IC U5	RC5 Pin 3	U4 Pin 7	0.20 - 0.90	N/A
D37	D37 Anode	D37 Cathode	0.20 - 0.90	N/A
D38	D38 Anode	D38 Cathode	0.20 - 0.90	N/A
D39	D39 Anode	D39 Cathode	0.20 - 0.90	N/A
D42	D42 Anode	D42 Cathode	0.20 - 0.90	N/A
D43	D43 Anode	D43 Cathode	0.20 - 0.90	N/A
D44	D44 Anode	D44 Cathode	0.20 - 0.90	N/A
D11	D11 Anode	D11 Cathode	0.10 - 0.30	N/A
D20	D20 Anode	D20 Cathode	0.10 - 0.30	N/A
D18	D18 Anode	D18 Cathode	0.20 - 0.90	N/A
D41	D41 Anode	D41 Cathode	0.20 - 0.90	N/A
D46	D46 Anode	D46 Cathode	0.10 - 0.30	N/A
D49	D49 Anode	D49 Cathode	0.20 - 0.90	N/A
D51	D51 Anode	D51 Cathode	0.20 - 0.90	N/A
D61	D61 Anode	D61 Cathode	0.20 - 0.90	N/A

8-23. Power Interconnect Board PC2 Testing Information (Use with Section 8-24)

⚠ Measure voltage of input capacitors according to Section 8-3, and be sure voltage is near zero before touching any parts.

Be sure plugs are secure before applying power. See Section 8-24 for specific values during testing.

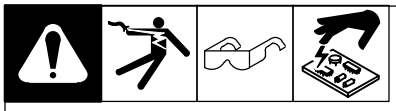
1 Power Interconnect Board PC2



Test Equipment Needed:

Ref. 258043-C / 907161

8-24. Power Interconnect Board PC2 Test Point Values



PC2 Voltage Readings

a) Tolerance – ±10% unless specified

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

Receptacle	Pin	Type	Value
RC1	⚠ **Do not measure – high voltage present.**		
RC2	⚠ **High voltage present. Voltages on this receptacle can exceed 900 volts DC from chassis (GND).**		
	NOTE: All pins on this receptacle are referenced to the primary – Bus		
	1	Output	Primary (+) bus; regulated to 940 volts DC with respect to primary (–) bus
	2		Not Used
	3		Not Used
	4	Output	Primary (+) rectifier; rectified primary line volts
RC3	⚠ **High voltage present. Voltages on this receptacle can exceed 900 volts DC from chassis (GND).**		
	NOTE: All pins on this receptacle are referenced to the primary – Bus		
	1		Do not measure – Boost IGBT gate drive signal return
	2	Input	Do not measure – Boost IGBT gate drive signal
	3	Output	Do not measure – Boost inductor current feedback
	4	Input	–12 volts DC; regulated with respect to primary (–) bus, –12 volts DC power to boost inductor current sensor
	5	Precom	Circuit common referenced to primary (–) bus
	6	Precom	Circuit common referenced to primary (–) bus
	7	Input	Precharge relay coil return; 0 volts DC = relay contacts open, –12 volts DC = relay contacts closed with respect to primary (–) bus
	8	Input	+15 volts DC; regulated with respect to primary (–) bus, +15 volts DC power to boost inductor current sensor
RC6	⚠ **High voltage present. Voltages on this receptacle can exceed 900 volts DC from chassis (GND).**		
	NOTE: All pins on this receptacle are referenced to the primary – Bus		
	1		Snubber resistor1; input boost snubber, located in resistor module mounted to primary heat sink
	2		Not Used
	3		Snubber resistor2; inverter snubber, located in resistor module mounted to primary heat sink
	4		Snubber resistor1; input boost snubber, located in resistor module mounted to primary heat sink
	5		Not Used
	6		Snubber resistor2; inverter snubber, located in resistor module mounted to primary heat sink

☞ *No testing required for remaining plugs and receptacles.*

Section 8-24. Power Interconnect Board PC2 Test Point Values (Continued)

	⚠ **High voltage present. The following terminals are used to interconnect the main power circuit with the primary supply, and with power circuit components not soldered in the pcb. Voltages on this receptacle can exceed 900 volts DC from chassis (GND).**		
Receptacle	**Pin**	**Type**	**Value**
AC1		Power	Primary AC mains phase 1; line voltage, measure with respect to AC2 or AC3
AC2		Power	Primary AC mains phase 2; line voltage, measure with respect to AC1 or AC3
AC3		Power	Primary AC mains phase 3; line voltage, measure with respect to AC1 or AC2
L1		Power	Input boost inductor; rectified line voltage, measure with respect to (–) bus
L1-L2		Power	Common point between input boost inductor and boost IGBT snubber inductor
L2		Power	Boost IGBT snubber inductor
HF-XFMR		Power	High frequency weld power transformer primary
C13 (+)		Power	(+) Bus; regulated to 940 volts DC with respect to (–) bus
C12 (–)		Power	(–) Bus; power circuit common
Center Bus		Power	Bus capacitors center point; regulated to 470 volts DC with respect to (–) bus

Notes

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)

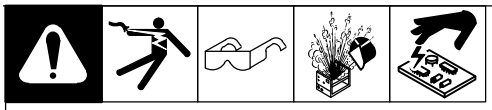
5/16 in (.313 in)

3/8 in (.375 in)

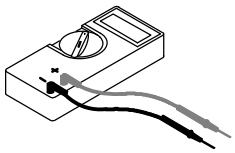
1/2 in (.5 in)

Notes

8-25. Power Interconnect Board (PC2) - Power Off Checks (Prior To MB510232A)



Test Equipment Needed:



Ref. 907161 / 232403-B

⚠ **Read and follow safety information in Section 8-2 before proceeding.**

⚠ **Wear an earth grounded wrist strap when performing power off checks. Remove wrist strap before performing any checks or procedures with power applied to the machine.**

☞ *Remove all plugs from PC2 before testing.*

1 Power Interconnect Board PC2

Visually inspect PC2 for damage.

Check all measurements for PC2 (see Section 8-26).

☞ *If any measurements failed, replace PC2.*

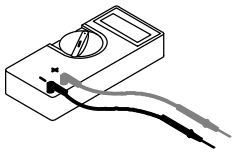
8-26. Power Interconnect Board (PC2) - Power Off Checks (Prior To MB510232A)

Power Interconnect Board PC2	DMM Positive Lead	DMM Negative Lead	DMM Diode	DMM Ohms
Pre-Charge Resistor R14	R14 Bottom	R14 Top	N/A	200
SCR Gate Resistor R10	R10 Left	R10 Right	N/A	10 - 16.5
SCR Gate Resistor R11	R11 Left	R11 Right	N/A	10 - 16.5
SCR Gate Resistor R12	R12 Left	R12 Right	N/A	10 - 16.5
Pre-Charge Diode D5	AC3	R14 Top	0.20 - 0.90	N/A
Pre-Charge Diode D6	AC2	R14 Top	0.20 - 0.90	N/A
Pre-Charge Diode D7	AC1	R14 Top	0.20 - 0.90	N/A
Boost Gate Protection Diode D12	D12 Anode	D12 Cathode	0.20 - 0.90	N/A
Boost Gate Protection Diode D13	D13 Anode	D13 Cathode	0.20 - 0.90	N/A
Inverter Gate MOSFET Q1	Q1-S (Source)	Q1-D (Drain)	0.20 - 0.90	N/A
Inverter Gate MOSFET Q2	Q2-S (Source)	Q2-D (Drain)	0.20 - 0.90	N/A
Inverter Gate Protection Diode D1	D1 Anode	D1 Cathode	0.20 - 0.90	N/A
Inverter Gate Protection Diode D2	D2 Anode	D2 Cathode	0.20 - 0.90	N/A
Inverter Gate Protection Diode D3	D3 Anode	D3 Cathode	0.20 - 0.90	N/A
Inverter Gate Protection Diode D4	D4 Anode	D4 Cathode	0.20 - 0.90	N/A
Snubber Gate Protection Diode D8	D8 Anode	D8 Cathode	0.20 - 0.90	N/A
Snubber Gate Protection Diode D9	D9 Anode	D9 Cathode	0.20 - 0.90	N/A
Snubber Gate Protection Diode D10	D10 Anode	D10 Cathode	0.20 - 0.90	N/A
Snubber Gate Protection Diode D11	D11 Anode	D11 Cathode	0.20 - 0.90	N/A

Notes

8-27. Power Interconnect Board (PC2) - Power Off Checks (Effective With MB510232A Thru MH474076U)

Test Equipment Needed:



Ref. 907161 / 224662-B

⚠ **Read and follow safety information in Section 8-2 before proceeding.**

⚠ **Wear an earth grounded wrist strap when performing power off checks. Remove wrist strap before performing any checks or procedures with power applied to the machine.**

☞ *Remove all plugs from PC2 before testing.*

1 Power Interconnect Board PC2

Visually inspect PC2 for damage.

Check all measurements for PC2 (see Section 8-28).

☞ *If any measurements failed, replace PC2.*

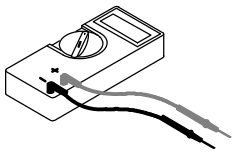
8-28. Power Interconnect Board (PC2) - Power Off Checks (Effective With MB510232A Thru MH474076U)

Power Interconnect Board PC2	DMM Positive Lead	DMM Negative Lead	DMM Diode	DMM Ohms
Pre-Charge Resistor R14	R14 Bottom	R14 Top	N/A	200
SCR Gate Resistor R10	R10 Left	R10 Right	N/A	10 - 16.5
SCR Gate Resistor R11	R11 Left	R11 Right	N/A	10 - 16.5
SCR Gate Resistor R12	R12 Left	R12 Right	N/A	10 - 16.5
Pre-Charge Diode D5	AC3	R14 Top	0.20 - 0.90	N/A
Pre-Charge Diode D6	AC2	R14 Top	0.20 - 0.90	N/A
Pre-Charge Diode D7	AC1	R14 Top	0.20 - 0.90	N/A
Boost Gate Protection Diode D12	D12 Left	D12 Right	N/A	100k
Inverter Gate MOSFET Q1	Q1-S (Source)	Q1-D (Drain)	0.20 - 0.90	N/A
Inverter Gate MOSFET Q2	Q2-S (Source)	Q2-D (Drain)	0.20 - 0.90	N/A
Inverter Gate Protection Diode D2	D2 Left	D2 Right	N/A	100k
Inverter Gate Protection Diode D3	D3 Left	D3 Right	N/A	100k
Snubber Gate Protection Diode D9	D9 Left	D9 Right	N/A	100k

Notes

8-29. Power Interconnect Board (PC2) - Power Off Checks (Effective With MH474077U)

Test Equipment Needed:



Ref. 907161 / 258043-C

⚠ **Read and follow safety information in Section 8-2 before proceeding.**

⚠ **Wear an earth grounded wrist strap when performing power off checks. Remove wrist strap before performing any checks or procedures with power applied to the machine.**

☞ *Remove all plugs from PC2 before testing.*

1 Power Interconnect Board PC2

Visually inspect PC2 for damage.

Check all measurements for PC2 (see Section 8-26).

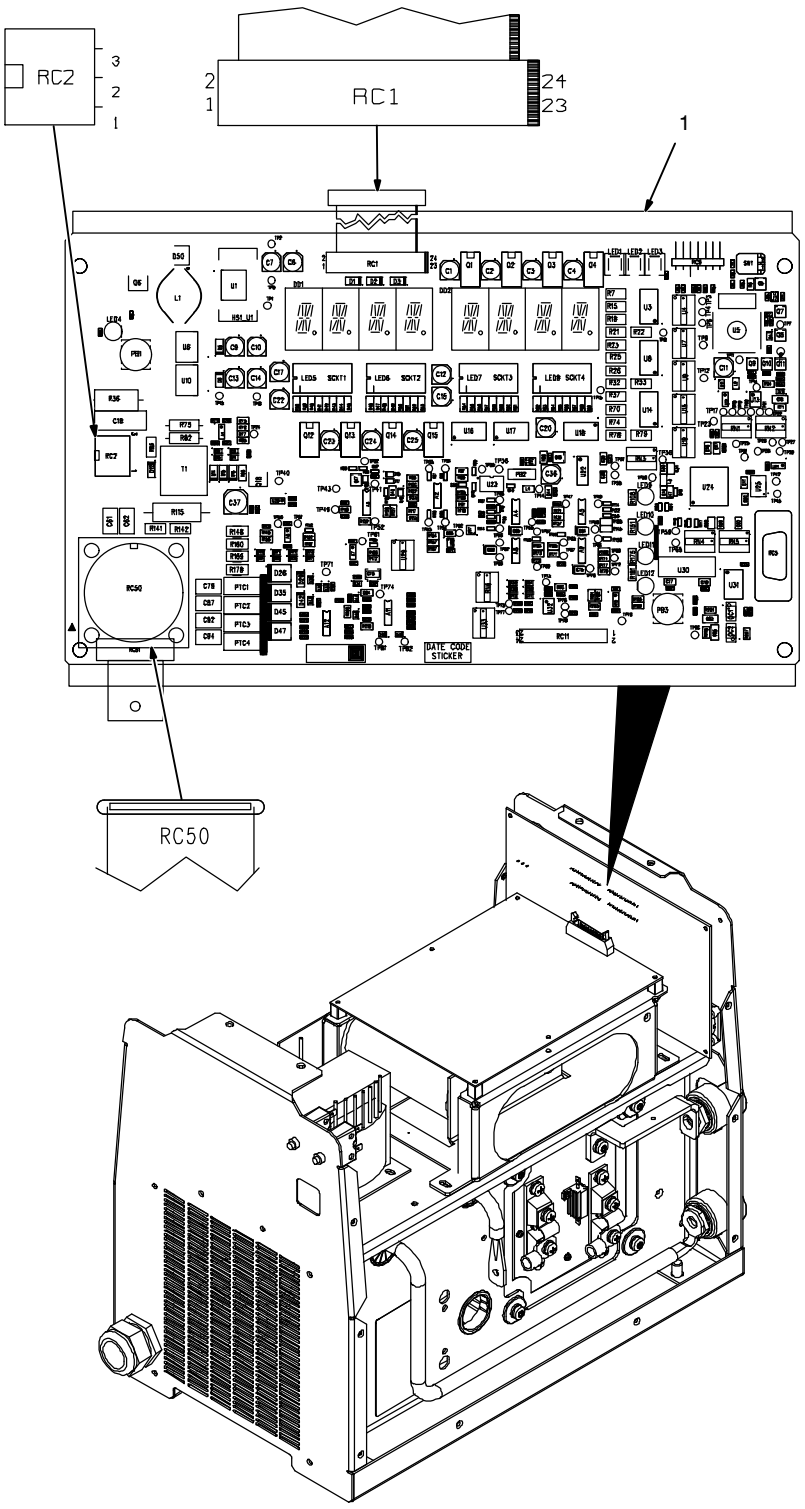
☞ *If any measurements failed, replace PC2.*

8-30. Power Interconnect Board (PC2) - Power Off Checks (Effective With MH474077U)

Power Interconnect Board PC2	DMM Positive Lead	DMM Negative Lead	DMM Diode	DMM Ohms
Pre-Charge Resistor R14	R14 Bottom	R14 Top	N/A	40
SCR Gate Resistor R10	R10 Left	R10 Right	N/A	10 - 16.5
SCR Gate Resistor R11	R11 Left	R11 Right	N/A	10 - 16.5
SCR Gate Resistor R12	R12 Left	R12 Right	N/A	10 - 16.5
Pre-Charge Diode D5	AC3	R14 Top	0.20 - 0.90	N/A
Pre-Charge Diode D6	AC2	R14 Top	0.20 - 0.90	N/A
Pre-Charge Diode D7	AC1	R14 Top	0.20 - 0.90	N/A
Boost Gate Protection Diode D12	D12 Left	D12 Right	N/A	100k
Inverter Gate MOSFET Q1	Q1-S (Source)	Q1-D (Drain)	0.20 - 0.90	N/A
Inverter Gate MOSFET Q2	Q2-S (Source)	Q2-D (Drain)	0.20 - 0.90	N/A
Inverter Gate Protection Diode D2	D2 Left	D2 Right	N/A	100k
Inverter Gate Protection Diode D3	D3 Left	D3 Right	N/A	100k
Snubber Gate Protection Diode D9	D9 Left	D9 Right	N/A	100k
Thermistor	PTC1 Left	PTC1 Right	N/A	25 - 60 at 25°C (77°F)

Notes

8-31. Front Panel/Display Board PC3 Testing Information (Use with Section 8-32)



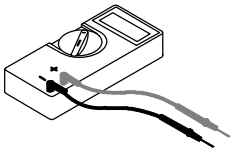
⚠ Measure voltage of input capacitors according to Section 8-3, and be sure voltage is near zero before touching any parts.

Be sure plugs are secure before applying power. See Section 8-32 for specific values during testing.

1 Front Panel/Display Board PC3

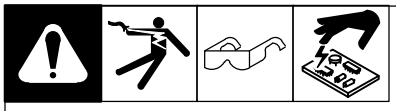
☞ *No testing required for remaining plugs and receptacles.*

Test Equipment Needed:



Ref. 243612-C / 805137-A

8-32. Front Panel/Display Board PC3 Test Point Values



PC3 Voltage Readings

a) Tolerance – ±10% unless specified

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

Receptacle	Pin	Type	Value
RC1	1	Output	Output reference; 1 volt DC per 42.5 amperes of weld output when machine is under load; when machine at idle, process set to MIG with .035 STL wire and ARGN CO2 gas selected; adjust control set to 10V preset = 8.2V; adjust control set 38V preset = 9.4V
	2	Output	Voltage feedback; 1 volt DC per 10 volts DC of weld output
	3	Input	Current feedback; 1 volt DC per 100 amperes of weld output
	4		Not Used
	5	Output	Output enable; 0 volts DC = ON, +12.5 volts DC = OFF
	6		Not Used
	7		Not Used
	8		Not Used
	9	Output	Fan enable; +5 volts DC = fan on, –15 volts DC = fan off
	10		Not Used
	11	Input	Main transformer overcurrent detect; +.7 volts DC = OK, +3.3 volts DC = T1 primary current = HELP 1
	12		Not Used
	13	Output	+3.0 volts DC reference voltage for thermistors
	14	GND	Circuit common referenced to chassis
	15	Input	Secondary side thermistor return; +1.2 volts DC at 25˚C thermistor temperature
	16	GND	Circuit common referenced to chassis
	17	Input	Primary side thermistor return; +1.2 volts DC at 25˚C thermistor temperature
	18	GND	Circuit common referenced to chassis
	19	Input	Foldback; decreases weld output if input bus voltage drops, 0 volts = OK, +15 volts DC 15Khz pwm squarewave = foldback
	20	GND	Circuit common referenced to chassis
	21	Input	+24 volts DC, unregulated DC voltage with respect to GND, power feed to front panel pcb
	22	Input	+24 volts DC, unregulated DC voltage with respect to GND, power feed to front panel pcb
	23	Input	–24 volts DC, unregulated DC voltage with respect to GND, power feed to front panel pcb
	24	Input	–24 volts DC, unregulated DC voltage with respect to GND, power feed to front panel pcb
RC2	1	Input	Negative weld output terminal; used for output voltage feedback
	2		Not Used
	3	Input	Positive weld output terminal; used for output voltage feedback

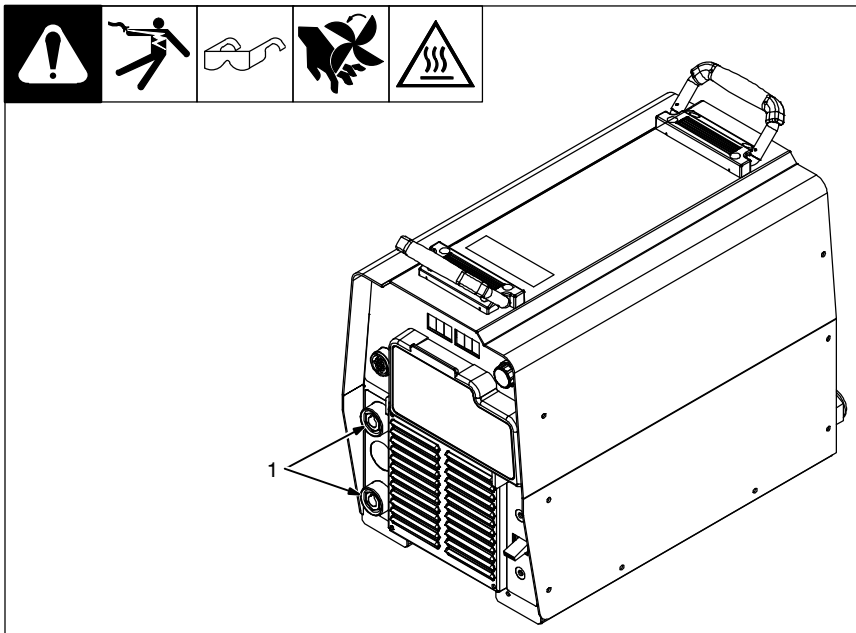
Section 8-32. Front Panel/Display Board PC3 Test Point Values (Continued)

Receptacle	Pin	Type	Value
RC50	A	Output	23 volts AC RMS at 10 amps; 14−pin remote accessory power
	B	Input	Remote output enable; 0 volts AC = weld output off, 23 volts AC RMS = weld output on
	C	Output	Output signal to remote command reference; +10 volts DC
	D	GND	Remote command reference signal common
	E	Input	Input signal from remote command; 0 to 10 volts DC, +13.5 volts DC when not connected to remote command from accessory
	F	Output	Current feedback; 1 volt DC per 100 amperes of weld output
	G	GND	14−pin remote accessory power return
	H	Output	Voltage feedback; 1 volt DC per 10 volts DC of weld output
	I*	Output	115 volts AC RMS at 2 amps; 14−pin remote accessory power
	J*	Input	Remote output enable; 0 volts AC = weld output off, 115 volts AC RMS = weld output on
	K	Chassis	Power source chassis
	L	Input	Wirefeed command. 0 to +10 volts DC from synergic capable wire feeder
	M	Input	Prior to MA370426A not used. Effective with MA370426A Remote Process Select. When connected to Remote Process Select capable single wirefeeder; Mig = 3.5 volts DC, Pulse = 2.5 volts DC. When connected to Remote Process Select capable dual wirefeeder; left side Mig = 5.5 volts DC, left side Pulse = 4.5 volts DC, right side Mig = 7.5 volts DC, right side Pulse = 6.5 volts DC
	N	Input	Wire feed speed common

☞ *No testing required for remaining plugs and receptacles.*

***** 115 volts AC not available at RC50 eff w/ME224001U.

8-33. Checking Unit Output After Servicing



1 Weld Output Terminals

Check open-circuit voltage between terminals according to Section 8-18 (voltage V-12)

If correct voltage is not present, repeat troubleshooting procedures.

☞ *Perform a load bank test to ensure welding generator operates properly after servicing. Be sure load bank is capable of handling the rated output of the welding generator being tested (see load bank Owner's Manual).*
The load bank will simulate a weld load and the electrical demand on the unit. See Specifications section for rated load.
If unit does not perform at rated load, repeat troubleshooting procedures.

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

Pre-Operational Checks
Check labels; replace labels that are unreadable or damaged (see Parts List).
Clean weld output terminals. Tighten connections.
Clean outside of entire unit.

Check Unit Static 2018-12 - 803691-E

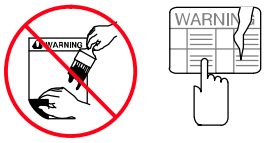
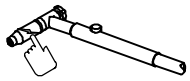
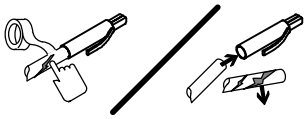
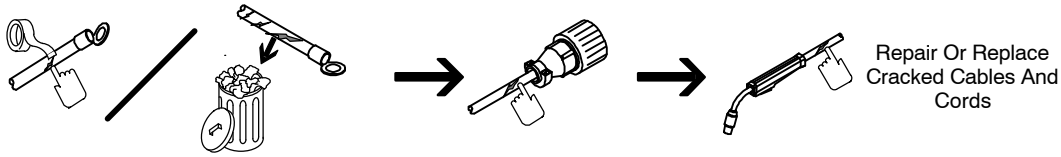
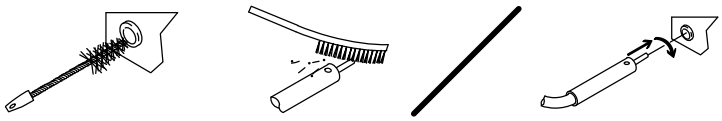
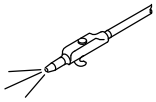
SECTION 9 – MAINTENANCE

9-1. Routine Maintenance

Disconnect power before maintaining.

☞ *Maintain more often during severe conditions.*

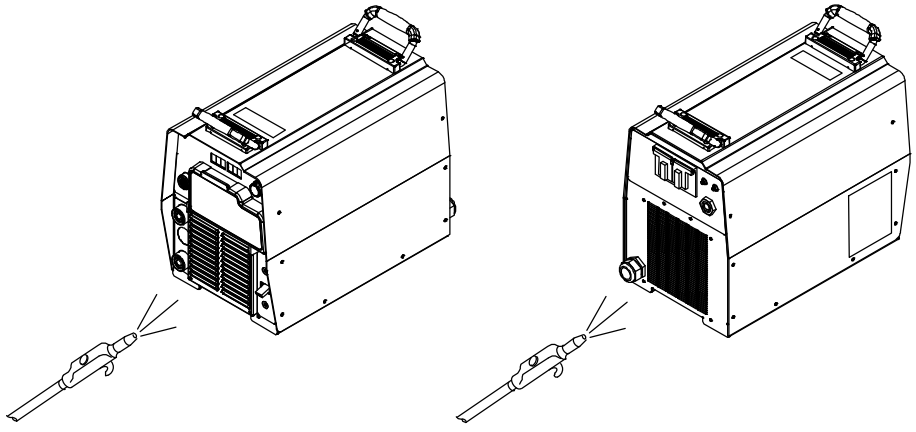
✓ = Check ◇ = Change ◒ = Clean ☆ = Replace

Every **3** Months	✓ ◇ ☆  Replace Damaged Or Unreadable Labels	✓ ☆  Replace Cracked Torch Body
	✓ ☆  Repair Or Replace Cracked Cables	
	✓ ☆  Repair Or Replace Cracked Cables And Cords	
	✓ ◒  Clean And Tighten Weld Connections	
Every **6** Months	✓ ◒  Blow Out Inside	

9-2. Blowing Out Inside Of Unit

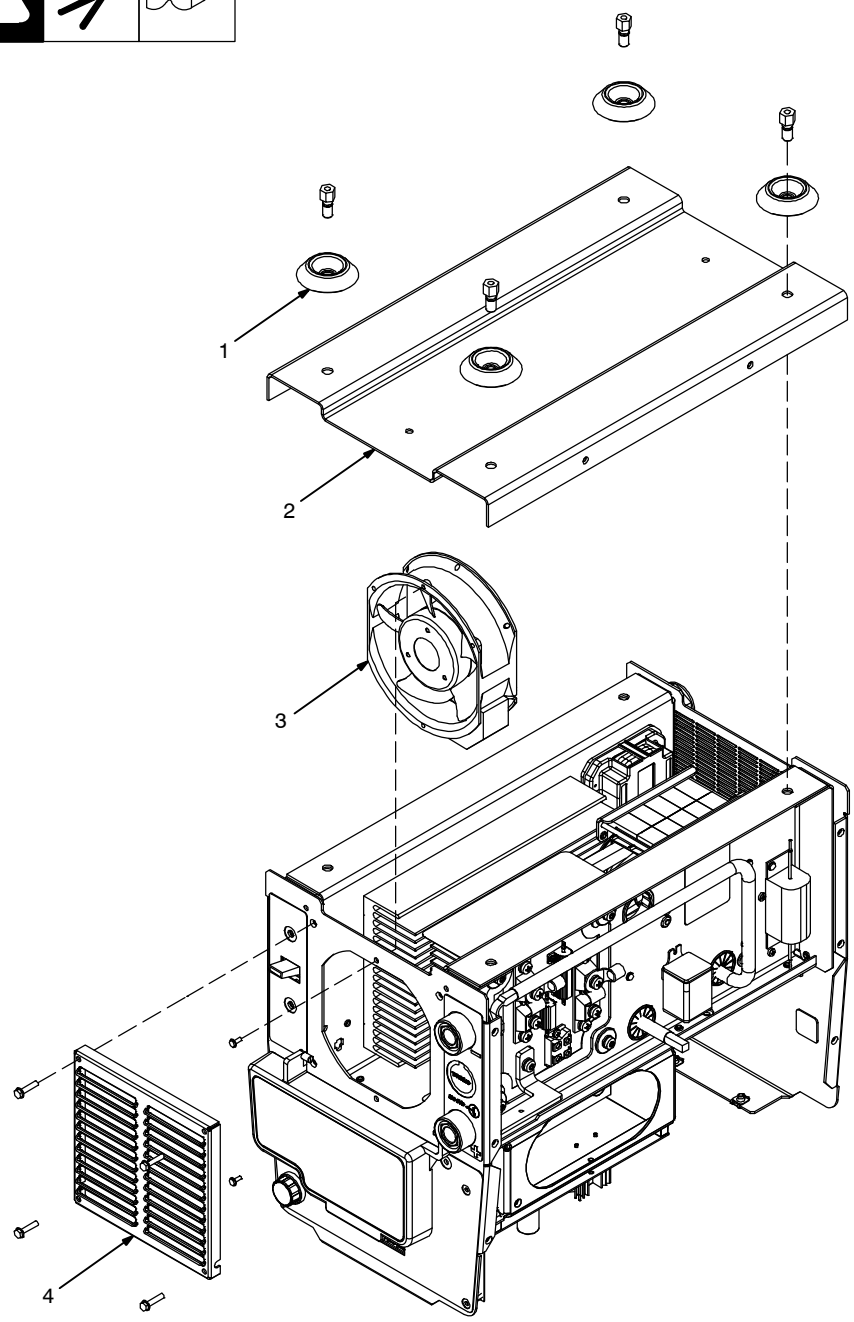
Do not remove case when blowing out inside of unit.

To blow out unit, direct airflow through front and back louvers as shown.



Ref. 803691-E

9-3. Removing Fan Motor



Significant DC voltage can remain on capacitors after unit is Off. Always check capacitors according to Section 8-3 to be sure they have discharged before working on unit.

☞ *Drawing is representative and may not reflect actual unit.*

1 Mounting Unit Foot

2 Base

3 Fan Motor

4 Louver

Remove wrapper from unit.

Place unit upside down on secure work area as shown.

Remove mounting unit feet.

Lift off base.

Remove louver from front panel assembly.

Remove bolts (2) securing fan assembly.

Disconnect fan motor plug and remove fan from unit.

Reverse steps to replace fan motor in unit.

Tools Needed:

1/2, 9/16 in.

5/16 in.

805299-A

SECTION 10 – ELECTRICAL DIAGRAMS

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

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

Model	Serial Or Style Number	Circuit Diagram	Wiring Diagram
Invision 352 MPa (208 – 575 Volt Models)	MA021803A thru MB380100A	246192-A	235706-A
	MB380101A thru MB520505A	254105-A	254106-A
	MB520506A thru ME224000U	256236-A	256243-A
	ME224001U thru MF254022U	265903-A	268764-A
	MF254023U thru MF344114U	271737-A	271738-A
	MF344115U and following	271737-B	271738-A
Circuit Board PC1 (Control W/Program)	MA021803A thru MF254022U	242816-E♦♦	
	MF254023U thru MG094219U	260294-E♦♦	
	MG094220U thru MJ404028U	273300-A♦♦	
	MJ404029U and following	276640-B♦	
Circuit Board PC2 (Power Interconnect)	MA021803A thru MB510231A	225066-C♦♦	
	MB510232A thru ME100268U	246338-A♦♦	
	ME100269 thru MJ164209U	224663-B♦♦	
	MJ164210U and following	258044-B♦	
Circuit Board PC3 (Front Panel/Display)	MA021803A and following	244286-C♦♦	

♦♦ Not included in this manual

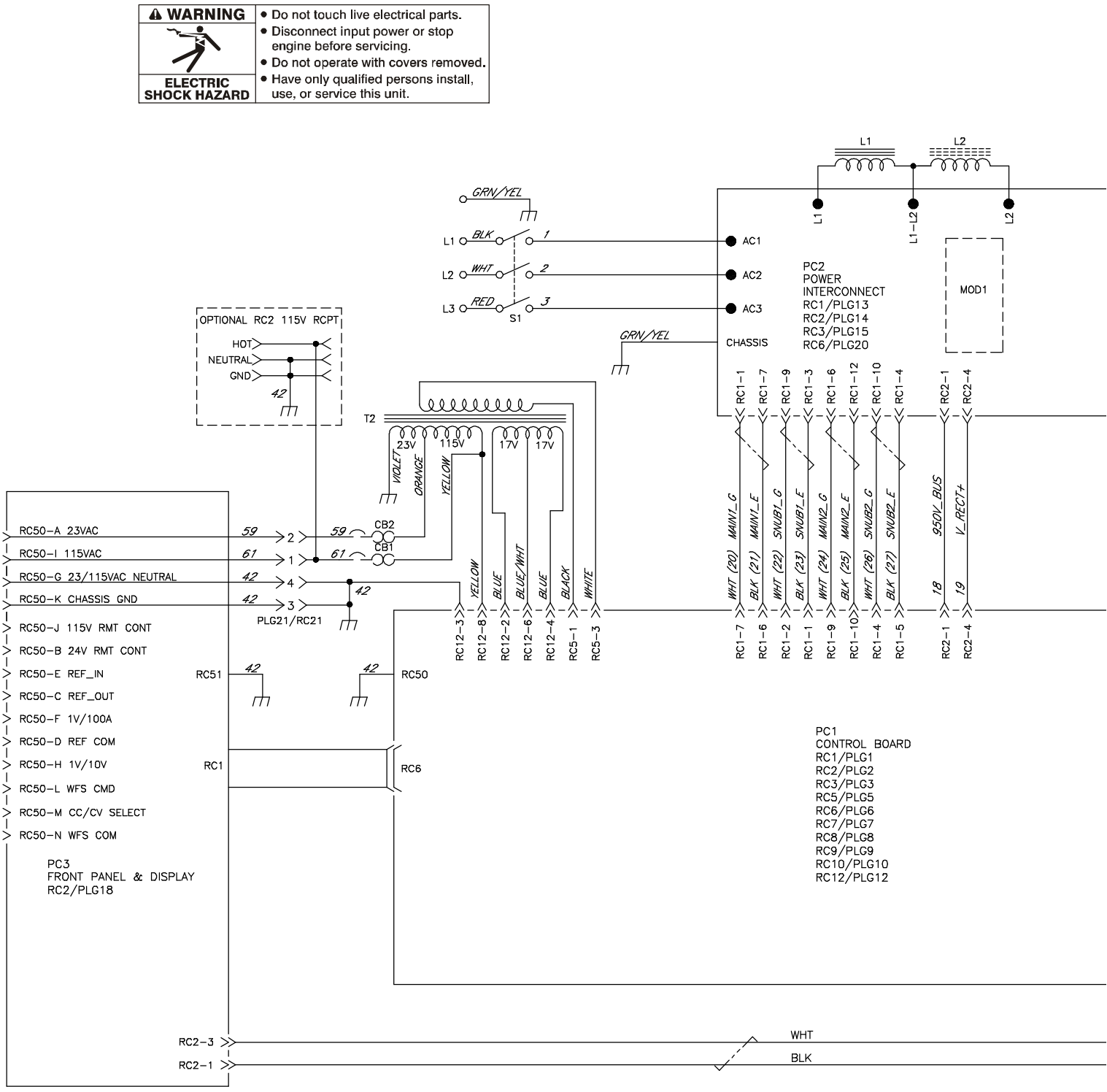
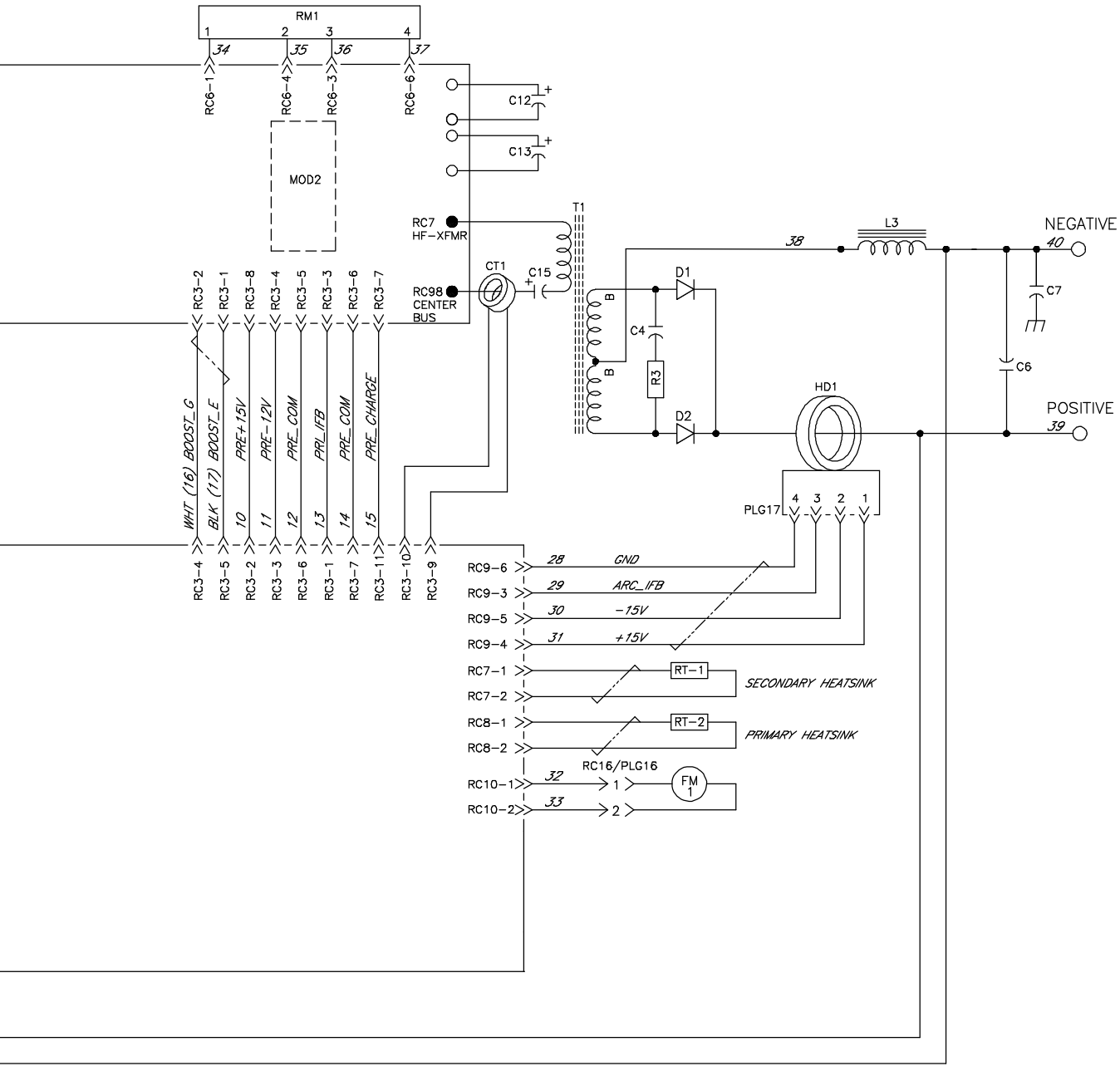


Figure 10-1. Circuit for Invision 352 MPa (208–575 Volt) Eff. w/Serial No. MA021803A thru MB380100A


RM1
1
2
3
4
34
35
36
37
RC6-1
RC6-4
RC6-3
RC6-6
MOD2
C12
C13
RC7
HF-XFMR
T1
L3
38
NEGATIVE
40
C7
C6
POSITIVE
39
CT1
C15
RC98
CENTER
BUS
D1
D2
C4
R3
B
HD1
PLG17
4 3 2 1
RC3-2
RC3-1
RC3-8
RC3-4
RC3-5
RC3-3
RC3-6
RC3-7
WHT (16) BOOST_G
BLK (17) BOOST_E
PRE+15V
PRE-12V
PRE_COM
PRI_IFB
PRE_COM
PRE_CHARGE
10
11
12
13
14
15
RC3-4
RC3-5
RC3-2
RC3-3
RC3-6
RC3-1
RC3-7
RC3-11
RC3-10
RC3-9
RC9-6
RC9-3
RC9-5
RC9-4
28
GND
29
ARC_IFB
30
-15V
31
+15V
RC7-1
RC7-2
RT-1
SECONDARY HEATSINK
RC8-1
RC8-2
RT-2
PRIMARY HEATSINK
RC16/PLG16
RC10-1
RC10-2
32
33
1
2
FM
1

246192-A

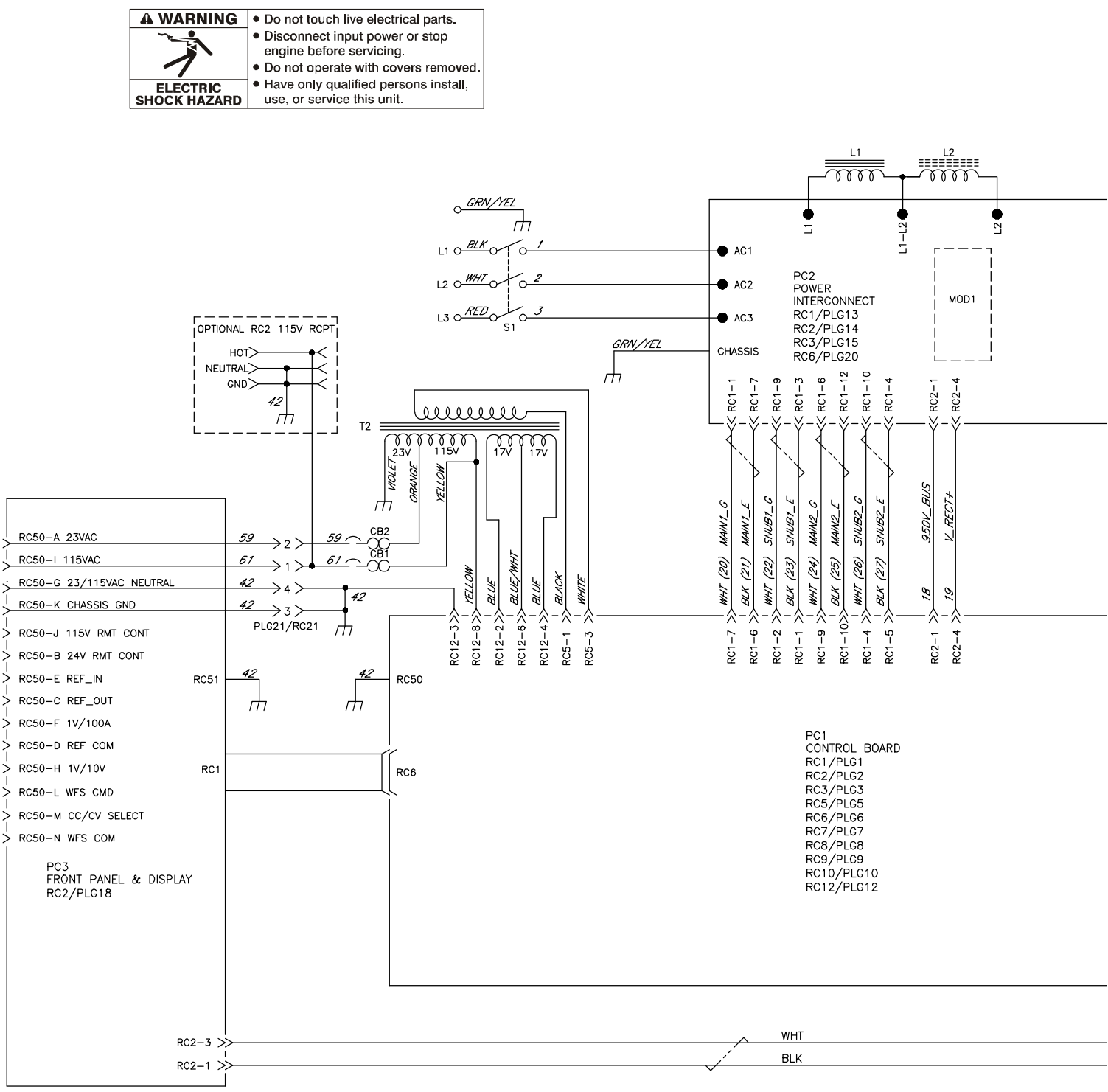
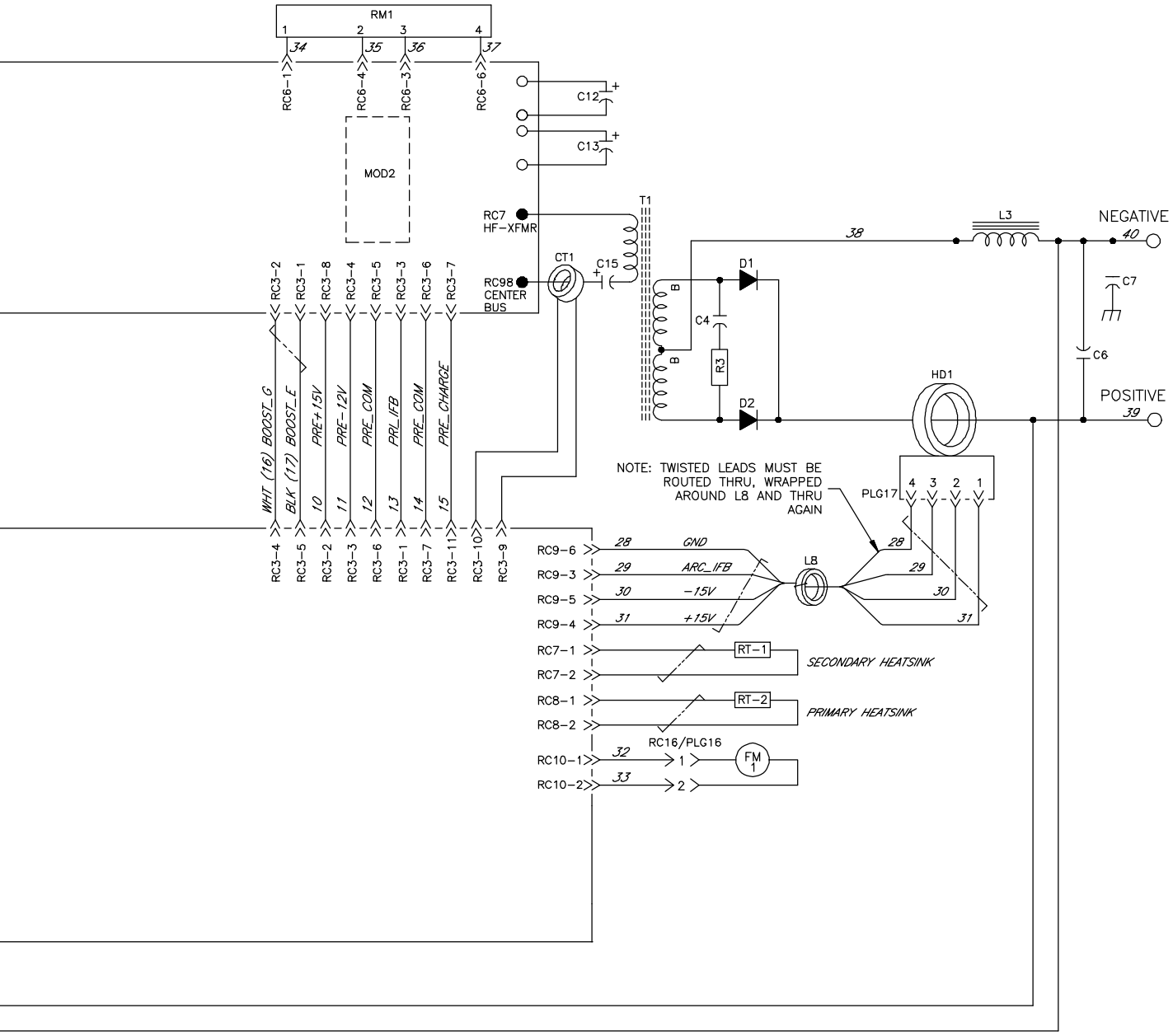


Figure 10-2. Circuit for Invision 352 MPa (208–575 Volt) Eff. w/Serial No. MB380101A thru MB520505A


RM1
1
2
3
4
34
35
36
37
RC6-1
RC6-4
RC6-3
RC6-6
MOD2
C12
C13
RC7
HF-XFMR
T1
L3
NEGATIVE
40
38
CT1
C15
RC98
CENTER
BUS
D1
D2
C4
R3
B
C7
C6
HD1
POSITIVE
39
RC3-2
RC3-1
RC3-8
RC3-4
RC3-5
RC3-3
RC3-6
RC3-7
WHT (16) BOOST_G
BLK (17) BOOST_F
10
PRE+15V
11
PRE-12V
12
PRE_COM
13
PRL_IFB
14
PRE_COM
15
PRE_CHARGE
RC3-4
RC3-5
RC3-2
RC3-3
RC3-6
RC3-1
RC3-7
RC3-11
RC3-10
RC3-9
NOTE: TWISTED LEADS MUST BE ROUTED THRU, WRAPPED AROUND L8 AND THRU AGAIN
PLG17
4
3
2
1
28
29
30
31
L8
RC9-6
RC9-3
RC9-5
RC9-4
28
GND
29
ARC_IFB
30
-15V
31
+15V
RC7-1
RC7-2
RT-1
SECONDARY HEATSINK
RC8-1
RC8-2
RT-2
PRIMARY HEATSINK
RC16/PLG16
RC10-1
RC10-2
32
33
1
2
FM
1

254105-A

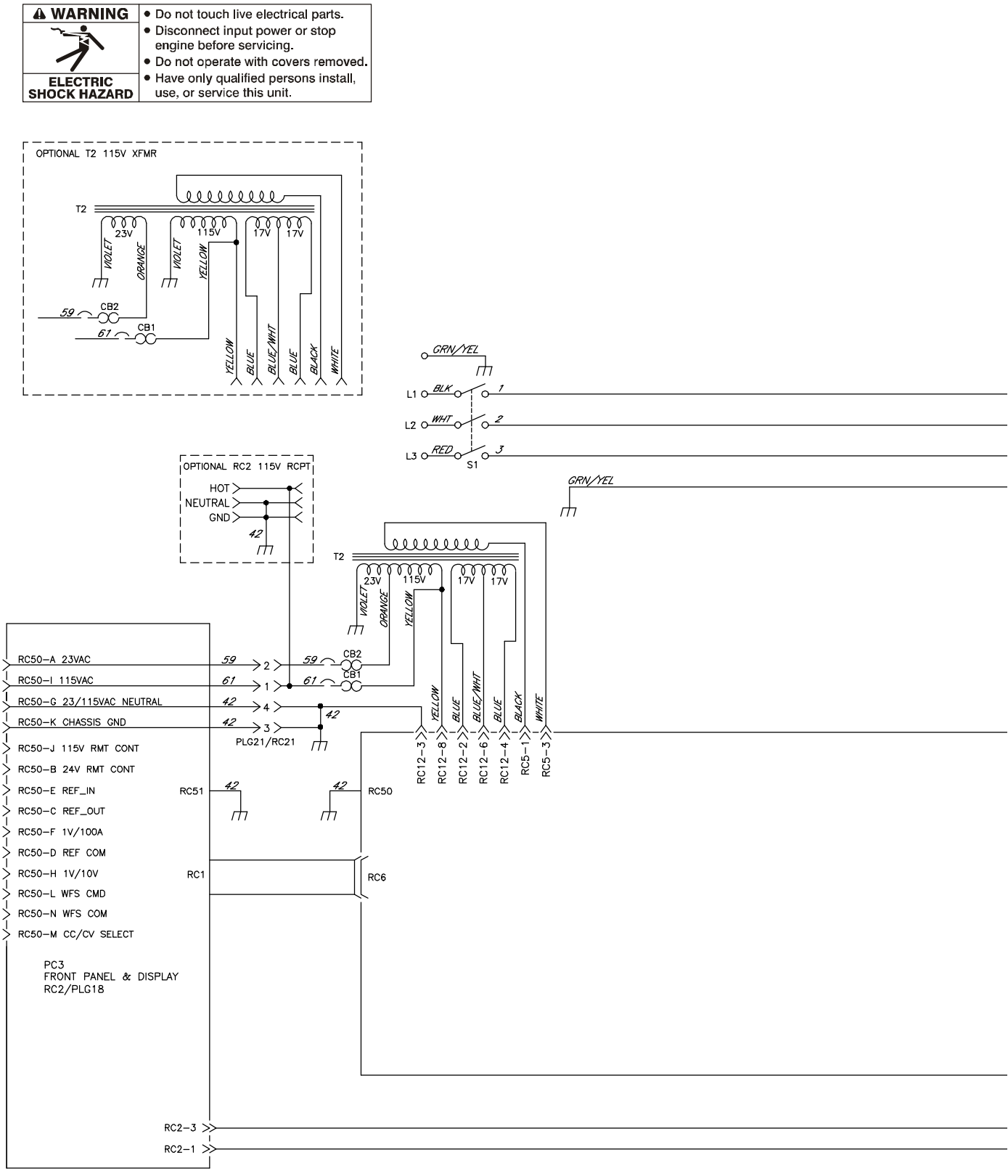
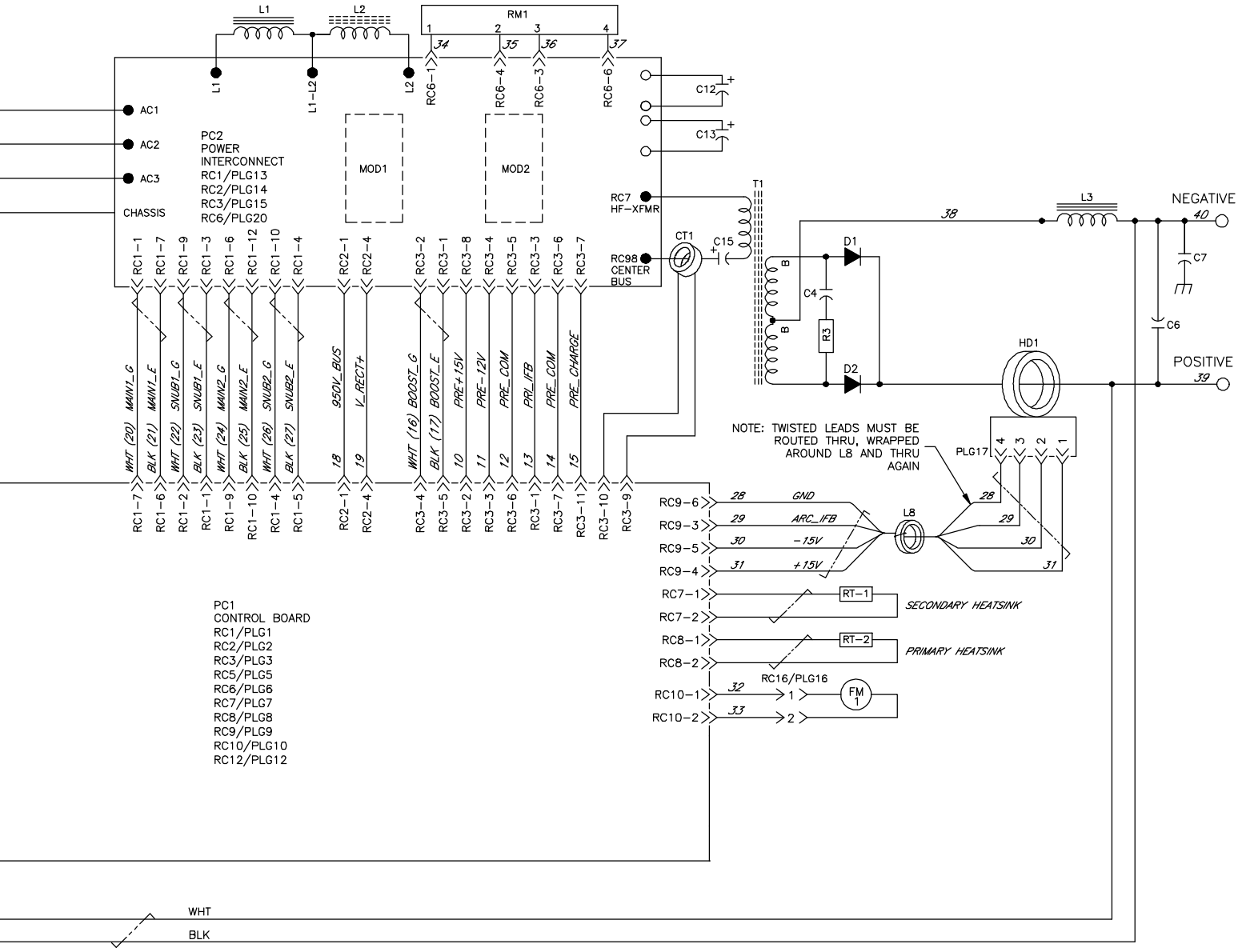


Figure 10-3. Circuit for Invision 352 MPa (208–575 Volt) Eff. w/Serial No. MB520506A Thru ME224000U


L1
L2
RM1
AC1
AC2
AC3
CHASSIS
PC2
POWER
INTERCONNECT
RC1/PLG13
RC2/PLG14
RC3/PLG15
RC6/PLG20
MOD1
MOD2
C12
C13
RC7
HF-XFMR
RC98
CENTER
BUS
CT1
C15
T1
D1
D2
C4
R3
L3
NEGATIVE
POSITIVE
C7
C6
HD1
NOTE: TWISTED LEADS MUST BE ROUTED THRU, WRAPPED AROUND L8 AND THRU AGAIN
PLG17
L8
GND
ARC_IFB
-15V
+15V
RT-1
SECONDARY HEATSINK
RT-2
PRIMARY HEATSINK
RC16/PLG16
FM 1
WHT (20) MAIN1_G
BLK (21) MAIN1_E
WHT (22) SNUB1_G
BLK (23) SNUB1_E
WHT (24) MAIN2_G
BLK (25) MAIN2_E
WHT (26) SNUB2_G
BLK (27) SNUB2_E
950V_BUS
V_RECT+
WHT (16) BOOST_G
BLK (17) BOOST_E
PRE+15V
PRE-12V
PRE_COM
PRI_IFB
PRE_COM
PRE_CHARGE
PC1
CONTROL BOARD
RC1/PLG1
RC2/PLG2
RC3/PLG3
RC5/PLG5
RC6/PLG6
RC7/PLG7
RC8/PLG8
RC9/PLG9
RC10/PLG10
RC12/PLG12
WHT
BLK

256236-A

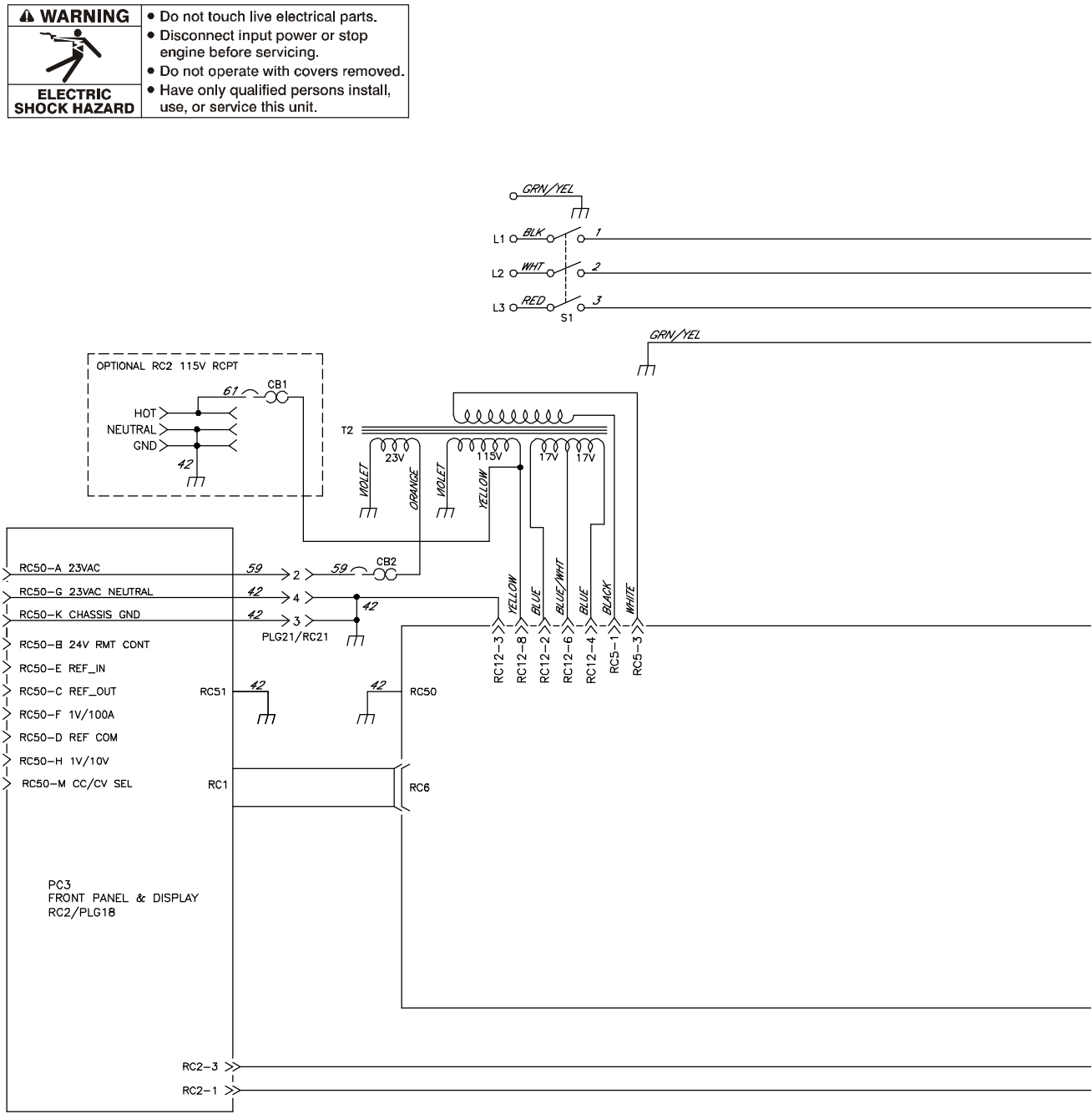
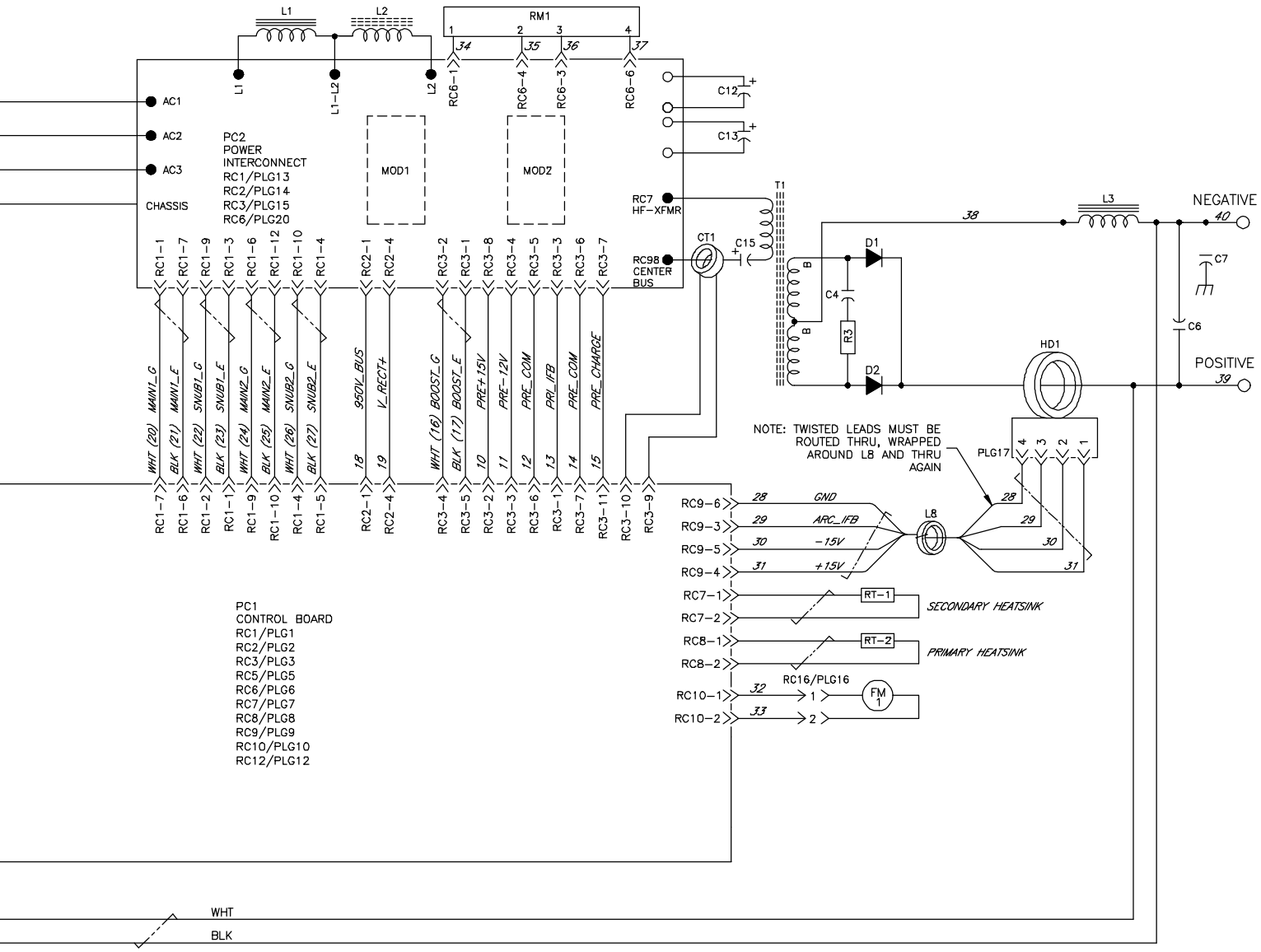


Figure 10-4. Circuit for Invision 352 MPa (208–575 Volt) Eff. w/Serial No. ME224001U Thru MF254022U


L1
L2
RM1
AC1
AC2
AC3
CHASSIS
PC2
POWER
INTERCONNECT
RC1/PLG13
RC2/PLG14
RC3/PLG15
RC6/PLG20
MOD1
MOD2
C12
C13
RC7
HF-XFMR
RC98
CENTER
BUS
CT1
C15
T1
D1
D2
C4
R3
L3
NEGATIVE
POSITIVE
C7
C6
HD1
NOTE: TWISTED LEADS MUST BE ROUTED THRU, WRAPPED AROUND L8 AND THRU AGAIN
PLG17
L8
GND
ARC_IFB
-15V
+15V
RT-1
SECONDARY HEATSINK
RT-2
PRIMARY HEATSINK
RC16/PLG16
FM 1
MAIN1_G
MAIN1_E
SNUB1_G
SNUB1_E
MAIN2_G
MAIN2_E
SNUB2_G
SNUB2_E
950V_BUS
V_RECT+
BOOST_G
BOOST_E
PRE+15V
PRE-12V
PRE_COM
PRI_IFB
PRE_COM
PRE_CHARGE
PC1
CONTROL BOARD
RC1/PLG1
RC2/PLG2
RC3/PLG3
RC5/PLG5
RC6/PLG6
RC7/PLG7
RC8/PLG8
RC9/PLG9
RC10/PLG10
RC12/PLG12
WHT
BLK

265903-A

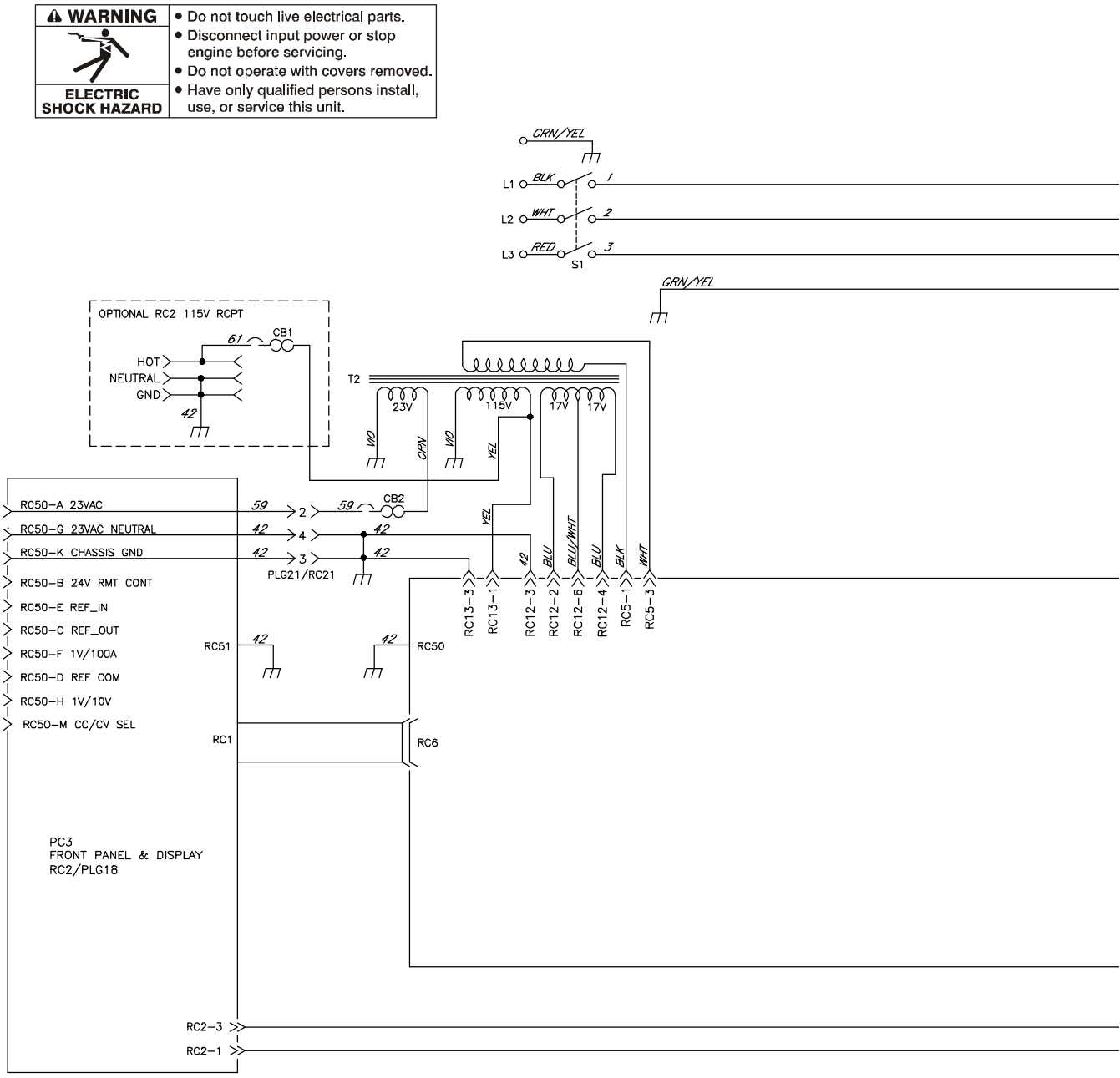
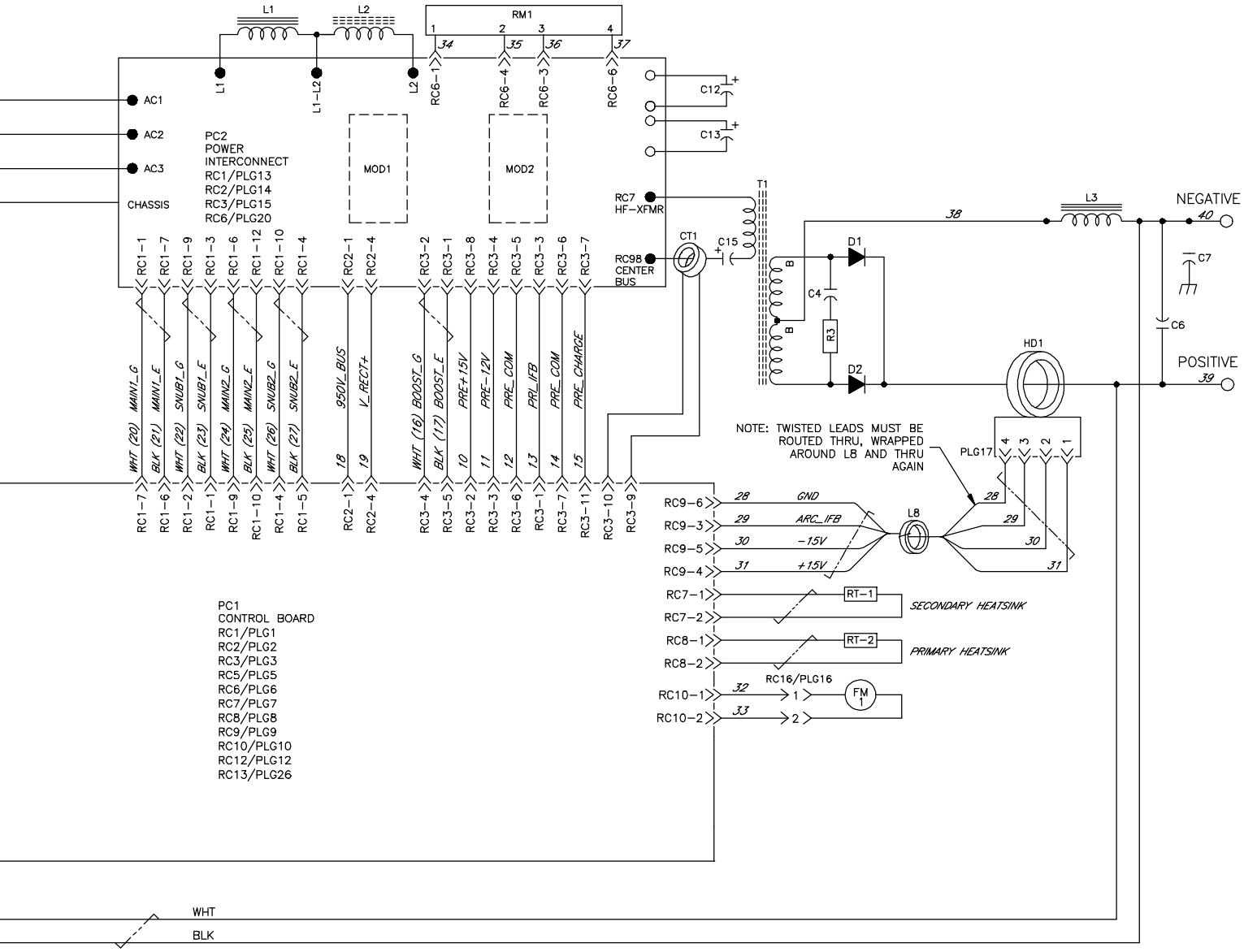


Figure 10-5. Circuit for Invision 352 MPa (208–575 Volt) Eff. w/Serial No. MF254023U Thru MF344114U


L1
L2
RM1
AC1
AC2
AC3
CHASSIS
PC2
POWER
INTERCONNECT
RC1/PLG13
RC2/PLG14
RC3/PLG15
RC6/PLG20
MOD1
MOD2
C12
C13
RC7
HF-XFMR
RC98
CENTER
BUS
CT1
C15
T1
D1
D2
C4
R3
L3
NEGATIVE
C7
C6
POSITIVE
HD1
NOTE: TWISTED LEADS MUST BE ROUTED THRU, WRAPPED AROUND L8 AND THRU AGAIN
PLG17
L8
GND
ARC_IFB
-15V
+15V
RT-1
SECONDARY HEATSINK
RT-2
PRIMARY HEATSINK
RC16/PLG16
FM 1
MAIN1_G
MAIN1_E
SNUB1_G
SNUB1_E
MAIN2_G
MAIN2_E
SNUB2_G
SNUB2_E
950V_BUS
V_RECT+
BOOST_G
BOOST_E
PRE+15V
PRE-12V
PRE_COM
PRI_IFB
PRE_COM
PRE_CHARGE
PC1
CONTROL BOARD
RC1/PLG1
RC2/PLG2
RC3/PLG3
RC5/PLG5
RC6/PLG6
RC7/PLG7
RC8/PLG8
RC9/PLG9
RC10/PLG10
RC12/PLG12
RC13/PLG26
WHT
BLK

271737-A

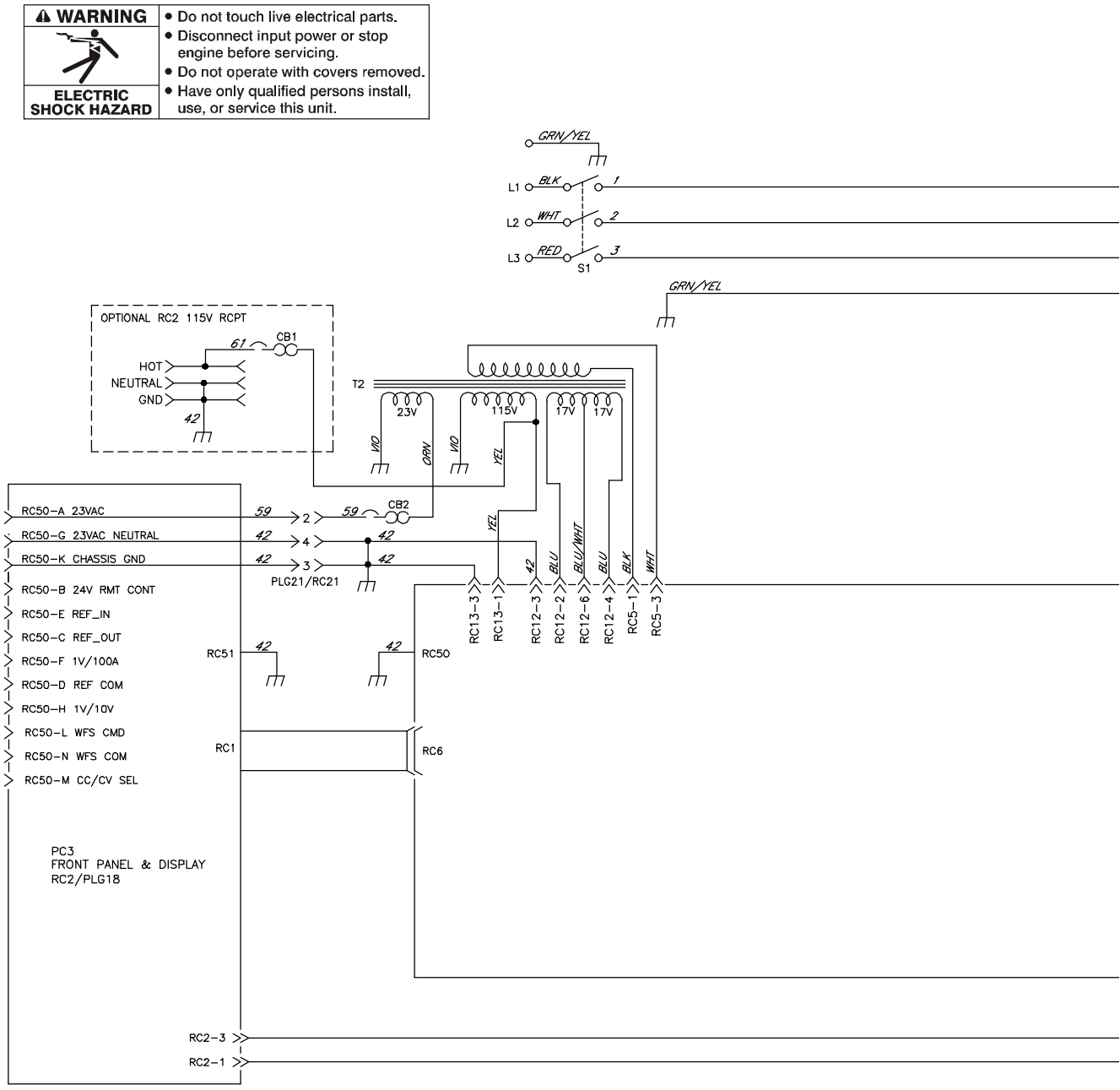
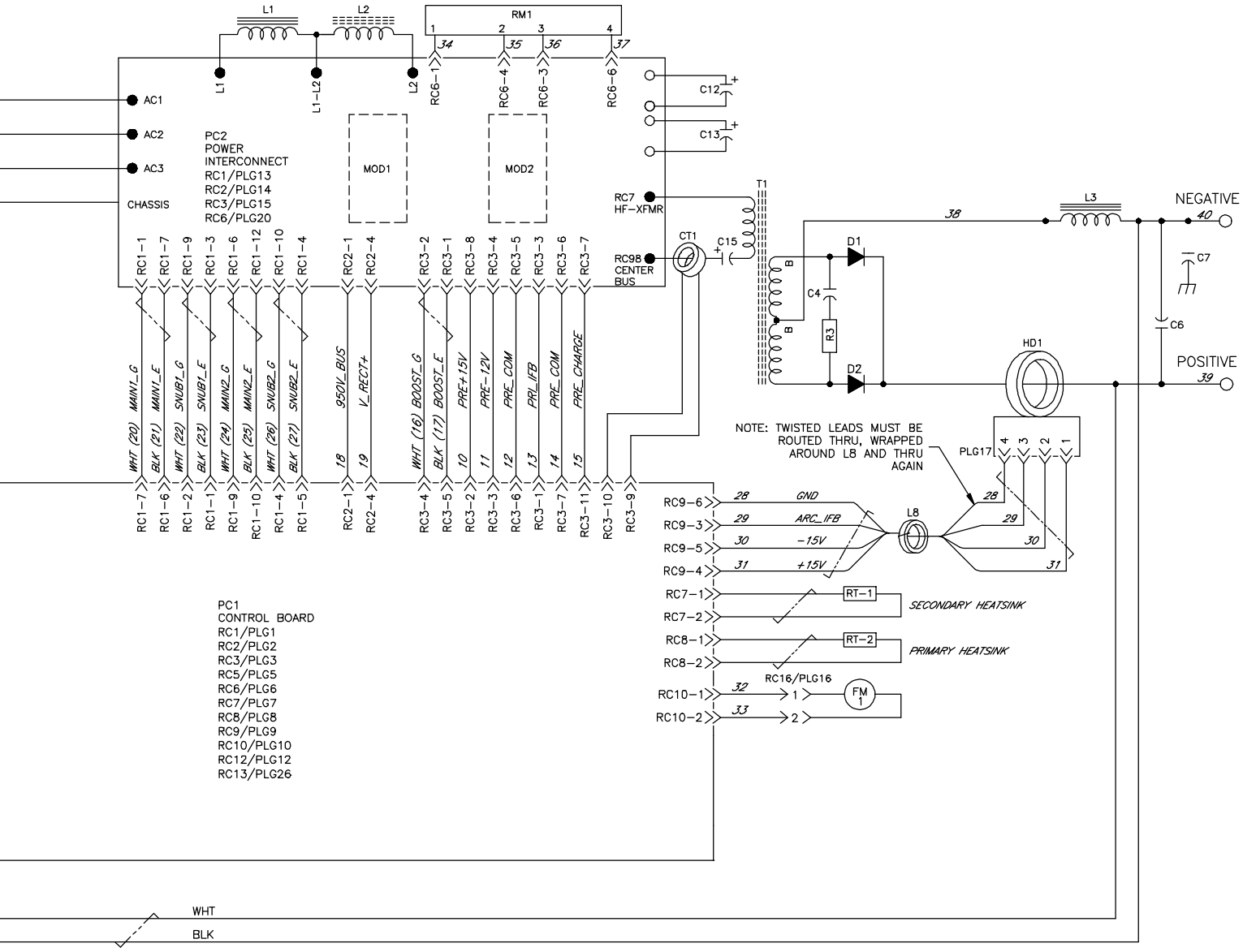


Figure 10-6. Circuit for Invision 352 MPa (208–575 Volt) Eff. w/Serial No. MF344115U And Following


L1
L2
RM1
AC1
AC2
AC3
CHASSIS
PC2
POWER
INTERCONNECT
RC1/PLG13
RC2/PLG14
RC3/PLG15
RC6/PLG20
MOD1
MOD2
C12
C13
RC7
HF-XFMR
RC98
CENTER
BUS
CT1
C15
T1
D1
D2
C4
R3
L3
NEGATIVE
C7
C6
POSITIVE
HD1
NOTE: TWISTED LEADS MUST BE ROUTED THRU, WRAPPED AROUND L8 AND THRU AGAIN
PLG17
L8
GND
ARC_IFB
-15V
+15V
RT-1
SECONDARY HEATSINK
RT-2
PRIMARY HEATSINK
RC16/PLG16
FM 1
MAIN1_G
MAIN1_E
SNUB1_G
SNUB1_E
MAIN2_G
MAIN2_E
SNUB2_G
SNUB2_E
950V_BUS
V_RECT+
BOOST_G
BOOST_E
PRE+15V
PRE-12V
PRE_COM
PRI_IFB
PRE_COM
PRE_CHARGE
PC1
CONTROL BOARD
RC1/PLG1
RC2/PLG2
RC3/PLG3
RC5/PLG5
RC6/PLG6
RC7/PLG7
RC8/PLG8
RC9/PLG9
RC10/PLG10
RC12/PLG12
RC13/PLG26
WHT
BLK

271737-B

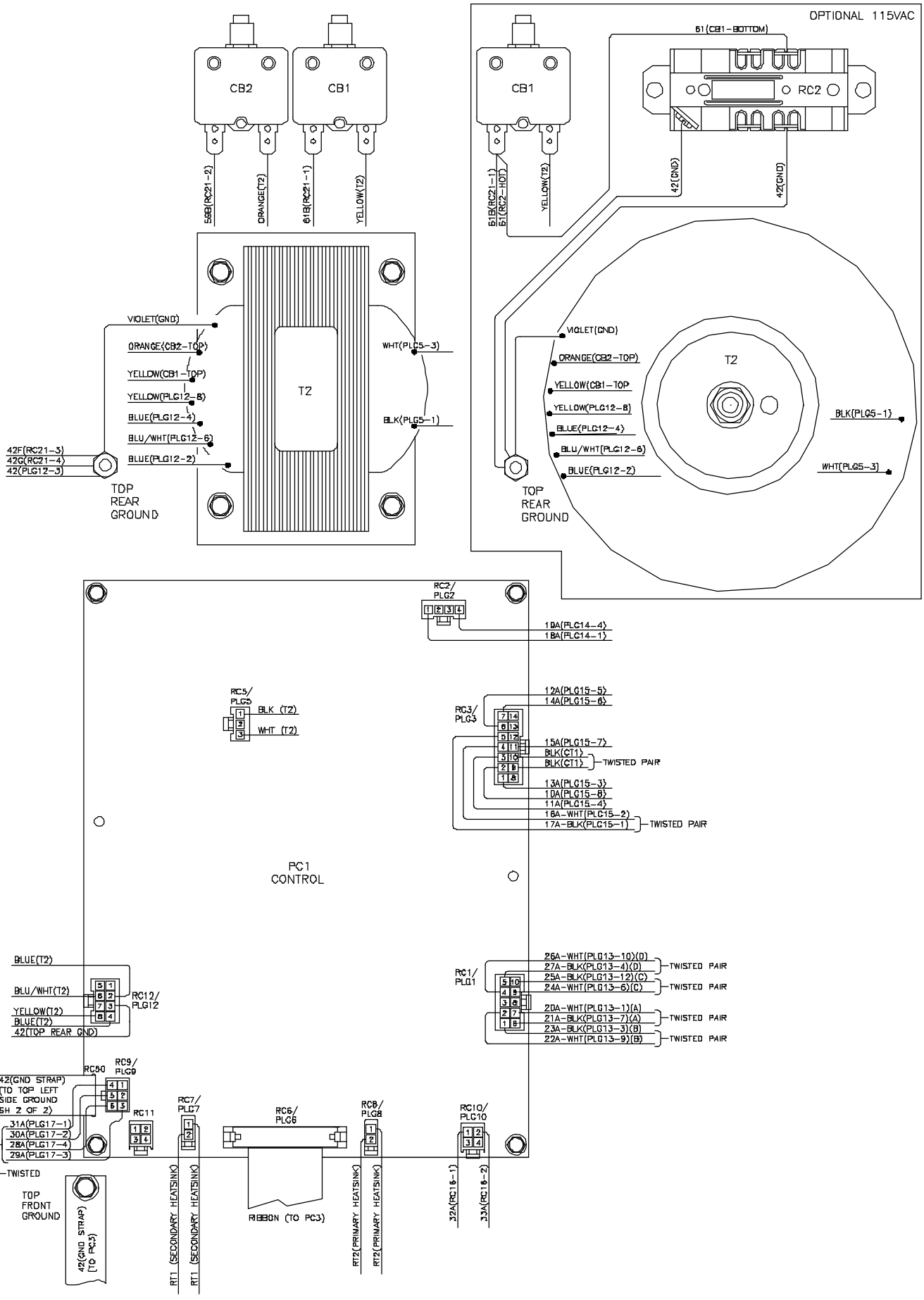
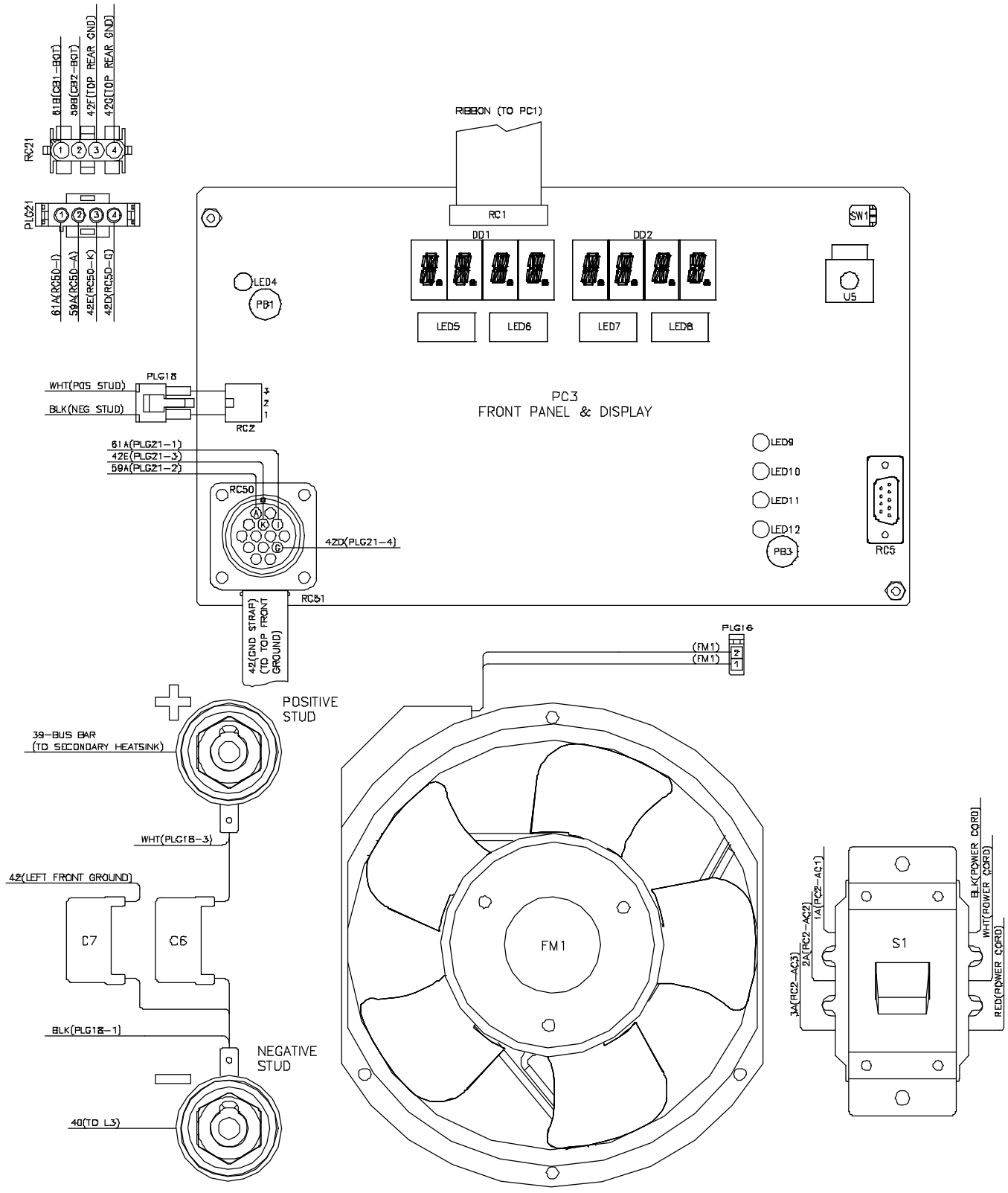


Figure 10-7. Wiring Diagram for Invision 352 MPa Eff. w/Serial No. MA021803A And Following (1 of 2)



⚠ 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	

235706-A

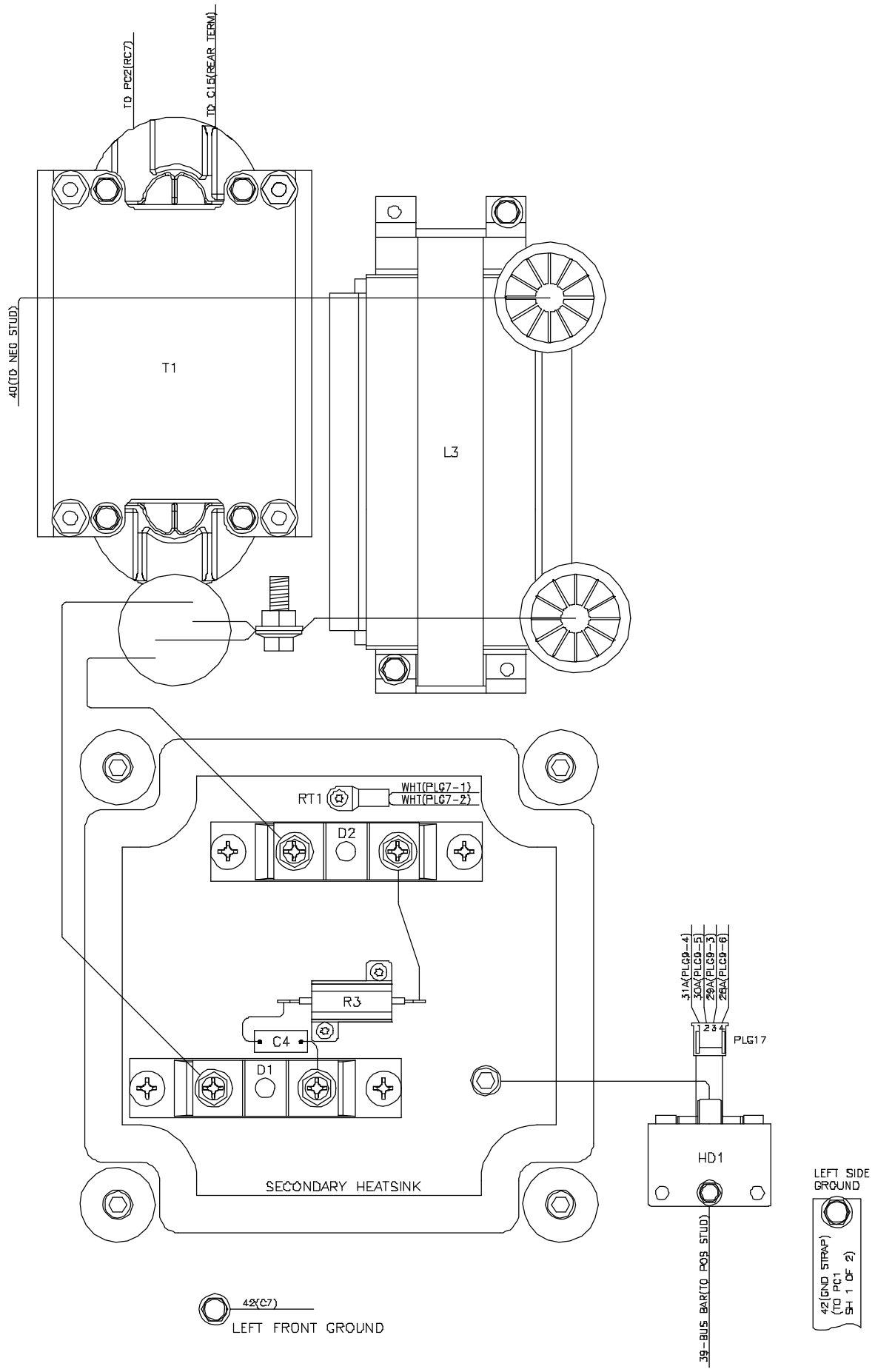
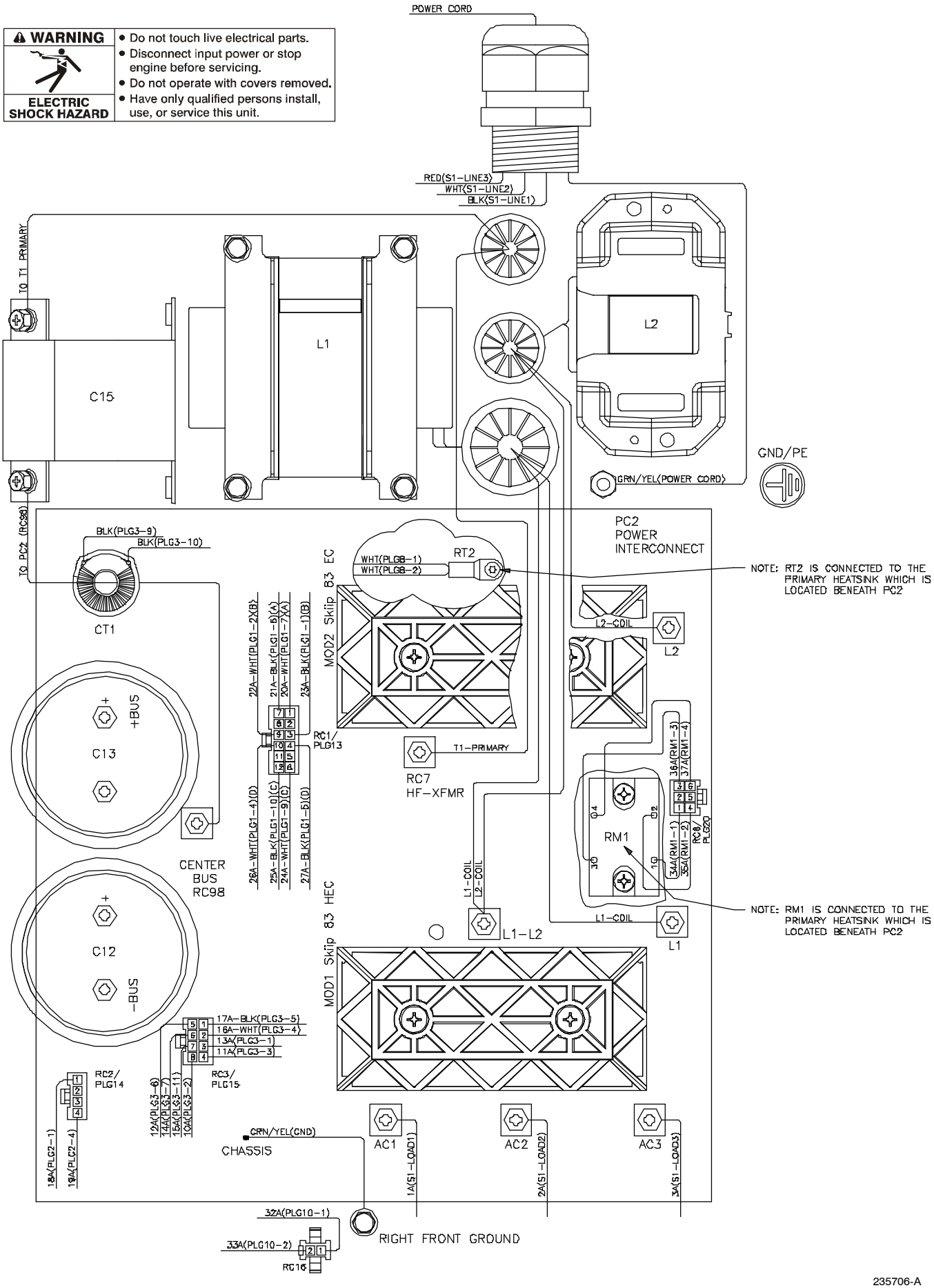


Figure 10-8. Wiring Diagram for Invision 352 MPa Eff. w/Serial No. MA021803A And Following (2 of 2)


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.
POWER CORD
RED(S1-LINE3)
WHT(S1-LINE2)
BLK(S1-LINE1)
TO T1 PRIMARY
L1
L2
C15
GND/PE
GRN/YEL(POWER CORD)
TO PC2 (RC98)
BLK(PLG3-9)
BLK(PLG3-10)
CT1
PC2
POWER
INTERCONNECT
WHT(PLG8-1)
WHT(PLG8-2)
RT2
NOTE: RT2 IS CONNECTED TO THE PRIMARY HEATSINK WHICH IS LOCATED BENEATH PC2
MOD2 Skiip 83 EC
L2-COIL
L2
22A-WHT(PLG1-2)(B)
21A-BLK(PLG1-6)(A)
20A-WHT(PLG1-7)(A)
23A-BLK(PLG1-1)(B)
RC1/
PLG13
T1-PRIMARY
RC7
HF-XFMR
+BUS
C13
CENTER
BUS
RC98
-BUS
C12
26A-WHT(PLG1-4)(D)
25A-BLK(PLG1-10)(C)
24A-WHT(PLG1-9)(C)
27A-BLK(PLG1-5)(D)
16A(RM1-3)
37A(RM1-4)
RM1
34A(RM1-1)
35A(RM1-2)
RC8/
PLG20
Q4
Q2
30
10
L1-COIL
L2-COIL
L1-L2
L1-COIL
L1
NOTE: RM1 IS CONNECTED TO THE PRIMARY HEATSINK WHICH IS LOCATED BENEATH PC2
MOD1 Skiip 83 HEC
17A-BLK(PLG3-5)
16A-WHT(PLG3-4)
13A(PLG3-1)
11A(PLG3-3)
RC2/
PLG14
RC3/
PLG15
12A(PLG3-6)
14A(PLG3-7)
15A(PLG3-11)
10A(PLG3-2)
18A(PLG2-1)
19A(PLG2-4)
GRN/YEL(GND)
CHASSIS
AC1
AC2
AC3
1A(S1-LOAD1)
2A(S1-LOAD2)
3A(S1-LOAD3)
32A(PLG10-1)
33A(PLG10-2)
RC16
RIGHT FRONT GROUND
235706-A

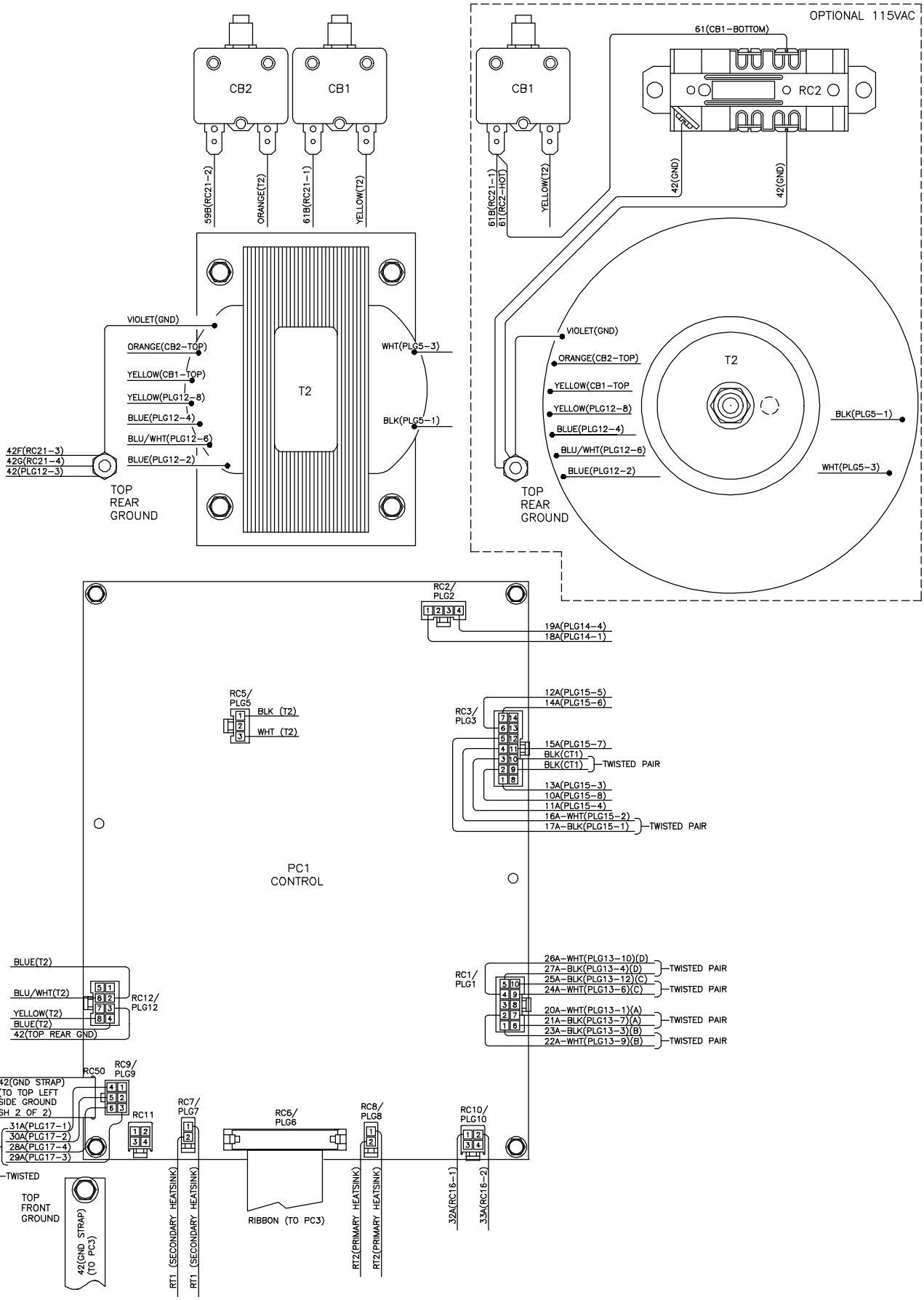
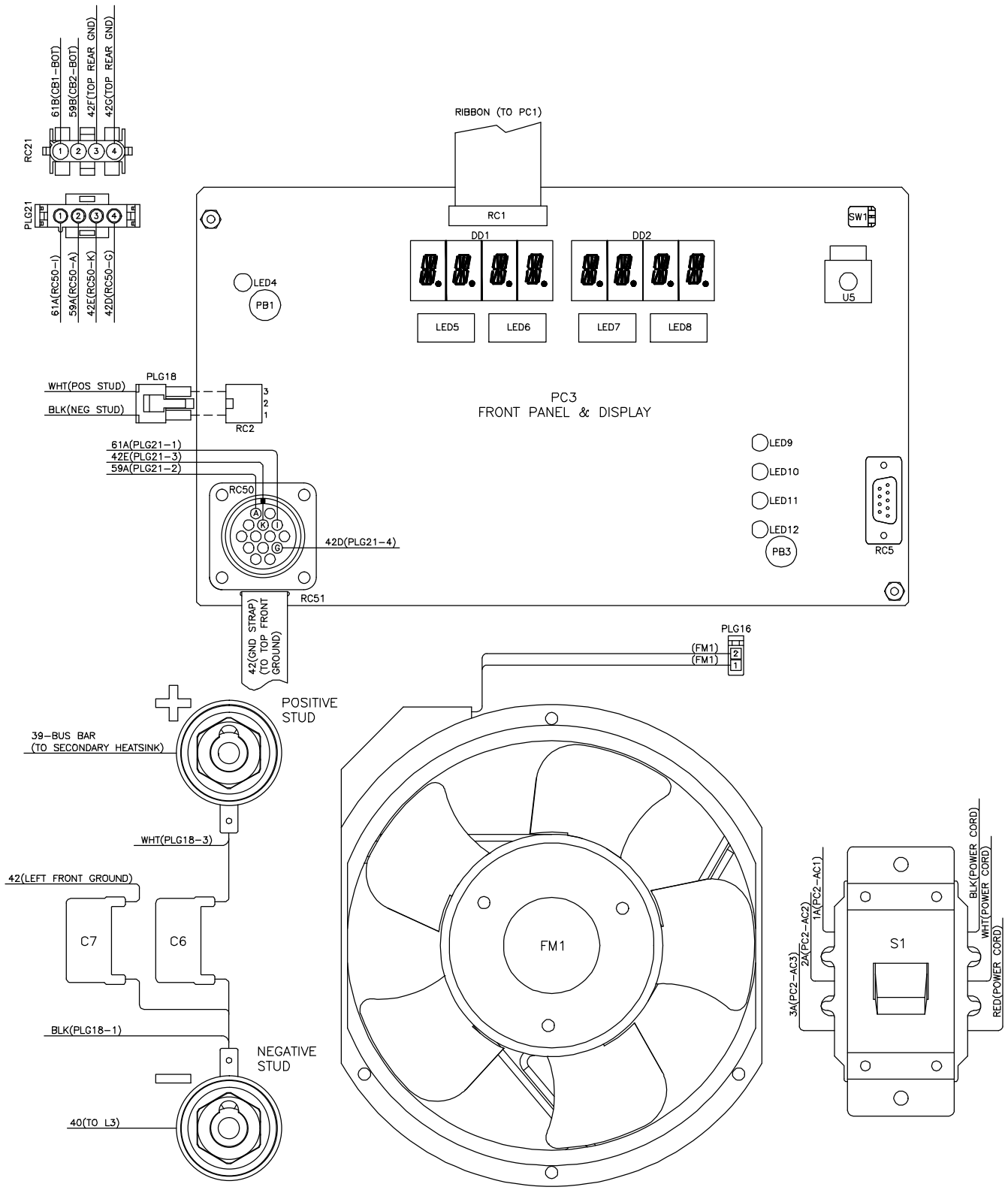


Figure 10-9. Wiring Diagram for Invision 352 MPa w/Serial No. MB380101A Thru MB520505A (1 of 2)



⚠ 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	

254106-A

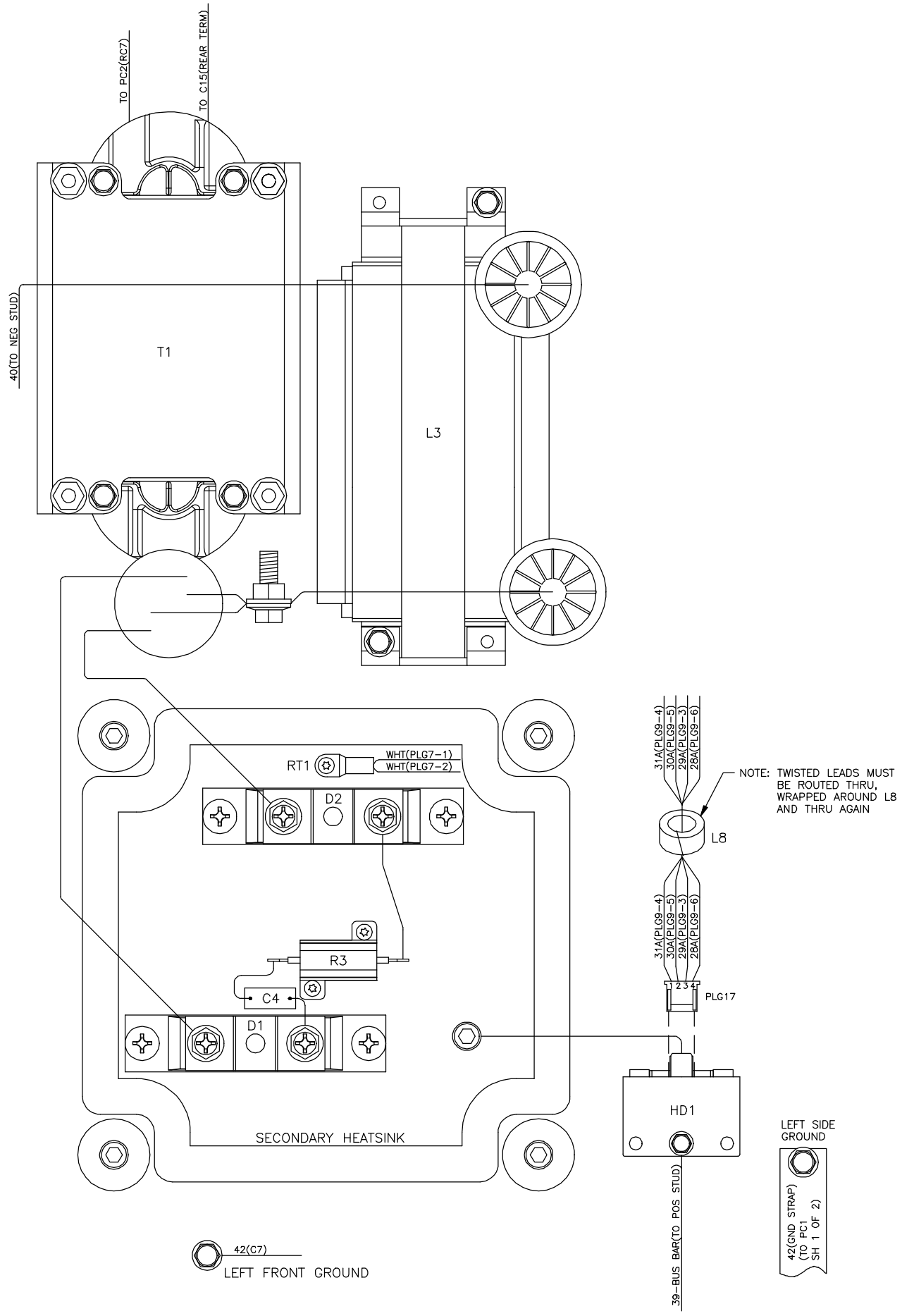
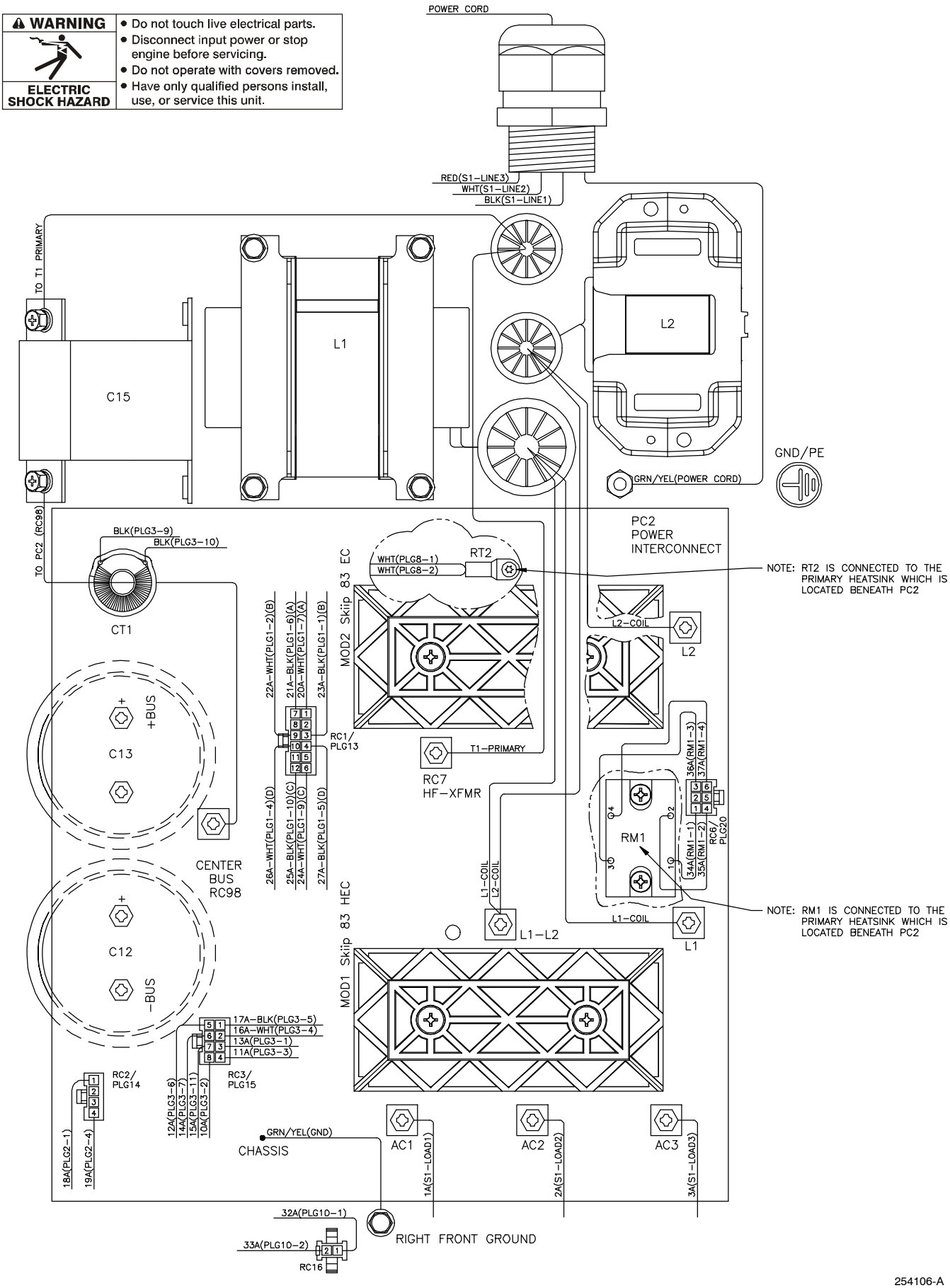


Figure 10-10. Wiring Diagram for Invision 352 MPa Eff. w/Serial No. MB380101A Thru MB520505A (2 of 2)


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.
POWER CORD
RED(S1–LINE3)
WHT(S1–LINE2)
BLK(S1–LINE1)
TO T1 PRIMARY
L1
L2
C15
GND/PE
GRN/YEL(POWER CORD)
TO PC2 (RC98)
BLK(PLG3–9)
BLK(PLG3–10)
CT1
PC2
POWER
INTERCONNECT
WHT(PLG8–1)
WHT(PLG8–2)
RT2
NOTE: RT2 IS CONNECTED TO THE PRIMARY HEATSINK WHICH IS LOCATED BENEATH PC2
MOD2 Skiip 83 EC
22A–WHT(PLG1–2)(B)
21A–BLK(PLG1–6)(A)
20A–WHT(PLG1–7)(A)
23A–BLK(PLG1–1)(B)
L2–COIL
L2
RC1/
PLG13
T1–PRIMARY
RC7
HF–XFMR
+BUS
C13
CENTER
BUS
RC98
26A–WHT(PLG1–4)(D)
25A–BLK(PLG1–10)(C)
24A–WHT(PLG1–9)(C)
27A–BLK(PLG1–5)(D)
36A(RM1–3)
37A(RM1–4)
RC6/
PLG20
34A(RM1–1)
35A(RM1–2)
RM1
Q4
Q2
3Q
1Q
L1–COIL
L2–COIL
L1–L2
L1
NOTE: RM1 IS CONNECTED TO THE PRIMARY HEATSINK WHICH IS LOCATED BENEATH PC2
MOD1 Skiip 83 HEC
C12
–BUS
17A–BLK(PLG3–5)
16A–WHT(PLG3–4)
13A(PLG3–1)
11A(PLG3–3)
RC2/
PLG14
RC3/
PLG15
12A(PLG3–6)
14A(PLG3–7)
15A(PLG3–11)
10A(PLG3–2)
18A(PLG2–1)
19A(PLG2–4)
GRN/YEL(GND)
CHASSIS
AC1
AC2
AC3
1A(S1–LOAD1)
2A(S1–LOAD2)
3A(S1–LOAD3)
32A(PLG10–1)
33A(PLG10–2)
RC16
RIGHT FRONT GROUND
254106-A

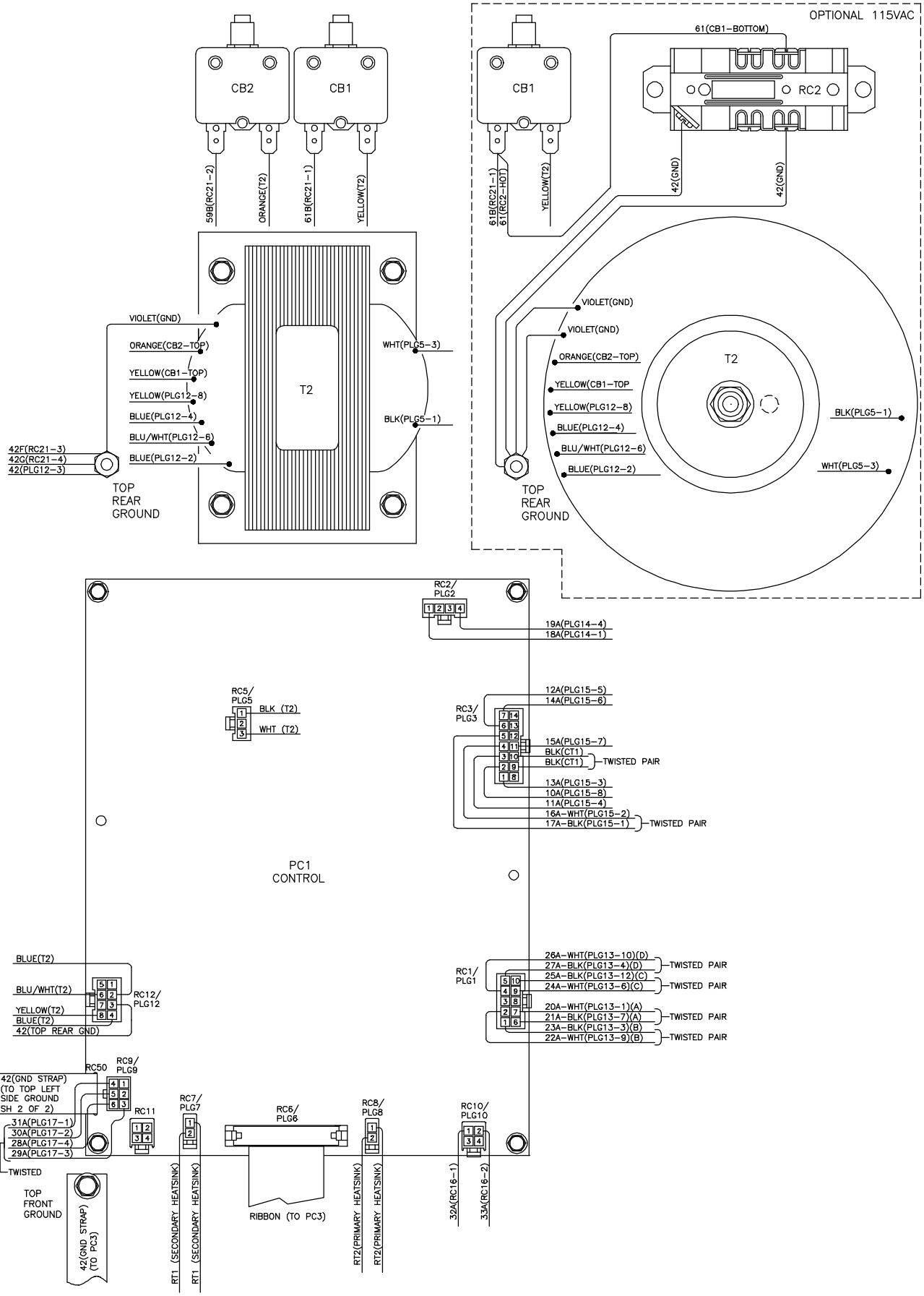
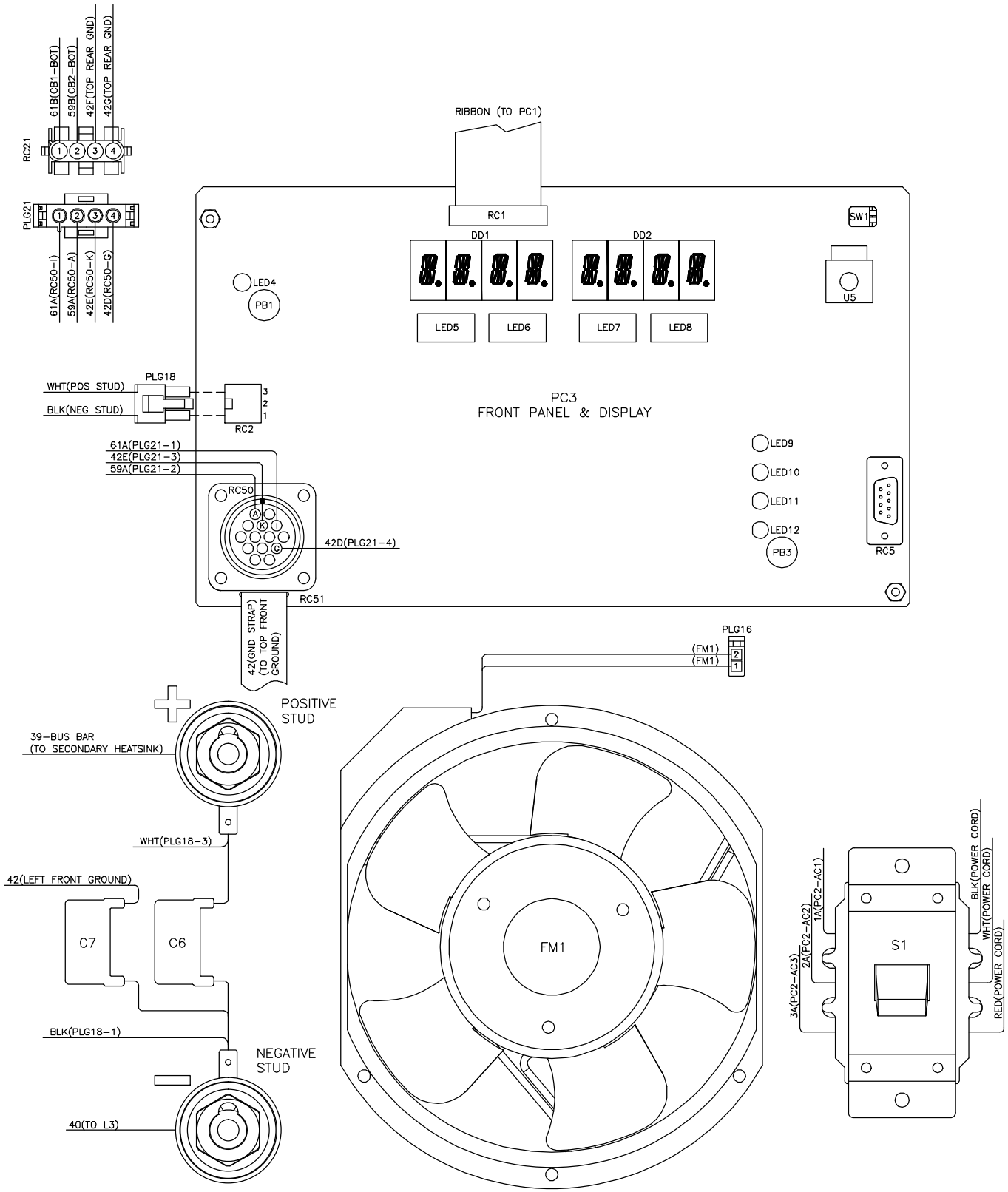


Figure 10-11. Wiring Diagram for Invision 352 MPa Eff. w/Serial No. MB520506A Thru ME224000U (1 of 2)



⚠ 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	

256243-A

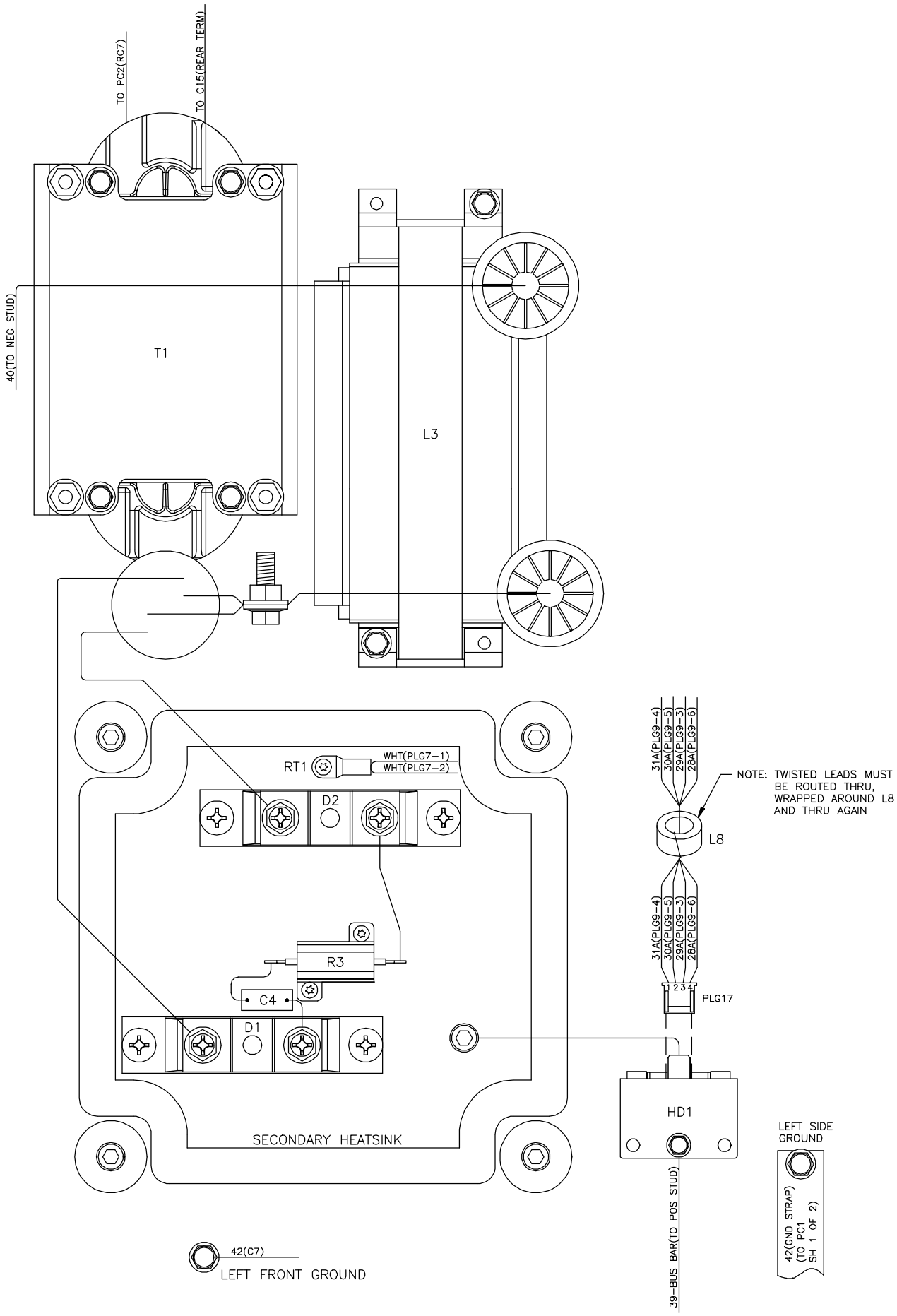
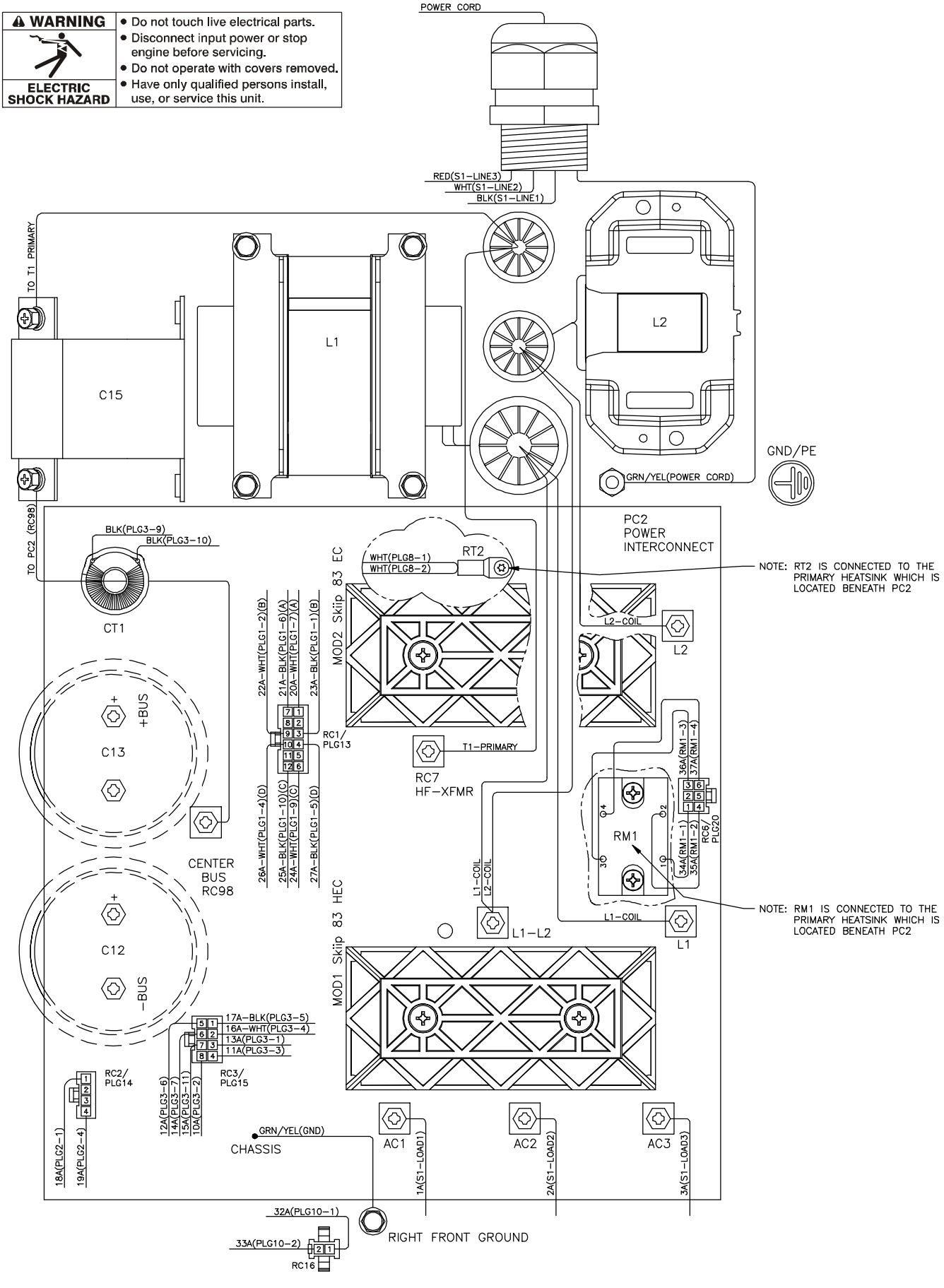


Figure 10-12. Wiring Diagram for Invision 352 MPa Eff. w/Serial No. MB520506A Thru ME224000U (2 of 2)


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.
POWER CORD
RED(S1–LINE3)
WHT(S1–LINE2)
BLK(S1–LINE1)
TO T1 PRIMARY
L1
L2
C15
GND/PE
GRN/YEL(POWER CORD)
TO PC2 (RC98)
BLK(PLG3–9)
BLK(PLG3–10)
CT1
PC2
POWER
INTERCONNECT
WHT(PLG8–1)
WHT(PLG8–2)
RT2
NOTE: RT2 IS CONNECTED TO THE PRIMARY HEATSINK WHICH IS LOCATED BENEATH PC2
MOD2 Skiip 83 EC
22A–WHT(PLG1–2)(B)
21A–BLK(PLG1–6)(A)
20A–WHT(PLG1–7)(A)
23A–BLK(PLG1–1)(B)
L2–COIL
L2
RC1/
PLG13
T1–PRIMARY
RC7
HF–XFMR
+BUS
C13
CENTER
BUS
RC98
26A–WHT(PLG1–4)(D)
25A–BLK(PLG1–10)(C)
24A–WHT(PLG1–9)(C)
27A–BLK(PLG1–5)(D)
36A(RM1–3)
37A(RM1–4)
34A(RM1–1)
35A(RM1–2)
RC6/
PLG20
RM1
L1–COIL
L2–COIL
L1–L2
L1–COIL
L1
NOTE: RM1 IS CONNECTED TO THE PRIMARY HEATSINK WHICH IS LOCATED BENEATH PC2
MOD1 Skiip 83 HEC
C12
–BUS
17A–BLK(PLG3–5)
16A–WHT(PLG3–4)
13A(PLG3–1)
11A(PLG3–3)
RC2/
PLG14
RC3/
PLG15
12A(PLG3–6)
14A(PLG3–7)
15A(PLG3–11)
10A(PLG3–2)
18A(PLG2–1)
19A(PLG2–4)
GRN/YEL(GND)
CHASSIS
AC1
AC2
AC3
1A(S1–LOAD1)
2A(S1–LOAD2)
3A(S1–LOAD3)
32A(PLG10–1)
33A(PLG10–2)
RC16
RIGHT FRONT GROUND
256243-A

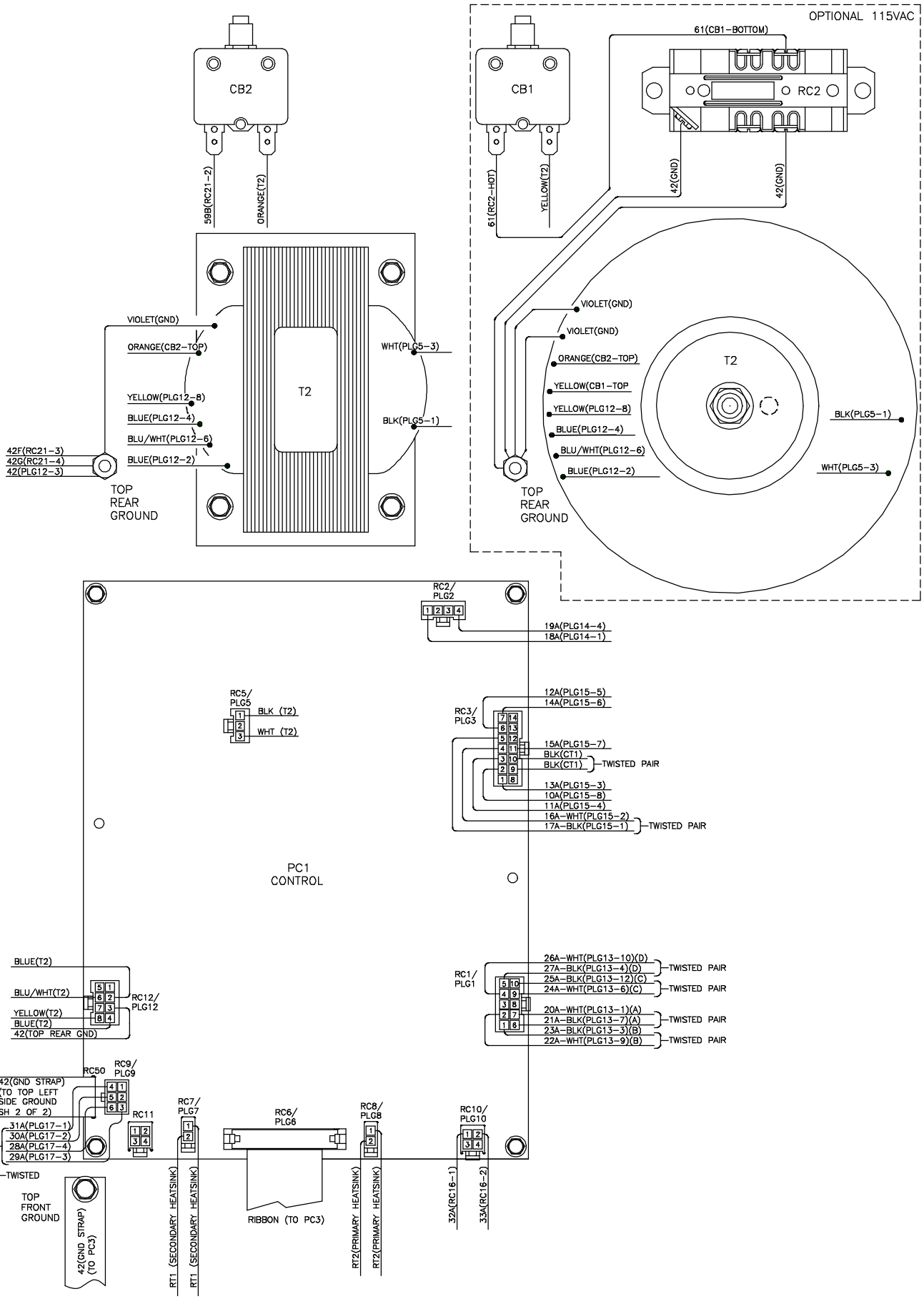
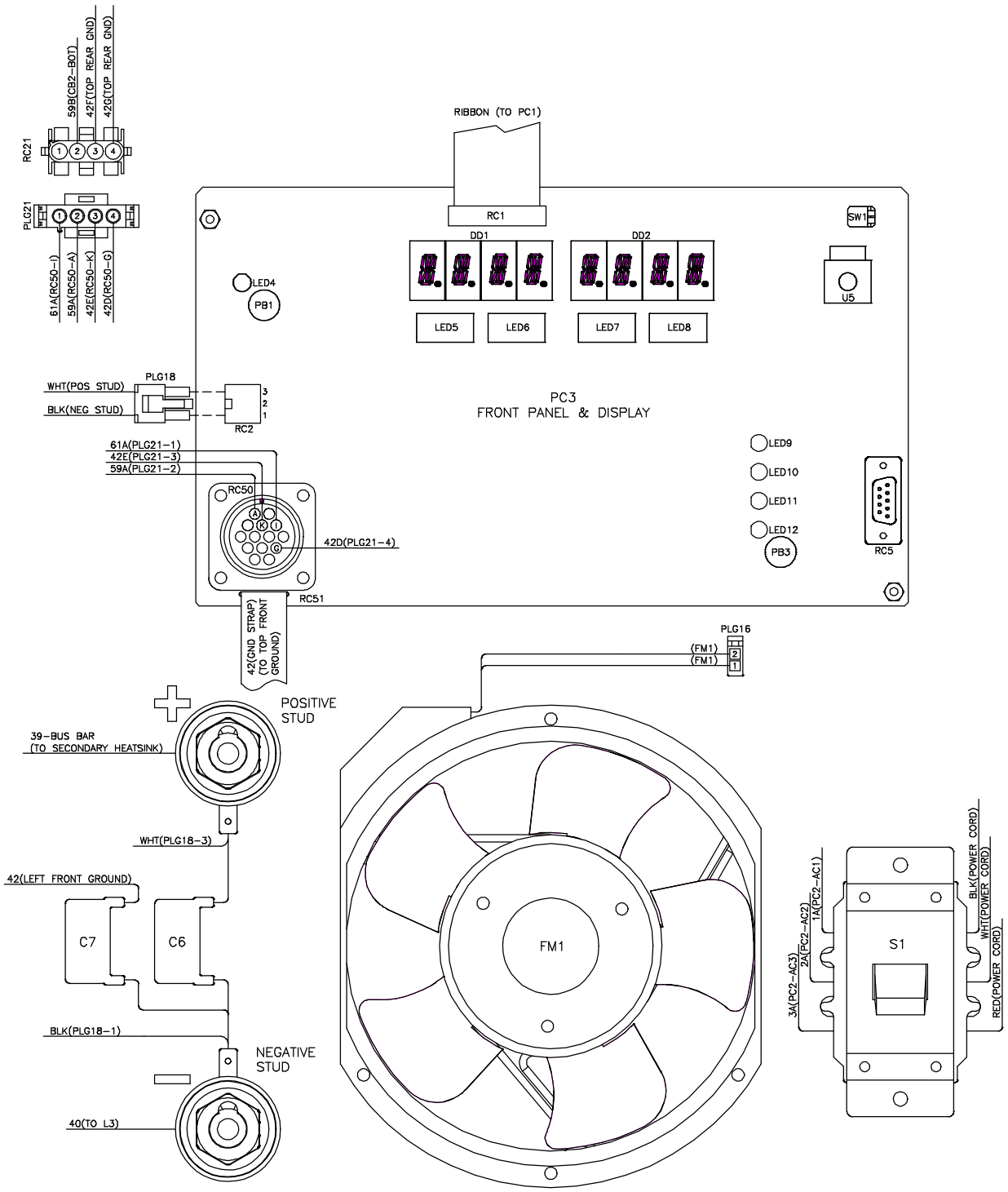


Figure 10-13. Wiring Diagram for Invision 352 MPa Eff. w/Serial No. ME224001U Thru MF254022U (1 of 2)



⚠ 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	

268764-A

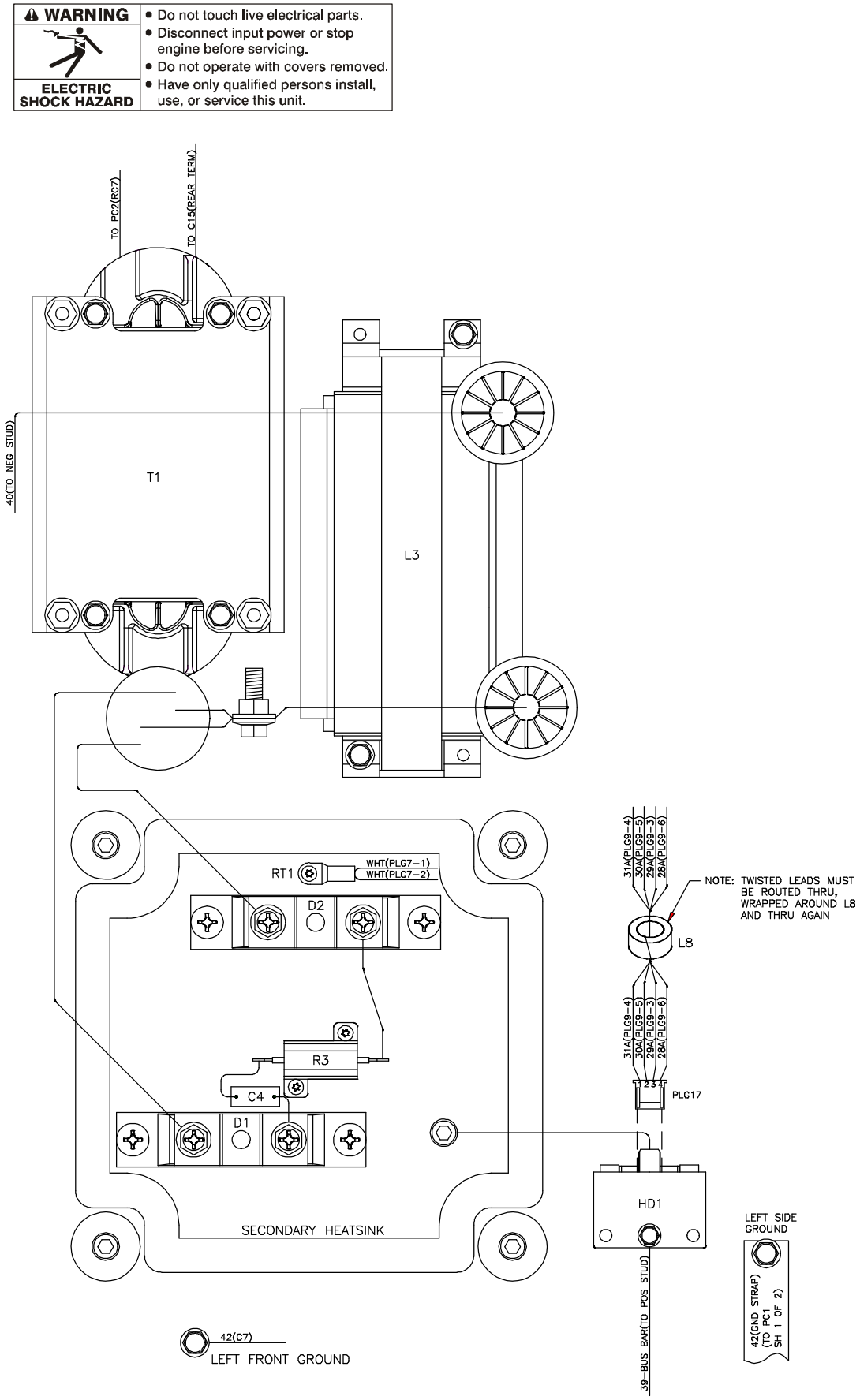
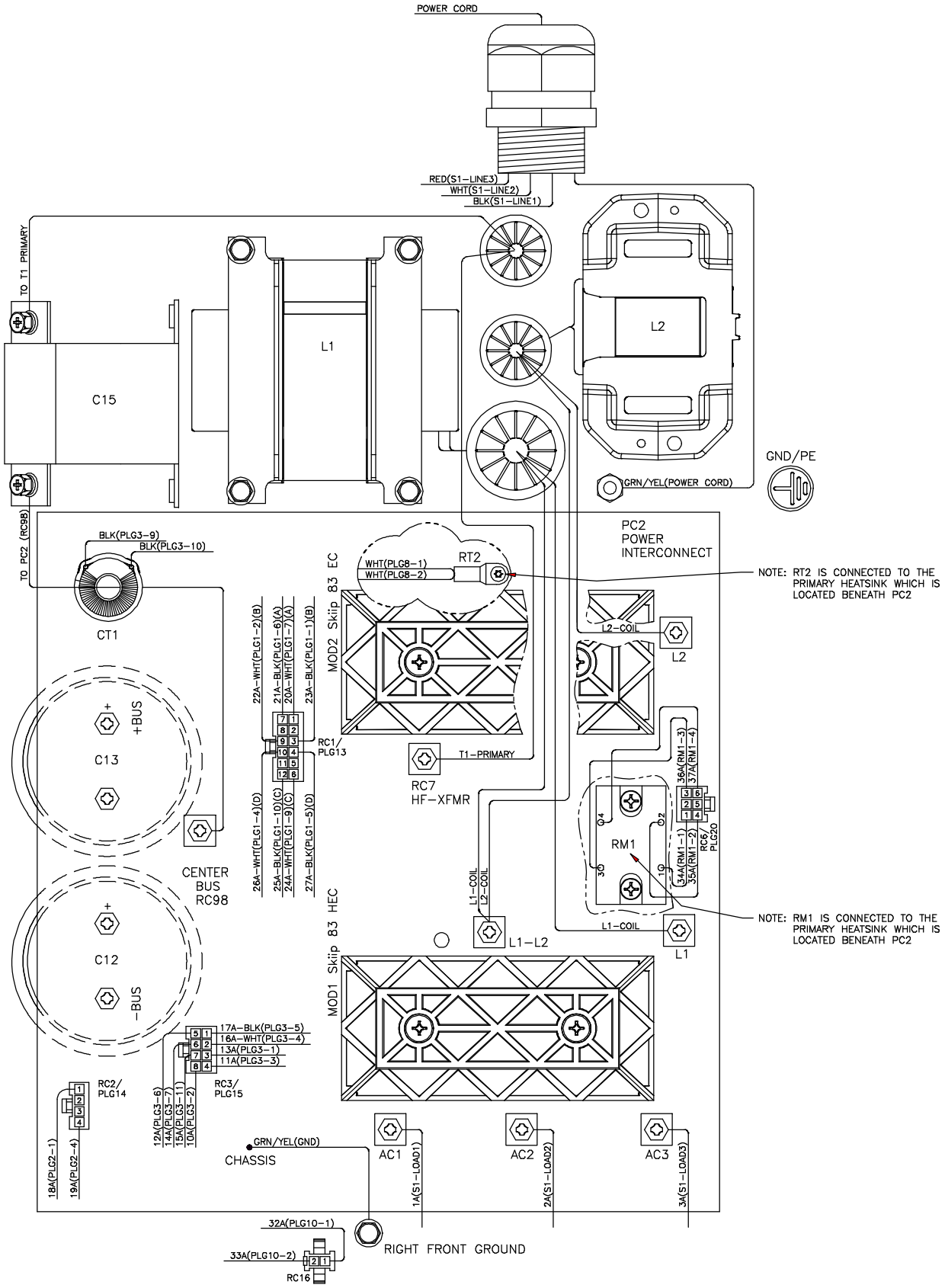


Figure 10-14. Wiring Diagram for Invision 352 MPa Eff. w/Serial No. ME224001U Thru MF254022U (2 of 2)


POWER CORD
RED(S1-LINE3)
WHT(S1-LINE2)
BLK(S1-LINE1)
TO T1 PRIMARY
L1
L2
C15
GND/PE
GRN/YEL(POWER CORD)
TO PC2 (RC98)
BLK(PLG3-9)
BLK(PLG3-10)
CT1
PC2
POWER
INTERCONNECT
NOTE: RT2 IS CONNECTED TO THE PRIMARY HEATSINK WHICH IS LOCATED BENEATH PC2
WHT(PLG8-1)
WHT(PLG8-2)
RT2
MOD2 Skiip 83 EC
L2-COIL
L2
22A-WHT(PLG1-2)(B)
21A-BLK(PLG1-6)(A)
20A-WHT(PLG1-7)(A)
23A-BLK(PLG1-1)(B)
RC1/
PLG13
+BUS
C13
T1-PRIMARY
RC7
HF-XFMR
36A(RM1-3)
37A(RM1-4)
RC5/
PLG20
34A(RM1-1)
35A(RM1-2)
RM1
Q4
Q2
Q3
Q1
26A-WHT(PLG1-4)(D)
25A-BLK(PLG1-10)(C)
24A-WHT(PLG1-9)(C)
27A-BLK(PLG1-5)(D)
CENTER
BUS
RC98
L1-COIL
L2-COIL
L1-L2
L1-COIL
L1
NOTE: RM1 IS CONNECTED TO THE PRIMARY HEATSINK WHICH IS LOCATED BENEATH PC2
C12
-BUS
MOD1 Skiip 83 HEC
17A-BLK(PLG3-5)
16A-WHT(PLG3-4)
13A(PLG3-1)
11A(PLG3-3)
RC2/
PLG14
RC3/
PLG15
12A(PLG3-6)
14A(PLG3-7)
15A(PLG3-11)
10A(PLG3-2)
18A(PLG2-1)
19A(PLG2-4)
GRN/YEL(GND)
CHASSIS
AC1
AC2
AC3
1A(S1-LOAD1)
2A(S1-LOAD2)
3A(S1-LOAD3)
32A(PLG10-1)
33A(PLG10-2)
RC16
RIGHT FRONT GROUND

268764-A

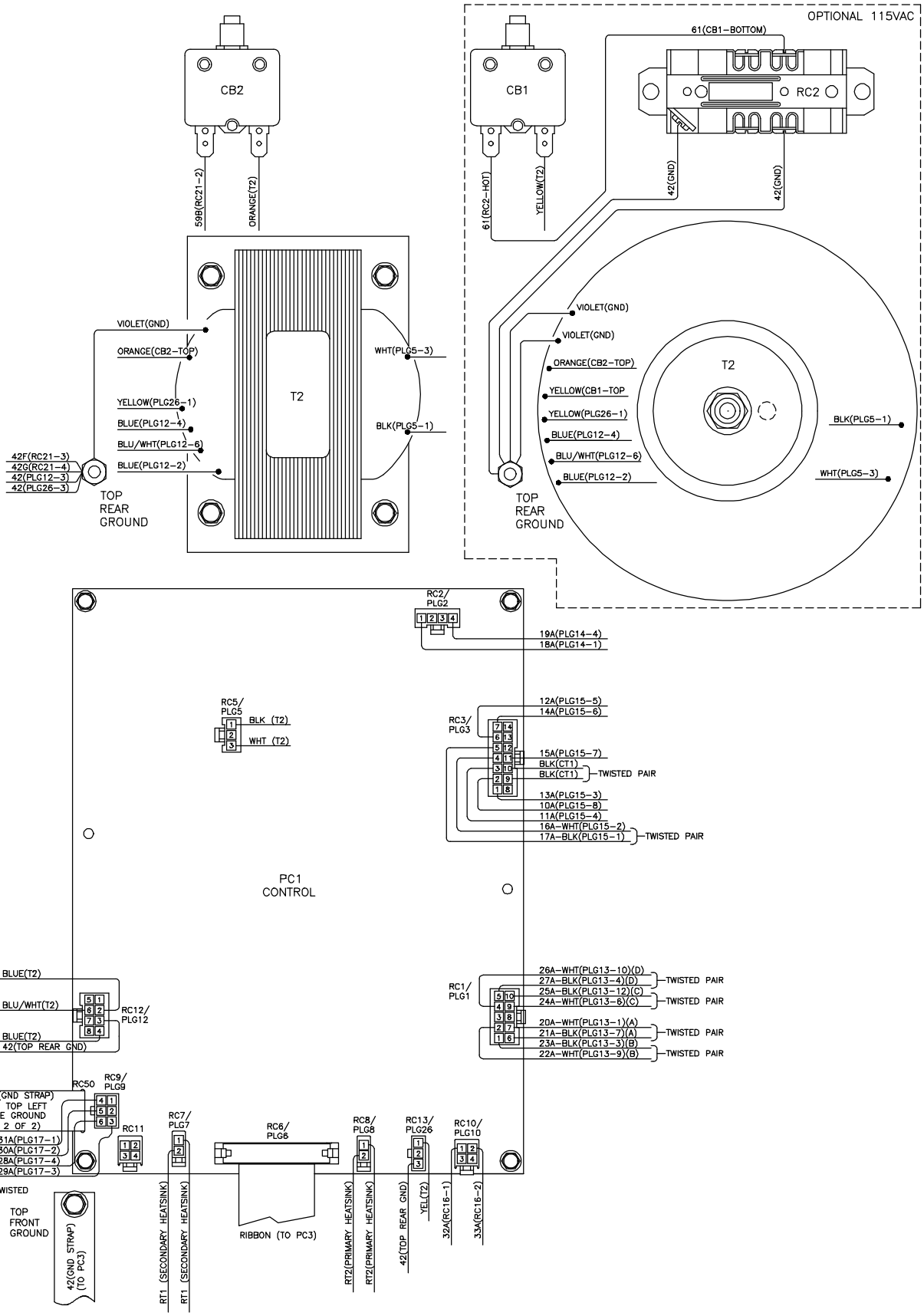
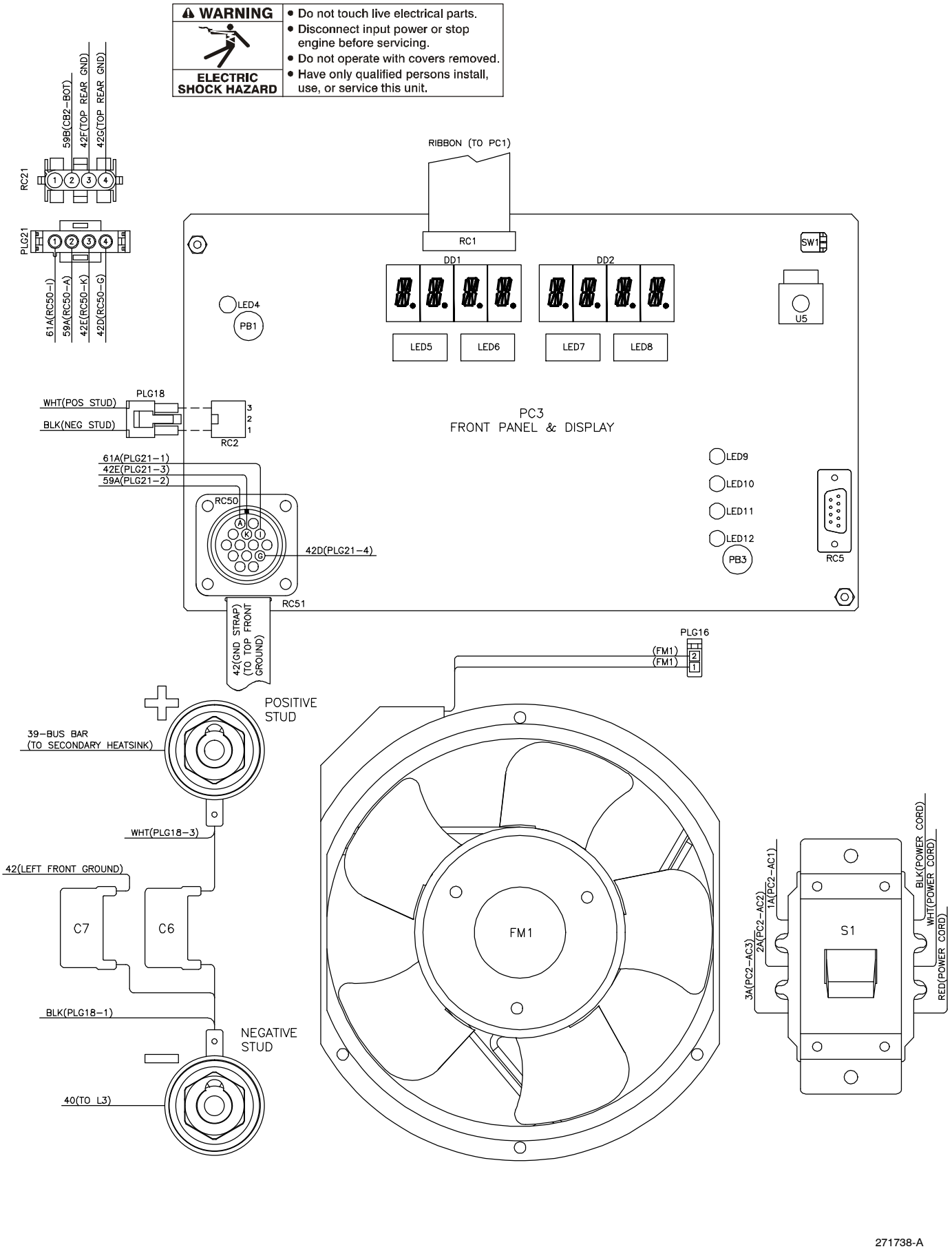


Figure 10-15. Wiring Diagram for Invision 352 MPa Eff. w/Serial No. MF254023U And Following (1 of 2)


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
RC21
59B(CB2-BOT)
42F(TOP REAR GND)
42G(TOP REAR GND)
PLG21
61A(RC50-I)
59A(RC50-A)
42E(RC50-K)
42D(RC50-G)
RIBBON (TO PC1)
RC1
DD1
DD2
SW1
U5
LED4
PB1
LED5
LED6
LED7
LED8
PLG18
WHT(POS STUD)
BLK(NEG STUD)
RC2
PC3
FRONT PANEL & DISPLAY
61A(PLG21-1)
42E(PLG21-3)
59A(PLG21-2)
RC50
42D(PLG21-4)
LED9
LED10
LED11
LED12
PB3
RC5
RC51
42(GND STRAP) (TO TOP FRONT GROUND)
PLG16
(FM1)
(FM1)
POSITIVE STUD
39-BUS BAR (TO SECONDARY HEATSINK)
WHT(PLG18-3)
42(LEFT FRONT GROUND)
C7
C6
FM1
BLK(PLG18-1)
NEGATIVE STUD
40(TO L3)
3A(PC2-AC3)
2A(PC2-AC2)
1A(PC2-AC1)
S1
BLK(POWER CORD)
WHT(POWER CORD)
RED(POWER CORD)

271738-A

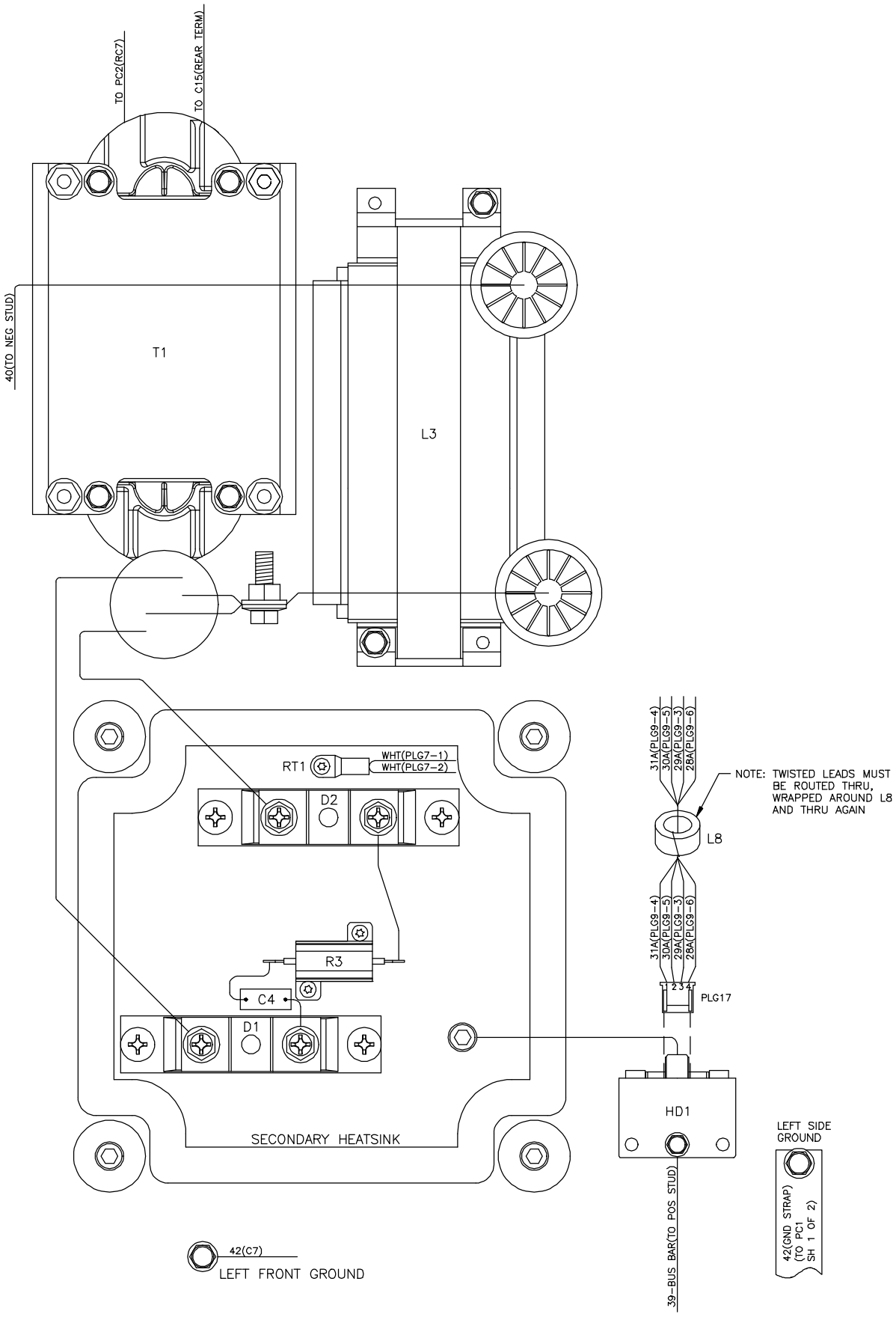
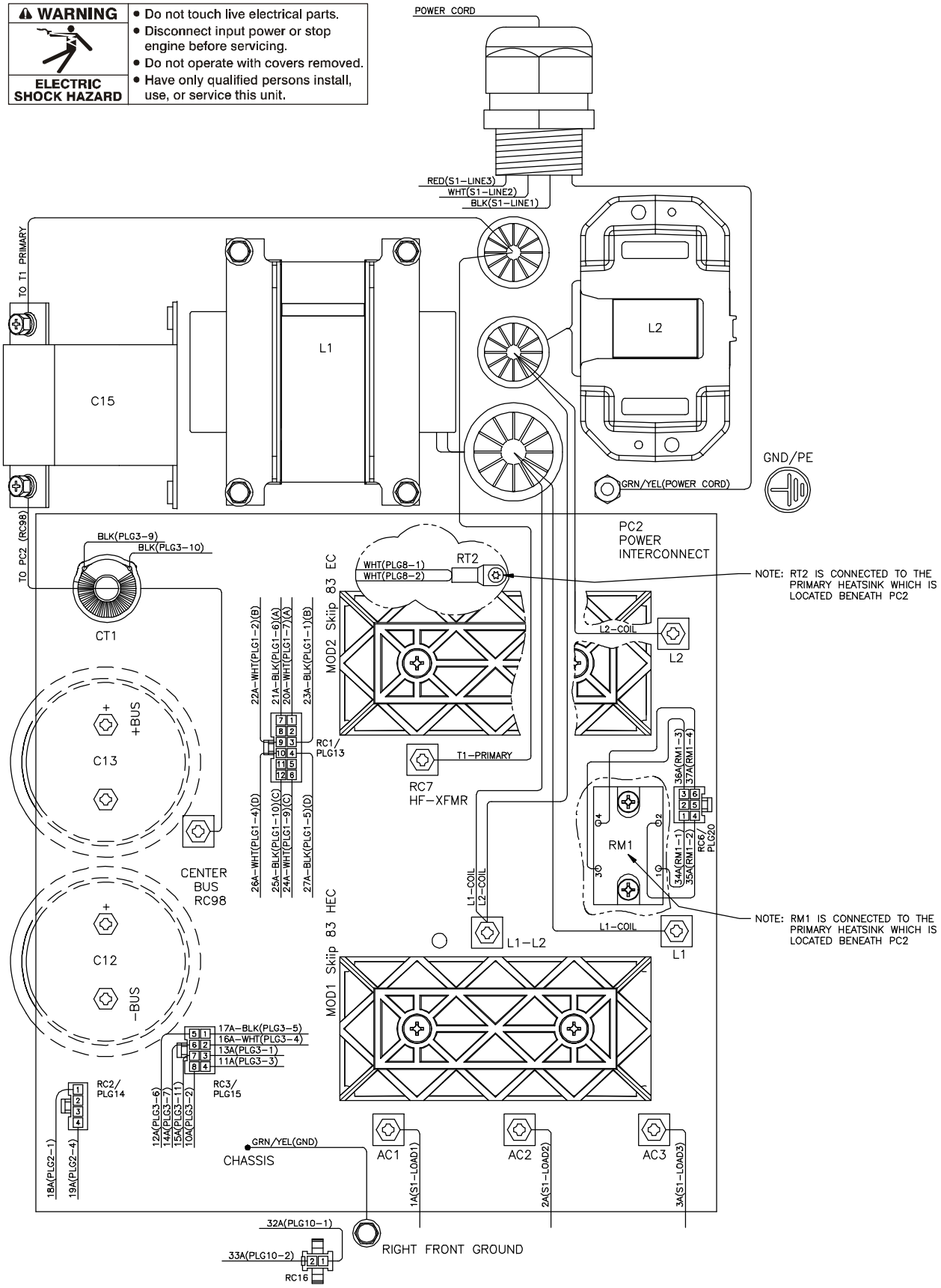


Figure 10-16. Wiring Diagram for Invision 352 MPa Eff. w/Serial No. MF254023U And Following (2 of 2)


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
POWER CORD
RED(S1–LINE3)
WHT(S1–LINE2)
BLK(S1–LINE1)
TO T1 PRIMARY
L1
L2
C15
GND/PE
GRN/YEL(POWER CORD)
TO PC2 (RC98)
BLK(PLG3–9)
BLK(PLG3–10)
CT1
PC2
POWER
INTERCONNECT
WHT(PLG8–1)
WHT(PLG8–2)
RT2
NOTE: RT2 IS CONNECTED TO THE PRIMARY HEATSINK WHICH IS LOCATED BENEATH PC2
MOD2 Skiip 83 EC
L2–COIL
L2
22A–WHT(PLG1–2)(B)
21A–BLK(PLG1–6)(A)
20A–WHT(PLG1–7)(A)
23A–BLK(PLG1–1)(B)
RC1/
PLG13
T1–PRIMARY
RC7
HF–XFMR
+BUS
C13
36A(RM1–3)
37A(RM1–4)
RC6/
PLG20
RM1
34A(RM1–1)
35A(RM1–2)
26A–WHT(PLG1–4)(D)
25A–BLK(PLG1–10)(C)
24A–WHT(PLG1–9)(C)
27A–BLK(PLG1–5)(D)
CENTER
BUS
RC98
L1–COIL
L2–COIL
L1–L2
L1–COIL
L1
NOTE: RM1 IS CONNECTED TO THE PRIMARY HEATSINK WHICH IS LOCATED BENEATH PC2
MOD1 Skiip 83 HEC
C12
–BUS
17A–BLK(PLG3–5)
16A–WHT(PLG3–4)
13A(PLG3–1)
11A(PLG3–3)
RC2/
PLG14
RC3/
PLG15
12A(PLG3–6)
14A(PLG3–7)
15A(PLG3–11)
10A(PLG3–2)
18A(PLG2–1)
19A(PLG2–4)
GRN/YEL(GND)
CHASSIS
AC1
AC2
AC3
1A(S1–LOAD1)
2A(S1–LOAD2)
3A(S1–LOAD3)
32A(PLG10–1)
33A(PLG10–2)
RC16
RIGHT FRONT GROUND

271738-A

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