



OM-1308

144212M

December 1997

Processes



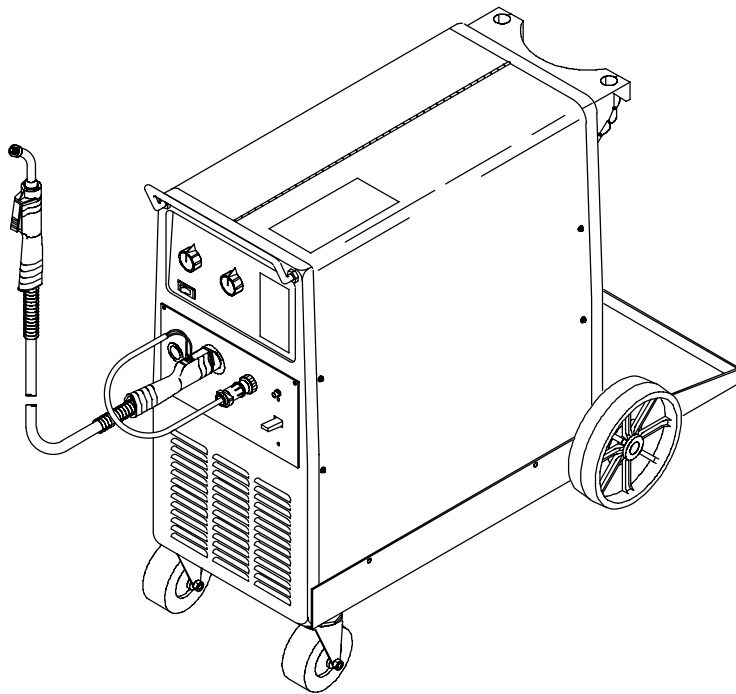
Gas Metal Arc (MIG) Welding
Flux Cored Arc (FCAW)
Welding

Description



Arc Welding Power Source And Wire Feeder

Millermatic[®] 250



Visit our website at
www.MillerWelds.com

OWNER'S MANUAL

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The following terms are used interchangeably throughout this manual:
MIG = GMAW

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SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

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1-1. Symbol Usage



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

▲ Marks a special safety message.

☞ Means "Note"; not safety related.



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

1-2. Arc Welding Hazards

▲ The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-4. Read and follow all Safety Standards.

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

▲ During operation, keep everybody, especially children, away.



ELECTRIC SHOCK can kill.

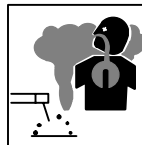
Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel,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

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.

- If earth grounding of the workpiece is required, ground it directly with a separate cable – do not use work clamp or work cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

SIGNIFICANT DC VOLTAGE exists after removal of input power on inverters.

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any parts.



FUMES AND GASES can be hazardous.

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

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
- If ventilation is poor, use an approved air-supplied respirator.
- Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watchperson nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.



ARC RAYS can burn eyes and skin.

Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

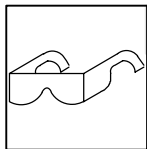
- Wear a welding helmet fitted with a proper shade of filter to protect your face and eyes when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash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



WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

- Protect yourself and others from flying sparks and hot metal.
- Do not weld where flying sparks can strike flammable material.
- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.



FLYING METAL can injure eyes.

- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.



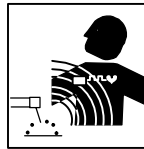
BUILDUP OF GAS can injure or kill.

- Shut off shielding gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.



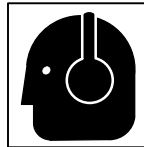
HOT PARTS can cause severe burns.

- Do not touch hot parts bare handed.
- Allow cooling period before working on gun or torch.



MAGNETIC FIELDS can affect pacemakers.

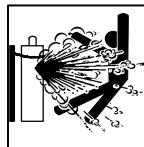
- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.



NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.



CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

1-3. Additional Symbols for Installation, Operation, and Maintenance



FIRE OR EXPLOSION hazard.

- Do not install or place unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not overload building wiring – be sure power supply system is properly sized, rated, and protected to handle this unit.



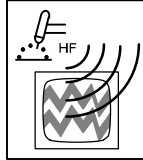
MOVING PARTS can cause injury.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.



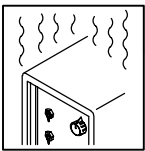
FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use 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.



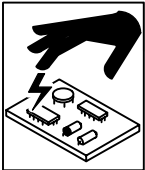
H.F. RADIATION can cause interference.

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



OVERUSE can cause OVERHEATING

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



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.



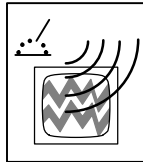
MOVING PARTS can cause injury.

- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.



WELDING WIRE can cause injury.

- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.



ARC WELDING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding machine is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

1-4. Principal Safety Standards

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

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

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

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

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

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

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

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

1-5. EMF Information

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

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

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

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

About Pacemakers:

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



SECTION 2 – INSTALLATION

2-1. Specifications

Rated Output		Max. Open-Circuit Voltage	Amps Input at Rated Output, 50 or 60 Hz, Single-Phase								
			200 V	220 V	230 V	380 V	415 V	460 V	575 V	KVA	KW
250 A at 28 VDC, 40% Duty Cycle	200 A at 28 VDC, 60% Duty Cycle	32	50 2.3*	45 2.2*	44 2*	26 1.3*	24 1.2*	22 1*	18 0.8*	10 0.46*	7.7 0.13*
Wire Type and Diameter			Wire Feed Speed		Dimensions		Net Weight				
Solid Steel	Stainless Steel	Flux Cored	50–670 IPM (1.2–1.7 m/min)		H: 37 in (940 mm) W: 19 in (483 mm) D: 30-1/4 in (768 mm)		225 lb (102 kg)				
.023 – .045 in (0.6 – 1.2 mm)	.023 – .035 in (0.6 – 0.9 mm)	.030 – .045 in (0.8 – 1.2 mm)									

* While idling

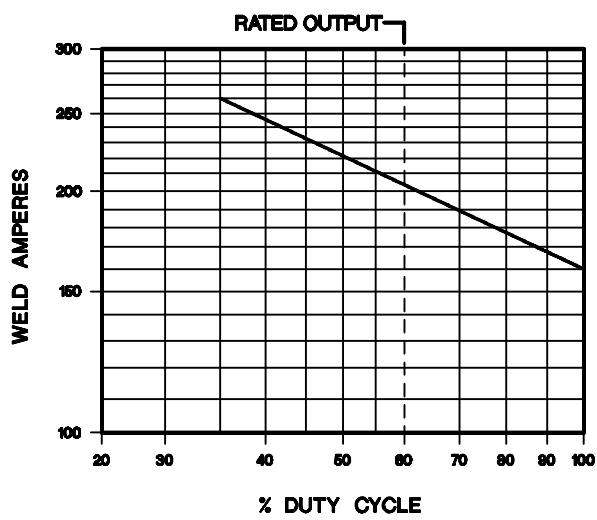
2-2. Duty Cycle And Overheating

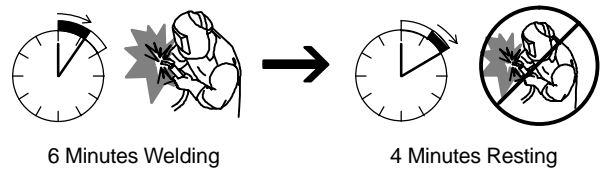
Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

If unit overheats, thermostat(s) opens, output stops, and cooling fan runs. Wait fifteen minutes for unit to cool. Reduce amperage or voltage, or duty cycle before welding.

▲ Exceeding duty cycle can damage unit and void warranty.

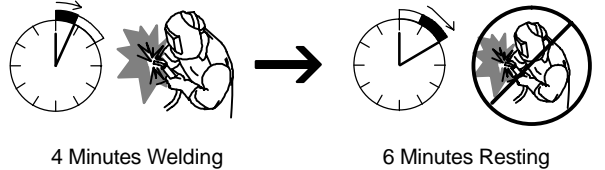


60% Duty Cycle At 200 Amperes



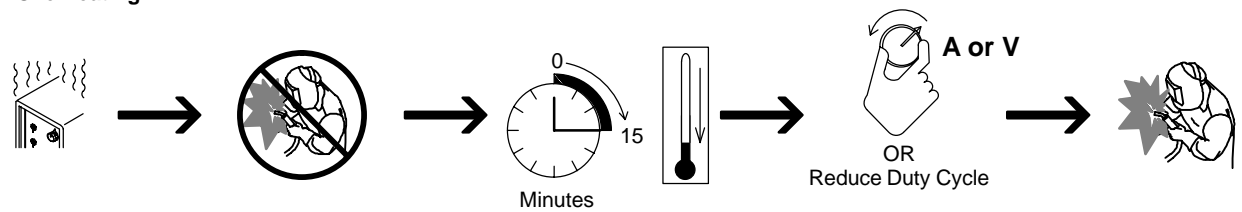
6 Minutes Welding 4 Minutes Resting

40% Duty Cycle At 250 Amperes



4 Minutes Welding 6 Minutes Resting

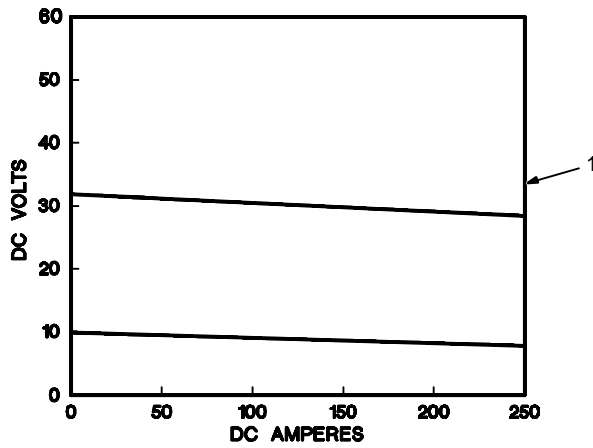
Overheating



Minutes OR Reduce Duty Cycle

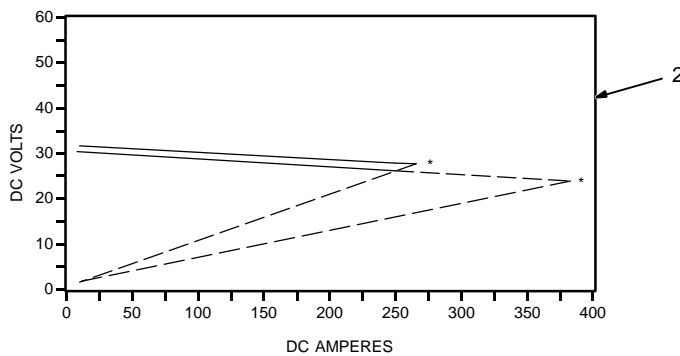
duty1 4/95 – SB-150 215

2-3. Volt-Ampere Curves



1 Normal Volt-Ampere Curves
The volt-ampere curves show the normal minimum and maximum voltage and amperage output capabilities of the welding power source. Curves of other settings fall between the curves shown.

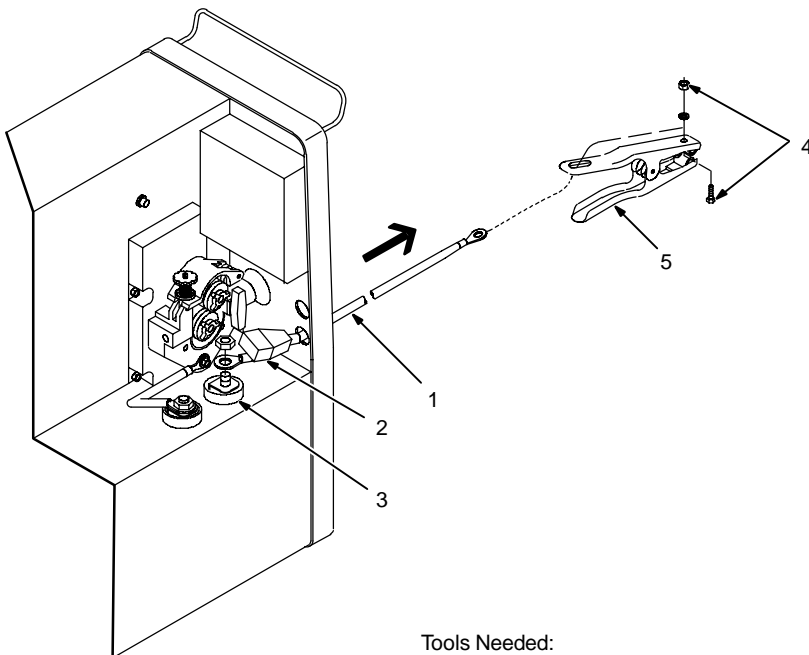
2 Overload Volt-Ampere Curves
When unit is used beyond capacity, circuitry senses the overload and shuts down unit output. Release trigger and lower weld voltage setting before trying to weld. This shut down circuitry protects internal circuits and parts from overload damage.



*Approximate shutdown voltage/amperage points shown for reference only.

ssb1.1 10/91 – SB-144 925 / S-0700

2-4. Installing Work Clamp



- 1 Work Cable
 - 2 Boot
- Slide boot onto work cable. Route cable out front panel opening from inside.
- 3 Negative (-) Output Terminal
- Connect cable to terminal and cover connection with boot.
- 4 Hardware
 - 5 Work Clamp
- Route cable through clamp handle and secure as shown.
Close door.

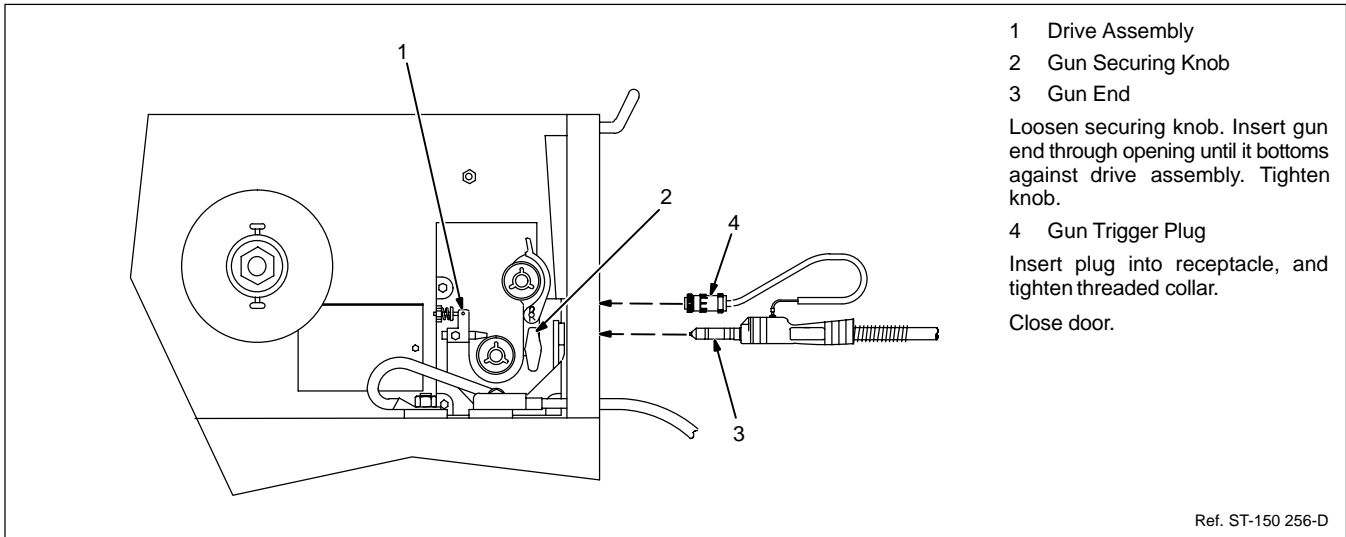
Tools Needed:



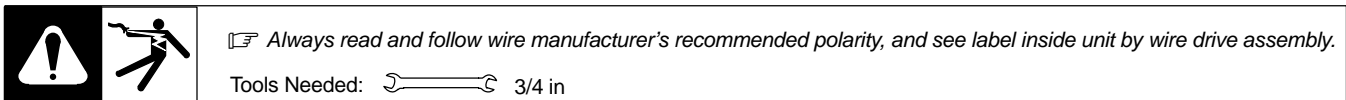
1/2, 3/4 in

ST-150 228-E

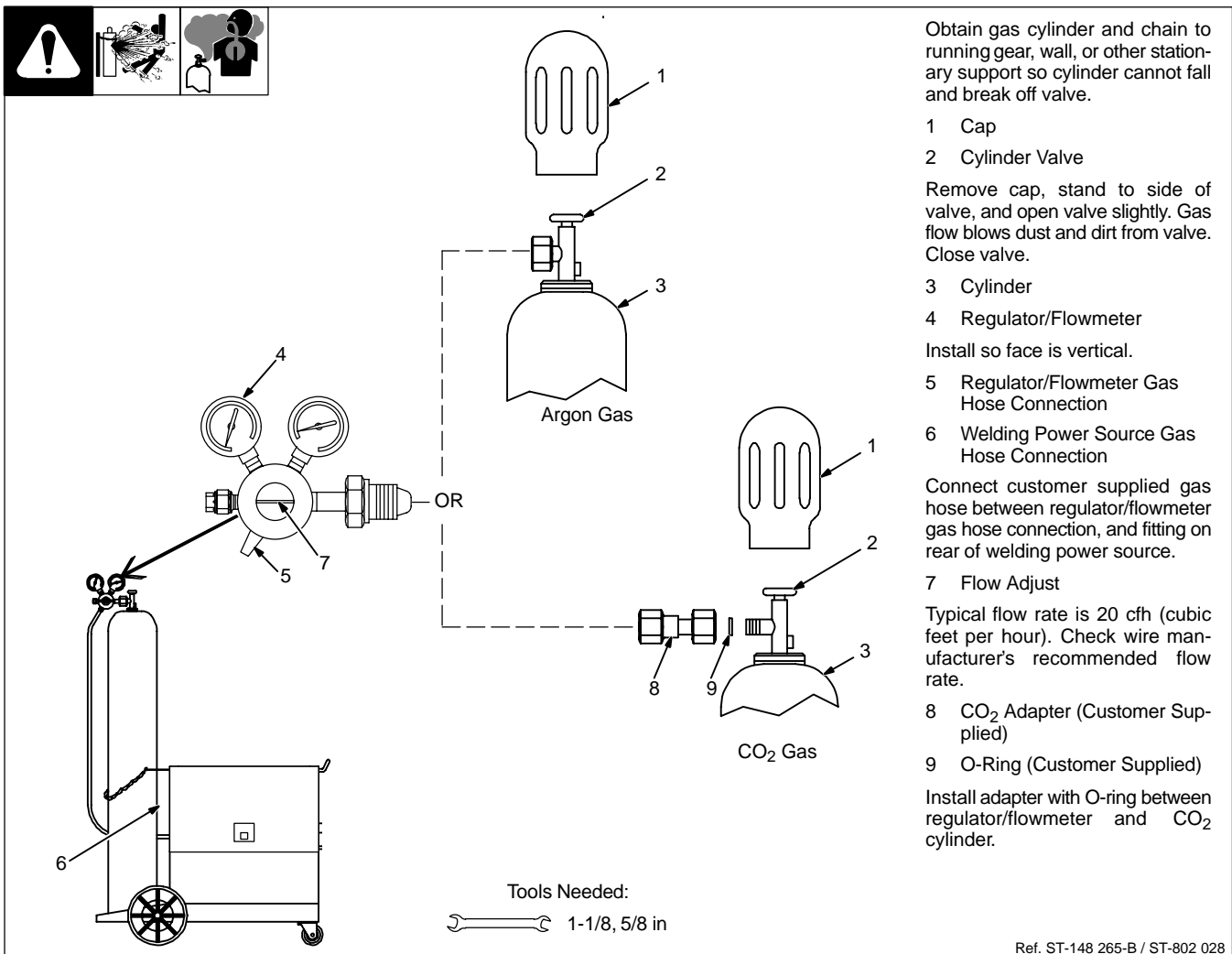
2-5. Installing Welding Gun



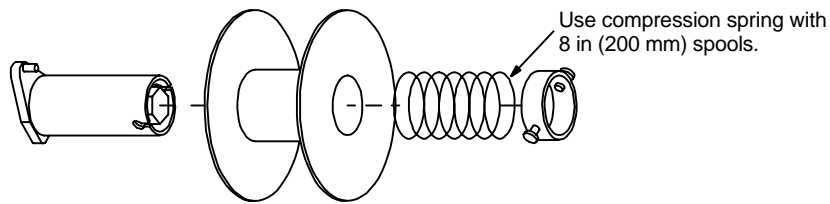
2-6. Setting Gun Polarity For Wire Type



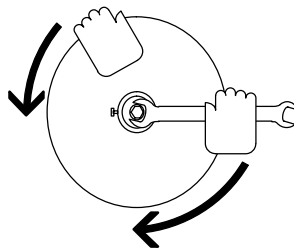
2-7. Installing Gas Supply



2-8. Installing Wire Spool And Adjusting Hub Tension

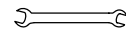


When a slight force is needed to turn spool, tension is set.



Tools Needed:



 15/16 in

ST-072573-B

2-9. Positioning Jumper Links



Check input voltage available at site.

1 Jumper Links Access Door

Open door.

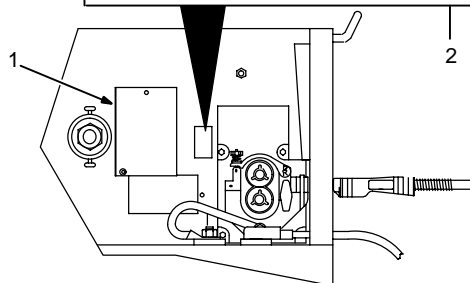
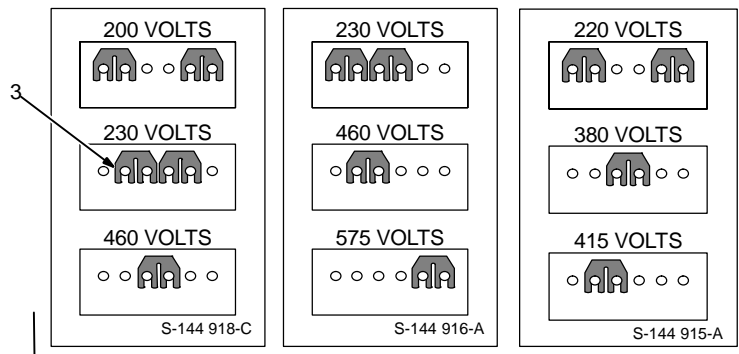
2 Jumper Link Label

Check label – only one is on unit.

3 Input Voltage Jumper Links

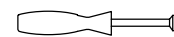
Move jumper links to match input voltage.

Close and secure access door.



Tools Needed:



 3/8 in

Ref. ST-148 263-C


2-10. Electrical Service Guide

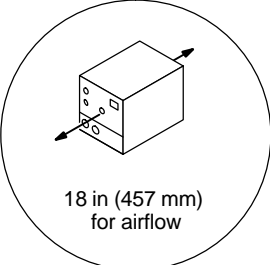
Input Voltage	200	220	230	380	415	460	575
Input Amperes At Rated Output	50	45	44	26	24	22	17
Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes	80	70	70	40	35	35	25
Min Input Conductor Size In AWG/Kcmil	8	10	10	12	12	10	12
Max Recommended Input Conductor Length In Feet (Meters)	93 (28)	75 (23)	82 (25)	137 (42)	163 (50)	329 (100)	313 (95)
Min Grounding Conductor Size In AWG/Kcmil	8	10	10	12	12	10	12

Reference: 1996 National Electrical Code (NEC).

S-0092J

2-11. Selecting A Location And Connecting Input Power





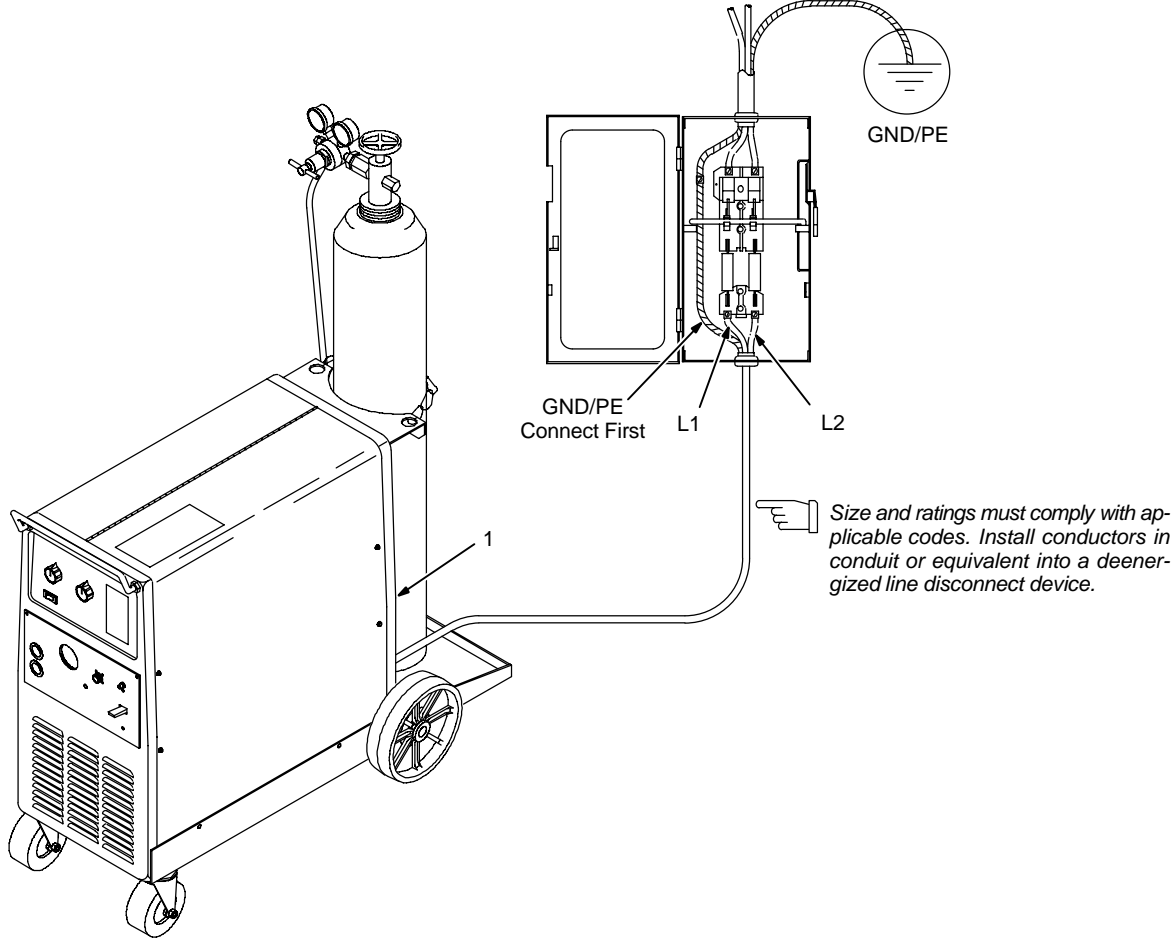
18 in (457 mm)
for airflow

Have only qualified persons make this installation.

1 Rating Label

Supply correct input power.

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

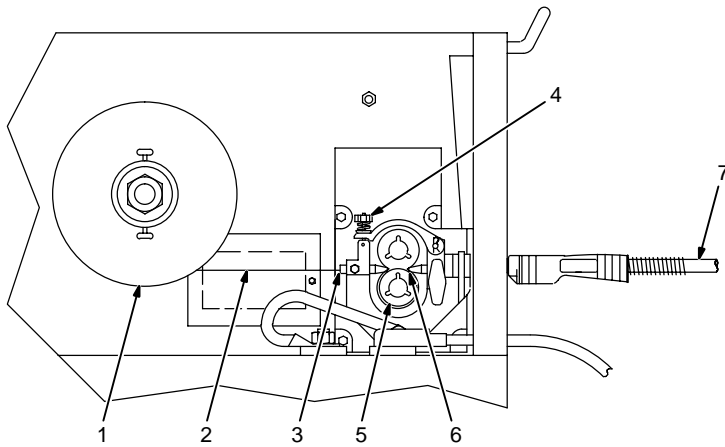


ST-801 721

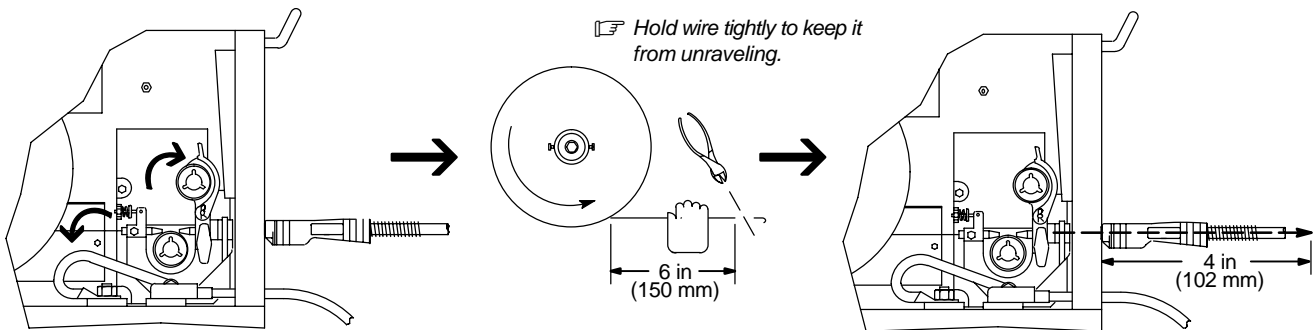
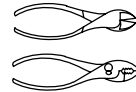
2-12. Threading Welding Wire



- 1 Wire Spool
 - 2 Welding Wire
 - 3 Inlet Wire Guide
 - 4 Pressure Adjustment Knob
 - 5 Drive Roll
 - 6 Outlet Wire Guide
 - 7 Gun Conduit Cable
- Lay gun cable out straight.



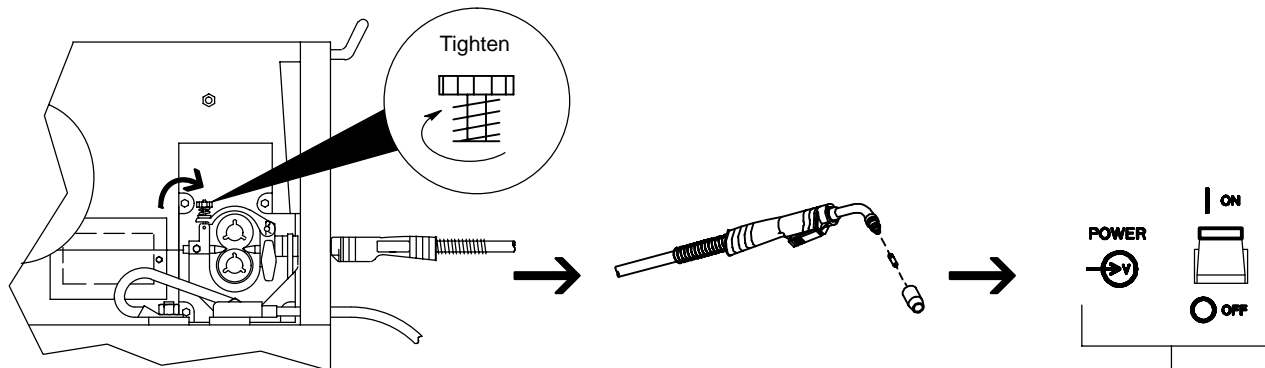
Tools Needed:



Open pressure assembly.

Pull and hold wire; cut off end.

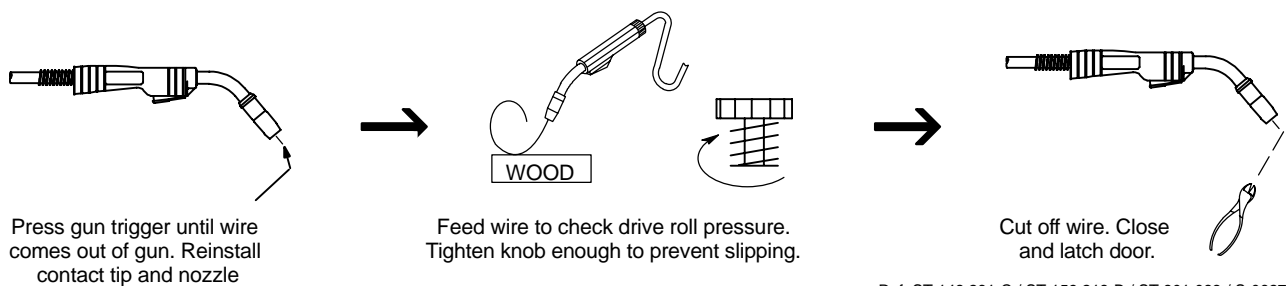
Push wire thru guides into gun; continue to hold wire.



Close and tighten pressure assembly, and let go of wire.

Remove gun nozzle and contact tip.

Turn On.



Press gun trigger until wire comes out of gun. Reinstall contact tip and nozzle

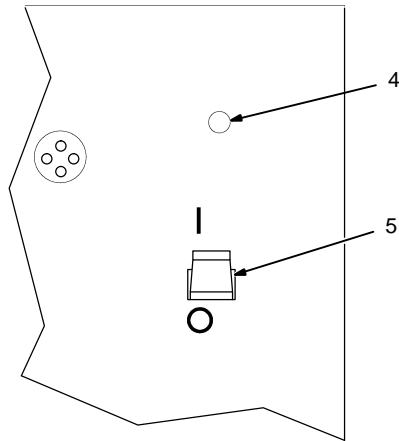
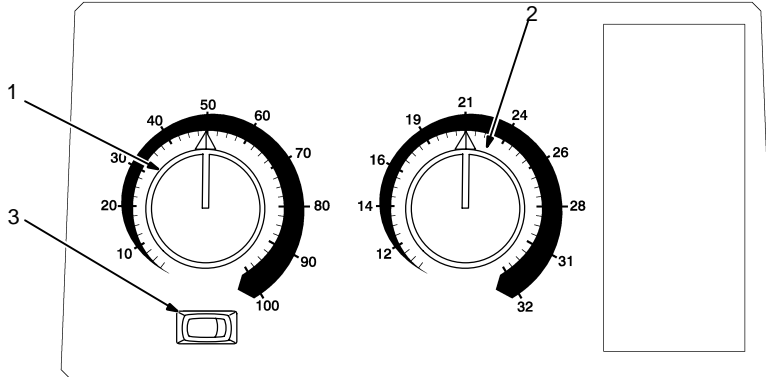
Feed wire to check drive roll pressure. Tighten knob enough to prevent slipping.

Cut off wire. Close and latch door.

Ref. ST-148 261-C / ST-159 218-B / ST-801 083 / S-0627-A

SECTION 3 – OPERATION

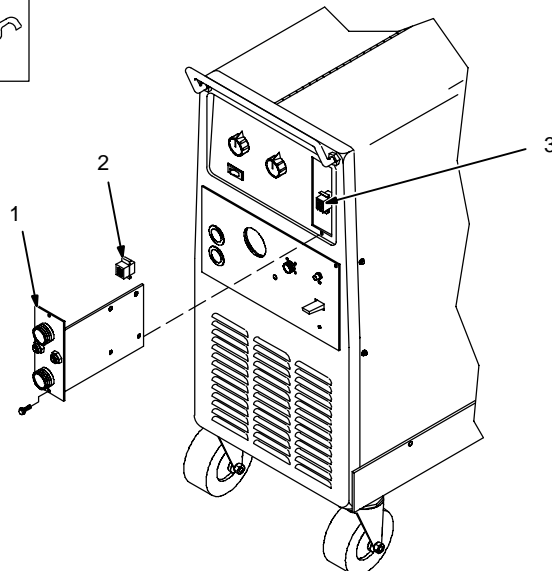
3-1. Controls



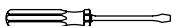
- 1 Wire Speed Control
The scale around the control is percent, not wire feed speed.
- 2 Voltage Switch
The scale around the control is actual voltage.
- 3 Low Range/Full Range Switch
Use Low Range when wire speed is between 50 and 350 ipm.
- 4 Pilot Light
- 5 Power Switch

Ref. ST-148 579-A / Ref. ST-174 835-A

3-2. Installing Receptacle Module For Use With A Spool Gun (Optional)



Tools Needed:



Remove existing options panel.

- 1 Module
- 2 Plug PLG9
- 3 Plug PLG7

Connect PLG9 to PLG7.

Slide module into upper front panel where options panel was removed. Secure with screws.

See Options and Accessories page at end of manual, or contact your Factory Authorized Service Agent for details.

ST-801 732

SECTION 4 – MAINTENANCE AND TROUBLESHOOTING

4-1. Routine Maintenance

			▲ Disconnect power before maintaining.
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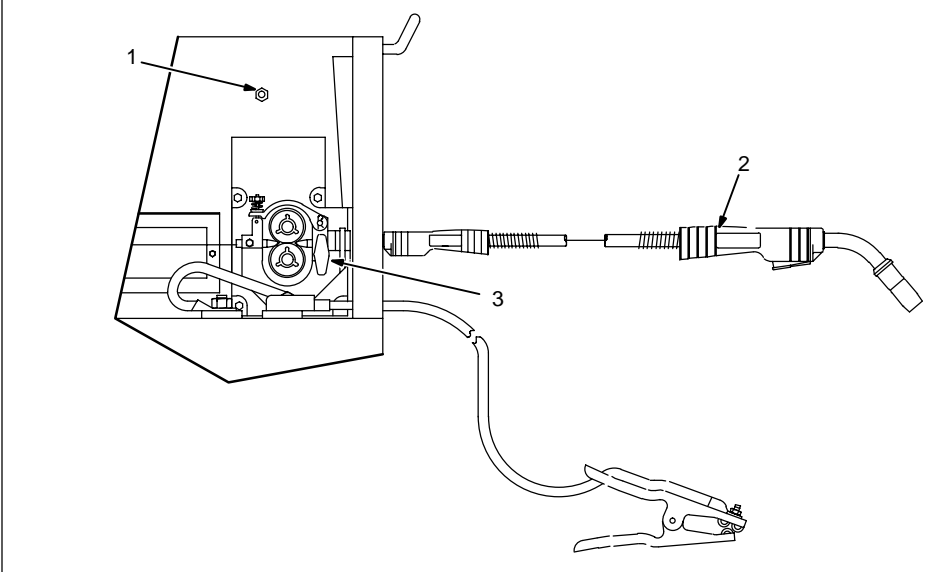
	3 Months	Replace unreadable labels.		Repair or replace cracked weld cable.	
--	-----------------	----------------------------	--	---------------------------------------	--

		Clean and tighten weld terminals.	
--	--	-----------------------------------	--

	6 Months	Blow out or vacuum inside. during heavy service clean monthly.		Remove drive roll and carrier. Apply light coat of oil or grease to drive motor shaft.	
--	-----------------	--	--	--	--

4-2. Circuit Breaker CB1

--	--	--	--	--



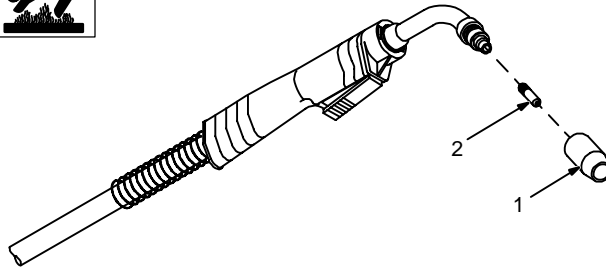
- 1 Circuit Breaker CB1
If CB1 opens, wire feeding stops.
- 2 Welding Gun
Check gun liner for blockage or kinks.
- 3 Wire Drive Assembly
Check for jammed wire, binding drive gear or misaligned drive rolls.
Allow cooling period and reset breaker. Close door.

Ref. ST-148 261-C

4-3. Unit Overload

If unit is used beyond capacity (excessive wire feed, shorted output, etc.), wire feeds but is not energized. Release gun trigger to reset this condition.

4-4. Replacing Gun Contact Tip



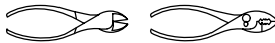
▲ Turn Off power.

- 1 Nozzle
- 2 Contact Tip

Cut off welding wire at contact tip. Remove nozzle.

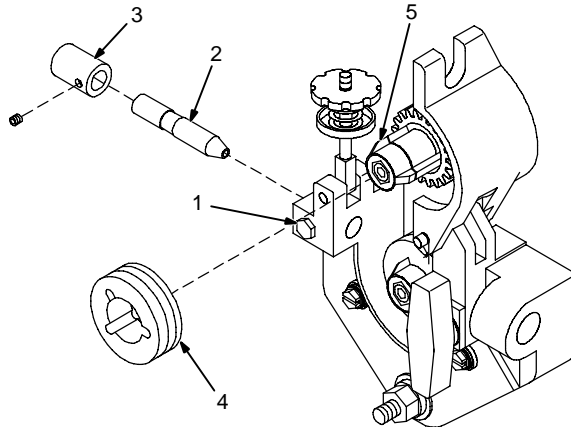
Remove contact tip and install new contact tip. Reinstall nozzle.

Tools Needed:

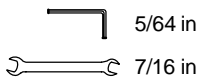


ST-149 326-B

4-5. Changing Drive Roll And Wire Inlet Guide



Tools Needed:



- 1 Securing Screw
- 2 Inlet Wire Guide

Loosen screw. Slide tip as close to drive rolls as possible without touching. Tighten screw.

- 3 Anti-Wear Guide
- Install guide as shown.

- 4 Drive Roll

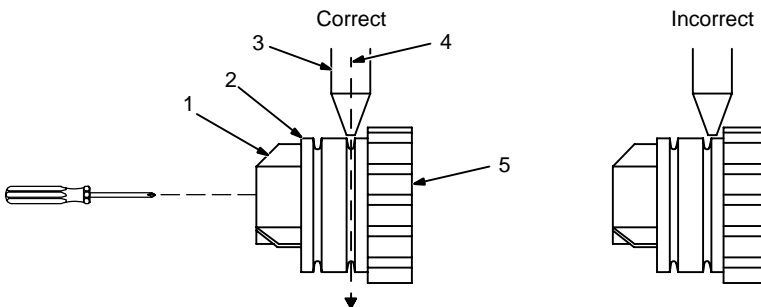
Install correct drive roll for wire size and type.

- 5 Drive Roll Securing Nut

Turn nut one click to secure drive roll.

ST-150 227-C

4-6. Aligning Drive Rolls And Wire Guide



Tools Needed:



▲ Turn Off power.

View is from top of drive rolls looking down with pressure assembly open.

- 1 Drive Roll Securing Nut
- 2 Drive Roll
- 3 Wire Guide
- 4 Welding Wire
- 5 Drive Gear

Insert screwdriver, and turn screw in or out until drive roll groove lines up with wire guide.

Close pressure roll assembly.

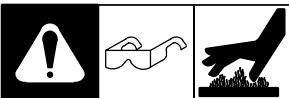
Close door.

Ref. ST-800 412-A

4-7. Unicable Repair

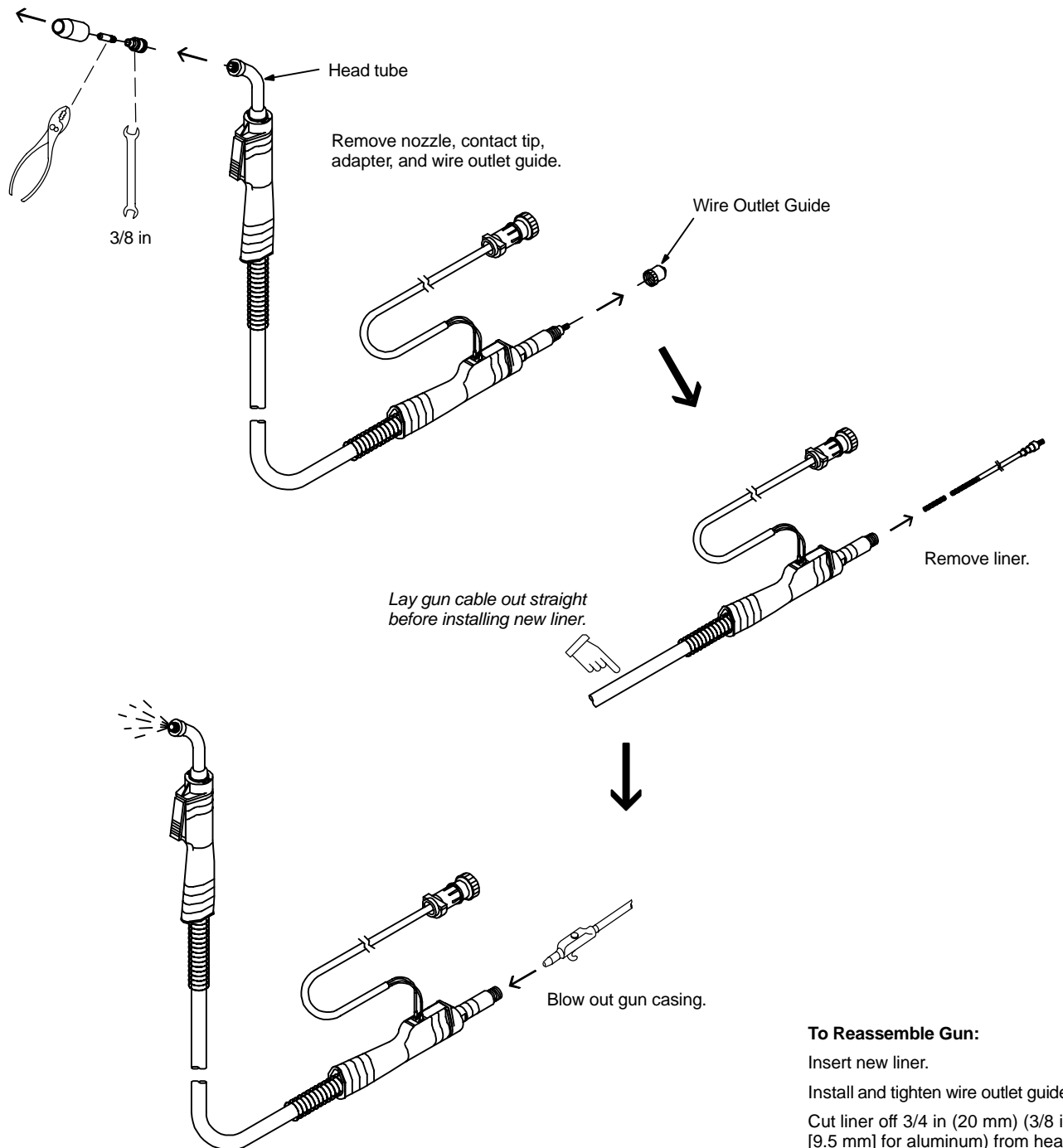
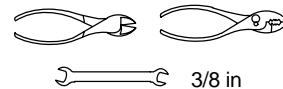
To repair or replace uncable, order Uncable Clamp Kit, Part Number 172 018.

4-8. Cleaning Or Replacing Gun Liner



▲ Disconnect gun first.

Tools Needed:



To Reassemble Gun:

Insert new liner.

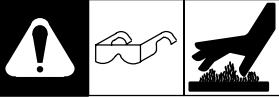
Install and tighten wire outlet guide.

Cut liner off 3/4 in (20 mm) (3/8 in [9.5 mm] for aluminum) from head tube.

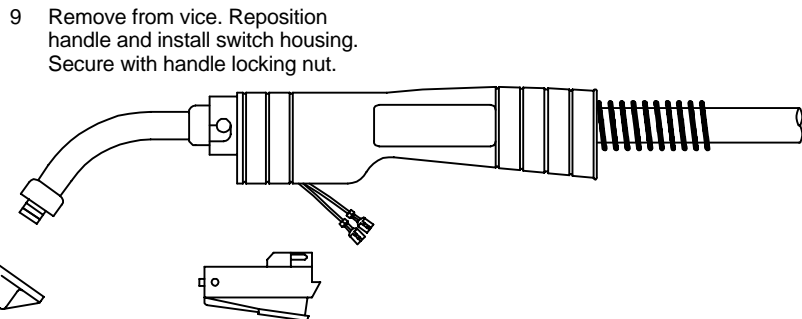
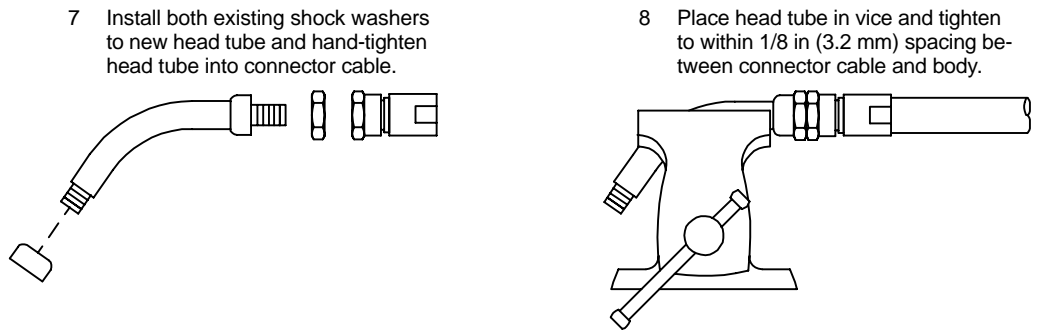
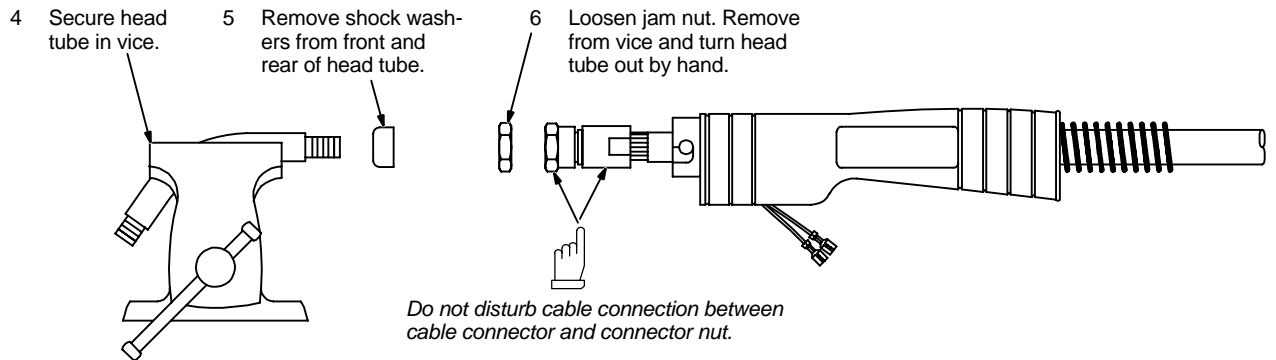
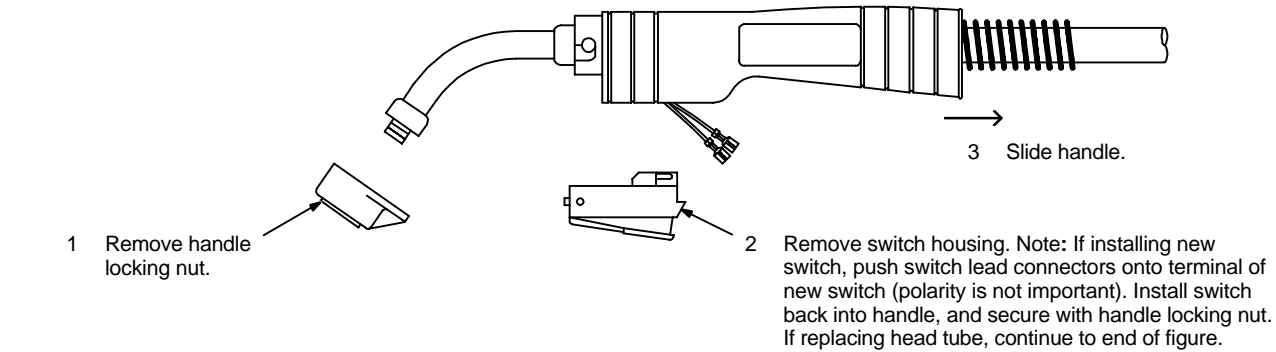
Install adapter, contact tip, and nozzle.

Ref. ST-800 797-A

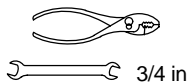
4-9. Replacing Switch And/Or Head Tube



▲ Disconnect gun first.



Tools Needed:



4-10. Troubleshooting



Trouble	Remedy
No weld output; wire does not feed.	Be sure line disconnect switch is On (see Section 2-11).
	Replace building line fuse or reset circuit breaker if open (see Section 2-11).
	Reset circuit breaker CB1 (see Section 4-2).
	Secure gun trigger connections (see Section 2-5).
	Check and replace Power switch if necessary.
	Have Factory Authorized Service Agent check all board connections and main control board.
No weld output; wire feeds.	Thermostat TP1 open (overheating). Allow fan to run; the thermostat will close when the unit has cooled (see Section 2-2).
	Connect work clamp to get good metal to metal contact.
	Replace contact tip (see Section 4-4).
	An overload condition occurred. Release gun trigger (see Section 4-3).
	Have Factory Authorized Service Agent check main control board and main rectifier.
Low weld output.	Connect unit to proper input voltage or check for low line voltage (see Section 2-11).
	Check input voltage jumper links and correct position if necessary (see Section 2-9).
	Have Factory Authorized Service Agent check main control board.
Fan motor does not run. NOTE: Fan only runs when cooling is necessary.	Have Factory Authorized Service Agent check fan-on-demand circuit.
Low, high, or erratic wire speed.	Readjust front panel settings (see Section 3-1).
	Place Low Range/Full Range switch in correct position (see Section 3-1).
	Change to correct size drive rolls (see Section 4-5).
	Readjust drive roll pressure (see Section 2-12).
	Replace inlet guide, contact tip, and/or liner if necessary (see Sections 4-4, and 4-8).
	Check position of input jumper links (see Section 2-9).
	Have Factory Authorized Service Agent check main control board.
No wire feed.	Reset circuit breaker CB1 (see Section 4-2).
	Turn Wire Speed control to higher setting (see Section 3-1).
	Clear obstruction in gun contact tip or liner (see Sections 4-4 and 4-8).
	Readjust drive roll pressure (see Section 2-12).
	Change to correct size drive rolls (see Section 4-5).
	Rethread welding wire (see Section 2-12).
	Check gun trigger and leads. Repair or replace gun if necessary.
	Have Factory Authorized Service Agent check main control board.
Poor weld bead, or welding wire is noodle welding.	Check polarity setting for type of welding wire being used (see Section 2-6).

SECTION 5 – ELECTRICAL DIAGRAM

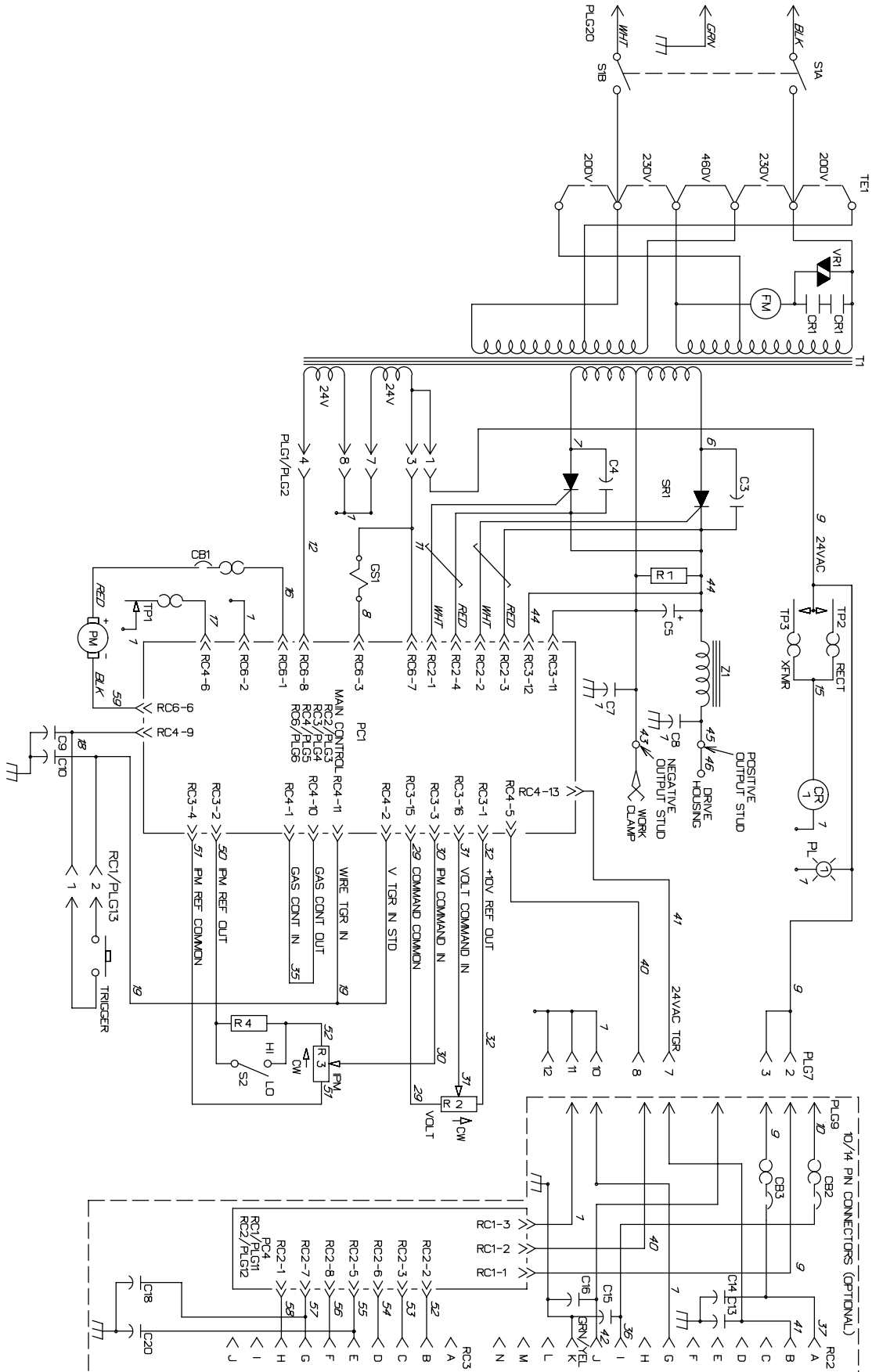


Figure 5-1. Circuit Diagram

SECTION 6 – PARTS LIST

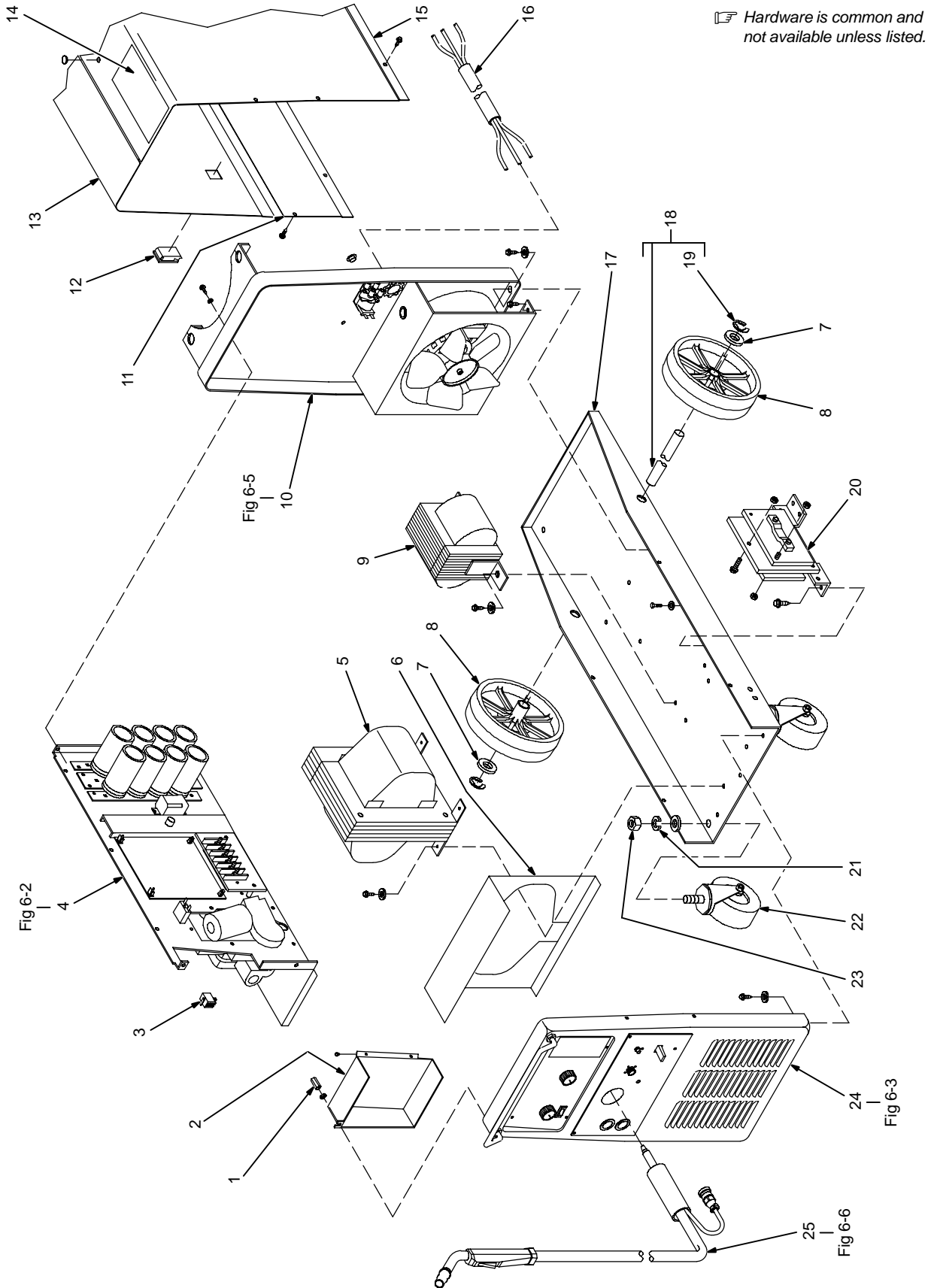


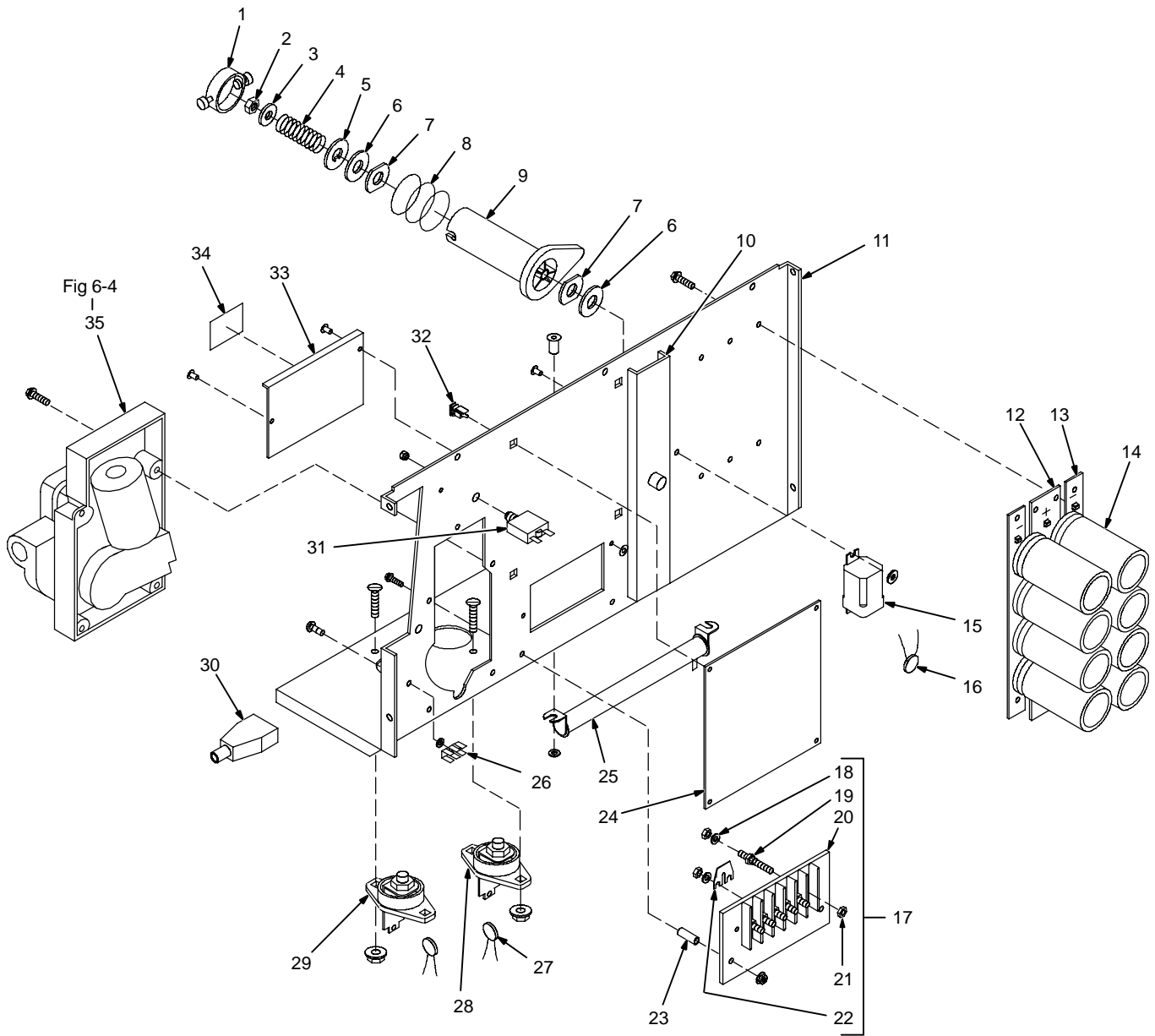
Figure 6-1. Main Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 6-1. Main Assembly				
...	1	148 597	COUPLER, rod threaded .312-18 x 1.000	1
...	2	146 168	PANEL, center enclosure	1
...	3	PLG7 083 526	HOUSING RECEPTACLE & SOCKETS	1
...	4	Fig 6-2	BAFFLE, center w/components	1
...	5	T1 174 553	TRANSFORMER, pwr main (200/230/460) (consisting of)	1
...	5	T1 174 554	TRANSFORMER, pwr main (230/460/575) (consisting of)	1
...	5	T1 174 552	TRANSFORMER, pwr main (220/380/415) (consisting of)	1
...		TP3 121 497	THERMOSTAT	1
...	6	150 387	BAFFLE, air transformer	1
...	7	602 250	WASHER, flat stl SAE .750	2
...	8	186 758	WHEEL	2
...	9	Z1 143 892	STABILIZER, (60Hz)	1
...	9	Z1 150 385	STABILIZER, (50Hz)	1
...	10	Fig 6-5	PANEL, rear w/components	1
...	11	146 165	PANEL, side LH	1
...	12	089 899	LATCH, slide flush mtg hole 1.000 wide x 1.500 lg	2
...	13	+146 167	PANEL, side	1
...		146 991	LABEL, weld parameters	1
...	14	134 464	LABEL, warning general precautionary	1
...	15	+170 513	WRAPPER	1
...		117 860	BLANK, snap-in nyl .187mtg hole	2
...	16	PLG20 144 086	CORD SET, pwr 250V 8-10ga 3/c 600V 12ft (200/230V)	1
...		039 778	RECEPTACLE, str 2P3W 50A 250V (200/230V only)	1
...	16	144 085	CORD SET, pwr 8-10ga 3/c 600V 12ft	1
...	17	146 161	BASE	1
...	18	052 692	AXLE, running gear (consisting of)	1
...	19	121 614	RING, retaining ext .750 shaft x .085grv depth	2
...	20	SR1 173 713	RECTIFIER, SCR main (consisting of)	1
...		166 667	CLAMP, spring thyristor rectifier	1
...		173 784	HEAT SINK, rectifier	2
...	C3,4	031 689	CAPACITOR, rectifier	2
...		143 818	THYRISTOR, SCR 325A 300V hockey puck	2
...	TP1	154 243	THERMOSTAT, NC	1
...		171 405	HEAT SINK, rectifier	1
...		143 852	FOOT, mtg rectifier	2
...	TP2	154 244	THERMOSTAT, NO	1
...		173 714	CLAMP, thyristor rectifier	1
...	21	602 213	WASHER, lock stl split .375	2
...	22	008 999	CASTER, plstc swvl 4 in dia	2
...	23	601 871	NUT, stl hex jam .375-16	2
...	24	Fig 6-3	PANEL, front w/components	1
...	25	169 596	GUN, 12ft .030-.035 wire (Fig 6-6)	1
...		182 137	REGULATOR/FLOWMETER, 10-50 CFH Argon/CO ₂	1
...		144 108	HOSE, gas	1
...		130 750	CLAMP, ground 350A	1
...		600 318	CABLE, weld cop strd No. 3 (order by ft)	10ft

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

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

☞ Hardware is common and not available unless listed.



ST-148 325-C


Figure 6-2. Baffle, Center w/Components

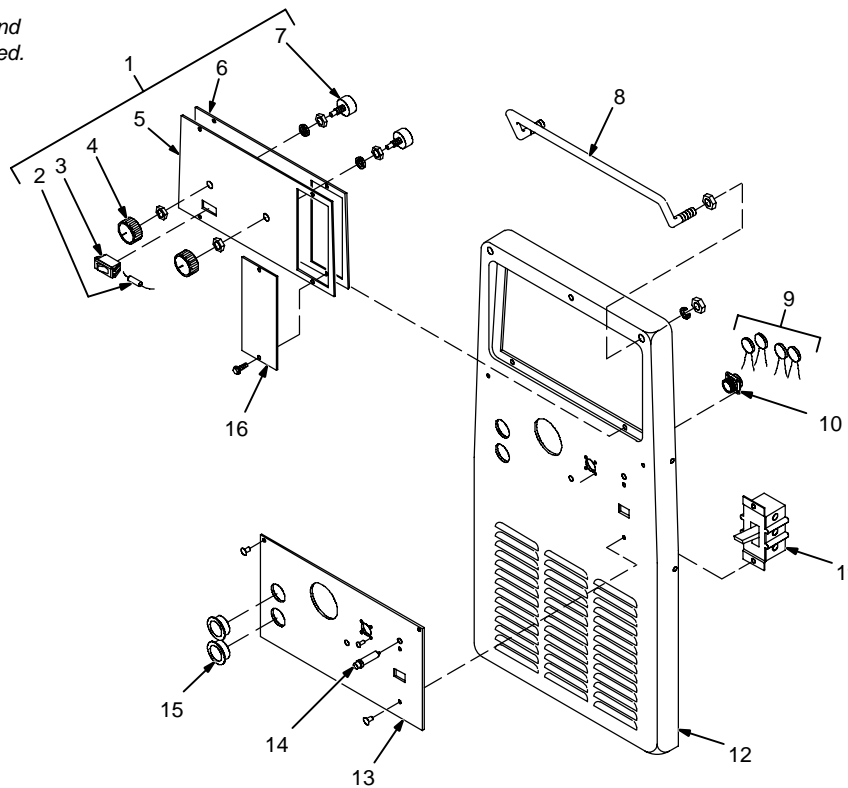
Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 6-2. Baffle, Center w/Components (Fig 6-1 Item 4)				
...	1	058 427	RING, retaining spool	1
...	2	085 980	NUT, stl hex full .625-11	1
...	3	605 941	WASHER, flat stl .640 ID x 1.000 OD x 14ga thk	1
...	4	057 543	SPRING, cprsn .845 OD x .091 wire x 1.500	1
...	5	057 971	WASHER, flat stl keyed 1.500dia x .125thk	1
...	6	010 191	WASHER, fbr .656 ID x 1.500 OD x .125thk	2
...	7	058 628	WASHER, brake stl	2
...	8	057 745	SPRING, cprsn 2.430 OD x .090 wire x 2.500	1
...	9	058 428	HUB, spool	1
...	10	177 307	REEL, support	1
...	11	174 813	BAFFLE, center	1
...		186 998	CAPACITOR KIT,(consisting of)	1
...	12	082 902	STRIP, mtg center capacitor	1
...	13	185 643	STRIP, mtg capacitors	2
...	14	C5	184 584 CAPACITOR, elctlt 15000uf 45VDC	8
...		083 147	GROMMET, scr No. 8/10 panel hole .312sq .500 high	6
...		187 752	INSULATOR	1
...	15	CR1	006 393 RELAY, encl 24VAC DPDT	1
...	16	VR1	149 542 VARISTOR, 75 joule 350VDC	1
...	17	TE1	143 911 TERMINAL ASSEMBLY, pri 1ph triple voltage (consisting of)	1
...	18		010 913 WASHER, flat brs .218 ID x .460 OD x .031thk	6
...	19		038 887 STUD, pri bd brs 10-32 x 1.375	6
...	20		083 426 TERMINAL BOARD, pri	1
...	21		601 835 NUT, brs hex 10-32	12
...	22		038 618 LINK, jumper term bd pri	2
...	23		010 199 TUBING, stl .275 ID x .048 wall x 1.000 lg	2
...	24	PC1	184 316 CIRCUIT CARD, control main	1
...		PLG3	115 094 HOUSING PLUG & SOCKETS	1
...		PLG4	131 052 HOUSING RECEPTACLE & SOCKETS	1
...		PLG5	131 056 HOUSING RECEPTACLE & SOCKETS	1
...		PLG6	115 092 HOUSING PLUG & SOCKETS	1
...	25	R1	119 998 RESISTOR, WW fxd 300W 5 ohm	1
...	26	1T	129 524 TERMINAL, frict male .250 x .032 3 pair	1
...	27	C7,8	128 750 CAPACITOR	2
...	28	POS	039 047 TERMINAL, pwr output red	1
...	29	NEG	039 046 TERMINAL, pwr output black	1
...	30		071 971 COVER, cable	1
...	31	CB1	123 745 CIRCUIT BREAKER, man reset 1P 4A 250VAC	1
...	32		134 201 STAND-OFF SUPPORT, PC card	4
...	33		+144 933 DOOR, access chgov	1
...	34		021 469 LABEL, danger high voltage	1
...	35		Fig 6-4 WIRE DRIVE & GEARS	1

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

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

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 6-3. Panel, Front w/Components (Fig 6-1 Item 24)				
1		175 840	CONTROL PANEL, (consisting of)	1
2	R4	157 366	RESISTOR, MF .5W 1.5K ohm	1
3	S2	148 638	SWITCH, rocker SPDT 4A 250VAC	1
4		097 924	KNOB, pointer 1.625dia x .250 ID	2
5			PLATE, indicator upper (order by model and serial number)	1
6		148 586	PANEL, front control	1
7	R2,3	035 897	POTENTIOMETER	2
8		143 974	HANDLE, running gear	1
9	C9	146 158	LEAD ASSEMBLY, elect	1
9	C10	175 719	LEAD ASSEMBLY, elect	1
10	RC1	048 282	RECEPTACLE w/SOCKETS	1
11	S1	128 755	SWITCH, tgl DPST 40A 600VAC	1
12		174 814	PANEL, front	1
13			PLATE, indicator lower (order by model and serial number)	1
14	PL1	157 958	LIGHT, ind white lens 28V	1
15		057 357	BUSHING, snap-in nyl .937 ID x 1.125mtg hole	2
16		144 127	COVER, opening module	1

 Hardware is common and not available unless listed.



ST-801 716


Figure 6-3. Panel, Front w/Components

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

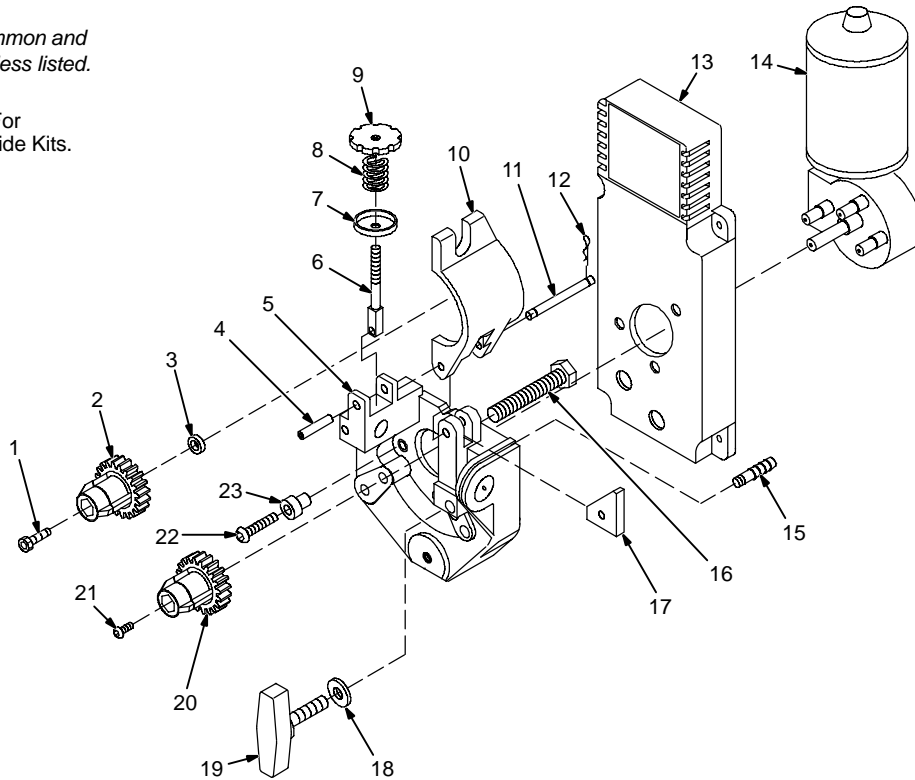
Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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Figure 6-4. Wire Drive And Gears (Fig 6-2 Item 35)

...	1	602 009	... SCREW, .250-20 x 1.25 soc hd gr 8	1
...	2	172 075	... CARRIER, drive roll w/components	1
...	3	166 072	... SPACER, gear	1
...	4	010 224	... PIN, spring CS .187 x 1.000	1
...	5	182 788	... HOUSING, adapter gun/feeder	1
...	6	085 242	... FASTENER, pinned	1
...	7	085 244	... WASHER, cupped stl .328 ID x .812 OD x .125 lip	1
...	8	010 231	... SPRING, cprsn .770 OD x .105 wire x 1.225	1
...	9	085 243	... KNOB, adj tension	1
...	10	166 071	... LEVER, mtg pressure gear	1
...	11	079 634	... PIN, hinge	1
...	12	151 828	... PIN, cotter hair .054 x .750	2
...	13	173 616	... COVER, right angle motor	1
...	14	PM 173 435	... MOTOR, gear 24VDC 122RPM 20:1 ratio	1
...	15	079 633	... FITTING, hose brs barbed M 3/16tbg	1
...	16	601 966	... SCREW, .375-16 x 1.25hexhd	3
...	17	145 237	... STOP, cover	1
...	18	604 538	... WASHER, flat stl SAE .312	1
...	19	124 778	... KNOB, plstc T 1.000 lg x .312-18 x 2.000 bar	1
...	20	173 619	... CARRIER, drive roll w/components	1
...	21	174 609	... SCREW, M 4-.7 x 12	1
...	22	174 610	... SCREW, M 6-1.0 x 20 soc hd	3
...	23	173 620	... BUSHING, motor mtg	3
...		045 233	... GUIDE, anti-wear	1

 Hardware is common and not available unless listed.

See Table 6-1 For Drive Roll & Wire Guide Kits.



ST-148 529-C

Figure 6-4. Wire Drive And Gears

*Recommended Spare Parts.

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

Table 6-1. Drive Roll And Wire Guide Kits

Note 

Base selection of drive rolls upon the following recommended usages:

- 1 V-Grooved rolls for hard wire.
- 2 U-Grooved rolls for soft and soft shelled cored wires.
- 3 U-Cogged rolls for extremely soft shelled wires (usually hard surfacing types).
- 4 V-Knurled rolls for hard shelled cored wires.
- 5 Drive roll types may be mixed to suit particular requirements (example: V-Knurled roll in combination with U-Grooved).


Wire Diameter			Kit No.	Drive Roll		Inlet Wire Guide
Fraction	Decimal	Metric		Part No.	Type	
.023/.025 in.	.023/.025 in.	0.6 mm	087 131	087 130	V-Grooved	056 192
.030 in.	.030 in.	0.8 mm	079 594	053 695	V-Grooved	056 192
.035 in.	.035 in.	0.9 mm	079 595	053 700	V-Grooved	056 192
.045 in.	.045 in.	1.2 mm	079 596	053 697	V-Grooved	056 193

Ref. S-0026-B/7-91

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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Figure 6-5. Panel, Rear w/Components (Fig 6-1 Item 10)

...	1	...	134 834	...	HOSE, SAE .187 ID x .410 OD (order by ft)	...	3ft
...	2	...	149 332	...	CLAMP, hose .405-.485clp dia slftng	...	2
...	3	GS1	125 785	...	VALVE, 24VAC 2 way custom port 1/8 orf	...	1
...	4	...	143 810	...	PANEL, rear	...	1
...	5	...	169 654	...	BRACKET, support tank	...	1
...	6	...	602 387	...	CHAIN, weldless 2/0 x 27.000 lg	...	1
...	7	...	605 227	...	NUT, nyl hex jam .750NPST	...	1
...	8	...	044 426	...	CONNECTOR, clamp cable .690/1.070	...	1
...	9	...	010 493	...	BUSHING, snap-in nyl .625 ID x .875mtg hole	...	1
...	10	...	148 242	...	WINDTUNNEL, 9 in	...	1
...	11	FM1	148 808	...	MOTOR, fan 230V 1550RPM .312dia shaft	...	1
...	12	...	148 809	...	BLADE, fan 9 in 5wg 34deg .309 bore CCW	...	1
...	13	...	049 399	...	NUT, speed push-on-type .312 stud .625 OD x .456 ID	...	1

 Hardware is common and not available unless listed.

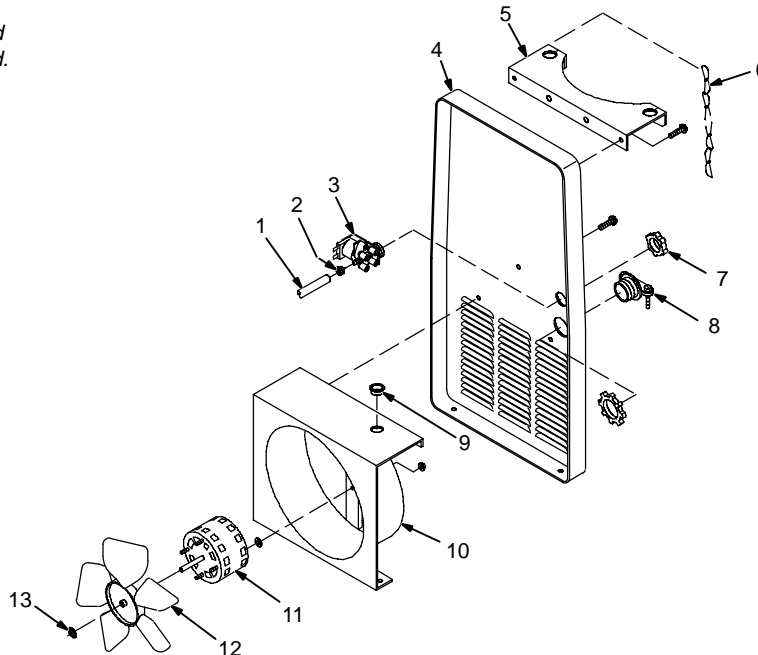


Figure 6-5. Panel, Rear w/Components

ST-148 327-C

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

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

Figure 6-6. M-25 Gun (Fig 6-1 Item 25)

...	1	...	◆169 724	.. NOZZLE, slip type .500 orf .125 recess	1
...	1	...	◆169 725	.. NOZZLE, slip type .625 orf .125 recess	1
...	1	...	◆169 726	.. NOZZLE, slip type .625 orf flush	1
...	1	...	◆169 727	.. NOZZLE, slip type .625 orf .125 stickout	1
...	1	...	◆176 238	.. NOZZLE, spot flat	1
...	1	...	◆176 240	.. NOZZLE, spot inside corner	1
...	1	...	◆176 242	.. NOZZLE, spot outside corner	1
...	2	...	◆087 299	.. TIP, contact scr .023 wire x 1.125	2
...	2	...	◆000 067	.. TIP, contact scr .030 wire x 1.125	2
...	2	...	◆000 068	.. TIP, contact scr .035 wire x 1.125	2
...	2	...	◆000 069	.. TIP, contact scr .045 wire x 1.125	2
...	3	...	169 728	.. ADAPTER, contact tip	1
...	4	...	169 729	.. ADAPTER, nozzle	1
...	5	...	170 467	.. RING, retaining	1
...	6	...	170 468	.. O-RING	1
...	7	...	169 730	.. WASHER, shock	1
...	8	...	169 731	.. TUBE, head	1
...	9	...	169 738	.. NUT, locking handle	2
...	10	...	169 732	.. NUT, jam	2
...	11	...	169 733	.. CONNECTOR, cable	2
...	12	...	169 734	.. NUT, connector	2
...	13	...	172 018	.. M25 UNICABLE CLAMP KIT, (consisting of)	2
...	14	...	169 735	.. CLIP, compression	1
...	15	...	169 742	.. TUBE, support	1
...	16	...	169 743	.. CLAMP, inner	1
...	17	...	170 469	.. CLAMP, jacket	1
...	18	...	169 746	.. CONNECTOR, switch lead	2

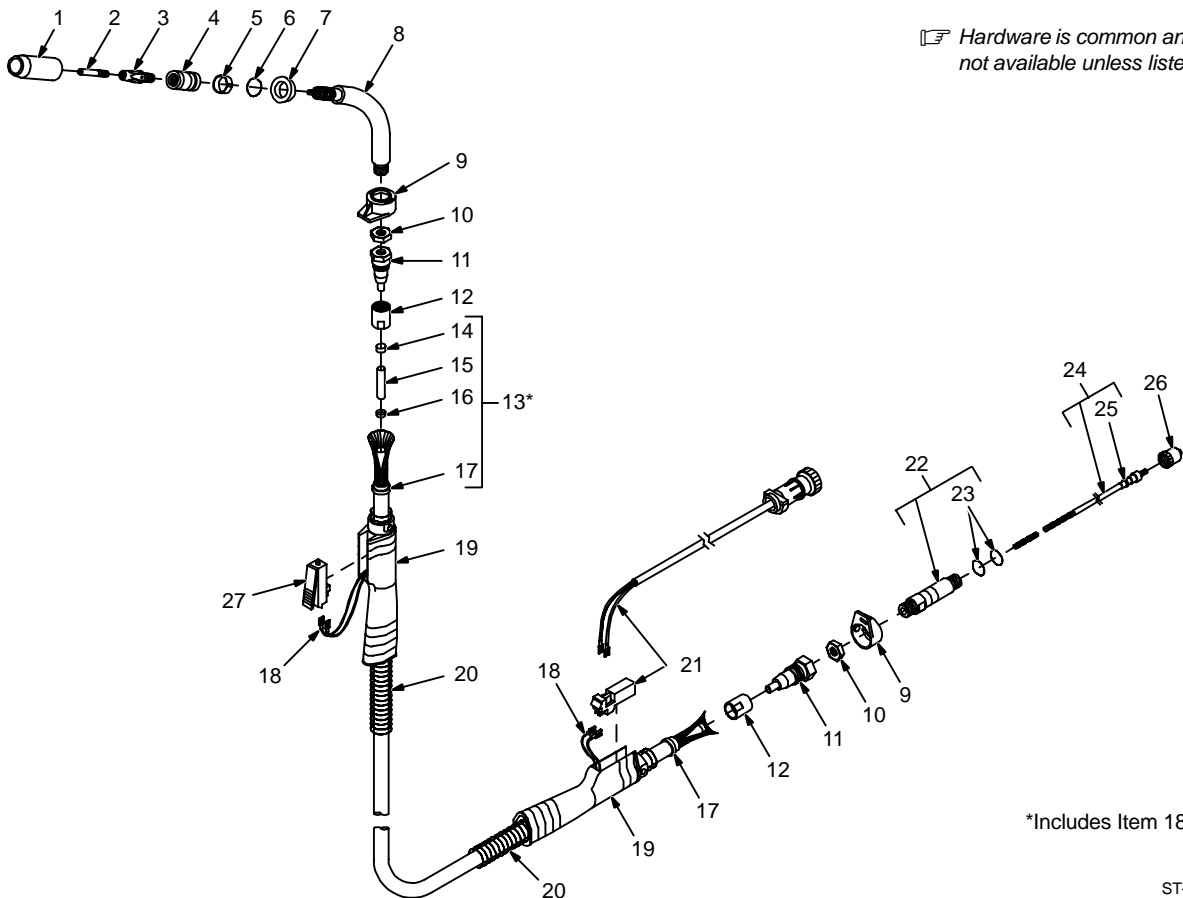


Figure 6-6. M-25 Gun

Item No.	Part No.	Description	Quantity
Figure 6-6. M-25 Gun (Fig 6-1 Item 25) (Continued)			
... 19	169 737	.. HANDLE	2
... 20	169 741	.. STRAIN RELIEF, cable	2
... 21	180 433	.. CABLE, trigger	1
... 22	173 521	.. CONNECTOR, feeder (consisting of)	1
... 23	079 974	... O-RING, .500 ID x .103CS rbr	2
... 24	◆172 257	.. KIT, liner monocoil .023/.025 wire x 15ft (consisting of)	1
... 24	◆172 258	.. KIT, liner monocoil .030/.035 wire x 15ft (consisting of)	1
... 24	◆172 259	.. KIT, liner monocoil .035/.045 wire x 15ft (consisting of)	1
... 25	079 975	... O-RING, .187 ID x .103CS rbr	1
... 26	169 723	.. GUIDE, outlet	1
... 27	169 739	.. SWITCH, trigger	1

◆OPTIONAL

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

TRUE BLUE[®]

WARRANTY

Effective January 1, 1997
(Equipment with a serial number preface of "KH" or newer)

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

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

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

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

- 5 Years Parts – 3 Years Labor
 - * Original main power rectifiers
 - * Inverters (input and output rectifiers only)
- 3 Years — Parts and Labor
 - * Transformer/Rectifier Power Sources
 - * Plasma Arc Cutting Power Sources
 - * Semi-Automatic and Automatic Wire Feeders
 - * Inverter Power Supplies
 - * Intellitig
 - * Robots
 - * Engine Driven Welding Generators
(NOTE: Engines are warranted separately by the engine manufacturer.)
- 1 Year — Parts and Labor
 - * Motor Driven Guns (w/exception of Spoolmate 185)
 - * Process Controllers
 - * Positioners and Controllers
 - * Automatic Motion Devices
 - * Orbital Weld Heads
 - * IHPS Power Sources
 - * Water Coolant Systems
 - * HF Units
 - * Grids
 - * Spot Welders
 - * Load Banks
 - * SDX Transformers
 - * Miller Cyclomatic Equipment
 - * Running Gear/Trailers
 - * Plasma Cutting Torches (except APT, ZIPCUT & PLAZCUT Models)
 - * Deutz Engines (outside North America)
 - * Field Options
(NOTE: Field options are covered under True Blue[®] for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
- 6 Months — Batteries
- 90 Days — Parts and Labor
 - * MIG Guns/TIG Torches

- * APT, ZIPCUT & PLAZCUT Model Plasma Cutting Torches
- * Remote Controls
- * Accessory Kits
- * Replacement Parts (No labor)
- * Spoolmate 185

Miller's True Blue[®] Limited Warranty shall not apply to:

- Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
- Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear.
- Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

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

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

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

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

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

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

Warranty Questions?

Call
1-800-4-A-MILLER
for your local
Miller distributor.





Owner's Record

Please complete and retain with your personal records.

Model Name

Serial/Style Number

Purchase Date

(Date which equipment was delivered to original customer.)

Distributor

Address

City

State

Zip



Resources Available

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:

To locate distributor nearest you call
1-800-4-A-Miller

Welding Supplies and Consumables

Options and Accessories

Personal Safety Equipment

Service and Repair

Replacement Parts

Training (Schools, Videos, Books)

Owner's Manuals

Technical Manuals (Servicing Information
and Parts)

Circuit Diagrams

Welding Process Handbooks

Contact the Delivering Carrier
for:

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

File a claim for loss or damage during ship-
ment.

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