OM-1313 179 084P
September 2001

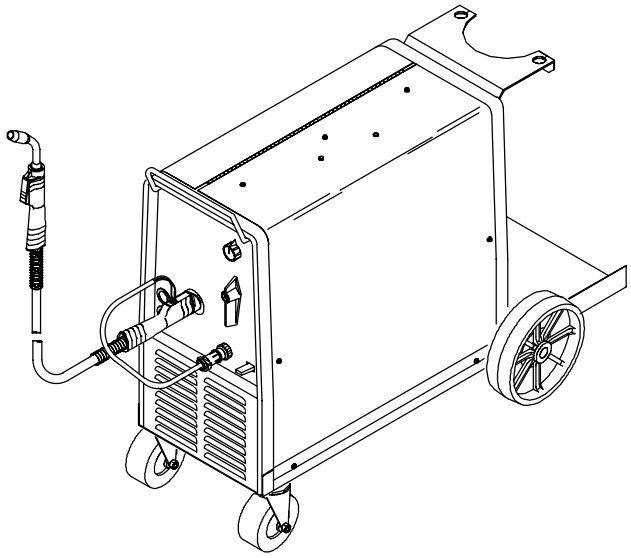
Processes

MIG (GMAW) Welding
Flux Cored (FCAW) Welding

Description

Arc Welding Power Source
And Wire Feeder

Millermatic® 185 And M-15 Gun

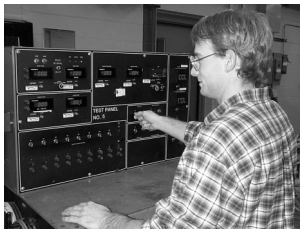


OWNER'S MANUAL

Visit our website at
www.MillerWelds.com

From Miller to You

Thank you and *congratulations* on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.



That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite.

ISO 9001 REGISTERED QUALITY SYSTEM

Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001 Quality System Standard.

We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide which exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual catalog sheets. **To locate your nearest distributor or service agency call 1-800-4-A-Miller, or visit us at www.MillerWelds.com on the web.**

TRUE BLUE® WARRANTY

Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.

Miller offers a Technical Manual which provides more detailed service and parts information for your unit. To obtain a Technical Manual, contact your local distributor. Your distributor can also supply you with Welding Process Manuals such as SMAW, GTAW, GMAW, and GMAW-P.

Miller
The Power of Blue.

TABLE OF CONTENTS

⚠ WARNING

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

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

OM1313

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 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 watch-person 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.

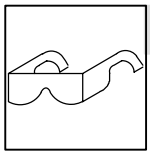
Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

- 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.

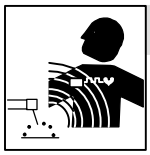
- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.

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.

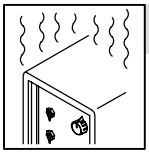
1-3. Additional Symbols For Installation, Operation, And Maintenance

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.

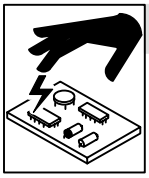
FALLING UNIT can cause injury.

- 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.



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.

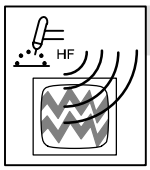
- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.

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.

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.



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.

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

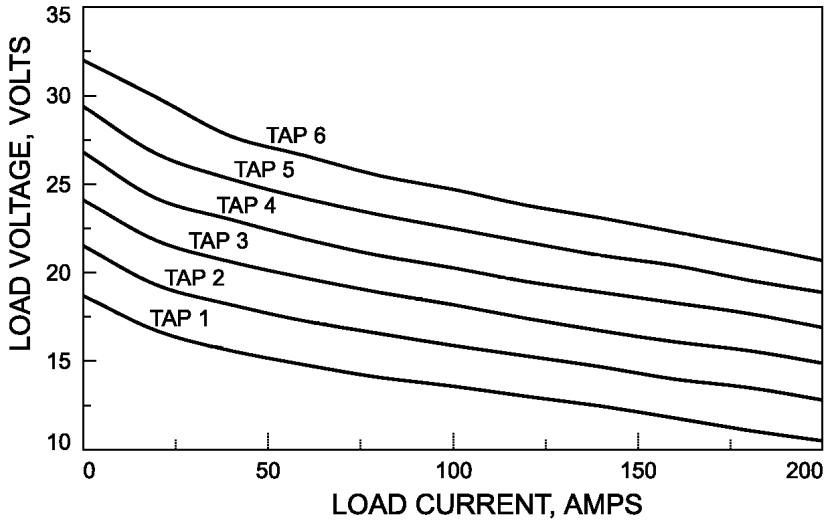
2-1. Specifications

Rated Welding Output	Amperage Range	Maximum Open-Circuit Voltage DC	Amperes Input at Rated Load Output, 60 Hz, Single-Phase				Weight	Overall Dimensions
			200 V	230 V	KVA	KW		
150 A @ 23 Volts DC, 60% Duty Cycle	30 – 185	33	30 (1.6)*	26 (1.4)*	6 (0.27)*	5 (0.13)*	165 lb (75 kg)	Length: 36 in (915 mm) Width: 18 in (457 mm) Height: 27 in (686 mm)

Wire Type And Diameter			Calculated Wire Speed Range At No Load	Max Wire Feed Speed While Welding
Solid Steel / Stainless Steel	Flux Cored	Aluminum		
.023 – .035 in (0.6 - 0.9 mm)	.030 – .045 in (0.8 – 1.2 mm)	.030 – .035 in (0.8 – 0.9 mm)	138 – 795 IPM (3.5 – 20.3 m/min)	650 IPM (16.5 m/min)
*While idling				
Operating Temperature Range – –20C to +40C			Storage Temperature Range – -30C to + 50C	

2-2. Volt-Ampere Curves

Volt-ampere curves show minimum and maximum voltage and amperage output capabilities of unit. Curves of other settings fall between curves shown.



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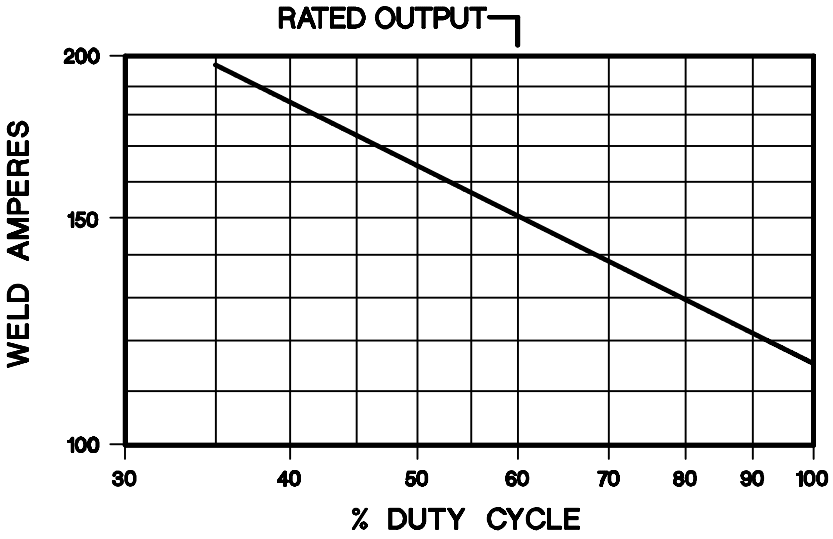
2-3. Welding Power Source Duty Cycle And Overheating

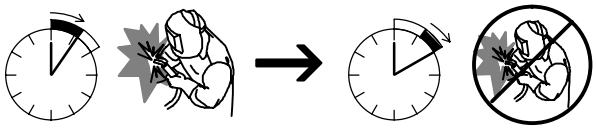


Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

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.

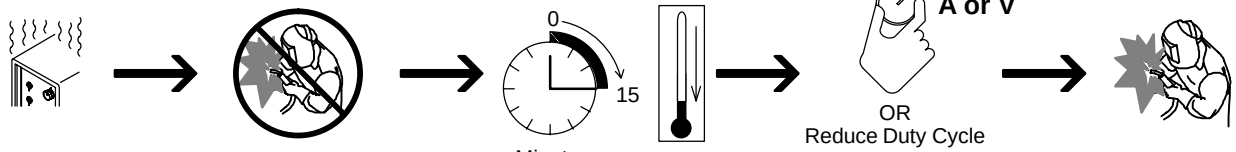
▲ **Exceeding duty cycle can damage unit and void warranty.**

60% Duty Cycle At 150 Amperes



6 Minutes Welding — 4 Minutes Resting

Overheating



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2-4. Welding Gun Duty Cycle And Overheating

⚠ CAUTION

WELDING LONGER THAN RATED DUTY CYCLE can damage gun and void warranty.

- Do not weld at rated load longer than shown below.
- Using gasless flux cored wire reduces gun duty cycle.

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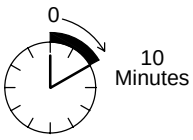
Definition

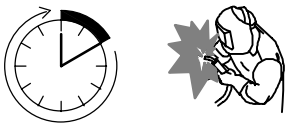


Duty Cycle is percentage of 10 minutes that gun can weld at rated load without overheating.

.023 To .045 in (0.6 To 1.1 mm) Hard Or Flux Cored Wires

100% Duty Cycle At 150 Amperes Using CO_2

100% Duty Cycle At 120 Amperes Using Mixed Gases

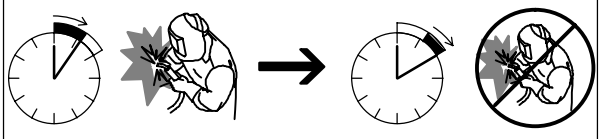


Continuous Welding

.023 To .045 in (0.6 To 1.1 mm) Hard Or Flux Cored Wires

60% Duty Cycle At 200 Amperes Using CO_2

60% Duty Cycle At 150 Amperes Using Mixed Gases



6 Minutes Welding — 4 Minutes Resting

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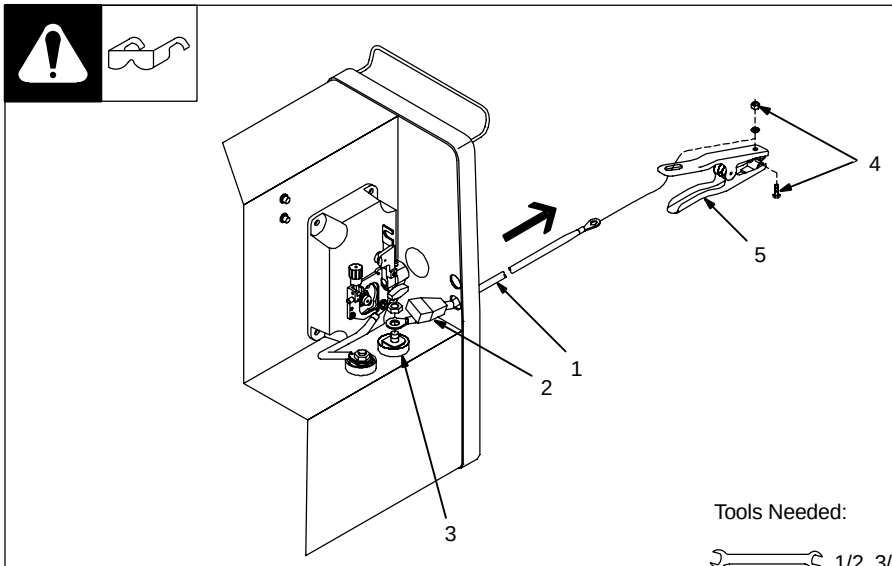
2-5. Installing Work Clamp



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:

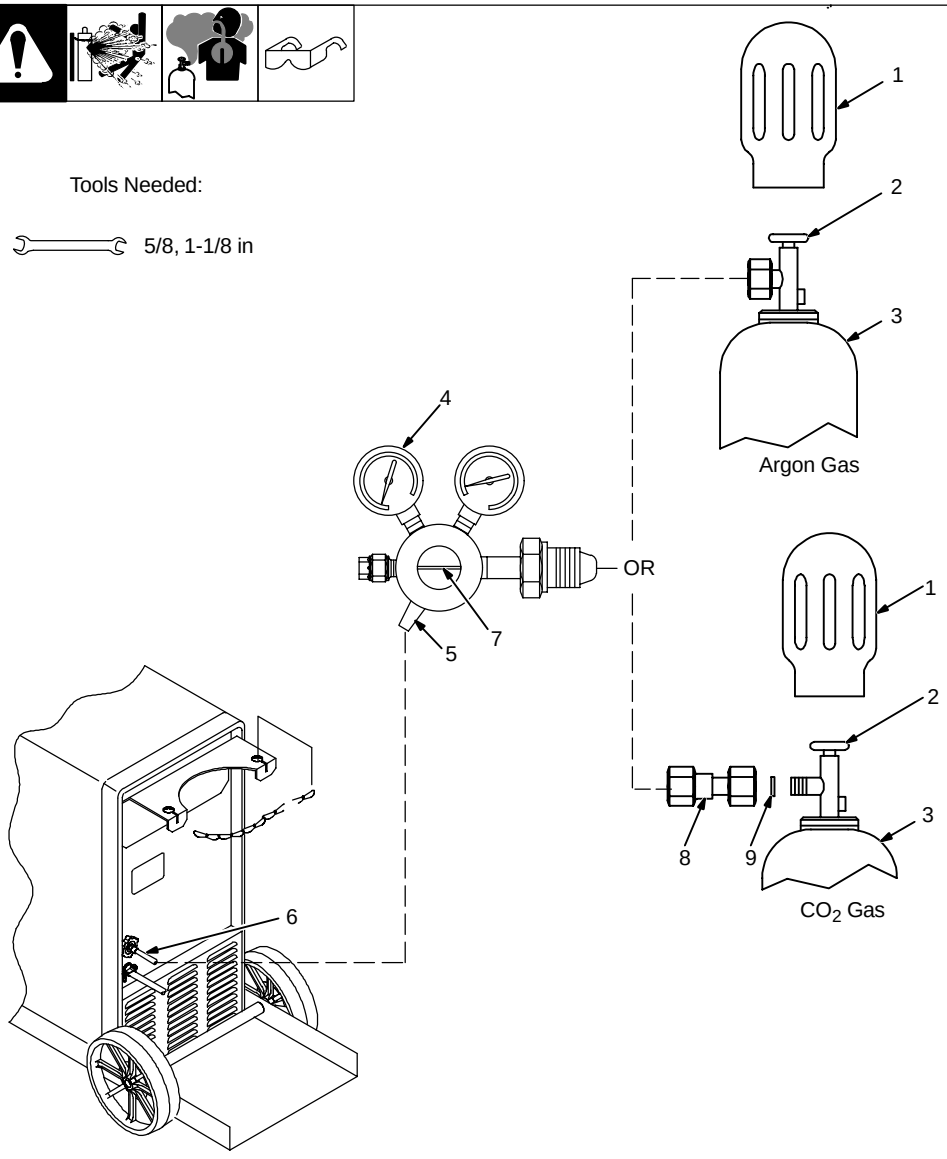
1/2, 3/4 in

ST-801 566-A

2-6. Installing Gas Supply

Tools Needed:

5/8, 1-1/8 in



Obtain gas cylinder and chain to running gear, wall, or other stationary support so cylinder cannot fall and break off valve.

1 Cap

2 Cylinder Valve

Remove cap, stand to side of valve, and open valve slightly. Gas flow blows dust and dirt from valve. Close valve.

3 Cylinder

4 Regulator/Flowmeter

Install so face is vertical.

5 Regulator/Flowmeter Gas Hose Connection

6 Welding Power Source Gas Hose Connection

Connect customer supplied gas hose between regulator/flowmeter gas hose connection, and fitting on rear of welding power source.

7 Flow Adjust

Typical flow rate is 20 cfh (cubic feet per hour). Check wire manufacturer's recommended flow rate.

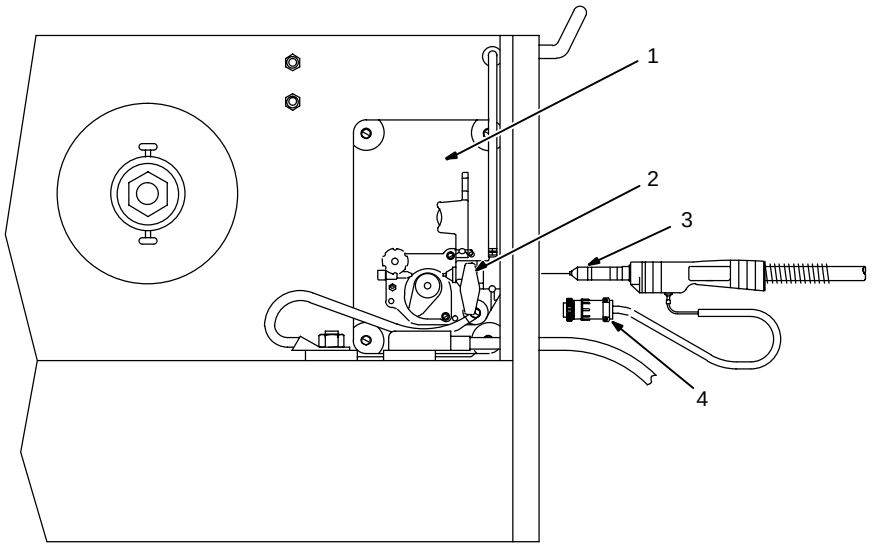
8 CO_2 Adapter (Customer Supplied)

9 O-Ring (Customer Supplied)

Install adapter with O-ring between regulator/flowmeter and CO_2 cylinder.

ST-801 571 / ST-802 028

2-7. Installing Welding Gun



1 Drive Assembly

2 Gun Securing Knob

3 Gun End

Loosen securing knob. Insert gun end through opening until it bottoms against drive assembly. Tighten nut.

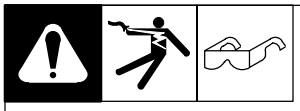
4 Gun Trigger Plug

Insert plug into receptacle, and tighten threaded collar.

Close door.

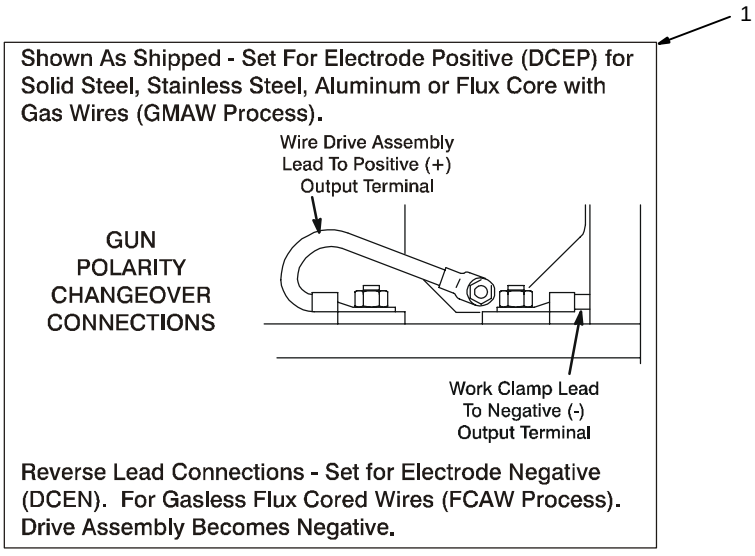
Ref. ST-801 567

2-8. Setting Gun Polarity



1 Polarity Changeover Label

Always read and follow manufacture's recommended polarity.

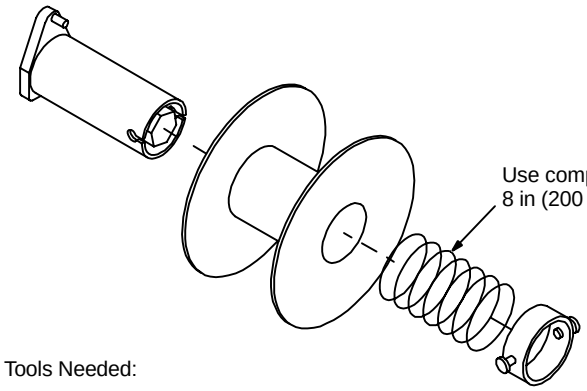


Tools Needed:

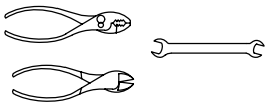
3/4, 11/16 in

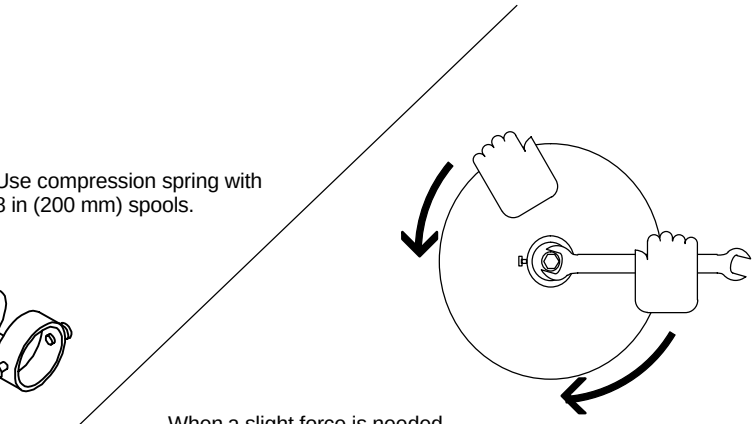
Ref. 190 821-A

2-9. Installing Wire Spool And Adjusting Hub Tension



Tools Needed:

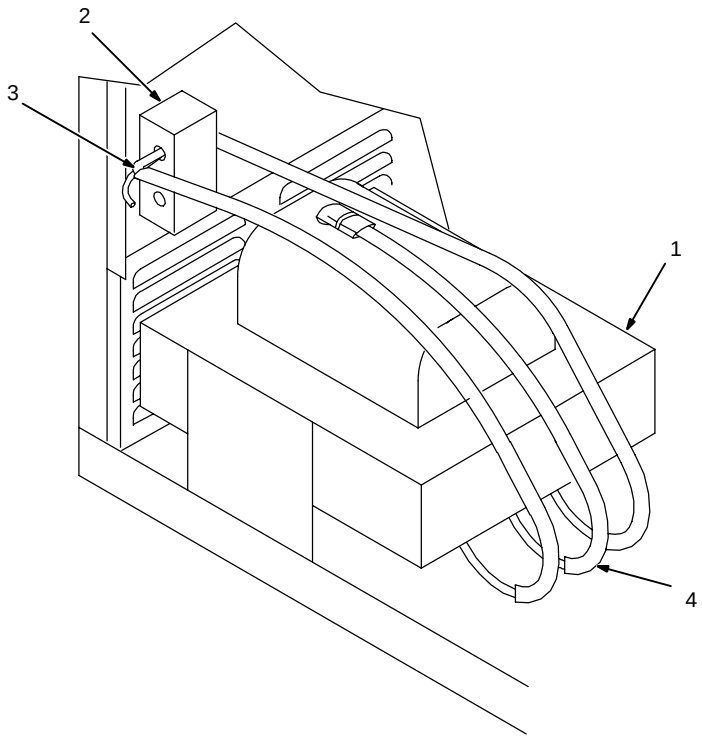




When a slight force is needed to turn spool, tension is set.

ST-072573-B

2-10. Changing Input Voltage



▲ **Turn Off unit, and disconnect input power.**

Unit was shipped from factory set for 230 volts.

1 Transformer T1

2 Rear Of Power Switch S1

3 Lead Marked 230 Volt And Fan Motor Lead

Disconnect 230 volt lead and fan motor lead from rear of S1. Leave fan motor lead connected to 230 volt lead.

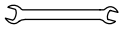
4 Lead Marked 200 Volt

Remove cable tie, and slide short piece of sleeving off 200 volt lead, and slide sleeving over end of 230 volt and fan motor leads. Fold sleeving over and secure in place.

Connect 200 volt lead to S1 where 230 volt lead was removed.

Reinstall wrapper.

Tools Needed:



ST-801 580-A

2-11. Electrical Service Guide

Input Voltage	200	230
Input Amperes At Rated Output	30	26
Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes		
Circuit Breaker [1], Time-Delay [2]	35	30
Normal Operating [3]	45	40
Min Input Conductor Size In AWG/Kcmil	10	10
Max Recommended Input Conductor Length In Feet (Meters)	97 (29)	128 (39)
Min Grounding Conductor Size In AWG/Kcmil	10	10

Reference: 1999 National Electrical Code (NEC)

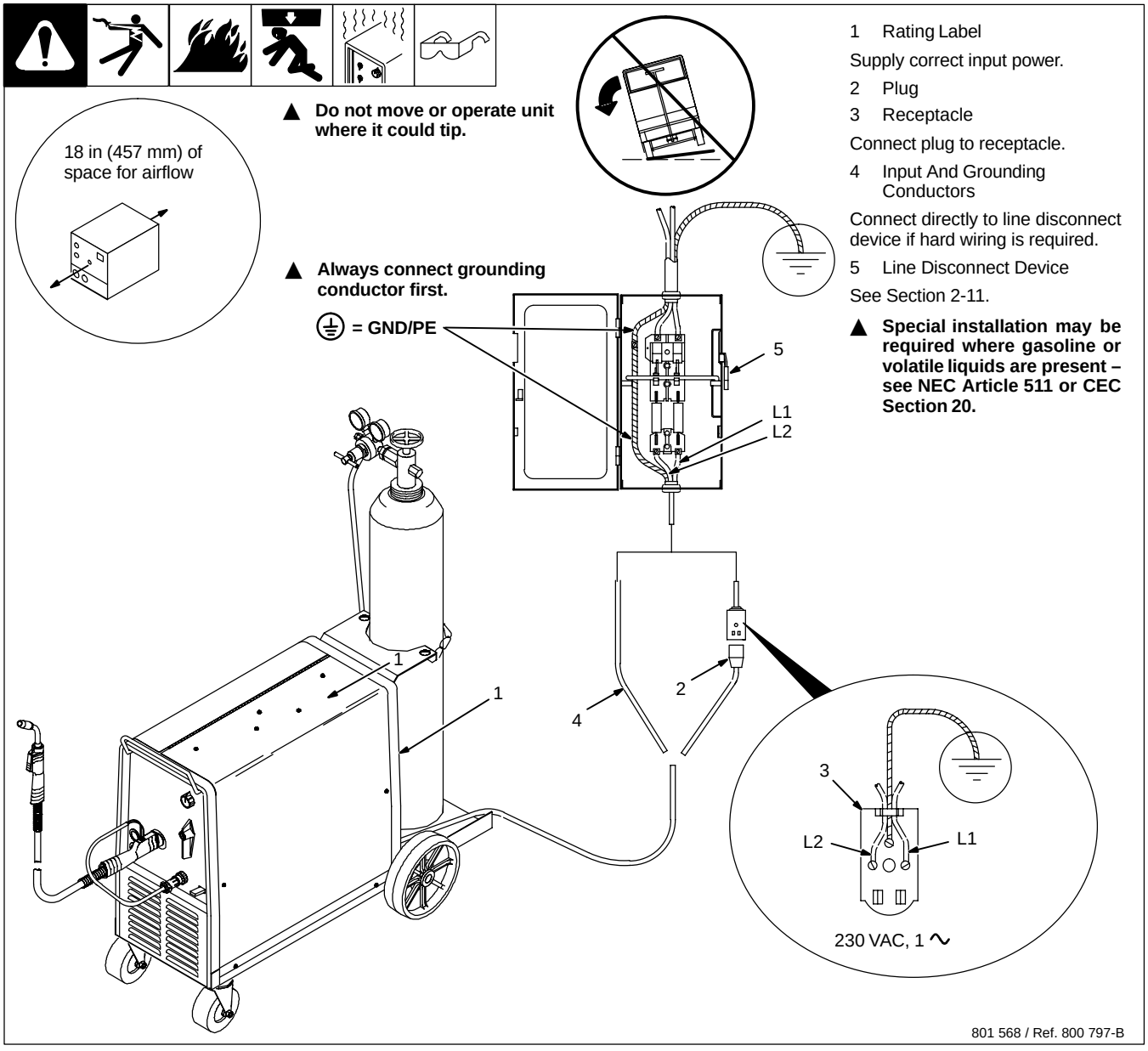
1 Choose a circuit breaker with time-current curves comparable to a Time Delay Fuse.

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

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

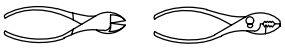
▲ **Caution: Failure to follow these fuse and circuit breaker recommendations could create an electric shock or fire hazard.**

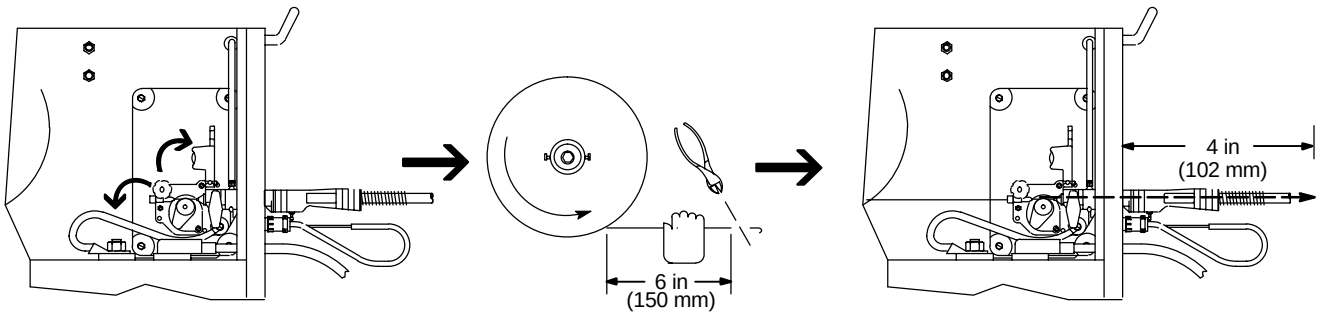
2-12. Selecting A Location And Connecting Input Power



2-13. Threading Welding Wire

Tools Needed:

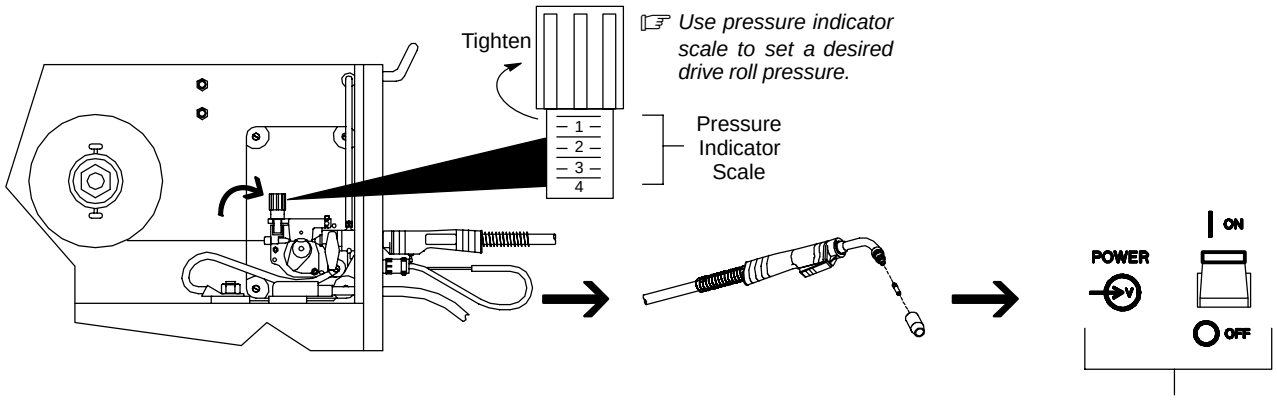




Open pressure assembly.

Pull and hold wire; cut off end.

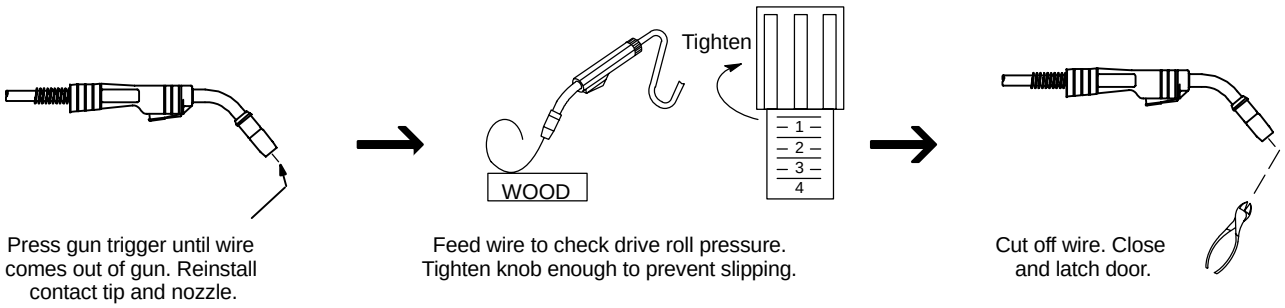
Push wire thru guides into gun; continue to hold wire.



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.

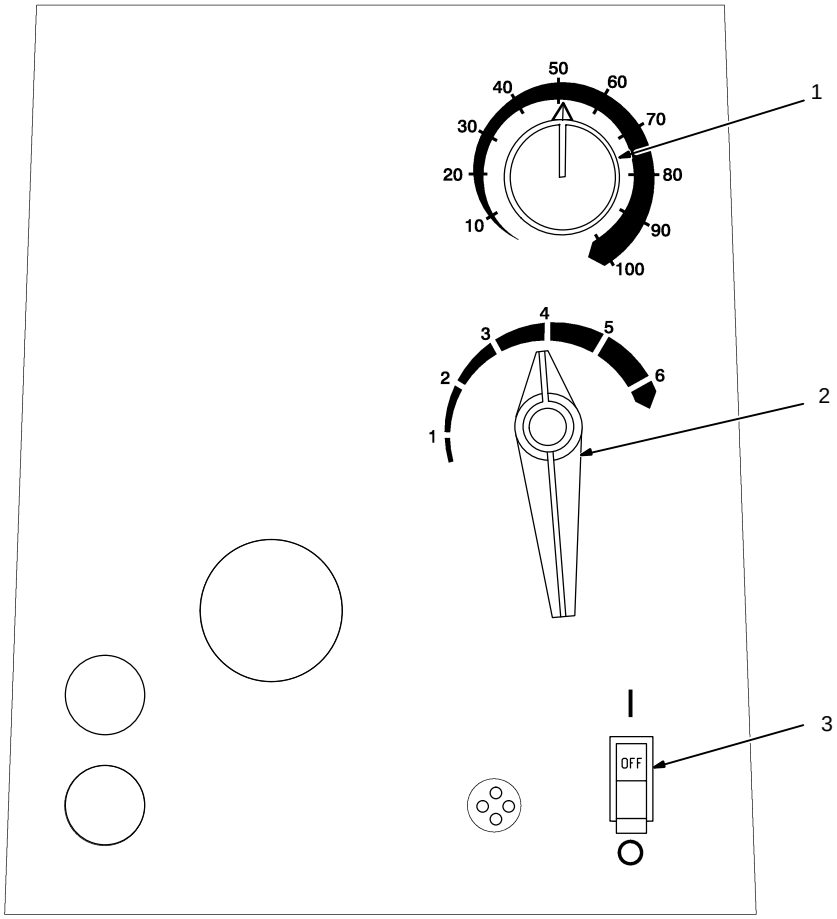
Cut off wire. Close and latch door.

Ref. ST-801 570-A / ST-801 083 / S-0627-A

Notes

SECTION 3 – OPERATION

3-1. Front Panel Controls



Controls For Standard Units

1 Wire Speed Control

Use control to select a wire feed speed. Scale around control is not actual wire feed speed, but is for reference only.

2 Voltage Switch

The higher the selected number, the thicker the material that can be welded (see Section 3-2). Do not switch while welding.

3 Power Switch

Ref. ST-180 930

3-2. Weld Parameter Chart

Selecting Wire, Gas and Control Settings

What Material are You Welding?	Suggested Wire Types	Suggested Shielding Gases and Flow Rate	Wire Sizes (Diameter)
Steel	Solid (or hard) ER70S-6	100% CO_2, 20 cfh	.023" (0.6 mm) .030" (0.8 mm) .035" (0.9 mm)
		75% Ar/25% CO_2, 20 cfh (Ar/CO_2 produces less spatter – better overall appearance)	.023" (0.6 mm) .030" (0.8 mm) .035" (0.9 mm)
Steel – for outdoor, windy applications or when weld appearance is not critical.	Flux core E71T-GS	No shielding gas required	.030" (0.8 mm) .035" (0.9 mm) .045" (1.1 mm)
Stainless steel	Stainless steel ER 308	Tri-Mix, 20 cfh (90% He/7.5% Ar/ 2.5% CO_2)	.023" (0.6 mm) .030" (0.8 mm) .035" (0.9 mm)
Aluminum with Optional Spoolmate™ 185 spoolgun	Aluminum 4043 AL	100% Ar, 20 cfh	.030" (0.8 mm) .035" (0.9 mm)
	Aluminum 5356 AL	100% Ar, 20 cfh	.030" (0.8 mm) .035" (0.9 mm)

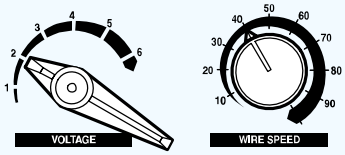
*Line voltage can affect weld output, settings on this chart are starting values only. You may need to adjust voltage and wire feed speed to optimize your settings.

Input Line Voltage*		Parameter Chart Settings
Higher e.g. 240 Volts AC	→	Weld Will Be Hotter Lower Settings
230 Volts AC	→	Use Parameter Chart Inside Door
Lower e.g. 218 Volts AC	→	Weld Will Be Colder Raise Settings

Select Voltage and Wire Speed Based on Thickness of Metal Being Welded

To read settings: Number on left of slash is voltage, number on right of slash is wire-speed. "—" Means not recommended.

Example: 2/40 =

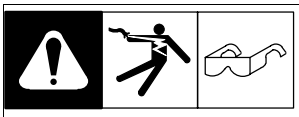


3/8" (9.5 mm)	1/4" (6.4 mm)	3/16" (4.8 mm)	1/8" (3.2 mm)	12 ga. (2.8 mm)	14 ga. (2.0 mm)	16 ga. (1.6 mm)	18 ga. (1.2 mm)	20 ga. (0.9 mm)	22 ga. (0.8 mm)
—	6/100	5/80	4/65	3/55	3/45	2/35	2/25	1/15	1/5
6/80	5/70	4/60	3/55	3/45	2/35	2/25	1/15	1/5	—
6/70	5/60	4/50	3/45	3/40	2/30	2/20	2/10	—	—
—	5/90	4/80	3/70	3/60	2/50	2/40	1/35	1/25	1/12
6/85	5/75	4/65	3/55	3/50	2/45	2/35	1/20	1/5	1/0
6/80	5/70	4/60	3/45	3/40	2/30	2/20	1/10	1/0	—
6/80	5/70	5/65	4/55	4/50	3/30	2/20	1/10	—	—
6/60	5/50	4/40	3/30	3/25	2/20	1/10	—	—	—
6/40	5/30	4/25	3/20	3/20	—	—	—	—	—
6/95	4/85	4/80	4/60	3/50	3/50	3/50	2/30	2/20	2/20
6/70	5/70	4/70	3/50	3/45	2/50	2/45	2/40	1/0	—
6/65	5/40	5/40	4/30	3/30	2/25	2/20	2/10	—	—
5/88	5/88	4/73	3/55	3/50	2/45	—	—	—	—
6/95	6/85	5/68	4/59	4/54	2/34	—	—	—	—
—	5/100	4/90	3/80	3/75	2/70	—	—	—	—
6/100	6/92	5/85	4/70	4/65	2/60	—	—	—	—

Ref. 197 949

SECTION 4 – MAINTENANCE & TROUBLESHOOTING

4-1. Routine Maintenance

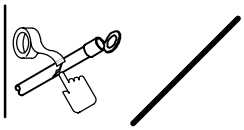


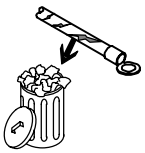
▲ **Disconnect power before maintaining.**

☞ *Maintain more often during severe conditions.*

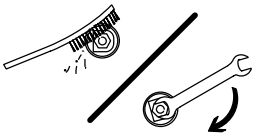
3 Months

Replace Damaged Or Unreadable Labels



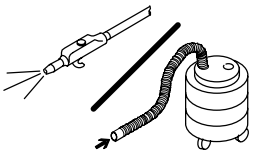


Repair Or Replace Cracked Cables And Cords



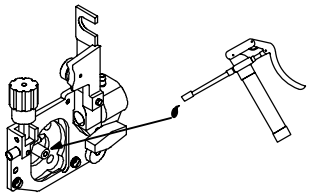
Clean And Tighten Weld Terminals

6 Months

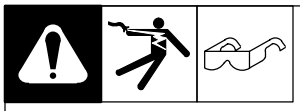


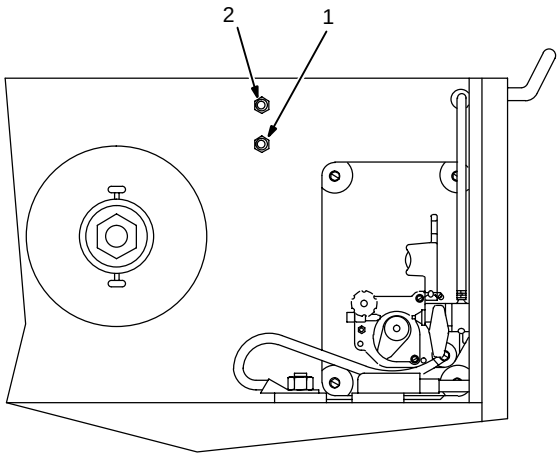
Blow Out Or Vacuum Inside

Remove drive roll and apply light coat of oil or grease to drive motor shaft.



4-2. Circuit Breakers CB1 And CB2





▲ **Turn Off unit.**

1 Circuit Breaker CB1

CB1 protects the transformer from overload. If CB1 opens, wire feeding stops.

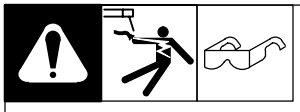
2 Circuit Breaker CB2

CB2 protects the trigger circuit from overload. If CB2 opens, weld output stops.

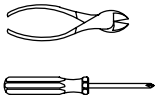
Press button to reset circuit breaker. Close door.

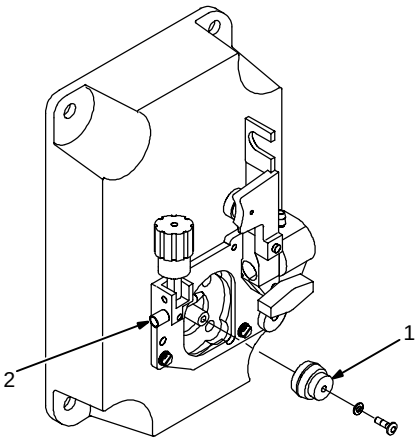
Ref. ST-801 567

4-3. Changing Drive Roll And Inlet Wire Guide



Tools Needed:





1 Drive Roll

Choose correct drive roll for wire type, and install as shown.

2 Inlet Wire Guide

Remove guide by pressing on barbed area, or cutting off one end near housing and pulling it out of hole. Push new guide into hole from rear until it snaps in place.

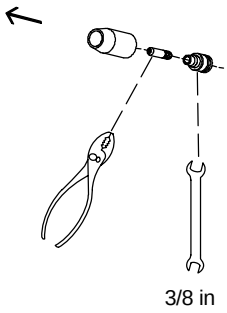
Ref. ST-801 569-A

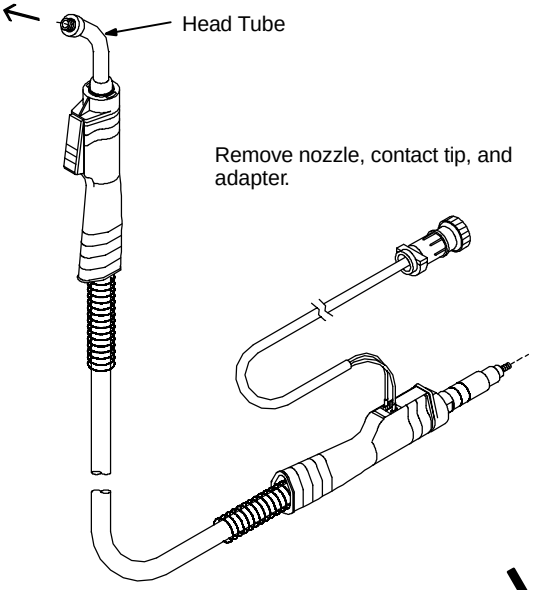
4-4. Cleaning Or Replacing Gun Liner

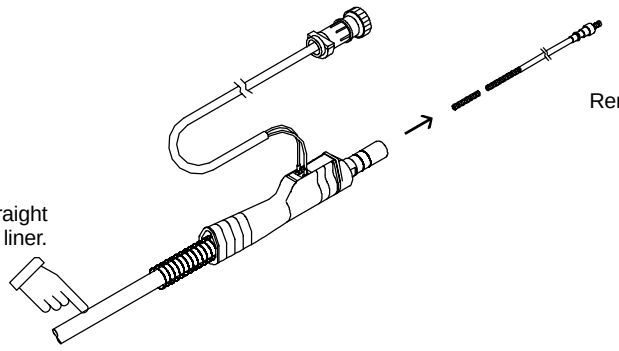
▲ **Disconnect gun first.**

Tools Needed:

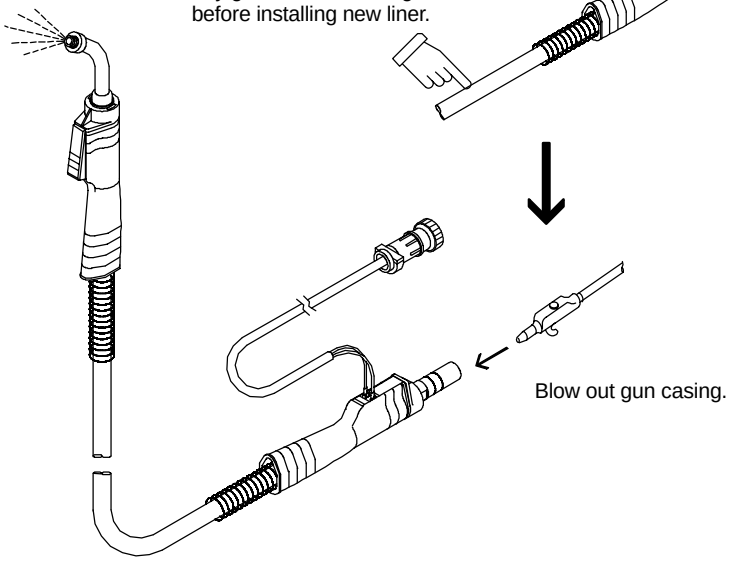
3/8 in







Lay gun cable out straight before installing new liner.



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.

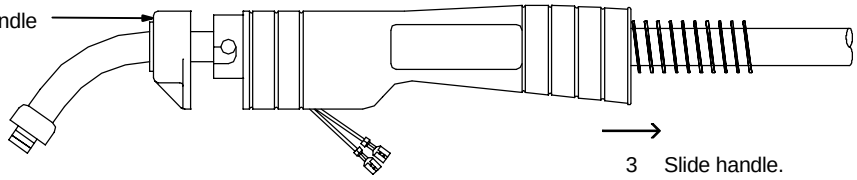
Install adapter, contact tip, and nozzle.

Ref. ST-800 797-C

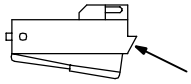
4-5. Replacing Switch And/Or Head Tube

▲ **Disconnect gun first.**

1 Remove handle locking nut.

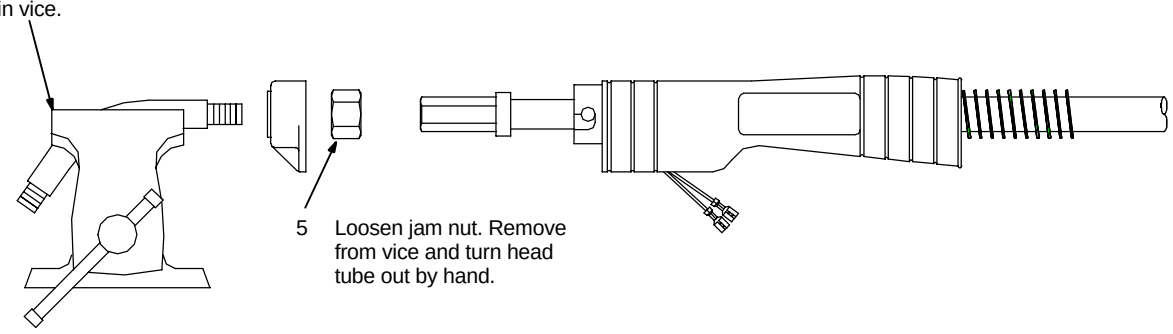


3 Slide handle.



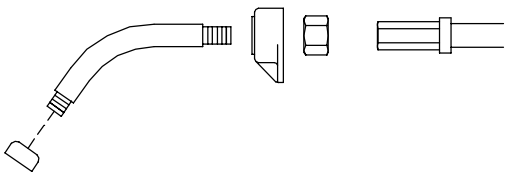
2 Remove switch housing. Note**:** If installing new switch, push switch lead connectors onto terminal of new switch (polarity is not important). Install switch back into handle, and secure with handle locking nut. If replacing head tube, continue to end of figure.

4 Secure head tube in vice.

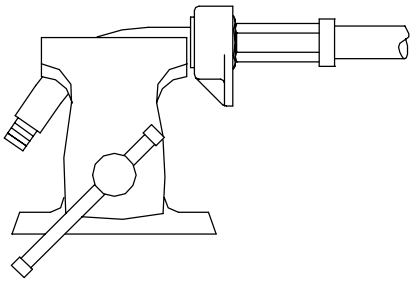


5 Loosen jam nut. Remove from vice and turn head tube out by hand.

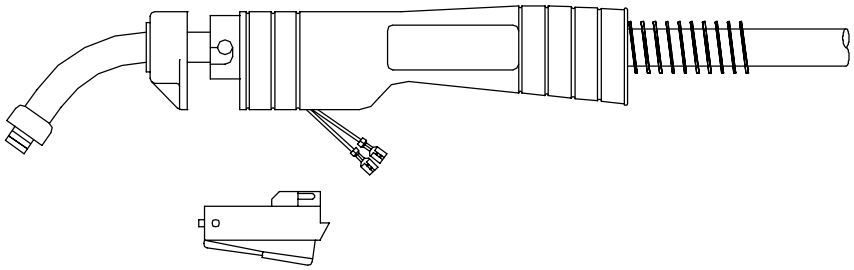
6 Install existing shock washer onto new head tube. Hand-tighten head tube into connector cable.



7 Place head tube in vice and tighten until nuts are tight.



8 Remove from vice. Reposition handle and install switch housing. Secure with handle locking nut.

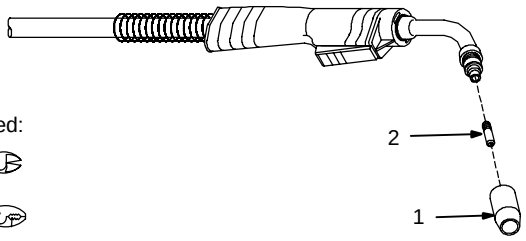


Tools Needed:

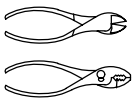
3/4 in

Ref. ST-800 795-C

4-6. Replacing Gun Contact Tip



Tools Needed:



▲ **Turn Off unit.**

1 Nozzle

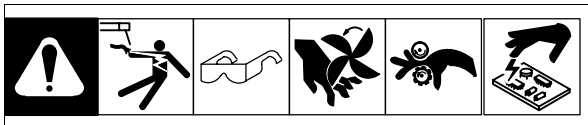
2 Contact Tip

Cut off welding wire at contact tip. Remove nozzle.

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

Ref. 800 797-C

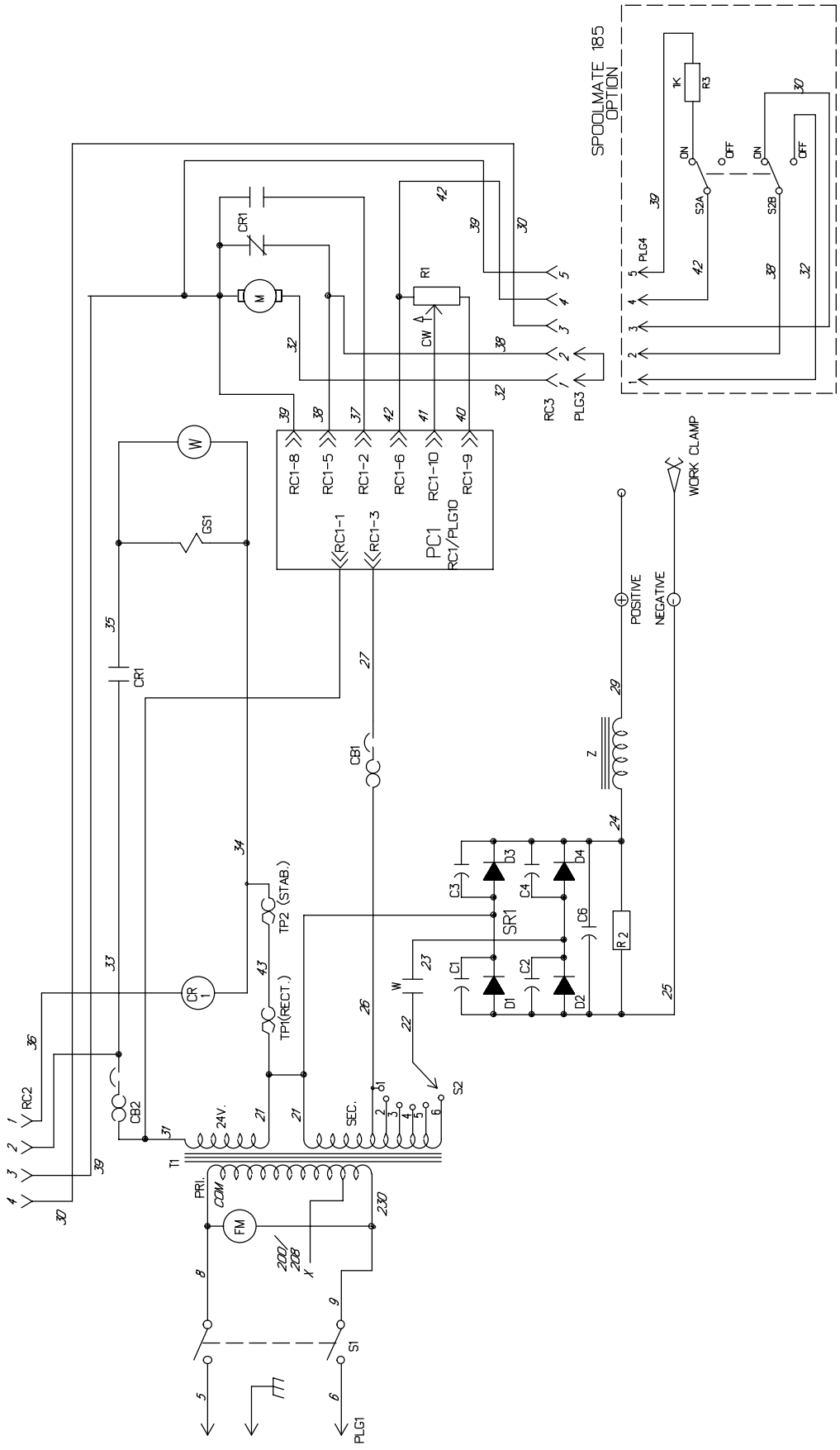
4-7. Troubleshooting



Welding Trouble	Remedy
No weld output; wire does not feed.	Secure power cord plug in receptacle (see Section 2-12).
	Check and replace power switch if necessary.
	Check circuit breakers CB1 and/or CB2, and reset if necessary (see Section 4-2).
	Replace building line fuse or reset circuit breaker if open (see Section 2-12).
	Secure gun plug in receptacle or repair leads, or replace trigger switch (see Section 2-7 and/or 4-5).
	Thermostat TP1 open (overheating). Allow fan to run; the thermostat will close when the unit has cooled (see Section 2-3).
No weld output; wire feeds.	Connect work clamp to get good metal to metal contact.
	Replace contact tip (see Section 4-6).
Low weld output.	Connect unit to proper input voltage or check for low line voltage (see Section 2-12).
Low, high, or erratic wire speed.	Readjust front panel settings (see Section 3-1).
	Change to correct size drive roll (see Section 4-3).
	Readjust drive roll pressure (see Section 2-13).
	Replace inlet guide, contact tip, and/or liner if necessary (see Sections 2-13, and 4-4).

Wire Drive/Gun Trouble	Remedy
Electrode wire feeding stops during welding.	Straighten gun cable and/or replace damaged parts (see Section 4-4).
	Adjust drive roll pressure (see Section 2-13).
	Readjust hub tension (see Section 2-9).
	Replace contact tip if blocked (see Section 4-6).
	Clean or replace wire inlet guide or liner if dirty or plugged (see Section 4-4).
	Replace drive roll if worn or slipping (see Section 4-3).
	Secure gun plug in receptacle or repair leads, or replace trigger switch (see Section 2-7 and/or 4-4).
	Check and clear any restrictions at drive assembly and liner (see Section 4-4).
	Have nearest Factory Authorized Service Agent check drive motor.

SECTION 5 – ELECTRICAL DIAGRAM



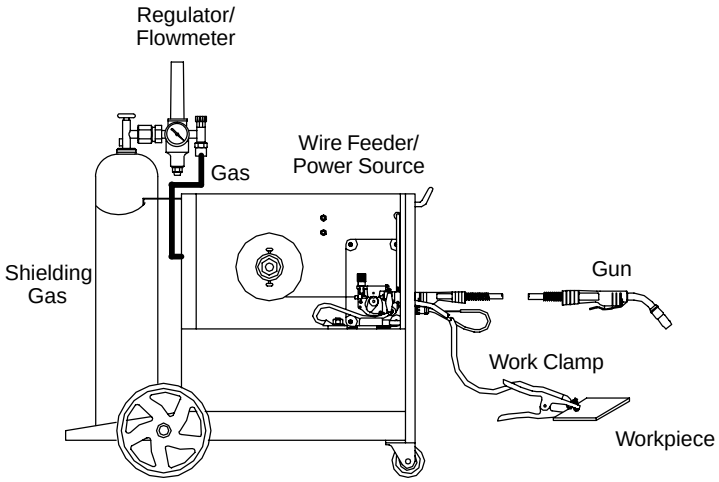
SB-186 065

Figure 5-1. Circuit Diagram

SECTION 6 – MIG WELDING (GMAW) GUIDELINES

6-1. Typical MIG Process Connections

▲ **Weld current can damage electronic parts in vehicles. Disconnect both battery cables before welding on a vehicle. Place work clamp as close to the weld as possible.**



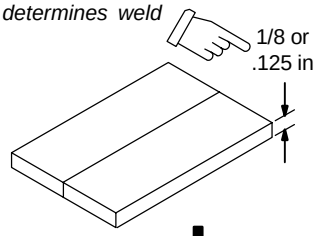
light mig 5/967 / Ref. 801 909 / Ref. 801 570-B

6-2. Typical MIG Process Control Settings

NOTE ☞

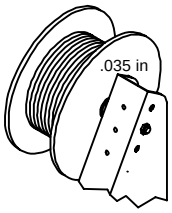
These settings are guidelines only. Material and wire type, joint design, fitup, position, shielding gas, etc. affect settings. Test welds to be sure they comply to specifications.

Material thickness determines weld parameters.



Convert Material Thickness to Amperage (A)

(.001 in = 1 ampere)
.125 in = 125 A



Wire Size	Amperage Range
.023 in	30 – 90 A
.030 in	40 – 145 A
.035 in	50 – 180 A

Select Wire Size

Wire Size	Recommendation	Wire Speed (Approx.)
.023 in	3.5 in per ampere	3.5 x 125 A = 437 ipm
.030 in	2 in per ampere	2 x 125 A = 250 ipm
.035 in	1.6 in per ampere	1.6 x 125 A = 200 ipm

Select Wire Speed (Amperage)

125 A based on 1/8 in material thickness

ipm = inch per minute

Low voltage: wire stubs into work

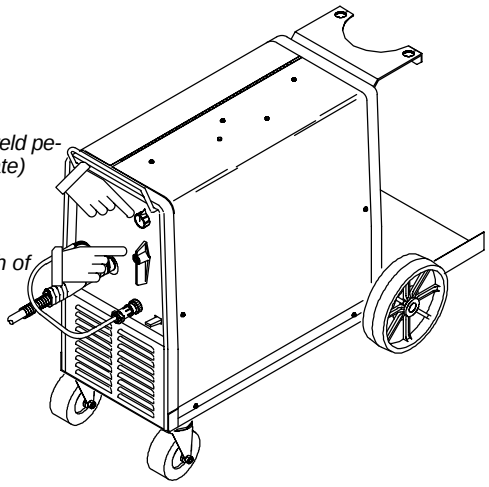
High voltage: arc is unstable (spatter)

Set voltage midway between high/low voltage.

Select Voltage

Wire speed (amperage) controls weld penetration (wire speed = burn-off rate)

Voltage controls height and width of weld bead.

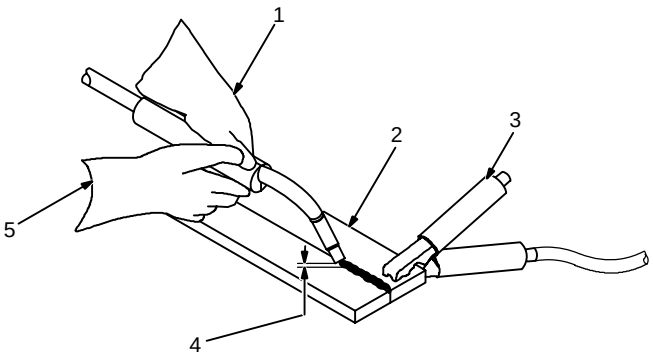


Ref. ST-801 865

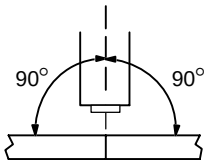
6-3. Holding And Positioning Welding Gun

NOTE ☞

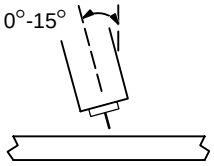
Welding wire is energized when gun trigger is pressed. Before lowering helmet and pressing trigger, be sure wire is no more than 1/2 in (13 mm) past end of nozzle, and tip of wire is positioned correctly on seam.



1 Hold Gun and Control Gun Trigger
2 Workpiece
3 Work Clamp
4 Electrode Extension (Stickout) 1/4 to 1/2 in (6 To 13 mm)
5 Cradle Gun and Rest Hand on Workpiece

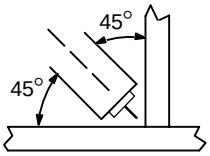


End View of Work Angle

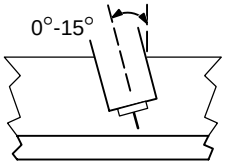


Side View of Gun Angle

GROOVE WELDS



End View of Work Angle



Side View of Gun Angle

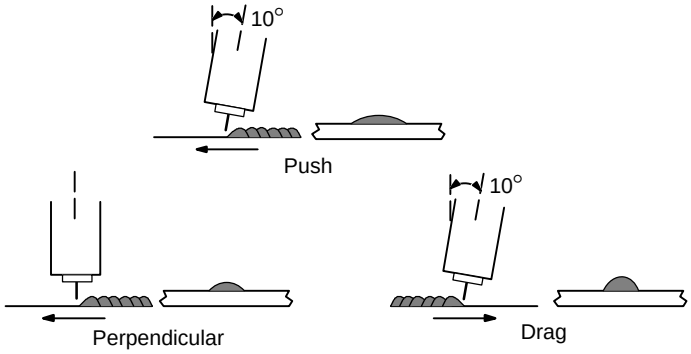
FILLET WELDS

S-0421-A

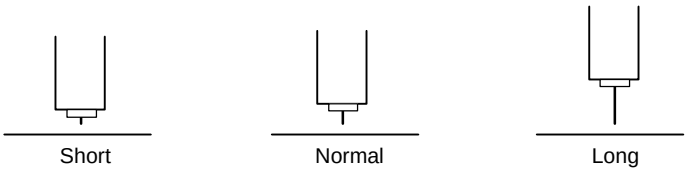
6-4. Conditions That Affect Weld Bead Shape

NOTE ☞

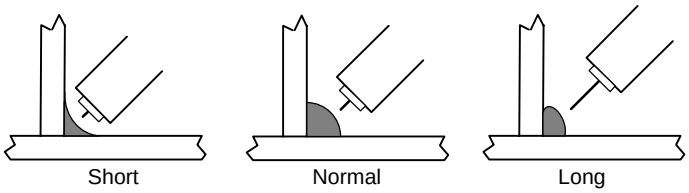
Weld bead shape depends on gun angle, direction of travel, electrode extension (stickout), travel speed, thickness of base metal, wire feed speed (weld current), and voltage.



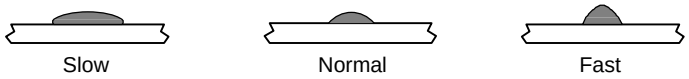
GUN ANGLES AND WELD BEAD PROFILES



ELECTRODE EXTENSIONS (STICKOUT)



FILLET WELD ELECTODE EXTENSIONS (STICKOUT)



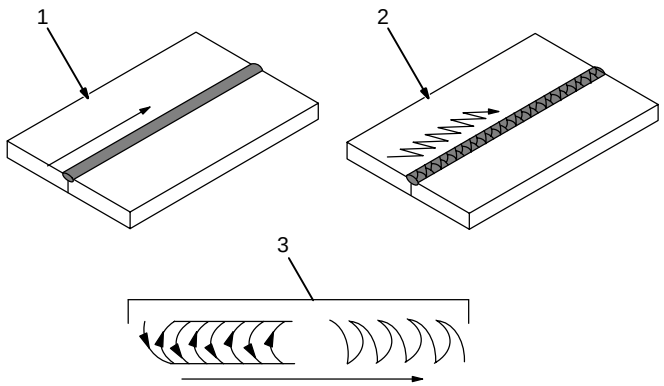
GUN TRAVEL SPEED

S-0634

6-5. Gun Movement During Welding

NOTE ☞

Normally, a single stringer bead is satisfactory for most narrow groove weld joints; however, for wide groove weld joints or bridging across gaps, a weave bead or multiple stringer beads works better.



1 Stringer Bead – Steady Movement Along Seam

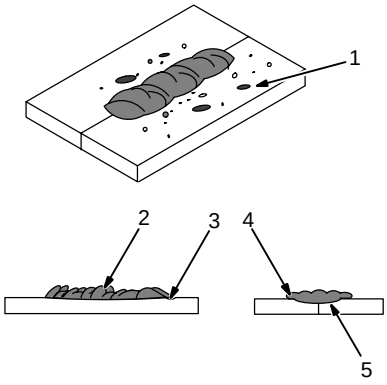
2 Weave Bead – Side To Side Movement Along Seam

3 Weave Patterns

Use weave patterns to cover a wide area in one pass of the electrode.

S-0054-A

6-6. Poor Weld Bead Characteristics



1 Large Spatter Deposits

2 Rough, Uneven Bead

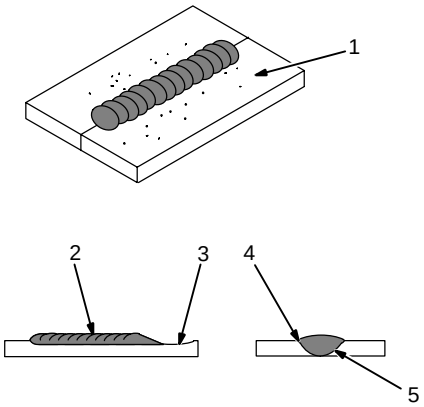
3 Slight Crater During Welding

4 Bad Overlap

5 Poor Penetration

S-0053-A

6-7. Good Weld Bead Characteristics



1 Fine Spatter

2 Uniform Bead

3 Moderate Crater During Welding

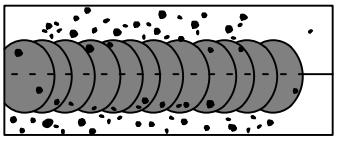
Weld a new bead or layer for each 1/8 in (3.2 mm) thickness in metals being welded.

4 No Overlap

5 Good Penetration into Base Metal

S-0052-B

6-8. Troubleshooting – Excessive Spatter

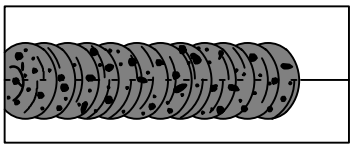


Excessive Spatter – scattering of molten metal particles that cool to solid form near weld bead.

S-0636

Possible Causes	Corrective Actions
Wire feed speed too high.	Select lower wire feed speed.
Voltage too high.	Select lower voltage range.
Electrode extension (stickout) too long.	Use shorter electrode extension (stickout).
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, undercoating, and dirt from work surface before welding.
Insufficient shielding gas at welding arc.	Increase flow of shielding gas at regulator/flowmeter and/or prevent drafts near welding arc.
Dirty welding wire.	Use clean, dry welding wire.
	Eliminate pickup of oil or lubricant on welding wire from feeder or liner.

6-9. Troubleshooting – Porosity

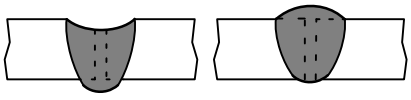


Porosity – small cavities or holes resulting from gas pockets in weld metal.

S-0635

Possible Causes	Corrective Actions
Insufficient shielding gas at welding arc.	Increase flow of shielding gas at regulator/flowmeter and/or prevent drafts near welding arc.
	Remove spatter from gun nozzle.
	Check gas hoses for leaks.
	Place nozzle 1/4 to 1/2 in (6-13 mm) from workpiece.
	Hold gun near bead at end of weld until molten metal solidifies.
Wrong gas.	Use welding grade shielding gas; change to different gas.
Dirty welding wire.	Use clean, dry welding wire.
	Eliminate pick up of oil or lubricant on welding wire from feeder or liner.
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, coatings, and dirt from work surface before welding.
	Use a more highly deoxidizing welding wire (contact supplier).
Welding wire extends too far out of nozzle.	Be sure welding wire extends not more than 1/2 in (13 mm) beyond nozzle.

6-10. Troubleshooting – Excessive Penetration



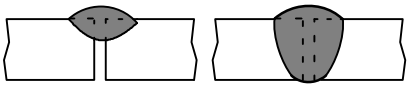
Excessive Penetration Good Penetration

Excessive Penetration – weld metal melting through base metal and hanging underneath weld.

S-0639

Possible Causes	Corrective Actions
Excessive heat input.	Select lower voltage range and reduce wire feed speed.
	Increase travel speed.

6-11. Troubleshooting – Lack Of Penetration

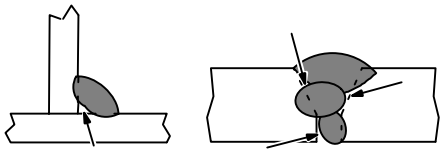


Lack Of Penetration – shallow fusion between weld metal and base metal.

S-0638

Possible Causes	Corrective Actions
Improper joint preparation.	Material too thick. Joint preparation and design must provide access to bottom of groove while maintaining proper welding wire extension and arc characteristics.
Improper weld technique.	Maintain normal gun angle of 0 to 15 degrees to achieve maximum penetration.
	Keep arc on leading edge of weld puddle.
	Be sure welding wire extends not more than 1/2 in (13 mm) beyond nozzle.
Insufficient heat input.	Select higher wire feed speed and/or select higher voltage range.
	Reduce travel speed.

6-12. Troubleshooting – Incomplete Fusion

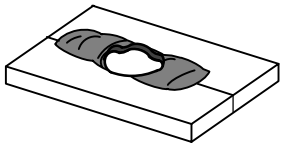


Incomplete Fusion – failure of weld metal to fuse completely with base metal or a preceeding weld bead.

S-0637

Possible Causes	Corrective Actions
Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, undercoating, and dirt from work surface before welding.
Insufficient heat input.	Select higher voltage range and/or adjust wire feed speed.
Improper welding technique.	Place stringer bead in proper location(s) at joint during welding.
	Adjust work angle or widen groove to access bottom during welding.
	Momentarily hold arc on groove side walls when using weaving technique.
	Keep arc on leading edge of weld puddle.
	Use correct gun angle of 0 to 15 degrees.

6-13. Troubleshooting – Burn-Through

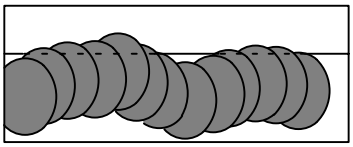


Burn-Through – weld metal melting completely through base metal resulting in holes where no metal remains.

S-0640

Possible Causes	Corrective Actions
Excessive heat input.	Select lower voltage range and reduce wire feed speed.
	Increase and/or maintain steady travel speed.

6-14. Troubleshooting – Waviness Of Bead

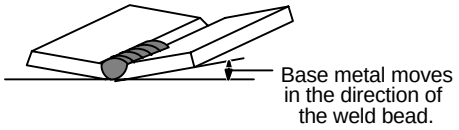


Waviness Of Bead – weld metal that is not parallel and does not cover joint formed by base metal.

S-0641

Possible Causes	Corrective Actions
Welding wire extends too far out of nozzle.	Be sure welding wire extends not more than 1/2 in (13 mm) beyond nozzle.
Unsteady hand.	Support hand on solid surface or use two hands.

6-15. Troubleshooting – Distortion



Distortion – contraction of weld metal during welding that forces base metal to move.

S-0642

Possible Causes	Corrective Actions
Excessive heat input.	Use restraint (clamp) to hold base metal in position.
	Make tack welds along joint before starting welding operation.
	Select lower voltage range and/or reduce wire feed speed.
	Increase travel speed.
	Weld in small segments and allow cooling between welds.

6-16. Common MIG Shielding Gases

This is a general chart for common gases and where they are used. Many different combinations (mixtures) of shielding gases have been developed over the years. The most commonly used shielding gases are listed in the following table.

Gas	Application			
	Spray Arc Steel	**Short Circuiting Steel**	**Short Circuiting Stainless Steel**	**Aluminum**
Argon				X
Argon + 25% CO_2		X		
80% or greater Argon + balance CO_2 or Oxygen	X	X[1]		
100% CO_2		X	X	
Tri-Mix[2]			X	

1 Limited short circuiting use

2 90% HE + 7-1/2% AR + 2-1/2% CO_2

6-17. Troubleshooting Guide For Semiautomatic Welding Equipment

Problem	Probable Cause	Remedy
Wire feed motor operates, but wire does not feed.	Too little pressure on wire feed rolls.	Increase pressure setting on wire feed rolls.
	Incorrect wire feed rolls.	Check size stamped on wire feed rolls, replace to match wire size and type if necessary.
	Wire spool brake pressure too high.	Decrease brake pressure on wire spool.
	Restriction in the gun and/or assembly.	Check and replace cable, gun, and contact tip if damaged. Check size of contact tip and cable liner, replace if necessary.
Wire curling up in front of the wire feed rolls (bird nesting).	Too much pressure on wire feed rolls.	Decrease pressure setting on wire feed rolls.
	Incorrect cable liner or gun contact tip size.	Check size of contact tip and check cable liner length and diameter, replace if necessary.
	Gun end not inserted into drive housing properly.	Loosen gun securing bolt in drive housing and push gun end into housing just enough so it does not touch wire feed rolls.
	Dirty or damaged (kinked) liner.	Replace liner.
Wire feeds, but no gas flows.	Gas cylinder empty.	Replace empty gas cylinder.
	Gas nozzle plugged.	Clean or replace gas nozzle.
	Gas cylinder valve not open or flowmeter not adjusted.	Open gas valve at cylinder and adjust flow rate.
	Restriction in gas line.	Check gas hose between flowmeter and wire feeder, and gas hose in gun and cable assembly.
	Loose or broken wires to gas solenoid.	Have Factory Authorized Service Agent repair wiring.
	Gas solenoid valve not operating.	Have Factory Authorized Service Agent replace gas solenoid valve.
	Incorrect primary voltage connected to welding power source.	Check primary voltage and relink welding power source for correct voltage.

Problem	Probable Cause	Remedy
Welding arc not stable.	Wire slipping in drive rolls.	Adjust pressure setting on wire feed rolls. Replace worn drive rolls if necessary.
	Wrong size gun liner or contact tip.	Match liner and contact tip to wire size and type.
	Incorrect voltage setting for selected wire feed speed on welding power source.	Readjust welding parameters.
	Loose connections at the gun weld cable or work cable.	Check and tighten all connections.
	Gun in poor shape or loose connection inside gun.	Repair or replace gun as necessary.

Notes

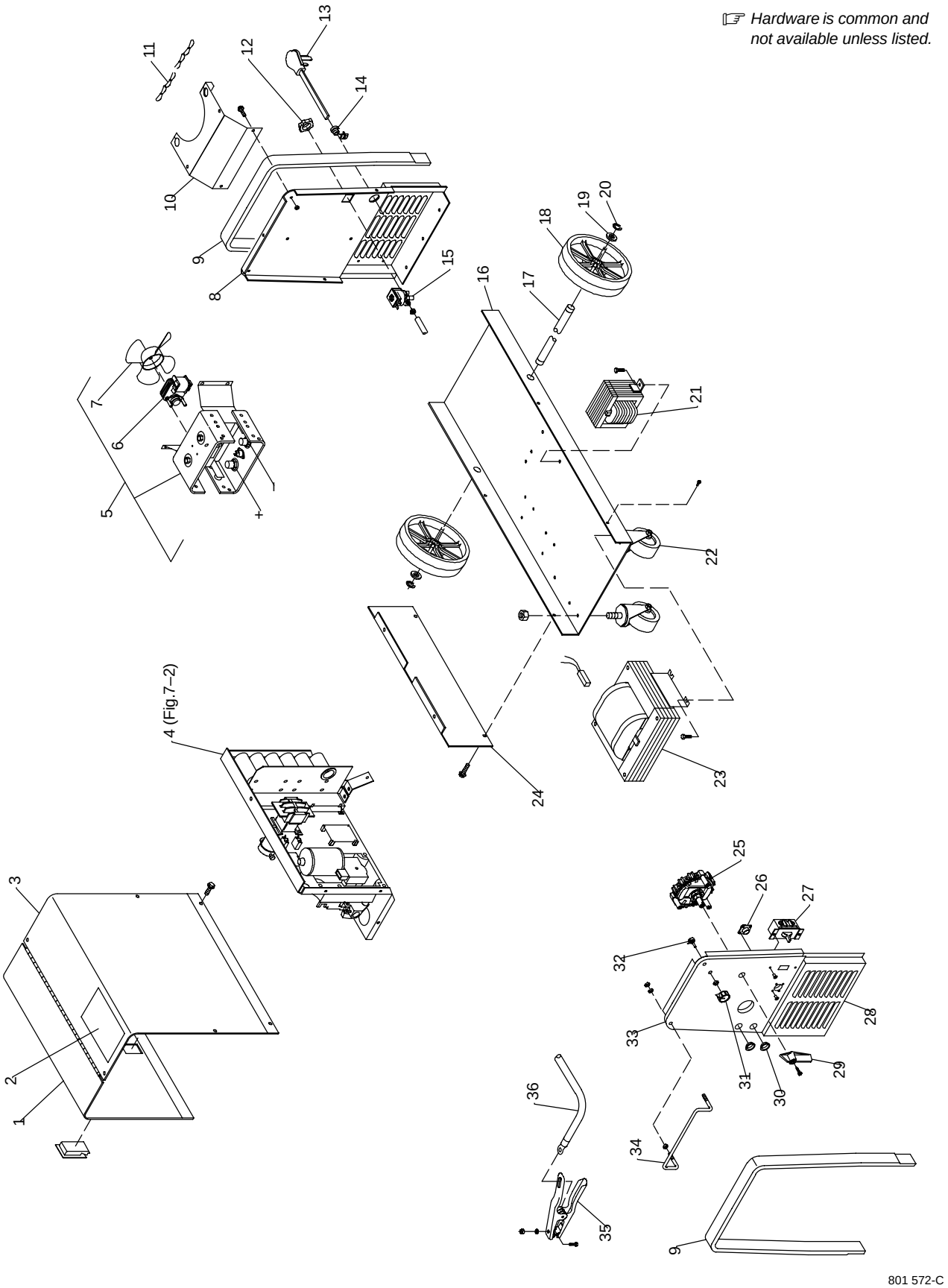


Figure 7-1. Main Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 7-1. Main Assembly	
1		151 187	LATCH, slide flush	1
2		134 464	LABEL, warning general precautionary	1
3		+151 565	WRAPPER	1
4		Fig 7-2	CENTER BAFFLE, w/components	1
5	SR1	191 487	RECTIFIER ASSEMBLY, (consisting of)	1
		180 920	BRACKET RECTIFIER	1
		191 375	RECTIFIER SI DIODE ASSEMBLY, POS	1
		191 376	RECTIFIER SI DIODE ASSEMBLY, NEG	1
		152 862	GROMMET, SCR .250 panel hole	8
		026 947	STAND-OFF	2
	TP1	604 515	THERMOSTAT, NC open 211F	1
6	FM	123 468	MOTOR, fan 230V 60/50 Hz 3000RPM	1
7		005 656	BLADE, fan 6.000 4wg 30 deg .175 bore	1
8		180 918	PANEL, rear	1
9		190 773	BEZEL, front rear	2
10		180 923	BRACKET, bottle retainer	1
		200 285	LABEL, warning	1
11		602 387	CHAIN, weldless 2/0 x 27	1
12		605 227	NUT, 750-14 knurled 1.68dia	1
13	PLG1	181 072	CORD SET, 250V 6-50P 12ga 3/c	1
14		111 443	BUSHING, strain relief	1
15	GS1	125 785	VALVE, 24VAC 2 way	1
16		180 916	BASE	1
17		203 417	AXLE, running gear	1
18		186 758	WHEEL, rubolene 10in dia x 2.25	2
19		602 250	WASHER, flat .812 ID x 1.469 OD	2
20		121 614	RING, rtng ext .750 shaft	2
21	Z	*180 989	STABILIZER	1
	TP2	163 266	THERMOSTAT, NC	1
22		008 999	CASTER, swvl 4.00 in plastic	2
23	T1	180 925	TRANSFORMER, power main	1
24		180 924	PANEL, side lower	1
25	S2	153 197	SWITCH, selector 6 position	1
26	RC2	048 282	RECEPTACLE W/SOCKETS	1
27	S1	124 511	SWITCH, tgl DPST 40A 600VAC scr	1
28		180 917	PANEL, front	1
29		148 956	HANDLE, switch	1
30		057 357	BUSHING, snap-in nyl .937 ID x 1.125mtg hole	2
31		097 924	KNOB, pointer	1
32	R1	035 897	POTENTIOMETER	1
33		200 033	LABEL, nameplate	1
34		147 571	HANDLE	1
35		130 750	CLAMP, work 300A	1
36		600 318	CABLE, weld copper (order by ft)	10ft
		203 388	REGULATOR/FLOWMETER, 10–50 cfh	1
		144 108	HOSE, gas 5ft	1

+When ordering a component originally displaying a precautionary label, the label should also be ordered.
*When ordering stabilizer 180 989, also order thermostat 163 266.
To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

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

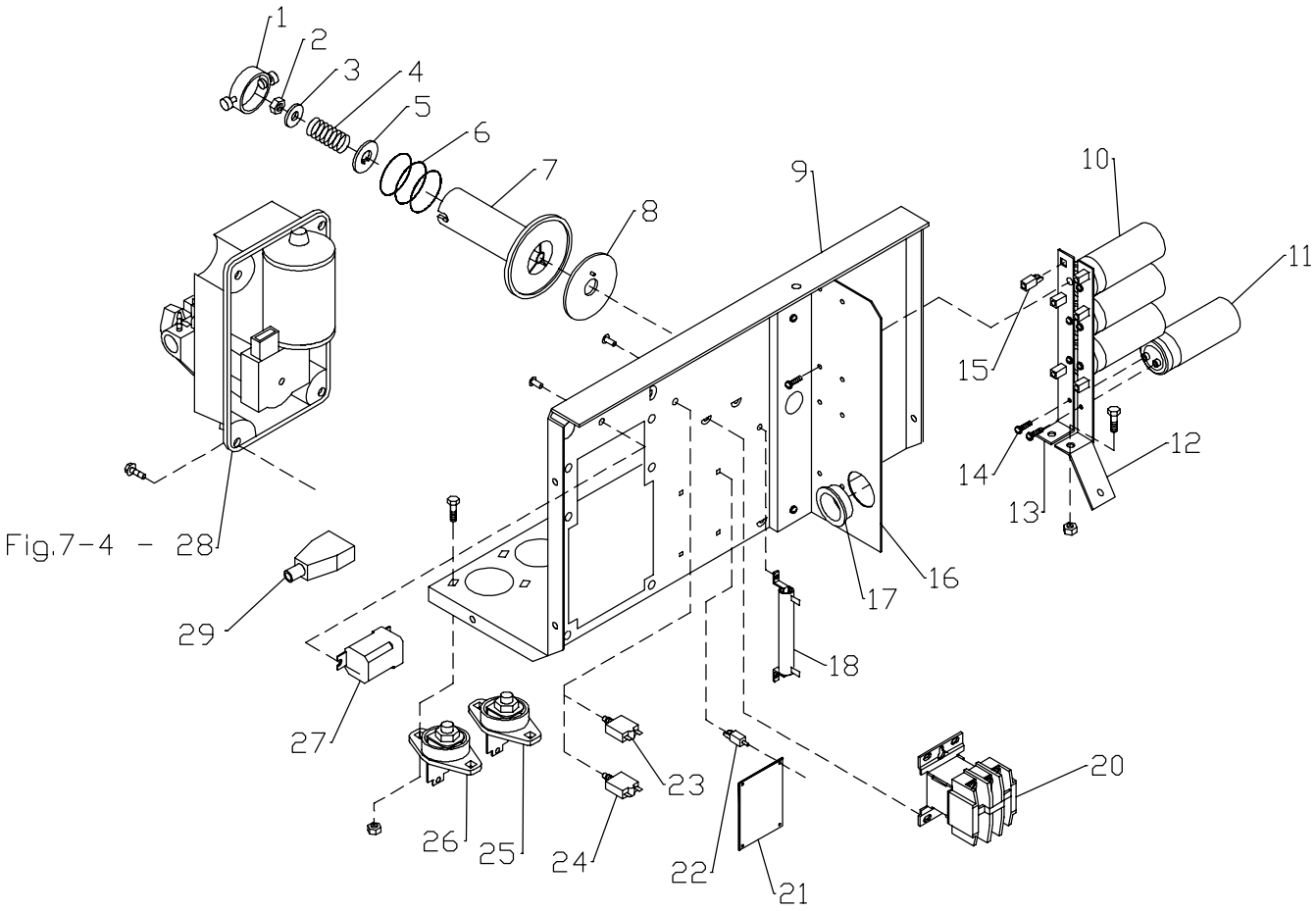


Figure 7-2. Center Baffle w/Components

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

Figure 7-2. Baffle, Center w/Components (Fig 7-1 Item 4)

1		058 427	RING, retaining spool	1
2		085 980	NUT, 625-11 .94 hex	1
3		605 941	WASHER, flat	1
4		186 437	SPRING, cprsn .84500 x .110W	1
5		057 971	WASHER, flat .632 ID x 1.500 OD x .12	1
6		057 745	SPRING, cprsn 2.430 OD x .90 wire x 2.500	1
7		186 435	HUB, spool	1
8		186 436	WASHER, brake plastic	1
9		180 915	BAFFLE, center	1
10	C6	191 385	CAPACITOR ASSEMBLY, (consisting of)	1
11		191 374	CAPACITOR, elctlt 30000uf	4
12		191 101	BUSS BAR, positive	1
13		191 102	BUSS BAR, negative	1
14		188 846	SCREW, .010-32 x .50 hex hd-slt S	8
15		083 147	GROMMET, scr No. 8/10 panel hole	4
16		180 927	REEL SUPPORT	1
17		057 358	BUSHING, snap-in nyl 1.000 ID x 1.375mtg hole	1
18	R2	091 685	RESISTOR, WW fxd 50W 25 ohm	1
20	W	189 486	CONTACTOR, def prp 40A 3P	1
21	PC1	171 986	CIRCUIT CARD ASSEMBLY, control	1
	PLG10	165 745	HOUSING & PINS	1
22		134 201	STAND-OFF SUPPORT, PC card	4
23	CB2	180 912	CIRCUIT BREAKER, man reset 5A 250V	1
24	CB1	183 492	CIRCUIT BREAKER, man reset 10A 250V	1
25		097 421	TERMINAL, pwr output red	1
26		097 416	TERMINAL, pwr output black	1
27	CR1	072 817	RELAY, encl 24VAC DPDT 20	1
28		Fig 7-4	DRIVE ASSEMBLY, wire	1
	PLG3	115 093	CONNECTOR & SOCKETS	1
	RC3	131 059	CONNECTOR & PINS	1
29		196 318	COVER, cable	1
		196 894	BRACKET, consumable/tool tray	1
		202 449	PLATE, switch	1

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
	169 589	**Figure 7-3. M-15 Gun (Fig 7-1 Item 36)**	
1	169 715	NOZZLE, slip type .500 orf flush	1
2	♦087 299	TIP, contact scr .023 wire x 1.125	
2	♦000 067	TIP, contact scr .030 wire x 1.125	
2	♦000 068	TIP, contact scr .035 wire x 1.125	
2	♦000 069	TIP, contact scr .045 wire x 1.125	
3	169 716	ADAPTER, contact tip	1
5	170 470	RING, retaining	1
8	169 718	TUBE, head	1
9	169 738	NUT, locking handle	2
10	194 524	NUT, jam	1
11	169 737	HANDLE	2
12	169 741	STRAIN RELIEF, cable	2
13	180 433	CORD, trigger assembly	1
14	079 974	O-RING, .500 ID x .103CS rbr	2
15	♦194 010	LINER, monocoil .023/.025 wire x 15ft (consisting of)	1
15	♦194 011	LINER, monocoil .030/.035 wire x 15ft (consisting of)	1
15	♦194 012	LINER, monocoil .035/.045 wire x 15ft (consisting of)	1
16	079 975	O-RING, .187 ID x .103CS rbr	1
17	196 255	SWITCH, trigger	1

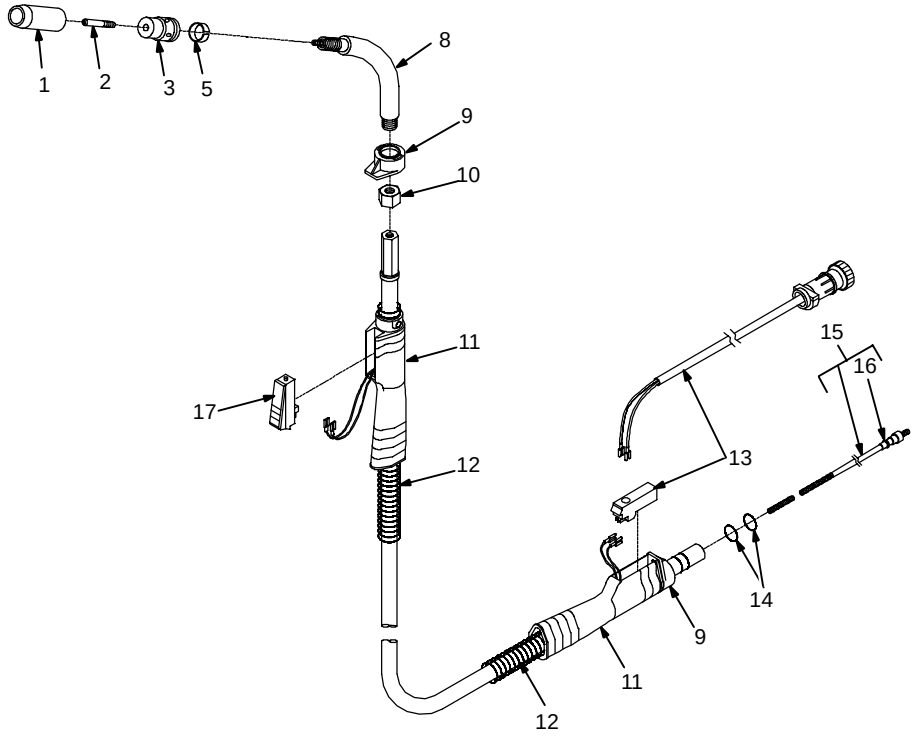


Figure 7-3. M-15 Gun

♦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.

Item No.	Part No.	Description	Quantity

Figure 7-4. Drive Assembly, Wire (Fig 7-2 Item 29)

1	196 237	MOTOR, gear 24VDC	1
2	180 929	HOUSING, motor drive	1
3	198 789	DRIVE ASSEMBLY, wire (consisting of)	1
4	196 895	KNOB, tension	1
5	090 415	SPRING, cprsn .695 OD x .080 wire x 1.500	1
6	198 080	CUP, spring 185	1
7	085 242	FASTENER, pinned	1
8	090 416	PIN, hinge	1
9	124 817	HOUSING, wire drive	1
10	090 443	BEARING, ball rdl sgl row .315 x .866 x .27 (consisting of)	1
	111 622	SPACER, bearing .196 ID x .310 OD x .500 collar	1
11	112 031	LEVER, pressure roll	1
12	151 828	PIN, cotter hair .054 x .750	1
13	124 778	KNOB, T 2.000 bar w/.312-18 st	1
14	174 609	SCREW	3
15	090 423	ROLL, drive V groove .023-.035	1
16	058 549	GUIDE, wire inlet 1/16	1
17	010 224	PIN, spring CS .187 x 1.000	1

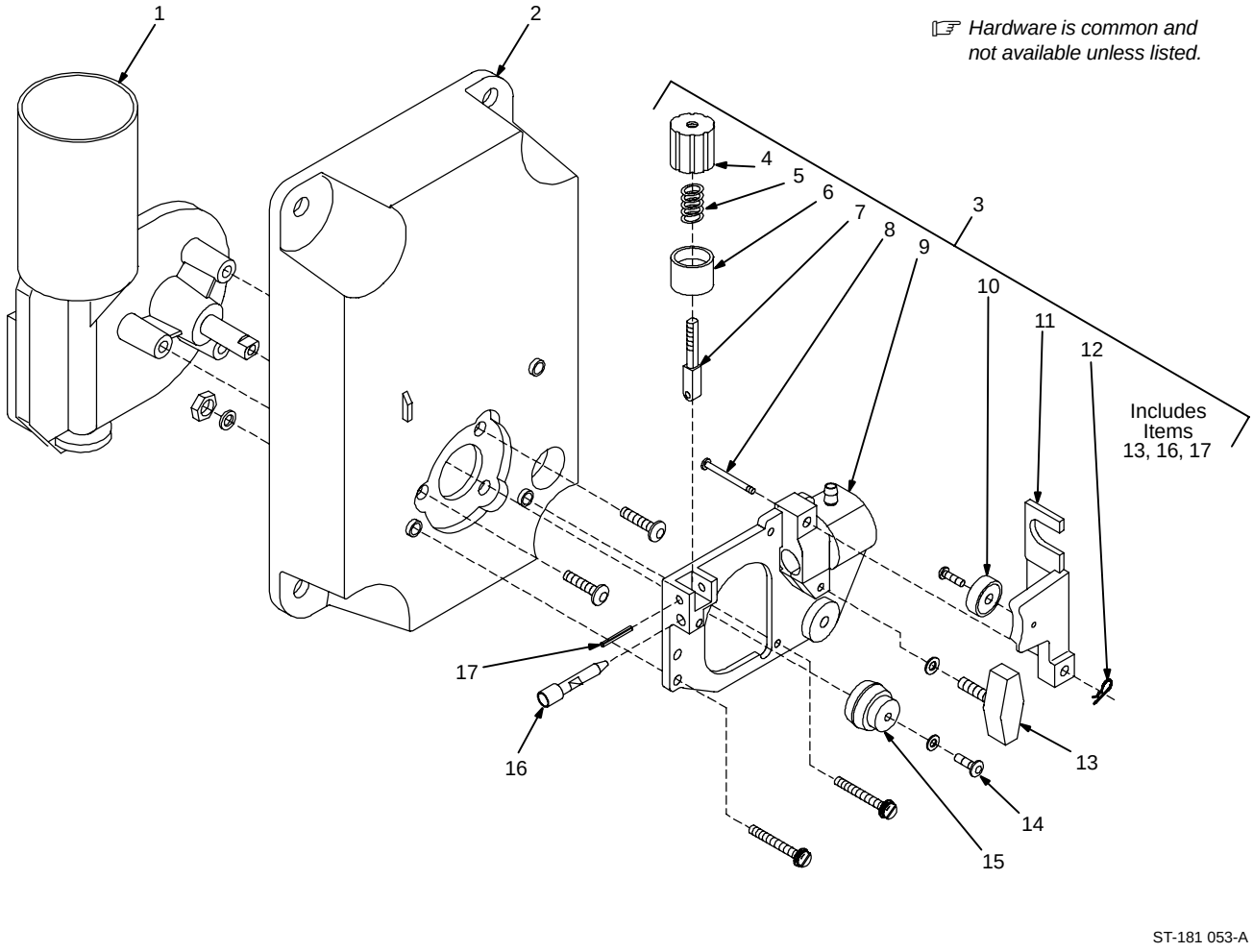


Figure 7-4. Drive Assembly, Wire

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.

Warranty Questions?

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

Your distributor also gives you ...

Service
You always get the fast, reliable response you need. Most replacement parts can be in your hands in 24 hours.

Support
Need fast answers to the tough welding questions? Contact your distributor. The expertise of the distributor and Miller is there to help you, every step of the way.

Miller
The Power of Blue.

TRUE BLUE® WARRANTY

Effective January 1, 2000
(Equipment with a serial number preface of "LA" or newer)

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

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

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

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

1. 5 Years Parts – 3 Years Labor
   * Original main power rectifiers
   * Inverters (input and output rectifiers only)
2. 3 Years — Parts and Labor
   * Transformer/Rectifier Power Sources
   * Plasma Arc Cutting Power Sources
   * Semi-Automatic and Automatic Wire Feeders
   * Inverter Power Supplies
   * Intellitig
   * Engine Driven Welding Generators **(NOTE: Engines are warranted separately by the engine manufacturer.)**
3. 1 Year — Parts and Labor
   * DS-2 Wire Feeder
   * Motor Driven Guns (w/exception of Spoolmate 185 & Spoolmate 250)
   * Process Controllers
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources
   * Water Coolant Systems
   * HF Units
   * Grids
   * Maxstar 140
   * Spot Welders
   * Load Banks
   * Miller Cyclomatic Equipment
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * 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.)
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches
   * Induction Heating Coils and Blankets
   * APT, ZIPCUT & PLAZCUT Model Plasma Cutting Torches
   * Remote Controls
   * Accessory Kits
   * Replacement Parts (No labor)
   * Spoolmate 185 & Spoolmate 250
   * Canvas Covers

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

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear.**
2. 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.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

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

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

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

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

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

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

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

For Service

Call 1-800-4-A-Miller or see our website at www.MillerWelds.com to locate a DISTRIBUTOR or SERVICE AGENCY near you.

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:	Welding Supplies and Consumables
	Options and Accessories
	Personal Safety Equipment
	Service and Repair
	Replacement Parts
	Training (Schools, Videos, Books)
	Technical Manuals (Servicing Information and Parts)
	Circuit Diagrams
	Welding Process Handbooks
Contact the Delivering Carrier for:	File a claim for loss or damage during shipment.

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

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