

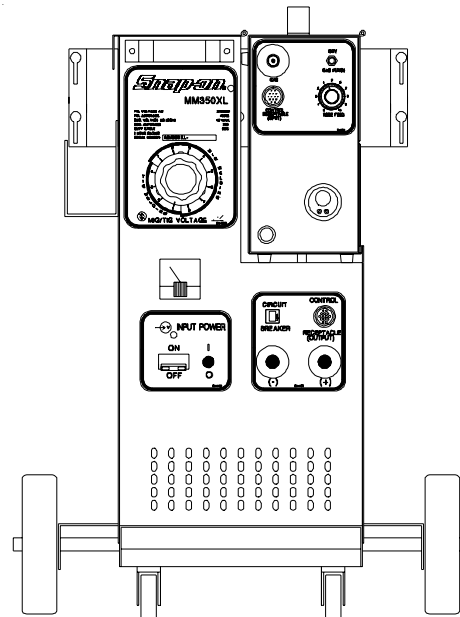


Muscle Mig System™

800-ABC-WELD

OWNER'S MANUAL

MM350XL M.I.G. COMBINATION UNIT



CONGRATULATIONS!

YOU HAVE PURCHASED THE WORLDS FINEST MIG WELDING SYSTEM AVAILABLE EXCLUSIVELY FROM SNAP-ON TOOLS. THE SNAP-ON MUSCLE MIG SYSTEM MODEL# **MM350XL** IS DESIGNED AND ENGINEERED BY THE PROS FOR THE PROS. UNDER NORMAL CARE THIS SYSTEM WILL PROVIDE YOU WITH YEARS OF UNSURPASSED SERVICE AND MOST IMPORTANTLY PERFORMANCE.



FOR TECH. SERVICE, CALL TOLL-FREE 1-800-232-9353.
PROVIDE MODEL & SERIAL NUMBER.

INSTALLATION
OPERATION
MAINTENANCE

SAFETY - WELDERS



DANGER

- Electric welding causes ultraviolet rays and weld spatter.



Bystanders will be exposed to ultraviolet rays and weld spatter.



Wear welding helmet with appropriate shade lens while using electric welders. Do not allow bystanders while welding. Wear safety shield and protective clothing (user and bystanders).



Read and follow instructions.

Ultraviolet rays will burn eyes; weld spatter can cause injury.



WARNING

- Materials can cause sparks or flying metal when heated which can cause fire.



Wear safety shield and protective clothing (user and bystanders).



Sparks, fire and flying metal can cause injury.



SAFETY - WELDERS



WARNING

- Electrical shock can result from absence of grounding prong.



Do not remove or bypass the grounding prong in any electrical plug.

Electrical shock can cause injury.



WARNING

- Smoke, fumes and gases are created by the welding process.

Use only in well ventilated area.

Avoid breathing smoke, fumes and gases.

Smoke, fumes and gases can cause injury.



WARNING

- Welded surface can be hot and cause burns and injury.



MANUFACTURER'S LIMITED WARRANTY

This equipment is warranted against defects in materials and workmanship for a period of two years from the date of purchase.

EXCEPTION: THE MIG TORCH IS WARRANTED FOR A PERIOD OF 30 DAYS FROM THE DATE OF PURCHASE.

Should the equipment become defective for such reason, the Manufacturer will repair it without charge, if it is returned to the Manufacturer's factory, freight prepaid. This warranty does not cover: (1) failure due to normal wear and tear; (2) consumable parts, such as, but not limited to, torch contact tips, gas cups and insulating bushings; (3) damage by accident, force majeure, improper use, neglect, unauthorized repair or alteration; (4) anyone other than the original purchaser.

THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. THE MANUFACTURER SHALL NOT BE LIABLE FOR ANY INJURY TO PERSONS, INCLUDING DEATH; OR LOSS OR DAMAGE TO ANY PROPERTY, DIRECT OR CONSEQUENTIAL, INCLUDING, BUT NOT LIMITED TO, LOSS OF USE, ARISING OUT OF THE USE, OR THE INABILITY TO USE, THE PRODUCT. THE USER ASSUMES ALL RISK AND LIABILITY WHATSOEVER IN CONNECTION WITH THE USE OF THE PRODUCT, AND BEFORE DOING SO, SHALL DETERMINE ITS SUITABILITY FOR HIS INTENDED USE, AND SHALL ASCERTAIN THE PROPER METHOD OF USING IT.

SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, OR THE EXCLUSIONS OR LIMITATIONS OF INCIDENTAL OR CONSEQUENTIAL DAMAGES. SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY HAVE OTHER RIGHTS WHICH MAY VARY FROM STATE TO STATE.

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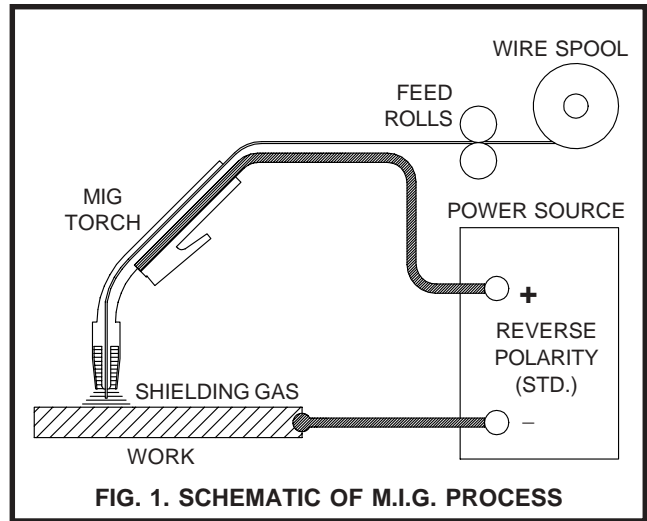
INTRODUCTION

The Snap-on Tools **MM350XL** is a combination welding power source, remote feed unit, MIG torch and accessory package, which is designed to meet the requirements of the light to heavy metal fabrication industries. The **MM350XL** produces fusion welds by the Gas Metal Arc Welding process (GMAW or MIG), on steel and aluminum up to "1/2" thick, using .023" through 1/16" steel wire and .023" through 3/64" aluminum wire with the optional MHG5-B spool gun. **(optional liners and drive rolls must be purchased to cover all given wire types and sizes)**. Heavier sections can be easily welded using slightly different techniques.

The number of controls on the unit have been reduced to assist inexperienced operators to learn MIG welding. This facilitates rapid set up for welding various thicknesses of material requiring various heat inputs. The VOLTAGE control adjusts the welding voltage and the WIRE FEED control adjusts the speed of the wire feed motor.

THE MIG PROCESS AS APPLIED TO THE MM350XL

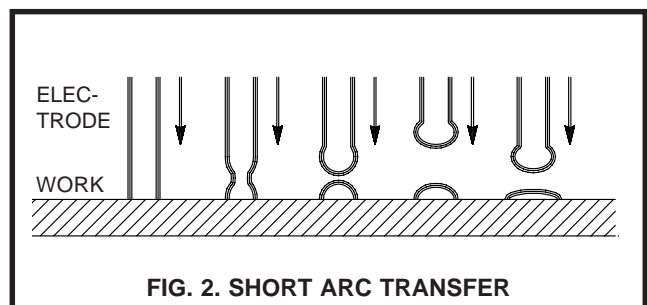
The MIG process uses a bare, consumable electrode in the form of spooled wire, which is fed by a controllable speed feed unit through the cable and torch to the weld. The emerging wire and the weld are shielded by a stream of CO₂, Argon, or a mixture of the two, which prevents oxidation of the molten weld puddle. The gas shield enables high quality welds to be made without the use of flux, eliminating the need for slag or flux removal after the weld is completed.



The consumable electrode wire is melted and transferred to the weld puddle by any of three arc modes; short arc transfer, globular transfer, or spray arc transfer. The **MM350XL** is capable of performing all modes.

SHORT ARC OR DIP TRANSFER

Short arc transfer occurs at 12 to 22 arc volts (voltage while welding), depending on wire size. Welding commences as the arc is struck and a weld pool is formed. The tip of the electrode wire dips into the pool and causes a short circuit. The short circuit current flow causes a rapid temperature rise in the electrode wire and the end of the wire is melted off. An arc is immediately formed between the tip of the wire and the weld pool, maintaining the electrical circuit and producing sufficient heat to keep the weld pool fluid. The electrode continues to feed and again dips into the pool.

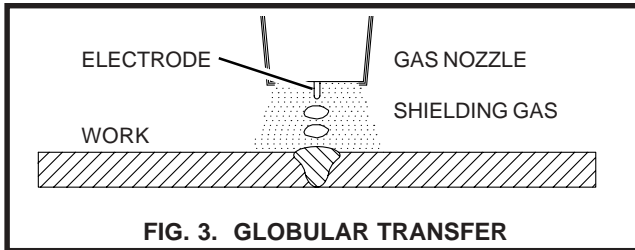


SHORT ARC OR DIP TRANSFER (Cont.)

This sequence of events is repeated up to 200 times per second. Short arc transfer is suitable for positional welding. The heat input to the workpiece is kept to a minimum which limits distortion and makes possible the welding of thin sheet material.

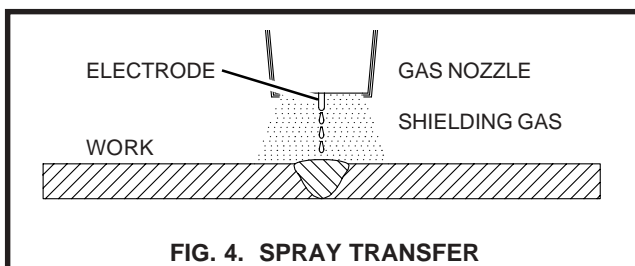
GLOBULAR TRANSFER

Globular transfer occurs at the intermediate range of 22 to 24 arc volts, depending on wire size. As the name implies, the transfer takes place in the form of irregularly shaped globules. Globular transfer is useful in cases where a lower heat input than that of true spray is required.



SPRAY TRANSFER

Spray transfer occurs at 22 to 32 arc volts, depending on wire size. The length of the arc is held constant by the voltage available. The higher voltage and current causes the electrode wire to melt off before touching the workpiece. The molten metal crosses the gap to the workpiece in a spray form. Spray transfer is used in the down-hand position and provides higher deposition rates than short arc transfer or globular transfer.



DESCRIPTION

The **MM350XL** consists of a combination MIG welding power source and remote feed unit, a MIG torch with twelve foot cable, a fifteen foot feeder control cable, a twenty-five foot work cable with clamp, a twenty foot power input cable, a gas regulator - flowmeter, a torch accessory kit, built-in storage compartment and a dual cylinder rack and industrial wheel kit.

Welder controls are simple and clearly marked. The output voltage is controlled by a twelve position tap switch, providing **4 TIG** and **8 MIG** voltage selections. Wire feed speed is controlled by the wire speed potentiometer on the front of the feed unit.

SPECIFICATIONS

PART NUMBER: MM350XL

INPUT POWER REQUIREMENTS:

Voltage	208/230
Phase	single phase
Frequency	50/60 hertz
Current	46/42

DUTY CYCLE - OUTPUT POWER:

@ 100%	- 300 Amps
@ 60%	- 350 Amps

DUTY CYCLE TIME PERIOD:

10 minutes

OPEN CIRCUIT VOLTAGE:

18 - 42 volts DC

ARC VOLTAGE:

12 - 32 volts DC

WELD CURRENT RANGE:

30 - 350 amps

REMOTE FEED UNIT

Input Voltage	28 VAC
Wire Feed Speed Range:	50-800 IPM

(continued on following page)

SPECIFICATIONS (Cont.)

WIRE TYPES: mild steel,
stainless steel, aluminum,
bronze, flux cored,
flux cored - gasless
Recommended (for steel) ER70S-6

WIRE SIZES: .023" - 1/16" steel,
3/64 - 1/16" aluminum,
(.023" - 3/64" alum. w/spool gun)
.030" - .035" bronze,
.035" - .045" flux cored
(gas shielded or gasless)
Recommended Size: Aluminum .035
Others .035

SHIELDING GASES:
For Steel CO2 or Argon/CO2 mix
Recommended (for steel) 75% Argon/
25% CO2
For Aluminum, Bronze 100% Argon
For Stainless Steel
98% Argon/2% Oxygen
For Flux cored CO2 or
Argon/CO2 mix

DIMENSIONS:
Height 35-3/4 in. (90.8 cm.)
Width 27-1/4 in. (69.2 cm.)
Depth 34-1/2 in. (87.7 cm.)
Weight 275 lbs. (124.9 kg.)

TORCH SPECIFICATIONS

NECK ANGLE: 60 degrees
LEAD LENGTH: 12 feet
OVERALL LENGTH: 12 feet
COOLING METHOD: gas (air)

RATING - DUTY CYCLE:
With Argon/CO2 gas 250 amps @ 100%
With CO2 gas 300 amps @ 100%

CHECK LIST

THE SNAP-ON TOOLS MM350XL INCLUDES THE FOLLOWING:

- 1- Combination Power Source/Remote Feed Unit.
- 1- Dual Cylinder Rack & Industrial Wheel Kit.
- 1- FCA-15X 15 foot Feeder Control Cable assy.
- 1- 35XL12 12 foot MIG Torch with adjustable nozzle.
- 1- 20CP-3M 20 foot Power Input Cable.
- 1- SN-178X521 25 foot Work Cable and 500 amp clamp.
- 1- 350LPK Parts Kit.
- 1- GR-FM Gas Regulator/Flowmeter.
- 1- ER70S-6-35-3, Sample Spool of .035 Steel Wire.
- 1- 8IN-A 8 inch Reel Adapter.

ITEMS REQUIRED FOR MIG WELDING WHICH ARE NOT PROVIDED WITH THE MM350XL

1. Full cover welding helmet with proper colored lens (shade 9 to 11 depending on operator's preference).
2. Proper shielding gas and cylinder.
3. Leather welding gloves.
4. Electrical power and matching electrical plug.
5. Other personal protective equipment which may vary to match the welding being performed.

THE MM350XL REQUIRES A 208 OR 230 VOLT, SINGLE PHASE, AC, 60 AMP CIRCUIT

INSTALLATION

POSITIONING THE UNIT

Locate the unit adjacent to the welding area and position it so there is adequate clearance all around for ventilation and maintenance.



WARNING

- Smoke, fumes and gases are created by the welding process.

Use only in well ventilated area.

Avoid breathing smoke, fumes and gases.

Smoke, fumes and gases can cause injury.

ELECTRICAL SUPPLY



WARNING

- Electrical shock can result from absence of grounding prong.



Do not remove or bypass the grounding prong in any electrical plug.

Electrical shock can cause injury.

Ensure that there is a **208 or 230 volt, single phase, 60 amp** electrical supply within easy reach of the unit. The input cable supplied is 20 feet long. Attach a suitable plug **making sure the green wire is attached to the ground terminal of the wall plug**. All wiring should be performed by a qualified electrician.

230V INPUT SELECTION

1. Factory selected no change is needed.

208V INPUT SELECTION

1. Remove the left side panel.

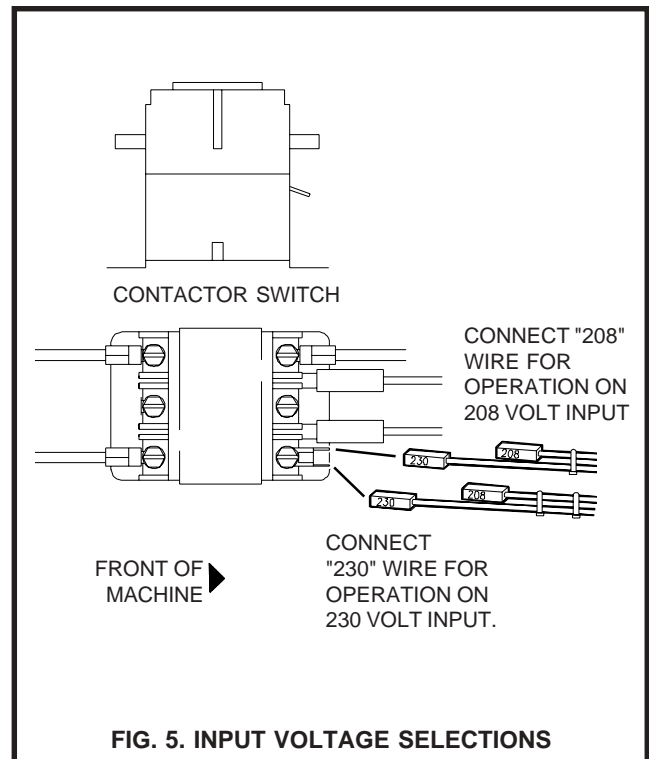


FIG. 5. INPUT VOLTAGE SELECTIONS

2. Locate the contactor switch, which is mounted on top of the main power transformer (See Figure 5).

CAUTION

MAKE SURE POWER SOURCE IS UNPLUGGED BEFORE MAKING INPUT SELECTION CHANGE-OVER.

3. Attached to the power source's contactor are two (2) two position plugs which allows easy selection of input voltages of either 208 or 230 volts.
4. Remove both plugs labeled 230V and connect the two (2) plugs labeled 208V.
5. Reattach the left side panel of the machine. Voltage input selection is now complete.

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INSTALLING THE FEEDER CONTROL CABLE ASSEMBLY

1. Uncoil the cable assembly.

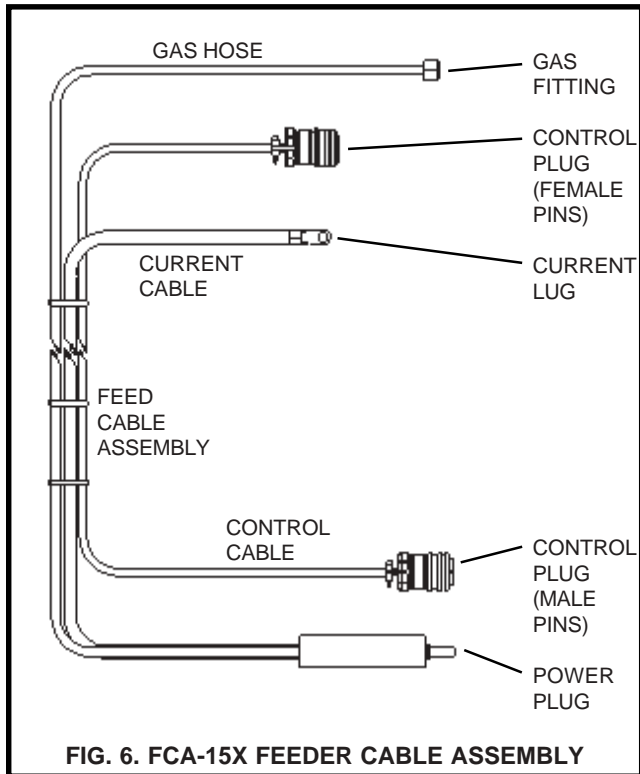


FIG. 6. FCA-15X FEEDER CABLE ASSEMBLY

2. Insert the current lug through the hole on the front of the feed unit and with the proper size wrench fasten it to the input current stud, located on the back side of the drive bracket.

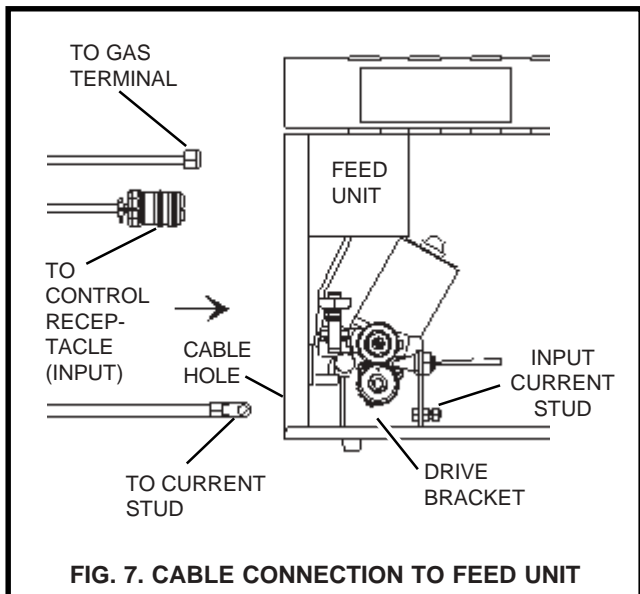


FIG. 7. CABLE CONNECTION TO FEED UNIT

3. With the proper size wrench attach the gas fitting to the gas terminal (located on the front of the feed unit).
4. Connect the control plug (female pins) onto the control receptacle (INPUT) and tighten (located on the front of the feed unit).
5. Plug the power plug into the positive (+) terminal (located on the front of the welding machine).
6. Connect the control plug (male pins) onto the control receptacle (OUTPUT) and tighten (located on the front of the welding machine).

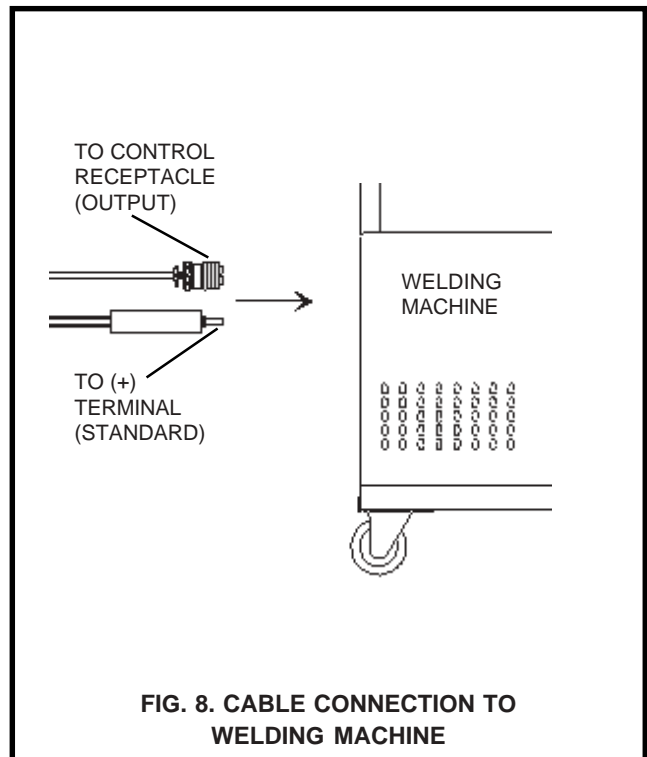


FIG. 8. CABLE CONNECTION TO WELDING MACHINE

SHIELDING GAS CONNECTIONS

1. Place a cylinder of the appropriate shielding gas in the rack at the rear of the machine and secure it with the chain provided.

2. Rapidly open and close the cylinder valve. This will purge dust and foreign matter from the valve.

CAUTION

Take care to point the valve outlet away from yourself or other people, as escaping high pressure gas may be dangerous.

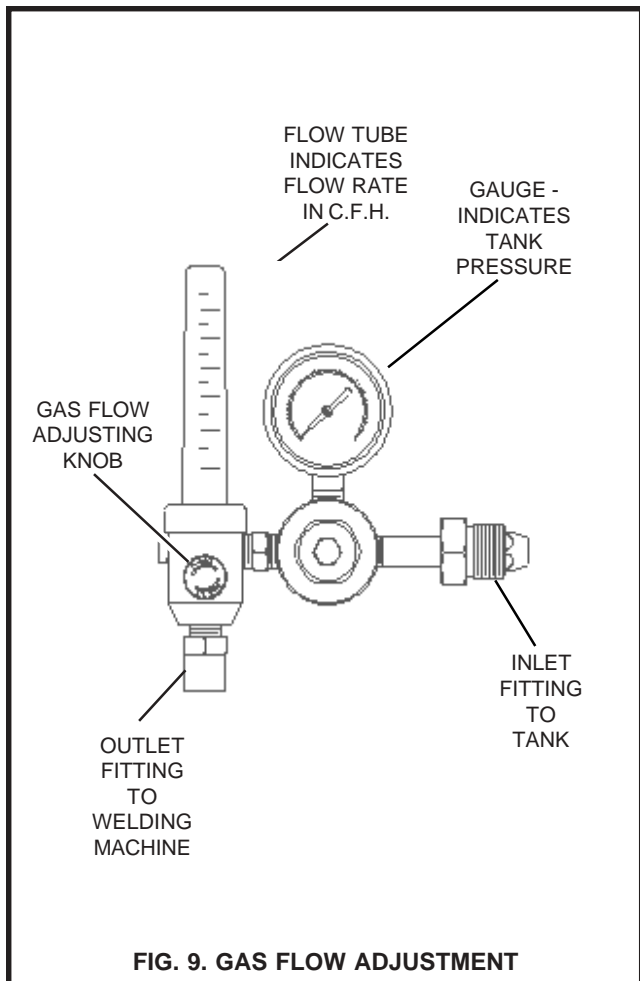


FIG. 9. GAS FLOW ADJUSTMENT

3. Attach the gas regulator - flow-meter supplied with this unit, to the cylinder valve using a suitable wrench.

NOTE

If this unit is to be used with 100% CO₂ shielding gas, an optional gas regulator coupler is required.

4. Fit the gas hose from the welding machine to the regulator outlet fitting and tighten it with a wrench. Open the cylinder valve. When welding steel, the gas flow rate is 30 CFH.

NOTE

The **MM350XL** must be turned "ON" and the MIG torch trigger depressed, before the gas flow rate can be adjusted.

TORCH CONNECTION

1. Open the access door of the Feed unit to its fullest extent.

NOTE

Prior to inserting the MIG torch into the torch panel mount, apply anti-spatter spray to the "O" rings.

2. Back out the thumb screw located on the drive bracket inside the machine. Insert the MIG torch into the torch panel mount and **TIGHTEN THE THUMB SCREW SECURELY.**

WARNING

SEVERE DAMAGE TO THIS PRODUCT MAY RESULT. TIGHTEN THUMB SCREW BEFORE EACH USE.

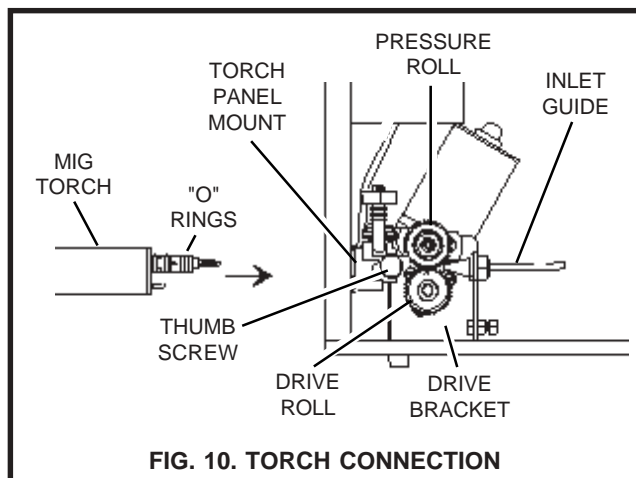


FIG. 10. TORCH CONNECTION

FITTING AND THREADING THE ELECTRODE WIRE - ALWAYS USE ER70S-6 WELDING WIRE WHEN WELDING STEEL.

1. Remove the wire spool clip from the spool hub.
2. Unpack the spool of welding wire from its protective packaging.
3. Place the spool of ER70S-6 welding wire onto the hub. The wire is fed off the bottom of the spool.

CAUTION

Look for wire protruding from the center of the spool. The protruding wire is electrically HOT during welding and must not touch the machine.

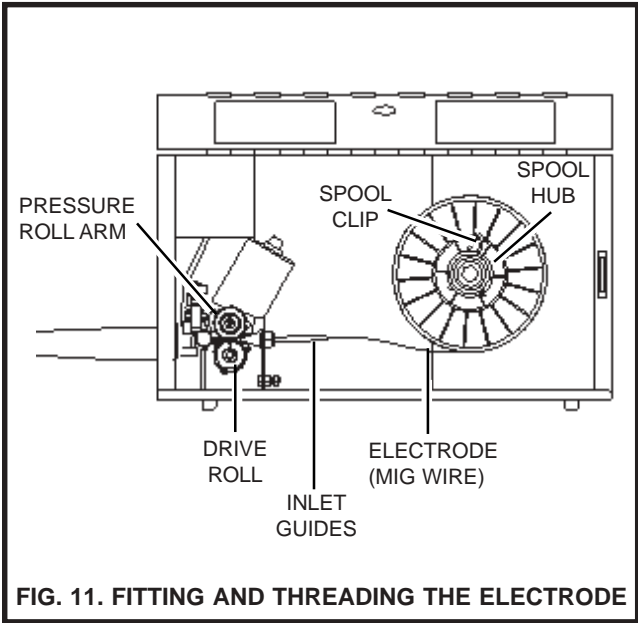


FIG. 11. FITTING AND THREADING THE ELECTRODE

4. Replace the spool clip on the hub.
5. Unlatch the pressure roll arm and swing it open.

6. Make sure the double v-groove drive roll is installed to match the wire size. To change the wire size setting, remove the drive roll, turn it over and reinstall it on the shaft.

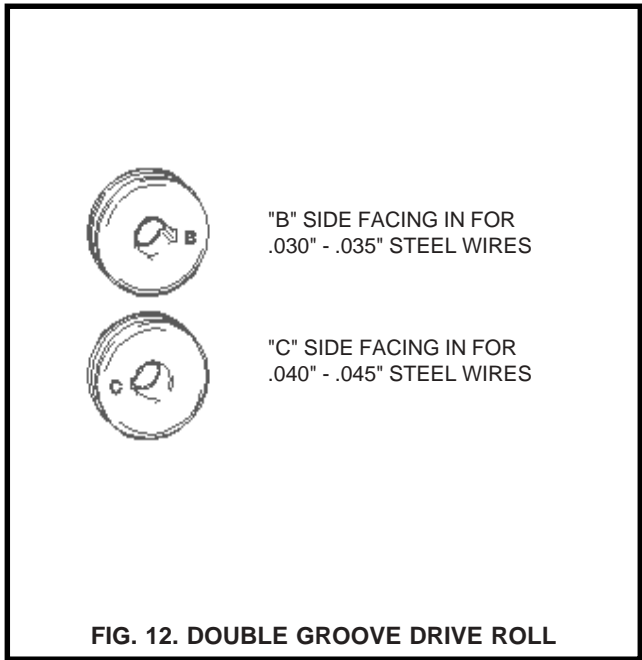


FIG. 12. DOUBLE GROOVE DRIVE ROLL

7. Release the wire from the spool and trim off the kinked end with wire cutters. The wire must be straight when it enters the inlet guide.
8. Thread the electrode wire through the inlet guide, over the feed roll and into the liner. Ensure that the wire locates in the feed roll groove. Do not allow the wire on the spool to loosen.
9. Close and relatch the pressure roll arm.
10. Stretch the torch cable straight out in front of the machine making sure there are no kinks. Remove the nozzle and contact tip from the torch.

11. Turn on the circuit breaker on the front of the machine. The cooling fan will start and the "ON" indicator light will illuminate. Set the MIG/TIG VOLTAGE control switch to "MIG 3" and the WIRE SPEED control to "5". Pull the trigger on the MIG torch. The wire feed system will start and wire will be fed through the cable liner and torch. If the wire does not feed, or appears to slip, tighten the pressure roll arm adjusting nut. Feed the wire until it protrudes from the front of the torch approximately six inches.

CAUTION

Keep hands and face away from the front of the torch and do not allow the wire to contact ground. The wire is electrically HOT when the torch trigger is actuated.

12. Install the contact tip over the protruding wire and tighten it firmly using a proper size wrench. Make sure the tip is the correct size for the wire being used.
13. Install the nozzle on the torch. For steel, the contact tip should be flush or stick out up to 1/16 inch beyond the end of the nozzle. Using wire cutters, trim off the wire so the stickout is approximately 1/4 inch for steel.



FIG. 13. WIRE STICKOUT

14. For steel welding only, spray anti-spatter compound inside the nozzle and on the outside of the contact tip.

WIRE FEED PRESSURE ROLL ADJUSTMENT

The wire feed pressure roll is adjusted at the factory, prior to delivery. It may be necessary to readjust the setting as components "seat in" or when changing to a different diameter wire. To check for proper roll pressure, hold the torch in one hand and pinch the wire between two fingers of the other gloved hand. Pull the torch trigger. If the wire continues to feed when firm pressure is applied to the wire, the pressure roll adjusting nut should be backed off until the feed rolls start to slip. If the wire will not feed with very little pressure applied, the pressure roll adjusting nut should be tightened.

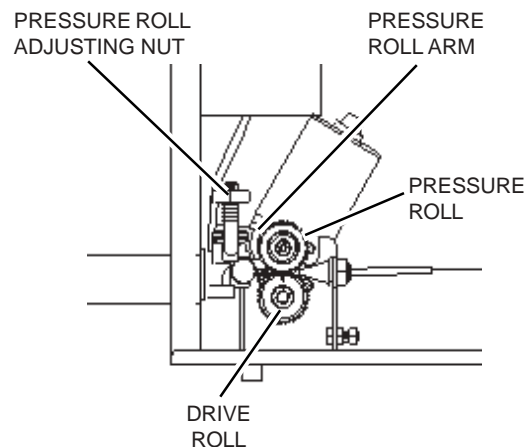


FIG. 14. PRESSURE ROLL ADJUSTMENT

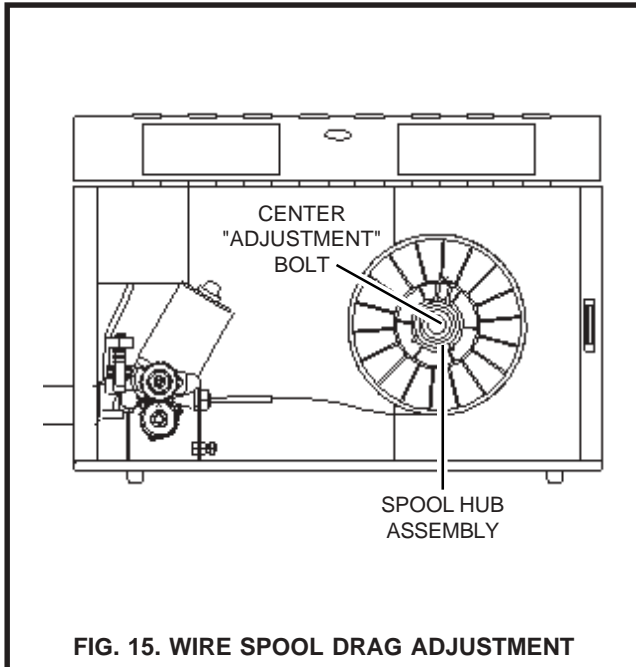
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FITTING AND THREADING THE ELECTRODE WIRE (Cont.)

WIRE SPOOL DRAG ADJUSTMENT

The center bolt of the Spool Hub Assembly is used for drag adjustment.

1. If there is too much drag, causing excessive slippage, reduce the drag by turning the center adjustment bolt, **counter-clockwise**.
2. If there is not enough drag, causing the wire spool to override and the wire to tangle, increase the drag by turning the center adjustment bolt, **clockwise**.



WORK (GROUND) CABLE

Uncoil the work (ground) cable and plug it into the negative (-) terminal on the machine.

OPERATION

The following operating instructions and detailed setup procedures enable an operator without previous experience to produce quality fusion welds. It is recommended that an operator without prior experience with this equipment, first practice on scrap metal of the same type and thickness as the material to be welded.

OPERATING SEQUENCE

1. Make sure that the pieces of metal to be welded are free of grease, dirt, paint and scale. Use a wire brush to remove paint and scale. Paint must be completely removed to bare metal. Grease and oil could burn and cause a fire or safety hazard. Failure to clean the metal properly will result in erratic and porous welds.
2. Install the unit as directed in the installation instructions and make sure the work clamp is firmly attached to a cleaned area on the workpiece to be welded.
3. Open the shielding gas cylinder valve. Press the torch trigger and listen for gas flow.

CAUTION

The welding wire will feed when the trigger is actuated. Take care that the wire is not directed to hit yourself or anything that is common to the work cable on the welder.

PROCESS SELECTION

The following controls are located on the front of the **MM350XL**.

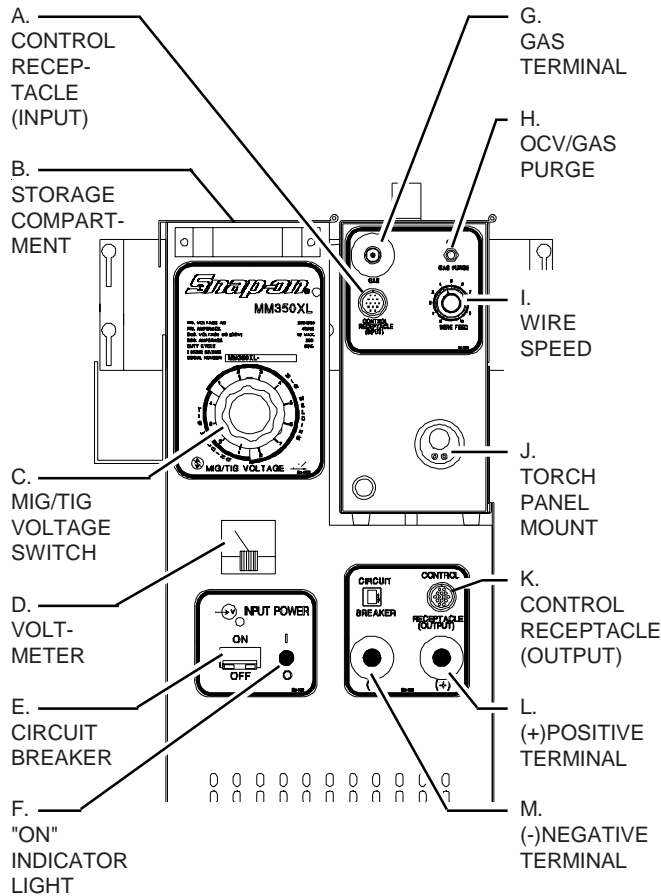


FIGURE 16. FRONT PANEL

- A. CONTROL RECEPTACLE (INPUT)**
Input receptacle for wire feed voltage, trigger circuit and wire speed control from welding machine.
- B. STORAGE COMPARTMENT**
Compartment for tools and the 350LPK parts kit.
- C. MIG/TIG VOLTAGE SWITCH**
Twelve position switch provides "4" TIG (requires optional FLEX TIG) and "8" MIG voltage settings.
- D. VOLTMETER**
Indicates open circuit voltage when torch trigger switch is activated and arc (welding) voltage during welding.

- E. CIRCUIT BREAKER**
Primary power switch and over-load protection device.
- F. "ON" INDICATOR LIGHT**
Illuminates when the circuit breaker on the machine is "ON".
- G. GAS TERMINAL**
Single terminal connection for gas from welding machine.
- H. OCV/GAS PURGE**
Operates the gas solenoid to purge the lines of impurities prior to welding. Pressing the switch also causes open circuit voltage to be registered on the power source voltmeter.

CAUTION

Torch is electrically **HOT** when switch is actuated.

- I. WIRE SPEED**
Potentiometer controls speed of wire drive motor to give wire speed of 50 to 800 inches per minute.
- J. TORCH PANEL MOUNT**
Combination current output, contactor switch connection, gas supply connection, and wire feed output in a single unit.
- K. CONTROL RECEPTACLE (OUTPUT)**
Output receptacle for wire feed voltage, trigger circuit and wire speed control out to the remote feed unit.
- L. (+) POSITIVE TERMINAL**
Positive output terminal from the welder DC power source. The Power plug is inserted into this terminal for standard welding operation. The work cable can be plugged into this terminal for straight polarity welding on very light sheet metal, or for using flux cored gasless wire.

(continued on following page)

PROCESS SELECTION (cont.)

M. (-)NEGATIVE TERMINAL

Negative output terminal. The work cable is plugged into this terminal during standard welding operation. The Power plug can be inserted into this terminal for straight polarity welding on very light sheet metal, or for using flux cored gasless wire.

Optimum control settings will vary according to the thickness of the metal, the type of joint, operator preference, etc. Best results can be obtained through experience with the welding machine or by making trial welds. Select some sample material of the same type and thickness as the material to be welded. Set the welding controls (using the **parameter chart** located on the door of the feed unit or on page 25) for optimum results using the sample material thickness and wire size being used as a starting point, weld until experience is gained using the unit.

WELDING



DANGER

- Electric welding causes ultraviolet rays and weld spatter.



Bystanders will be exposed to ultraviolet rays and weld spatter.



Wear welding helmet with appropriate shade lens while using electric welders.

Do not allow bystanders while welding.

Wear safety shield and protective clothing (user and bystanders).

Read and follow instructions.



Ultraviolet rays will burn eyes; weld spatter can cause injury.



WARNING

- Materials can cause sparks or flying metal when heated which can cause fire.



Wear safety shield and protective clothing (user and bystanders).



Sparks, fire and flying metal can cause injury.



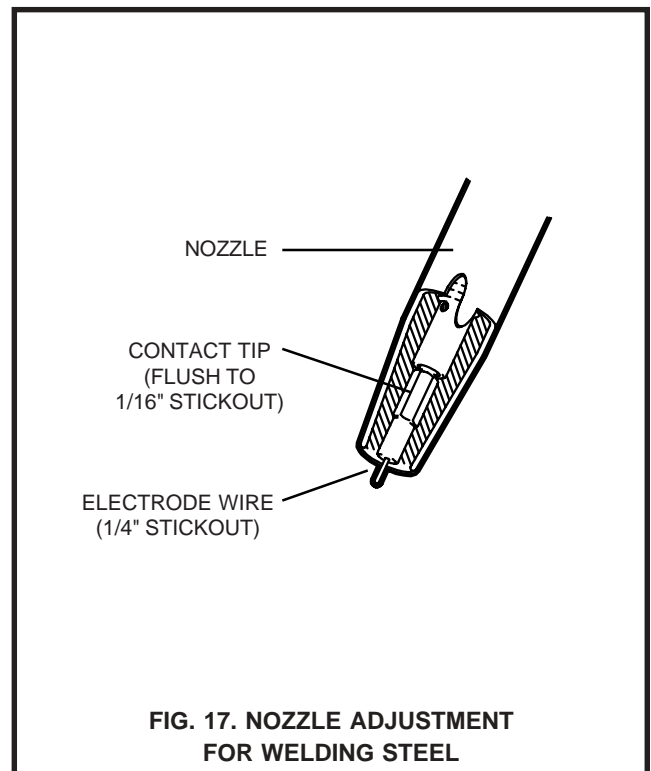
WARNING

- Welded surface can be hot and cause burns and injury.



CONTINUOUS WELDING ON STEEL

1. Trim the electrode wire to leave approximately 1/4 inch stickout beyond the end of the contact tip and install the welding nozzle. The contact tip should be flush or stick out up to 1/16 inch beyond the end of the nozzle.



2. Spray the inside of the nozzle and the outside of the contact tip with anti-spatter compound.
3. Locate the torch over the joint to be welded with the contact tip approximately 3/4 inch from the work surface.
4. Use a welding helmet with a shade 9 to 11 filter lens, depending on operator preference.

NOTE

When welding steel, the ideal position for holding the torch is inclined approximately 30 degrees towards the direction of travel. This allows the arc to be seen easily, resulting in greater control of the weld pool. Most right-handed weldors move from left to right. This method, known as forehand welding, provides a gas shield for the cooling weld puddle and helps in obtaining an oxidation free weld deposit.

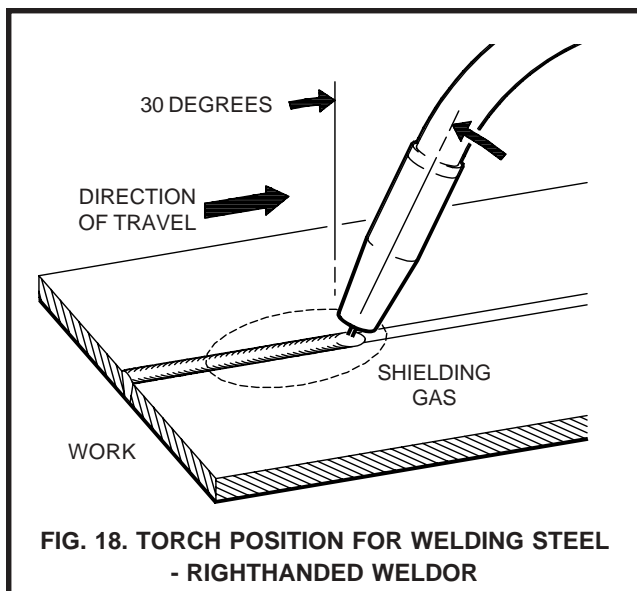


FIG. 18. TORCH POSITION FOR WELDING STEEL
- RIGHTHANDED WELDOR

5. Squeeze the torch trigger. The wire will feed and an arc will be established. As the weld is deposited, move the torch slowly along the weld seam at a constant speed, while maintaining a constant arc length and a constant tip-to-work distance.

OPERATING HINTS

BURNBACK

In the event the welding wire burns back into the contact tip:

1. Remove the nozzle from the torch.
2. Unscrew the contact tip from the gas diffuser using a pair of pliers as the tip will be very hot.
3. Free the wire from the contact tip and clean the end of the tip so the new wire will slide smoothly through the hole. DO NOT use a drill or reamer to clean the hole as they will enlarge it and cause an erratic arc. Replace the contact tip if it is badly damaged.
4. Install the contact tip in the torch and tighten it firmly with an appropriate wrench.
5. Reinstall the torch nozzle.
6. If the wire continues to burn back, check for erratic wire feed, or speed up the wire by increasing the WIRE SPEED control setting or reducing the VOLTAGE control setting.

(continued on following page)

OPERATING HINTS (Cont.)

SPATTER

Before beginning to weld and periodically during welding, the torch nozzle must be removed and the spatter (small globules of melted metal) cleared from the inside of the nozzle and the outside of the contact tip and the gas diffuser. Spatter buildup between the contact tip and the nozzle can cause a short circuit and consequently, failure of the torch or welding machine. The frequent use of anti-spatter spray will help prevent the adherence of spatter to the torch components.

NOTE

DO NOT use any anti-spatter spray when welding stainless steel.

Restricted gas flow, holding the torch too far from the work piece, and the use of CO₂ gas rather than 75% Argon - 25% CO₂ will increase the spatter levels.

MAINTENANCE

To ensure that this equipment maintains its operating efficiency, the following maintenance schedule and procedures are recommended. These routines should be performed regularly by the operator.

REGULARLY - Usage and shop conditions determine frequency.

1. Remove and clean the torch nozzle and contact tip. The use of anti-spatter compound will reduce the adherence of spatter and makes its removal easier.
2. Blow out the torch liner prior to the installation of each new spool of wire. The contact tip and gas diffuser must be removed, but it is not necessary to remove the liner.
3. If the torch cable assembly is bent severely, a kink may develop in the steel liner. This can cause wire feeding problems so a new liner should be installed.

WEEKLY

1. Remove dirt and dust from the wire feed compartment. Use low pressure dry compressed air.
2. Remove dirt and metal deposits from the grooves in the feed roll. If the grooves are badly worn, the feed roll should be replaced. If the pressure roll does not turn freely, it should be replaced.
3. Check all gas fittings for leaks. Tighten or repair as required.

EVERY SIX MONTHS

1. Disconnect the welder from its main power supply.
2. Remove the machine's side panels.
3. Using low pressure dry compressed air, remove dust and dirt from all components.
4. Check for loose or frayed wiring. Particularly check welding current wire connections.
5. Replace torch liner if necessary.

**RECOMMENDED
CUSTOMER SPARE PARTS**

The Snap-on Tools **MM350XL** is a machine of proven design and reliability. Following is a list of consumable items recommended as spare parts for this unit.

contact tips M3-T30, etc.
 gas nozzles M6-C62
 nozzle insulators M6-B
 gas diffusers M6-D
 steel liner(.020-.030) .. M123L-B
 steel liner(.035-.045) .. M124L-N
 steel liner(.062) M126L-G
 drive roll (.020-.035) .. 20-35DR
 drive roll (.045-5/64) . 45-564DR

In the event of the failure of any part of this equipment, contact your Snap-On Tools representative for replacement parts and service. When ordering parts from Snap-On Tools Corporation, order numbers should be preceded by "CKS".



WARNING

- **DO NOT** lift the unit when a gas cylinder is installed or attached.
- **DO NOT** weld on any item that has a common electrical ground.
- **DO NOT** operate the unit with the side panels removed. Overheating will occur.
- **DO NOT** weld upon the case of the welding machine.
- **ONLY** a qualified electrician should perform work inside the welding machine.
- **ALWAYS** wear protective clothing, leather gloves and a full cover welding hood while welding.
- **DO NOT** weld in a closed in area. Proper ventilation is a necessity, or a fresh air supplied hood should be worn.
- **WHEN** welding near combustibles, a helper or "watcher" should stand by with a fire extinguisher or other fire protective device.
- **NEVER** weld on a closed vessel or one that has contained combustibles.

IF IN DOUBT - DON'T DO IT!

BE SAFE - DON'T BE SORRY!

TROUBLE SHOOTING (SYMBOL*)

FOR TECH. SERVICE, CALL TOLL-FREE 1-800-232-9353

The Trouble Shooting Chart is a guide in identifying and correcting possible troubles which may occur when operating this equipment.

FAULT	POSSIBLE CAUSE	REMEDY
EQUIPMENT MALFUNCTION		
No main power, fan does not operate, "on" indicator light is off.	MM350XL switch is "OFF". <small>(CB1)</small> Wall breaker is "tripped". "Open" circuit breaker on MM350XL. <small>(CB1)</small> Loose or broken connection in power input circuit.	Turn switch "on". Reset wall breaker. Reset or replace breaker. Tighten or repair connection.
Main power on, torch trigger activated, no response.	MIG torch unplugged. Faulty trigger switch. <small>(S1)</small> Fault in torch cable. Loose or broken connection on wiring harness. <small>(PLG2)</small> Wire feed motor unplugged. <small>(RC5)</small> Faulty control transformer. <small>(T3)</small>	Plug in MIG torch. Replace micro switch. Check torch cable for continuity. Check or repair connections. Plug in motor. Check for 28VAC output.
Main power on, torch trigger activated, no wire feed but contactor operates & gas flows.	Pressure roll arm unlatched. "Slippage" at drive rolls. Wire path restricted. 5 amp mini breaker is tripped. <small>(CB2)</small> Wire feed circuit board needs calibrated. Defective wire feed circuit board. <small>(PC1)</small> Faulty wire feed motor or connection. <small>(M)</small> Faulty motor relay. <small>(CR1)</small> Loose or broken connection.	Latch arm & add tension. Increase drive roll tension. See page 11. Clean path or replace torch liner. Reset or replace breaker. Calibrate wire feed circuit board. See page 22. Replace circuit board. Repair or replace faulty item. Check motor on a 12VDC battery. Sand points or replace relay. Tighten or repair connection.

(SYMBOL*) - USE THIS IDENTIFIER, ALONG WITH THE SCHEMATIC DIAGRAM FOUND IN THE SERVICE MANUAL, FOR TROUBLE-SHOOTING PURPOSES.

TROUBLE SHOOTING (Cont.) (SYMBOL*)
FOR TECH. SERVICE, CALL 1-800-232-9353

FAULT	POSSIBLE CAUSE	REMEDY
EQUIPMENT MALFUNCTION (Cont.)		
Main power on, torch trigger activated, no welding current, but gas flows & wire feeds.	Loose torch thumb screw. Broken or loose connection. Unplugged or faulty power contactor switch. (W) 208/230V selector wires off. (W) "Opened" thermal switch. (TP1 & TP2) Faulty diodes. (D1-D8)	Tighten thumb screw. Check cables for continuity. Repair or tighten connections. Plug in or replace switch. Reattach wire. Allow unit to cool, then retry. Check diodes. See page 21.
Main power on, torch trigger activated, no gas flow, but contactor operates & wire feeds.	No shielding gas - tank empty. Loose or broken connections. Faulty Gas solenoid valve. (GS) Clogged gas flow path.	Replace tank. Tighten or repair connections. Repair or replace valve. Locate & clean clog.
FAULTY WELDS		
"Jerky" or "slipping" wire feed.	Worn , kinked or dirty torch liner. Wire spool turns too hard. Worn double v-groove drive roll. Weak pressure roll spring. Worn or dirty contact tip. Worn inlet guide(s). Sticking pressure roll. Feed roll tension incorrect.	Clean or replace liner. Lubricate spool shaft. Set drag adjustment. Replace drive roll. Replace spring. Replace contact tip. Clean or replace guides. Replace pressure roll. Adjust feed roll tension. See page 11.

(continued on following page)

TROUBLE SHOOTING (Cont.) (SYMBOL*)
 FOR TECH. SERVICE, CALL TOLL-FREE 1-800-232-9353

FAULT	POSSIBLE CAUSE	REMEDY
FAULTY WELDS (Cont.)		
"Birdnesting" (Wire wrapping around drive rolls)	Excessive feed roll tension. Poor alignment. Oversize contact tip.	Reduce tension. See page 11. Make sure wire is properly aligned across roller. Replace contact tip with correct size.
"Cold" weld puddle.	Incorrect machine settings. Incorrect shielding gas. Excessive wire stick-out. Poor connections. Faulty diode. <i>(D1-D8)</i>	Increase heat & wire speed. Replace with proper gas. Hold torch closer to work. Check and tighten all connections. Test diodes, replace faulty diode(s). See page 21.
Heavy spatter.	Incorrect machine settings. Incorrect shielding gas. Excessive wire stick-out.	Increase heat, decrease wire feed speed. Replace with proper gas. Hold torch closer to work.
Porous welds.	No shielding gas. Not enough gas flow. Contaminated wire. Faulty gas solenoid. <i>(GS)</i> Incorrect electrode wire. Contaminated base material.	Turn on gas. Check hoses for leaks, make sure cylinder is not empty. Increase flow rate. Change wire. Replace solenoid. Use correct wire. Clean or etch base material.

(SYMBOL*) - USE THIS IDENTIFIER, ALONG WITH THE SCHEMATIC DIAGRAM FOUND IN THE SERVICE MANUAL, FOR TROUBLE-SHOOTING PURPOSES.

TESTING AND REPLACING DIODES

Silicon diodes have proven to be highly reliable. However, weld spatter build-up in the torch can short out and cause diode overload and consequent failure. The following information is provided as a guide should a failure be suspected.

Silicon diodes exhibit two main fault conditions:

1. "Open Circuit" - causes a reduction in welder output.
2. "Short Circuit" - causes the circuit breaker to trip.

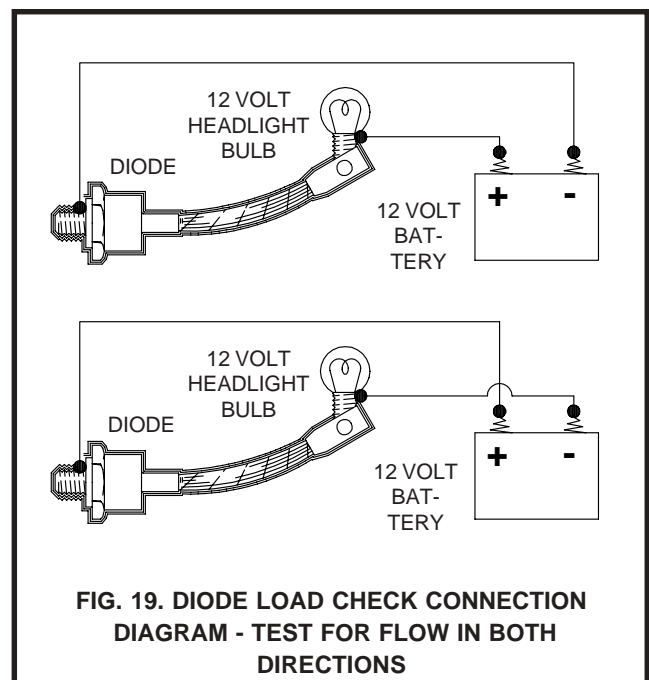
If a fault is suspected, the diode may be tested as follows:

1. Remove the top connection of each diode to be tested.
2. Using a Volt-Ohm Meter set on RX1K, check for continuity through the diode in both directions. If there is no continuity in either direction, the diode is in "open circuit" condition and must be replaced. If there is continuity in both directions, the diode is in "short circuit" condition and must be replaced. If there is continuity in one direction only, the diode is functioning properly.

3. If all the diodes check out satisfactorily with the Volt-Ohm Meter, a load check must be made. This is easily accomplished using a twelve volt battery and a twelve volt headlight bulb connected as shown. Again test for electrical current flow in both directions. The bulb should light in one (1) direction only - not both.

CAUTION

NEVER use a "megger" or a high voltage device to test a diode.



4. When replacing diodes, it is very important that a heat conductive compound (Radio Shack #276-1372) be used where the diode makes contact with the aluminum heat sink. Do not grease the threads on the diode.

WIRE FEED CALIBRATION

Due to **INPUT LINE VOLTAGE** variations supplied to the welding machine. The **WIRE FEED SPEED** should be checked for proper operation.

TO CHECK

1. Remove any tension on the drive roll.
2. Turn the wire speed dial (on the front of the machine) to "0".
3. Activate the torch trigger.
4. The bottom drive roll should rotate very slowly(non-jerky).
5. If this proves to be true, no adjustment is required.

IF ADJUSTMENT IS REQUIRED

1. Remove the left hand side panel from the base unit.
2. Locate the printed circuit board mounted at the back of the machine.
3. Referring to Figure 20, locate the trim resistor, this is located in the upper right hand corner of the wire feed PC board.
4. Turn the wire speed dial (on the front of the machine) to "0".
5. Remove any tension on the drive roll.

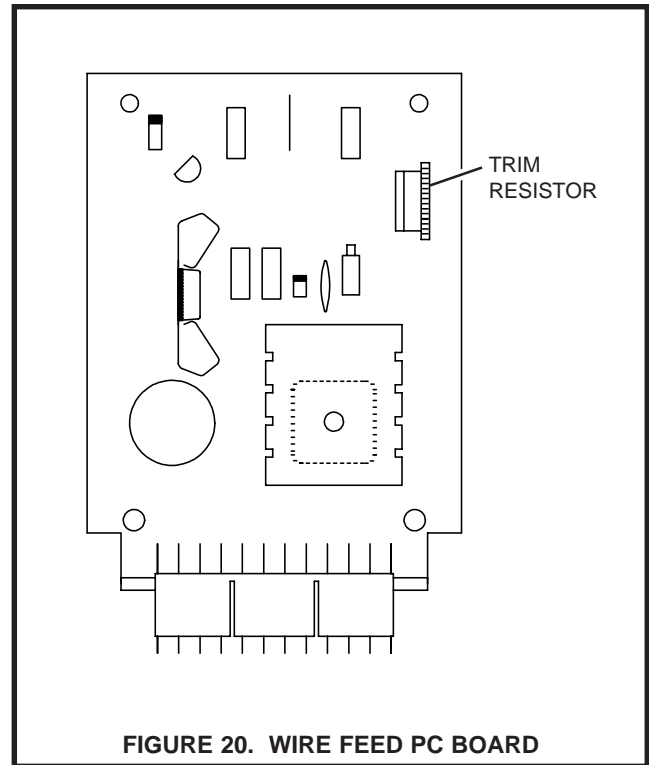


FIGURE 20. WIRE FEED PC BOARD

6. Activate the torch trigger.
7. Rotate the trim resistor, back and forth, until the bottom drive roll moves.
8. Calibrate so the bottom drive roll rotates very slowly (non-jerky).
9. If calibrated correctly the wire speed dial (on the front of the machine) should affect the speed of the drive roll from "0" thru "10".
10. Adjustment is now complete!

CONNECTING THE FLEXTIG

CHANGING FROM STANDARD MIG OPERATION TO FLEXTIG OPERATION

1. Unplug the feeder control cable plug from the control receptacle (OUTPUT) on the welder.
2. Unplug the feeder gas and current cable/power plug and the work cable from the welders front panel.
3. Plug the **FLEXTIG** torch power cable into the negative (-) weld terminal and plug the work cable into the positive (+) weld terminal. This provides straight polarity current as required for **TIG** welding.
4. Plug the **FLEXTIG** torch switch cord into the welder control receptacle (OUTPUT).
5. Attach the **FLEXTIG** torch gas hose directly to the gas regulator/flowmeter and adjust the flow to 20 C.F.H.

NOTE

Pure Argon is the shielding gas to be used for TIG welding.

6. Follow the operating instructions in the **FLEXTIG** manual (Form **WC5229**).
7. To change back to standard **MIG** operation, reverse the procedure.

CONNECTING THE MHG5-B SPOOL GUN

CHANGING FROM STANDARD MIG OPERATION TO SPOOL GUN OPERATION

1. Unplug the feeder control cable plug from the control receptacle (OUTPUT) of the welder.
2. Plug the **MHG5-B** spool gun control cable plug into the welder control receptacle (OUTPUT).
3. Remove the feeder gas and current cable/power plug from the welders positive (+) weld terminal.
4. Plug the **MHG5-B** gun cable fitting into the welder positive (+) weld terminal.

NOTE

Make sure the welder primary gas hose and regulator/flowmeter are connected to a cylinder of the proper shielding gas - 100% Argon for aluminum and 98% Argon + 2% O₂ for stainless steel and 75% Argon + 25% CO₂ for steel welding.

5. Follow the operating instructions in the **MHG5-B** manual (Form **WC5268**).
6. To change back to standard **MIG** operation, reverse the procedure.

M.I.G. TORCH LINER INSTALLATION (steel only)

The MIG torch liner provided with the **MM350XL** is designed for wire diameters from .035 thru .045. If smaller or larger wire diameters are to be fed and or there is a problem (i.e. clog, kink, etc.), a liner change is required.

Following is a step by step guide to aid in liner removal and installation.

NOTE

When removing the welding wire from the MIG torch, care should be taken to avoid the wire from uncoiling from the wire spool.

REMOVING OLD LINER

1. Remove torch assembly from the welding machine.
2. Place torch assembly on a flat surface, making sure torch is laying straight as possible.
3. Remove nozzle, bushing insulator, contact tip and gas diffuser from the front end of the torch assembly.
4. Loosen set screw located on the connector end of the torch assembly (see FIG. 22).
5. Grip the liner and gas seal firmly, then pull. The liner should easily slide from torch assembly.

INSTALLING NEW LINER

1. Remove the new liner from the package.
2. Uncoil liner and lay the liner parallel next to the MIG torch assembly.
3. Adjust the liner stickout length to 3/4" as shown in FIG. 21.

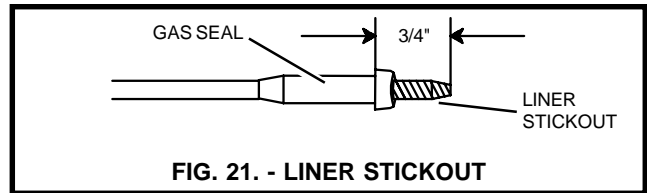


FIG. 21. - LINER STICKOUT

4. Install the new liner into the MIG torch assembly, until gas seal seats flush with the connector plug.
5. Tighten set screw. (Do not over-tighten), refer to FIG. 22.

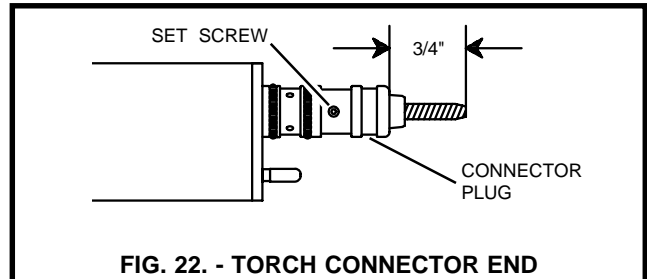


FIG. 22. - TORCH CONNECTOR END

6. Following the diagram in FIG. 23, measure out 1 5/8" + from the neck assembly and cut off the protruding liner.
7. Deburr the cutoff end of the liner to insure unobstructed wire feed.

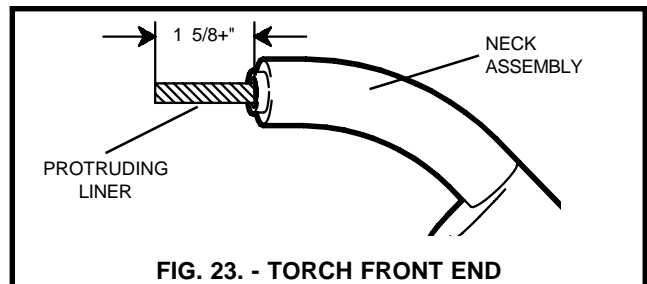
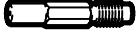





FIG. 23. - TORCH FRONT END

8. Install the gas diffuser and contact tip of proper wire size, tighten with a wrench.
9. Install the bushing insulator onto the gas diffuser.
10. Install the TWIST-ON adjustable nozzle and twist the nozzle during the installation. Turn to Page 14 for correct nozzle adjustment.

CONSUMABLE PARTS BREAKDOWN - 35XL SERIES M.I.G. TORCH

XL STYLE FRONT END - STANDARD

WIRE SIZE	CONTACT TIP	GAS DIFFUSER	NOZZLE	INSULATOR
.020 - .025 inch .030 inch .035 inch .040 - .047 inch	M3-T25 M3-T30 M3-T35 M3-T45  (1-7/16" length)	M6-D 	M6-C62 (5/8" I.D.) 	M6-B (includes rings) 

LINERS FOR STEEL WELDING

WIRE SIZE	TORCH LENGTH	ORDER NUMBER	
		LINER W/SEAL	SEAL ONLY
.020-.030 inch	10 feet	M103L-B	M3LS-B (Blue)
	12 feet	M123L-B	
.035-.045 inch	10 feet	M104L-N	M4LS-N (Natural)
	12 feet	M124L-N	
	15 feet	M154L-N	
1/16 inch	10 feet	M106L-G	M6LS-G (Green)
	12 feet	M126L-G	
	15 feet	M156L-G	



Guide For Setting Welder - Adjust For Best Results GAS METAL ARC (MIG) PROCESS - DCEP (REVERSE POLARITY)

Note: Settings are approximate and may vary. Adjust for best results.

MATERIAL	SHIELDING GAS		WELDING WIRE		THICKNESS	MIG VOLTAGE	WIRE SPEED	AMPS OUTPUT
	TYPE	FLOW	TYPE	SIZE				
CARBON STEEL	75% ARGON 25% CO2	25 CFH (Min.)	ER70S-6	.030"	18 Ga.(.048")	1	1/2	80
					16 Ga.(.060")	2	3/4	90
					14 Ga.(.075")	3	2	110
					12 Ga.(.105")	3	3	120
					1/8"	4	4	135
					3/16"	5	6 1/2	150
					1/4"	5	8	160
				.035"	14 Ga.(.075")	2	1	110
					12 Ga.(.105")	3	2	115
					1/8"	3	2 1/2	120
					3/16"	4	3 1/2	140
					1/4"	4	4	150
				.045"	5/16"	5	6 1/2	160
					3/8"	6	7 1/2	190
					1/8"	3	2	150
					3/16"	3	3	200
					1/4"	4	3	210
					5/16"	4	4	220
				1/16"	3/8"	5	5	240
					1/2"	6	7 1/2	260
					● Optional Drive Roller and Liner are required.			

PARTS BREAKDOWN - 35XL SERIES MIG TORCH (Cont.)

PART NO. DESCRIPTION (SYMBOL)

TORCH NECK GROUP

- M3-101B TORCH NECK *
- M3-112 NECK INSULATOR
- M3-119 LOCK SCREW - SWITCH HOUSING
- M3-120 FERRULE *

M3-200B SWITCH ASSEMBLY CONSISTING OF:

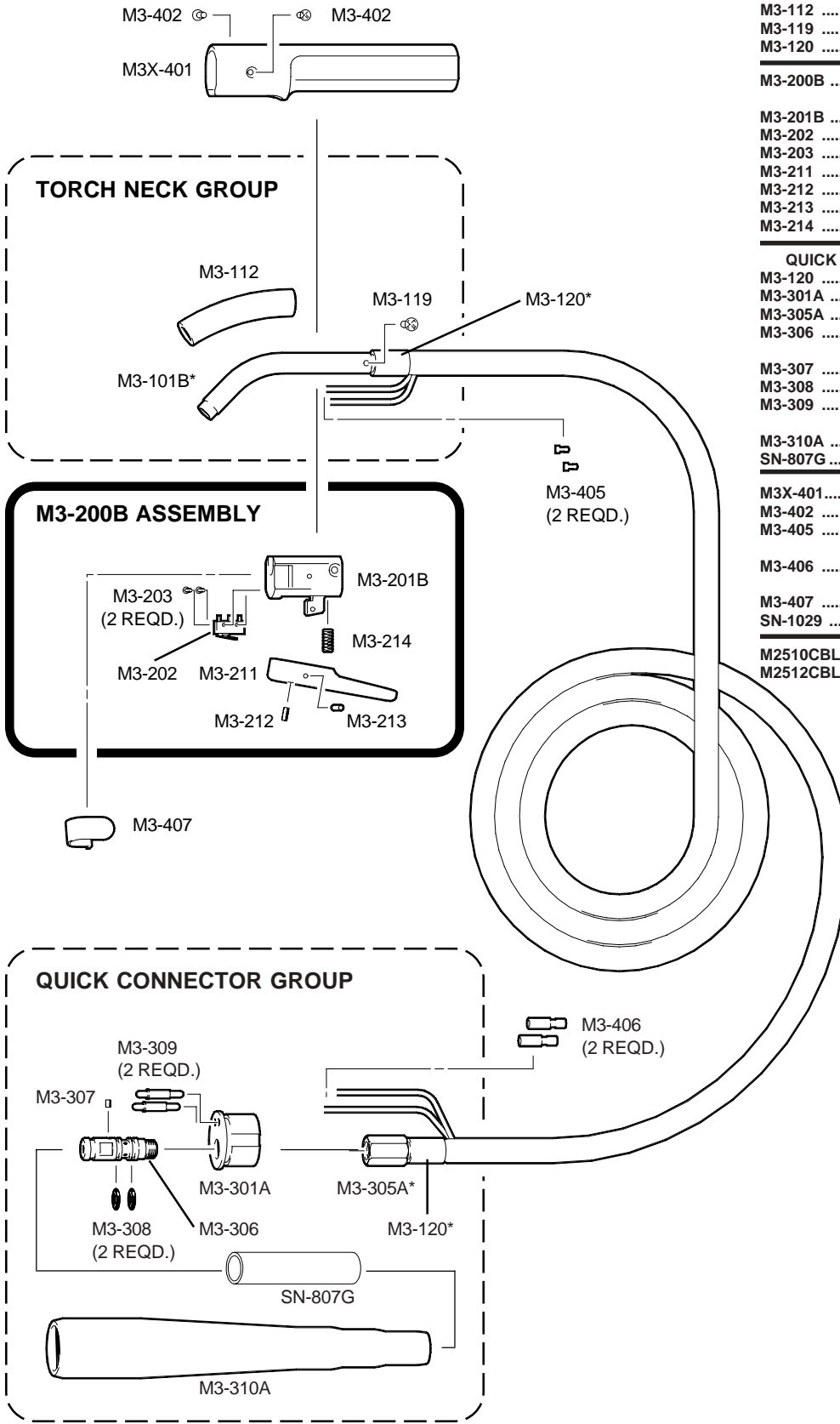
- M3-201B SWITCH HOUSING
- M3-202 SWITCH (S1)
- M3-203 SWITCH SCREW (2 REQUIRED)
- M3-211 TRIGGER - WITH ADJUSTING SCREW
- M3-212 TRIGGER ADJUSTING SCREW (ONLY)
- M3-213 TRIGGER PIN
- M3-214 TRIGGER SPRING

QUICK CONNECTOR GROUP

- M3-120 FERRULE *
- M3-301A CONNECTOR HOUSING
- M3-305A CONNECTOR STEM *
- M3-306 CONNECTOR PLUG
- WITH SETSCREW & O-RINGS
- M3-307 SETSCREW (ONLY)
- M3-308 O-RING (ONLY) (2 REQUIRED)
- M3-309 TERMINAL - CONNECTOR CONTACT
(2 REQUIRED)
- M3-310A BOOT / CABLE SUPPORT
- SN-807G CABLE COVER

- M3X-401 HANDLE
- M3-402 HANDLE SCREW (2 REQUIRED)
- M3-405 TERMINAL - TORCH END
(2 REQUIRED)
- M3-406 TERMINAL - CONNECTOR END
(2 REQUIRED)
- M3-407 HANGING BRACKET
- SN-1029 LABEL, 35XL SERIES

- M2510CBL... 10 FOOT CABLE *
- M2512CBL... 12 FOOT CABLE *



M2510CBL*
M2512CBL*

NOTES:

* BECAUSE SPECIAL TOOLS AND PROCEDURES ARE REQUIRED TO PROPERLY INSTALL THE CABLE ON THE TORCH NECK AND THE CONNECTOR STEM, ITEMS WITH THE ASTERICK ARE AVAILABLE FACTORY INSTALLED ONLY.

TORCH REBUILD PROGRAM

35XL SERIES TORCHES CAN BE REBUILT BY THE FACTORY FOR A NOMINAL LABOR + PARTS CHARGE.

OPTIONS

FLEXTIG

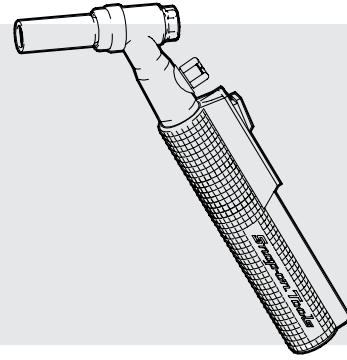
TIG WELD WITH YOUR SNAP-ON TOOLS MUSCLE MIG SYSTEM (MM140SL, MM250SL & MM350XL)

The TIG Welding Process is used to produce the highest quality, porosity-free welds. The FLEXTIG adds TIG Welding capabilities to your Snap-on Tools MIG Welder.

The FLEXTIG is designed for Tungsten-Inert Gas (TIG) welding with Direct Current, Straight Polarity (DCSP) on steel, stainless steel, chrome-moly, copper or cast iron (18 Ga. minimum plate thickness).

THE FLEXTIG WILL NOT WELD ALUMINUM.

The FLEXTIG consists of a 200 amp, gas cooled torch with built-in gas control valve and remote on-off switch, 12-1/2 or 25 foot cable assembly and accessories required for putting the unit in service.



SPECIFICATIONS

Part Number	FLEXTIG 12 (12-1/2' cable) FLEXTIG 25 (25' cable)
Torch Rating	200 Amps, DCSP
Duty Cycle	100% (reduce duty cycle when operating over 200 amps.)
Cooling Method	Gas(100% ARGON)
Shielding Gas	
Control Method	Gas Valve on Torch
Welding Current	
On-Off Control	Locking Switch on Torch

CONTENTS OF FLEXTIG

1 each	TIG Torch with built-in valve
1 each	Locking Electric Switch with cord & plug (installed on torch)
1 each	12-1/2 foot Power Cable with Connector (installed on torch)
1 each	15 foot Gas Hose with fitting (installed on torch)
3 each	3C116 Collet - for 1/16" tungsten
3 each	3C332 Collet - for 3/32" tungsten
2 each	3CB116 Collet Body - for 1/16" tungsten
2 each	3CB332 Collet Body - for 3/32" tungsten
2 each	3C6 Gas Cup - 3/8" orifice
6 each	3C7 Gas Cup - 7/16" orifice
2 each	3C8 Gas Cup - 1/2" orifice
1 each	300L Long Backcap
3 each	1/16" X 3" Tungsten Electrode
3 each	3/32" X 3" Tungsten Electrode

MHG5-B

ONE POUND SPOOL GUN FOR ALUMINUM MIG WELDING WITH SNAP-ON TOOLS MUSCLE MIG SYSTEMS (MM140SL, MM250SL & MM350XL)

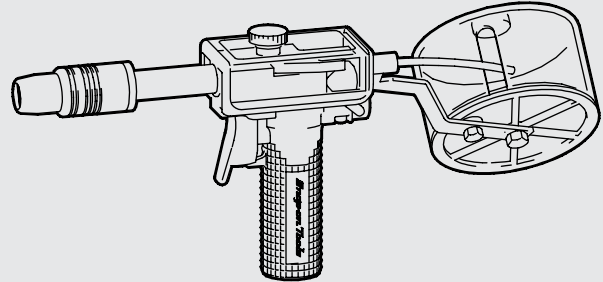
The MHG5-B (Motorized Hand Gun System) is a compact, light-in-weight, easy to operate MIG welding system designed for aluminum welding. It will feed .023" Thru 3/64" diameter wire from 4 inch spools. The standard equipment cable is 25 feet in length. 35 foot and 50 foot cables are optional. The wire speed control knob is built into the gun handle.

With the following options, the MHG5-B can also be used to weld steel or stainless steel (.030"-.035" diameter wire size).

- SN-2160K** Knurled Drive Roll for .030 - .035" steel wire
- M5-T30** Contact tip - for .030" steel wire
- or M5-T35** Contact tip - for .035" steel wire

SPECIFICATIONS

Part Number	MHG5-B
Gun Rating	200 Amps @ 100% duty cycle 250 Amps @ 60% duty cycle
Wire Feed Speed Range ...	50 to 850 inches per minute
Cooling Method	Air (gas)



MHG5-B SYSTEM COMPONENTS

1 each	MHG-5 Spool Gun (only)
1 each	HGC9-25 Hand Gun Cable Assembly with fittings - 25 feet length
7 each	MG-TXX Contact Tip(1 installed in gun)
	2 - .030 (MG-T30)
	3 - .035 (MG-T35)
	2 - 3/64 (MG-T364)
1 each	M35-NA62 Nozzle Assembly (installed on gun)
1 each	M35-D Gas Diffuser (installed on gun)

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ZMM350XL

6/02 (Rev. 2/03)