



Instruction Manual  
301-2 CCW/CTW  
Revised 08/2016

# D/F MACHINE SPECIALTIES, INC.

*MIG & TIG Welding Products, Consumables & Accessories*

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## WATER-COOLED CURVED GUN

**55° Curved Torch  
with Single Mode Trigger Switch**

**Model CCW (Slip-in Current Tip)**

**Model CTW (Threaded Current Tip)**



**INSTRUCTION, PARTS & SPECIFICATIONS MANUAL**

**D/F MACHINE SPECIALTIES** is a world leader in the design, development, and manufacture of “MIG” (GMAW) & “TIG” (GTAW) welding products, consumables and accessories. D/F offers several types of manual Air or Water-Cooled “MIG” welding tools, and with the increased use of automated and robotic welding systems, a demand has been created for welding tools of the highest quality, durability and interchangeability. For over forty years, D/F welding products have been used extensively on “MIG” and “TIG” welding applications. This experience, coupled with patented design features, unavailable on any other competitive equipment, has made D/F welding tools the most advanced “MIG” and “TIG” welding guns and barrels for semi-automatic, automatic or robotic welding applications.

This Catalog is a guide to helping you select the proper tool for a given semi-automatic, automatic or robotic welding application. The following is only a partial listing of available semi-automatic, automatic and robotic guns. For further information on special “MIG” and “TIG” requirements, please consult the factory.

#### **Customer satisfaction and customer benefits are the center points of all strategic contents**

The spirit of the D/F Machine Specialties personnel is to listen to and to integrate the customer throughout the process, to develop and design marketable products, to present prototypes, to carry out pilot tests and to prepare for and be open to new technology and tasks. We attract and carefully select talented individuals who share our values. Together we will nurture and sustain a work environment with two-way communication, training, mentoring, and rewarding career opportunities.

#### **Innovation and quality**

Innovation and quality come from being receptive and willing to learn from others. We encourage our people to be creative and take risks in the pursuit of excellence. Innovative practices are deeply rooted in every one of our employees, a philosophy that leads to continuous product development and industry firsts.

#### **Progress**

By remaining confident, focused, and persistent in challenging times, we will discover opportunity. Commitment to quality and the pursuit on innovation ensure that D/F Machine Specialties will remain an industry leader for years to come.

#### **Commitment to excellence**

At D/F Machine Specialties we commit to design, build and deliver premium products and superior customer support to quality driven welding professionals. Customers still to this day choose D/F over competitors because of our responsiveness and flexibility. Customers will continue to choose D/F tomorrow for our superior hand-made products and service. To ensure this, we need creative and competent personnel in all business divisions, an intensive exchange of thoughts and ideas with all users, participation in working and study groups within the field of welding technology and intensive cooperation with institutes and universities.

#### **Teamwork**

Striving for excellence is a commitment that is an integral component of the D/F Culture. Our team of skilled and dedicated employees takes pride in the excellence products they produce. Each of us willingly accepts personal responsibility for meeting our commitments and we hold each other to a high standard of accountability.

#### **Responsibility**

We will continually strive to be environmentally responsible and to support the health and safety of our employees, customers, and neighbors. We continue to support the communities in which we operate and the industries in which we participate.

*Thank You for Choosing D/F Machine Specialties*



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## SAFETY MEASURES - \*\*PLEASE READ!\*\*

Welding is not particularly hazardous when certain safety practices are followed. Anyone using this equipment should be thoroughly trained in safe welding practices. Failure to observe safe practices may cause serious injury. Handling welding torches presents no danger if the appropriate safety regulations are strictly adhered to. For example:

- Starting-up procedures must be reserved for those fully conversant with processes relating to arc welding equipment.
- Arc welding can prove damaging to eyes, skin, and hearing! It is therefore imperative that the Accident Prevention Regulations UVV 26.0 and VGB 15 are fully observed and that all protective clothing, eye and ear protectors specified are worn.
- The load data given are maximum limit figures. Overloading will inevitably damage the torch!
- Before changing wear parts, disconnect for the power supply.
- The operating instructions for the individual welding components - e.g. power source, wire feed and cooling unit must be followed.
- Never pull the cable assembly across sharp edges or set down close to weld spatter or on a hot workpiece.
- Those not involved in the welding process should be protected by curtains or partitions from radiation and the danger of being dazzled.
- When handling gas cylinders, consult the instructions issued by the manufacturers and the suppliers of the pressurized gas.
- Workpieces which have been degreased using chlorinated solvents must be sprayed down with clean water before welding starts to avoid the risk of phosgene forming. For the same reason, no degreasing baths containing chlorine must be placed close to the welding point.
- All vapors given off by metals can cause harm and a special warning is attached to lead, cadmium, copper, zinc, and beryllium. If necessary, take appropriate precautions (by providing adequate ventilation or an extraction system) to ensure that the legal maximum levels of toxic concentrations are not exceeded.

**For more information**, refer to the following standards in their latest revisions and comply as applicable.

- ANSI Standard Z49.1, SAFETY IN WELDING AND CUTTING obtainable from the American Welding Society, 2501 N.W. 7th St., Miami, FL 33125.
- ANSI Standard Z41.1, STANDARD FOR MEN'S SAFETY - TOE FOOTWEAR obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
- ANSI Standard Z49.2, FIRE PREVENTION IN THE USE OF CUTTING AND WELDING PROCESSES obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
- OSHA, SAFETY AND HEALTH STANDARDS, 29CFR 1910, obtainable from the U.S. Government Printing Office, Washington, D.C. 20402.
- AWS Standard A6.0, WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTIBLES obtainable from the American Welding Society, 2501 N.W. 7th St., Miami, FL 33125.
- NFPA Standard 70-1978, NATIONAL ELECTRICAL CODE obtainable from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.
- ANSI Standard Z88.2, "Practice for Respiratory Protection" obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
- ANSI Standard Z87.1, SAFE PRACTICES FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION obtainable from the American National Standards Institute, 1430 Broadway, New York, NY, 10018.
- NIOSH, SAFETY AND HEALTH IN ARC WELDING AND GAS WELDING AND CUTTING obtainable from the Superintendent of Documents, U.S. Printing Office, Washington, D.C. 20402.
- American Welding Society Standard AWSF4.1 "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", obtainable from the American Welding Society, 2501 N.W. 7th St., Miami, FL 33125.

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### IMPORTANT

The D/F torch is famous for the fact that if it is chilled properly, the welder can grab the front of the torch with their bare hand and it will be cold to the touch seconds after welding. With the proper chiller, this can be done even after a 4 hour arc time.

Make certain the cooling water supply is at least the minimum flow rate of 3 quarts per minute (for each inner body), at 40 psi (80 psi maximum) with a 5 gallon reservoir and 15,000 BTU/hr cooling capacity. Gun ratings are affected by shielding gas used, arc time, cooling time and inlet water temperature. Water outlet temperature should not exceed 27°C (80°F). The torch's water out & power cable is not cooled until the coolant has gone through the torch and out the water out & power cable. If water is not flowing through the D/F torch for at least 1 minute prior to striking an arc, when you apply the power and water hits the "hot" water/out & power cable, you will generate steam. Steam can damage the torches internals in seconds causing a leak. It can also blow out the torches water/out & power cable. A flow switch can be installed after the return line ensuring that coolant is present at the return line prior to striking an arc.

When High-Deposition GMAW or extended periods of arc time are used, it is recommended that a liquid chiller be considered with a larger reservoir and a minimum of 30,000 BTU/hr cooling capacity. Precise temperature control maintains the cooling at a constant 13°C (55°F) temperature, thus prolonging the life of the welding equipment and more specifically extending the service life of the gas nozzle and current tip.

A refrigerated liquid chiller for GMAW may be obtained from:

For single torch chillers: Dynaflux - 800-334-4420 - [www.dynaflux.com](http://www.dynaflux.com)

For multiple torch cooling systems: Koolant Koolers - 800-968-5665 - [www.koolantkoolers.com](http://www.koolantkoolers.com)

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## INTRODUCTION

The CCW/CTW series welding gun is available with three (3) nozzle body configurations for manual MIG welding. In addition to the models listed on the cover, there is a CCW-E series with an external casing which also utilizes the use of the same nozzle bodies and gas nozzles. Consult the factory for details.

These CCW/CTW guns are durable, light weight and have excellent cooling within the integral water passages, thus eliminating the need for gaskets or o-rings. Gun and cable assemblies are shipped from the factory assembled complete with a current tip and gas nozzle., which must be selected by the user.

The manufacturer, along with model wire feeder, must be specified when ordering. Select feeder adapter and, when required, wire inlets from page 20.

For further information or help with D/F Machine Specialties products, please visit our web site at [www.dfmachinespecialties.com](http://www.dfmachinespecialties.com), or consult the factory at 1-507-625-6200.

## TABLE 1 - MODEL SPECIFICATIONS

| MODEL               | CURRENT CAPACITY                           | LENGTH  | BODY DIAMETER | WEIGHT (APPROX.) | COOLING REQUIRED | RECOMMENDED WIRE DIAMETER RANGE        |
|---------------------|--|---------|---------------|------------------|------------------|--|
| CCW 55°/<br>CTW 55° | 450 amps CO <sub>2</sub><br>350 amps Argon | 14.375" | 1.450"        | 1.8 lbs.         | 2 quarts/min     | .030"- .062" Hard<br>3/64"-1/16" Cored |

## TABLE 2 - ORDERING INFORMATION

| LENGTH | MODEL       | NOZZLE BODY                  | CODE NO. |
|--------|-------------|------------------------------|----------|
| 10 Ft. | CTW51       | Mini Nozzle Body             | 15551    |
|        | CCW86/CTW86 | Standard Nozzle Body 13197   | 11586    |
|        | CCW85/CTW85 | Heavy Duty Nozzle Body 13198 | 11585    |
| 12 Ft. | CTW52       | Mini Nozzle Body             | 15552    |
|        | CCW88/CTW88 | Standard Nozzle Body 13197   | 11588    |
|        | CCW87/CTW87 | Heavy Duty Nozzle Body 13198 | 11587    |
| 15 Ft. | CTW53       | Mini Nozzle Body             | 15553    |
|        | CCW/CTW90   | Standard Nozzle Body 13197   | 11590    |
|        | CCW/CTW89   | Heavy Duty Nozzle Body 13198 | 11589    |

When ordering, please specify the model number of the torch, the wire diameter to be used to determine the proper contact tip for use, and the wire feeder make and model to determine the wire feeder and inlet required.



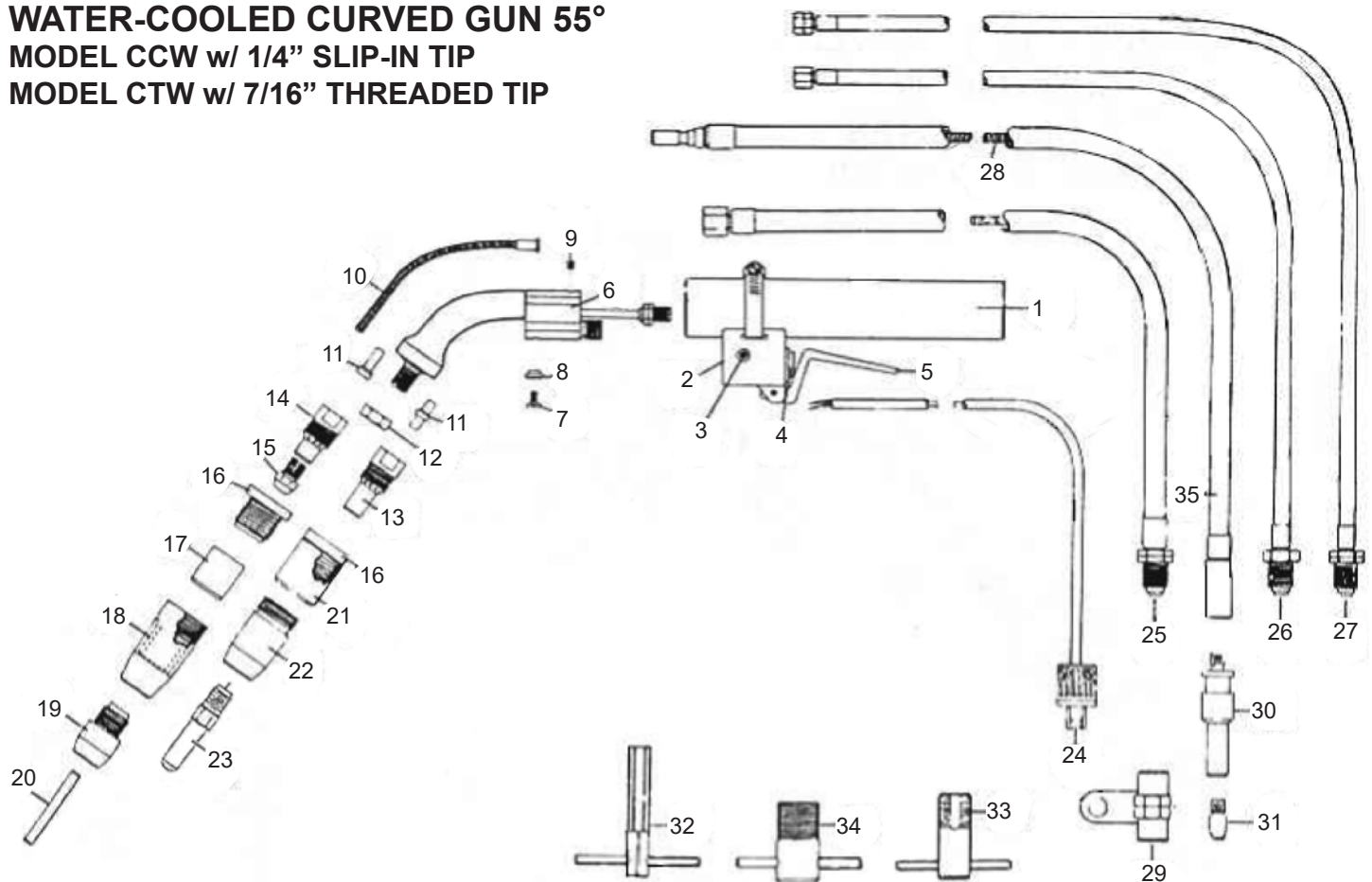
## DISASSEMBLY

1. When repairs are made on the production line make certain the power source and wire feeder are disconnected from primary power.
2. Remove forward gas nozzle. If threads are damaged or clogged up with spatter, use (14610) nozzle thread chaser tap to recondition the front of nozzle bodies (16384 & 13197).
3. Remove current tip. A wrench is provided for the collet holding the slip-in tip on the CA-C Series. See page 14 for replacement of tips and nozzles.
4. If the 1/4" and 5/16" collet adapters (13205 & 13209) or 7/16" threaded tip adapter (12019) is to be replaced, proceed as follows:
  - a. Unscrew the nozzle body. If the insulator threads off with the nozzle body, it may be necessary to grip the edge of the insulator (13163) and turn it out. Do not apply excessive pressure to the insulator.
  - b. The nozzle body insulator (16605) can be removed by sliding it to the rear. NOTE: Nozzle body (13196, 13197, 13198, & 16384) rear insulator threads can be reconditioned and re-chased with (14612) rear thread chaser.
5. Remove the adapter by using two 5/8" wrenches - one to hold the jam nut (16202) and the other to unscrew the adapter.
6. NOTE: Optional "Body Bushing" is provided to center up the liner located at the forward end of the inner body on guns not utilizing the inner body liner and single piece casing.
7. Insulator on body tube should be inspected and replaced if worn or cut at this time.
8. Remove flat head screw (12610) and insulator from the body tube.
9. Release pressure on switch housing clamp.
10. Grasp electrical cable and at the same time pull body tube off the curved inner body. A slight twisting motion will aid in sliding the tube back.
11. The casing set screw (14712) can now be released and the casing/liner assembly withdrawn out of the inner body. NOTE: Swivel socket set is captivated by the body tube.
12. Insert and replace inner body liner. See page 17 for replacement.
13. If the trigger switch is to be removed:
  - a. Release socket set screw holding the switch in position.
  - b. Drift out the roll pin holding the lever in the switch housing.
  - c. Carefully pull button switch from housing - inspect and replace as required.

## ASSEMBLY

1. Care must be exercised in connecting fittings to allow sliding of the handle over the hoses when reassembling. Keep the hose/services as straight as possible, avoiding twisting of service lines.
2. If new power cable is required:
  - a. Trim off approximately 1" off cable covering.
  - b. Carefully wrap copper strands with copper sheet.
  - c. Slip wrapped copper cable end with locking clip (16196) provided into the rear of the inner body assembly.
3. Securely tighten socket set on the power cable assembly.
4. If possible, check for gas flow through gun body after applying the gas hose assembly.
5. By following the procedures listed in Disassembly in reverse, the gun cable can now be re-assembled.
6. Check to make sure that your gun assembly has the right size current tip and liners for wire to be used.
7. Be sure replacement lines/composite body liner is cut off at the proper length. For adjustment of current tip stick-out, see page 13.
8. When trimming liner, important! Remove any sharp edges outside or inside and file if necessary.
9. When installing a new collet (11950 & 18262) be careful not to over-tighten with the collet wrench. Excessive pressure is not required due to good gripping action of the collet.
10. Current tips and nozzles should be cleaned as frequently as required. A clogged nozzle will restrict the flow of shielding gas.
11. Check regularly the condition of service hose and control wire connections leading from the feeder and power source.

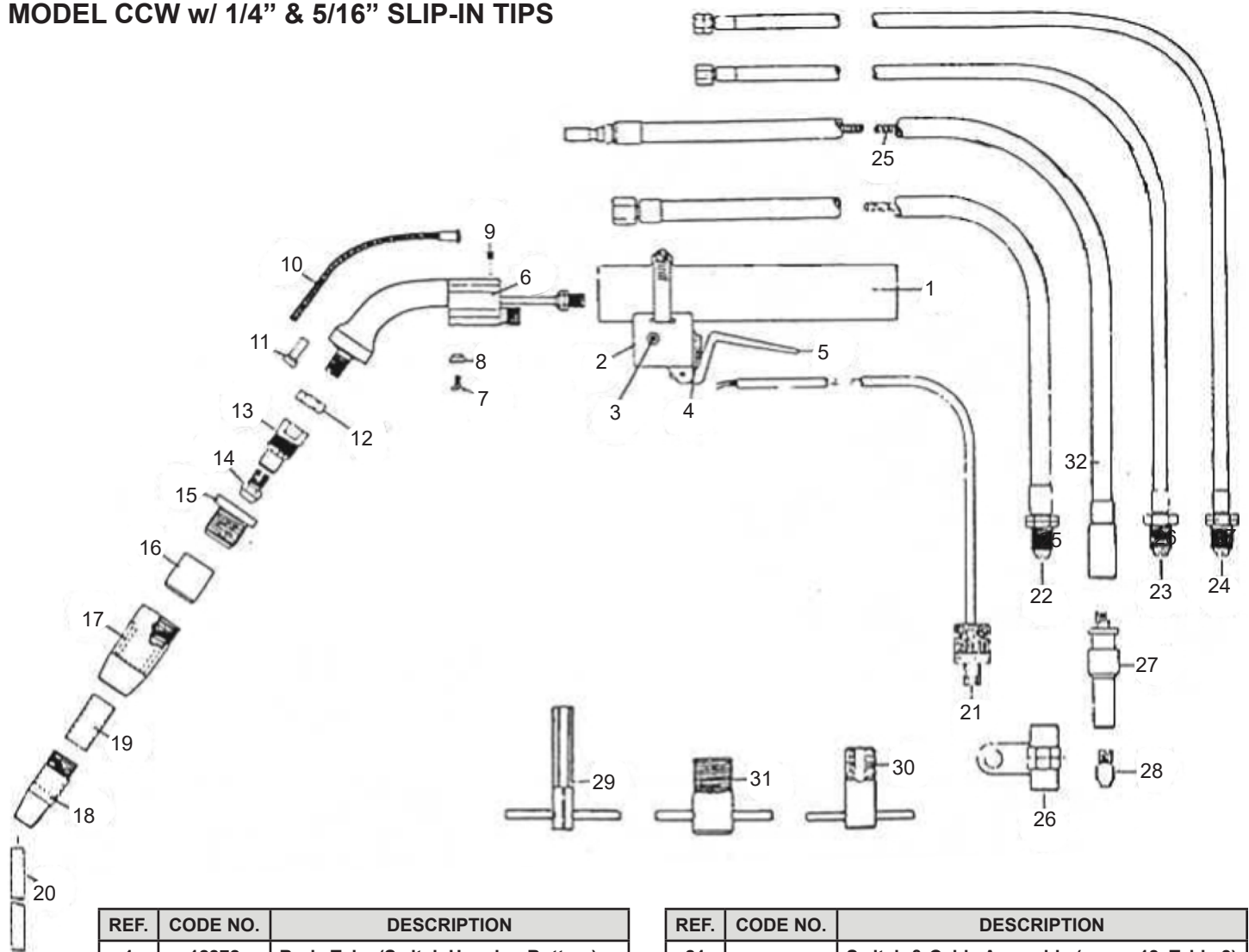
**WATER-COOLED CURVED GUN 55°**  
**MODEL CCW w/ 1/4" SLIP-IN TIP**  
**MODEL CTW w/ 7/16" THREADED TIP**



| REF. | CODE NO. | DESCRIPTION                                   |
|------|----------|---|
| 1    | 12872    | Body Tube - Std. (Switch Housing Bottom)      |
|      | 12877    | Body Tube (Switch Housing Top)                |
| 2    | 12861    | Switch Housing Assembly                       |
| 3    | 12540    | Socket Set Screw                              |
| 4    | 12145    | Button Switch (Single Mode)                   |
| 5    | 12840    | Lever   |
| 6    | 11038    | Inner Body 55 Degree                          |
| 7    | 12610    | Flat Head Screw (SS)                          |
|      | 12611    | Flat Head Screw (Nylon)                       |
| 8    | 12880    | Washer  |
| 9    | 14714    | Socket Set Screw                              |
| 10   |          | Body Liner (see p. 17)                        |
| 11   |          | Body Bushing (see p. 16)                      |
| 12   | 16202    | Adapter Jam Nut                               |
| 13   | 12019    | Adapter - 7/16" Threaded Tip                  |
| 14   | 13205    | Adapter - 1/4" Slip-In Tip                    |
| 15   | 11950    | Collet Nut                                    |
| 16   | 13163    | Insulator                                     |
| 17   | 16605    | Insulation Tube                               |
| 18   | 13176    | Nozzle Body (with Insulator)                  |
|      | 13197    | Nozzle Body (less Insulator)                  |
| 19   |          | Gas Nozzle (see p. 14, Table 4)               |
| 20   |          | Current Tip (see p. 14, Table 3)              |
| 21   | 13177    | Nozzle Body (with Insulator)                  |
|      | 13198    | Nozzle Body (less Insulator)                  |
| 22   | 10379    | Gas Nozzle                                    |
| 23   |          | Current Tip - 7/16" Th'd (see p. 14, Table 3) |

| REF. | CODE NO. | DESCRIPTION                                  |
|------|----------|--|
| 24   |          | Switch & Cable Assembly (see p. 18, Table 8) |
| 25   | 11906    | Water Out & Power Cable 10 Ft.               |
|      | 11910    | Water Out & Power Cable 12 Ft.               |
|      | 11908    | Water Out & Power Cable 15 Ft.               |
| 26   | 11846    | Gas Hose Assembly 10 Ft.                     |
|      | 11852    | Gas Hose Assembly 12 Ft.                     |
|      | 11847    | Gas Hose Assembly 15 Ft.                     |
| 27   | 12942    | Water In Hose Assembly 10 Ft.                |
|      | 12947    | Water In Hose Assembly 12 Ft.                |
|      | 12943    | Water In Hose Assembly 15 Ft.                |
| 28   |          | Liner (see p. 15, Table 5)                   |
| 29   | 14430    | Cable/Water Hose Power Coupling              |
| 30   |          | Wire Feeder Adapter (see p. 20)              |
| 31   |          | Inlet (see p. 20)                            |
| 32   | 12111    | Wrench                                       |
| 33   | 14610    | Nozzle Thread Chaser Tap (Front)             |
| 34   | 14612    | Nozzle Thread Chaser Tap (Rear)              |
| 35   |          | Casing (see p. 15, Table 6)                  |

# **WATER-COOLED CURVED GUN 55°** **MODEL CCW w/ 1/4" & 5/16" SLIP-IN TIPS**

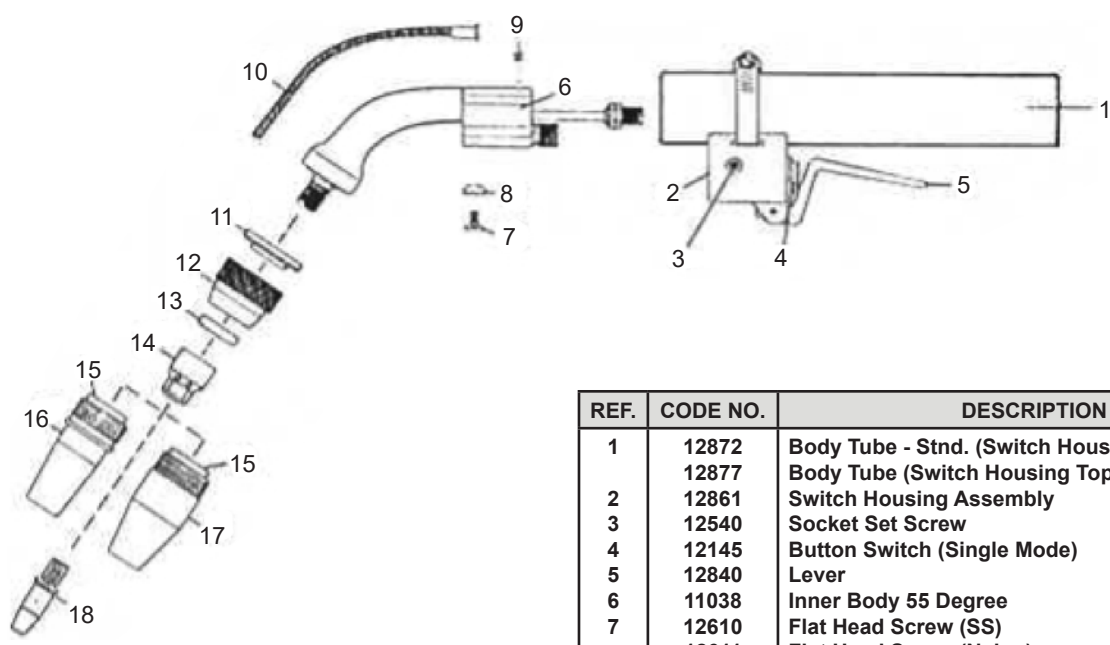


| REF. | CODE NO. | DESCRIPTION                                |
|------|----------|--|
| 1    | 12872    | Body Tube (Switch Housing Bottom)          |
|      | 12877    | Body Tube (Switch Housing Top)             |
| 2    | 12861    | Switch Housing Assembly                    |
| 3    | 12540    | Socket Set Screw                           |
| 4    | 12145    | Button Switch (Single Mode)                |
| 5    | 12840    | Lever                                      |
| 6    | 11038    | Inner Body 55 Degree                       |
| 7    | 12610    | Flat Head Screw (SS)                       |
|      | 12611    | Flat Head Screw (Nylon)                    |
| 8    | 12880    | Washer                                     |
| 9    | 14714    | Socket Set Screw                           |
| 10   |          | Body Liner (see p. 17)                     |
| 11   |          | Body Bushing (see p. 16)                   |
| 12   | 16202    | Adapter Jam Nut                            |
| 13   | 13205    | Adapter - 1/4" Slip-In Tip                 |
|      | 13209    | Adapter - 5/16" Slip-In Tip                |
| 14   | 11950    | Collet Nut - 1/4" Slip-In Tip              |
|      | 18262    | Collet Nut - 5/16" Slip-In Tip             |
| 15   | 13163    | Insulator                                  |
| 16   | 16605    | Insulation Tube                            |
| 17   | 13176    | Nozzle Body (with Insulator)               |
|      | 13197    | Nozzle Body (less Insulator)               |
| 18   | 16379    | Gas Nozzle .546"                           |
|      | 16380    | Gas Nozzle .625"                           |
| 19   | 16426    | Insulator - Gas Nozzle                     |
| 20   |          | Current Tip - Slip-In (see p. 14, Table 3) |

| REF. | CODE NO. | DESCRIPTION                                  |
|------|----------|--|
| 21   |          | Switch & Cable Assembly (see p. 18, Table 8) |
| 22   | 11906    | Water Out & Power Cable 10 Ft.               |
|      | 11910    | Water Out & Power Cable 12 Ft.               |
|      | 11908    | Water Out & Power Cable 15 Ft.               |
| 23   | 11846    | Gas Hose Assembly 10 Ft.                     |
|      | 11852    | Gas Hose Assembly 12 Ft.                     |
|      | 11847    | Gas Hose Assembly 15 Ft.                     |
| 24   | 12942    | Water In Hose Assembly 10 Ft.                |
|      | 12947    | Water In Hose Assembly 12 Ft.                |
|      | 12943    | Water In Hose Assembly 15 Ft.                |
| 25   |          | Liner (see p. 15, Table 5)                   |
| 26   | 14430    | Cable/Water Hose Power Coupling              |
| 27   |          | Wire Feeder Adapter (see p. 20)              |
| 28   |          | Inlet (see p. 20)                            |
| 29   | 12111    | Wrench                                       |
| 30   | 14610    | Nozzle Thread Chaser Tap (Front)             |
| 31   | 14612    | Nozzle Thread Chaser Tap (Rear)              |
| 32   |          | Casing (see p. 15, Table 6)                  |



**AIR-COOLED CURVED GUN 35°**  
**MODEL CTW w/ THREADED BULLET TIP**

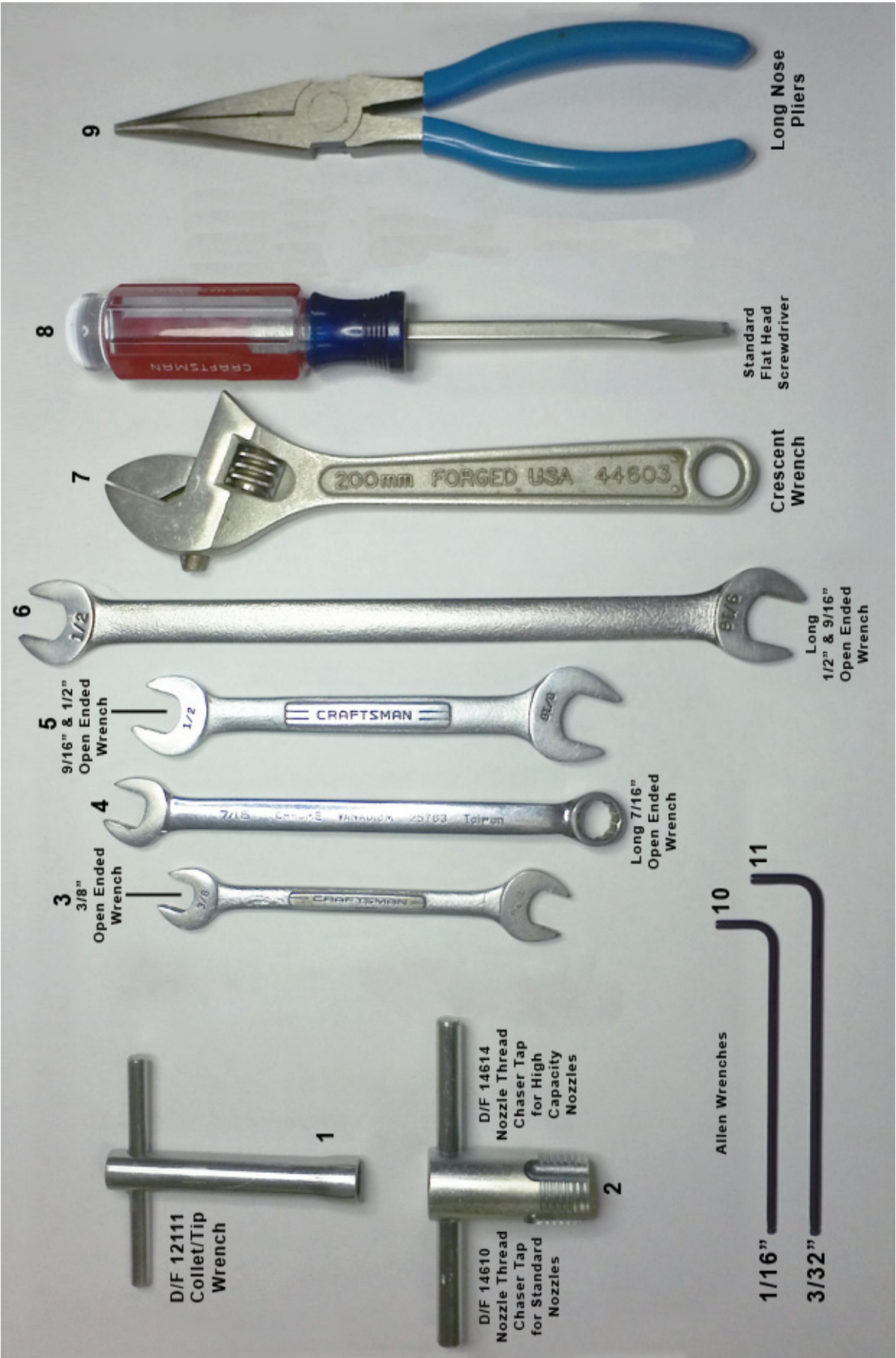


| REF. | CODE NO. | DESCRIPTION  |
|------|----------|--|
| 1    | 12872    | Body Tube - Stnd. (Switch Housing Bottom)          |
|      | 12877    | Body Tube (Switch Housing Top)                     |
| 2    | 12861    | Switch Housing Assembly                            |
| 3    | 12540    | Socket Set Screw                                   |
| 4    | 12145    | Button Switch (Single Mode)                        |
| 5    | 12840    | Lever  |
| 6    | 11038    | Inner Body 55 Degree                               |
| 7    | 12610    | Flat Head Screw (SS)                               |
|      | 12611    | Flat Head Screw (Nylon)                            |
| 8    | 12880    | Washer   |
| 9    | 14714    | Socket Set Screw                                   |
| 10   |          | Body Liner (see p. 17)                             |
| 11   | 40080    | Insulating Washer                                  |
| 12   | 40081    | Nut  |
| 13   | 40082    | Centering Washer                                   |
| 14   | 40083    | Adapter  |
| 15   | 40084    | Insulation Tube                                    |
| 16   | 40079    | Gas Nozzle 5/8" ID                                 |
| 17   | 40085    | Gas Nozzle 7/16" ID                                |
| 18   | 10909    | Current Tip - Bullet Threaded (see p. 14, Table 3) |

## REQUIRED TOOLS LIST FOR DISASSEMBLY & ASSEMBLY

1. **D/F 12111 Collet/Tip Wrench** - This is the only tool that should ever be used to tighten the collet nut or the tip. Pressure should be 30 lbs., or as snug as hand tightened. Never use another wrench to apply more torque to this wrench.
2. **D/F Nozzle Thread Chaser Taps (Front & Rear)** - This is used to re-tap damaged threads that have been improperly cleaned or cross threaded. Always blow out the nozzle and gas nozzle after changing gas cup or re-tapping. For more information on how to use the nozzle thread chaser tap, use the following link: [www.dfmachine.com/taps](http://www.dfmachine.com/taps)
3. **3/8" Open Ended Wrench**
  - A. This is used on the inner body's gas hose fitting to secure the gas hose (right-hand thread) to the torch's inner body. A crescent wrench could be used instead, but due to the large size of crescent wrenches, we prefer the smaller size of the open ended wrenches. You never want to use excessive force by using too large of a wrench. You will use the Long 7/16" Open Ended Wrench for the fitting on the gas hose itself while using the 3/8" wrench to steady the inner body at the fitting. (see #4 A)
  - B. This is used on the inner body's water in hose fitting to secure the water in hose (left-hand thread) to the torch's inner body. A crescent wrench could be used instead, but due to the large size of crescent wrenches, we prefer the smaller size of the open ended wrenches. You never want to use excessive force by using too large of a wrench. You will use the Long 7/16" Open Ended Wrench for the fitting on the water in hose itself while using the 3/8" wrench to steady the inner body at the fitting. (see #4 B)
4. **Long 7/16" Open Ended Wrench**
  - A. This is used to secure the gas hose to the torch's inner body. (see #3 A)
  - B. This is also used to secure the water in hose to the torch's inner body. (see #3 B)
5. **9/16" & 1/2" Open Ended Wrench** - This is used on the inner body's water out & power cable fitting to secure the water out and power cable to the torch's inner body. A crescent wrench could be used instead, but due to the large size of crescent wrenches, we prefer the smaller size of the open ended wrenches. We prefer the use of the larger wrenches on the power cable fitting to ensure that there are no water leaks, and that it has been seated correctly. You will use the #6 (Long 9/16" Open Ended Wrench) for the fitting on the water out & power cable hose. (see #6)
6. **Long 1/2" & 9/16" Open Ended Wrench** - This is used to secure the water out & power cable to the torch's inner body. A medium size adjustable crescent wrench could be used as well. We prefer the use of the larger wrenches on the power cable fitting to ensure that there are no water leaks, and that it has been seated correctly. (see #5)
7. **Adjustable Crescent Wrench** - A medium size adjustable crescent wrench could be used as well. We prefer the use of the larger wrenches on the power cable fitting to ensure that there are no water leaks, and that it has been seated correctly. **CAUTION:** Never use excessive force with large wrenches, for you could twist or break parts.
8. **Standard Flat Head Screwdriver** - This is used to tighten or secure the torch's body screw. Also, the screwdriver can be used to straighten the contact tip if it is not aligned in the center of the gas cup or water-cooled nozzle **CAUTION:** This cannot be done unless the spatter disc has been removed from the torch.
9. **Long Nose Pliers**
10. **1/16" Allen Wrench** - This is used to secure the socket screw that holds the button switch in the trigger assembly.
11. **3/32" Allen Wrench** - This is used to secure the socket screw that holds the casing in the inner body.

REQUIRED TOOLS LIST FOR DISASSEMBLY & ASSEMBLY



## HOW DO I CUT, FIT, AND INSTALL A NEW LINER?

1. Be sure the MIG Gun cable is arranged in a straight line, free from twists, when installing or removing a wire liner.
2. Remove the old liner by first removing the MIG gun's contact tip.
3. Pull the old wire liner out of the conduit/casing assembly from the feeder connector or feeder adapter plug end. If you are using a feeder adapter that has an inlet, the inlet must be removed first. If you have any problems removing the liner you may un-thread the feeder adapter first this will also back the liner out of the conduit/casing.
4. If you know that the old liner is the correct length or is still the original liner that was cut at the factory you may hold the new liner up against the old liner and cut off the new liner to the same size as the old liner.
5. Make sure you have a good sharp cut off with no material sticking out!
6. To get the correct length of the new liner, insert the liner into the feeder adapter and feed it through the conduit/casing.
7. Once again be sure the MIG Gun cable is arranged in a straight line, free from twists, when installing a new wire liner.
8. Sometimes on longer conduits/casings and liners it may take 2 people together; one on each end to rotate and twist the conduit/casing to get the liner through the torch.
9. If you have any troubles getting a liner through a torch make sure you have a good sharp cut off, and if you have to you can gently sand the end of the liner on a belt sander. You can remove the cast in the aluminum liner by pre-bending and straightening the liner before loading.
10. After the new liner comes out the end of the torch you want to cut the new liner off flush with the end of the copper gas nozzle or Cu gas cup.
11. Now you have the overall length of the liner, you still have to take out the length of the contact tip.
12. Carefully remove the liner one more time.
13. After removing the liner hold the gun end of the liner up against the tip.
14. Cut off the length off the tip plus the set back of the tip (1/8" or 3/8" tip setbacks)
15. Now that you have cut off the length of the tip plus the setback you may install the new liner and it will back up into the back of the tip chamfer.
16. We always recommend checking the condition of the insulation tube in the front of the torch and collet nut that holds the slip-in tip.
17. We always recommend replacing the spatter disc/gas diffuser, contact tip, and nozzle, after installing a new liner.
18. Tighten the flat head set screw in the inner body, or the Allen set screw in the docking spool onto the conduit/casing to prevent backward movement or an unwanted pumping action.

## WHAT IS THE PROPER USE OF THE NOZZLE THREAD CHASER TAP?

All D/F Nozzles are hand checked for fit before and after plating, and checked again before shipping. If a nozzle has been installed on a new complete torch, they have also been hand checked while being assembled.

The only reason to ever take a gas cup out a nozzle is to clean it. The nozzle and the gas cup must be blown out, and all of the threads have to be wire brushed and blown out again before hand-tightening the gas cup back into the nozzle. If you can't thread it in by hand then something is wrong. Never force a gas cup into a nozzle.

When using the D/F Machine Specialties nozzle thread chaser taps, be sure to always follow the steps below:

1. Make sure that the nozzle is properly supported when tapping so it does not twist in the front of the torch body and cause damage.
  - Improper support can cause the spigots to twist off the top of the rear nozzle collar, or damage the torch internal body parts.
  - Note where the water ports go down the sides of the water-cooled nozzle (following down in line with the spigots). Too much direct pressure on these water ports could cause them to cave in and block of the flow of water.
  - Best practice is to hold the water-cooled nozzle in a vice with soft jaws, perpendicular to the spigots.
  - Over-tightening of the vice can cause damage in general.
2. Remove the tip from the front of the torch before tapping.
3. Lightly lubricate the nozzle and nozzle thread chaser tap before tapping.
4. Be sure to start the tap very carefully. Do not cross thread the nozzle.
5. Be very careful to start threads correctly. Only tap 1/2 turn at a time, always backing up and removing chips 1/2 cycle at a time before moving forward. Do not try to tap further into the water-cooled nozzle than needed or past the factory thread depth.
6. Blow out the nozzle after tapping. Wire brush and blow off the gas cup before threading it back into the nozzle.
7. If nozzle is badly deformed or damaged please return to the factory for a repair estimate before disposing of product (damaged parts can often be repaired).

### ORDERING INFORMATION - NOZZLE THREAD CHASER TAPS

| CODE NO. | DESCRIPTION   | USED WITH<br>NOZZLE ASSEMBLY  | USED FOR<br>GAS NOZZLE                                      |
|----------|---|---|---|
| 14610    | Nozzle Thread Chaser Tap<br>for Standard A/C & W/C<br>Nozzle Assembly Front     | 13197<br>16184<br>11117, 45101<br>11118, 45102<br>11119, 45103<br>45114<br>45107<br>NCC-N/HTC-N<br>NCC-LRN, HTC-LRN | 10340<br>10359<br>10362<br>10374                            |
| 14611    | Nozzle Thread Chaser Tap<br>for BIG MIG & BIG TIG<br>Nozzle Assembly Front      | 11123   | 10382<br>10387<br>10389<br>10390<br>10392                   |
| 14612    | Nozzle Thread Chaser Tap<br>for Nozzle Body<br>Assembly Rear                    | 13196<br>13197<br>13198<br>16184  |   |
| 14614    | Nozzle Thread Chaser Tap<br>for Series A High-Capacity<br>Nozzle Assembly Front | 11142, 45120<br>11138, 45121<br>45127<br>11132, 45129<br>45125  | 16748<br>16749<br>16750<br>16751<br>18030<br>18031<br>18032 |
| 14615    | Nozzle Thread Chaser Tap<br>for Nozzle Body<br>Assembly Front                   | 13198   | 10379   |
| 14617    | Nozzle Thread Chaser Tap<br>for Tandem Nozzle<br>Assembly Front                 | 41641   | 41667<br>41668  |



## TABLE 3 - CURRENT TIPS

CURRENT TIPS - 2-1/2" SLIP-IN - 1/4" DIAMETER

| Gun/Barrel Model                                 | Wire Size | Wire Type | Code No. |
|--|-----------|-----------|----------|
| All NC, NCC, NCM<br>(Tip provides 1/8" set back) | .030"     | Hard      | 10794    |
|  | .035"     | Hard      | 10795    |
|  | .045"     | Hard      | 10796    |
|  | .052"     | Hard      | 10840    |
|  | 1/16"     | Hard      | 10797    |
| All NC, NCC, NCM<br>(Tip provides 1/8" set back) | 3/64"     | Aluminum  | 10785    |
|  | 1/16"     | Aluminum  | 10786    |



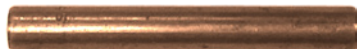
CURRENT TIPS - BULLET THREADED

| Gun/Barrel Model                        | Wire Size | Wire Type | Code No. |
|---|-----------|-----------|----------|
| CCW, CTW<br>For Mini Nozzle Arrangement | .030"     | Hard      | 10909    |
|   | .035"     | Hard      | 10910    |
|   | .045"     | Hard      | 10911    |
|   | .052"     | Hard      | 10912    |
|   | 1/16"     | Hard      | 10918    |



CURRENT TIPS - 2-1/2" SLIP-IN - 5/16" DIAMETER

| Gun/Barrel Model                                 | Wire Size | Wire Type | Code No. |
|--|-----------|-----------|----------|
| All NC, NCC, NCM<br>(Tip provides 1/8" set back) | .030"     | Hard      | 19390    |
|  | .035"     | Hard      | 19391    |
|  | .045"     | Hard      | 19392    |
|  | .052"     | Hard      | 19393    |
|  | 1/16"     | Hard      | 19394    |
|  | 5/64"     | Hard      | 19711    |
|  | 3/32"     | Hard      | 19726    |
|  | 7/64"     | Hard      | 19396    |
|  | 1/8"      | Hard      | 19727    |
| All NC, NCC, NCM<br>(Tip provides 3/8" set back) | .035"     | Cored     | 19400    |
|  | .045"     | Cored     | 19401    |
|  | .052"     | Cored     | 19402    |
|  | 1/16"     | Cored     | 19403    |
|  | 5/64"     | Cored     | 19404    |
|  | 3/32"     | Cored     | 19405    |
|  | 7/64"     | Cored     | 19406    |
|  | 1/8"      | Cored     | 19720    |
| All NC, NCC, NCM<br>(Tip provides 1/8" set back) | 3/64"     | Aluminum  | 19407    |
|  | 1/16"     | Aluminum  | 19408    |
|  | 5/64"     | Aluminum  | 19728    |
|  | 3/32"     | Aluminum  | 19409    |



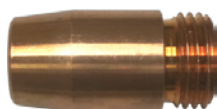
CURRENT TIPS - 7/16" DIAMETER THREADED

| Gun/Barrel Model  | Wire Size | Wire Type | Code No. |
|---|-----------|-----------|----------|
| All HT, HTC, HTM, CTW, CW-T,<br>MTW<br>(Tip provides 1/8" set back) | .035"     | Hard      | 15116    |
|   | .045"     | Hard      | 15117    |
|   | .052"     | Hard      | 15121    |
|   | 1/16"     | Hard      | 15118    |
|   | 5/64"     | Hard      | 15119    |
|   | 3/32"     | Hard      | 15120    |
|   | 7/64"     | Hard      | 15122    |
|   | 1/8"      | Hard      | 15105    |
| All HT, HTC, HTM, CTW, CW-T,<br>MTW<br>(Tip provides 3/8" set back) | .035"     | Cored     | 15101    |
|   | .045"     | Cored     | 15106    |
|   | .052"     | Cored     | 15112    |
|   | 1/16"     | Cored     | 15107    |
|   | 5/64"     | Cored     | 15108    |
|   | 3/32"     | Cored     | 15109    |
|   | 7/64"     | Cored     | 15110    |
|   | 1/8"      | Cored     | 15111    |
| All HT, HTC, HTM, CTW, CW-T,<br>MTW<br>(Tip provides 1/8" set back) | 3/64"     | Aluminum  | 15126    |
|   | 1/16"     | Aluminum  | 15125    |
|   | 5/64"     | Aluminum  | 15087    |
|   | 3/32" Sm. | Aluminum  | 15124    |
|   | 3/32" Lg. | Aluminum  | 15148    |
|   | 1/8"      | Aluminum  | 15123    |



## TABLE 4 - GAS NOZZLES

| Gun Model | Ref. | Nozzle Type       | O.D.   | I.D.  | Code No. |
|-----------|------|-------------------|--------|-------|----------|
| CA-C/CA-T | 1    | Copper Tapered    | 63/64" | 5/8"  | 10362    |
|           | 2    | Copper Straight   | 1"     | 3/4"  | 10340    |
|           | 3    | Copper Full Taper | 63/64" | 5/8"  | 10359    |
|           | 4    | Copper Straight   | 5/8"   | 7/16" | 10374    |
|           | 5    | Tapered           |        | 5/8"  | 40079    |
|           | 6    | Tapered           |        | 7/16" | 40085    |
|           | 7    | Tapered           |        | 1/2"  | 40086    |



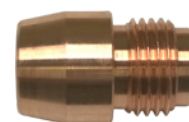
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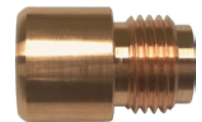
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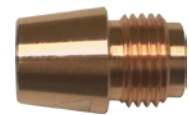
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1



2



3



4

**TABLE 5 - LINERS**

| Description | Wire Size      | 2 Ft. | 3 Ft. | 4 Ft. | 5 Ft. | 6 Ft. | 7 Ft. | 8 Ft. | 10 Ft. | 12 Ft. | 15 Ft. |
|-------------|----------------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|
| Hard        | .030"          | -     | 14130 | 14131 | 14132 | 16818 | 16819 | 16820 | 12320  | 12321  | 12322  |
| Hard/Cored  | .035"-.045" ** | 16443 | 16444 | 16445 | 16446 | 16447 | 16448 | 16449 | 16407  | 16408  | 16409  |
| Hard/Cored  | .045"-1/16" ** | 16147 | 16148 | 16149 | 16150 | 16151 | 16152 | 16153 | 16119  | 16120  | 16121  |
| Stainless   | .035"-.045" ** | 16154 | 16155 | 16156 | 16157 | 16158 | 16159 | 16160 | 12336  | 12337  | 12338  |
| Stainless   | .045"-1/16" ** | 16501 | 16502 | 16503 | 16504 | 16505 | 16506 | 16507 | 16508  | 16509  | 16510  |
| Aluminum    | 3/64" **       | 16833 | 14146 | 14148 | 14150 | 16618 | 16619 | 12410 | 12411  | 12412  | 12413  |
| Aluminum    | 1/16" **       | 16834 | 14152 | 14154 | 14156 | 14164 | 16620 | 12401 | 12402  | 12416  | 12404  |
| Aluminum    | 3/32" **       | 16835 | 14158 | 14160 | 14162 | 14165 | 16769 | 16602 | 16602  | 12417  | 12426  |

\*\* Liners to be used with double asterisk casing

**TABLE 6 - CASINGS**

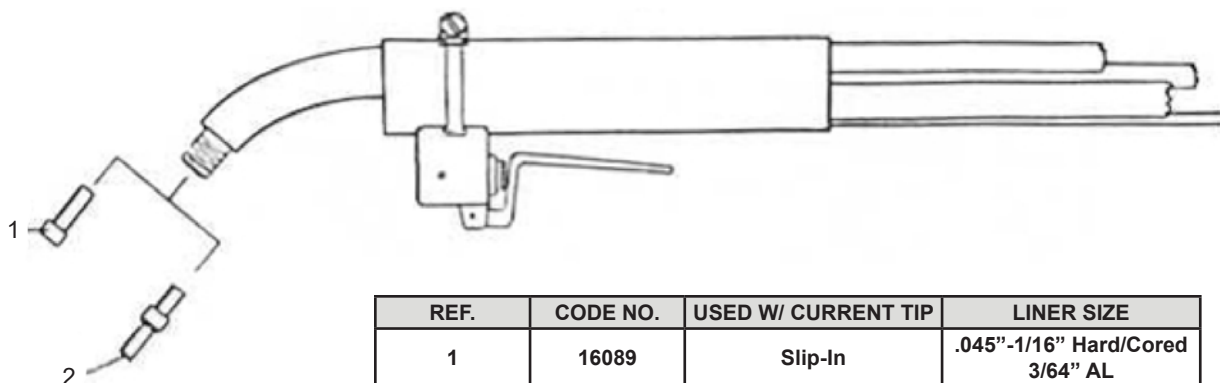
| Description                  | Wire Size      | 2 Ft. | 3 Ft. | 4 Ft. | 5 Ft. | 6 Ft. | 7 Ft. | 8 Ft. | 10 Ft. | 12 Ft. | 15 Ft. |
|------------------------------|----------------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|
| Casing Assembly (Flexible)   |                |       |       |       |       |       |       |       |        |        |        |
| Select Liner                 | .030"          | 14440 | 14441 | 14442 | 14443 | 12291 | 12292 | 12285 | 12286  | 12287  | 12290  |
| Select Liner                 | .035"-1/16" ** | 14444 | 14445 | 14446 | 14447 | 16173 | 16561 | 13565 | 13751  | 13757  | 13752  |
| Casing Assembly (Reinforced) |                |       |       |       |       |       |       |       |        |        |        |
| Single Piece                 | .035"-.045"    | 16735 | 16736 | 16737 | 16738 | 16739 | 16740 | 16512 | 15988  | 15991  | 16055  |
| Single Piece                 | .045"-1/16"    | 15750 | 15751 | 15752 | 15753 | 15754 | 15755 | 16513 | 12380  | 12383  | 12386  |
| Single Piece                 | 5/64"-3/32"    | 15729 | 15730 | 15731 | 15732 | 15733 | 15734 | 15735 | 12441  | 12449  | 12443  |
| Single Piece                 | 7/64"-1/8"     | 15740 | 15741 | 15742 | 15743 | 15744 | 15745 | 16515 | 12445  | 12448  | 12446  |

\*\* Liners to be used with double asterisk casing

**TABLE 7 - RECOMMENDED SPARE PARTS**

| ITEM            | CODE NO.       | MIN QTY. |
|-----------------|----------------|----------|
| Gas Nozzle      | To Be Selected | 2        |
| Current Tip     | To Be Selected | 25       |
| Collet Nut      | To Be Selected | 1        |
| Body Liner      | To Be Selected | 2        |
| Insulation Tube | To Be Selected | 1        |
| Insulator       | 13163          | 1        |
| Insulator       | 16605          | 1        |

## OPTIONAL BODY BUSHING USE WITH .045"/.62" LINERS



## REPLACEMENT OF BODY BUSHING

1. Remove the current tip and nozzle body with insulator to expose inner body adapter.
2. Using two 5/8" open end wrenches, support the inner body adapter with one wrench, and with the other release the jam nut which secures the adapter to the inner body. The adapter may now be removed.
3. Slip the body bushing into inner body and reapply the adapter. Make certain that the jam nut is applied to the adapter.

## FITTING REPLACEABLE LINERS TO CASING ASSEMBLIES

The recommended method of cutting liners to size is as follows:

1. All repairs and adjustments to gun assemblies are made with the power sources and feeder turned off.
2. Place gun and casing assembly as flat as possible on workbench (floor) keeping service lines straight.
3. Remove the inlet or adapter depending on the feeder make. Slack off switch housing clamp; remove the inner body fastening screw. The body housing may now be pulled back to expose the inner body. The set screw fastening the casing may now be released and the casing may be taken out of the inner body. NOTE: Use a short piece of liner material for pushing used liners back.
4. Now carefully push the new liner in at the adapter end.
5. Cut liner off even at the gun end casing fitting.
6. Liner is now cut to size and the gun may be reassembled.

## COMPOSITE BODY LINERS

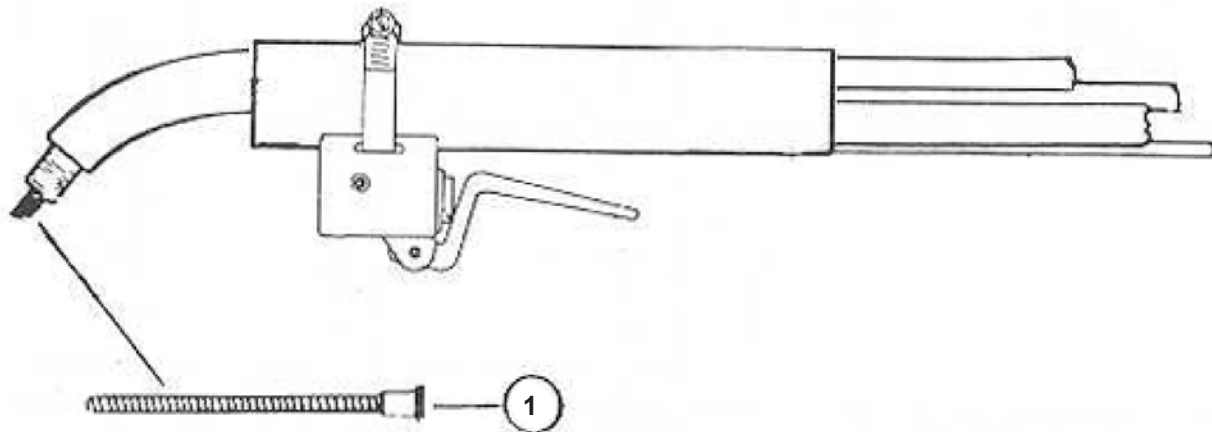
### REQUIRED WITH SINGLE PIECE CASING OR CASINGS THAT USE REPLACEABLE LINERS

#### Model CA-C - Pre-Fit Body Liner Used with Slip-In Tip

| CODE NO. | DESCRIPTION          | SIZE WIRE         | TYPE WIRE  |
|----------|----------------------|-------------------|------------|
| 18083    | Composite Body Liner | .030"-.035"       | Hard/Cored |
| 18084    | Composite Body Liner | .035"-.045"       | Hard/Cored |
| 18085    | Composite Body Liner | .045"-.052"-1/16" | Hard/Cored |
| 16386    | Composite Body Liner | 3/64"             | Soft       |
| 19024    | Composite Body Liner | 1/16"             | Soft       |
| 19025    | Body Liner           | 5/64"             | Cored      |

#### Model CA-T - Pre-Fit Body Liner Used with Threaded Tip

| CODE NO. | DESCRIPTION          | SIZE WIRE         | TYPE WIRE  |
|----------|----------------------|-------------------|------------|
| 18086    | Composite Body Liner | .030"-.035"       | Hard/Cored |
| 18087    | Composite Body Liner | .035"-.045"       | Hard/Cored |
| 18088    | Composite Body Liner | .045"-.052"-1/16" | Hard/Cored |
| 18089    | Body Liner           | 5/64"-7/64"       | Cored      |



## FITTING COMPOSITE BODY LINERS AND GUN BODY LINERS

Gun body liners may be changed to accommodate different types of tips and liner with /casing combinations.

1. All repairs and adjustments to gun assemblies are made with the power source and feeder turned off.
2. Loosen current tip and unscrew nozzle body from the adapter.
3. Remove the handle screw and insulating washer, slack of the switch housing clamp, and slide back the body housing on service lines.
4. Release the jam nut which secures the adapter to the inner body and remove the adapter from the curved body.
5. Push existing liner out the rear of the curved body.
6. Carefully push the new body liner or composite liner into the rear of the curved body.
7. Cut as recommended below:
  - a. For a 1/8" set back of threaded type current tips, allow 5/8" length of body liner extend out of the gooseneck body.
  - b. For 1/8" set back of slip-in type current tips, allow 5/16" length of body liner to extend out of the gooseneck body.
8. Replace the casing and check all connections at the gun body; tighten body screw with insulator.
9. Apply the adapter jam nut and adapter to the inner body and replace the nozzle body assembly.
10. Proceed with casings and liners as outlined.
11. Apply the current tip.

**TABLE 8 - SWITCH & CABLE ASSEMBLIES**

| Code No. | Feeder Manufacturer - Model No.                              | Type Of Connector | Length |
|----------|--|-------------------|--------|
| 12166    | Miller "50" Series   | AMP               | 10 Ft. |
| 11174    | OTC CMRE-741 & 742   | Amphenol - 2 Pin  | -      |
| 11159    | Hobart-Airco-Westinghouse                                    | Amphenol - 3 Pin  | -      |
| 11173    | Oxo All-Auto Arc   | Amphenol - 4 Pin  | -      |
| 16140    | Lincoln LN-7, LN-8, LN-9, Power Feed 10, LF-72, LF-74, PF-84 | Amphenol - 5 Pin  | -      |
| 11182    | Miller "30" Series-Linde/ESAB31/35                           | Hubbell - 2 Blade | -      |
| 16107    | Hobart 27  | Phone Jack        | -      |
| 12167    | Miller "50" Series   | AMP               | 12 Ft. |
| 11176    | OTC CMRE-741 & 742   | Amphenol - 2 Pin  | -      |
| 16122    | Hobart-Airco-Westinghouse                                    | Amphenol - 3 Pin  | -      |
| 11177    | Oxo All-Auto Arc   | Amphenol - 4 Pin  | -      |
| 16141    | Lincoln LN-7, LN-8, LN-9, Power Feed 10, LF-72, LF-74, PF-84 | Amphenol - 5 Pin  | -      |
| 11183    | Miller "30" Series-Linde/ESAB31/35                           | Hubbell - 2 Blade | -      |
| 16108    | Hobart 27  | Phone Jack        | -      |
| 12168    | Miller "50" Series   | AMP               | 15 Ft. |
| 11178    | OTC CMRE-741 & 742   | Amphenol - 2 Pin  | -      |
| 11160    | Hobart-Airco-Westinghouse                                    | Amphenol - 3 Pin  | -      |
| 11175    | Oxo All-Auto Arc   | Amphenol - 4 Pin  | -      |
| 16142    | Lincoln LN-7, LN-8, LN-9, Power Feed 10, LF-72, LF-74, PF-84 | Amphenol - 5 Pin  | -      |
| 11184    | Miller "30" Series-Linde/ESAB31/35                           | Hubbell - 2 Blade | -      |
| 16109    | Hobart 27  | Phone Jack        | -      |
| Code No. | DESCRIPTION (PLUG ONLY)                                      | Type Of Connector |        |
| 12162    | Miller "50" Series   | AMP               |        |
| 13850    | OTC CMRE-741 & 742   | Amphenol - 2 Pin  |        |
| 12160    | Hobart-Airco-Westinghouse                                    | Amphenol - 3 Pin  |        |
| 14731    | Oxo All-Auto Arc   | Amphenol - 4 Pin  |        |
| 14734    | Lincoln LN-7, LN-8, LN-9, Power Feed 10, LF-72, LF-74, PF-84 | Amphenol - 5 Pin  |        |
| 13317    | Miller "30" Series-Linde/ESAB31/35                           | Hubbell - 2 Blade |        |
| 13431    | Hobart 27  | Phone Jack        |        |



UTILITY STATION - STANDARD

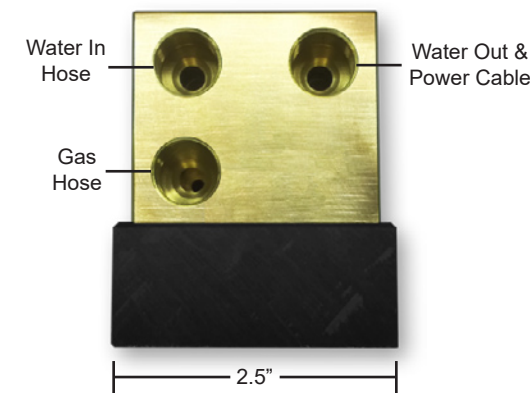
ORDERING INFORMATION

| Description                        | Code No. |
|------------------------------------|----------|
| Utility Station                    | 45196    |
| Utility Station - Dual Power Cable | 45188    |

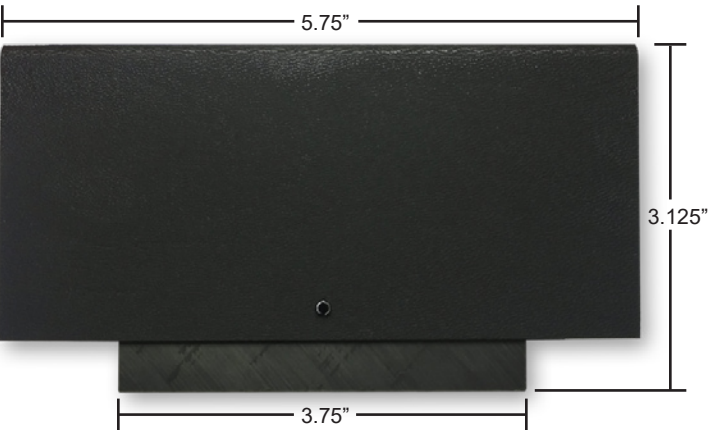
DIMENSION SPECIFICATIONS

|                               |          |
|-------------------------------|----------|
| Base Length                   | 3.75"    |
| Overall Length                | 5.75"    |
| Base Width                    | 2.25"    |
| Overall Width                 | 2.5"     |
| Overall Height                | 3.125"   |
| Mounting Hole Center Distance | 2.75"    |
| Overall Weight                | 3.5 lbs. |

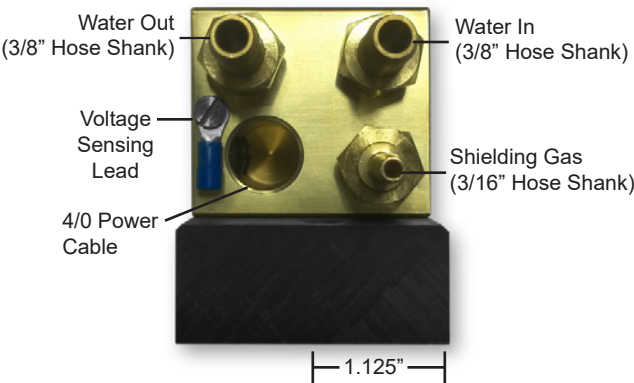
D/F TORCH CONNECTION



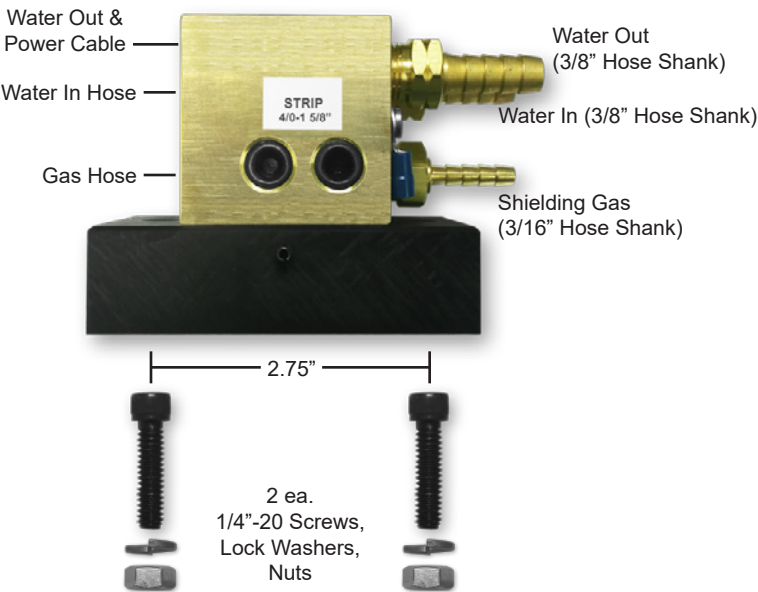
UTILITY STATION SIDE VIEW WITH COVER



CUSTOMER UTILITIES CONNECTION



FROM LEFT: D/F TORCH CONNECTION  
FROM RIGHT: CUSTOMER UTILITIES CONNECTION



## WIRE FEEDER ADAPTERS & INLETS

| Manufacturer        | Models                                  | Wire Diameter   | Remote Mount Adapter    |                                  |                | Direct Mount Adapter    |       |
|---------------------|---|---|-------------------------|----------------------------------|----------------|-------------------------|-------|
|                     |   |   | Hard or AL              | Cored                            | Stub* Liner    | Hard or AL              | Cored |
| ESAB®               | D20 (20mm)                              | .030"-3/32" H/C/AL<br>5/64"-1/8" H/C  | 13098                   | 13099                            | *              | 13096                   | 13097 |
| ESAB®               |   |   | 18246                   | 18247                            | *              | 18248                   | 18249 |
| EURO                |   |   | 18493                   | 18493                            |                | 18540                   | 18540 |
| Hobart®             | All Models                              | .030"-3/32" H/C/AL<br>5/64"-1/8" H/C  | 13067                   | 16087                            | *              | 13068                   | 16225 |
| Lincoln®            | LN-7, LN-8, NA5-R                       | .030"-3/32" H/C/AL<br>5/64"-1/8" H/C  | 13110                   | 13112                            | *              | 13113                   | 13116 |
|                     | LN-9                                    | .030"-3/32" H/C/AL<br>5/64"-1/8" H/C  | 16581                   | 16582                            | *              | 16528                   | 16529 |
|                     | NA3, NA5                                | .030"-3/32" H/C/AL<br>5/64"-1/8" H/C  | 16879                   | 16878                            | *              | 16880                   | 16881 |
| "BIG MIG"           | NA3, NA5                                | .030"-3/32" H/C/AL<br>5/64"-1/8" H/C  | 16879                   | 16878                            | *              | 16888                   | 16888 |
| Lincoln®            | Power-Feed 10, LF-72, LF-74             | .030"-3/32" H/C/AL<br>5/64"-1/8" H/C  | 13479                   | 13469                            | *              | 13480                   | 13468 |
| Linde®              | SWM31<br>SWM34<br>SWM37<br>SWM38<br>EH8 | Casing to Feeder (Accepts Linde® Outlet Guide)  | 13046                   |                                  |                | 13046                   |       |
|                     |   | D/F Insert<br>.035"-.045" Hard<br>.045"-1/16" Hard<br>5/64"-3/32" Cored<br>3/64"-1/16" AL | 13047<br>13048<br>13050 | 13049                            |                | 13047<br>13048<br>13050 | 13049 |
|                     |   |   |                         |                                  |                |                         |       |
|                     | EH10                                    | .030"-3/32" H/C/AL<br>5/64"-1/8" H/C  | 13043                   | 13052                            | *              | 13080                   | 13079 |
| Mavrix®             | PA-10                                   | .030"-3/32" H/C/AL<br>5/64"-1/8" H/C  | 16556                   | 16568                            | Requires Inlet |                         |       |
| Miller® (50 Series) |   | .030"-3/32" H/C/AL<br>5/64"-1/8" H/C  | 16557                   | 16559                            | *              | 16558                   | 16560 |
| OTC®                | Requires Insert                         | .030"-1/8"<br>.030"-1/8"  | 18268                   |                                  | *              | 18275                   |       |
|                     | CMRE-741                                |   | 18282                   |                                  |                | 18282                   |       |
| Panasonic®          | PME-12X<br>YW50AKW1                     | .030"-1/16"<br>.030"-1/16"  | 13090<br>13466          | Requires Inlet                   |                |                         |       |
| TWECO®              | #4                                      | .030"-3/32" H/C/AL<br>5/64"-1/8" H/C  | 13479                   | 13469                            | *              | 13480                   | 13468 |
| Welding Alloys®     |   | .030"-3/32" H/C/AL<br>5/64"-1/8" H/C  |                         | Requires Liner<br>Requires Inlet |                | 13486                   | 13486 |

\*Stub liners only required in feeder adapter when single-piece casing is used.

### ORDERING INFORMATION

Each D/F gun is fully assembled and ready to install. In order to make the installation complete, the code number, wire size & type, make/model of wire feeder, and inlet as needed must be specified when ordering. If special welding tools or accessories other than those listed previously are required, please consult with the factory.

### FEEDER ADAPTER INLETS

| Wire Size | Steel Code No. | Brass Code No. | Nylon Code No. |
|-----------|----------------|----------------|----------------|
| .030"     | 13801          | 16417          |                |
| .035"     | 13803          | 16418          |                |
| .045"     | 13806          | 16419          |                |
| .052"     | 13844          | 16420          |                |
| 1/16"     | 13809          | 16421          |                |
| 5/64"     | 13812          | 16422          |                |
| 3/32"     | 13814          | 16422          |                |
| 7/64"     | 13816          |                |                |
| 1/8"      | 13842          |                |                |
| 3/64" AL  |                |                | 13807          |
| 1/16" AL  |                |                | 13810          |
| 3/32" AL  |                |                | 13815          |

Esab®, Hobart®, Lincoln®, Linde®, Miller®, OTC®, Panasonic®, ABB®, Fanuc®, Kuka®, Mavrix®, Motoman®, Thermal Arc®, TWECO®, & Welding Alloys® are registered trademarks of their respective companies. Names are mentioned for reference only. D/F Machine Specialties is in no way affiliated with these companies.

# TROUBLESHOOTING: POROSITY (SUMMARY)

NOTE: Most POROSITY is caused by gas problems, followed by base metal contamination.

## Causes of Porosity

### BASE METAL CONTAMINATION

Impurities on base metal

### FILLER METAL CONTAMINATION

Impurities on filler metal (wire)

### ATMOSPHERIC CONTAMINATION

Drafts, wind, fans, etc.

### GAS MIXING APPARATUS

1. Too high a gas flow, causing turbulence, and/or sucking air at hose connections; creating the venturi effect at end of gas nozzle
2. Too low a gas flow, causing insufficient gas coverage
3. Damaged or kinked gas lines
4. Too high an oxygen content
5. Leaks in gas distribution system
6. Other impurities in gas - moisture, etc.
7. Inconsistent gas flow (cfh) at the torch connection

### GAS TURBULENCE

1. Excessive spatter build-up in gas nozzle and on current tip
2. Nozzle damage, causing uneven gas coverage
3. Torch gas ports clogged or deformed
4. Super-heated nozzle, causing shielding gas to expand rapidly and create return effect at end of nozzle
5. Gas diffuser/nozzle insulator missing
6. Too high a gas flow causing the venturi effect

### WELDING PARAMETERS, ETC.

1. Too long a wire stick-out; gas nozzle too far from weld puddle
2. Bad torch position - too sharp a torch incline causing the venturi effect at the end of the nozzle leading to atmospheric contamination
3. Excessively wide weld pool for nozzle I.D.
4. Arc voltage too high
5. Too high a travel speed

## Possible Solutions

- a. Remove contamination; clean surfaces
- b. Use of specific wire/gas mix for specific types of impurities

- a. Replace wire
- b. Install wire-cleaning system
- c. Prevent industrial dust/dirt/grit from contaminating wire during storage or use
- d. Prevent build-up of aluminum oxide on exposed aluminum wire surface by using up quickly
- e. Remove wire from wire drive unit and store in a sealed plastic bag when not in use for long periods

- a. Protect weld from drafts (curtains/screens)
- b. Use tapered or bottleneck gas nozzles when drafts cannot be avoided

- 1a. Reduce gas flow
- 1b. Tighten all hose connection points
2. Increase gas flow
3. Repair or replace
4. Adjust mixer
5. Repair leaks
6. Overhaul system; fit filters and/or dryers
7. Regulate pressure into flow meter for consistent cfh delivery of gas

1. Clean nozzle and tip regularly; spray with anti-spatter fluid
2. Replace nozzle
3. Clean or replace
4. Check duty cycle rating of torch
5. Replace
6. Reduce gas flow

1. Use longer nozzle or adjust stick-out (3/8" minimum or 15 times wire diameter)
2. Correct torch angle
3. Width of the weld pool should be 1.3 times the nozzle I.D.; use suitable wider gas nozzle
4. Reduce voltage
5. Reduce speed

# TROUBLESHOOTING: SPATTER

## Problems/Causes

### SPATTER

Too fast or too slow wire feed for the arc voltage

Too long an arc

Damaged current tip

Inclination of welding gun too great

Faulty power source

Incorrect start

Incorrect pulse parameters

Uneven wire feed

Impurities on the base metal

Poor ground contact

Too long stick-out (short-arc welding)

Incorrect polarity

## Possible Solutions

Set the wire feed rate and voltage in accordance with good welding practices as recommended by a qualified welding engineer.

Adjust the wire feed and voltage so that the arc is in accordance with good welding practice for the joint to be welded. The distance from the current tip to the workpiece should be 15 times the welding wire diameter. If the arc is too long there will be spatter, usually in the direction of the weld.

If the current tip becomes worn the welding wire will not be in constant contact with the tip and the arc will become unstable. A current tip contaminated with spatter will cause uneven wire feed resulting in further spatter.

The angle of the gas nozzle relative to the workpiece should be between 45 and 90 degrees. If the angle is too small, the wire runs parallel to the weld pool, resulting in spatter in the direction of the welding.

Have the power source checked for faulty conditions such as broken wires and faulty contacts.

A great deal of spatter occurs if the stick-out is too great and if the welding gun is held too far from the workpiece when striking the arc. Try to start with as short a stick-out as possible and with the welding gun as close to the starting point as possible. If a large ball end is formed on the end of the welding wire, remove it by cutting the wire with sharp wire cutters. It is helpful if the wire is cut to a point. Always remove the ball end before striking an aluminum arc. Check the welding ground connection.

Check the user manual for your power supply or consult a qualified welding engineer.

Uneven wire feed gives rise to heavy spatter. Find the cause of the disturbance and correct the condition before proceeding.

Paint, mill scale, rust and other contamination on the base metal form an insulating layer causing an unstable arc that results in heavy spatter. Clean the surfaces to be welded.

Inspect ground cable for loose connections, fraying and cuts. Correct any problem areas found and attach the ground cable directly to the workpiece after having cleaned the contact surface first. POOR GROUND CONTACT IS THE MOST COMMON CAUSE OF UNSTABLE MIG WELDING CONDITIONS.

The stick-out should be 15 times the diameter of the wire electrode being used. With increasing stick-out, the current is reduced and the arc voltage rises, giving a longer unstable arc and increased spatter.

Check for correct polarity. Follow the electrode manufacturer's recommendations.

# TROUBLESHOOTING: GENERAL GUIDE

## Problems/Causes

## Possible Solutions

### ERRATIC WIRE FEED

Slipping feed rolls

Check that the feed roll size is correct for the wire size being used. Increase the drive roll pressure until the wire feed is even. Do not apply excessive pressure as this can damage the wire surface, causing copper coating to loosen from steel wires or metal shavings to be formed from soft wires like aluminum. These metal fragments or shavings can be drawn into the wire feed conduit and will rapidly clog the liner. When welding with flux-cored wires, excessive drive roll pressure may open the wire seam and allow flux or metal powders to escape.

Clogged or worn gun liner

a. Dust, particles of copper, drawing lubricants, metal or flux and other forms of contamination can all clog the liner so that the wire feed is slowed or impeded. A liner that has been in use for an extended period of time becomes worn and filled with dirt and must be replaced.

b. When changing the welding wire, remove the tip from the front end of the gun and blow out the body liner with clean, dry compressed air from the back of the gun. Repeat with the casing and liner assembly. Note: Wear safety goggles when using compressed air to clean the liners. Make sure proper safety procedures are followed in order to avoid possible serious eye injury.

Liners too long or too short

Check the lengths of the liners and trim or replace if too long or too short. The efficient feeding of the welding wire is dependent on the liners fitting correctly.

Spatter on the wire

An unprotected coil of wire quickly collects dust and other airborne contamination. If grinding is being performed in the vicinity, particles can become attached to the wire, severely interfering with the wire feed. Replace with clean wire and keep it protected with a cover. Make sure spare wire rolls are stored in a clean, dry place.

Coil brake incorrectly adjusted

Set the brake so that the coil immediately stops rotating as soon as welding is interrupted. If the brake is applied too hard it will cause the feed rolls to slip, resulting in uneven wire feed. If it is too loose, overrun of the wire will occur, causing wire tangles, inconsistent tension on the feed mechanism and irregular arc characteristics.

### UNSTABLE ARC

Incorrect setting of voltage and/or current

Set the wire feed in relation to the arc voltage in such a way that the arc is stable and burns evenly. In spray arc welding, set the wire feed so that there are no short circuits and the filler metal is transferred in a spray across the arc. Find the cause of the interference and correct it. (See ERRATIC WIRE FEED above)

Problems in wire feeding: worn current tip

When the internal diameter of the current tip becomes worn from the passage of wire through it, the wire may no longer stay in continuous electrical contact with the tip. This results in an unstable arc and an increase in spatter. Paint, mill scale, silicon scale, rust or flux deposits from previous weld runs may form an insulating layer causing an unstable arc. Clean the surfaces to be welded.

Impurities on the base metal

Securely attach the ground cable as close to the point of welding as possible on the workpiece. Clean the surfaces thoroughly to ensure good contact.

Poor contact between ground cable and work-piece or loose power connection

Check to insure the welding power connection on the power source is tight, the and workpiece. Connection on the wire feeder is tight, the connection to the adaptor block is tight, Loose power connection and the connection of the gun to the adaptor block is tight.

Stick-out too long

Adjust the current tip to work distance to a minimum of 3/8" for short arc welding. A more precise distance is 15 times the wire diameter.



# TROUBLESHOOTING: GENERAL GUIDE

## Problems/Causes

## Possible Solutions

### AIR-COOLED GUN RUNNING TOO HOT

Poor ground

Inspect ground cable for loose connections, fraying and cuts. Correct any problem areas found. Clean clamping area to insure good contact. Securely attach the ground cable to the workpiece, as close as possible to the point of welding. Make sure there is a good connection to the welding power source.

Loose power connection

Check to make sure the power connection on the power source is tight, the connection on the wire feeder is tight, the connection to the adaptor block is tight, and the connection of the gun to the adaptor block is tight.

Consumable items loose or worn

Remove nozzle from gun and inspect current tip, collet nut (tip holder) and spatter disc (gas diffuser) for wear and tightness; replace or tighten as necessary.

Capacity of gun being exceeded

Note complete weld parameters, including welding current (Amps), welding voltage, wire feed speed, type and size of wire, type of gas and flow rate of gas and consult your local Authorized D/F Machine Specialties Distributor or contact the factory.

Dirty connection

Remove torch and inspect parts for dirt build-up. Periodic cleaning is necessary.



# D/F MACHINE SPECIALTIES, INC.

*MIG & TIG Welding Products, Consumables & Accessories*

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## WARRANTY

This Equipment is sold by D/F MACHINE SPECIALTIES, Incorporated, under the warranty set forth in the following paragraph. Such warranty is extended only to the buyer who purchases the equipment directly from D/F or its authorized distributor as new merchandise.

The barrel and cable assemblies are warranted by D/F to be free from manufacturing defects for 90 days after delivery by D/F, provided that the equipment is properly operated under conditions of normal use and that regular periodic maintenance and service is performed. Expendable parts are not warranted for any specific time. Expendable parts referred to herein would be the nozzles, current tips, spatter discs, insulators, casing liners, and wire inlets. D/F's sole obligation under this warranty is limited to making replacement at its manufacturing facility for barrel assemblies which are returned to it with transportation charges prepaid, and upon D/F's examination have been found to be so defective.

Genuine D/F MACHINE SPECIALTIES, Inc. Parts, Accessories, and Consumables must be used for safety and performance reasons. The use of anything other than genuine D/F MACHINE SPECIALTIES, Inc. Parts, Accessories, or Consumables will void this Warranty. All units returned for warranty repair are subject to Warranty Inspection. Warranty and repair work shall not apply to goods that have been altered or repaired, have been subject to misuse or used while any parts are loose, broken, or damaged, or used with other than original D/F® parts, consumables, or accessories which may affect performance and safety.

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