Instruction Manual 541NB
NCC/HTC N & NCC/HTC LRN
Curved Automatic Torches
Revised 02/2018

D/F MACHINE SPECIALTIES, INC.

MIG & TIG Welding Products, Consumables & Accessories

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WATER-COOLED CURVED OR STRAIGHT GUNS

Direct Mount Docking Spool/Weld Body Combination

Available in Straight, 22°& 45°

INSTRUCTIONS, 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.

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.

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.

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.

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.

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, 29CRF 1910, obtainable from the U.S. Government Printing Office, Washington, D.C. 20402.
• AWS Standard A6.0, WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTABLES 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.

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

**For extreme duty cycles or multiple torch cooling systems: MTA Refrigerated Chillers - 716-693-8651 - https://www.mta-it.com/eng/

INTRODUCTION

This manual covers the Direct Mount Docking Spool®/Weld Body Combination which accommodates a Composite Type Water-Cooled Curved or Straight Guns. This arrangement is readily adaptable to Automation Welding applications.

The equipment consists of four (4) basic components: a Utility Station, an intermediate Utilities Combination Assembly, a Docking Spool®/Weld Body Combination and a Water-Cooled Curved Gun.

The Docking Spool ®/Weld Body Combination is the principal component in this welding equipment arrangement. It accepts the utilities at the top end of the Spool and provides a means of accepting the Water-Cooled Curved or Straight Gun at the lower end. Several features important to a welding system are provided. Incorporated within the water channels of the Docking Spool are check valves which provide a means of retaining residual water in the check lines when the nozzle assembly is removed from the Docking Spool ®/Weld Body Combination. In addition, a Posit® Ring is provided at the upper end of the Spool which allows positive location in a Mounting Bracket to maintain dimensional stability.

These Models NCC-N/NCC-LRN have a current capacity of 500/600 amperes in argon shielding. They accommodate slip-in current tips fastened by a collet action nut. The wire diameter range with hard and cored wire is .030”-1/8”, and with aluminum wire is 3/64”-3/32”.

The Models HTC-N/HTC-LRN have a current capacity range of 500/600 amperes. The Models HTC-LRN employ threaded current tips. The wire diameter range with hard and cored wire is .030”-1/8”, and with aluminum wire is 3/64”-3/32”.

Reference page 12 for the parts breakdown covering the 22° 5” Water-Cooled Curved Gun, page 13 for the parts breakdown of the 22° Long Reach, page 14 for the 45° Long Reach Water-Cooled Guns, and page 15 for the Straight 5” & Long Reach Water-Cooled Guns.

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

DISASSEMBLY

To remove the Water-Cooled Curved Gun from the Docking Spool®/Weld Body Combination, proceed as follows:

1) Unscrew the fastening nut which applies the Water-Cooled Curved Gun Assembly to the Docking Spool®/Weld Body Combination. With a screw driver release and back off the set screw Ref. 3. The Water-Cooled Curved Gun may now be pulled from the Docking Spool®/Weld Body Combination.

2) The Water Transfer Fittings Ref. 9 may be removed from the Water-Cooled Curved Gun with a 7/16" adjustable wrench. Following this the insulating collar may be removed.

ASSEMBLY

1) The nylon collar should be placed over the fittings on the rear collar of the Water-Cooled Curved Gun assembly. It is important that the collar alignment indication hole (viewed from the rear of the Water-Cooled Curved Gun) aligns with the small concave mark provided on the collar of the Water-Cooled Nozzle.

2) The Water-Cooled Curved Gun assembly may now be applied to the Docking Spool®/Weld Body Combination. It is extremely important that the indicator hole in the collar aligns with the small concave mark provided on the face of the Docking Spool®. This alignment will allow the Water-Cooled Curved Gun to be pushed up into the Docking Spool®. The Nut Ref. 15 may now be applied, and should be followed by fastening Body Set Screw Ref. 3.

3) Load Body Liner in the center rear tube and fit as required.

4) Apply front nozzle Insulation Tube. Then load gas diffuser onto the adapter and install collet with slip-in tip or threaded tip.

5) Check alignment and tighten all fittings as required.

6) Periodically check the gas diffuser, body liner and insulation tube.

TABLE 1 - SPARE PARTS

ITEM	CODE NO.	MIN QTY.
Gas Nozzle	To Be Selected	2
Current Tip	To Be Selected	25
Collet Nut	To Be Selected To	1
Spatter Disc	Be Selected	2
Body Liner	To Be Selected	2
Insulation Tube	To Be Selected	1
Transfer Fitting	To Be Selected	2

TABLE 2 - GAS NOZZLES

REF	CODE NO.	TYPE	O.D.	I.D.
1	10362	Copper Tapered	15/16"	5/8"
2	10340	Copper Straight	1"	3/4"
3	10374	Copper Straight	5/8"	7/16"
4	10359	Copper Tapered	15/16"	5/8"

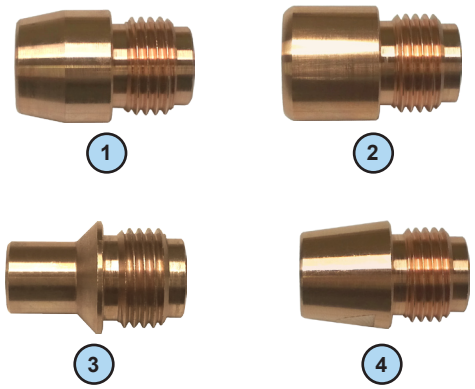
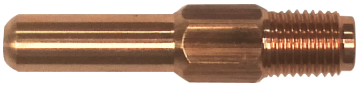


TABLE 3 - CURRENT TIPS

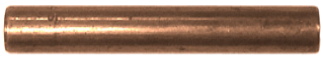
CURRENT TIPS - 7/16” DIAMETER THREADED

Gun/Barrel Model	Wire Size	Wire Type	Code No.
All HT, HTC, HTM, CTW, CW-T, MTW (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, MTW (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, MTW (Tip provides 1/8” set back)	3/64”	Aluminum	15126
	1/16”	Aluminum	15125
	5/64”	Aluminum	15087
	3/32”	Aluminum	15148
	1/8”	Aluminum	15123



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

Gun/Barrel Model	Wire Size	Wire Type	Code No.
All NC, NCC, NCM (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 (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 (Tip provides 1/8” set back)	3/64”	Aluminum	19407
	1/16”	Aluminum	19408
	5/64”	Aluminum	19728
	3/32”	Aluminum	19409



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

Gun/Barrel Model	Wire Size	Wire Type	Code No.
All NC, NCC, NCM (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 (Tip provides 1/8” set back)	3/64”	Aluminum	10785
	1/16”	Aluminum	10786

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 Tap** - 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

3. **Socket Wrench & 3/8" Long Socket** - This is used to tighten the transfer fittings onto the water-cooled nozzle. The transfer fittings have to be set at a specific height of 1.400" (accepted range is 1.395" – 1.410"), otherwise the water supply in the torch could be cut off, or the torch could leak. If the transfer fittings are tightened past 1.400" they can break. (see p. 21)

4. **3/8" Open Ended Wrench** - This is used on the inner body's water in hose fitting to secure the water in hose 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 #5)

5. **Long 7/16" Open Ended Wrench** - This is used to secure the water in hose to the torch's inner body. (see #4)

6. **9/16" & 1/2" Open Ended Wrench**
   A. 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 #7 (Long 9/16" Open Ended Wrench) for the fitting on the water out & power cable hose. (see #7 A)
   B. This wrench is also used to secure the adapter and jam nut that hold the current tip to the inner body. In your left hand hold the inner body, and with your right hand thread up the adapter using the 1/2" Open Ended Wrench until it is tight. Now place the same wrench on the jam nut and snug it up against the inner body. Keeping that wrench on the jam nut and placing it on the table for force, take #7 (Long 1/2" Open Ended Wrench), place it on the adapter and push it down (counter-clockwise) securing the adapter to the inner body. (see #7 B)
   C. This is used on the inner body's gas fitting to secure the gas hose 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.

7. **Long 1/2" & 9/16" Open Ended Wrench**
   A. 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 #6 A)
   B. This wrench is also used to secure the adapter and jam nut to the inner body. (see #6 B)
   C. This is used to secure the gas hose 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.

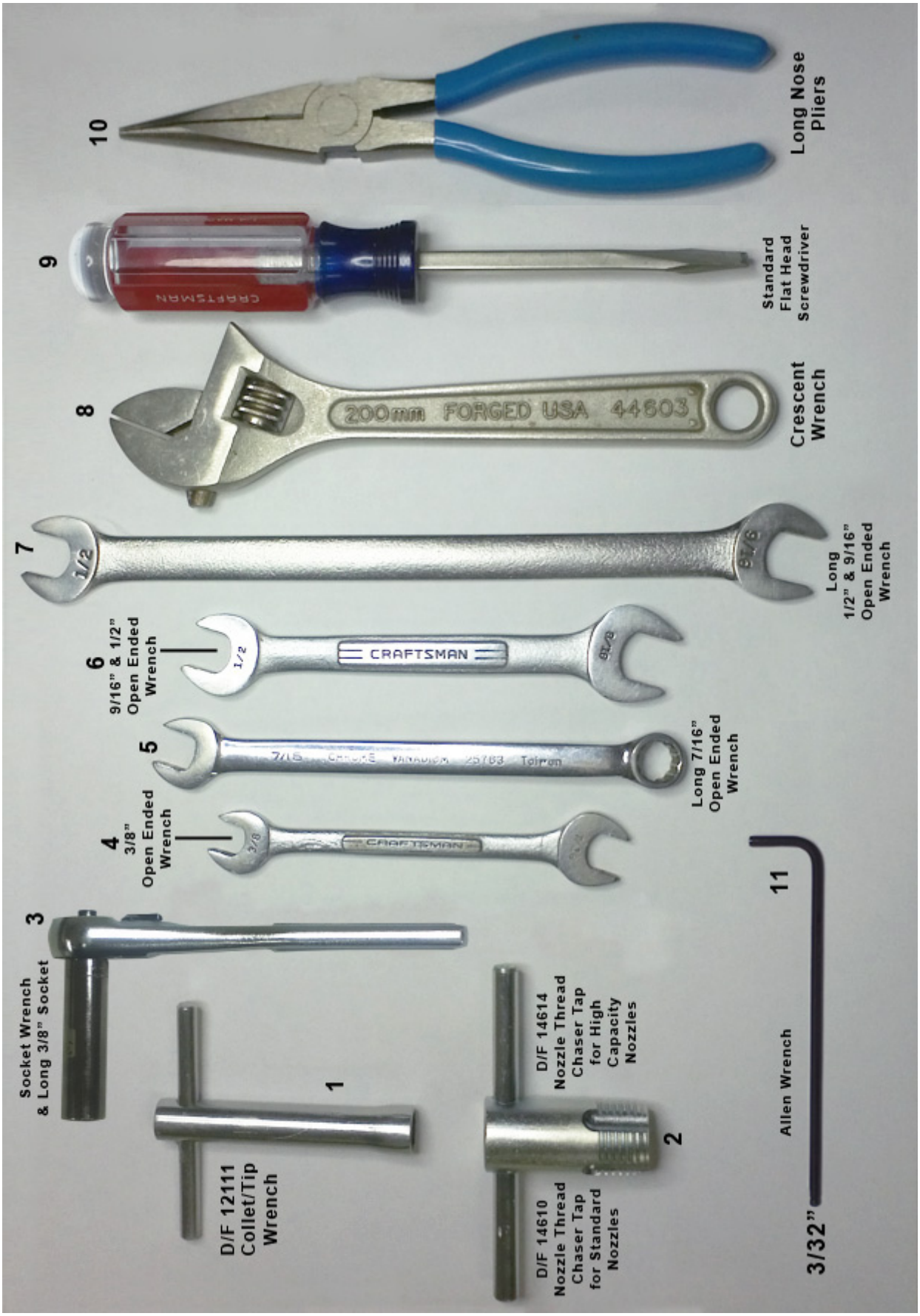
8. **Adjustable Crescent Wrench** - A medium size adjustable crescent wrench could be used as well. We prefer the use of the larger wrenches on the power cable fitting to ensure that there are no water leaks, and that it has been seated correctly. **CAUTION:** Never use excessive force with large wrenches, for you could twist or break parts.

9. **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.

10. **Long Nose Pliers**

11. **3/32" Allen Wrench** - This is used to secure the socket cap 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 trough 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.

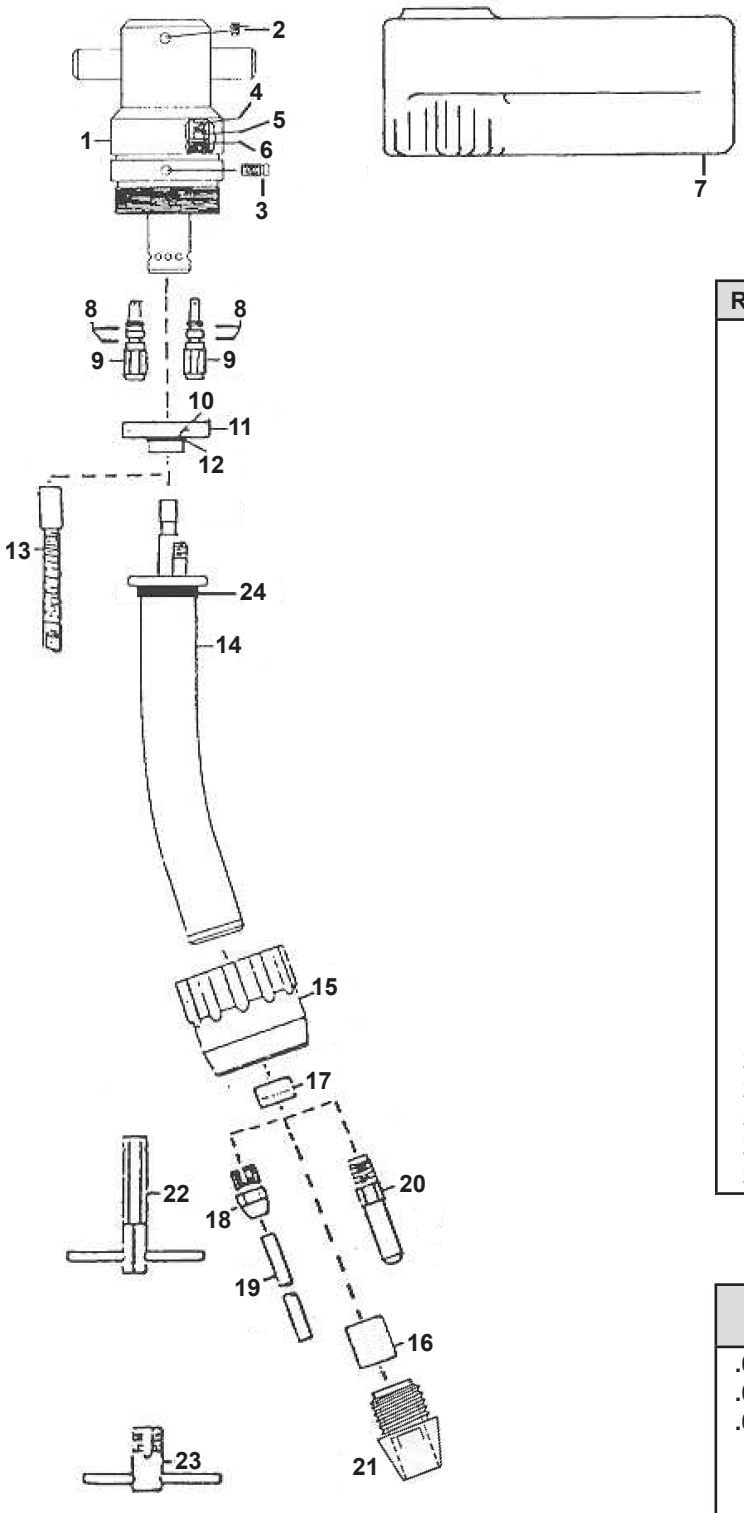
6. Blow out the nozzle after tapping. Wire brush and blow off the gas cup before threading it back into the nozzle.

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 NOZZLE ASSEMBLY	USED FOR GAS NOZZLE
14610	Nozzle Thread Chaser Tap for Standard A/C & W/C Nozzle Assembly Front	13197 16184 11117, 45101 11118, 45102 11119, 45103 45114 45107 NCC-N/HTC-N NCC-LRN, HTC-LRN	10340 10359 10362 10374
14611	Nozzle Thread Chaser Tap for BIG MIG & BIG TIG Nozzle Assembly Front	11123	10382 10387 10389 10390 10392
14612	Nozzle Thread Chaser Tap for Nozzle Body Assembly Rear	13196 13197 13198 16184	
14614	Nozzle Thread Chaser Tap for Series A High-Capacity Nozzle Assembly Front	11142, 45120 11138, 45121 45127 11132, 45129 45125	16748 16749 16750 16751 18030 18031 18032
14615	Nozzle Thread Chaser Tap for Nozzle Body Assembly Front	13198	10379
14617	Nozzle Thread Chaser Tap for Tandem Nozzle Assembly Front	41641	41667 41668

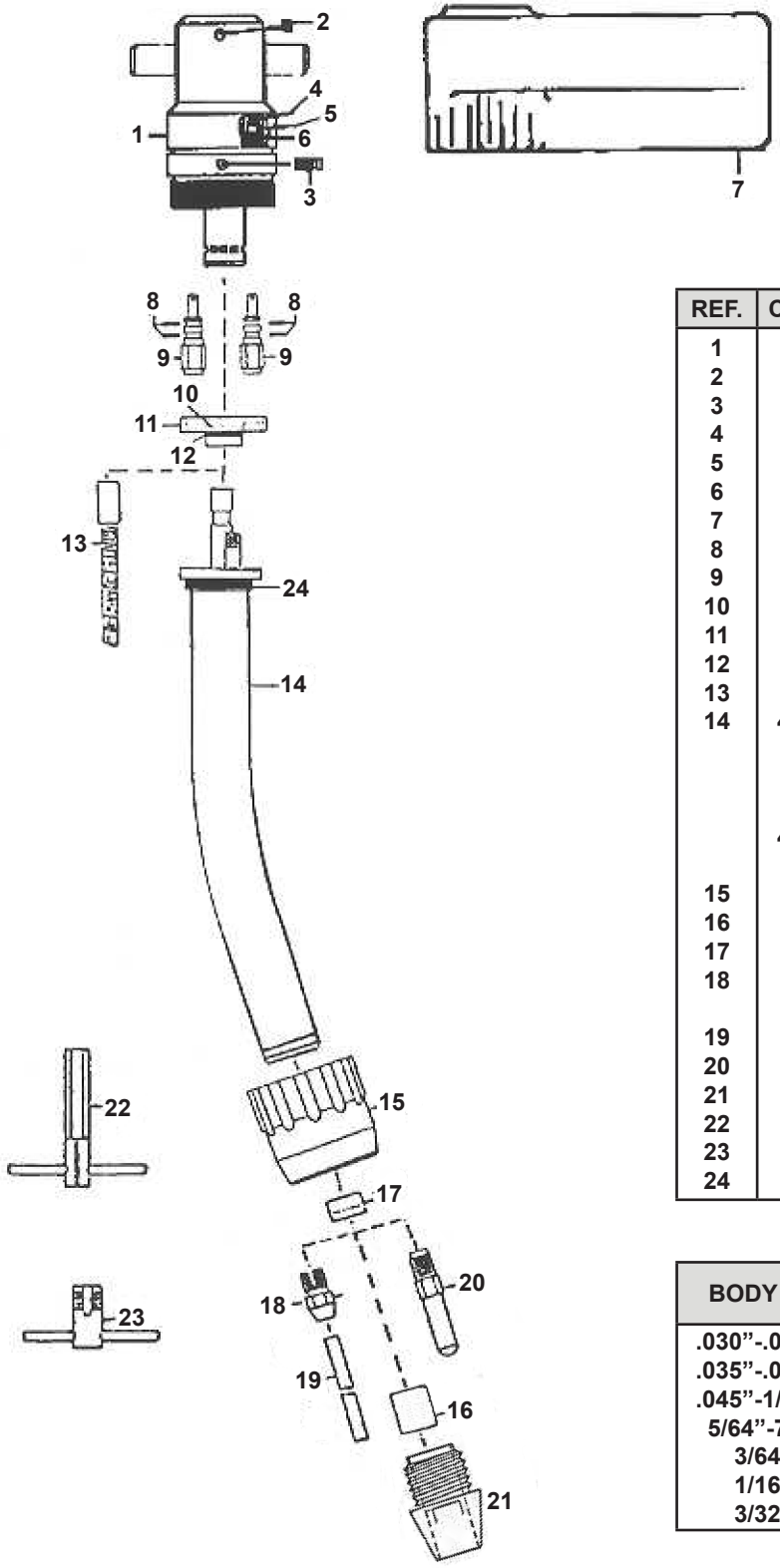
DIRECT MOUNT DOCKING SPOOL/WELD BODY COMBINATION
22 DEGREE - 5” WATER-COOLED NOZZLE - MODEL NCC-N/HTC-N



REF.	CODE NO.	DESCRIPTION
1	45171	Docking Spool®/Weld Body Combination
2	14715	Socket Set Screw
3	40078	Set Screw w/ O-Ring
4	40022	Spring
5	40023	Ball
6	40024	Seat
7	14050	Boot
8	13921	O-Rings (4 req’d)
9	40025	Transfer Fitting
10	13912	Internal O-Ring
11	40010	Insulating Collar
12	12516	External O-Ring
13		Body Liners (see below)
14	48227	COMPLETE W/C Curved Gun Assembly 22 Degree 5” Nozzle Consists of items 8 thru 21 Specify Current Tip and Body Liner
	48228	W/C Curved Gun (ONLY) 22 Degree 5” Nozzle
15	42274	Nut
16	42275	Insulation Tube
17	42276	Spatter Disc
18	18262	Collet Nut (5/16” Slip-In Tip)
	11950	Collet Nut (1/4” Slip-In Tip)
19		Current Tip - Slip-In (see p. 7, Table 3)
20		Current Tip - Threaded (see p. 7, Table 3)
21		Gas Nozzle (see p. 6, Table 2)
22	12111	Wrench
23	14610	Nozzle Thread Chaser Tap
24	13914	O-Ring

BODY LINER	FOR SLIP-IN TIPS	FOR 7/16” THREADED TIPS
.030”-.035” H/C	45515	45515
.035”-.045” H/C	45516	45516
.045”-1/16” H/C	45517	45521
5/64”-7/64” C	45514	45523
3/64” AL	45518	45518
1/16” AL	45519	45524
3/32” AL	45520	45525

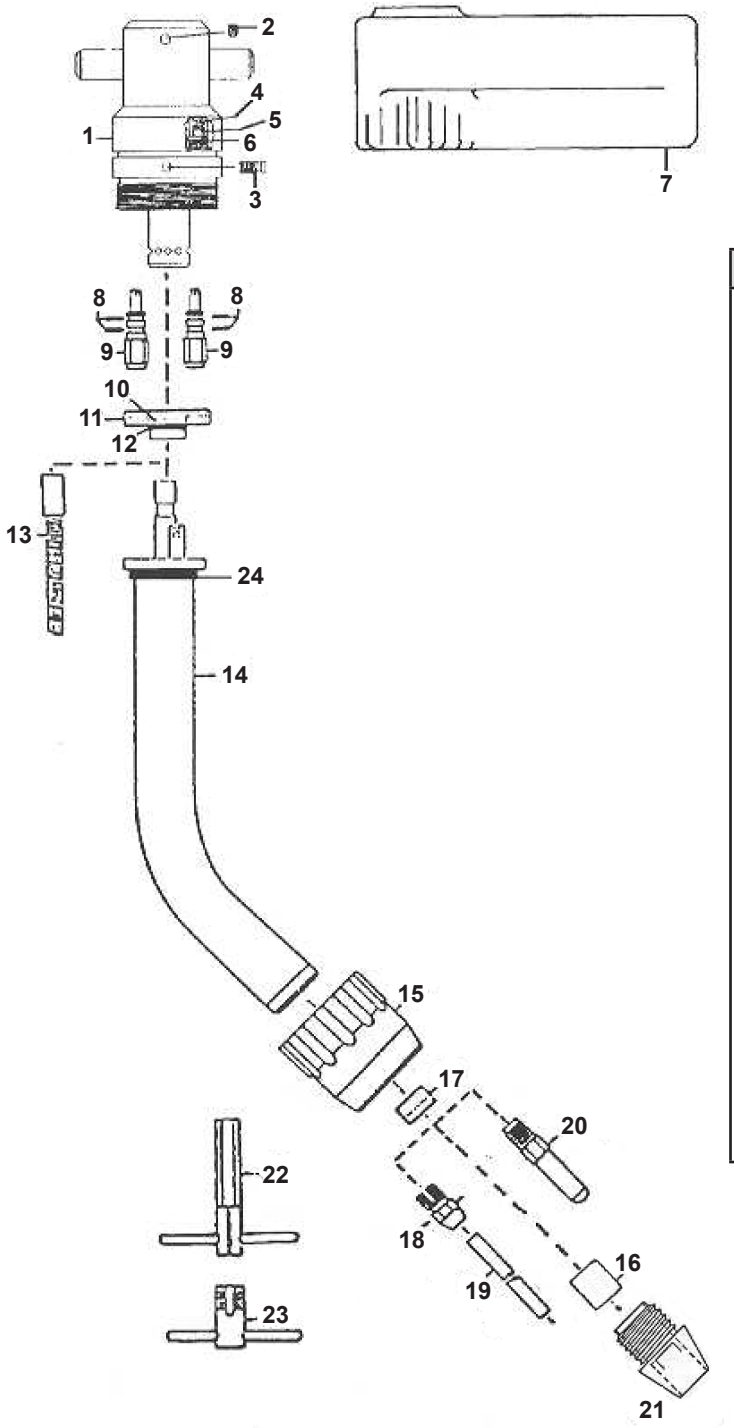
DIRECT MOUNT DOCKING SPOOL/WELD BODY COMBINATION
22 DEGREE - LONG REACH WATER-COOLED NOZZLE - MODEL NCC-LRN/HTC-LRN



REF.	CODE NO.	DESCRIPTION
1	45171	Docking Spool®/Weld Body Combination
2	14715	Socket Set Screw
3	40078	Set Screw w/ O-Ring
4	40022	Spring
5	40023	Ball
6	40024	Seat
7	14050	Boot
8	13921	O-Rings (4 req'd)
9	40025	Transfer Fitting
10	13912	Internal O-Ring
11	40010	Insulating Collar
12	12516	External O-Ring
13		Body Liners (see below)
14	48225NB	COMPLETE W/C Curved Gun Assembly 22 Degree Long Reach Consists of items 8 thru 21 Specify Current Tip and Body Liner
	48226NB	W/C Curved Gun (ONLY) 22 Degree Long Reach
15	42274	Nut
16	42275	Insulation Tube
17	42276	Spatter Disc
18	18262	Collet Nut (5/16" Slip-In Tip)
	11950	Collet Nut (1/4" Slip-In Tip)
19		Current Tip - Slip-In (see p. 7, Table 3)
20		Current Tip - Threaded (see p. 7, Table 3)
21		Gas Nozzle (see p. 6, Table 2)
22	12111	Wrench
23	14610	Nozzle Thread Chaser Tap
24	13914	O-Ring

BODY LINER	FOR SLIP-IN TIPS	FOR 7/16" THREADED TIPS
.030"-.035" H/C	45515	45515
.035"-.045" H/C	45516	45516
.045"-1/16" H/C	45517	45521
5/64"-7/64" C	45514	45523
3/64" AL	45518	45518
1/16" AL	45519	45524
3/32" AL	45520	45525

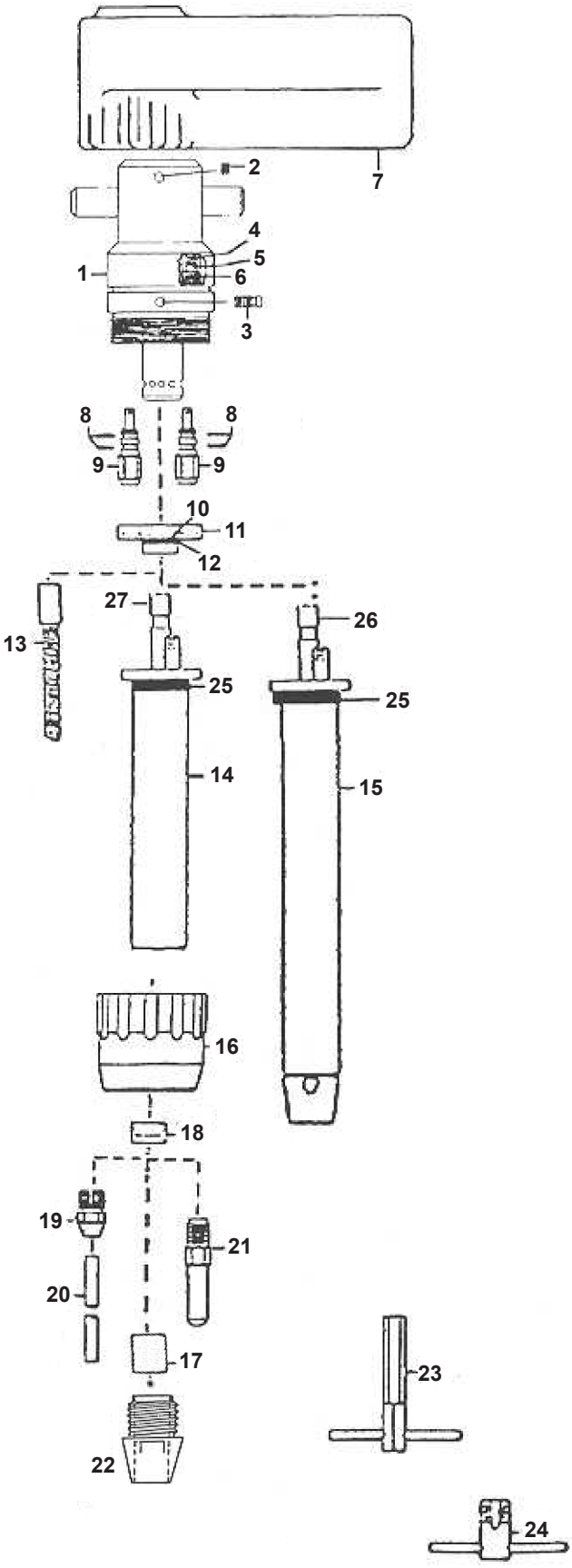
DIRECT MOUNT DOCKING SPOOL/WELD BODY COMBINATION
45 DEGREE - LONG REACH WATER-COOLED NOZZLE - MODEL NCC-LRN/HTC-LRN



REF.	CODE NO.	DESCRIPTION
1	45171	Docking Spool®/Weld Body Combination
2	14715	Socket Set Screw
3	40078	Set Screw w/ O-Ring
4	40022	Spring
5	40023	Ball
6	40024	Seat
7	14050	Boot
8	13921	O-Rings (4 req'd)
9	40025	Transfer Fitting
10	13912	Internal O-Ring
11	40010	Insulating Collar
12	12516	External O-Ring
13		Body Liners - See Table III
14	48221NB	COMPLETE W/C Curved Gun Assembly 45 Degree Long Reach Consists of items 8 thru 21 Specify Current Tip and Body Liner
	48222NB	W/C Curved Gun (ONLY) 45 Degree Long Reach
15	42274	Nut
16	42275	Insulation Tube
17	42276	Spatter Disc
18	18262	Collet Nut (5/16" Slip-In Tip)
	11950	Collet Nut (1/4" Slip-In Tip)
19		Current Tip - Slip-In (see p. 7, Table 3)
20		Current Tip - Threaded (see p. 7, Table 3)
21		Gas Nozzle (see p. 6, Table 2)
22	12111	Wrench
23	14610	Nozzle Thread Chaser Tap
24	13914	O-Ring

BODY LINER	FOR SLIP-IN TIPS	FOR 7/16" THREADED TIPS
.030"-.035" H/C	45515	45515
.035"-.045" H/C	45516	45516
.045"-1/16" H/C	45517	45521
5/64"-7/64" C	45514	45523
3/64" AL	45518	45518
1/16" AL	45519	45524
3/32" AL	45520	45525

DIRECT MOUNT DOCKING SPOOL/WELD BODY COMBINATION
STRAIGHT - LONG REACH WATER-COOLED NOZZLE - MODEL NCC-LRN/HTC-LRN

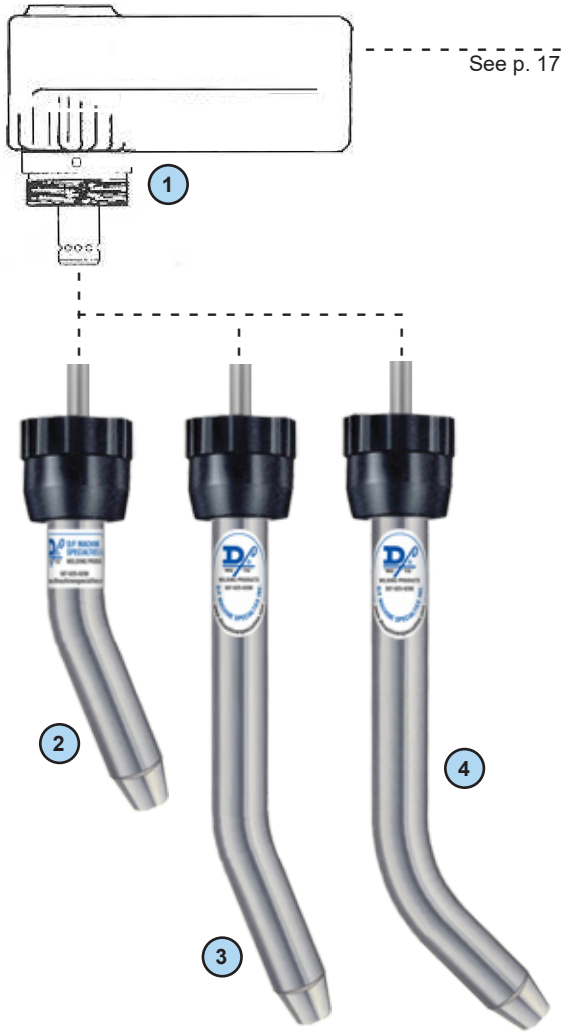


REF.	CODE NO.	DESCRIPTION
1	45171	Docking Spool®/Weld Body Combination
2	14715	Socket Set Screw
3	40078	Set Screw w/ O-Ring
4	40022	Spring
5	40023	Ball
6	40024	Seat
7	14050	Boot
8	13921	O-Rings (4 req'd)
9	40025	Transfer Fitting
10	13912	Internal O-Ring
11	40010	Insulating Collar
12	12516	External O-Ring
13		Body Liners (see below)
14	48121	COMPLETE W/C Curved Gun Assembly 22 Degree Long Reach Consists of items 8 thru 21 Specify Current Tip and Body Liner
	48122	W/C Curved Gun (ONLY) 22 Degree Long Reach
15	48240	COMPLETE W/C Curved Gun Assembly 22 Degree Long Reach Consists of items 8 thru 21 Specify Current Tip and Body Liner
	48241	W/C Curved Gun (ONLY) 22 Degree Long Reach
16	42274	Nut
17	42275	Insulation Tube
18	42276	Spatter Disc
19	18262	Collet Nut (5/16" Slip-In Tip)
	11950	Collet Nut (1/4" Slip-In Tip)
20		Current Tip - Slip-In (see p. 7, Table 3)
21		Current Tip - Threaded (see p. 7, Table 3)
22		Gas Nozzle (see p. 6, Table 2)
23	12111	Wrench
24	14610	Nozzle Thread Chaser Tap
25	13914	O-Ring
26	42273-NCM	Adapter - LRN (Internal) -Slip-In Tip
	42273-HTM	Adapter - LRN (Internal) -Threaded Tip
27	42778-NCM	Adapter - N 5"(Internal) -Slip-In Tip
	42278-HTM	Adapter - N 5"(Internal) -Threaded Tip

BODY LINER	FOR SLIP-IN TIPS	FOR 7/16" THREADED TIPS
.030"-.035" H/C	45515	45515
.035"-.045" H/C	45516	45516
.045"-1/16" H/C	45517	45521
5/64"-7/64" C	45514	45523
3/64" AL	45518	45518
1/16" AL	45519	45524
3/32" AL	45520	45525

WATER-COOLED CURVED GUNS - STANDARD ASSEMBLIES

Remote Mount Docking Spool®/Weld Body Combination



See p. 17

Ordering Information - Water-Cooled Curved Guns

REF.	CODE NO.	DESCRIPTION
1	45171	Docking Spool®/Weld Body Combination
2		W/C N 22° Curved Gun p. 12 - Ref. 14
3		W/C LRN 22° Curved Gun p. 13 - Ref. 14
4		W/C LRN 45° Curved Gun p. 14 - Ref. 14

Note For Complete Standard Assemblies:
Specify Slip-In or Threaded Tip &
Advise wire diameter and Feeder Manufacturer

Ref. 2

W/C Curved Gun 22° 5”	
Model	Code No.
NCC-N 2 Ft.	40172-2
NCC-N 3 Ft.	40172-2
NCC-N 4 Ft.	40172-2
NCC-N 5 Ft.	40172-2
HTC-N 2 Ft.	40187-2
HTC-N 3 Ft.	40187-3
HTC-N 4 Ft.	40187-4
HTC-N 5 Ft.	40187-5

Ref. 3

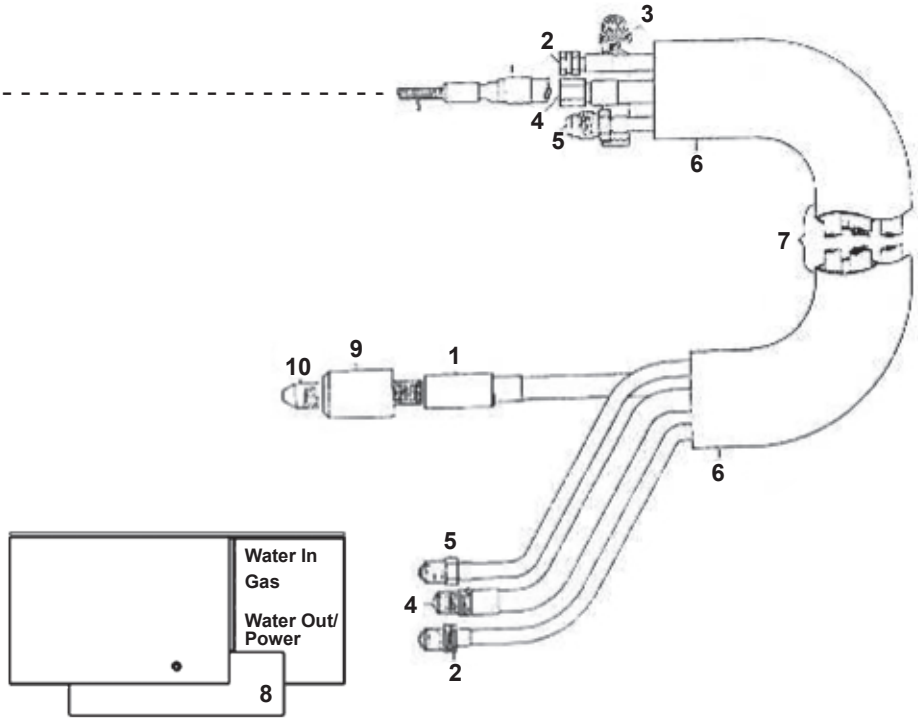
W/C Curved Gun 22° LRN	
Model	Code No.
NCC-LRN 2 Ft.	40174NB-2
NCC-LRN 3 Ft.	40174NB-3
NCC-LRN 4 Ft.	40174NB-4
NCC-LRN 5 Ft.	40174NB-5
HTC-LRN 2 Ft.	40189NB-2
HTC-LRN 3 Ft.	40189NB-3
HTC-LRN 4 Ft.	40189NB-4
HTC-LRN 5 Ft.	40189NB-5

Ref. 4

W/C Curved Gun 45° LRN	
Model	Code No.
NCC-N 2 Ft.	40173NB-2
NCC-N 3 Ft.	40173NB-3
NCC-N 4 Ft.	40173NB-4
NCC-N 5 Ft.	40173NB-5
HTC-N 2 Ft.	40188NB-2
HTC-N 3 Ft.	40188NB-3
HTC-N 4 Ft.	40188NB-4
HTC-N 5 Ft.	40188NB-5

UTILITIES
Standard Assemblies

From p. 16



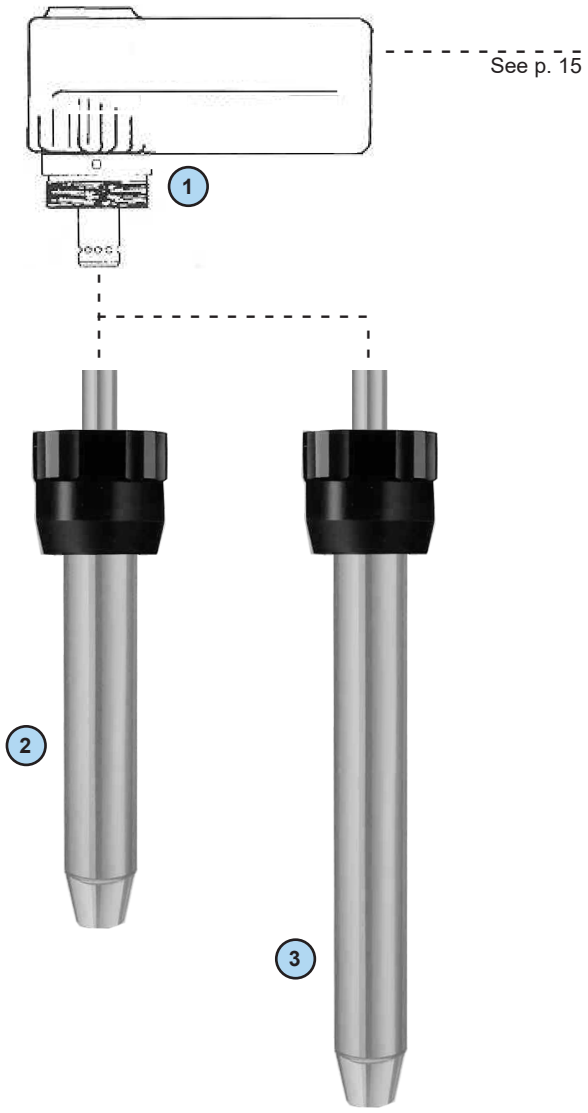
REF.	CODE NO.	DESCRIPTION
1	46350	Casing .030”-.035” (Requires Liner)
	46370	Casing .035”-1/16” (Requires Liner)
	46420	Casing .035”-.045” Single Piece
	46440	Casing .045”-1/16” Single Piece
	46460	Casing 5/64”-3/32” Single Piece
	46480	Casing 7/64”-1/8” Single Piece
2	46300	Water In Hose Assembly
3	14803	Clamp
4	46320	Water Out & Power Cable Assembly
5	46260	Gas Hose Assembly - Standard
	46281	Gas Hose Assembly - High Capacity
6	46630	Cable/Hose Sheath
7		Utility Combination
		Consists of Items 1, 2, 3, 4, 5, 6 & 11
	46620	.030”-.035” (46460, Req. Liner)
	46621	.035”-1/16” (D/F Casing, Req. Liner)
	46622	.035”-.045” Single Piece Casing
	46623	.045”-1/16” Single Piece Casing
	46624	5/64”-3/32” Single Piece Casing
	46625	7/64”-1/8” Single Piece Casing

REF.	CODE NO.	DESCRIPTION
8	45196	Utility Station (Optional, see p. 20)
9		Feeder Adapter (see p. 18)
10		Inlet - See Page 20
11	47020	Liner .030”-.035”
	47021	Liner .035”-.045”
	47022	Liner .045”-1/16”
	47023	Liner 3/64” Soft
	47024	Liner 1/16” Soft
	47025	Liner 3/32” Soft

ORDERING INFORMATION:
WIRE CASINGS, WATER IN HOSE, WATER OUT & POWER CABLE, GAS HOSE, UTILITIES COMBINATION & LINERS ONLY
Add Footage Digit to Item Code Number for Length Required
Example: Require 10 Ft. Casing .035”-3/32” - 46370-10
Example: Require 6 Ft. Liner .045” - 47022-6

WATER-COOLED STRAIGHT GUNS - STANDARD ASSEMBLIES

Remote Mount Docking Spool®/Weld Body Combination



See p. 15

Ordering Information - Water-Cooled Straight Guns

REF.	CODE NO.	DESCRIPTION
1	45171	Docking Spool®/Weld Body Combination
2		W/C N Straight Gun p. 11 - Ref. 14
3		W/C LRN Straight Gun p. 11 - Ref. 15

Note For Complete Standard Assemblies:
Specify Slip-In or Threaded Tip &
Advise wire diameter and Feeder Manufacturer

Ref. 2

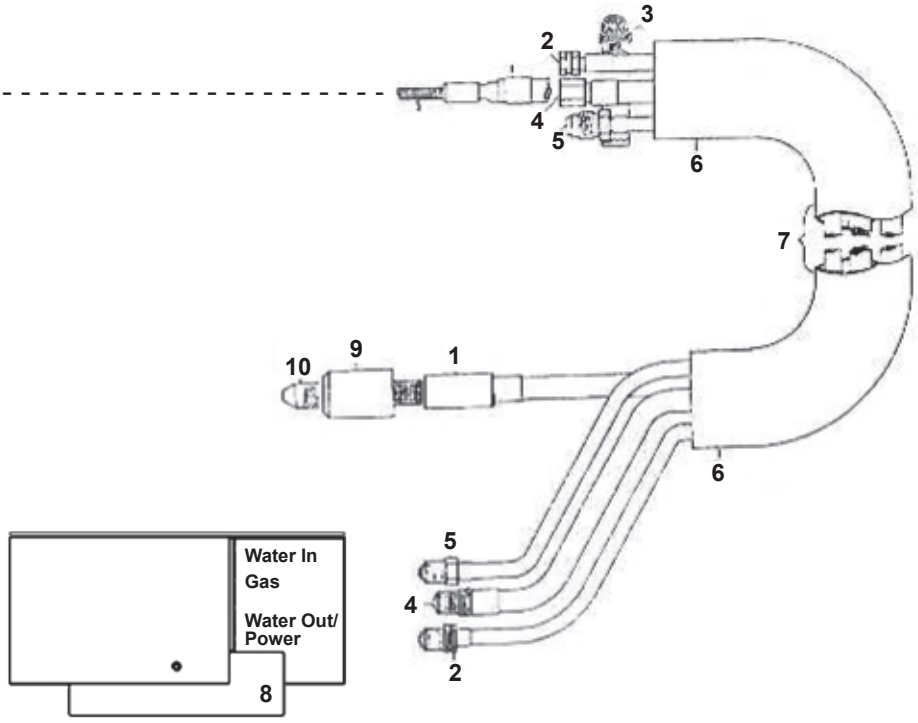
W/C Straight Gun 22° 5”	
Model	Code No.
NCC-N 2 Ft.	40216-2
NCC-N 3 Ft.	40216-3
NCC-N 4 Ft.	40216-4
NCC-N 5 Ft.	40216-5
HTC-N 2 Ft.	40217-2
HTC-N 3 Ft.	40217-3
HTC-N 4 Ft.	40217-4
HTC-N 5 Ft.	40217-5

Ref. 3

W/C Straight Gun LRN	
Model	Code No.
NCC-LRN 2 Ft.	40171-2
NCC-LRN 3 Ft.	40171-3
NCC-LRN 4 Ft.	40171-4
NCC-LRN 5 Ft.	40171-5
HTC-LRN 2 Ft.	40186-2
HTC-LRN 3 Ft.	40186-2
HTC-LRN 4 Ft.	40186-2
HTC-LRN 5 Ft.	40186-2

UTILITIES
Standard Assemblies

From p. 14



REF.	CODE NO.	DESCRIPTION
1	46350	Casing .030”-.035” (Requires Liner)
	46370	Casing .035”-1/16” (Requires Liner)
	46420	Casing .035”-.045” Single Piece
	46440	Casing .045”-1/16” Single Piece
	46460	Casing 5/64”-3/32” Single Piece
	46480	Casing 7/64”-1/8” Single Piece
2	46300	Water In Hose Assembly
3	14803	Clamp
4	46320	Water Out & Power Cable Assembly
5	46260	Gas Hose Assembly - Standard
	46281	Gas Hose Assembly - High Capacity
6	46630	Cable/Hose Sheath
7		Utility Combination
		Consists of Items 1, 2, 3, 4, 5, 6 & 11
	46620	.030”-.035” (46460, Req. Liner)
	46621	.035”-1/16” (D/F Casing, Req. Liner)
	46622	.035”-.045” Single Piece Casing
	46623	.045”-1/16” Single Piece Casing
	46624	5/64”-3/32” Single Piece Casing
	46625	7/64”-1/8” Single Piece Casing

REF.	CODE NO.	DESCRIPTION
8	45196	Utility Station (Optional, see p. 20)
9		Feeder Adapter (see p. 22)
10		Inlet (see p. 22)
11	47020	Liner .030”-.035”
	47021	Liner .035”-.045”
	47022	Liner .045”-1/16”
	47023	Liner 3/64” Soft
	47024	Liner 1/16” Soft
	47025	Liner 3/32” Soft

ORDERING INFORMATION:
WIRE CASINGS, WATER IN HOSE, WATER OUT & POWER CABLE, GAS HOSE, UTILITIES COMBINATION & LINERS ONLY
Add Footage Digit to Item Code Number for Length Required
Example: Require 10 Ft. Casing .035”-3/32” - 46370-10
Example: Require 6 Ft. Liner .045” - 47022-6

UTILITY STATION - STANDARD

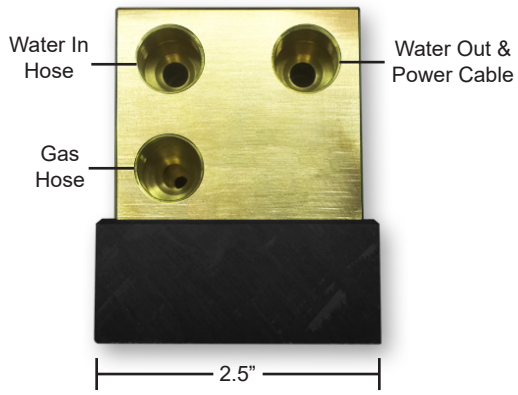
ORDERING INFORMATION

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

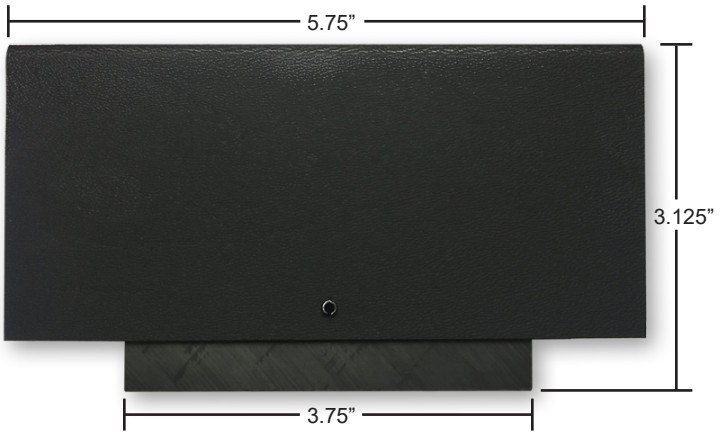
DIMENSION SPECIFICATIONS

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.

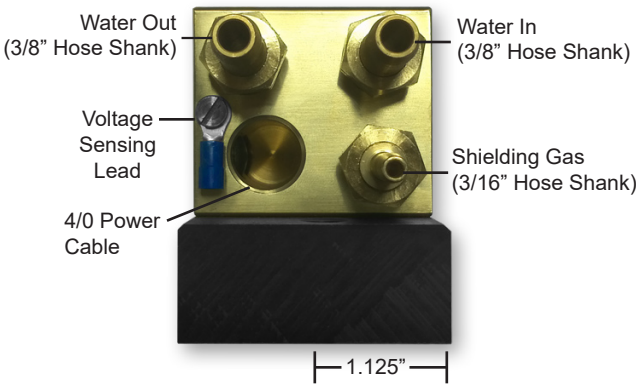
D/F TORCH CONNECTION



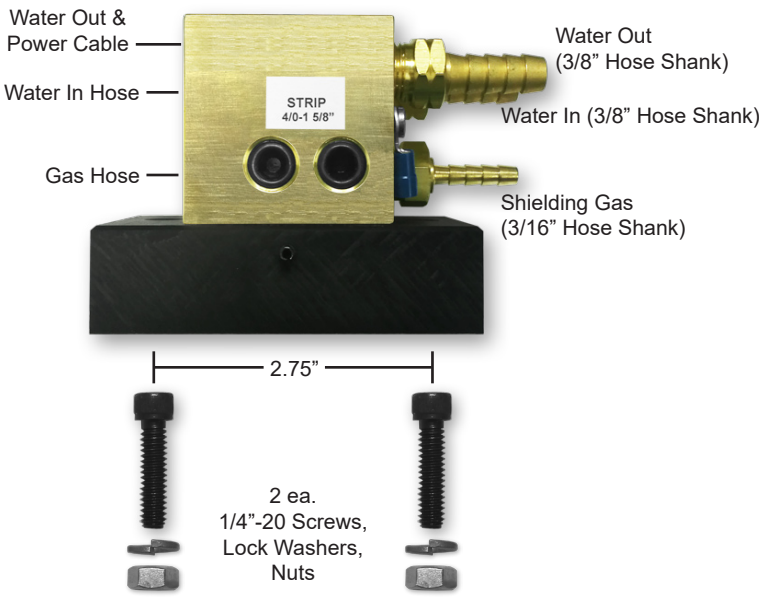
UTILITY STATION SIDE VIEW WITH COVER



CUSTOMER UTILITIES CONNECTION

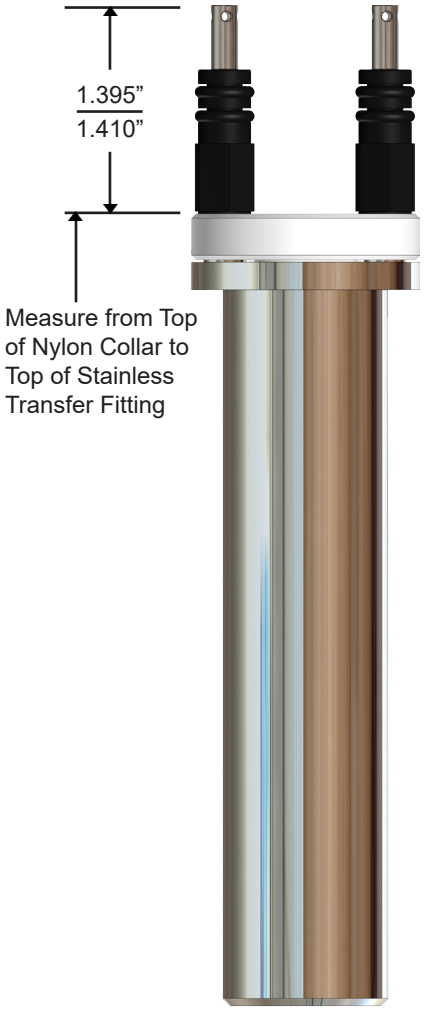


FROM LEFT: D/F TORCH CONNECTION
FROM RIGHT: CUSTOMER UTILITIES CONNECTION



TRANSFER FITTING (D/F #40025) INSTALLATION

Each D/F torch requires 2 of the D/F Transfer Fitting part #40025. When a torch bumps into something or crashes, this is the part that is designed to break to hopefully protect the rest of the torch from being destroyed. We recommend having at least 2 of them in stock for every torch for extra security. This is also the part of the torch that transfers the water from the docking spool body to the water-cooled nozzle. The transfer fittings have to be set at a specific height (1.395” – 1.410”, see right), otherwise the water supply in the torch could be cut off, or the torch could leak. If the transfer fittings are tightened past 1.400” they can break.



ALWAYS use a LONG 3/8” socket when applying transfer fittings for support. At the factory, transfer fittings are set with a height of 1.400”. To check the height on a transfer fitting, hold the water-cooled nozzle in your left hand and place your pointer finger and middle finger over the white collar (like you are throwing a fork ball). You want to hold the collar down tight. When you know the collar is down tight, measure with a micrometer from the top of the white collar to the top of the stainless tip of the transfer fitting. The distance has to be in the 1.395” – 1.410” range (preferably around 1.400”). If a transfer fitting shows signs of wear, or is cracked or broken, it must be replaced. Always make sure there is a proper amount of lubricant/grease on the O-rings of the transfer fittings.

When you put the water-cooled nozzle back on the docking spool body of the torch you must make sure the water-cooled nozzle is pushed up correctly, and tighten the cone nut thoroughly so that everything is in the correct place and there are no leaks. There should be no reason to take apart the torches and wear out the O-rings on the transfer fitting unless there has been a crash. They will not last as long if they are taken apart and put back together over and over.

To properly change a contact tip you do not have to take off the gas cup! Simply loosen the collet one-half to one-full turn and pull out the tip. If you take the collet out all the way make sure to wire brush and blow out the threads in the docking spool body and on the collet. The same goes for the gas cup or nozzle. If you do happen to remove the gas cup for cleaning, make sure to blow out water-cooled nozzle, and wire brush and blow out the threads of the gas cup.

Any preemptive maintenance will considerably extend the life of the torches and their consumables.

Points to Remember:

1. Always make sure transfer fitting height is 1.395” to 1.410” (from the white collar to the stainless spigot)
2. Always use a Long 3/8” socket for support when applying transfer fittings.
3. Do not take off the gas cup to change a tip. Only take off the gas cup when cleaning is needed.
4. Wire brush the threads on gas cups and collets for better heat transfer.
5. Loosen collet ½ a turn to remove tip. Only take out collet when cleaning is needed.
6. Always make sure there is a proper amount of lubricant/grease on the O-rings of the transfer fittings.

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 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 5/64”-1/8” H/C	13067	16087	* *	13068	16225
Lincoln®	LN-7, LN-8, NA5-R	.030”-3/32” H/C/AL 5/64”-1/8” H/C	13110	13112	* *	13113	13116
	LN-9	.030”-3/32” H/C/AL 5/64”-1/8” H/C	16581	16582	* *	16528	16529
	NA3, NA5	.030”-3/32” H/C/AL 5/64”-1/8” H/C	16879	16878	* *	16880	16881
“BIG MIG”	NA3, NA5	.030”-3/32” H/C/AL 5/64”-1/8” H/C	16879	16878	* *	16888	16888
Lincoln®	Power-Feed 10, LF-72, LF-74	.030”-3/32” H/C/AL 5/64”-1/8” H/C	13479	13469	* *	13480	13468
Linde®	SWM31 SWM34 SWM37 SWM38 EH8	Casing to Feeder (Accepts Linde® Outlet Guide)	13046			13046	
		D/F Insert .035”-.045” Hard .045”-1/16” Hard 5/64”-3/32” Cored 3/64”-1/16” AL	13047 13048 13050	13049		13047 13048 13050	13049
	EH10	.030”-3/32” H/C/AL 5/64”-1/8” H/C	13043	13052	* *	13080	13079
Mavrix®	PA-10	.030”-3/32” H/C/AL 5/64”-1/8” H/C	16556	16568	Requires Inlet		
Miller® (50 Series)		.030”-3/32” H/C/AL 5/64”-1/8” H/C	16557	16559	* *	16558	16560
OTC®	Requires Insert	.030”-1/8” .030”-1/8”	18268		* *	18275	
	CMRE-741		18282			18282	
Panasonic®	PME-12X YW50AKW1	.030”-1/16” .030”-1/16”	13090 13466	Requires Inlet			
TWECO®	#4	.030”-3/32” H/C/AL 5/64”-1/8” H/C	13479	13469	* *	13480	13468
Welding Alloys®		.030”-3/32” H/C/AL 5/64”-1/8” H/C		Requires Liner 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

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TROUBLESHOOTING: POROSITY (SUMMARY)

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

Causes of Porosity	Possible Solutions
BASE METAL CONTAMINATION	
Impurities on base metal	a. Remove contamination; clean surfaces b. Use of specific wire/gas mix for specific types of impurities
FILLER METAL CONTAMINATION	
Impurities on filler metal (wire)	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
ATMOSPHERIC CONTAMINATION	
Drafts, wind, fans, etc.	a. Protect weld from drafts (curtains/screens) b. Use tapered or bottleneck gas nozzles when drafts cannot be avoided
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	1a. Reduce gas flow 1b. Tighten all hose connection points
2. Too low a gas flow, causing insufficient gas coverage	2. Increase gas flow
3. Damaged or kinked gas lines	3. Repair or replace
4. Too high an oxygen content	4. Adjust mixer
5. Leaks in gas distribution system	5. Repair leaks
6. Other impurities in gas - moisture, etc.	6. Overhaul system; fit filters and/or dryers
7. Inconsistent gas flow (cfh) at the torch connection	7. Regulate pressure into flow meter for consistent cfh delivery of gas
GAS TURBULENCE	
1. Excessive spatter build-up in gas nozzle and on current tip	1. Clean nozzle and tip regularly; spray with anti-spatter fluid
2. Nozzle damage, causing uneven gas coverage	2. Replace nozzle
3. Torch gas ports clogged or deformed	3. Clean or replace
4. Super-heated nozzle, causing shielding gas to expand rapidly and create return effect at end of nozzle	4. Check duty cycle rating of torch
5.Gas diffuser/nozzle insulator missing	5. Replace
6. Too high a gas flow causing the venturi effect	6. Reduce gas flow
WELDING PARAMETERS, ETC.	
1. Too long a wire stick-out; gas nozzle too far from weld puddle	1. Use longer nozzle or adjust stick-out (3/8” minimum or 15 times wire diameter)
2. Bad torch position - too sharp a torch incline causing the venturi effect at the end of the nozzle leading to atmospheric contamination	2. Correct torch angle
3. Excessively wide weld pool for nozzle I.D.	3. Width of the weld pool should be 1.3 times the nozzle I.D.; use suitable wider gas nozzle
4. Arc voltage too high	4. Reduce voltage
5. Too high a travel speed	5. Reduce speed

TROUBLESHOOTING: SPATTER

Problems/Causes	Possible Solutions
SPATTER Too fast or too slow wire feed for the arc voltage	Set the wire feed rate and voltage in accordance with good welding practices as recommended by a qualified welding engineer.
Too long an arc	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.
Damaged current tip	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.
Inclination of welding gun too great	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.
Faulty power source	Have the power source checked for faulty conditions such as broken wires and faulty contacts.
Incorrect start	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.
Incorrect pulse parameters	Check the user manual for your power supply or consult a qualified welding engineer.
Uneven wire feed	Uneven wire feed gives rise to heavy spatter. Find the cause of the disturbance and correct the condition before proceeding.
Impurities on the base metal	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.
Poor ground contact	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.
Too long stick-out (short-arc welding)	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.
Incorrect polarity	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 workpiece 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

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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