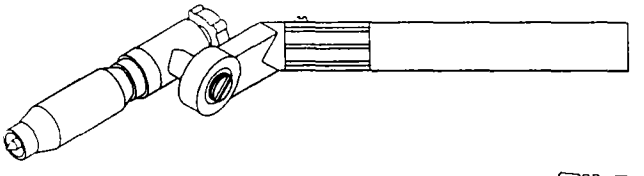
Miller®

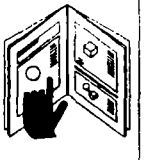
January 1994 Form: OM-1563B
Effective With Style No. KB-8

OWNER'S MANUAL



MTL-17 Torches

- Air-Cooled Torches For GTAW Welding
- Rated At 150 Amperes 100% Duty Cycle Using Argon Shielding Gas
- .020 Thru 1/8 in (0.5 Thru 3.2 mm) Tungsten Size Capacity
- Includes 12-1/2 Or 25 ft (3.8 or 7.6 m) Cable
- Remote Contactor And Current Control Available
- Tungsten Electrode And Some Torch Parts Needed



- Read and follow these instructions and all safety blocks carefully.
- Have only trained and qualified persons install, operate, or service this unit.
- Call your distributor if you do not understand the directions.

- Give this manual to the operator.

- For help, call your distributor
- or: MILLER Electric Mfg. Co., P.O. Box 1079, Appleton, WI 54912 414-734-9821

MILLER'S TRUE BLUE™ LIMITED WARRANTY

Effective January 1, 1992
(Equipment with a serial number preface of "KC" or newer)

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

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

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

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

1. 5 Years - Parts - 3 Years Labor
   - [illegible] power rectifiers
2. 3 Years - Parts and Labor
   - Transformer Rectifier Power Sources
   - Plasma Arc Cutting Power Sources
   - Semi-Automatic and Automatic Wire Feeders
   - Robots
3. 2 Years - Parts and Labor
   - Engine Driven Welding Generators
     NOTE: Engines are warranted separately by the engine manufacturer [illegible]
   - [illegible]
4. 1 Year - Parts and Labor
   - Motor Driven Guns
   - Process Controllers
   - Wire Drive Systems
   - [illegible]
   - Driver
   - Spot Welders
   - Load Banks
   - SDX Transformers
   - Running Gear/Trailers
   - Field Options

     (NOTE: Field options are covered under True Blue™ for the remaining warranty period of the product they are installed in, or for a minimum of one year, whichever is greater.)
5. 6 Months - Batteries
6. 90 Days - Parts and Labor
   - MIG Guns/TIG Torches
   - Plasma Cutting Torches
   - Remote Controls
   - Accessory Kits
   - Replacement Parts

MILLER'S True Blue™ Limited Warranty shall not apply to:

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

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

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

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

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

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

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

RECEIVING-HANDLING

Before unpacking equipment, check carton for any damage that may have occurred during shipment. File any claims for loss or damage **with the delivering carrier**. Assistance for filing or settling claims may be obtained from distributor and/or equipment manufacturer's Transportation Department.

When requesting information about this equipment, always provide Model Designation and Serial or Style Number.

Use the following spaces to record Model Designation and Serial or Style Number of your unit. The information is located on the rating label or nameplate.

Model _____

Serial or Style No. _____

Date of Purchase _____

SAFETY PRECAUTIONS FOR GTAW TORCHES

⚠ WARNING — **GTAW WELDING can be hazardous.**

PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS KEEP AWAY UNTIL CONSULTING YOUR DOCTOR.

In welding, as in most jobs, exposure to certain hazards occurs. Welding is safe when precautions are taken. The safety information given below is only a summary of the more complete safety information found in the welding power source Owner's Manual. Read and follow all safety precautions.

HAVE ALL INSTALLATION, OPERATION, MAINTENANCE, AND REPAIR WORK PERFORMED ONLY BY QUALIFIED PEOPLE.

ELECTRIC SHOCK can kill.

1. Always wear dry insulating gloves.
2. Insulate yourself from work and ground.
3. Do not touch live electrode or electrical parts.
4. Repair or replace worn, damaged, or cracked torch or cable insulation.
5. Turn off welding power source before changing tungsten electrode or torch parts.
6. Keep all covers and handle securely in place.

ARC RAYS can burn eyes and skin.

1. Wear welding helmet with correct shade of filter.
2. Wear correct eye and body protection.
3. Cover exposed skin.

FUMES AND GASES can be hazardous to your health.

1. Keep your head out of the fumes.
2. Ventilate area, or use breathing device.
3. Read Material Safety Data Sheets (MSDSs) and manufacturer's instructions for material used.

WELDING can cause fire or explosion.

1. Do not weld near flammable material.
2. Do not weld on closed containers.
3. Watch for fire; keep extinguisher nearby.

HOT SURFACES can burn skin.

1. Allow torch to cool before touching.
2. Do not touch hot metal.
3. Protect hot metal from contact by others.

NOISE can damage hearing; SOME APPLICATIONS, SUCH AS PULSING, are noisy.

1. Check for noise level limits exceeding those specified by OSHA.
2. Use approved ear plugs or ear muffs if noise level is high.
3. Warn others nearby about noise hazard.

EMF INFORMATION

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

The following is a quotation from the General Conclusions Section of the U.S. Congress, Office of Technology Assessment, *Biological Effects of Power Frequency Electric & Magnetic Fields – Background Paper*, OTA-BP-E-53 (Washington, DC: U.S. Government Printing Office, May 1989): ". . . there is now a very large volume of scientific findings based on experiments at the cellular level and from studies with animals and people which clearly establish that low frequency magnetic fields can interact with, and produce changes in, biological systems. While most of this work is of very high quality, the results are complex. Current scientific understanding does not yet allow us to interpret the evidence in a single coherent framework. Even more frustrating, it does not yet allow us to draw definite conclusions about questions of possible risk or to offer clear science-based advice on strategies to minimize or avoid potential risks."

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

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

About Pacemakers:

The above procedures are among those also normally recommended for pacemaker wearers. Consult your doctor for complete information.

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SECTION 1 – SAFETY INFORMATION

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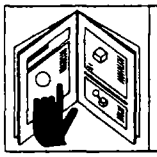
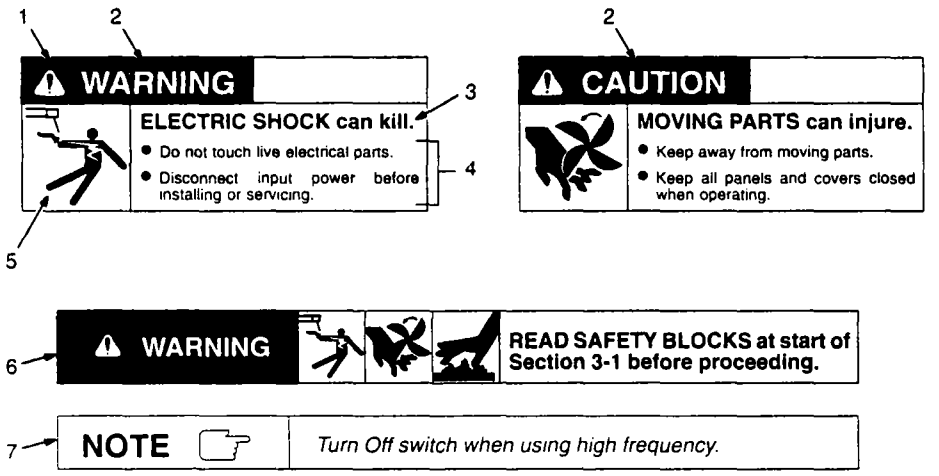


- Read all safety messages throughout this manual.
- Obey all safety messages to avoid injury.
- Learn the meaning of WARNING and CAUTION.



1 Safety Alert Symbol

2 Signal Word

WARNING means possible death or serious injury can happen.

CAUTION means possible minor injury or equipment damage can happen.

3 Statement Of Hazard And Result

4 Safety Instructions To Avoid Hazard

5 Hazard Symbol (If Available)

6 Safety Banner

Read safety blocks for each symbol shown.

7 NOTE

Special instructions for best operation – not related to safety.

Figure 1-1. Safety Information

SECTION 2 – SPECIFICATIONS

Table 2-1. Welding Torch

Specification	Description			
Model Description	MT: Miller Torch; L: Flex Lok; 17: 150 Ampere Rating; V: Gas Valve 12: 12-1/2 ft (3.8 m) Cable; 25: 25 ft (7.6 m) Cable; 1: One-Piece Cable Example: MTL-17-12 – Miller Torch; Flex Lok; 150 Ampere Rating; 12-1/2 ft (3.8 m); One-Piece Cable			
Ampere Rating At 100% Duty Cycle DCEN, ACHF	150 Amperes Using Argon Gas			
Cooling Method	Air Cooling			
Tungsten Size Capacity	.020 Thru 1/8 in (0.5 Thru 3.2 mm)			
Options And Accessories	See Rear Cover			
	12-1/2 ft (3.8 m) Cable	**25 ft (7.6 m) Cable**	**12-1/2 ft (3.8 m) Cable With Gas Valve**	**25 ft (7.6 m) Cable With Gas Valve**
Total Weight	Net: 2.5 lb (1.1 kg); Ship: 3 lb (1.4 kg)	Net: 4.5 lb (2 kg); Ship: 5 lb (2.3 kg)	Net: 2.5 lb (1.1 kg); Ship: 3 lb (1.4 kg)	Net: 5 lb (2.3 kg); Ship: 5 lb (2.3 kg)
Torch Body Dimensions And Weight	Length: 8 in (203 mm); Handle Diameter: 3/4 in (19 mm) Weight: 5.6 oz (160 g)		Length: 8-3/4 in (222 mm); Handle Diameter: 7/8 in (23 mm); Weight: 7.5 oz (210 g)	

2-1. Duty Cycle

⚠ CAUTION

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

- Do not weld at rated load longer than shown below.

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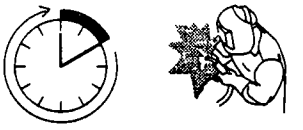
Definition

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

100% Duty Cycle At 150 Amperes Using Argon Gas



Continuous Welding

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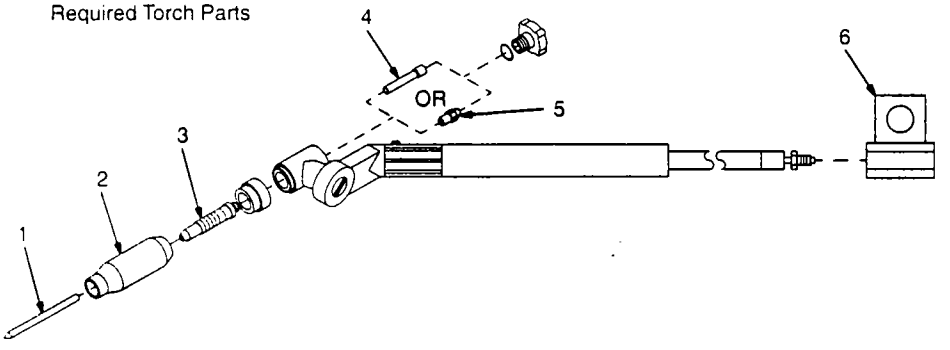
Figure 2-1. Duty Cycle

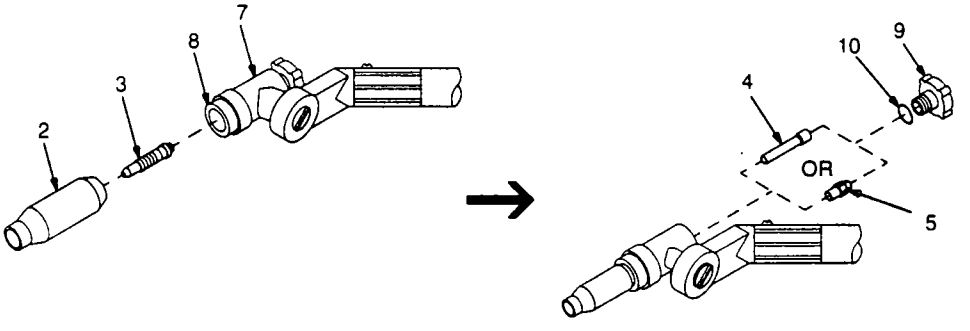
SECTION 3 – INSTALLATION & OPERATION

3-1. Required Torch Parts And Torch Assembly

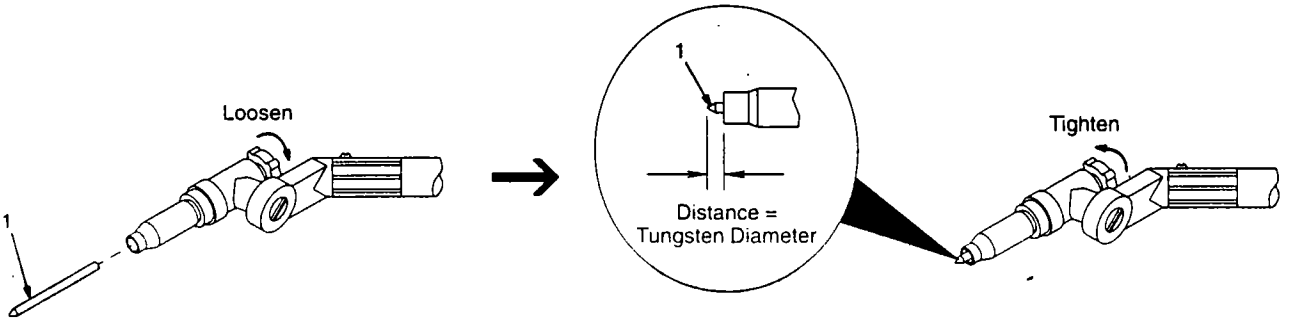
Required Torch Parts



Assembling Torch Parts



Installing Tungsten



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Obtain the following parts (see Section 6):

1 Tungsten Electrode (See Section 5)

2 Cup

3 Collet Body

4 Standard Collet

5 Reverse Collet

Reverse collet improves electrical contact of tungsten electrode.

6 Power Cable Adapter

Assembling Torch Body

7 Flex-Lok Head

8 Heat Shield

9 Backcap (Short Backcap Shown)

10 O-Ring

Installing Tungsten

To adjust tungsten position, loosen backcap.

Keep connections tight. Replace cup, heat shield, backcap, and O-rings if cracked.

Figure 3-1. Required Torch Parts And Torch Assembly

3-2. Adjusting Flex-Lok Head

⚠ CAUTION

TOOLS can damage torch.

- Do not use hand tools to adjust torch flex-lok head.

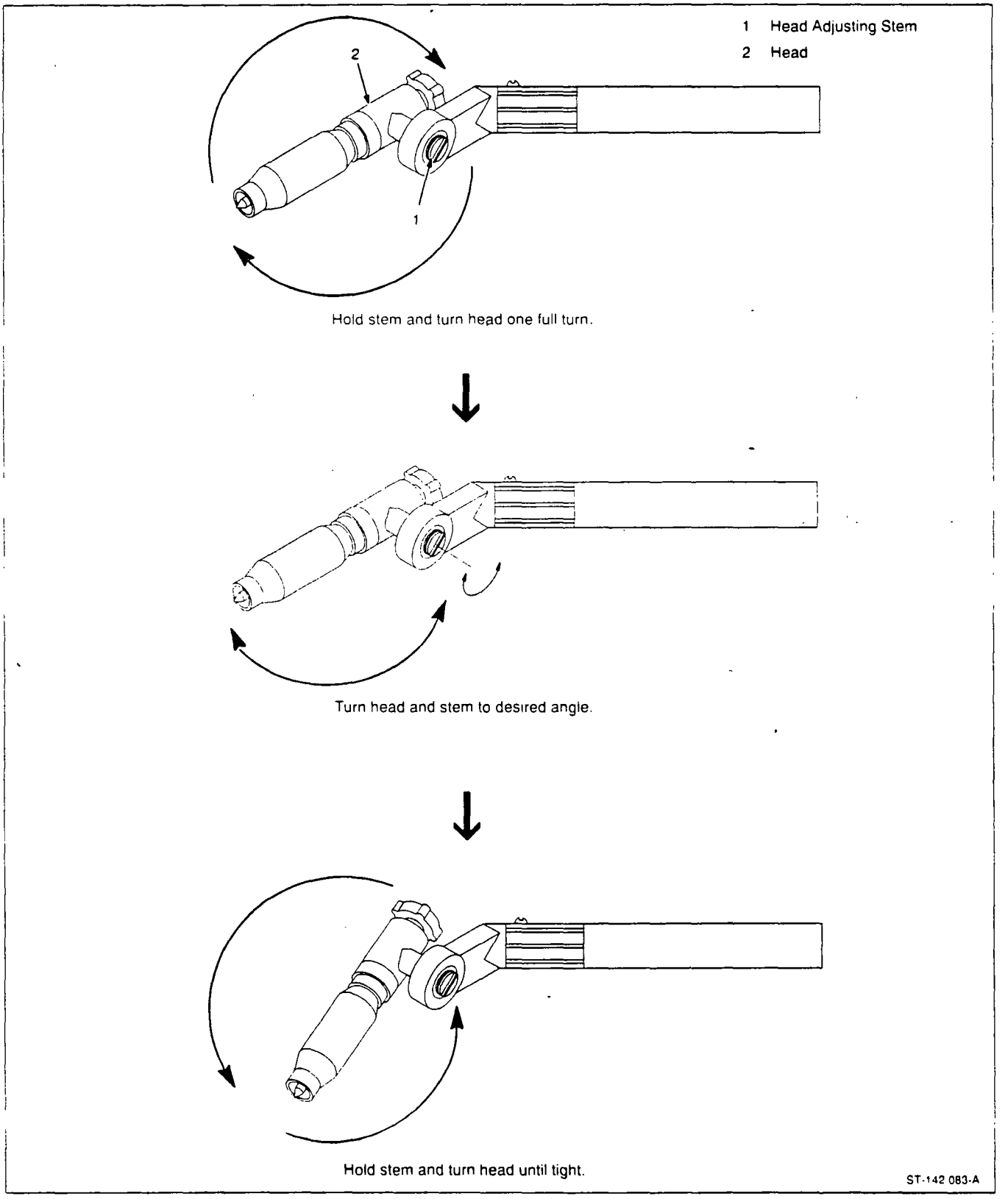

Figure 3-2. Adjusting Flex-Lok Head

3-3. Connecting Torch

⚠ WARNING

READ SAFETY BLOCKS at beginning of manual before proceeding.

BUILDUP OF SHIELDING GAS can harm health or kill.

- Shut off shielding gas supply when not in use.

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If applicable, install high-frequency unit.

Turn Off welding power source, and disconnect input power before installing torch.

Obtain the following hose:

1 Gas Hose With 5/8-18 Right-Hand Fittings

Connections:

2 Regulator/Flowmeter

3 Gas Cylinder

4 Welding Power Source

5 Gas Valve

6 Torch Cable

7 Power Cable Adapter

Connect hose and cable to adapter before connecting adapter to weld output terminal.

8 Work Clamp

Connect work clamp to clean, paint-free location on workpiece. as close to weld area as possible.

Use wire brush or sandpaper to clean metal at weld joint area.

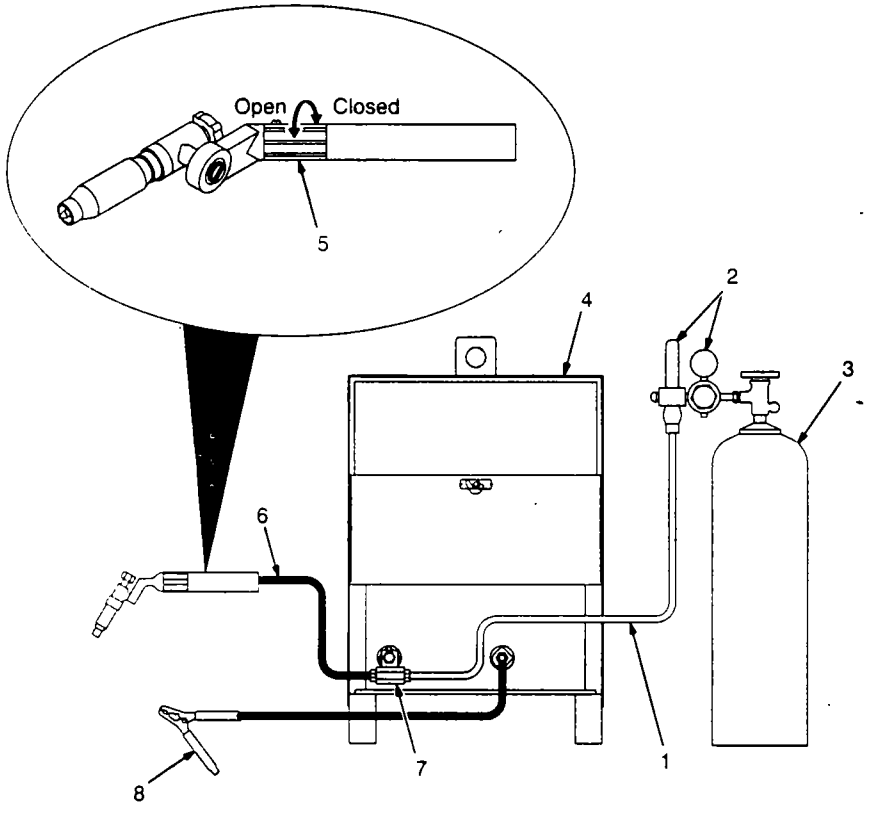
Operating Torch Gas Valve:

Valve controls gas preflow and postflow. Preflow aids arc starting. Preflow and postflow prevent electrode from forming a black surface (oxidizing).

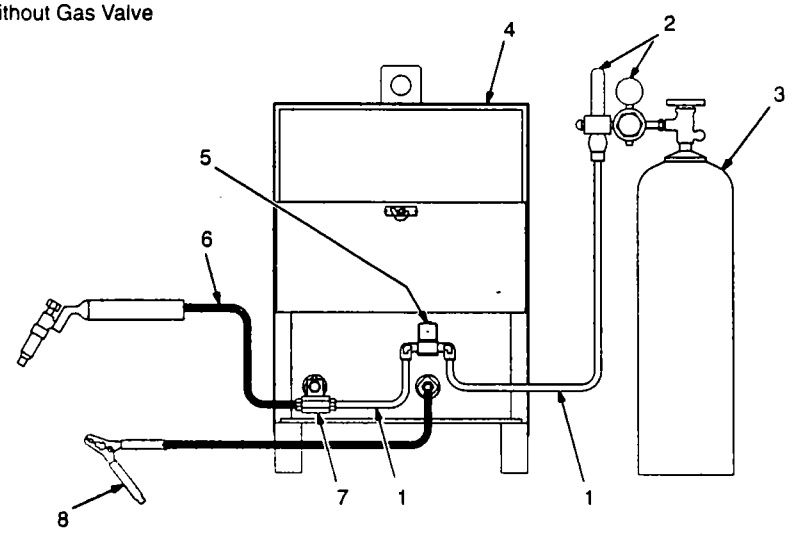
Open valve just before welding. Turn valve clockwise 1/4 turn to open, and counterclockwise 1/4 turn to close.

After welding, leave valve open about 10 seconds for every 100 amperes of weld current. Close valve when postflow is finished.

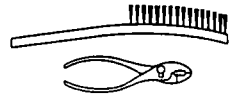
Torch With Gas Valve



Torch Without Gas Valve



Tools Needed:



5/8, 7/8 in

ST-800 487

Figure 3-3. Connecting Torch

SECTION 4 – MAINTENANCE & TROUBLESHOOTING

⚠ WARNING **READ SAFETY BLOCKS at beginning of manual before proceeding.**

⚠ **Turn Off all power before maintaining.**

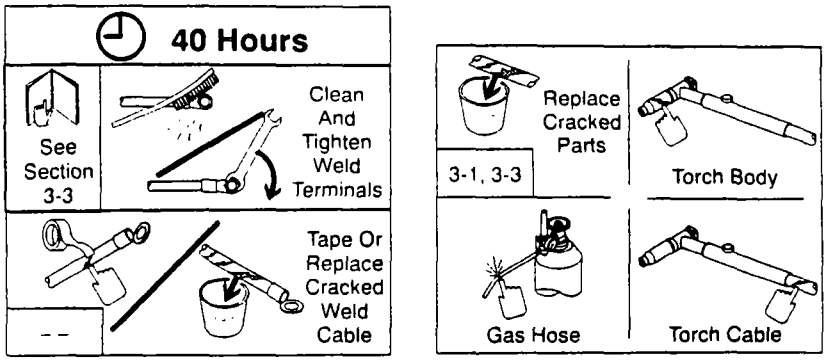


Figure 4-1. Maintenance Schedule

Table 4-1. Troubleshooting

NOTE *Before using troubleshooting table, check selection and preparation of tungsten electrode according to Section 5.*

Trouble	Remedy
Lack of high frequency; difficulty in establishing arc.	Check cables and torch for cracks or bad connections. Be sure that torch cables are not close to any grounded metal. Repair or replace necessary parts.
	Check welding power source high frequency control, and if necessary, check and adjust spark gaps.
Torch gas valve not working properly (if applicable).	Have Factory Authorized Service Station/Service Distributor check valve.
Wandering arc – poor control of direction of arc.	Reduce gas flow rate.
Tungsten electrode oxidizing and not remaining bright after conclusion of weld.	Shield weld zone from drafts. Check and tighten all gas fittings.
	Increase postflow time.
	Check gas valve.

SECTION 5 – TUNGSTEN ELECTRODE

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NOTE ☞

For additional information, see your distributor for a handbook on the Gas Tungsten Arc Welding (GTAW) process.

Wear clean gloves to prevent contamination of tungsten electrode.

5-1. Selecting Tungsten Electrode

Table 5-1. Tungsten Size

Electrode Diameter	Amperage Range - Gas Type♦ - Polarity			
	DC – Argon – Electrode Negative/Straight Polarity	DC – Argon – Electrode Positive/Reverse Polarity	AC – Argon – Using High Frequency	AC – Argon – Balanced Wave Using High Freq.
Pure Tungsten (Green Band)				
.010"	Up to 15	*	Up to 15	Up to 10
.020"	5-20	*	5-20	10-20
.040"	15-80	*	10-60	20-30
1/16"	70-150	10-20	50-100	30-80
3/32"	125-225	15-30	100-160	60-130
1/8"	225-360	25-40	150-210	100-180
5/32"	360-450	40-55	200-275	160-240
3/16"	450-720	55-80	250-350	190-300
1/4"	720-950	80-125	325-450	250-400
2% Thorium Alloyed Tungsten (Red Band)				
.010"	Up to 25	*	Up to 20	Up to 15
.020"	15-40	*	15-35	5-20
.040"	25-85	*	20-80	20-60
1/16"	50-160	10-20	50-150	60-120
3/32"	135-235	15-30	130-250	100-180
1/8"	250-400	25-40	225-360	160-250
5/32"	400-500	40-55	300-450	200-320
3/16"	500-750	55-80	400-500	290-390
1/4"	750-1000	80-125	600-800	340-525
Zirconium Alloyed Tungsten (Brown Band)				
.010"	*	*	Up to 20	Up to 15
.020"	*	*	15-35	5-20
.040"	*	*	20-80	20-60
1/16"	*	*	50-150	60-120
3/32"	*	*	130-250	100-180
1/8"	*	*	225-360	160-250
5/32"	*	*	300-450	200-320
3/16"	*	*	400-550	290-390
1/4"	*	*	600-800	340-525

♦ Typical argon shielding gas flow rates are 15 to 35 cfh (cubic feet per hour).

*Not Recommended.

The figures listed are intended as a guide and are a composite of recommendations from American Welding Society (AWS) and electrode manufacturers.

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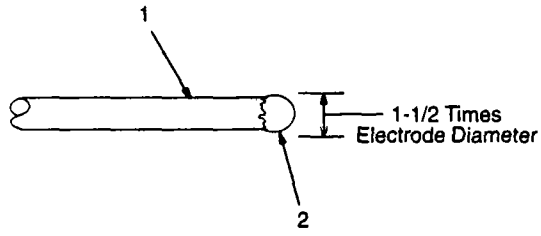
5-2. Preparing Tungsten



1 Tungsten Electrode

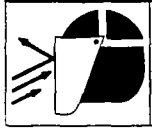
2 Balled End

Ball end of tungsten before welding by applying either an ac amperage slightly higher than what is recommended for a given electrode diameter (see Table 5-1), or a dc electrode positive amperage.

Ref. S-0161

Figure 5-1. Preparing Tungsten For AC Or DC Electrode Positive (DCEP) Welding

⚠ CAUTION



FLYING SPARKS AND HOT METAL can cause injury and start fires.

- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand, and body protection.
- Keep flammables away.

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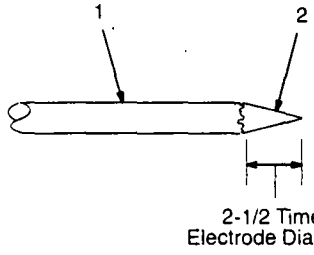

1 Tungsten Electrode

2 Tapered End

Grind end of tungsten on fine grit, hard abrasive wheel before welding. Do not use wheel for other jobs or tungsten can become contaminated causing lower weld quality.

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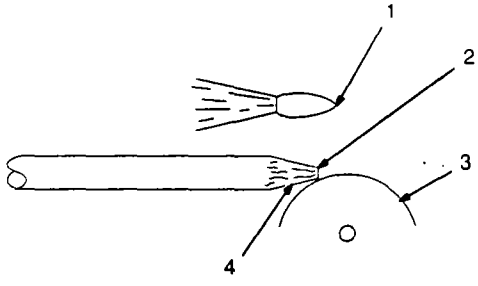


Ideal Tungsten Preparation – Stable Arc

1 Stable Arc

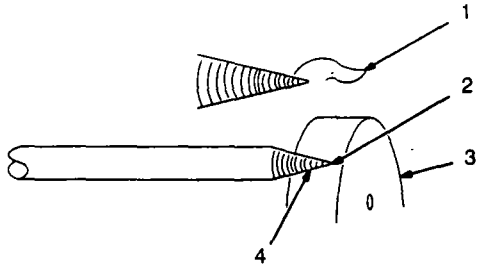
2 Flat

Diameter of this flat determines amperage capacity.

3 Grinding Wheel

4 Straight Ground

Ref. S-0162



Wrong Tungsten Preparation – Wandering Arc

1 Arc Wander

2 Point

3 Grinding Wheel

4 Radial Ground

Ref. S-0162

Figure 5-2. Preparing Tungsten For DC Electrode Negative (DCEN) Welding

SECTION 6 – PARTS LIST

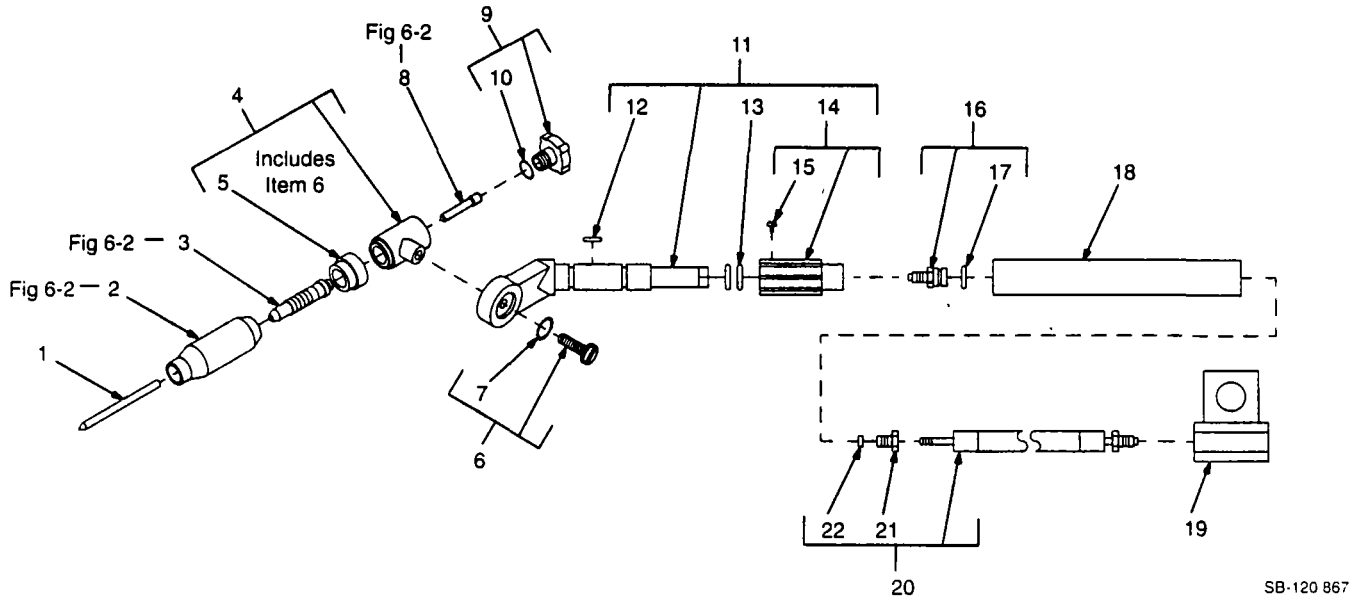


Figure 6-1. Complete Torch Assembly

Item No.	Stock No.	Model No.	Description	Quantity

Figure 6-1. Complete Torch Assembly

1			TUNGSTEN, *electrode (consult your welding supply distributor)*	
2			CUP, (see Fig 6-2)	
3			COLLET BODY, (see Fig 6-2)	
4	118 526	FL3L	3 SERIES HEAD, (consisting of)	1
5	116 256	300HS	HEAT SHIELD, std	1
5	♦119 914	3GHS	HEAT SHIELD, small dia gas lens	1
5	♦119 915	3GHSLD	HEAT SHIELD, large dia gas lens	1
6	116 203	01-0009	HEAD ADJUSTMENT STEM, (consisting of)	1
7	116 260	300R	O-RING	1
8			COLLET, (see Fig 6-2)	
9	116 259	300S	BACKCAP, short (consisting of)	1
9	♦116 258	300M	BACKCAP, medium (consisting of)	1
9	♦116 257	300L	BACKCAP, long (consisting of)	1
10	116 260	300R	O-RING	1
11	116 208		FLEX LOC TORCH BODY, w/valve (consisting of)	1
12	116 219	01-0012	O-RING	1
13	116 217	01-0002	O-RING	2
14	116 216	FLHV	VALVED HANDLE, models w/valve (consisting of)	1
15	116 218	01-0007	SCREW, non-conductive	1
16	116 220	01-0013	HANDLE ADAPTER, models w/valve (consisting of)	1
17	116 217	01-0002	O-RING,	1
11	116 207		FLEX LOC TORCH BODY, (consisting of)	1
13	116 217	01-0002	O-RING	2
18	118 510		HANDLE	1
19	♦116 276	15PCA	POWER CABLE ADAPTER	1
20	116 271	1512PCHF	HI-FLEX POWER CABLE, 12-1/2ft (consisting of)	1
20	116 272	1525PCHF	HI-FLEX POWER CABLE, 25ft (consisting of)	1
21	120 721		RH NUT	2
22	120 720		RING NUT	2

♦OPTIONAL
BE SURE TO PROVIDE MODEL AND STYLE NUMBER WHEN ORDERING REPLACEMENT PARTS.

CONSUMABLE PARTS SELECTOR

(Note: Collet Body and Gas Cup required to complete torch).
Torches with high Rex composite cable also require a power cable adapter.

Tungsten Diameter		in. (mm)	.020" (0.5)	.040" (1.0)	1/16" (1.6)	3/32" (2.4)	1/8" (3.2)
Amperage Range		ACHF DCSP	5-20 5-20	10-80 15-80	50-150 70-150	100-235 150-250	150-325 (220-350)
Collet (Standard)		Model No. Stock No.	3C20 116 367	3C40 116 368	3C116 116 369	3C332 116 370	3C418 116 371
Collet (Reverse)		Model No. Stock No.	7C20 116 379	7C40 116 380	7C116 116 381	7C332 116 382	7C418 116 383
Collet Body (Std Lgth.)		Model No. Stock No.	3CB20 116 361	3CB40 116 362	3CB116 116 363	3CB332 116 364	3CB418 116 365
	Stock/Model No.						Cup Orifice
Cup, Ceramic 1-27/32" Long	116 347 (3C3)						3/16"
	116 348 (3C4)						1/4"
	116 349 (3C5)						5/16"
	116 350 (3C6)						3/8"
	116 351 (3C7)						7/16"
	116 352 (3C8)						1/2"
	116 353 (3C10)						5/8"
	116 354 (3C12)						3/4"
Cup, Ceramic 3-7/32" Long	116 343 (3C4L)						1/4"
	116 344 (3C5L)						5/16"
	116 345 (3C6L)						3/8"
	116 346 (3C7L)						7/16"
Cup, Alumina 1-27/32" Long	116 330 (3A4)						1/4"
	116 331 (3A5)						5/16"
	116 332 (3A6)						3/8"
	116 333 (3A7)						7/16"
	116 334 (3A8)						1/2"
	116 335 (3A10)						5/8"
	116 336 (3A12)						3/4"
Gas Lens Collet Body Std. Lgth	Model No. Stock No.		3GL20 119 926	3GL40 119 927	3GL116 119 928	3GL332 119 929	3GL418 119 930
	Stock/Model No.						
Cup, Ceramic Gas Lens 1-5/8" Long	119 917 (3CG4)						1/4"
	119 918 (3CG5)						5/16"
	119 919 (3CG6)						3/8"
	119 920 (3CG7)						7/16"
	119 921 (3CG8)						1/2"
	119 922 (3CG11)						11/16"
3CG11 is 1-1/8" Long	119 923 (3CG12)						3/4"
	119 924 (3CG14)						7/8"
	119 925 (3CG16)						1"
Cup, Alumina Gas Lens 1-5/8" Long	119 932 (3AG4)						1/4"
	119 933 (3AG5)						5/16"
	119 934 (3AG6)						3/8"
	119 935 (3AG7)						7/16"
	119 936 (3AG8)						1/2"
	119 937 (3AG11)						11/16"
Gas Lens Collet Body Lg. Dia.	Model No. Stock No.					3GLL332 119 902	3GLL418 119 903
	Stock/Model No.						
Cup, Alumina 1-7/8" Long	119 911 (3AG8LD)						1/2"
	119 912 (3AG10LD)						5/8"
	119 913 (3AG12LD)						3/4"

STANDARD LENGTH FRONT ENDS

Standard Length Collet Body 3CB-XXX
Use 300HS Heat Shield Stock No 116 256

Standard Length Gas Lens 3GL-XXX
Use 3GHS Heat Shield Stock No 119 914

Large Diameter Gas Lens 3GLL-XXX
Use 3GHSLD Heat Shield Stock No 119 915

Standard Collet 3C-XXX

Reverse Collet 7C-XXX

SHORT FRONT ENDS

Short Collet Body* 4CB-XXX
Use 300HS Heat Shield Stock No. 116 256

Short Gas Lens 4GL-XXX
Use 4GHS Heat Shield Stock No. 119 916

Short Collet 4C-XXX

Reverse Collet 7C-XXX

*Reduce Continuous Duty Rating By 25% When Using Short Collet/Collet Body

Tungsten Diameter		in. (mm)	.020" (0 5)	.040" (1.0)	1/16" (1.6)	3/32" (2.4)	1/8" (3.2)
Amperage Range		ACHF DCSP	5-20 5-20	10-80 15-80	50-150 70-150	100-235 150-250	150-325 (220-350)
Collet (Short)		Model No. Stock No.	4C20 116 373	4C40 116 374	4C116 116 375	4C332 116 376	4C418 116 377
Collet (Reverse)		Model No. Stock No.	7C20 116 379	7C40 116 380	7C116 116 381	7C332 116 382	7C418 116 383
Collet Body (Short)		Model No. Stock No.	4CB20 116 355	4CB40 116 356	4CB116 116 357	4CB332 116 358	4CB418 116 359
	Stock/Model No.						Cup Orifice
Cup, Ceramic 1-5/32" Long	116 337 (2C4)						1/4"
	116 338 (2C5)						5/16"
	116 339 (2C6)						3/8"
	116 340 (2C7)						7/16"
*1-1/8" Long	*116 341 (2C8)						1/2"
	*116 342 (2C10)						5/8"
Cup, Ceramic 1-7/8" Long	116 326 (2C3L)						3/16"
	116 327 (2C4L)						1/4"
	116 328 (2C5L)						5/16"
	116 329 (2C6L)						3/8"
Cup, Alumina 1-5/32" Long	116 310 (2A4)						1/4"
	116 311 (2A5)						5/16"
	116 312 (2A6)						3/8"
	116 313 (2A7)						7/16"
	116 314 (2A8)						1/2"
	116 315 (2A10)						5/8"
Gas Lens Collet Body - Short	Model No. Stock No.		4GL20 119 905	4GL40 119 906	4GL116 119 907	4GL332 119 908	4GL418 119 909
	Stock/Model No.						
Cup, Alumina 1" Long	119 893 (2AG4)						1/4"
	119 894 (2AG5)						5/16"
	119 895 (2AG6)						3/8"
	119 896 (2AG7)						7/16"

SHADED AREAS INDICATE RECOMMENDED USAGE

S-0768

Figure 6-2. Consumable Parts

Table 6-1. Cross Reference To Competitive Model

STOCK NO.	MODEL NO.	COMPETITIVE NO.
116 367	3C20	10N21
116 368	3C40	10N22
116 369	3C116	10N23
116 370	3C332	10N24
116 371	3C418	10N25
116 379	7C20	N/A
116 380	7C40	N/A
116 381	7C116	N/A
116 382	7C332	N/A
116 383	7C418	N/A
116 361	3CB20	10N29
116 362	3CB40	10N30
116 363	3CB116	10N31
116 364	3CB332	10N32
116 365	3CB418	10N28
116 347	3C3	N/A
116 348	3C4	105Z43
116 349	3C5	105Z42
116 350	3C6	105Z44
116 351	3C7	105Z45
116 352	3C8	08N78
116 353	3C10	08N79
116 354	3C12	08N80
116 343	3C4L	12N03
116 344	3C5L	105Z60
116 345	3C6L	12N02
116 346	3C7L	105Z61
116 330	3A4	10N50
116 331	3A5	10N49
116 332	3A6	10N48
116 333	3A7	10N47
116 334	3A8	10N46
116 335	3A10	10N45
116 336	3A12	10N44
119 926	3GL20	45V29
119 927	3GL40	45V24
119 928	3GL116	45V25
119 929	3GL332	45V26
119 930	3GL418	45V27
119 917	3CG4	54N35
119 918	3CG5	54N34
119 919	3CG6	54N33
119 920	3CG7	54N32
119 921	3CG8	54N31
119 922	3CG11	54N35
119 923	3CG12	N/A
119 924	3CG14	N/A
119 925	3CG16	N/A
119 932	3AG4	54N18
119 933	3AG5	54N17
119 934	3AG6	54N16
119 935	3AG7	54N15
119 936	3AG8	54N14
119 937	3AG11	54N19
119 902	3GLL332	45V64
119 903	3GLL418	995795
119 911	3AG8LD	57N74
119 912	3AG10LD	53N88
119 913	3AG12LD	53N87
116 373	4C20	N/A
116 374	4C40	10N22S
116 375	4C116	10N23S
116 376	4C332	10N24S
116 377	4C418	10N25S
116 379	7C20	N/A
116 380	7C40	N/A
116 381	7C116	N/A
116 382	7C332	N/A
116 383	7C418	N/A
116 355	4CB20	N/A
116 356	4CB40	17CB20
116 357	4CB116	17CB20
116 358	4CB332	17CB20
116 359	4CB418	17CB20
116 337	2C4	13N14
116 338	2C5	13N15
116 339	2C6	13N16
116 340	2C7	13N17
116 341	2C8	13N18
116 342	2C10	13N19
116 326	2C3L	796F70
116 327	2C4L	796F71
116 328	2C5L	796F72
116 329	2C6L	796F73
116 310	2A4	13N08
116 311	2A5	13N09
116 312	2A6	13N10
116 313	2A7	13N11
116 314	2A8	13N12
116 315	2A10	13N13
119 905	4GL20	N/A
119 906	4GL40	N/A
119 907	4GL116	N/A
119 908	4GL332	N/A
119 909	4GL418	N/A
119 893	2AG4	53N58
119 894	2AG5	53N59
119 895	2AG6	53N60
119 896	2AG7	53N61

OPTIONS AND ACCESSORIES

For TOTAL TIG™ system, select one each of the following items:

- Welding power source
- TIG torch
- TIG kit (see TIG kits listed below)
- Coolant system (if using water–cooled torch)
- Remote control

Note: The other items necessary to weld are power source primary cable, shielding gas, and filler metal.

KIT FOR MT–17 and MTL–17 SERIES AIR–COOLED TORCHES

12–1/2 ft. (3.8 m) length
(#129 590)
25 ft. (7.6 m) length
(#129 589)

Kit includes:

- Hose & hardware hook–up kit (THK–2)
- Consumable accessory kit (TAK–1) — one backcap and three sizes (.040, 1/16, and 3/32 in.) of collets, collet bodies, cups, and 2% thoriated tungsten
- Regulator/flowmeter (HRF–2425)
- Ground cable with clamp, 12–1/2 ft. (3.8 m) or 25 ft. (7.6 m) lengths to match TIG torch length

Note: Power cable adapter 105Z57 (#116 276) must be ordered for torches with one–piece composite cable.

POWER CABLE ADAPTERS

(Required on torches with one-piece, high-flex cable assembly and all water-cooled torches.)

Adapter 105Z57
Stock No. (#116 276)

INTERNATIONAL TIG TORCH CONNECTOR KIT

80 Amp Torch	**(#135 492)**
150 Amp Torch	**(#135 493)**
200 Amp Torch	**(#135 494)**
250/350 Amp Torch	**(#135 495)**

For direct connection of one–piece torches or water–cooled TIG torches into power sources with International–style connectors.

FUSE BLOCK ASSEMBLY

For use with water–cooled torches. Five fuse links included

Up to 260 Amps	**(#116 163)**
260 to 550 Amps	**(#116 164)**

Protects torch from overheating and damage if water is not circulating or if torch is run considerably higher than its rated capacity.

Note: Additional fuse links available in packages of 5 (#116 559).

CABLE EXTENSION BOX

For use with water–cooled torches

CEB (Non–fused) **(#120 797)**
CEB 260FA (#116 161)
(Fused up to 260 Amps)
CEB 550FA (#116 162)
(260 to 550 Amps)

Allows hose and cable assembly to be extended from the power source. Available with or without fuse protection. All components are protected by a strong, non–conductive enclosure.

Note: Hose and cables from power source to CEB box are not supplied. Use large diameter extension hoses and heavy welding cable for optimum performance.

RMC–H14 and RLC–H14 CONTACTOR SWITCHES

Torch handle with a built–in switch for remote contactor control of Miller solid–state TIG power sources. Includes 25 ft. (7.6 m) control cord with 14–pin plug.

RMC–H14–S (Momentary)
(#129 336)

RLC–H14–S (Locking)
(#129 335)

TIG HOSE HOOK–UP KITS (THK)

THK–1 (Water–cooled)
(#128 065)
THK–2 (Air–cooled)
(#128 066)

Provides the necessary hoses and hardware to connect either air– or water–cooled torches to a power source and, if applicable, water coolant system.

GAS REGULATORS

With 580 CGA inlet connector

HRF–2425 (#127 661)
This regulator/flowmeter has outlet pressure preset at 25 PSIG; the maximum inlet is 3000 PSIG and has 5–40 SCFH gas delivery.

AF–150 (#127 662)
This flowgauge regulator has adjustable gas delivery of 8–25 SCFH with argon gas.

TIG ACCESSORY KITS (TAK)

Kits include one backcap and three each of the following: collet, collet body, alumina cup, and 2% thoriated tungsten pieces.

TAK–1 (#129 585)
0.40, 1/16, and 3/32 in. for MT–17

TIG TORCH CABLE COVERS

Reinforced plastic cable covers made of tear and flame resistant material. A large and small cover is available in length to fit 12–1/2 ft. and 25 ft. (3.8 and 7.6 m) torches.

CC–12S (#126 150)
For 12–1/2 ft. (3.8 m) torches. Fits Miller TIG Torch models 80 Amps through 250 Amps.

CC–25S (#126 151)
For 25 ft. (7.6 m) torches. Fits Miller TIG Torch models 80 Amps through 250 Amps.

REMOTE CONTROLS

AMTV REMOTE CONTACTOR AND CURRENT CONTROL

(#152 608)
Linear motion control fastens to TIG torch handle using two Velcro straps. The AMTV is a practical alternative to a foot control. Includes 28 ft. (8.5 m) control cord with 14–pin plug.

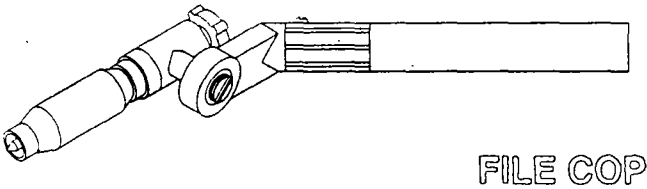
RCC REMOTE CONTACTOR AND CURRENT CONTROL

RCC–14 (14–pin plug)
(#151 086)
RCC–5 (5–pin plug)
(#157 365)
Rotary motion fingertip control fastens to TIG torch using two Velcro straps. Includes 28 ft. (8.5 m) control cord.

Miller®

January 1994 Form: OM-1563B
Effective With Style No. KB-8

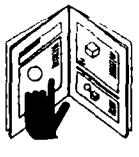
OWNER'S MANUAL



FILE COPY
RETURN TO FOLDER

MTL-17 Torches

- Air-Cooled Torches For GTAW Welding
- Rated At 150 Amperes 100% Duty Cycle Using Argon Shielding Gas
- .020 Thru 1/8 in (0.5 Thru 3.2 mm) Tungsten Size Capacity
- Includes 12-1/2 Or 25 ft (3.8 or 7.6 m) Cable
- Remote Contactor And Current Control Available
- Tungsten Electrode And Some Torch Parts Needed



- Read and follow these instructions and all safety blocks carefully.
- Have only trained and qualified persons install, operate, or service this unit.
- Call your distributor if you do not understand the directions.

- Give this manual to the operator.

- For help, call your distributor
- or: MILLER Electric Mfg. Co., P.O. Box 1079, Appleton, WI 54912 414-734-9821

MILLER'S TRUE BLUE™ LIMITED WARRANTY

Effective January 1, 1992
(Equipment with a serial number preface of "KC" or newer)

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

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

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

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

1. 5 Years - Parts - 3 Years Labor
   - [illegible] power rectifiers
2. 3 Years - Parts and Labor
   - Transformer Rectifier Power Sources
   - Plasma Arc Cutting Power Sources
   - Semi-Automatic and Automatic Wire Feeders
   - Robots
3. 2 Years - Parts and Labor
   - Engine Driven Welding Generators
     NOTE: Engines are warranted separately by the engine manufacturer [illegible] years.
   - Air Compressors
4. 1 Year - Parts and Labor
   - Motor Driven Guns
   - Process Controllers
   - Automatic Motion Systems
   - [illegible]
   - [illegible]
   - Spot Welders
   - Load Banks
   - SDX Transformers
   - Running Gear/Trailers
   - Field Options

     NOTE: Field options are covered under True Blue™ for the remaining warranty period of the product they are installed in, or for a minimum of one year, whichever is greater.)
5. 6 Months - Batteries
6. 90 Days - Parts and Labor
   - MIG Guns/TIG Torches
   - Plasma Cutting Torches
   - Remote Controls
   - Accessory Kits
   - Replacement Parts

MILLER'S True Blue™ Limited Warranty shall not apply to:

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

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

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

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

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

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

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

RECEIVING-HANDLING

Before unpacking equipment, check carton for any damage that may have occurred during shipment. File any claims for loss or damage **with the delivering carrier**. Assistance for filing or settling claims may be obtained from distributor and/or equipment manufacturer's Transportation Department.

When requesting information about this equipment, always provide Model Designation and Serial or Style Number.

Use the following spaces to record Model Designation and Serial or Style Number of your unit. The information is located on the rating label or nameplate.

Model _____

Serial or Style No. _____

Date of Purchase _____

SAFETY PRECAUTIONS FOR GTAW TORCHES

⚠ WARNING

GTAW WELDING can be hazardous.

PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS KEEP AWAY UNTIL CONSULTING YOUR DOCTOR.

In welding, as in most jobs, exposure to certain hazards occurs. Welding is safe when precautions are taken. The safety information given below is only a summary of the more complete safety information found in the welding power source Owner's Manual. Read and follow all safety precautions.

HAVE ALL INSTALLATION, OPERATION, MAINTENANCE, AND REPAIR WORK PERFORMED ONLY BY QUALIFIED PEOPLE.

ELECTRIC SHOCK can kill.

1. Always wear dry insulating gloves.
2. Insulate yourself from work and ground.
3. Do not touch live electrode or electrical parts.
4. Repair or replace worn, damaged, or cracked torch or cable insulation.
5. Turn off welding power source before changing tungsten electrode or torch parts.
6. Keep all covers and handle securely in place.

ARC RAYS can burn eyes and skin.

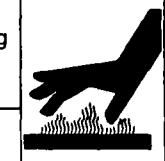
1. Wear welding helmet with correct shade of filter.
2. Wear correct eye and body protection.
3. Cover exposed skin.

FUMES AND GASES can be hazardous to your health.

1. Keep your head out of the fumes.
2. Ventilate area, or use breathing device.
3. Read Material Safety Data Sheets (MSDSs) and manufacturer's instructions for material used.

WELDING can cause fire or explosion.

1. Do not weld near flammable material.
2. Do not weld on closed containers.
3. Watch for fire; keep extinguisher nearby.



HOT SURFACES can burn skin.

1. Allow torch to cool before touching.
2. Do not touch hot metal.
3. Protect hot metal from contact by others.

NOISE can damage hearing; SOME APPLICATIONS, SUCH AS PULSING, are noisy.

1. Check for noise level limits exceeding those specified by OSHA.
2. Use approved ear plugs or ear muffs if noise level is high.
3. Warn others nearby about noise hazard.

EMF INFORMATION

NOTE ☞

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

The following is a quotation from the General Conclusions Section of the U.S. Congress, Office of Technology Assessment, *Biological Effects of Power Frequency Electric & Magnetic Fields – Background Paper*, OTA-BP-E-53 (Washington, DC: U.S. Government Printing Office, May 1989): ". . . there is now a very large volume of scientific findings based on experiments at the cellular level and from studies with animals and people which clearly establish that low frequency magnetic fields can interact with, and produce changes in, biological systems. While most of this work is of very high quality, the results are complex. Current scientific understanding does not yet allow us to interpret the evidence in a single coherent framework. Even more frustrating, it does not yet allow us to draw definite conclusions about questions of possible risk or to offer clear science-based advice on strategies to minimize or avoid potential risks."

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

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

About Pacemakers:

The above procedures are among those also normally recommended for pacemaker wearers. Consult your doctor for complete information.

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TABLE OF CONTENTS

SECTION 1 – SAFETY INFORMATION

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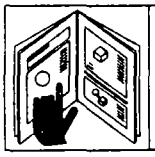
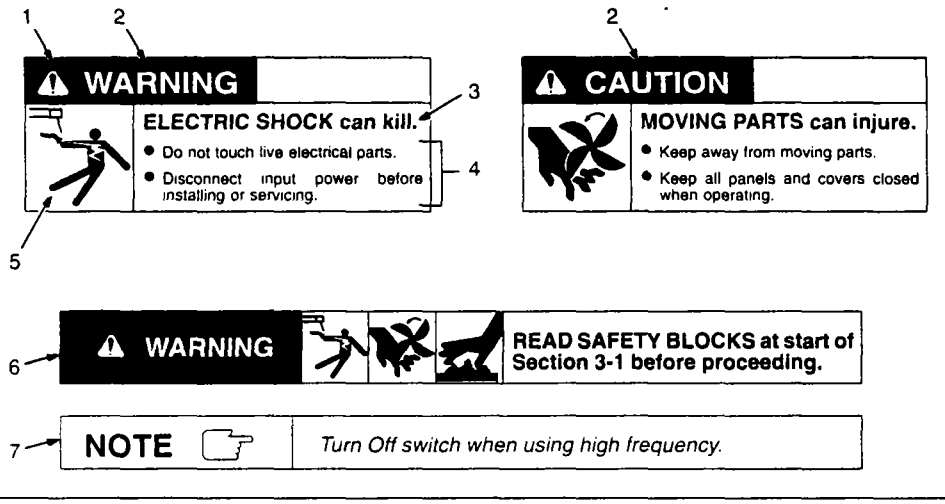


- Read all safety messages throughout this manual.
- Obey all safety messages to avoid injury.
- Learn the meaning of WARNING and CAUTION.



1 Safety Alert Symbol

2 Signal Word

WARNING means possible death or serious injury can happen.

CAUTION means possible minor injury or equipment damage can happen.

3 Statement Of Hazard And Result

4 Safety Instructions To Avoid Hazard

5 Hazard Symbol (If Available)

6 Safety Banner

Read safety blocks for each symbol shown.

7 NOTE

Special instructions for best operation – not related to safety.

Figure 1-1. Safety Information

SECTION 2 – SPECIFICATIONS

Table 2-1. Welding Torch

Specification	Description			
Model Description	MT: Miller Torch; L: Flex Lok; 17: 150 Ampere Rating; V: Gas Valve 12: 12-1/2 ft (3.8 m) Cable; 25: 25 ft (7.6 m) Cable; 1: One-Piece Cable Example: MTL-17-12 – Miller Torch; Flex Lok; 150 Ampere Rating; 12-1/2 ft (3.8 m); One-Piece Cable			
Ampere Rating At 100% Duty Cycle DCEN, ACHF	150 Amperes Using Argon Gas			
Cooling Method	Air Cooling			
Tungsten Size Capacity	.020 Thru 1/8 in (0.5 Thru 3.2 mm)			
Options And Accessories	See Rear Cover			
	12-1/2 ft (3.8 m) Cable	**25 ft (7.6 m) Cable**	**12-1/2 ft (3.8 m) Cable With Gas Valve**	**25 ft (7.6 m) Cable With Gas Valve**
Total Weight	Net: 2.5 lb (1.1 kg); Ship: 3 lb (1.4 kg)	Net: 4.5 lb (2 kg); Ship: 5 lb (2.3 kg)	Net: 2.5 lb (1.1 kg); Ship: 3 lb (1.4 kg)	Net: 5 lb (2.3 kg); Ship: 5 lb (2.3 kg)
Torch Body Dimensions And Weight	Length: 8 in (203 mm); Handle Diameter: 3/4 in (19 mm) Weight: 5.6 oz (160 g)		Length: 8-3/4 in (222 mm); Handle Diameter: 7/8 in (23 mm); Weight: 7.5 oz (210 g)	

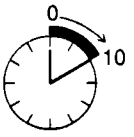
2-1. Duty Cycle

⚠ CAUTION

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

- Do not weld at rated load longer than shown below.

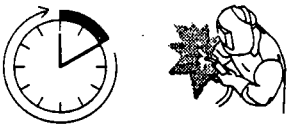
wlwarn8.1* 8/93



Definition

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

100% Duty Cycle At 150 Amperes Using Argon Gas



Continuous Welding

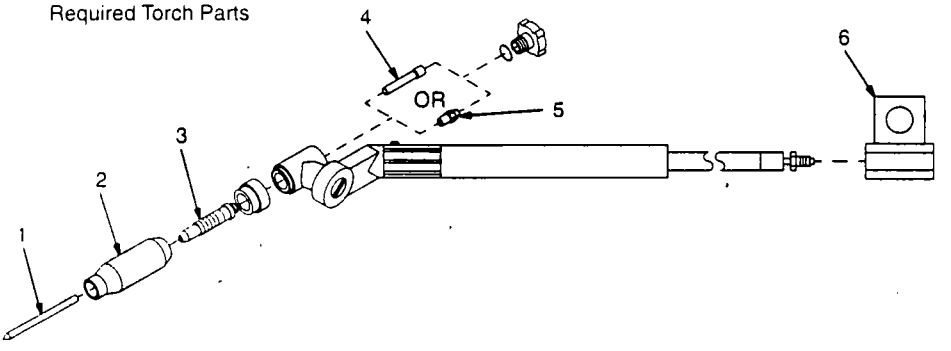
sb1.5* 8/93

Figure 2-1. Duty Cycle

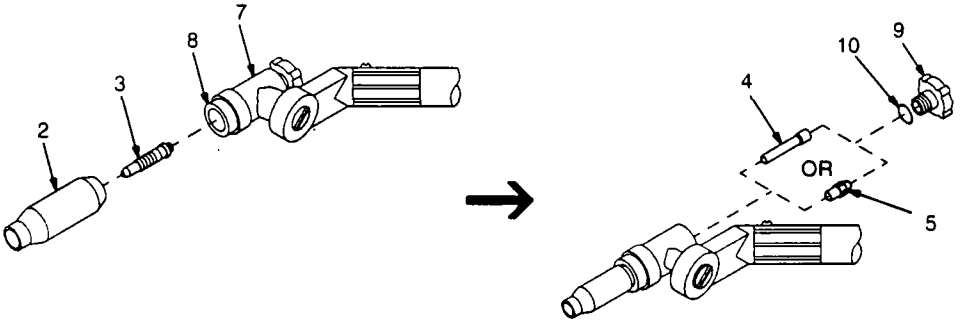
SECTION 3 – INSTALLATION & OPERATION

3-1. Required Torch Parts And Torch Assembly

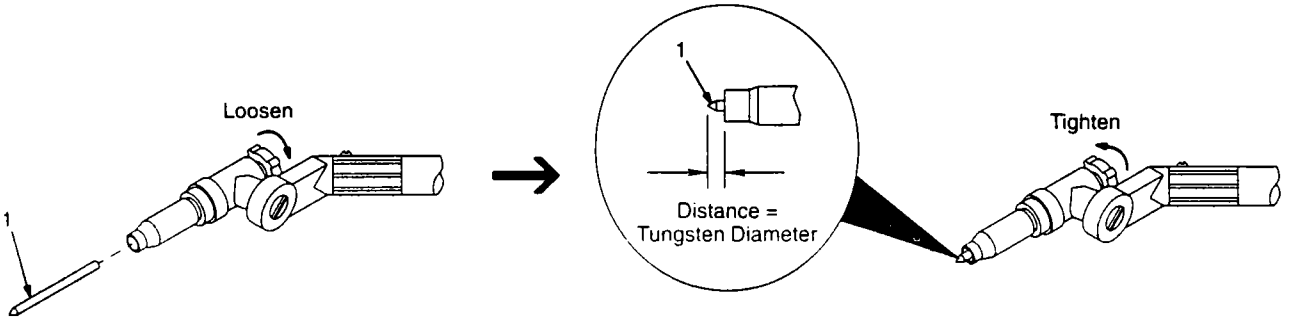
Required Torch Parts



Assembling Torch Parts



Installing Tungsten



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Obtain the following parts (see Section 6):

1 Tungsten Electrode (See Section 5)

2 Cup

3 Collet Body

4 Standard Collet

5 Reverse Collet

Reverse collet improves electrical contact of tungsten electrode.

6 Power Cable Adapter

Assembling Torch Body

7 Flex-Lok Head

8 Heat Shield

9 Backcap (Short Backcap Shown)

10 O-Ring

Installing Tungsten

To adjust tungsten position, loosen backcap.

Keep connections tight. Replace cup, heat shield, backcap, and O-rings if cracked.

Figure 3-1. Required Torch Parts And Torch Assembly

3-2. Adjusting Flex-Lok Head

⚠ CAUTION

TOOLS can damage torch.

- Do not use hand tools to adjust torch flex-lok head.

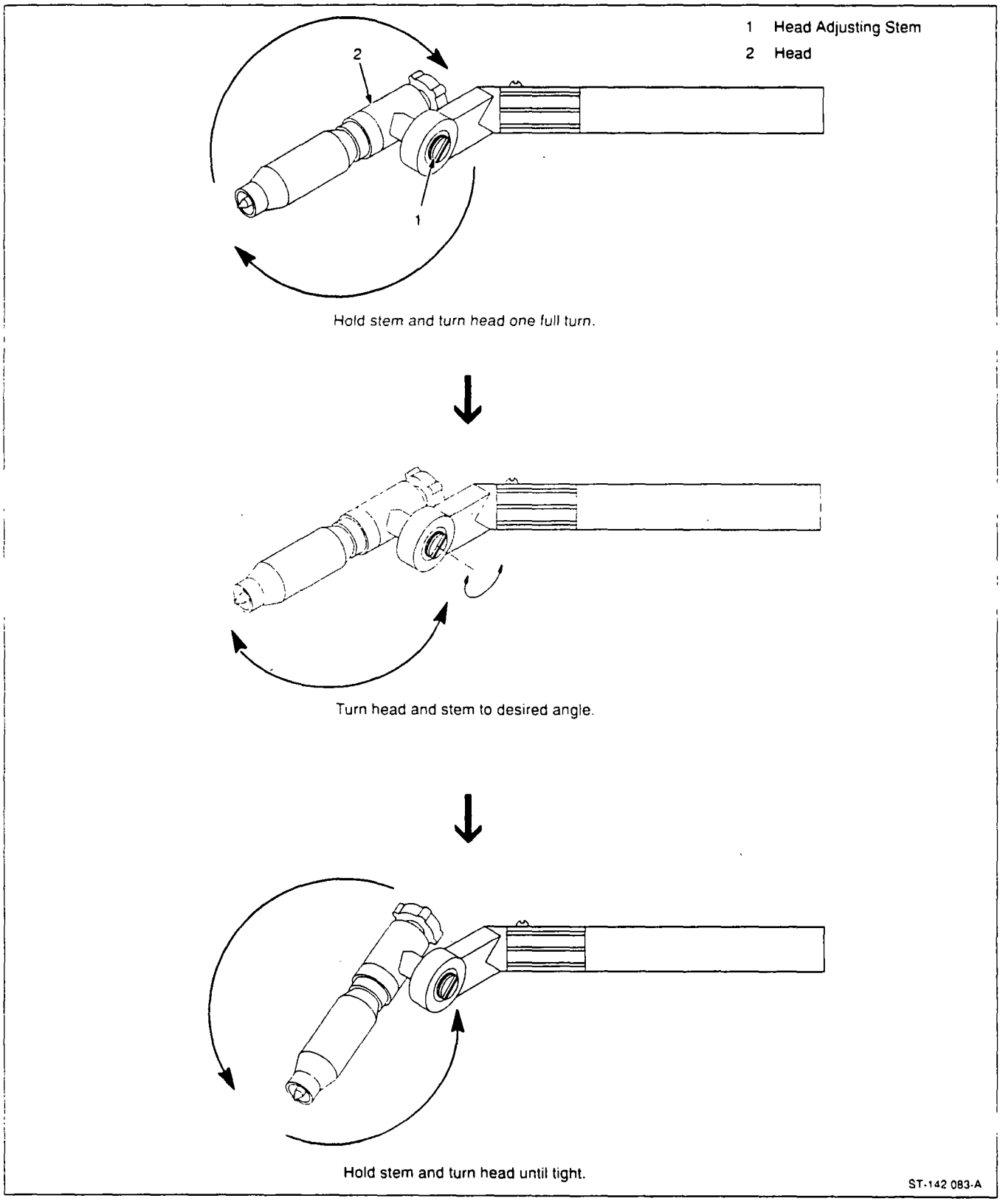


Figure 3-2. Adjusting Flex-Lok Head

3-3. Connecting Torch

⚠ WARNING

READ SAFETY BLOCKS at beginning of manual before proceeding.

BUILDUP OF SHIELDING GAS can harm health or kill.

- Shut off shielding gas supply when not in use.

warn1.1 9/91

If applicable, install high-frequency unit.

Turn Off welding power source, and disconnect input power before installing torch.

Obtain the following hose:

1 Gas Hose With 5/8-18 Right-Hand Fittings

Connections:

2 Regulator/Flowmeter

3 Gas Cylinder

4 Welding Power Source

5 Gas Valve

6 Torch Cable

7 Power Cable Adapter

Connect hose and cable to adapter before connecting adapter to weld output terminal.

8 Work Clamp

Connect work clamp to clean, paint-free location on workpiece, as close to weld area as possible.

Use wire brush or sandpaper to clean metal at weld joint area.

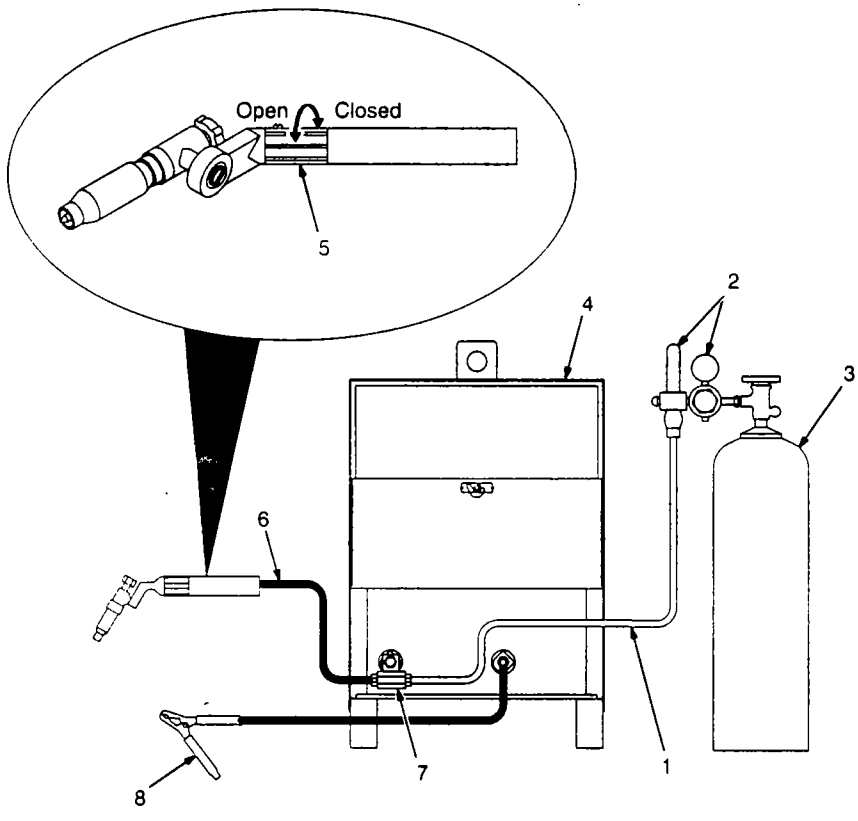
Operating Torch Gas Valve:

Valve controls gas preflow and postflow. Preflow aids arc starting. Preflow and postflow prevent electrode from forming a black surface (oxidizing).

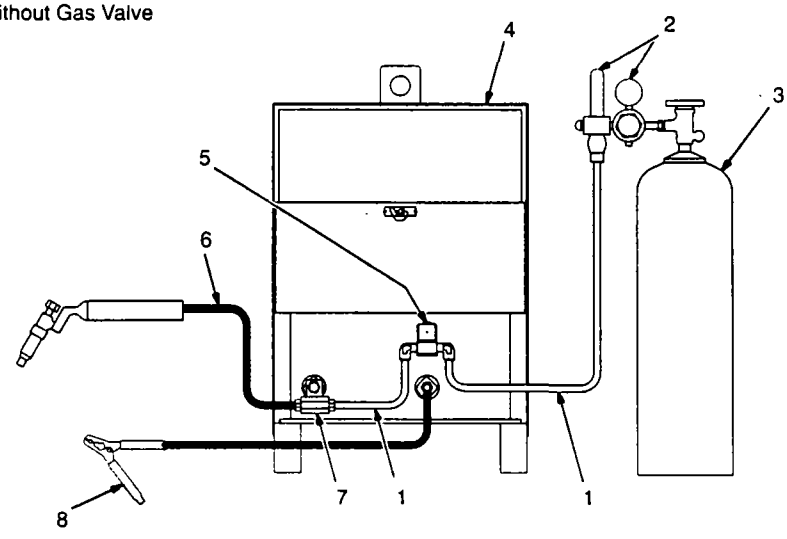
Open valve just before welding. Turn valve clockwise 1/4 turn to open, and counterclockwise 1/4 turn to close.

After welding, leave valve open about 10 seconds for every 100 amperes of weld current. Close valve when postflow is finished.

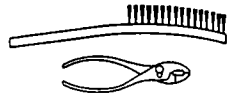
Torch With Gas Valve



Torch Without Gas Valve



Tools Needed:



5/8, 7/8 in

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Figure 3-3. Connecting Torch

SECTION 4 – MAINTENANCE & TROUBLESHOOTING

⚠ WARNING **READ SAFETY BLOCKS at beginning of manual before proceeding.**

⚠ **Turn Off all power before maintaining.**

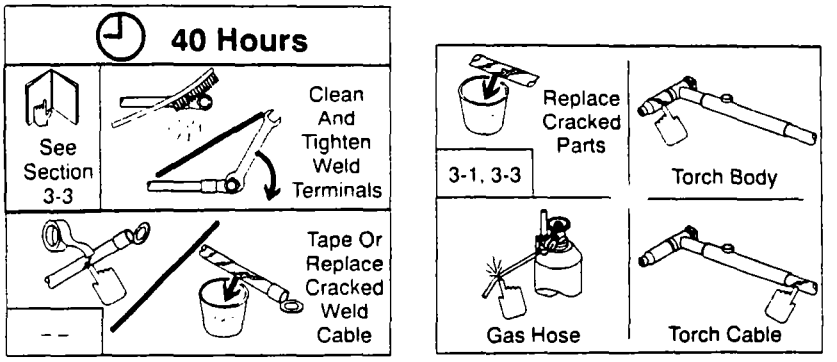

Figure 4-1. Maintenance Schedule

Table 4-1. Troubleshooting

NOTE *Before using troubleshooting table, check selection and preparation of tungsten electrode according to Section 5.*

Trouble	Remedy
Lack of high frequency; difficulty in establishing arc.	Check cables and torch for cracks or bad connections. Be sure that torch cables are not close to any grounded metal. Repair or replace necessary parts.
	Check welding power source high frequency control, and if necessary, check and adjust spark gaps.
Torch gas valve not working properly (if applicable).	Have Factory Authorized Service Station/Service Distributor check valve.
Wandering arc – poor control of direction of arc.	Reduce gas flow rate.
Tungsten electrode oxidizing and not remaining bright after conclusion of weld.	Shield weld zone from drafts. Check and tighten all gas fittings.
	Increase postflow time.
	Check gas valve.

SECTION 5 – TUNGSTEN ELECTRODE

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NOTE ☞

For additional information, see your distributor for a handbook on the Gas Tungsten Arc Welding (GTAW) process.

Wear clean gloves to prevent contamination of tungsten electrode.

5-1. Selecting Tungsten Electrode

Table 5-1. Tungsten Size

Electrode Diameter	Amperage Range - Gas Type♦ - Polarity			
	DC – Argon – Electrode Negative/Straight Polarity	DC – Argon – Electrode Positive/Reverse Polarity	AC – Argon – Using High Frequency	AC – Argon – Balanced Wave Using High Freq.
Pure Tungsten (Green Band)				
.010"	Up to 15	*	Up to 15	Up to 10
.020"	5-20	*	5-20	10-20
.040"	15-80	*	10-60	20-30
1/16"	70-150	10-20	50-100	30-80
3/32"	125-225	15-30	100-160	60-130
1/8"	225-360	25-40	150-210	100-180
5/32"	360-450	40-55	200-275	160-240
3/16"	450-720	55-80	250-350	190-300
1/4"	720-950	80-125	325-450	250-400
2% Thorium Alloyed Tungsten (Red Band)				
.010"	Up to 25	*	Up to 20	Up to 15
.020"	15-40	*	15-35	5-20
.040"	25-85	*	20-80	20-60
1/16"	50-160	10-20	50-150	60-120
3/32"	135-235	15-30	130-250	100-180
1/8"	250-400	25-40	225-360	160-250
5/32"	400-500	40-55	300-450	200-320
3/16"	500-750	55-80	400-500	290-390
1/4"	750-1000	80-125	600-800	340-525
Zirconium Alloyed Tungsten (Brown Band)				
.010"	*	*	Up to 20	Up to 15
.020"	*	*	15-35	5-20
.040"	*	*	20-80	20-60
1/16"	*	*	50-150	60-120
3/32"	*	*	130-250	100-180
1/8"	*	*	225-360	160-250
5/32"	*	*	300-450	200-320
3/16"	*	*	400-550	290-390
1/4"	*	*	600-800	340-525

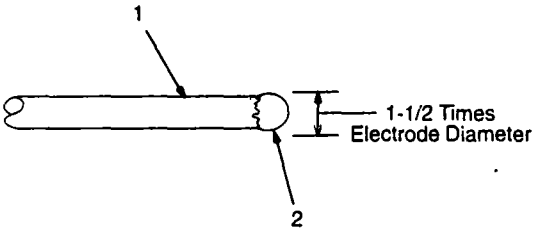
♦ Typical argon shielding gas flow rates are 15 to 35 cfh (cubic feet per hour).

*Not Recommended.

The figures listed are intended as a guide and are a composite of recommendations from American Welding Society (AWS) and electrode manufacturers.

S-0009

5-2. Preparing Tungsten



1 Tungsten Electrode

2 Balled End

Ball end of tungsten before welding by applying either an ac amperage slightly higher than what is recommended for a given electrode diameter (see Table 5-1), or a dc electrode positive amperage.

Ref. S-0161

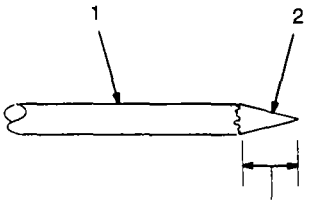
Figure 5-1. Preparing Tungsten For AC Or DC Electrode Positive (DCEP) Welding

⚠ CAUTION

FLYING SPARKS AND HOT METAL can cause injury and start fires.

- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand, and body protection.
- Keep flammables away.

warn2.1 9/91



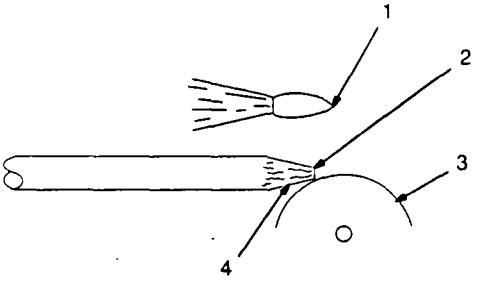
2-1/2 Times
Electrode Diameter

1 Tungsten Electrode

2 Tapered End

Grind end of tungsten on fine grit, hard abrasive wheel before welding. Do not use wheel for other jobs or tungsten can become contaminated causing lower weld quality.

Ref. S-0161



Ideal Tungsten Preparation – Stable Arc

1 Stable Arc

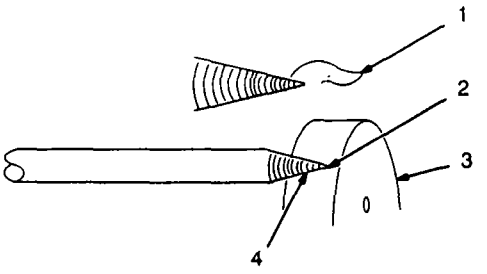
2 Flat

Diameter of this flat determines amperage capacity.

3 Grinding Wheel

4 Straight Ground

Ref. S-0162



Wrong Tungsten Preparation – Wandering Arc

1 Arc Wander

2 Point

3 Grinding Wheel

4 Radial Ground

Ref. S-0162

Figure 5-2. Preparing Tungsten For DC Electrode Negative (DCEN) Welding

SECTION 6 – PARTS LIST

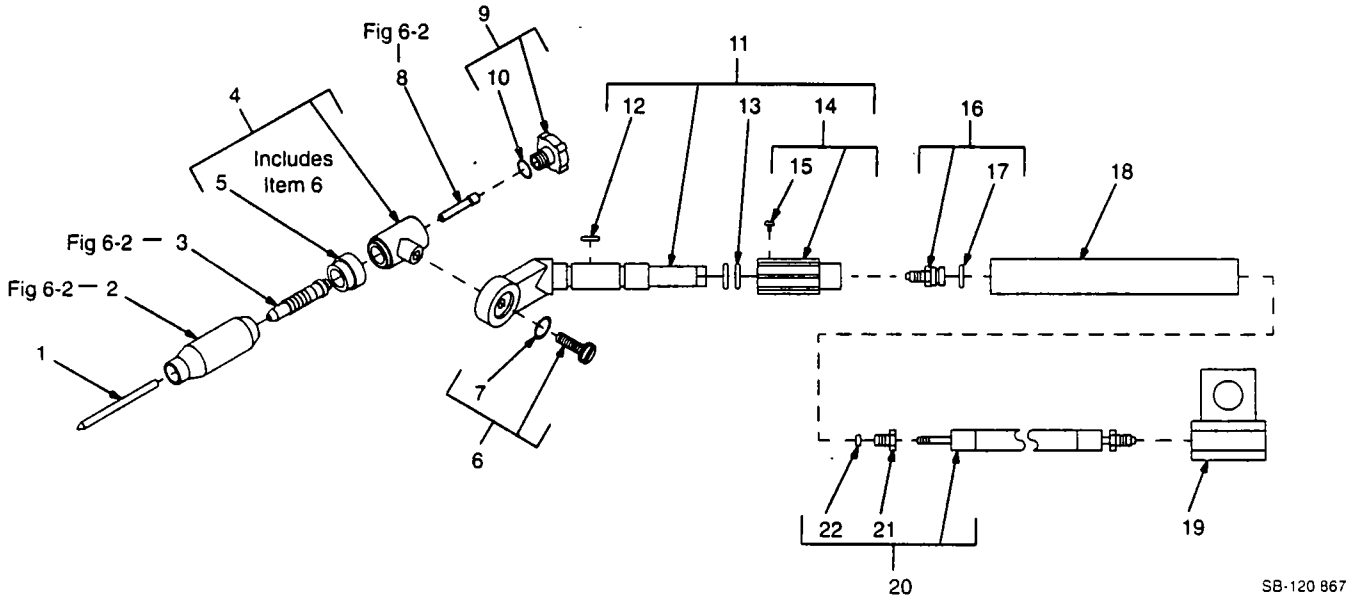


Figure 6-1. Complete Torch Assembly

Item No.	Stock No.	Model No.	Description	Quantity
			Figure 6-1. Complete Torch Assembly	
1			TUNGSTEN, electrode (consult your welding supply distributor)	
2			CUP, (see Fig 6-2)	
3			COLLET BODY, (see Fig 6-2)	
4	118 526	FL3L	3 SERIES HEAD, (consisting of)	1
5	116 256	300HS	HEAT SHIELD, std	1
5	♦119 914	3GHS	HEAT SHIELD, small dia gas lens	1
5	♦119 915	3GHSLD	HEAT SHIELD, large dia gas lens	1
6	116 203	01-0009	HEAD ADJUSTMENT STEM, (consisting of)	1
7	116 260	300R	O-RING	1
8			COLLET, (see Fig 6-2)	
9	116 259	300S	BACKCAP, short (consisting of)	1
9	♦116 258	300M	BACKCAP, medium (consisting of)	1
9	♦116 257	300L	BACKCAP, long (consisting of)	1
10	116 260	300R	O-RING	1
11	116 208		FLEX LOC TORCH BODY, w/valve (consisting of)	1
12	116 219	01-0012	O-RING	1
13	116 217	01-0002	O-RING	2
14	116 216	FLHV	VALVED HANDLE, models w/valve (consisting of)	1
15	116 218	01-0007	SCREW, non-conductive	1
16	116 220	01-0013	HANDLE ADAPTER, models w/valve (consisting of)	1
17	116 217	01-0002	O-RING,	1
11	116 207		FLEX LOC TORCH BODY, (consisting of)	1
13	116 217	01-0002	O-RING	2
18	118 510		HANDLE	1
19	♦116 276	15PCA	POWER CABLE ADAPTER	1
20	116 271	1512PCHF	HI-FLEX POWER CABLE, 12-1/2ft (consisting of)	1
20	116 272	1525PCHF	HI-FLEX POWER CABLE, 25ft (consisting of)	1
21	120 721		RH NUT	2
22	120 720		RING NUT	2

♦OPTIONAL
BE SURE TO PROVIDE MODEL AND STYLE NUMBER WHEN ORDERING REPLACEMENT PARTS.

CONSUMABLE PARTS SELECTOR

(Note: Collet Body and Gas Cup required to complete torch).
Torches with high Rex composite cable also require a power cable adapter.

STANDARD LENGTH FRONT ENDS

Tungsten Diameter		in. (mm)	.020" (0.5)	.040" (1.0)	1/16" (1.6)	3/32" (2.4)	1/8" (3.2)
Amperage Range		ACHF DCSP	5-20 5-20	10-80 15-80	50-150 70-150	100-235 150-250	150-325 (220-350)
Collet (Standard)		Model No. Stock No.	3C20 116 367	3C40 116 368	3C116 116 369	3C332 116 370	3C418 116 371
Collet (Reverse)		Model No. Stock No.	7C20 116 379	7C40 116 380	7C116 116 381	7C332 116 382	7C418 116 383
Collet Body (Std Lgth.)		Model No. Stock No.	3CB20 116 361	3CB40 116 362	3CB116 116 363	3CB332 116 364	3CB418 116 365
	Stock/Model No.						Cup Orifice
Cup, Ceramic 1-27/32" Long	116 347 (3C3)						3/16"
	116 348 (3C4)						1/4"
	116 349 (3C5)						5/16"
	116 350 (3C6)						3/8"
	116 351 (3C7)						7/16"
	116 352 (3C8)						1/2"
	116 353 (3C10)						5/8"
	116 354 (3C12)						3/4"
Cup, Ceramic 3-7/32" Long	116 343 (3C4L)						1/4"
	116 344 (3C5L)						5/16"
	116 345 (3C6L)						3/8"
	116 346 (3C7L)						7/16"
Cup, Alumina 1-27/32" Long	116 330 (3A4)						1/4"
	116 331 (3A5)						5/16"
	116 332 (3A6)						3/8"
	116 333 (3A7)						7/16"
	116 334 (3A8)						1/2"
	116 335 (3A10)						5/8"
	116 336 (3A12)						3/4"
Gas Lens Collet Body Std. Lgth	Model No. Stock No.		3GL20 119 926	3GL40 119 927	3GL116 119 928	3GL332 119 929	3GL418 119 930	
	Stock/Model No.							
Cup, Ceramic Gas Lens 1-5/8" Long	119 917 (3CG4)							1/4"
	119 918 (3CG5)							5/16"
	119 919 (3CG6)							3/8"
	119 920 (3CG7)							7/16"
	119 921 (3CG8)							1/2"
3CG11 is 1-1/8" Long	119 922 (3CG11)							11/16"
	119 923 (3CG12)							3/4"
	119 924 (3CG14)							7/8"
	119 925 (3CG16)							1"
Cup, Alumina Gas Lens 1-5/8" Long	119 932 (3AG4)							1/4"
	119 933 (3AG5)							5/16"
	119 934 (3AG6)							3/8"
	119 935 (3AG7)							7/16"
	119 936 (3AG8)							1/2"
	119 937 (3AG11)							11/16"
Gas Lens Collet Body Lg. Dia.	Model No. Stock No.					3GLL332 119 902	3GLL418 119 903	
	Stock/Model No.							
Cup, Alumina 1-7/8" Long	119 911 (3AG8LD)							1/2"
	119 912 (3AG10LD)							5/8"
	119 913 (3AG12LD)							3/4"

SHORT FRONT ENDS

*Reduce Continuous Duty Rating By 25% When Using Short Collet/Collet Body

Tungsten Diameter		in. (mm)	.020" (0.5)	.040" (1.0)	1/16" (1.6)	3/32" (2.4)	1/8" (3.2)
Amperage Range		ACHF DCSP	5-20 5-20	10-80 15-80	50-150 70-150	100-235 150-250	150-325 (220-350)
Collet (Short)		Model No. Stock No.	4C20 116 373	4C40 116 374	4C116 116 375	4C332 116 376	4C418 116 377
Collet (Reverse)		Model No. Stock No.	7C20 116 379	7C40 116 380	7C116 116 381	7C332 116 382	7C418 116 383
Collet Body (Short)		Model No. Stock No.	4CB20 116 355	4CB40 116 356	4CB116 116 357	4CB332 116 358	4CB418 116 359
	Stock/Model No.						Cup Orifice
Cup, Ceramic 1-5/32" Long	116 337 (2C4)						1/4"
	116 338 (2C5)						5/16"
	116 339 (2C6)						3/8"
	116 340 (2C7)						7/16"
*1-1/8" Long	*116 341 (2C8)						1/2"
	*116 342 (2C10)						5/8"
Cup, Ceramic 1-7/8" Long	116 326 (2C3L)						3/16"
	116 327 (2C4L)						1/4"
	116 328 (2C5L)						5/16"
	116 329 (2C6L)						3/8"
Cup, Alumina 1-5/32" Long	116 310 (2A4)						1/4"
	116 311 (2A5)						5/16"
	116 312 (2A6)						3/8"
	116 313 (2A7)						7/16"
	116 314 (2A8)						1/2"
	116 315 (2A10)						5/8"
Gas Lens Collet Body - Short	Model No. Stock No.		4GL20 119 905	4GL40 119 906	4GL116 119 907	4GL332 119 908	4GL418 119 909	
	Stock/Model No.							
Cup, Alumina 1" Long	119 893 (2AG4)							1/4"
	119 894 (2AG5)							5/16"
	119 895 (2AG6)							3/8"
	119 896 (2AG7)							7/16"

SHADED AREAS INDICATE RECOMMENDED USAGE

S-0768

Figure 6-2. Consumable Parts

Table 6-1. Cross Reference To Competitive Model

STOCK NO.	MODEL NO.	COMPETITIVE NO.
116 367	3C20	10N21
116 368	3C40	10N22
116 369	3C116	10N23
116 370	3C332	10N24
116 371	3C418	10N25
116 379	7C20	N/A
116 380	7C40	N/A
116 381	7C116	N/A
116 382	7C332	N/A
116 383	7C418	N/A
116 361	3CB20	10N29
116 362	3CB40	10N30
116 363	3CB116	10N31
116 364	3CB332	10N32
116 365	3CB418	10N28
116 347	3C3	N/A
116 348	3C4	105Z43
116 349	3C5	105Z42
116 350	3C6	105Z44
116 351	3C7	105Z45
116 352	3C8	08N78
116 353	3C10	08N79
116 354	3C12	08N80
116 343	3C4L	12N03
116 344	3C5L	105Z60
116 345	3C6L	12N02
116 346	3C7L	105Z61
116 330	3A4	10N50
116 331	3A5	10N49
116 332	3A6	10N48
116 333	3A7	10N47
116 334	3A8	10N46
116 335	3A10	10N45
116 336	3A12	10N44
119 926	3GL20	45V29
119 927	3GL40	45V24
119 928	3GL116	45V25
119 929	3GL332	45V26
119 930	3GL418	45V27
119 917	3CG4	54N35
119 918	3CG5	54N34
119 919	3CG6	54N33
119 920	3CG7	54N32
119 921	3CG8	54N31
119 922	3CG11	54N35
119 923	3CG12	N/A
119 924	3CG14	N/A
119 925	3CG16	N/A
119 932	3AG4	54N18
119 933	3AG5	54N17
119 934	3AG6	54N16
119 935	3AG7	54N15
119 936	3AG8	54N14
119 937	3AG11	54N19
119 902	3GLL332	45V64
119 903	3GLL418	995795
119 911	3AG8LD	57N74
119 912	3AG10LD	53N88
119 913	3AG12LD	53N87
116 373	4C20	N/A
116 374	4C40	10N22S
116 375	4C116	10N23S
116 376	4C332	10N24S
116 377	4C418	10N25S
116 379	7C20	N/A
116 380	7C40	N/A
116 381	7C116	N/A
116 382	7C332	N/A
116 383	7C418	N/A
116 355	4CB20	N/A
116 356	4CB40	17CB20
116 357	4CB116	17CB20
116 358	4CB332	17CB20
116 359	4CB418	17CB20
116 337	2C4	13N14
116 338	2C5	13N15
116 339	2C6	13N16
116 340	2C7	13N17
116 341	2C8	13N18
116 342	2C10	13N19
116 326	2C3L	796F70
116 327	2C4L	796F71
116 328	2C5L	796F72
116 329	2C6L	796F73
116 310	2A4	13N08
116 311	2A5	13N09
116 312	2A6	13N10
116 313	2A7	13N11
116 314	2A8	13N12
116 315	2A10	13N13
119 905	4GL20	N/A
119 906	4GL40	N/A
119 907	4GL116	N/A
119 908	4GL332	N/A
119 909	4GL418	N/A
119 893	2AG4	53N58
119 894	2AG5	53N59
119 895	2AG6	53N60
119 896	2AG7	53N61

OPTIONS AND ACCESSORIES

For TOTAL TIG™ system, select one each of the following items:

- Welding power source
- TIG torch
- TIG kit (see TIG kits listed below)
- Coolant system (if using water–cooled torch)
- Remote control

Note: The other items necessary to weld are power source primary cable, shielding gas, and filler metal.

KIT FOR MT–17 and MTL–17 SERIES AIR–COOLED TORCHES

12–1/2 ft. (3.8 m) length
(#129 590)
25 ft. (7.6 m) length
(#129 589)

Kit includes:

- Hose & hardware hook–up kit (THK–2)
- Consumable accessory kit (TAK–1) — one backcap and three sizes (.040, 1/16, and 3/32 in.) of collets, collet bodies, cups, and 2% thoriated tungsten
- Regulator/flowmeter (HRF–2425)
- Ground cable with clamp, 12–1/2 ft. (3.8 m) or 25 ft. (7.6 m) lengths to match TIG torch length

Note: Power cable adapter 105Z57 (#116 276) must be ordered for torches with one–piece composite cable.

POWER CABLE ADAPTERS

(Required on torches with one-piece, high-flex cable assembly and all water-cooled torches.)

Adapter 105Z57
Stock No. (#116 276)

INTERNATIONAL TIG TORCH CONNECTOR KIT

80 Amp Torch	**(#135 492)**
150 Amp Torch	**(#135 493)**
200 Amp Torch	**(#135 494)**
250/350 Amp Torch	**(#135 495)**

For direct connection of one–piece torches or water–cooled TIG torches into power sources with International–style connectors.

FUSE BLOCK ASSEMBLY

For use with water–cooled torches. Five fuse links included

Up to 260 Amps	**(#116 163)**
260 to 550 Amps	**(#116 164)**

Protects torch from overheating and damage if water is not circulating or if torch is run considerably higher than its rated capacity.

Note: Additional fuse links available in packages of 5 (#116 559).

CABLE EXTENSION BOX

For use with water–cooled torches

CEB (Non–fused) **(#120 797)**
CEB 260FA **(#116 161)**
(Fused up to 260 Amps)
CEB 550FA **(#116 162)**
(260 to 550 Amps)

Allows hose and cable assembly to be extended from the power source. Available with or without fuse protection. All components are protected by a strong, non–conductive enclosure.

Note: Hose and cables from power source to CEB box are not supplied. Use large diameter extension hoses and heavy welding cable for optimum performance.

RMC–H14 and RLC–H14 CONTACTOR SWITCHES

Torch handle with a built–in switch for remote contactor control of Miller solid–state TIG power sources. Includes 25 ft. (7.6 m) control cord with 14–pin plug.

RMC–H14–S (Momentary)
(#129 336)

RLC–H14–S (Locking)
(#129 335)

TIG HOSE HOOK–UP KITS (THK)

THK–1 (Water–cooled)
(#128 065)
THK–2 (Air–cooled)
(#128 066)

Provides the necessary hoses and hardware to connect either air– or water–cooled torches to a power source and, if applicable, water coolant system.

GAS REGULATORS

With 580 CGA inlet connector

HRF–2425 **(#127 661)**
This regulator/flowmeter has outlet pressure preset at 25 PSIG; the maximum inlet is 3000 PSIG and has 5–40 SCFH gas delivery.

AF–150 **(#127 662)**
This flowgauge regulator has adjustable gas delivery of 8–25 SCFH with argon gas.

TIG ACCESSORY KITS (TAK)

Kits include one backcap and three each of the following: collet, collet body, alumina cup, and 2% thoriated tungsten pieces.

TAK–1 **(#129 585)**
0.40, 1/16, and 3/32 in. for MT–17

TIG TORCH CABLE COVERS

Reinforced plastic cable covers made of tear and flame resistant material. A large and small cover is available in length to fit 12–1/2 ft. and 25 ft. (3.8 and 7.6 m) torches.

CC–12S **(#126 150)**
For 12–1/2 ft. (3.8 m) torches. Fits Miller TIG Torch models 80 Amps through 250 Amps.

CC–25S **(#126 151)**
For 25 ft. (7.6 m) torches. Fits Miller TIG Torch models 80 Amps through 250 Amps.

REMOTE CONTROLS

AMTV REMOTE CONTACTOR AND CURRENT CONTROL

(#152 608)

Linear motion control fastens to TIG torch handle using two Velcro straps. The AMTV is a practical alternative to a foot control. Includes 28 ft. (8.5 m) control cord with 14–pin plug.

RCC REMOTE CONTACTOR AND CURRENT CONTROL

RCC–14 (14–pin plug)
(#151 086)
RCC–5 (5–pin plug)
(#157 365)

Rotary motion fingertip control fastens to TIG torch using two Velcro straps. Includes 28 ft. (8.5 m) control cord.