



## OWNER'S      MANUAL

FOR

MODEL:    WTCMU-3503    U4528  
              WTCMU-4301    U4529  
              WTCMU-5002    U4530

**DO NOT DESTROY**

**IMPORTANT:** Read and understand the entire contents of this manual, with special emphasis on the safety material throughout the manual, before installing, operating, or maintaining this equipment. This equipment and this manual are for use only by persons trained and experienced in the safety operation of welding equipment. Do not allow untrained persons to install, operate or maintain this equipment. Contact your distributor if you do not fully understand this manual.

DAIHEN Corporation WELDING & MECHATRONICS DIVISION

May 15, 2000

**Upon contact, advise MODEL and MANUAL NO.**





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## 1. SAFETY INFORMATION

The following safety alert symbols and signal words are used throughout this manual to identify various hazards and special instructions.

 <b>WARNING</b>	<b>WARNING</b> gives information regarding possible personal injury or loss of life.
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 <b>CAUTION</b>	<b>CAUTION</b> refers to minor personal injury or possible equipment damage.
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## 2. ARC WELDING SAFETY PRECAUTIONS

 <b>WARNING</b>	
ARC WELDING can be hazardous.	
◆	<b>PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH.</b> Be sure to: <ul style="list-style-type: none"><li>• Keep children away.</li><li>• Keep pacemaker wearers away until consulting a doctor.</li></ul>
◆	Read and understand the summarized safety information given below and the original principal information that will be found in the <b>PRINCIPAL SAFETY STANDARDS</b> .
◆	Have only trained and experienced persons perform installation, operation, and maintenance of this equipment.
◆	Use only well maintained equipment. Repair or replace damaged parts at once.
ARC WELDING is safe when precautions are taken.	



### ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuits are electrically live whenever the output is on. The power line and internal circuits of this equipment are also live when the line disconnect switch is on. When arc welding all metal components in the torch and work circuits are electrically live.

1. Do not touch live electrical parts.
2. Wear dry insulating gloves and other body protection that are free of holes.
3. Insulate yourself from work and ground using dry insulating mats or covers.
4. Be sure to turn off the line disconnect switch before installing, changing torch parts or maintaining this equipment.
5. Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
6. Keep all panels and covers of this equipment securely in place.
7. Do not use worn, damaged, undersized, or poorly spliced cables.
8. Do not touch electrode and any metal object if POWER switch is ON.
9. Do not wrap cables around your body.
10. Turn off POWER switch when not in use.





### ARC RAYS can burn eyes and skin: FLYING SPARKS AND HOT METAL can cause injury. NOISE can damage hearing.

Arc rays from the welding process produce intense heat and strong ultraviolet rays that can burn eyes and skin.

Noise from some arc welding can damage hearing.

1. Wear face shield with a proper shade of filter ( See ANSI Z 49.1 listed in PRINCIPAL SAFETY STANDARDS) to protect your face and eyes when welding or watching a welder work.
2. Wear approved safety goggles. Side shields recommended.
3. Use protective screens or barriers to protect others from flash and glare: warn others not to look at the arc.
4. Wear protective clothing made from durable, flame-resistant material (wool and leather) and foot protection.
5. Use approved earplugs or earmuffs if noise level is high.  
Chipping and grinding can cause flying metal. As welds cool, they can throw off slag.
6. Wear approved face shield or safety goggles. Side shields recommended.
7. Wear proper body protection to protect skin

	<p>WELDING can cause fire and explosion.</p>
<p>Sparks and spatter fly off from the welding arc. The flying sparks and hot metal, spatter, hot base metal, and hot equipment can cause fire and explosion. Accidental contact of electrode or welding wire to metal object can cause sparks, overheating, or fire.</p> <ol style="list-style-type: none"> <li>1. Protect yourself and others from flying sparks and hot metals.</li> <li>2. Do not weld where flying sparks can strike flammable material.</li> <li>3. Remove all flammables within 10m (35ft.) of the welding arc. If this is not possible, tightly, cover them with approved covers.</li> <li>4. Be alert that welding sparks and hot metals from welding can easily pass through cracks and openings into adjacent areas.</li> <li>5. Watch for fire, and keep a fire extinguisher nearby.</li> <li>6. Be aware that welding on a ceiling, floor, bulkhead, or partition can ignite a hidden fire.</li> <li>7. Do not weld on closed containers such as tanks or drums.</li> <li>8. Connect base metal side cable as close to the welding area as possible to prevent the welding current from traveling along unknown paths and causing electric shock and fire hazards.</li> <li>9. Remove stick electrode from holder or cut off welding wire at contact tip when not in use.</li> <li>10. Do not use the welding power source for other than arc welding.</li> <li>11. Wear oil-free protective garments such as leather gloves, a heavy shirt, cuffless trousers, boots, and a cap.</li> <li>12. A loose cable connection can cause sparks and excessive heating.</li> <li>13. Tighten all cable connections.</li> </ol>	

	<p>FUMES AND GASES can be hazardous to your health.</p>
<p>Arc welding produce fumes and gases. Breathing these fumes and gases can be hazardous to your health.</p> <ol style="list-style-type: none"> <li>1. Keep your head out of the fumes. Do not breathe the fumes.</li> <li>2. Ventilate the area and / or use exhaust at the arc to remove welding fumes and gases.</li> <li>3. If ventilation is poor, use an approved air-supplied respirator.</li> <li>4. Read the Material Safety Data Sheets (MSDS) and the manufacturer's instructions on metals, consumables, coatings, and cleaners.</li> <li>5. Do not weld or cut in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.</li> <li>6. Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Shielding gases used for welding can displace air causing injury or death. Be sure the breathing air is safe.</li> </ol>	



CYLINDER can explode if damaged.

A shielding gas cylinder contains high-pressure gas. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

1. Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them in good condition.
2. Protect compressed gas cylinders from excessive heat, mechanical shock, and arcs.
3. Keep the cylinder upright and securely chained to a stationary support or a rack to prevent falling or tipping.
4. Keep cylinders away from any welding or other electrical circuit.
5. Never touch cylinder with welding electrode.
6. Read and follow instructions on compressed gas cylinders, associated equipment, and the CGA publication P-1 listed in PRINCIPAL SAFETY STANDARDS.
7. Turn face away from valve outlet when opening cylinder valve.
8. Keep protective cap in place over valve except when gas cylinder is in use or connected for use.



Rotating parts may cause injuries. Be sure to observe the following.

If hands, fingers, hair or clothes are put near the fan's rotating parts or wire feeder's feed roll, injuries may occur.

1. Do not use this equipment if the case and the cover are removed.
2. When the case is removed for maintenance/inspection and repair, certified or experienced operators must perform the work. Erect a fence, etc. around this equipment to keep others away from it.
3. Do not put hands, fingers, hair or clothes near the rotating fans or wire feed roll.

ARC WELDING work areas are potentially hazardous.

FALLING or MOVING machine can cause serious injury.

- ◆ Use both eyebolts, if installed, to lift the welding power source.
- ◆ Put the welding power source and wire feeder solidly on a flat surface.
- ◆ Do not pull the welding power source across a floor laid with cables and hoses.
- ◆ Do not put wire feeder on the welding power source.
- ◆ Do not put the welding power source and wire feeder where they will pit or fall.

WELDING WIRE can cause puncture wounds.

- ◆ Do not press gun trigger until instructed to do so.
- ◆ Do not point gun toward any part of the body, other people, or any metal when threading welding wire.

## PRINCIPAL SAFETY STANDARDS

Arc welding equipment – Installation and use, Technical Specification IEC 62081, from International Electrotechnical Commission

Safety in Welding and Cutting, ANSI Standard Z49.1, from American Welding Society.

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office.

Recommended Practices for Plasma Arc Cutting, American Welding Society Standard AWS C5.2, from American Welding Society.

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from American Welding Society.

National Electrical Code, NFPA Standard 70, from National Fire Protection Association.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association.

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales.

Safe Practices For Occupation And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute.

Cutting And Welding Processes, NFPA Standard 51B, from National Fire Protection Association.



### 3. OPERATION

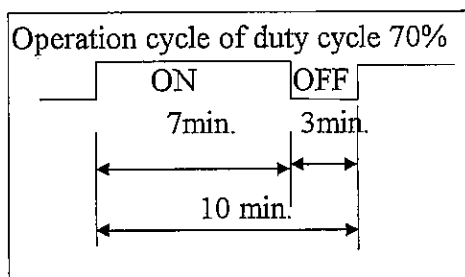
#### 3.1 Rated duty cycle

**⚠ CAUTION**

● Use at the rated duty cycle or under. If exceeding the rated duty cycle, the welding machine may be damaged.

- Rated duty cycle: 350A, 70% (CO<sub>2</sub>)  
430A, 70% (CO<sub>2</sub>)  
500A, 70% (CO<sub>2</sub>)

- Rated duty cycle 70% means that welding torch can be operated for seven minutes out of ten minutes, but it must be idle for three minutes.



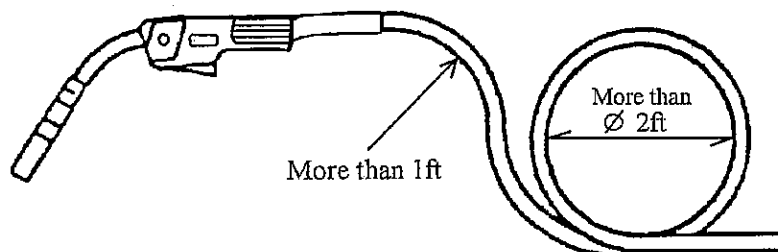
- If exceeding the rated duty cycle, temperature of welding torch rises, exceeding the allowable temperature and it can be a cause of damage to the equipment.

#### 3.2 Bending of power cable


**⚠ CAUTION**

• Observe the following to acquire high welding performance.

- If power cable of torch is bent excessively, smooth wire feeding will be hampered. Therefore, take care not to bend it too much.



### 3.3 Inching operation

<b>⚠ WARNING</b>	
	<ul style="list-style-type: none"> <li>Do not look into the tip to check on feeding of the wire while inching. Wire may extend out and stick your face and eyes, and it can be cause of injury.</li> <li>Do not hold the head of the welding torch near your face, eyes and body while inching. Wire may extend out and stick your face, eyes and body, and it can be cause of injury.</li> </ul>

- Straighten the welding torch, and feed wire by pushing the inching switch, then release switch when wire comes out about 10mm from the tip of welding torch.



### 3.4 Replacing of parts

<b>⚠ CAUTION</b>	
<ul style="list-style-type: none"> <li>● Be sure to observe the followings for preventing burning.</li> <li>● While welding, never touch the nozzle or tip due to the presence of high temperatures.</li> <li>● While welding, use the protection goods.</li> <li>● Replacing head of welding torch should be preformed after torch cools down.</li> </ul>	

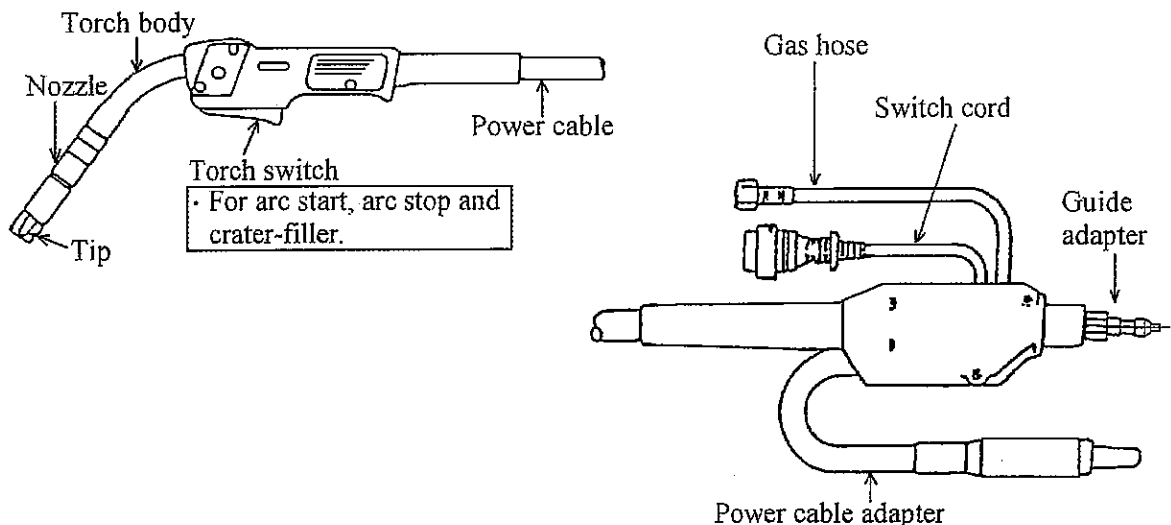
<b>⚠ CAUTION</b>	
<ul style="list-style-type: none"> <li>● In case of damaged parts, replace them with new parts for safety and quality.</li> <li>● Be sure to use only genuine OTC parts.</li> </ul>	

## 4. STANDARD ACCESSORIES

- Check for contents of package after opening.

Welding torch	Accessory			
		Description	Specification	Q'ty
		Hex wrench	No. 4 (For M5)	1

## 5. DESCRIPTION OF EACH PART

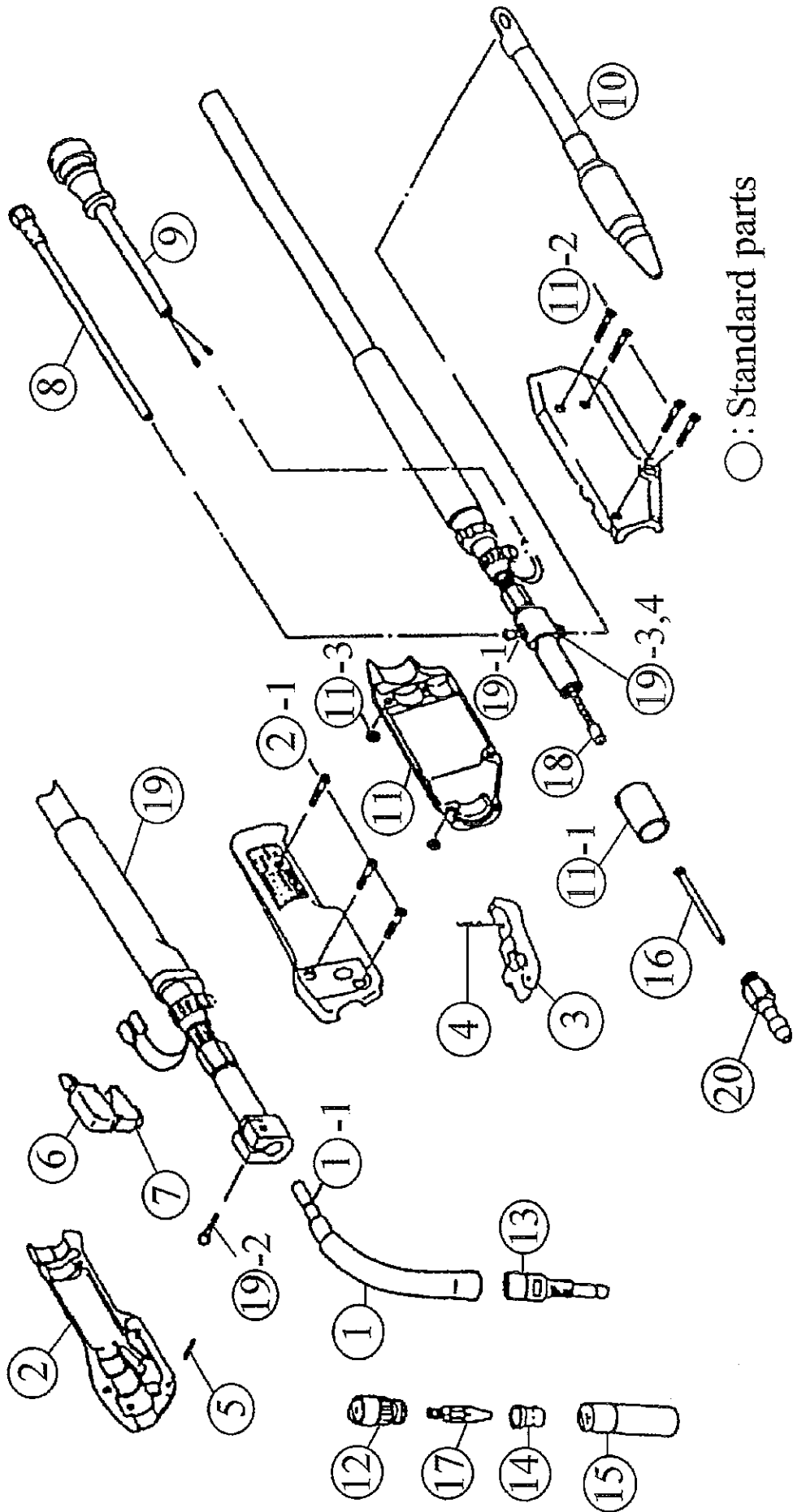


## 6. PARTS LIST

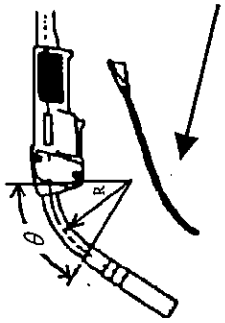
If replacement parts are required, place order using Description and Part No. to our sales staff or OTC's office for prompt shipment. For optional accessories, refer to 6.2.

## 6.1 Standard parts

Item	Part No.			Description	Q'ty
	WTCMU-3503	WTCMU-4301	WTCMU-5002		
1	U4167B00	U4188B00	U4173B00	Torch body	1
1-1	3570-124			"O" ring	(1)
2	U4528C00	U4529C00	U4530C00	Handle	1 set
2-1	3361-816			Small screw (M4×20)	(3)
3	U2853C03			Trigger	1
4	U2853C04			Spring	1
5	3361-207			Flat pin (φ 4-16)	1
6	4254-015			Micro switch	1
7	U2853C05			Switch cover	1
8	U2853E00			Gas hose	1
9	U4524F00			Switch code	1
10	U2853G00		U2774G00	Power cable adapter	1
11	U4528H00	U4529H00	U4530H00	Cable clamp	1set
11-1	U2853H03			Front cover	(1)
11-2	3361-817			Small screw (M4×25)	(4)
11-3	3361-808			Nut (M4)	(4)
12	U4167L00		U4173L00	Insulator	1
13	U4528J01		U4400G01	Tip body	1
14	U4167G02		U2774E03	Orifice	1
15	U4167G01		—	Nozzle (No. 10)	1
15	—	—	U4530J01	Nozzle (No. 12)	1
16	U69B34	—	—	Outlet guide (.040"~.045")	1
16	—	U69B35		Outlet guide (.040"~1/16")	1
17	K980C26	—	—	Tip 1.2(.045") CA	1
17	—	K980C27	—	Tip 1.4(.052") CA	1
17	—	—	K980C28	Tip 1.6(1/16") CA	1
18	U4535G01	—	—	Liner (.040"~.045") 15ft	1
18	—	U4537G01		Liner (.040"~1/16") 15ft	1
19	U4528D00	U4529D00	U4530D00	Power cable (15ft)	1
19-1	U2853D08			Hose exit	(1)
19-2	3361-681			Bolt with hole (M5×14)	(1)
19-3	3361-818			Bolt (M8×12)	(1)
19-4	3361-804			Flat washer	(1)
20	U4524J01			Guide adapter	1



Parts drawing



● Torch body combination figure

(◎: Built in body ○: Must be installed)

Torch body		U4167B00	U4167N00	U4167P00	U4167Q00	U4167R00	U4188B00	U4173B00	U4945A00
R	3.03"	—	—	3.94"	3.94"	1.97"	4.53"	5.12"	Flexible
θ	55°	Straight	35°	55°	65°	55°	55°	55°	±45°
Inner liner	U4167G05	U4167G05	U4167H17	U4167H18	U4167H19	U4188G05	U4188G05	U4173G05	U4913C03
WTCMU-3503	◎	○	○	○	○	○	○	○	○
WTCMU-4301	○	○	○	○	○	◎	◎	○	○
WTCMU-5002	○	○	○	○	○	○	○	◎	○

● Tip (Select by welding combination)

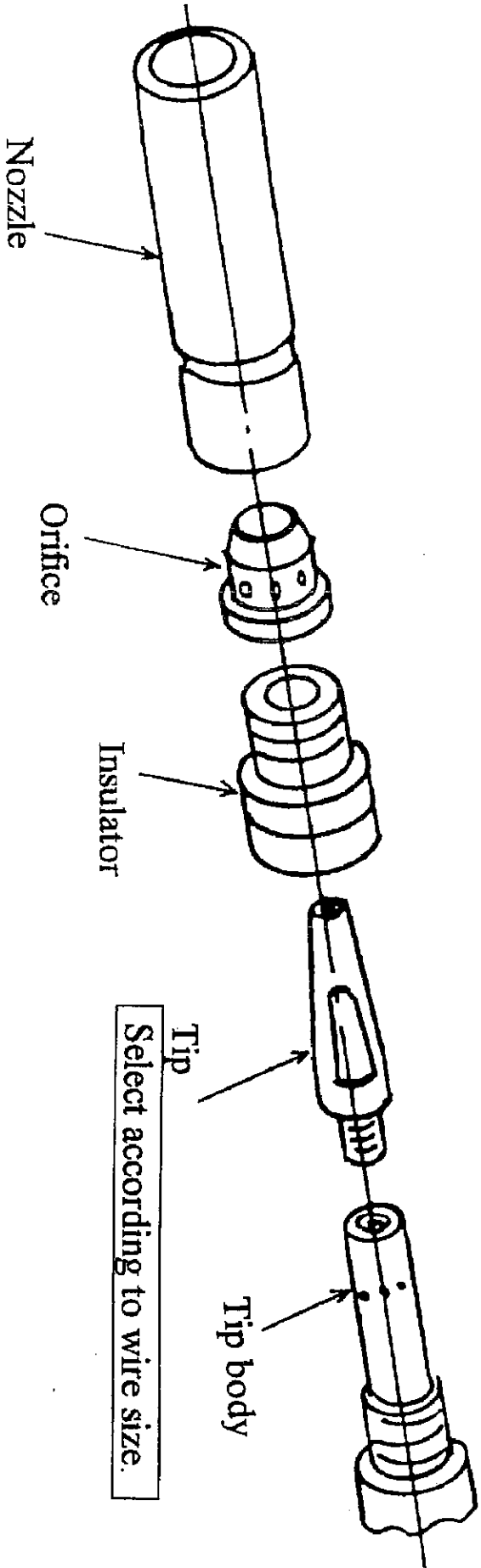
Wire size	1.0 (.040")	1.2 (.045")	1.4 (.052")	1.6 (1/16")
Standard tip	K980C25	K980C26	K980C27	K980C28
Heavy duty tip	U4167H13	U4167H12	U4167H11	U4167H10
Economy tip	K980C17	K980C19	K980C20	K980C21

● Liner (Select by welding combination)

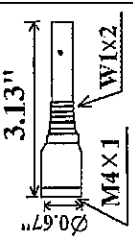

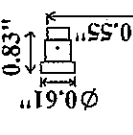
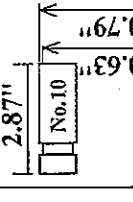
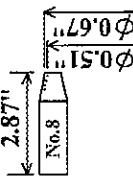
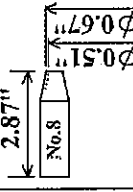
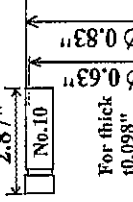
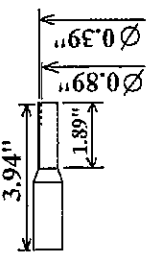
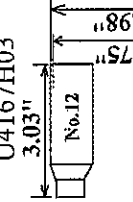
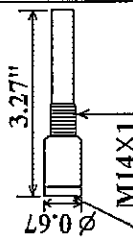

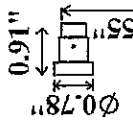
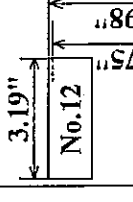
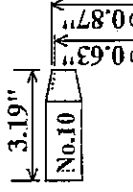
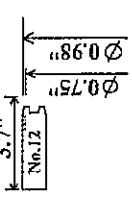
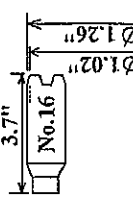
Liner length	15 ft		
Part No.	U4535G01	U4537G01	
Wire size	1.0~1.2 (.040"~.045")	1.2~1.6 (.045"~1/16")	
WTCMU-3503	◎	○	
WTCMU-4301		◎	
WTCMU-5002		◎	

◎: Built in body ○: Must be installed (optional parts)

6.2 Optional accessories  
(1) Torch replacement parts



● Torch parts and replacement nozzles (Torch performance is improved by nozzle replacement)

Torch model	Standard including parts				Replacing nozzle (optional)																							
	Tip body	Insulator	Orifice	Standard nozzle	For low current	For mid, High current	For arc spot	For deep or narrow space																				
WTCMU-3503	U4528J01 	U4167L00 	U4167G02 	U4167G01 	U4167H01 	U4167H02 	U4167H16 	U4167H04 																				
							U4167H03 																					
WTCMU-4301								<p>• Heavy frequency duty cycle kit (Kit No. U4167M)</p> <table border="1"> <thead> <tr> <th>Description</th> <th>Part No.</th> <th>Q'ty</th> <th>Use it when pulse MAG welding by WTCMU (Tip: For MAG).</th> </tr> </thead> <tbody> <tr> <td>1 Insulator</td> <td>U4173L00</td> <td>1</td> <td></td> </tr> <tr> <td>2 Orifice</td> <td>U2774E03</td> <td>1</td> <td></td> </tr> <tr> <td>3 Nozzle</td> <td>U4173G01</td> <td>1</td> <td>• Exchange nozzle for WTCX-5002 is able to use.</td> </tr> <tr> <td>4 Tip body</td> <td>U4173G03</td> <td>1</td> <td></td> </tr> </tbody> </table>	Description	Part No.	Q'ty	Use it when pulse MAG welding by WTCMU (Tip: For MAG).	1 Insulator	U4173L00	1		2 Orifice	U2774E03	1		3 Nozzle	U4173G01	1	• Exchange nozzle for WTCX-5002 is able to use.	4 Tip body	U4173G03	1	
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3 Nozzle	U4173G01	1	• Exchange nozzle for WTCX-5002 is able to use.																									
4 Tip body	U4173G03	1																										
WTCMU-5002	U4400G01 	U4173L00 	U2774E03 	U4530J01 	U4532G01 	U4530K01 	U4530K02 																					

7. SPECIFICATIONS

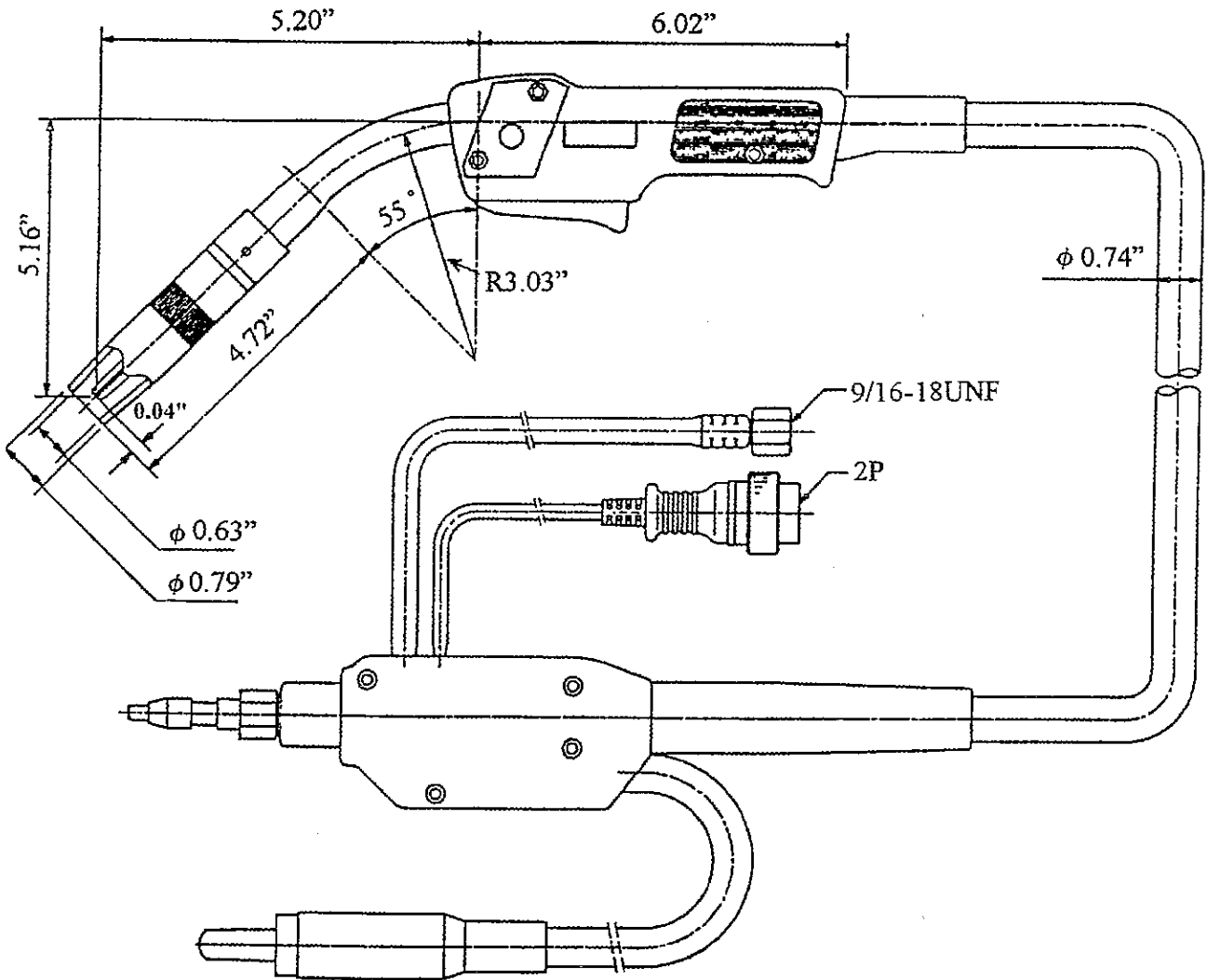
7.1 Specifications

Model	WTCMU-3503	WTCMU-4301	WTCMU-5002
Max. applicable current	350A, CO <sub>2</sub>	430A, CO <sub>2</sub>	500A, CO <sub>2</sub>
Duty cycle	70% CO <sub>2</sub>		
Usable wire	Solid wire, Cored wire		
Usable wire size	(.040"), (.045"), (.052")	(.040"), (.052"), (1/16")	(.045"), (.052"), 1/16"
Cable length	15 ft		
Mass. (With cable)	11 lbs.	12 lbs.	14 lbs.

Note: When use the wire size of "( )", optional parts are required.

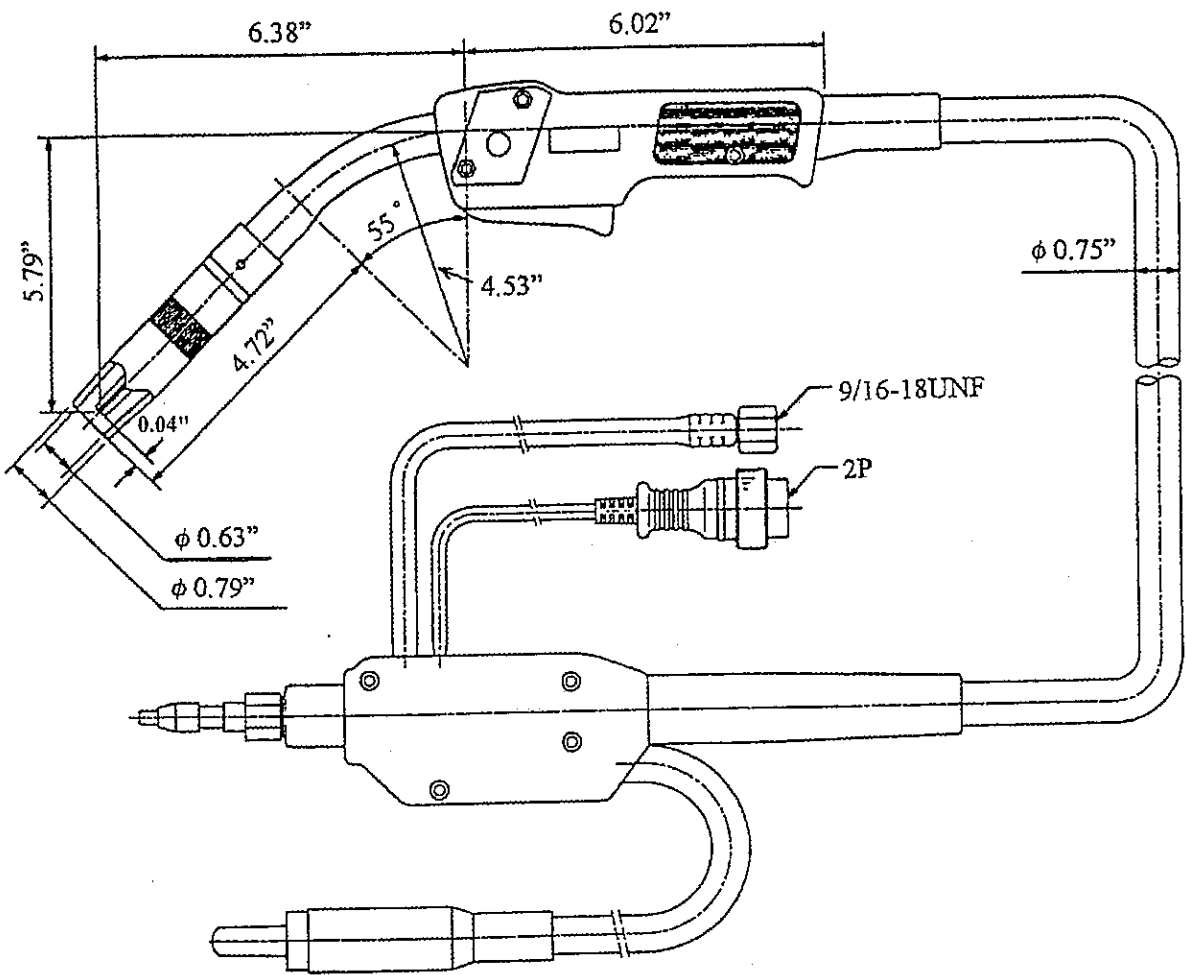
7.2 External view

[ WTCMU-3503 ]

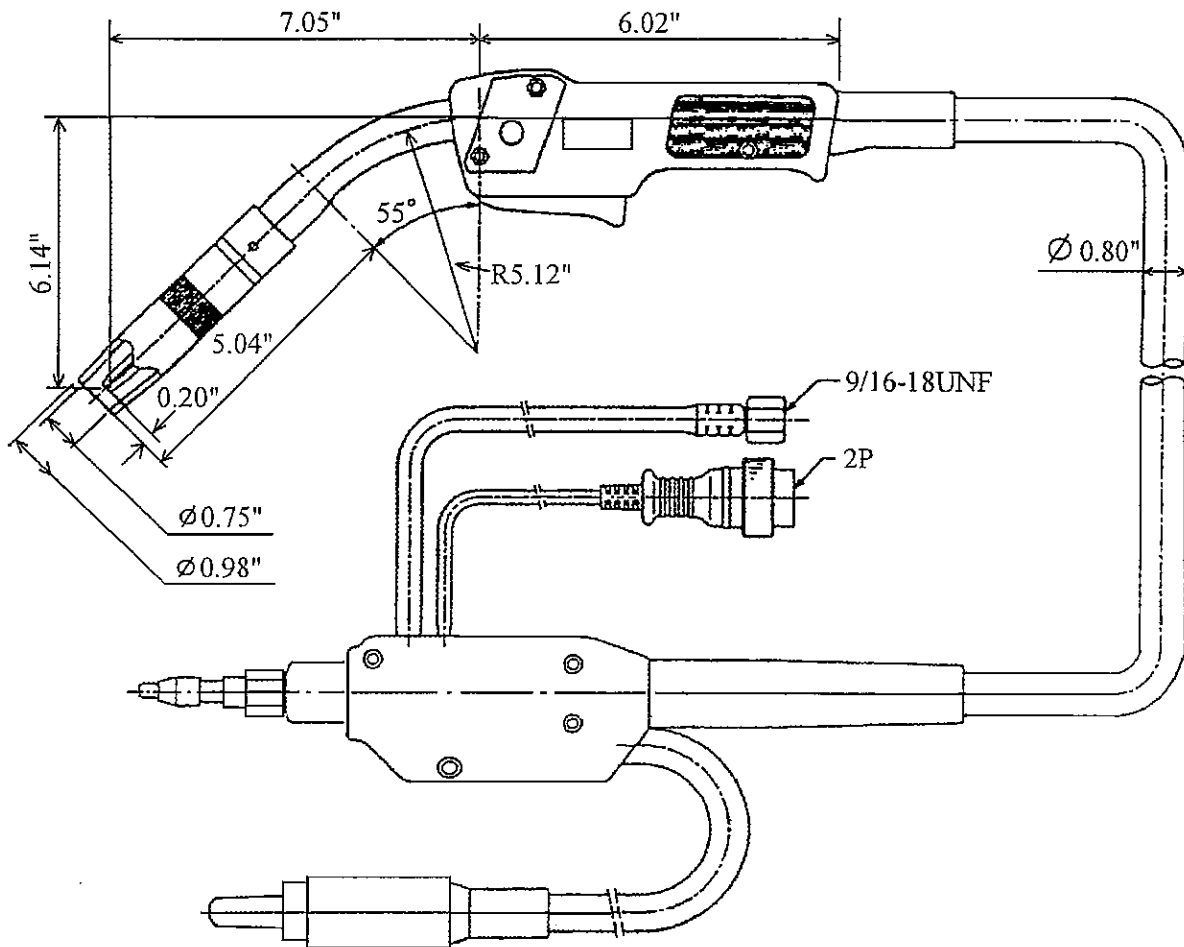




[ WTCMU-4301 ]



[ WTCMU-5002 ]



7.3 Wire feeder and compatible torch models

Model of welding torch	Wire feeder
WTCMU-3503	CM-231
WTCMU-4301	CMH-231
WTCMU-5002	CMWH-231





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