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OWNERS MANUAL
WELDMATIC 175S
MODEL NO. CP110-0, REV. B
11/2000



SAFETY

Before this equipment is put into operation, the SAFE PRACTICES section at the back of the manual must be read completely. This will help to avoid possible injury due to misuse or improper welding applications.

HANDLE

Please note that the handle fitted to the WELDMATIC 175S is intended for pushing or pulling the machine by hand only.

DO NOT use this handle for suspending or mounting the machine in any other manner.

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The information contained in this manual is set out to enable you to properly maintain your new equipment and ensure that you obtain maximum operating efficiency.

Please ensure that this information is kept in a safe place for ready reference when required at any future time.

When requesting spare parts, please quote the model and serial number of the machine and part number of the item required. All relevant numbers are shown in lists contained in this manual. Failure to supply this information may result in unnecessary delays in supplying the correct parts.

1. INTRODUCTION

The WELDMATIC 175S is a Gas Metal Arc welding power source designed for use with gas shielded and "self shielding" flux-cored wires. The consumable wire is fed to the welding gun by motor driven drive rollers. The arc is struck between the work piece and the end of the wire, which melts to form the weld deposit.

With solid consumable wires, the arc occurs in an envelope of shielding gas supplied via the gun from a separate gas cylinder.

"Self-shielding" wires contain a core of flux which, during welding, generates gases to shield the arc and the weld pool. The flux also leaves a light protective slag over the cooling weld deposit. In this way a separate gas supply is not required.

The WELDMATIC 175S is intended for use with 0.6mm to 0.9mm solid wires, and 0.9mm and 1.2mm self shielding consumable wires. The smaller wire sizes are recommended for welding at lower currents such as for sheet-metal applications. Increasing the wire diameter permits higher welding currents to be obtained.

2. RECEIVING

Check the equipment received against the shipping invoice to make sure the shipment is complete and undamaged. If any damage has occurred in transit, please immediately notify your supplier.

The CP110-0 Package contains;

- WELDMATIC 175S Power source with in built wirefeeder,
- BERNARD 200 Amp Gun cable, Euro connector, 3 metres,
- Rear wheels (2), ratchet cap (2), axle and ratchet cap applicator
- Work Lead Assembly,
- Gas Regulator,
- (This) Owners Manual.

3. SPECIFICATIONS

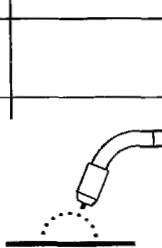
Manufactured to Australian standard AS1966.1
 Rated to AS3195


WELDING INDUSTRIES of AUSTRALIA

Weldmatic 175s

Made in Australia

	RATED TO AS 3195		N803
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	DUTY CYCLE	16%	25%	100%	18%	20%	
	OUTPUT RATING	$I_2(A)$	175	135	67	160	150
		$U_2(V)$	22.8	20.8	17.4	22	21.5
OPEN CCT, $U_{20}(V)$	19-40	-	-	18-38	16-37		

	RATED INPUT VOLTAGE, $U_1(V)$	240, 50Hz			230	220
	MAXIMUM INPUT CURRENT, $I_{1max}(A)$	30	-	-	28	27
	RATED INPUT CURRENT, $I_{1eff}(A)$	12	-	-	12	12
	S1(kVA)	7.2	-	-	6.4	5.9
	IP21	CLASS INS H			COOLING AF	

Duty cycle is defined in Australian Standard AS1966.1 as the ratio of arcing time to 5 minutes in any 5 minute period, expressed as a percentage.

4. POWER SOURCE CONTROLS

VOLTAGE CONTROL SWITCHES

The coarse and fine voltage control switches together provide 9 steps of output welding voltage adjustment.

Minimum welding voltage is obtained in with COARSE A and FINE 1 selected. Maximum welding voltage is obtained with COARSE C and FINE 3 selected.

IMPORTANT: Do not operate the Voltage Control switches during welding.

WIRE SPEED CONTROL

This control is used to adjust the feeding rate of the consumable electrode wire. Rotating the dial clockwise increases the wirespeed, so increasing the welding current.

Refer to Figure 7 of this manual for information with reference to the setting of these controls to obtain the intended welding current. A setting chart is also located inside the wire-spool enclosure cover.

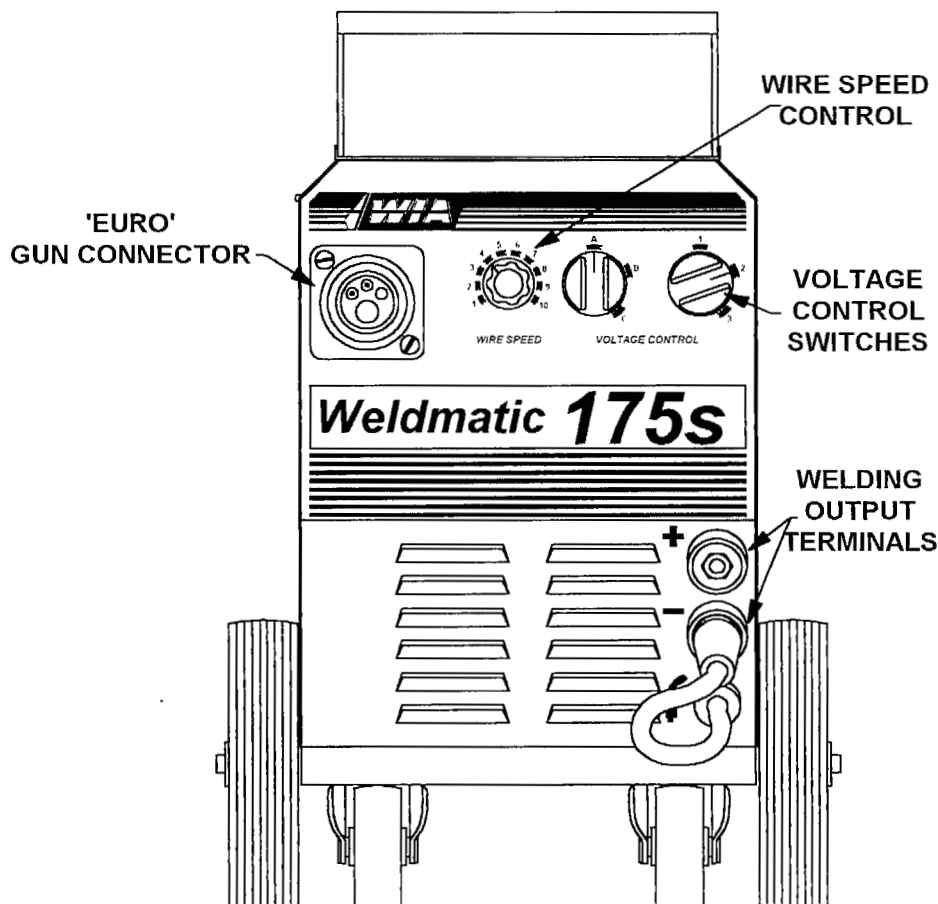


FIGURE 1. POWER SOURCE CONTROLS

5. INSTALLATION

5.1 FITTING THE REAR WHEEL ON TROLLEY ASSEMBLY

Fitting of the rear wheels on the Weldmatic 175 is shown in Figure 2 below.

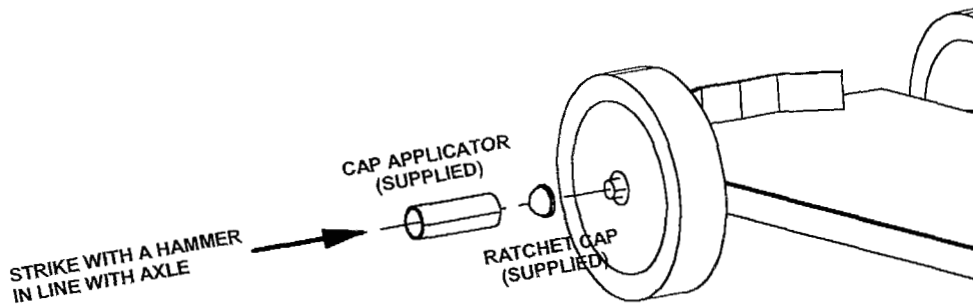


FIGURE 2. FITTING WHEELS

5.2 CONNECTION TO ELECTRICAL MAINS POWER SUPPLY

NOTE: All electrical work shall be undertaken by a qualified electrician

The Weldmatic 175S is fitted with a 3 metre, 3 core Heavy Duty PVC mains power supply cable with a standard 240 V, 15 Amp plug. The fitted supply cable is also a type Y cable attachment. This means that if the supply flexible cable is damaged, it must be replaced by the manufacturer or their service agent or similarly qualified person in order to avoid a hazard.

The minimum capacity of the mains wiring and power outlet supplying a welder is selected according to the *effective primary current* of the machine. The effective primary current for a Weldmatic 175S is 12 Amps. The minimum recommended circuit breaker rating for a Weldmatic 175S is 16 Amps. Note : The tripping time of a typical 16A circuit breaker can limit the duty cycle available from the Weldmatic 175S. A higher rated circuit breaker can be selected, but the mains wiring capacity must be increased to suit.

The current rating of the mains cable depends on cable size and method of installation. Refer to AS/NZS 3008.1, Table 9. If it becomes necessary to replace the mains supply cable, use only cable with correct current rating.

Access to the machine supply terminals is gained by removing the power-source side panel opposite to the wire-spool enclosure. Pass the cable through the bush fitted to the machine back panel. The cables are terminated at the terminal block as shown in Figure 3. Tighten the cable clamp leaving just sufficient slack in the cable so that the terminated wires are not in tension.

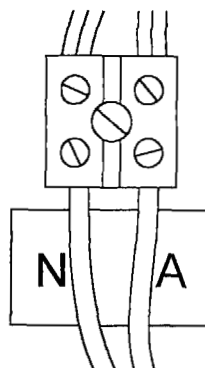


FIGURE 3. CONNECTION OF SUPPLY FLEXIBLE CABLE

5.3 FITTING THE GAS BOTTLE

Fit the gas regulator to the gas cylinder. DO NOT apply oil or grease to these connections. Fit the gas connector supplied with the regulator to the gas hose of the welder, and secure it with the 'O' clip supplied.

Always ensure the gas regulator adjusting knob is fully released before opening the gas cylinder valve. Failure to observe this practice can result in damage to the regulator.

5.4 FITTING THE GUN CABLE

The gun cable is attached to the power source via a 'Euro' adaptor which incorporates all required connection points for welding current, shielding gas and gun switch control.

To fit the gun cable, engage the mating parts of the male and female Euro connectors, then rotate the locking ring clockwise to firmly secure the connection.

5.5 FITTING THE CONSUMABLE WIRE

The quality of the consumable wire greatly affects how reliably a gas metal arc welder will operate. For best results when welding mild steel, we recommend quality WIA AUSTMIG ES6. Dirty, rusty or kinked wire will not feed smoothly through the gun cable and will cause erratic welding. Deposits from the wire will clog the gun cable liner requiring it to be replaced prematurely.

Place the spool of welding wire onto the spool holder. The location pin should mate with a hole provided on the wire spool body. Fit the spool retaining 'R' clip supplied. Check the adjustment of the spool brake, which should be set to prevent over-run of the wire spool at the end of a weld, without unduly loading the wirefeed motor. The braking can be adjusted by the

5.6 FEEDING THE CONSUMABLE WIRE

Open the two roll drive mechanism by drawing the pressure spring outwards, allowing the upper roller assembly to be rotated away from the driven roller. The end of the welding wire can now be passed through the inlet guide, over the bottom driven roller, and into the gun cable assembly.

Check that the drive roller groove is correct for the wire in use. The appropriate size is stamped on the visible side of the installed roller. Part numbers for alternate size drive rollers are shown in Section 11.

Check also that the correct size contact tip is fitted to the gun. Gun part numbers are shown in Section 12.

Return the top roller to the closed position and, with the machine energised, close the gun switch to feed wire through the gun cable. Adjust the compression screw to provide just sufficient clamping of the drive rolls drive to achieve constant wirefeed. Do not over tighten the compression screw, as the consumable wire can be crushed leading to erratic wirefeed.

5.7 WELDING POLARITY SELECTION

POSITIVE WIRE

Most gas shielded G.M.A.W. is carried out with the welding electrode Positive and the work piece Negative.

To set the machine for this condition, connect the 'GUN' lead to the (+) output terminal, and the 'WORK' lead to the (-) terminal, as in Figure 4. below.

NEGATIVE WIRE

Most "Self-Shielded" flux cored consumables are designed to be operated with the welding electrode Negative and the work piece Positive. Refer to the manufacturers data for the particular consumable to be used.

To set the machine for this condition, connect the 'GUN' lead to the (-) output terminal, and the 'WORK' lead to the (+) terminal, as in Figure 5. below.

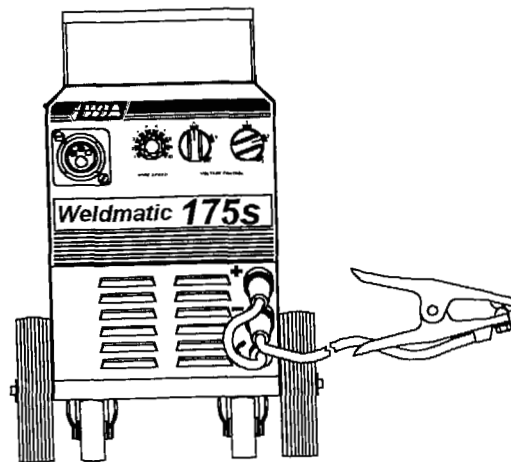


FIGURE 4. POSITIVE WIRE CONNECTION

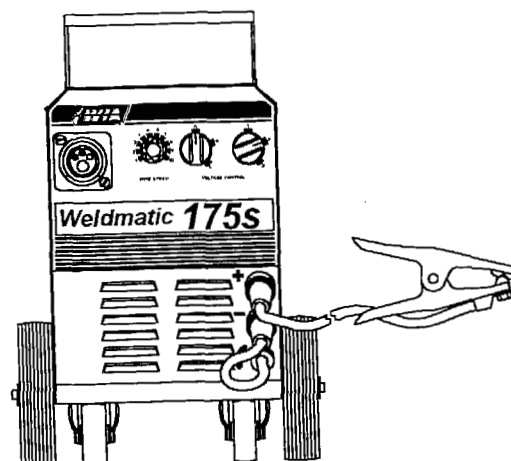


FIGURE 5. NEGATIVE WIRE CONNECTION

6. BASIC WELDING INFORMATION

6.1 SHIELDING GAS

The choice of shielding gas is largely determined by the consumable wire to be used. Many proprietary shielding gas mixtures are available.

The recommended shielding gases for use with this equipment are :

- Mild Steel..... Argon + 5 to 25% Carbon Dioxide;
- Aluminium..... Argon;
- Stainless Steel..... Argon + 1 to 2% Oxygen.

Consult your gas supplier if more specific information is required.

6.2 SHIELDING GAS FLOW RATE

In G.M.A.W., one of the functions of the shielding gas is to protect the molten weld pool from the effects of oxygen in the atmosphere. Without this protection the weld deposit becomes 'honeycombed' in appearance, an effect which is described as weld porosity.

In draft-free conditions the gas flow rate required to give adequate protection is typically 10 litres/min. In situations where drafts cannot be avoided, it may be necessary to increase this rate and/or to provide screening of the work area.

Weld porosity can also be caused by air entering the gas stream through a damaged hose, loose gas connection, or from restriction in the nozzle, such as from excess build-up of spatter.

6.3 ESTABLISHING A WELD SETTING

The WELDMATIC 175S has been designed for use with a range of solid and flux cored electrode wires. The charts shown on Figure 8 can be used to preset the machine for an approximate welding current. For each of the nine combinations of voltage control switch settings, there is a range of valid wirespeed settings.

The wirefeed rate determines the welding current; increasing the feed rate increases the current, and decreasing it decreases current. The selected wirefeed rate must be matched with sufficient arc voltage; an increase of wirefeed rate requires an increase of arc voltage.

If the voltage is too low and the wirespeed is set too high to suit the welding voltage, the wire will stub and stutter, and the arc will not be stable. To correct this situation, decrease the wirespeed setting. If the voltage is too high, the arc will be long with metal transfer occurring as a series of large droplets. To correct this situation, increase the wirespeed setting.

The welding current should be chosen to suit the thickness of the metal to be welded. It is important to check that the deposited weld provides sufficient strength to suit the application.

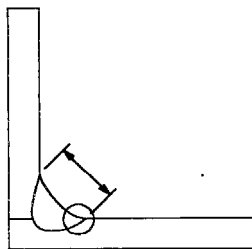


FIGURE 6. "GOOD" WELD.

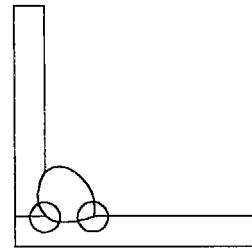


FIGURE 7. "BAD" WELD

A "good" weld will have the characteristics illustrated in Figure 6. The weld has penetrated into the parent metal, fusing the root of the joint where the two plates meet, and the weld blends smoothly into the side walls.

A "bad" weld is shown in Figure 7. The weld has not penetrated the joint root, and there is poor side wall fusion. This lack of fusion would normally be corrected by increasing the arc voltage, or by increasing both wirefeed rate and arc voltage to achieve a higher current weld setting.

IMPORTANT: Do not operate the Voltage Control switches during welding.

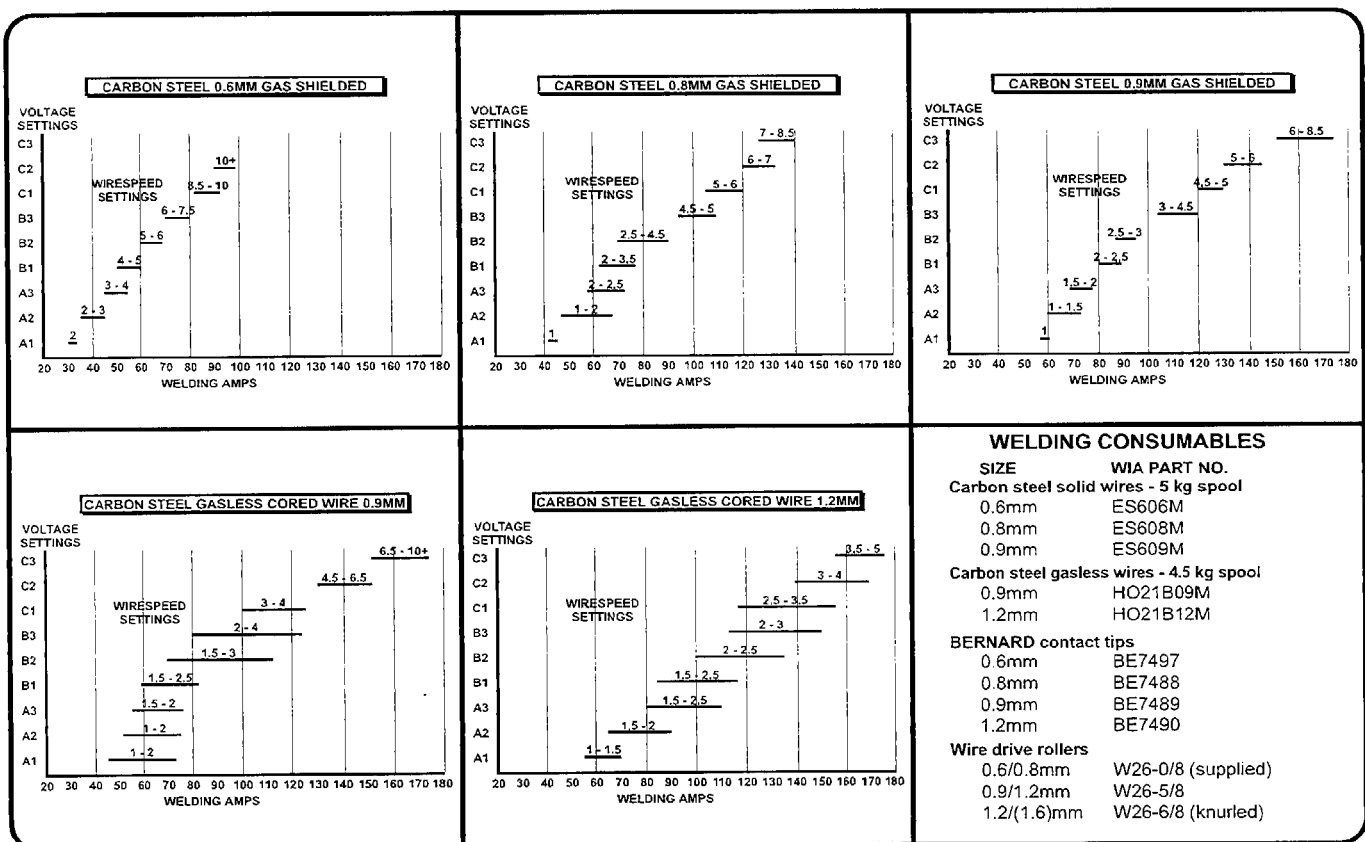


FIGURE 8. WELD SETTING CHARTS

6.4 GUN POSITION

For 'down hand' fillet welding with gas-shielded consumable wires, the gun is normally positioned as in the Figures shown below with the nozzle end pointing towards the direction of travel.

For 'down hand' fillet welding with self-shielded consumable wires, the gun is normally positioned as in the Figures shown below with the nozzle end pointing away from the direction of travel, referred to as 'dragging' the weld. Self shielding consumable wires should be operated with approximately 15mm of wire 'stick-out' from the welding contact tip.

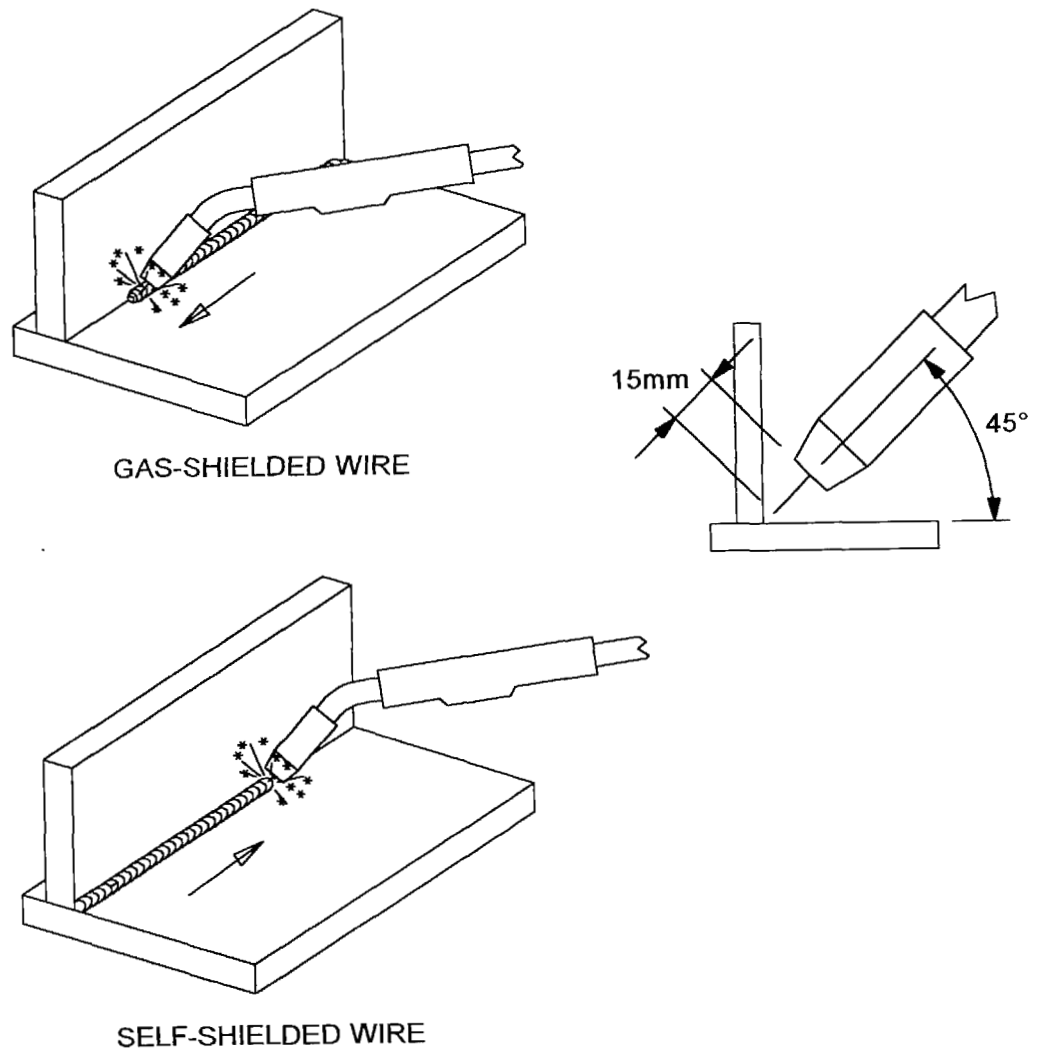


FIGURE 9. GUN POSITION

6.5 DUTY CYCLE

The term duty cycle indicates the percentage welding time available at the rated output current, for each 5 min period over 4 hours.

The WELDMATIC 175S is rated at 175 amps, 16% duty cycle. If the machine is operated at a reduced welding current, a higher duty cycle is available. The diagram below illustrates the appropriate duty cycle rating for the range of welding currents available from the 175S, and so allows the maximum welding time per 5 minute period to be determined.

The power source is protected by in built over temperature protection devices. These will operate if the machine is operated in excess of its current and duty cycle rating. If this occurs, the fan will continue to run, but the machine will not deliver welding current until the unit has cooled sufficiently.

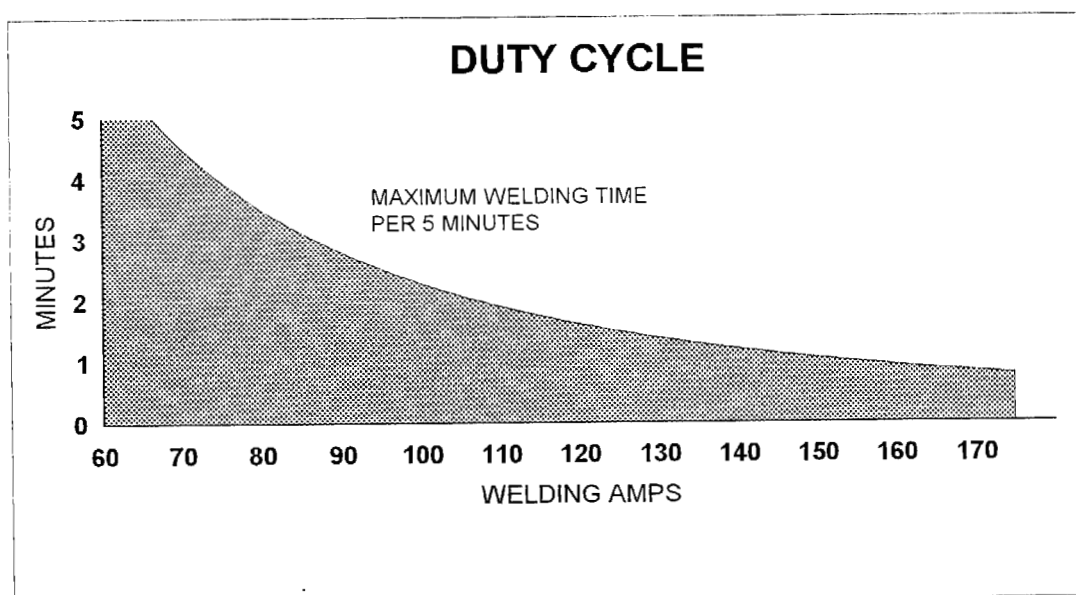


FIGURE 10. DUTY CYCLE RATING CHART

7. GENERAL MAINTENANCE

Before removing the machine cover, ENSURE that the unit is disconnected from the mains power supply. When the unit is energised LETHAL VOLTAGES are present on the electrical components enclosed.

DUST

Care should be taken to prevent excessive build-up of dust and dirt within the welding power source. It is recommended that at regular intervals, according to the prevailing conditions, the machine covers be removed and any accumulated dust be removed by the use of dry, low pressure compressed air, or a vacuum cleaner.

WIREFEED

In order to obtain the most satisfactory welding results, the wirefeed must be smooth and constant. It is therefore important to observe the following points;

- Keep the gun cable liner clear of dust and swarf build up. When liner replacement becomes necessary, fit only the genuine replacement part. The build up of dust in a cable liner can be minimised by regular purging of the liner with dry compressed air. This may be conveniently done each time the wire spool is replaced.
- Replace the welding tip as it becomes worn or damaged. Ensure the tip size is correct for the welding consumable wire in use. See Section 11 for gun part numbers.
- Keep the wire drive mechanism clean. Periodically check the drive roller for wear or clogging, and that the compression roller rotates freely.

8. TROUBLE SHOOTING

FAULT	REMEDY
Power source has no power, ie. 1) no output 2) no wirefeed 3) no gas flow 4) fan is not running	Turn on mains supply switch Check mains voltage, fuses or circuit breaker Check all primary connections in power source and in primary plug Check primary flexible cable for damage. Replace if faulty
When gun switch is closed, power source has : 1) no output 2) no wirefeed 3) no gas flow 4) but fan is running	Gun switch circuit incomplete. Check gun switch for continuity with ohm meter when switch is pressed. Replace if faulty Gun switch circuit incomplete. Check the 2 pin receptacles in euro adaptor are making contact with the 2 pins from the gun cable. Power source overheated. Allow thermostats to cool with fan on After cooling, if problem still persists, check rectifier thermostat and transformer thermostat for open circuit. Replace if faulty Check control transformer for open circuit. Replace if faulty.
When gun switch is closed, power source has no output and no wirefeed	Check all connections to welding contactor Check 24VAC coil of welding contactor. Replace if faulty.
Power source has no wirefeed when gun switch is closed	Check all connections to CP104-12 control board in power source Replace CP104-12 control board
Power source has no gas flow when gun switch is closed	Check all connections to gas valve. Check gas valve. Replace if faulty.
Power source has live output all the time when mains power is applied and gun switch is off	Check welding contactor. Replace if faulty
Power source has low weld output	Check welding circuit is making good electrical connection Check all cable connections in power source for hot spots.
Power source has no weld output variation when coarse and fine switches are operated	Check all cable connections to coarse and fine switches Check coarse and fine switches. Replace if faulty
Mains fuses blow or circuit breaker trips instantly when mains voltage is applied	Check control transformer for shorted turns or a primary fault to earth. Replace if faulty Check fan in power source for short circuit or fault to earth Replace if faulty
Mains fuses blow or circuit breaker trips instantly when gun switch is closed	Check welding transformer for shorted turns or a primary fault to Earth. Replace if faulty Check rectifier for shorted diodes. Replace if faulty
Mains fuses blow or circuit breaker trips when welding	Check that the recommended fuse or circuit breaker rating has been used. Consider upgrading to larger fuse or circuit breaker & wiring.

TROUBLE SHOOTING cont.**UNSATISFACTORY WELDING PERFORMANCE AND RESULTS**

FAULT	REMEDY
Erratic arc characteristics caused by poor wirefeed	Check gun liner for build up of dirt or blockage. Replace if dirty
	Check if wire is slipping on roller assembly. Replace feed roll if worn
	Check if there is too much drive roller pressure on wire
	Check spool holder is rotating smoothly
	Check that gun liner is not too short and is fitted correctly. Refer to page 21 for fitting instructions.
Constant poor arc characteristics	Check correct polarity has been selected for work and weld cables. Refer to page 8
	Check shielding gas is correct for the consumable in use
	Check welding circuit is making good electrical connection
	Check all connections in power source and wirefeeder for hot spots
Porosity in weld caused by lack of shielding gas	Check gas solenoid. Replace if faulty
	Check that the correct gas flow rate has been set
	Check for leaks in gas hose. Replace if leaking
	Check for leaks in gun cable, eg. o-rings. Replace if leaking
	Check nozzle is firmly attached to gun and that no air is being drawn in

9. SERVICE INFORMATION.

NOTE that the following information is intended for use by Qualified Service Personnel. When the unit is energised LETHAL VOLTAGES are present on the electrical and electronic components. It is not intended that persons without suitable training and knowledge attempt to perform service tasks on the components of this Welder.

Before removing the machine cover, ENSURE that the unit is disconnected from the mains power supply. When the unit is energised LETHAL VOLTAGES are present on the electrical components enclosed.

WIREFEED CONTROL BOARD CP104-12

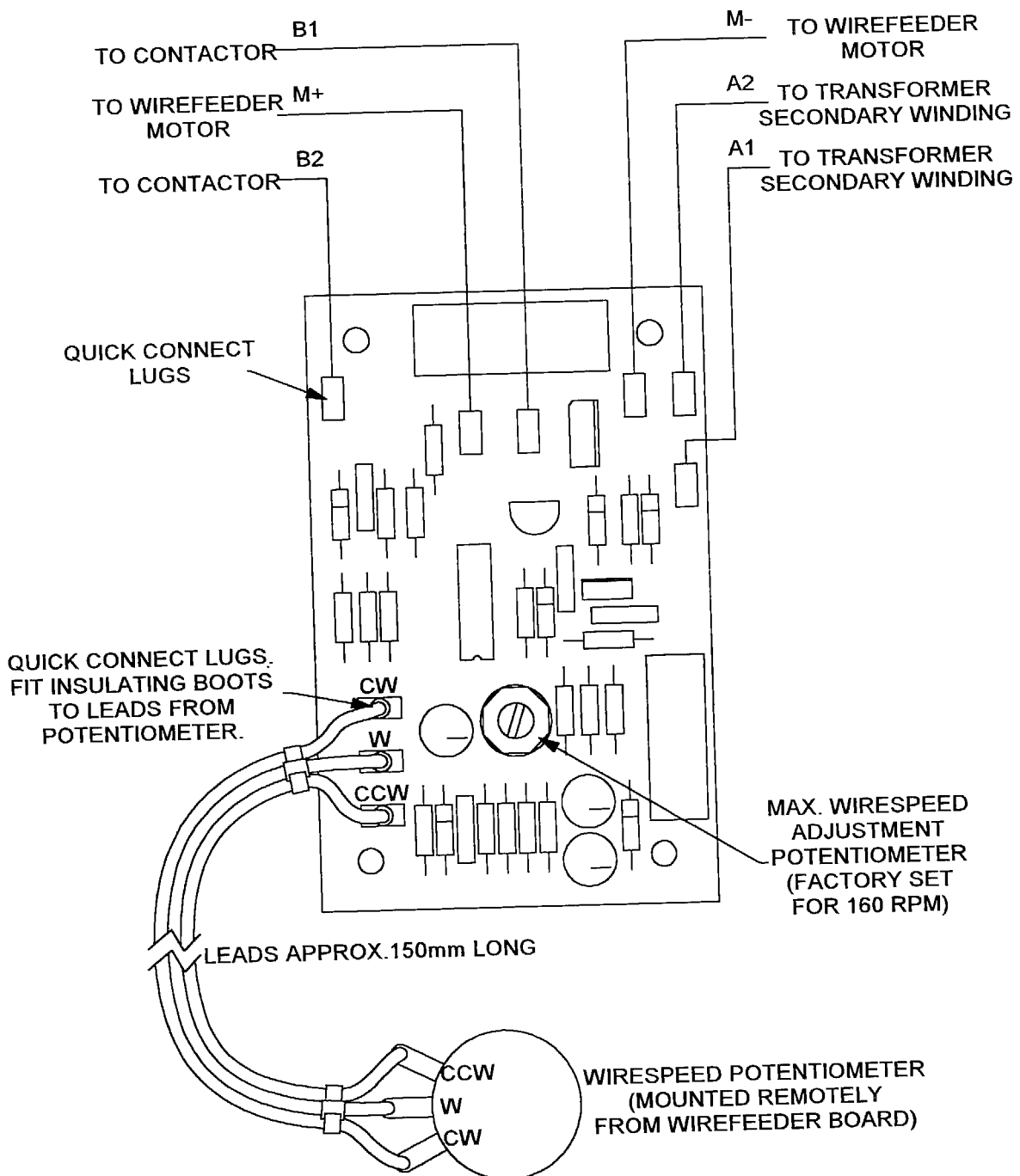
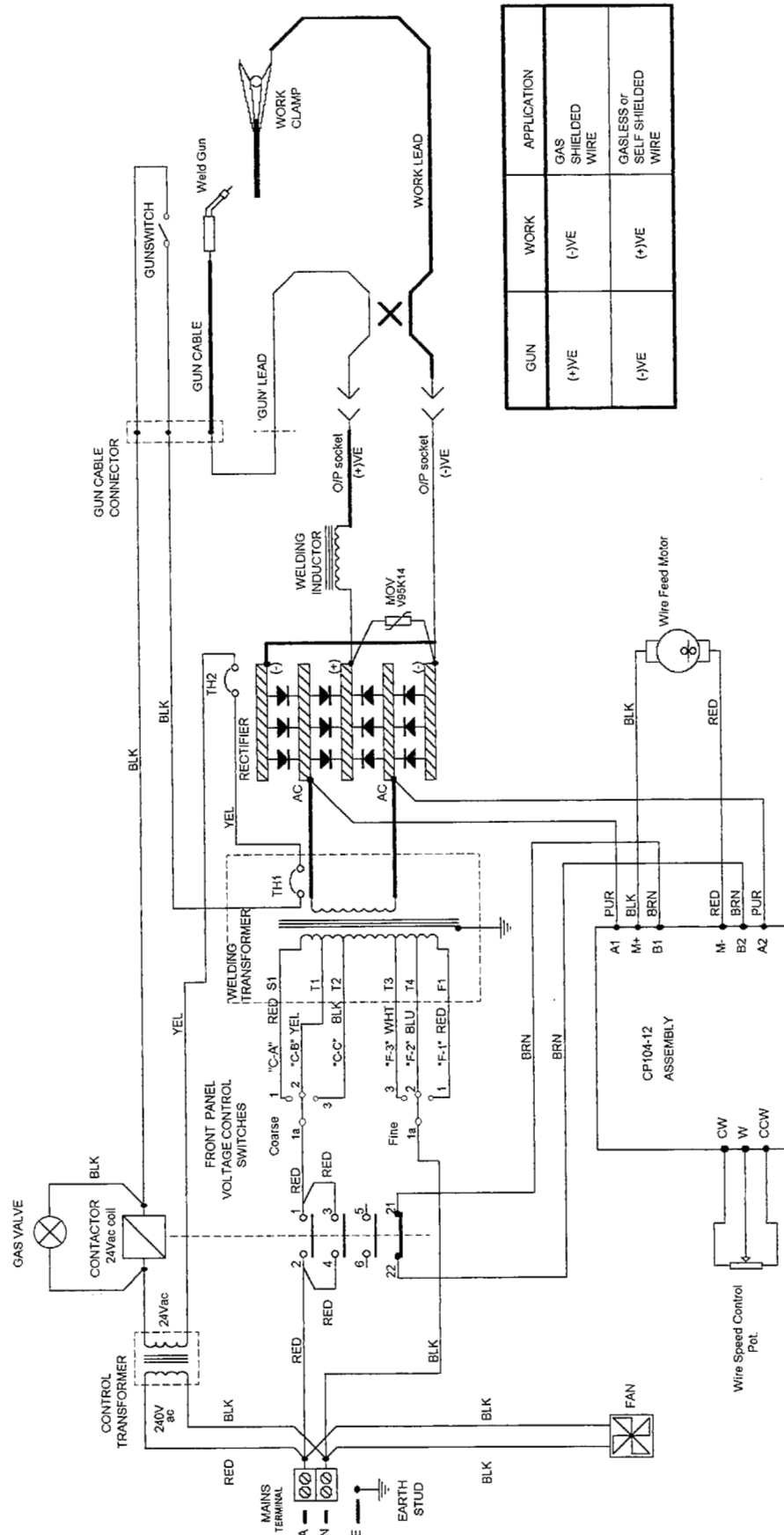


FIGURE 11. WIREFEED CONTROL BOARD

CIRCUIT DIAGRAM



GUN	WORK	APPLICATION
(+)VE	(-)VE	GAS SHIELDED WIRE
(-)VE	(+)VE	GASLESS or SELF SHIELDED WIRE

FIGURE 12. WELDMATIC 175S CIRCUIT DIAGRAM

10. PARTS LISTS

WELDMATIC 175S POWER SOURCE CP104-0

ITEM #.....	PART #.....	DESCRIPTION
1	CP104-12N	Wirespeed PCB Assembly (Remote Pots.)
2	CP110-15	Transformer/Inductance Assembly
Includes		
2.1	CP104-16/2	Thermal Overload
3	CP104-20	Base Assembly
4	CP104-21	Side and Top Cover, Fixed
5	CP104-22	Hinged Side cover (Not Shown)
6	CP104-23	Terminal Bracket
8	CP104-31	Support Plate
9	CP104-0/3	Butt Hinge (2)
10	W29-1/20	Slam Catch (Not Shown)
11	AM296-1	Top Cover & Handle
12	AM296-2	Trolley Base Assembly
13	AM234-5	Plastic Wheels (2)
14	MC11-53/6	Ratchet Cap (2)
15	AM296-2/3	Rear Axle
16	AM296-1/2	Rubber Mat
17	CP103-28	Axle
18	CP103-29	Spool Adaptor
19	AM133-3	'R' Clip
20	AM133-2	Thrust Washer
21	CP27-0/15	Fan and Motor
22	CP101-0/17	Finger Guard
23	CP104-0/2	Rectifier
24	AM152-11/2	Control Transformer
25	CP103-0/3	Contactora 24V
26	MK6/2	Terminal Block
27	MC66-0/8	Flex and Plug, 15A
28	MC84-2/1	Cable Clamp
30	H285	Earth Tab (Not Shown)
31	H774	Cup Terminal (Not Shown)
32	H774W	Washer (Not Shown)
33	CP110-10/1	Rotary Switch Body (2)
34	CP110-10/2	Rotary Switch Dust Cover (2)
35	CP110-10/3	Rotary Switch Knob (2)
36	K28	PCB Standoff Mount (4)
37	W5-10/19	Potentiometer Knob
38	W26	Motor and Two Roll Drive
39	TC396-1/1	Plastic Moulding
40	TC396-1/2	Central Adaptor
41	TC396-7/1	Adaptor Stem
42	TC396-1/8	Power Clamp
43	TC396-7/2	Guide Tube
44	CP104-0/1	Gas Valve 24 V AC
45	W11-11/1	Hose Barb (2)
46	62513	Gas Hose
47	OCL13	'O' Clip 13mm (2)
48	OCL8	'O' Clip 8mm
49	SA32-0/1	Twistlock Plug (2)
50	SA140-0/2	Twistlock Socket (2)
51	CABW10	Welding cable 10mm ²
52	WGWC1	Work Clamp 200A
53	BEXT2-4E210AE	Gun and Cable Assembly (Not Shown)
54	GW251190	Gas Regulator & Flow Gauge (Not Shown)
55	CP104-26	Loom Assembly
56	SCG030M	Chain

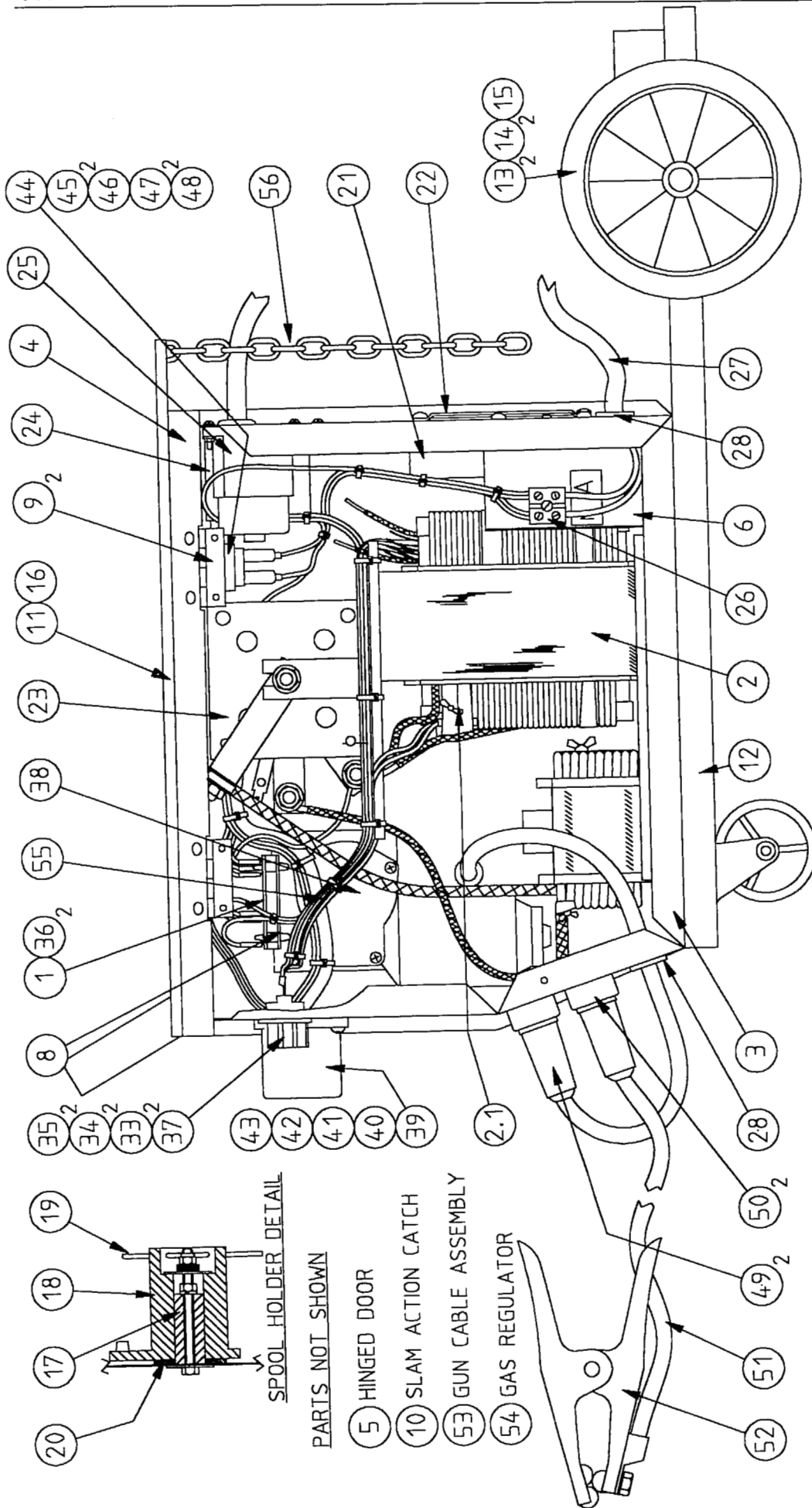


FIGURE 13. WELDMATIC 175S POWER SOURCE ASSEMBLY

11. PARTS LISTS

W26 MOTOR & TWO ROLL DRIVE ASSEMBLY

ITEM #	PART #	DESCRIPTION
1.....	W26-0/1.....	Motor and Gearbox
2.....	W26-0/3.....	Screw M6x12
3.....	W26-0/4.....	Key
4.....	W26-0/5.....	Nut M5
5.....	W26-0/6.....	Feed Plate
6.....	W26-0/7.....	Screw M5x10
7.....	W26-0/8.....	Feed Roll 0.6mm/0.8mm

Alternatives

(7).....	W26-5/8.....	Feed Roll 0.9 + 1.2mm, Solid Wire
(7).....	W26-2/8.....	Feed Roll 1.0 + 1.2mm, Solid Wire
(7).....	W26-3/8.....	Feed Roll 1.0 + 1.2mm, Aluminium Wire
(7).....	W26-7/8.....	Feed Roll 1.0 + 1.2mm, Flux Cored Wire
(7).....	W26-6/8.....	Feed Roll 1.2 + 1.6mm, Flux Cored Wire
8.....	W26-0/9.....	Screw
9.....	W26-0/10.....	Axle Shoulder Screw
10.....	W26-0/11.....	Pressure Spring
11.....	W26-0/12.....	Washer
12.....	W26-0/13.....	Inlet Guide
13.....	W26-0/14.....	Pressure Screw
14.....	W26-0/15.....	Nut M5
15.....	W26-0/16.....	Retaining Ring
16.....	H1972.....	Quick Connect Lug
17.....	H1135.....	Insulating Boot

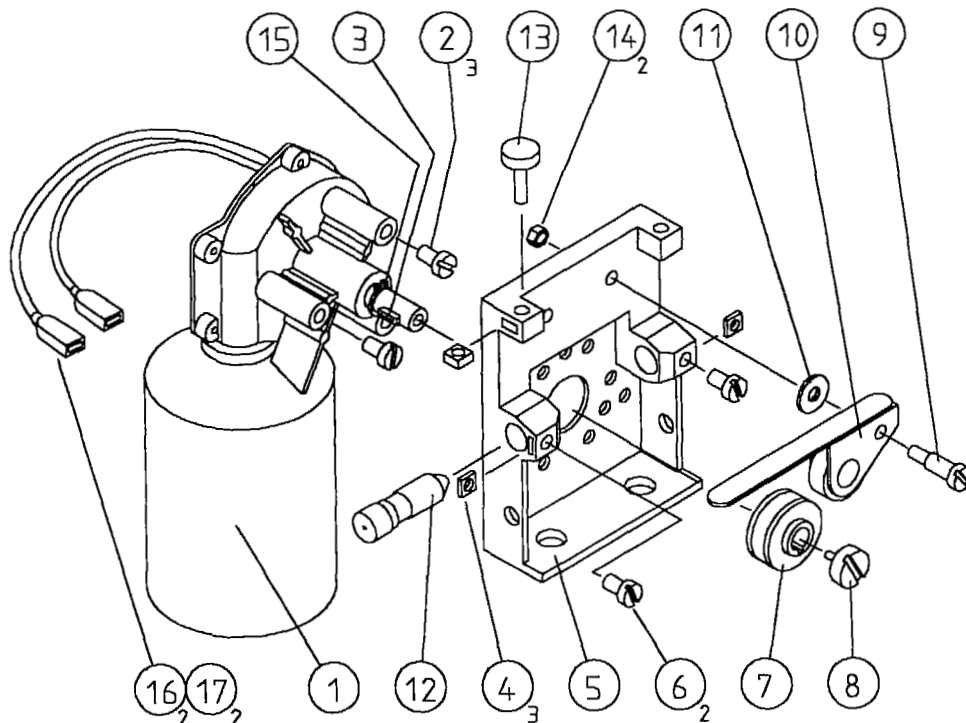


FIGURE 14. W26 TWO ROLL DRIVE ASSEMBLY

12. PARTS LISTS

BEXT2-4E210AE GUN ASSEMBLY

ITEM #	DESCRIPTION	PART #	ITEM #	DESCRIPTION	PART #
1	Nozzle	BE4392	15	End Fitting	BE4E213B
2	Contact tip 0.6mm	BE7497	16	Cone Nut	BE4305
	Contact tip 0.8mm	BE7488	17	Terminal	BE2660001
	Contact tip 0.9mm	BE7489	18	Clamp	BE1520008
	Contact tip 1.2mm	BE7490	19	Strain Relief	BE2520017
3	Head	BE4335	20	Bushing	BE1470007
4	Cap	BE4323R	21	Strain Relief, rigid	BE1880135
5	Nut Insulator	BE4780	22	Screw	BE2280002
6	Insulator	BE1370117	23	Insulated Link	H2072
7	Body Tube	BE1370116	24	Nut	BE4816
8	Handle Kit	BE1780006	25	Euro Block	BE5060
9	Trigger	BE5662	26	'O' Ring	BE4421
10	Screw Kit	BE1880004	27	Liner 0.9 - 1.2mm	BE43110
14	Cable 3m.	BE8681TE			

To replace liner: Disconnect gun cable assembly from the Euro adaptor on the machine case, remove nozzle (1) and head (3). Withdraw old liner from the wire feeder end. Insert new liner and refit gun cable assembly to Euro adaptor on the machine case. At the gun end, compress the liner within the gun cable, then **cut it one contact tip length past the end of the body tube (7)**. Refit head, tip and nozzle.

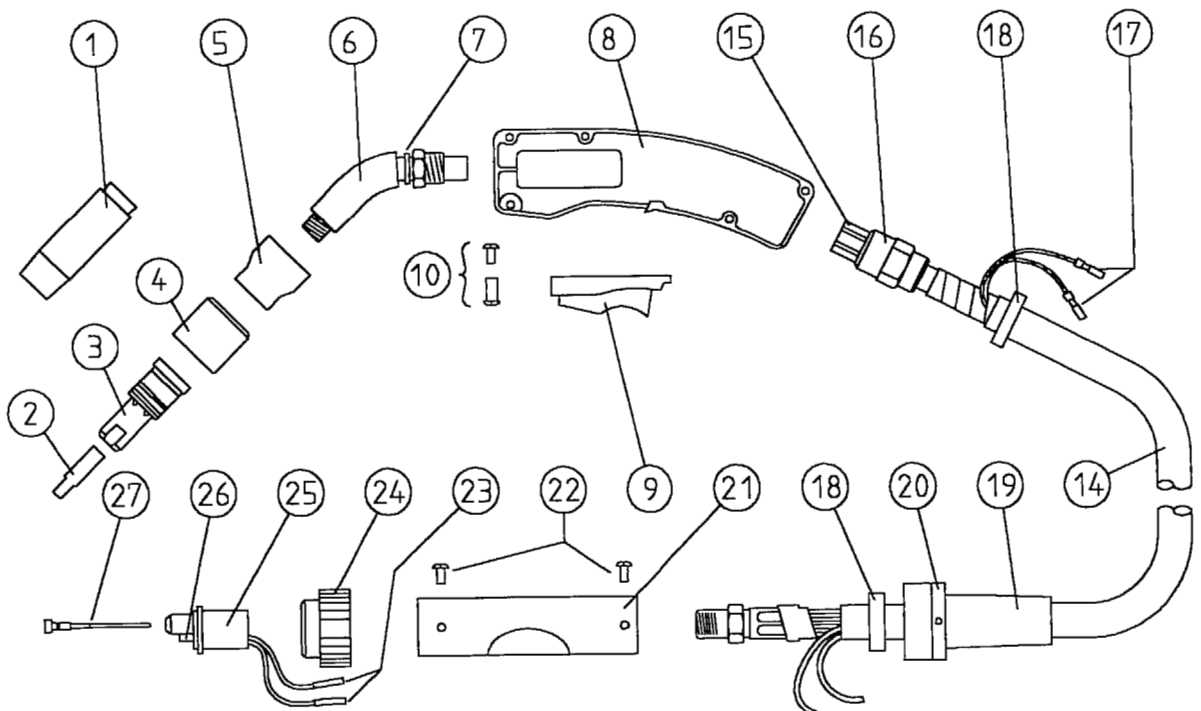


FIGURE 15. BEXT2-4E210AE GUN & CABLE ASSEMBLY

13. SAFE PRACTICES IN USING WELDING EQUIPMENT

These notes are provided in the interests of improving operator safety. They should be considered only as a basic guide to Safe Working Habits. A full list of Standards pertaining to industry is available from the Standards Association of Australia, also various State Electricity Authorities, Departments of Labour and Industry or Mines Department and other Local Health or Safety Inspection Authorities may have additional requirements. WTIA Technical Note TN7-98 also provides a comprehensive guide to safe practices in welding.

EYE PROTECTION

NEVER LOOK AT AN ARC WITHOUT PROTECTION. Wear a helmet with safety goggles or glasses with side shields underneath, with appropriate filter lenses protected by clear cover lens. This is a MUST for welding, cutting, and chipping to protect the eyes from radiant energy and flying metal. Replace the cover lens when broken, pitted, or spattered.

Recommended shade filter lens.

Amps	TIG	MMAW	MIG	Pulsed MIG
0-100	10	9	10	12-13
100-150	11	10	10	12-13
150-200	12	10-11	11-12	12-13
200-300	13	11	12-13	12-13
300-400	14	12	13	14
400-500	--	13	14	14
500 +	--	--	14	14

BURN PROTECTION.

The welding arc is intense and visibly bright. Its radiation can damage eyes, penetrate lightweight clothing, reflect from light-coloured surfaces, and burn the skin and eyes. Burns resulting from gas-shielded arcs resemble acute sunburn, but can be more severe and painful.

Wear protective clothing - leather or heat resistant gloves, hat, and safety-toe boots. Button shirt collar and pocket flaps, and wear cuffless trousers to avoid entry of sparks and slag.

Avoid oily or greasy clothing. A spark may ignite them. Hot metal such as electrode stubs and work pieces should never be handled without gloves.

Ear plugs should be worn when welding in overhead positions or in a confined space. A hard hat should be worn when others are working overhead.

Flammable hair preparations should not be used by persons intending to weld or cut.

TOXIC FUMES.

Adequate ventilation with air is essential. Severe discomfort, illness or death can result from fumes, vapours, heat, or oxygen depletion that welding or cutting may produce. NEVER ventilate with oxygen.

Lead, cadmium, zinc, mercury, and beryllium bearing and similar materials when welded or cut may produce harmful concentrations of toxic fumes. Adequate local exhaust ventilation must be used, or each person in the area as well as the operator must wear an air-supplied respirator. For beryllium, both must be used.

Metals coated with or containing materials that emit fumes should not be heated unless coating is removed from the work surface, the area is well ventilated, or the operator wears an air-supplied respirator.

Work in a confined space only while it is being ventilated and, if necessary, while wearing air-supplied respirator.

Vapours from chlorinated solvents can be decomposed by the heat of the arc (or flame) to form PHOSGENE, a highly toxic gas, and lung and eye irritating products. The ultra-violet (radiant) energy of the arc can also decompose trichlorethylene and perchlorethylene vapours to form phosgene. Do not weld or cut where solvent vapours can be drawn into the welding or cutting atmosphere or where the radiant energy can penetrate to atmospheres containing even minute amounts of trichlorethylene or perchlorethylene.

FIRE AND EXPLOSION PREVENTION.

Be aware that flying sparks or falling slag can pass through cracks, along pipes, through windows or doors, and through wall or floor openings, out of sight of the operator. Sparks and slag can travel up to 10 metres from the arc.

Keep equipment clean and operable, free of oil, grease, and (in electrical parts) of metallic particles that can cause short circuits.

If combustibles are present in the work area, do NOT weld or cut. Move the work if practicable, to an area free of combustibles. Avoid paint spray rooms, dip tanks, storage areas, ventilators. If the work can not be moved, move combustibles at least 10 metres away out of reach of sparks and heat; or protect against ignition with suitable and snug-fitting fire-resistant covers or shields.

Walls touching combustibles on opposite sides should not be welded on or cut. Walls, ceilings, and floor near work should be protected by heat-resistant covers or shields.

A person acting as Fire Watcher must be standing by with suitable fire extinguishing equipment during and for some time after welding or cutting if;

- Combustibles (including building construction) are within 10 metres.
- Combustibles are further than 10 metres but can be ignited by sparks.
- Openings (concealed or visible) in floors or walls within 10 metres may expose combustibles to sparks.
- Combustibles adjacent to walls, ceilings, roofs, or metal partitions can be ignited by radiant or conducted heat.

After work is done, check that area is free of sparks, glowing embers, and flames.

A tank or drum which has contained combustibles can produce flammable vapours when heated. Such a container must never be welded on or cut, unless it has first been cleaned as described in AS.1674-1974, the S.A.A. Cutting and Welding Safety Code. This includes a thorough steam or caustic cleaning (or a solvent or water washing, depending on the combustible's solubility), followed by purging and inerting with nitrogen or carbon dioxide, and using protective equipment as recommended in AS.1674-1974. Water-filling just below working level may substitute for inerting.

Hollow castings or containers must be vented before welding or cutting. They can explode. Never weld or cut where the air may contain flammable dust, gas, or liquid vapours.

SHOCK PREVENTION.

Exposed conductors or other bare metal in the welding circuit, or ungrounded electrically alive equipment can fatally shock a person whose body becomes a conductor. Ensure that the machine is correctly connected and earthed. If unsure have machine installed by a qualified electrician. On mobile or portable equipment, regularly inspect condition of trailing power leads and connecting plugs. Repair or replace damaged leads.

Fully insulated electrode holders should be used. Do not use holders with protruding screws. Fully insulated lock-type connectors should be used to join welding cable lengths.

Terminals and other exposed parts of electrical units should have insulated knobs or covers secured before operation.