

# **ELANDMIG INSTRUCTION MANUAL**



**175, 300 & 320 Models**

We congratulate you on your choice of an **Elandmig Compact Welding Machine**. With correct handling and maintenance this machine should give you many years of trouble free service. This manual is intended as a guide to proper installation and use, but if you meet any problem outside its scope your local distributor will be pleased to assist you.

### **WARRANTY CLAIMS**

The machine as a whole is covered by a 12 months warranty but the **Main Transformer and Choke** which are the heart of the unit are warranted for three years. The warranty does not cover the torch and its consumables such as for example tips, shrouds and liners. These are items which require replacement at intervals determined by the amount of usage of the unit. You should note that if you call out a service engineer under warranty and the problem is identified as originating in faulty torch maintenance or use then you will be liable for the call-out charge and engineer's time at whatever rate your local distributor charges.

Please be sure to retain evidence of the date of purchase of your machine since this will be required in the event of a claim.

### **HEALTH AND SAFETY GUIDANCE**

There are a number of potential hazards associated with welding and we recommend that all establishments where welding is carried out should obtain and make available to all supervisory staff a copy of "Health and Safety in Welding & Allied Processes" published by The Welding Institute (01223 891162). The following points should be noted particularly.

#### **(1) GENERAL**

Elandmig Welders are fitted with large widely spaced rear wheels for extra stability, but nonetheless if the machine is moved with the shielding gas cylinder in place it is essential that the cylinder is steadied during movement. If the machine is to be moved over an uneven surface, the cylinder should be removed first.

#### **(2) ELECTRICAL**

The normal precautions to be taken with any piece of electrical equipment apply to welding machines. The connection to the mains supply must be carried out by a technically competent person who must ensure that the correct size of fuse or circuit breaker is fitted. The machines are supplied with a 3 metre sheathed input cable of appropriate cross section. However if

the cable is to be replaced by a longer length then a steel wire braid reinforced cable is recommended in line with current H&S practice. Before attempting the removal of any covers secured by screws or bolts you must ensure that the machine has been disconnected from the mains. It is not sufficient for the ON/OFF switch on the machine to be in the "OFF" position.

The output voltage from MIG machines is too low to be hazardous to a normal healthy person, but wet or very damp conditions can change this and care should be taken.

All input, output, return and control cables and connectors should be inspected regularly and repaired or replaced if damaged.

### (3) HEAT

Welding involves melting of the metal being welded and hence the generation of intense heat. Welders must therefore wear appropriate protective welding gloves and face protection (see also below). The small droplets of molten metal (spatter) which may be thrown off can occasionally burn through ordinary clothing and more importantly cause any inflammable material in the vicinity to be ignited. Welding should not be carried out near inflammable material, but even in its absence a dry type fire extinguisher should be readily accessible.

Persons not engaged in welding can also be injured if they touch welded metal which may remain hot for a very considerable time. Handlers must be equipped with suitable gloves etc. and other persons kept away.

### (4) LIGHT & HARMFUL RADIATION

As well as intense visible light the arc emits infra-red and ultra-violet light which are harmful to the eye and damaging to the skin. Even very minor exposure without eye protection can result in the intense irritation known as "arc-eye" and prolonged unprotected exposure can result in serious permanent eye damage. The use of a handshield or headshield fitted with the correct shade of filter is absolutely mandatory. The brightness of the arc will vary with the materials being welded, but indicative shade values for filter are:-

0 -100A	SHADE 9 - 10
100 - 175A	SHADE 10 - 11
175 - 275A	SHADE 11 - 12
275 - 350A	SHADE 12 - 13

The eyes must also be protected from dust and grit when grinding or chipping the workpiece. Welders should wear clothing that protects the skin from arc radiation. Overalls should have long sleeves and button up to the neck. Care must be taken to protect bystanders and the welding station should be surrounded by screens of a material impervious to harmful radiation. Persons working with or close to the welder must take the same precautions as he.

#### (5) FUMES

Welding should only be carried out in conditions of good ventilation and preferably with the use of a purpose-built mobile fume extractor or fixed ventilation system. Failing this or when materials being welded can give rise to toxic fumes e.g. copper alloys or galvanised materials, breathing filters or respirators should be used.

Fumes can also arise from degreasing agents which can decompose to produce poisonous compounds. Any degreasing material must have fully evaporated and the workpiece must be dry before welding commences.

## INSTALLATION

### ELECTRICAL CONNECTION

The Elandmig Compact range of welding machines comprise of three models, two single phase machines and one three phase machine. Always ensure that the machine is connected to the correct supply, with the correct size of fuses or circuit breakers as shown below. If circuit breakers are used they must be type four otherwise tripping out may occur although there is no machine fault.

Model	Supply Type	Fuse
Elandmig 175	240 volt single phase	20 Amp
Elandmig 300	240 volt single phase	30 Amp
Elandmig 320	415 volt three phase	30 Amp

## **GAS CONNECTION**

The gas bottle should be placed on the platform at the rear of the machine and secured with the chain provided. The correct gas regulator must **always** be used.

<u>Gas</u>	<u>Regulator Type</u>
CO2	CO2 regulator
Argon/CO2 mixture	Argon regulator
Pure Argon	Argon regulator

## **GAS SELECTION**

The table below is for guidance only and the correct shielding gas for an application should always be checked with the gas supplier.

<u>Material</u>	<u>Preferred</u>	<u>Alternative</u>
Mild steel - up to 6mm	95% Argon, 5% CO2	80% Argon, 20% CO2 Pure CO2
Mild steel - over 6mm	80% Argon, 20% CO2	95% Argon, 5% CO2 Pure CO2
Aluminium - up to 6mm	Pure Argon	Helium/Argon mix
Aluminium - over 6mm	Helium/Argon mix	Pure Argon
Stainless steel		
Dip transfer	Helium/Argon mix	Argon/Oxygen mix
Spray transfer	Argon/Oxygen mix	

If CO2 gas is used a CO2 heater may be required, this should be checked with the gas supplier.

Gas pressure should be set to give a flow of between 8 and 15 litres per minute. If working outside it may be necessary to increase the pressure.

## **EARTH CONNECTION**

A suitable earth lead is supplied with the machine and should be connected to the socket on the front of the machine, turning the plug clockwise to lock it into position. The earth clamp must be securely attached to the workpiece as a poor or dirty connection will affect the quality of the weld.

## **TORCH CONNECTION**

The welding torch supplied is fitted to the central connector on the front of the machine and secured in position by screwing the collar on the torch clockwise hand tight. Power, gas and electrical contacts are all made when the collar is screwed home.

## **FEEDING WIRE TO THE TORCH**

Either 5Kg or 15Kg reels of wire may be used in the machine, but if a 5Kg is used a spacer is required otherwise the friction brake will not operate correctly. Place the reel of wire on the hub assembly locating the peg on the hub in the hole of the wire reel. Ensure that the size of the groove in the feed roller corresponds to the size of wire being used. Straighten the first 10cm of wire and check that the cut end is not burred or distorted. Release the pressure arm of the wire feed assembly and pass the wire through the inlet guide, across the feed roller and into the steel outlet guide, then replace the pressure assembly on the wire. The wire feed pressure should be set so that the wire just feeds without slipping. The correct pressure is critical to the smooth operation of the machine. The optimum pressure is that which ensures that the wire feeds smoothly but allows the feed roll to slip in the event of a blockage in the welding torch. The nut on the end of the hub assembly is for adjusting the amount of friction for braking purposes. This is correctly set but if over-running of the spool occurs the nut can be slightly tightened; conversely if the wire feed appears erratic some tension can be released, but care must be taken that over-running of the wire reel does not occur as the wire may come off the reel and foul round the hub assembly

## **REVERSE POLARITY**

The MIG welding process uses a DC voltage output and when welding with normal solid wires the welding torch is positive polarity and the earth lead is negative polarity. However some flux cored wires require these polarities to be reversed. The **Elandmig compacts** have the facility to allow this to be done. The cover by the wire feed motor is removed and the links altered as shown on the diagram. Always ensure that the links are tight before commencing welding.

## **CONTROLS (See Diagrams pp 8 & 9)**

### **1. ON/OFF SWITCH**

Is an illuminated rocker switch which lights up red when the machine is switched on.

### **2. VOLTAGE CONTROL SWITCH - 175**

This has 8 settings with No. 1 being the lowest, used for thin material and No. 8 being the maximum, used for heavier sections.

### **VOLTAGE CONTROL SWITCHES - 300**

The left hand switch has 2 settings which alters the voltage output in large steps, the right hand switch has 8 settings which alters the voltage output in small steps. The lowest setting is therefore switch position 1 - 1 an intermediate setting would be switch position 1 - 8 and the maximum setting would be switch position 2 - 8, giving 16 voltage settings.

### **VOLTAGE CONTROL SWITCHES - 320**

The left hand switch has 3 settings which alters the voltage output in large steps, the right hand switch has 8 settings which alters the output voltage in small steps. The lowest setting is therefore switch position 1 - 1, an intermediate setting would be switch position 2 - 4 and the maximum setting would be switch position 3 - 8, giving 24 voltage settings.

### **3. WIRE SPEED CONTROL**

This varies the speed of the welding wire between 2 and 20 metres per minute and is used in conjunction with the voltage controls to give a smooth arc at the correct welding current.

### **4. WELD TIMER**

Determines the amount of welding time in the stitch welding and spot welding modes. These are covered in the paragraph '**WELDING MODES**'.

### **5. PAUSE TIMER**

Determines the amount of no weld time in the stitch welding mode. This is covered in the paragraph '**WELDING MODES**'.

## **WELDING MODES**

### **A. CONTINUOUS OR SEAM WELDING**

In this form of welding the machine is controlled only by the torch trigger. Depressing and holding the trigger starts the machine and releasing the trigger stops the machine.

### **B. SPOT WELDING**

Timed spot welding is brought into operation by turning the spot weld timer in a clockwise direction until it clicks on, turning it further clockwise then increases the time. By turning the control anticlockwise until it clicks off the machine is returned to the manual mode.

To use the machine for spotwelding it is advisable to fit a special spotwelding gas shroud which has two extended prongs to hold the contact tip the correct distance away from the work. When the torch trigger is pressed welding takes place for the period of time set on the weld timer, the trigger only being released after the weld cycle has finished. It is advisable to have the machine set to a high output to give quick penetration and to control the weld size with the timer. If the time set is too short the two pieces of metal will not be joined. If the weld time is too long then a hole will be burnt straight through both pieces, therefore it is advisable to set the machine up on some scrap material before commencing work. To repeat the weld cycle the torch trigger must be released for a few seconds and then depressed again to start the next cycle. Spot welding can be carried out in two ways as follows:

**1. STRAIGHT THROUGH SPOT WELD**

By pressing two thin sheets of metal together by applying pressure with the prongs of the spot weld shroud and relying on the penetration of the weld to form the bond.

**2. PREPARED or "BUTTON HOLE" SPOT WELD**

Requires a hole to be punched or drilled in the outer sheet of metal in the position where the spot weld is needed. The spot welding shroud is placed centrally over the prepared hole, the hole is then filled by depressing the trigger and maintaining pressure with the prongs of the shroud. This method is superior where a strong bond is required, or where the thickness of material does not allow the straight through method to be used.

**C. STITCH WELDING**

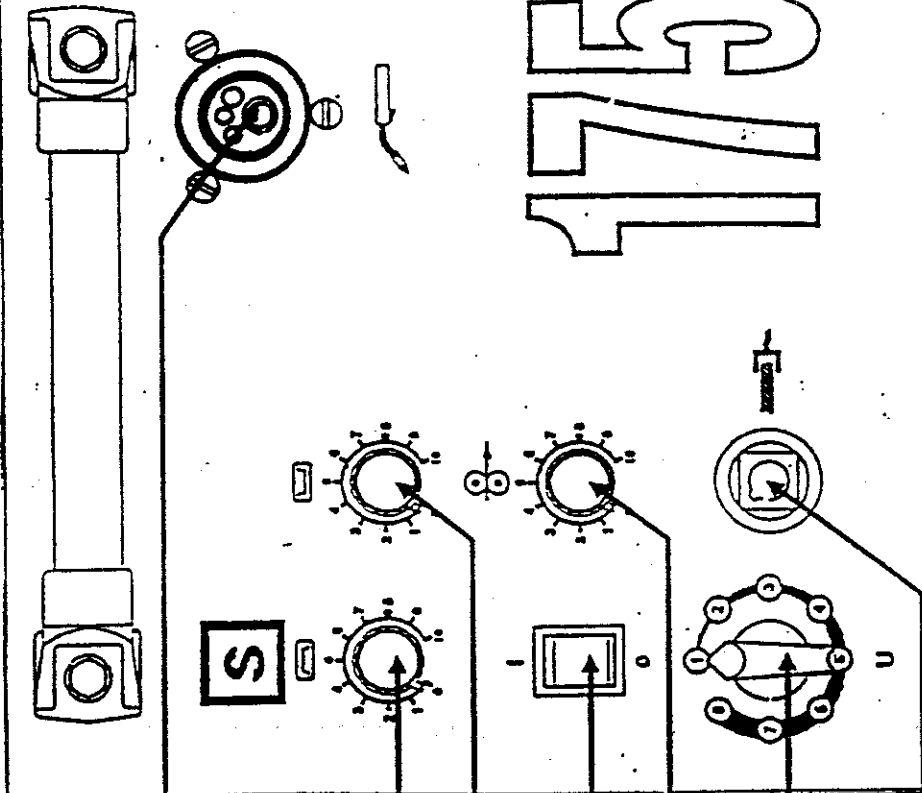
In this mode both the weld timer and the pause timer are used. Both timers are turned clockwise to the on positions and the torch trigger kept pressed. The weld timer controls the arc on time and the pause timer controls the arc off time, both time periods can be set independently of each other. Stitch welding allows greater control over the heat input in the weld as the weld pool cools down during the pause time, this allows welding on very thin or badly corroded material where burning through is a problem in the manual mode.

**D. LATCH WELDING**

To use the machine in this mode it is necessary to use a welding torch fitted with a latching trigger such as the Eland TB series. The machine can be used in either the continuous or the stitch mode when used with a latching torch.



# 175



Central connector

Welding timer

Pause timer

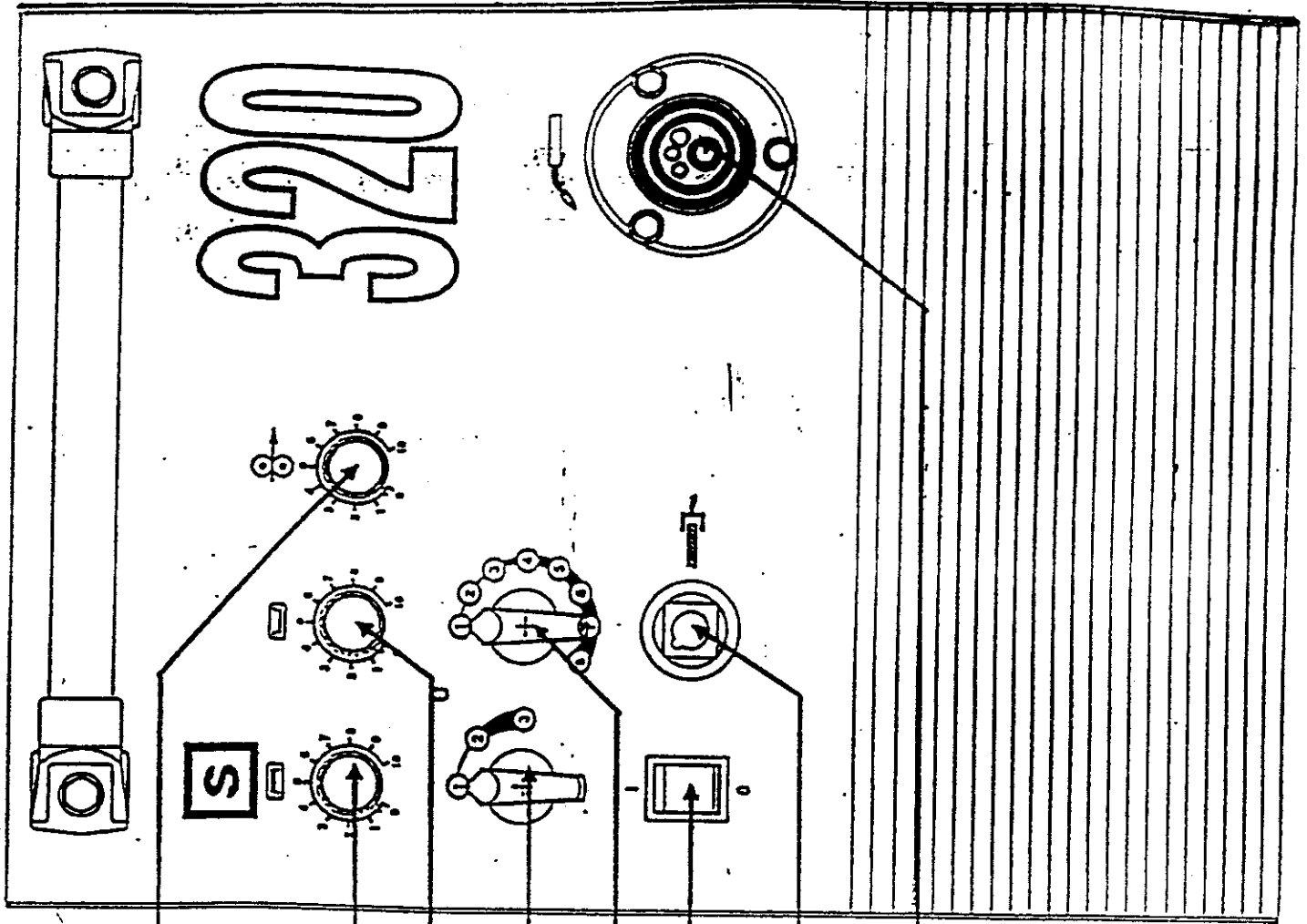
On/Off switch

Wire speed control

Voltage control switch

Earth socket

EM 175 MACHINE  
CONTROLS



Wire speed control:

Welding timer:

Pause timer:

Voltage control switch (range):

Voltage control (fine steps):

On/Off switch:

Earth socket:

Central connector:

**EM 300 AND EM 320 MACHINE  
CONTROLS**

# GENERAL TIPS

## TECHNIQUE

When welding on the lowest output settings, it is necessary to keep as short an arc as possible. This is achieved by holding the gun as close as possible, and at an angle of approximately 60 degrees to the workpiece. The arc length can be increased when welding on the higher settings, an arc length of up to 20mm being sufficient when welding on maximum settings.

From time to time some faults may be observed in the weld owing to outside influences, rather than due to a machine fault. Usually they are ascribed to 'Operator error'! Here are some that you may come across:-

## POROSITY

Small holes in the weld, not unlike Aero chocolate, caused by breakdown in gas coverage of the weld pool, or sometimes by inclusion of foreign bodies (see below).

Remedy is usually to grind out the weld, and re-do, so try and avoid it.

Avoidance - clean work, and adequate gas flow, correct torch angle.

## SPATTER

Small balls of molten metal which come out of the arc. A little is unavoidable, but it should be kept down to a minimum by selecting correct settings on set, and having correct gas flow. The use of Eland anti spatter spray minimises the problem of spatter removal from the workpiece.

## NARROW, HEAPED WELD

Can be caused by travelling too fast, or incorrect gas.

## VERY THICK OR WIDE WELD

Can be caused by travelling too slowly.

## WIRE BURNS BACK

Can be caused by wire feed slipping, loose or damaged tip, poor wire, nozzle held too close to work or voltage too high.

## LITTLE PENETRATION

Can be caused by moving torch too fast, too low voltage setting, or incorrect feed setting.

## BURNING HOLES

Can be caused by torch moving too slowly, voltage too high, or incorrect wire feed setting.

## HEAVY SPATTER AND POROSITY

Can be caused by nozzle too far from work, dirt on work, or by low gas flow or by working in a draught which blows away the shielding gas.

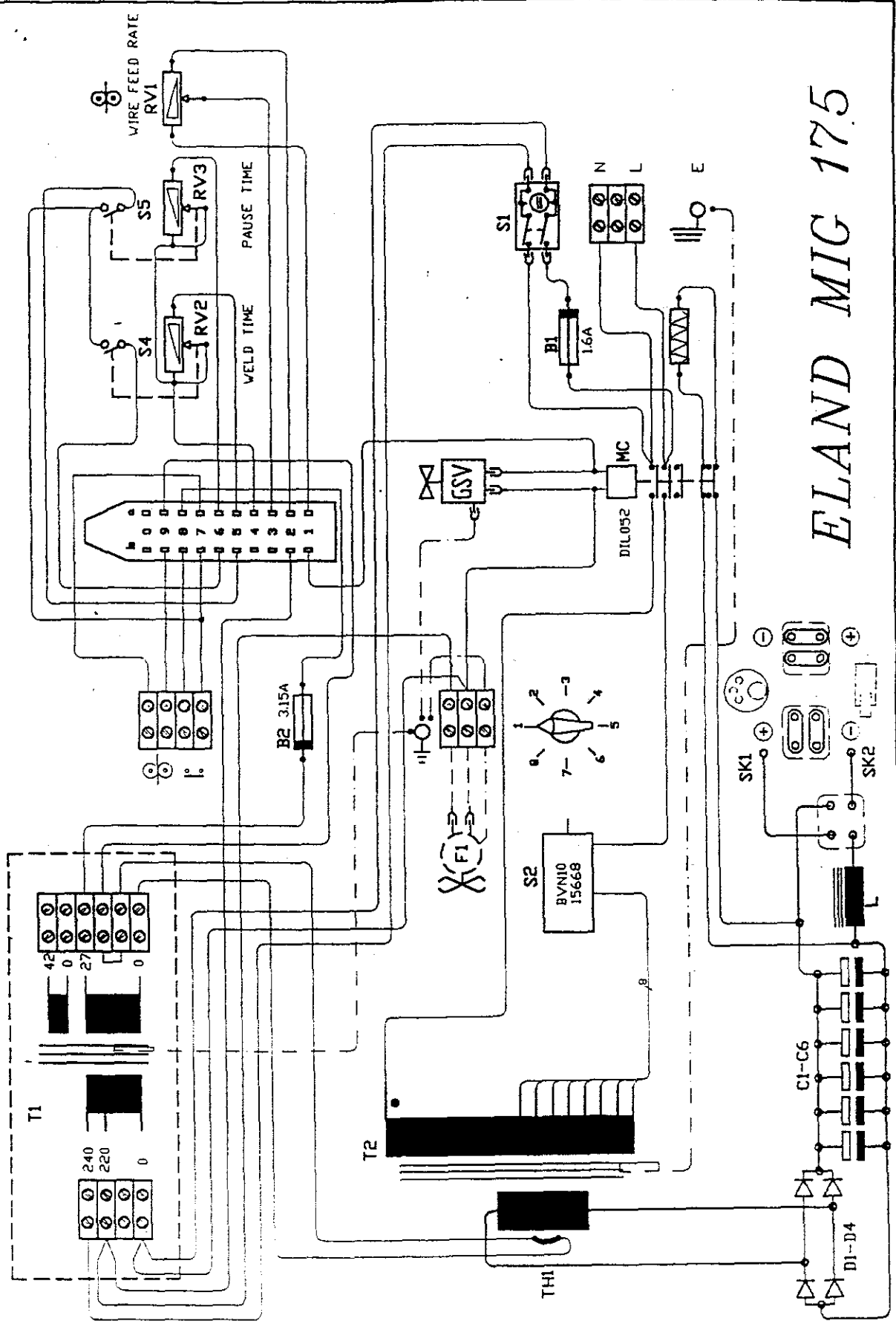
## FAULT FINDING

FAULT	REASON	REMEDY
Set is "dead".	<ol style="list-style-type: none"><li>1. On/Off switch not on.</li><li>2. Fuse in mains supply blown.</li></ol>	<p>Switch on. Replace fuse.</p>
Nothing happens when torch trigger is depressed.	<ol style="list-style-type: none"><li>1. Torch switch defective</li><li>2. Torch central connector pins not making proper contact in the machine adapter</li><li>3. Auxiliary circuit fuse blown</li></ol>	<p>Check for torch fault by shorting the switch pin sockets on the central adapter and listening for the main contractor coming in. Replace fuse.</p>
Wire is not conveyed when feed roll is turning.	<ol style="list-style-type: none"><li>1. The friction brake in the hub is tightened too hard.</li><li>2. Insufficient pressure on drive roll.</li><li>3. Wire is not running in the feed roll groove.</li><li>4. Dirt in liner and/or contact tip.</li></ol>	<p>Loosen Tighten. Re-align wire. Blow with compressed air, replace contact tip.</p>
Wire feeding in jerks or erratic.	<ol style="list-style-type: none"><li>1. Contact tip worn or burnt.</li><li>2. Dirt in feed roll groove.</li><li>3. Groove of feed roll worn.</li></ol>	<p>Replace. Clean. Replace.</p>
No arc.	<ol style="list-style-type: none"><li>1. Bad contact between earth clamp and workpiece.</li><li>2. Short circuit between contact tip and gas shroud.</li></ol>	<p>Tighten earth clamp and check connections. Clean. Replace tip and/or shroud as necessary.</p>

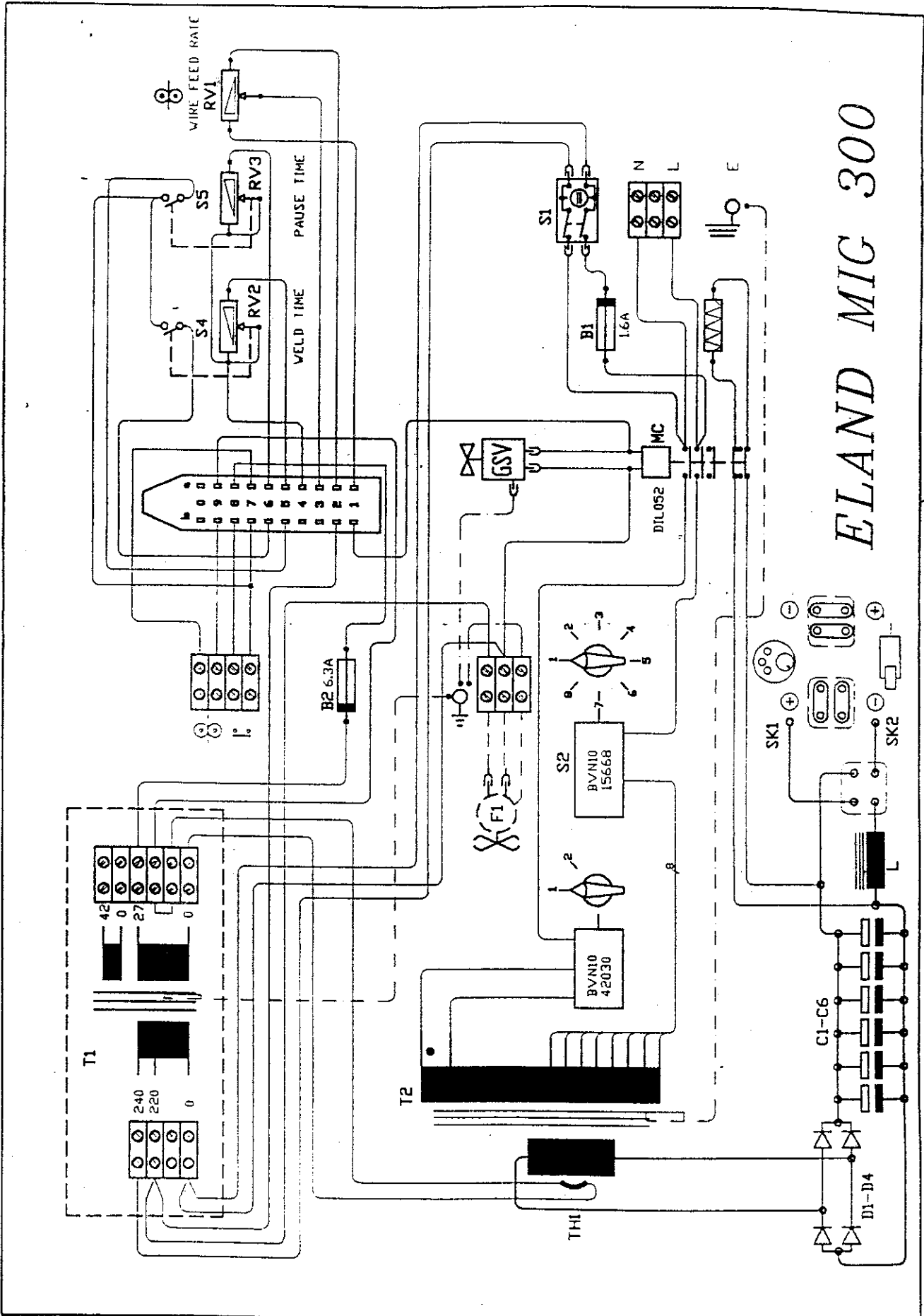
Porous welding seam.	1. Failure of gas shield because of spatter in gas shroud.	Clean gas shroud of spatter.
	2. Wrong distance and/or wrong inclination of welding gun.	The length of stick out wire from tip to workpiece must be 5-10mm. Inclination not less 60 in relation to workpiece.
	3. Too small quantity of gas.	Augment gas quantity, and Check cylinder contents.
	4. Draught.	Screen the welding site.
	5. Humid workpieces.	Dry with heat producer.
	6. Heavily rusted workpieces.	Clean workpieces of loose rust.
	7. Gas solenoid defect.	Clean/Replace.

The set suddenly stops welding after prolonged use.	Machine overheated due to being used in excess of stated duty cycle.	Do not switch off - leave machine to cool down.
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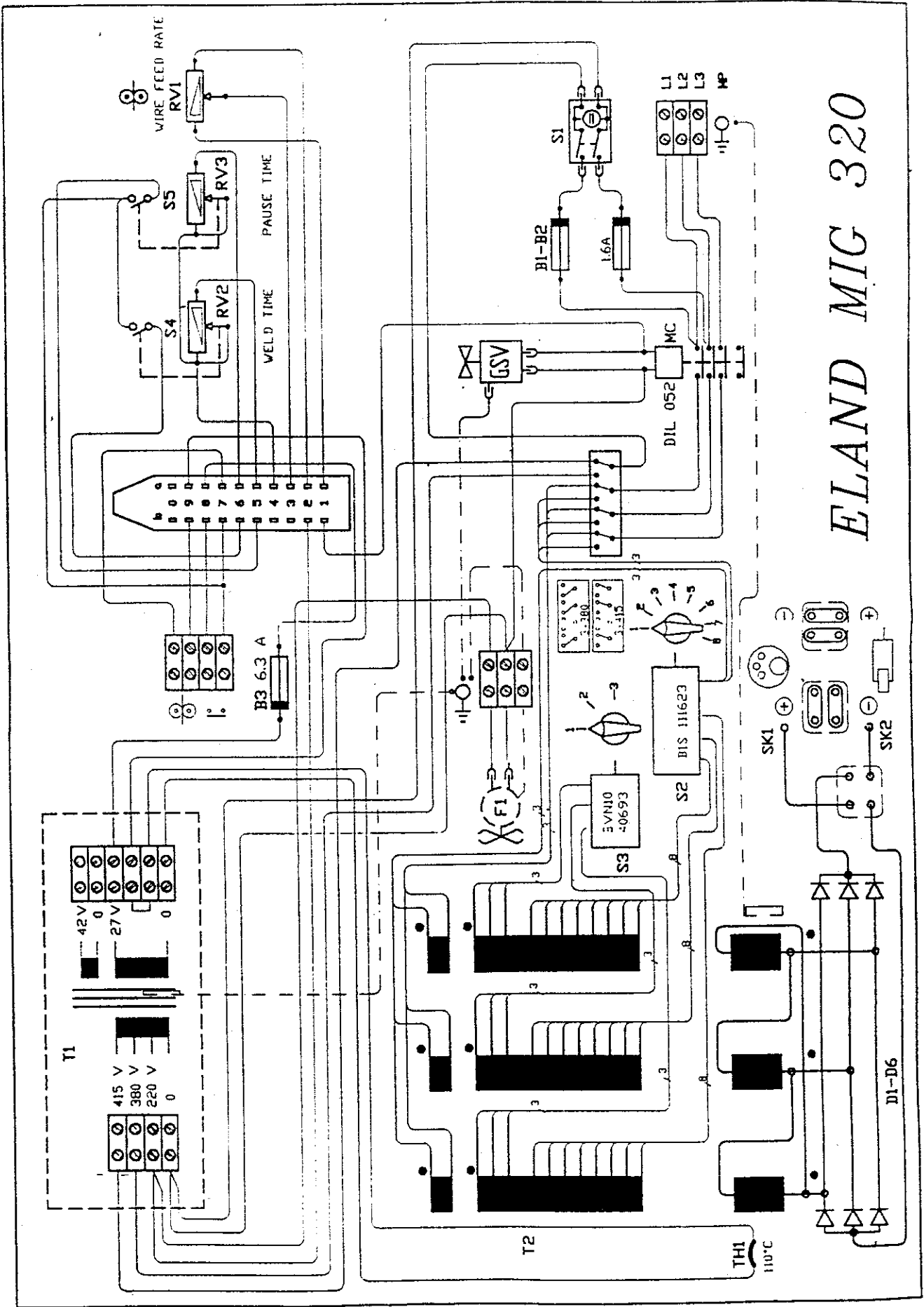
Should the above suggestions not remedy the fault then, it is possible that there has been a component breakdown and you should call your dealer for service.



# ELAND MIG 175



# ELAND MIC 300



# ELAND MIG 320



## ELANDMIG SPARE PARTS

<u>ELAND P/N</u>	<u>DESCRIPTION</u>	<u>MACHINE</u>
MIS001	Thermoswitch 110°C	175/300/320
MIS002	Potentiometer 10K	175/300/320
MIS003	Potentiometer 470K	175/300/320
MIS004	ON/OFF Switch	175/300/320
MIS005	Reel Hub Assembly	175/300/320
MIS006	Gas Solenoid Valve	175/300/320
MIS007	Diode SKN 130/04	175
MIS008	Diode SKN 240/04	300/320
MIS009	Main Contactor	175
MIS010	Main Contactor	300/320
MIS011	Fuse Holder G-20	175/300/320
MIS012	Fuse Holder G-30	175/300/320
MIS013	Capacitor 10000MF/63V	175/300
MIS014	Wire Feed Motor	175/300
MIS015	Printed Circuit Board	EM175/300/320
MIS016	Feed Roll Ring 06-0.8"	300/320
MIS017	Feed Roll Ring 0.8-1.0"	300/320
MIS018	Feed Roll Ring 1.0-1.2"	300/320
MIS020	Voltage Selector Switch 8 Position	175/300
MIS021	Voltage Selector Switch 2 Position	300
MIS022	Voltage Selector Switch 3 Position	320
MIS023	Voltage Selector Switch 8 Position	320
MIS024	Combined Wire Feeder	175
MIS025	Wire Feed Plate T3B	300/320
MIS026	Central Adaptor	300/320
MIS028	Auxilliary Trafo.	175/300
MIS029	Auxilliary Trafo.	320
MIS030	Resistor 240 Ohm/16W	175/300/320
MIS031	Fuse 3.15A	175
MIS032	Fuse 1.6A	175/300/320
MIS033	Fuse 6.3A	300/320
MIS035	Cooling Fan	175
MIS037	Capillary Tube 2.0x97M	175/300/320
MIS039	Wire Feed Motor	320
MIS043	Swivel Castor 100mm	175/300/320
MIS044	Rear Wheel 160mm	175/300/320
MIS045	Cooling Fan	300/320
MIS046	Handle	175
MIS047	Feed Roll 0.6-0.8 "V"	175
MIS048	Feed Roll 0.8-1.0 "V"	175
MIS049	Knob for Selector Switch	175/300/320
MIS050	Knob for Potentiometer	175/300/320
MIS053	Bottle Chain	175/300/320
MIS056	Handle	300/320
MIS057	Feed Roll Retainer Knob	175/300/320

MIS058	Main Transformer	175
MIS059	Main Transformer	300
MIS060	Main Transformer	320
MIS061	Choke	175
MIS062	Choke	300
MIS063	Heat Sink M12x1.5	175
MIS064	Heat Sink M16x1.5	300/320
MIS065	L.H. Side Panel	175
MIS066	R.H. Side Panel	175
MIS067	R.H. Lower Panel	175
MIS068	L.H. Side Panel	300/320
MIS069	R.H. Side Panel	300/320
MIS070	R.H. Lower Panel	300/320
MIS071	Woodruff Key-1 Piece	
	Feed Roll	175
MIS072	Woodruff Key-Feed Roll Ring	300/320
MIS073	Fuse Set	300T
MIS074	Fuse Set	320T
MIS075	Polarity Reversing Block	