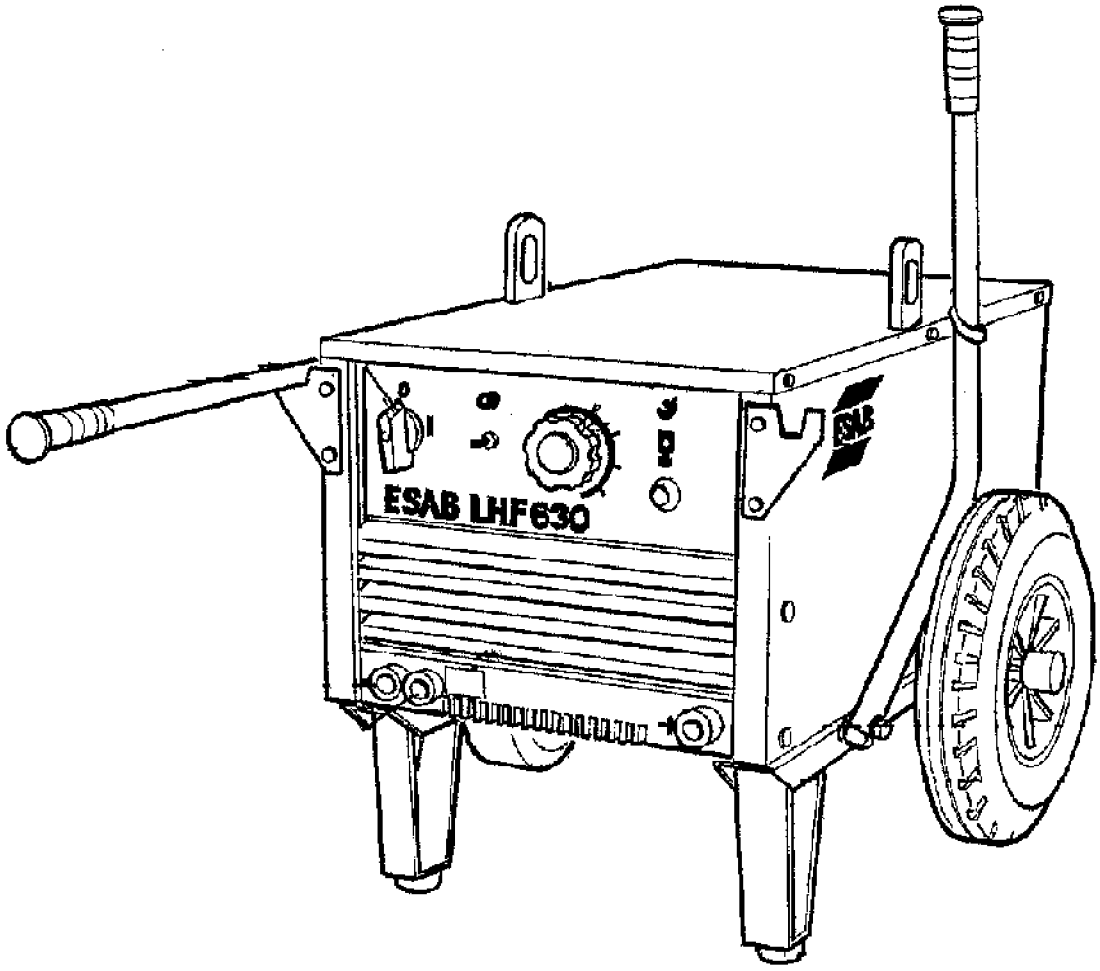
LHF 250
LHF 400
LHF 630
LHF 800



Service manual

0740 800 142 020328 Valid for serial no. 906-xxx-xxxx

LIST OF CONTENTS

READ THIS FIRST

Maintenance and repair work should be performed by an experienced person, and electrical work only by a trained electrician. Use only recommended replacement parts.

This service manual is intended for use by technicians with electrical/electronic training for help in connection with fault-tracing and repair.

Use the connection diagram as a form of index for the description of operation. The circuit board is divided into numbered blocks, which are described individually in more detail in the description of operation.

This manual contains details of all design changes that have been made to LHF machines with serial no. 906-xxx-xxxx up to and including March 2002.

The LHF 250, LHF 400, LHF 630 and LHF 800 are designed and tested in accordance with international and European standard IEC/EN 60974-1 and EN 50199.
On completion of service or repair work, it is the responsibility of the person(s) etc. performing the work to ensure that the product does not depart from the requirements of the above standard.

INTRODUCTION

The LHF 250/400/630/800 are thyristor-controlled welding power sources incorporating mains voltage compensation and intended for MMA welding, TIG welding and air-arc gouging. The mains voltage compensation ensures that the arc voltage and welding current remain stable even though supply voltage may vary. Electronic control ensures that the welding current maintains its set value at all times. A single knob regulates the welding current over its entire range.

TECHNICAL DATA

	LHF 250	**LHF 400**	**LHF 630**	**LHF 800**
Maximum load				
35 % duty cycle	250 A/30 V	400 A/36 V	630 A/44 V	800 A/44 V
60 % duty cycle	200 A/28 V	315 A/33 V	500 A/40 V	630 A/44 V
100 % duty cycle	160 A/26 V	250 A/30 V	400 A/36 V	500 A/40 V
Setting range	8A/20V-250A/30 (33)V	8A/20V-400A/36 V	8A/20V-630A/44 (49)V	8A/20V-800A/44 (50)V
Open circuit volt.	78-84 V	80-87 V	65-72 V	65-72 V
Open circuit output				
at 400 V	300 W	340 W	615 W	640 W
Power factor				
(max current)	0,88	0,90	0,87	0,82

	LHF 250	LHF 400	LHF 630	LHF 800
Efficiency				
(max current)	68 %	74 %	77 %	78 %
Enclosure class	IP 23	IP 23	IP 23	IP 23
Application class	S	S	S	S
Weight	160 kg	195 kg	260 kg	295 kg
Dimens. lxwxh	1310/765/705	1310/765/705	1310/765/705	1310/765/705

Duty cycle

The duty cycle refers to the time in per cent of a ten-minute period that you can weld at a certain load without overloading the welding power source.

Enclosure class

The **IP** code indicates the enclosure class, i. e. the degree of protection against penetration by solid objects or water. Equipment marked **IP 23** is designed for indoor and outdoor use.

Application class

The symbol S indicates that the power source is designed for use in areas with increased electrical hazard.

COMPONENT DESCRIPTION

This component description referres to the connection diagrams on pages 6 to 9.

WARNING !

STATIC ELECTRICITY can damage circuit boards and electronic components.

- **Observe precautions for handling electrostatic sensitive devices.**
- **Use proper static-proof bags and boxes.**

K1 Main transformer.

K2.1 Main thyristors.

K2.2 Main diodes.

K2.3 Base current diodes.

K2.4 Freewheel diode.

K6 Mains switch.

K11 Mains terminal block.

K12 Inductor.

K13 Welding current terminals.

K14 Base current resistor, 8.6 Ω ±5%.

K18.1 Shunt - 120 mV at 250 A (LHF 250), at 400 A (LHF 400), at 630 A (LHF 630) and at 800 A (LHF 800).

K18.2 Additional shunt for ampere meter, only LHF 630 and LHF 800.

K19 Ampere meter.

K20 Volt meter.

K24 Remote control socket

K25 Current relay. Activates contactor K62.2 during welding.

K27.1 Transient protection.

K27.3 Capacitor 0.1μF.

K27.4 Capacitor 5μF.

K27.5 Capacitor, reduces the supply voltage to the fan. See K51.

K28 Fan.

K30 Terminal block.

K30.1 Terminal block.

K31.1 Thermal switch: breaks at 68˚C, resets at 59˚C, tolerance ±3˚C.
Fitted on the thyristor heatsink.

K31.2 Thermal switch: LHF 250: breaks at 140˚C, LHF 400: breaks at 160˚C, LHF 630: breaks at 150˚C, LHF 800: breaks at 130˚C.
Fitted in the winding of the main transformer, K1.

K33 LOCAL/REMOTE control selector switch

K38.1 Indicating lamp, 28 V.

K38.2 LED, yellow. On when the thermal overload is activated, i.e. when one or both of the thermal switches K31.1 and K31.2 are open.

K45.1 Contact, 15 pole, male.

K45.2 Contact, 15 pole, female.

K45.3 Contact, 12 pole, male.

K45.4 Contact, 12 pole, female.

K45.5 Contact, 6 pole, male.

K45.6 Terminal block.

K47 Starting capacitor for cooling fan.

K50 Terminal block.

K51 Time relay. The fan runs at a reduced idle speed of 300 rpm. When welding with currents greater than 30 A the fan speed increases to its working speed of around 1350 rpm. Timer relay K51 maintains the higher speed setting for 6 1/2 minutes after welding has stopped.

K52.1 Control power supply transformer, supplied at 35 V from K1s3. The secondary winding supplies 19 V AC to circuit board K70.

K52.2 Control power supply transformer for the time relay (K51).

K57 Potentiometer (2 kΩ) for controlling the welding current. Fine-resolution type, fitted with planetary reduction gear.

K62.1 Relay, controlling LED K38.2.

K62.2 Contactor. When K62.2 is activated the runs at working speed, see K51.

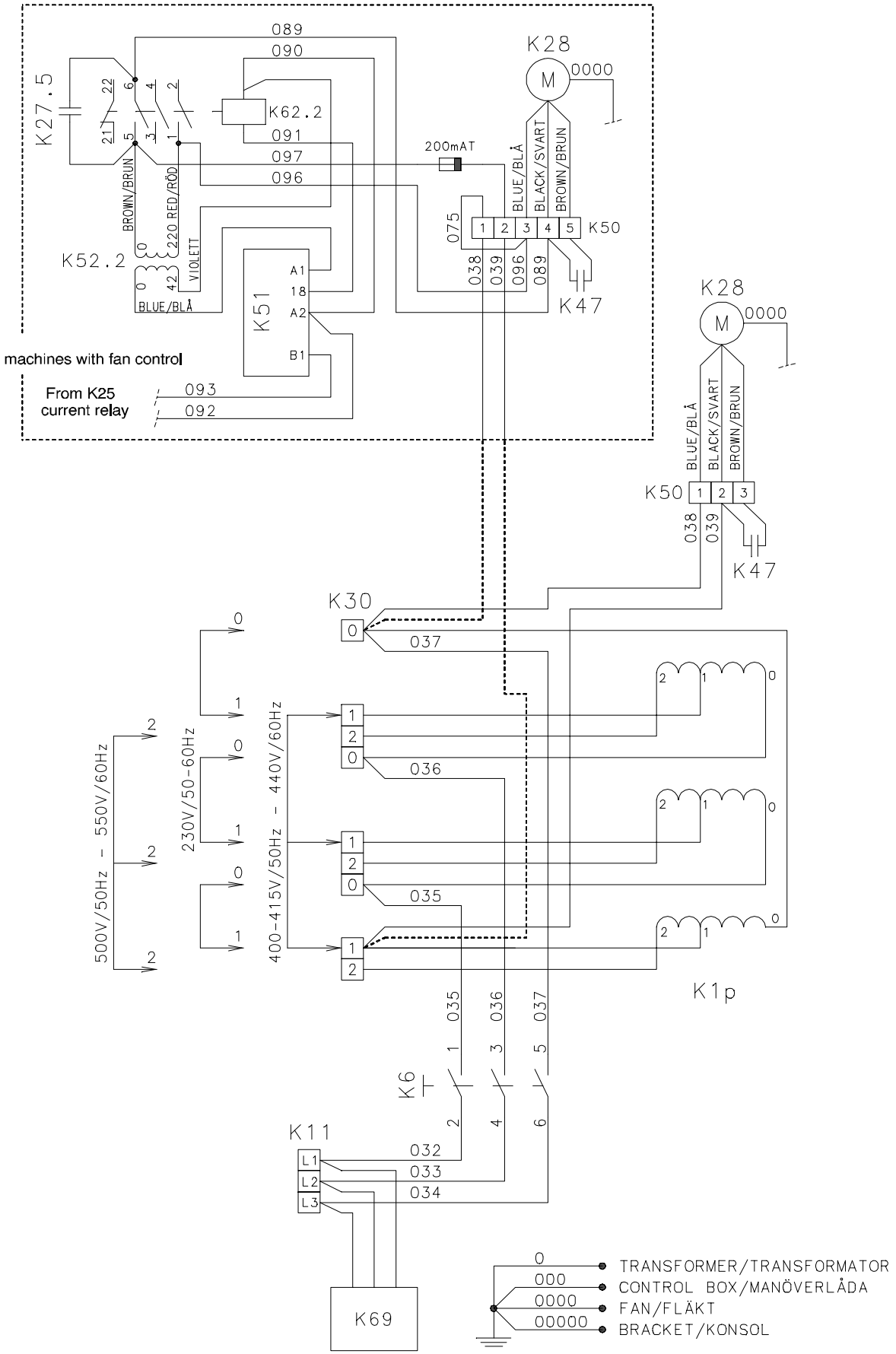
K69 Filter board (interference suppression).

K70 Main control circuit board.

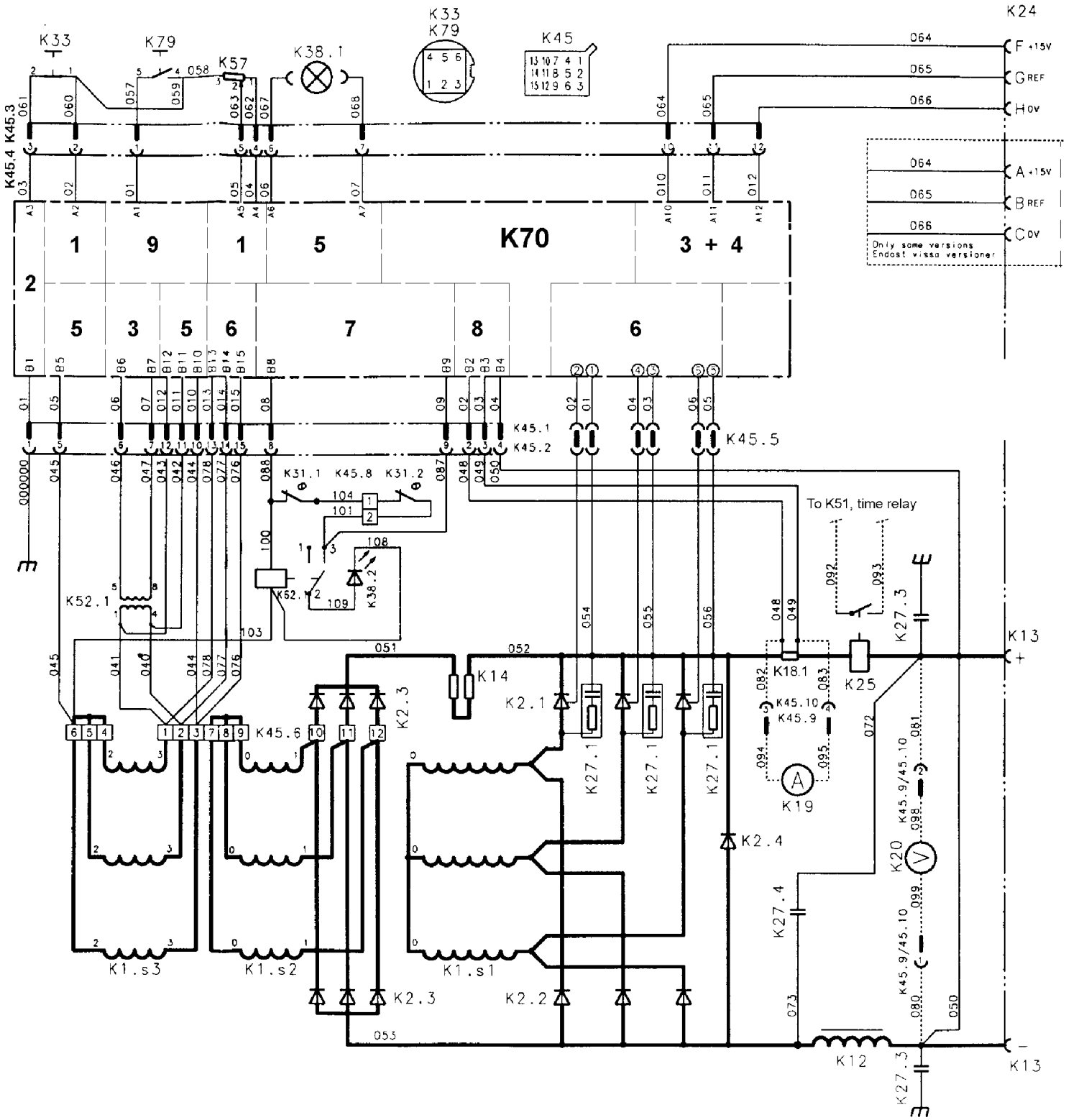
K79 Selector switch, TIG/MMA/Air-arc gouging. Only LHF 630 and LHF 800.

CONNECTION DIAGRAM LHF 250, LHF 400

Primary side

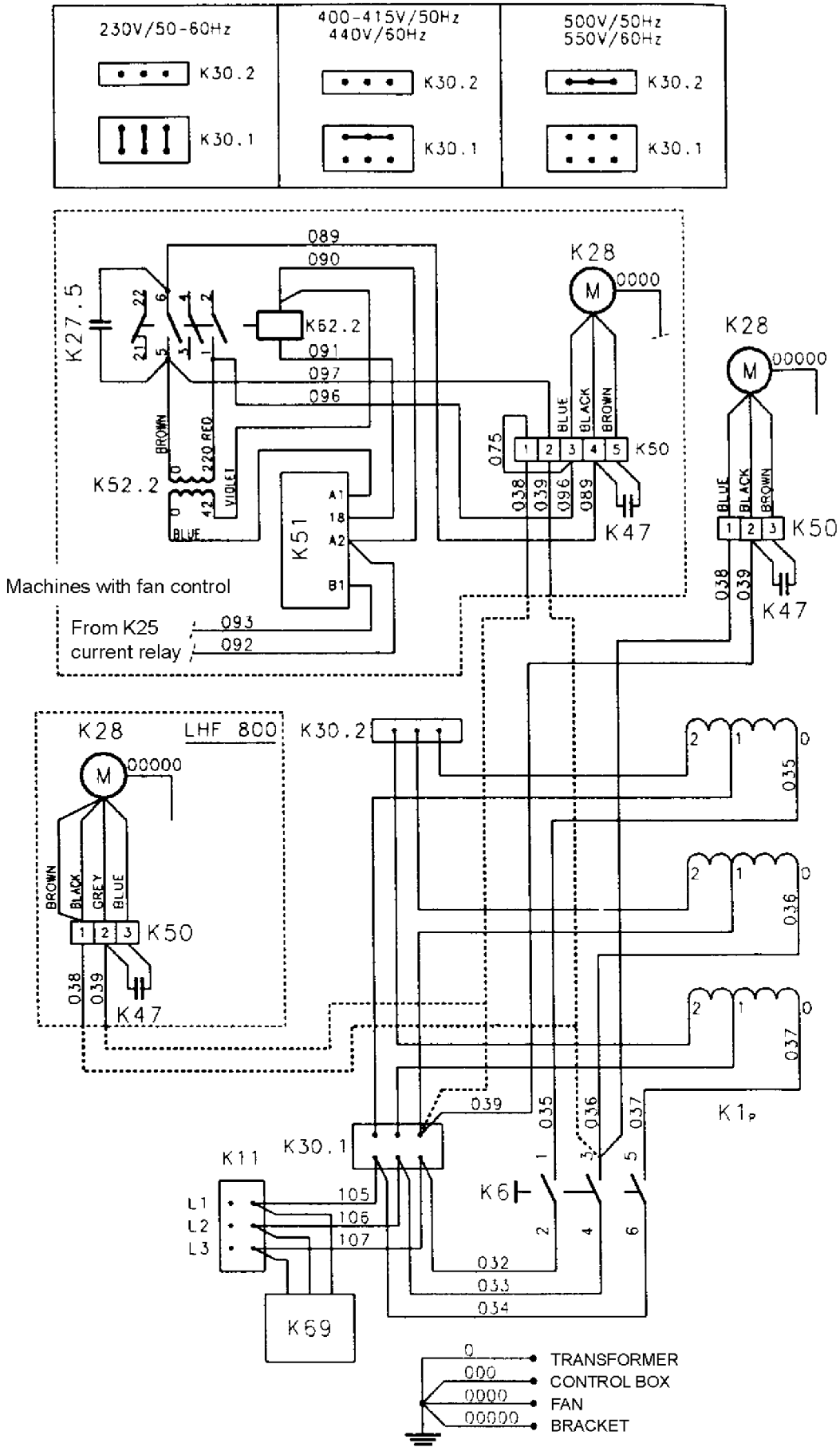


Secondary side

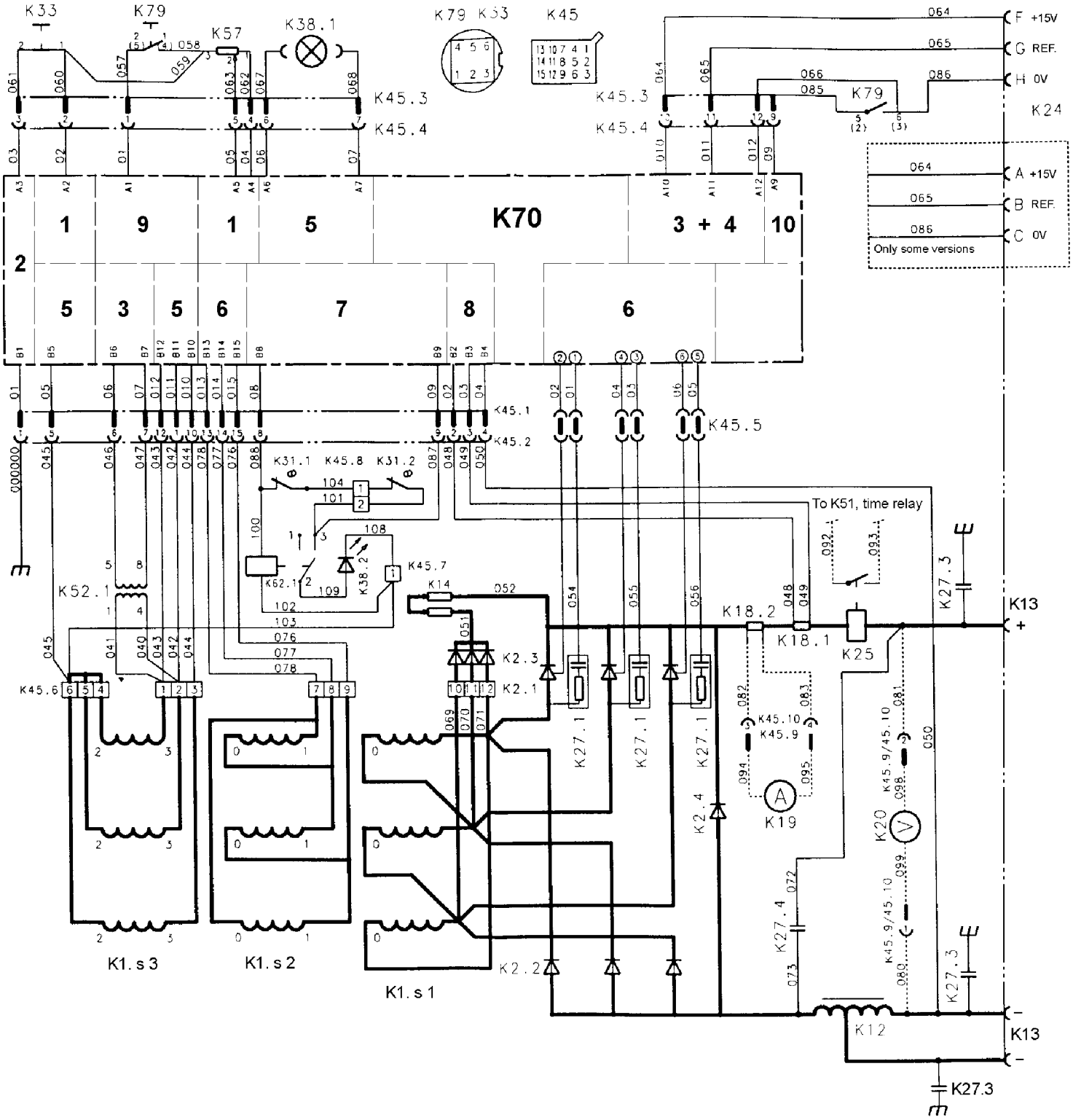


CONNECTION DIAGRAM LHF 630, LHF 800

Primary side



Secondary side

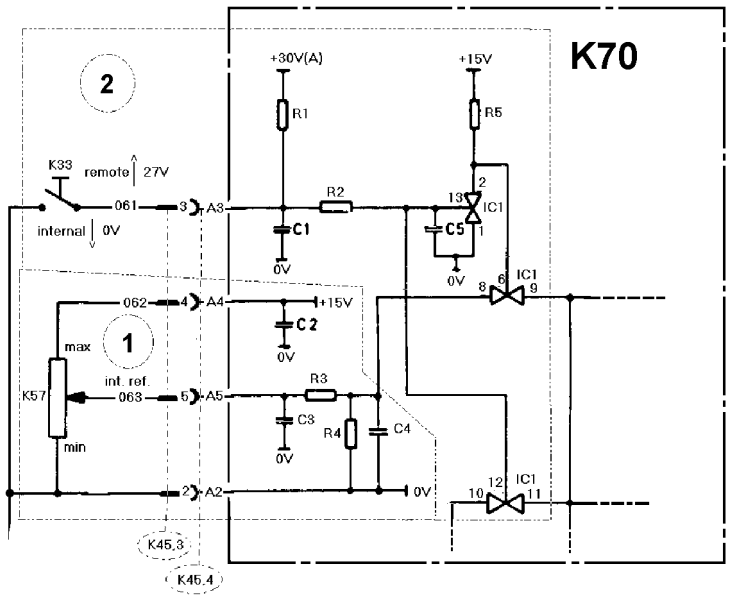


FUNCTION DESCRIPTION, CIRCUIT BOARD K70

This description refers to the connection diagrams on pages 6 to 9 and to the block diagram on page 16.

K70:1 Reference input

Reference potentiometer K57 (2kΩ ±10% 2W, linear) is supplied at +15V. The reference voltage is limited to 0–10V by potential divider R3/R4, and connected to analog switch IC1.



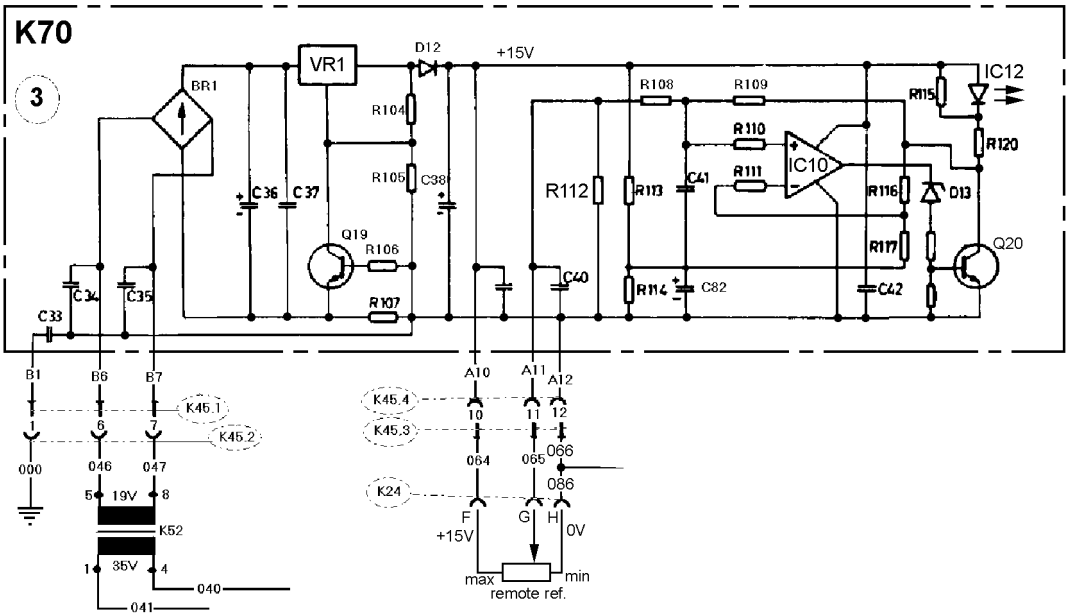
Reference input and Local / Remote selector switch

K70:2 Local / Remote selector switch

Three analog switches (IC1) control signal switching for selection of local (internal) or remote (external) control of the welding current.
These switches are, in turn, controlled by selector switch K33. The control voltage, which can be measured at terminal A3, is either 0 V (K33 closed = internal reference) or about +27 V (K33 open = remote reference).

IC1 contains four identical analog switches, of which three are used for local/remote changeover switching. The switches conduct with a control voltage of +15 V on pins 6, 12 and 13, and are open-circuit with a control voltage of 0 V.

K70:3 Remote control



The remote control device, which can be a potentiometer or a pulse generator, is connected to circuit board terminals A10, A11 and A12. It is supplied at 15 V.

A/D converter, IC10

The A/D converter and the voltage reference unit, see below, are galvanically isolated from the rest of the control circuitry by optocoupler IC12. The A/D converter converts the reference signal to a pulse train, in which the mark/space ratio represents the magnitude of the reference signal.

Optocoupler IC12 transfers the pulse train to the D/A converter (see K70:4 below), thus ensuring complete galvanic isolation between the voltage signal from the remote control input and the other electronic equipment.

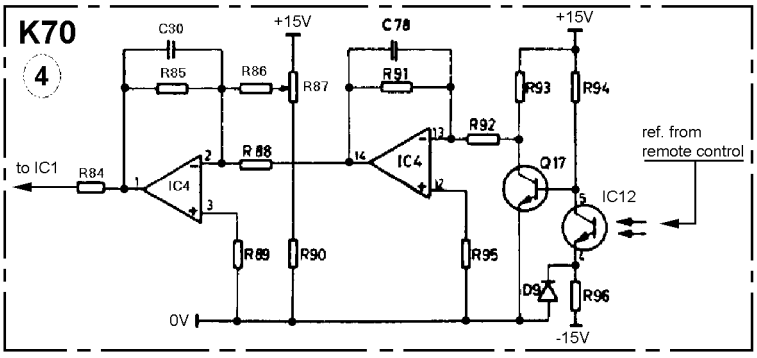
If selector switch K33 is in the REMOTE position, but no remote control device is connected, the power source will give low welding current, as R112 produces a low value of current reference signal.

Galvanically isolated voltage reference

The secondary output voltage from winding K1s3 on the main transformer supplies 35 V to control power supply transformer K52. The secondary voltage from K52 supplies 19 V to remote control output voltage regulator VR1 via diode bridge BR1.

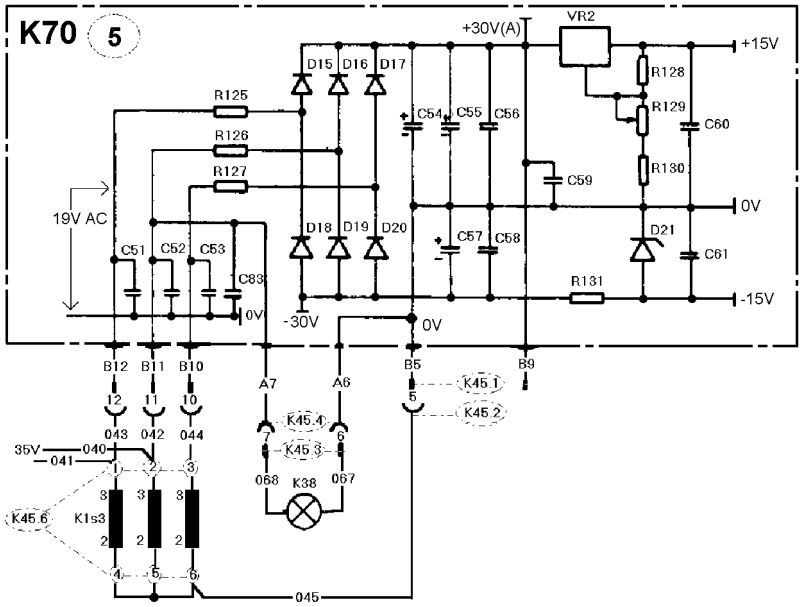
The output voltage from VR1 is 16.2 V, which is reduced to 15.6 V after diode D12. The regulator is current-limited to 120 mA by resistors R104-107, transistor Q19 and diode D12, making the remote control connection short circuit-proof.

K70:4 D/A converter



The D/A converter, which recreates the mean value of the reference signal from the pulse train from the A/D converter. The input signal is first amplified and filtered: trimming potentiometer R87 adjusts the output signal from IC4:1 to 0 V when the remote control potentiometer is at its minimum position and to +11.5 V when the potentiometer is at its maximum position. The signal is then passed to analog switch IC1, which is controlled by the LOCAL/REMOTE selector switch.

K70:5 Power supply



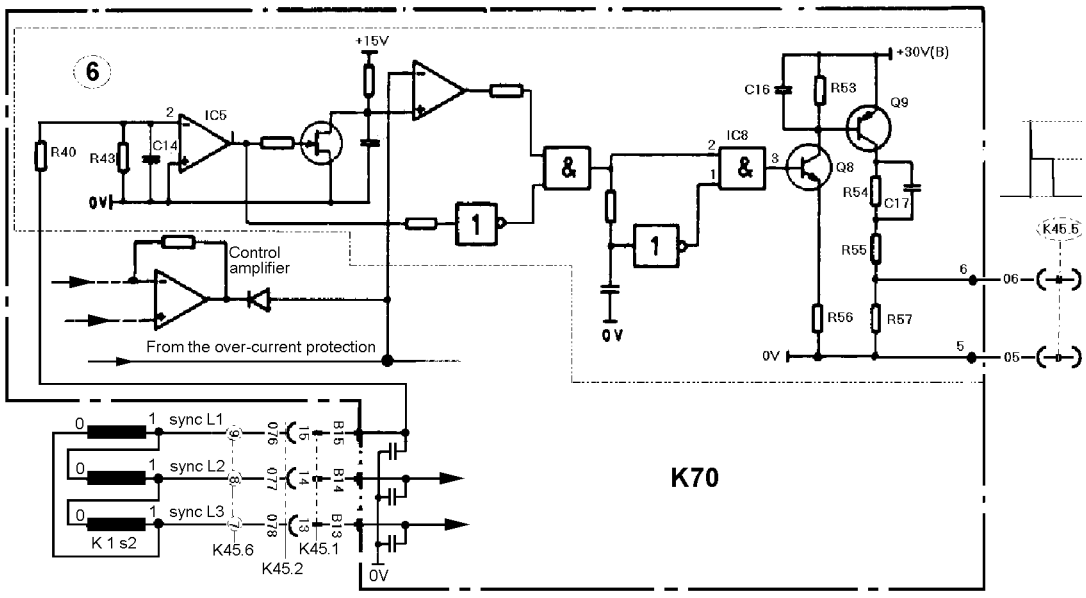
The control power supply is obtained from winding K1s3 on the main transformer, which is connected in star. The voltage between the star point and the respective phase terminals is about 19 V, and the star point is connected to B5, which is the neutral in the electronic circuitry.

Resistors R125–127 are film resistors that protect the synchronising winding against any short circuits on the circuit board.

Voltage regulator VR2 produces a +15 V stabilised voltage: trimming potentiometer R129 provides fine adjustment. Resistors R128 and R130 restrict the range over which the voltage can be adjusted to a maximum voltage of +18 V, which is the maximum permissible supply voltage for the CMOS circuits.

D21 stabilises the negative voltage to –15 V. The power rating of R131 is such as to allow the circuit to supply a load current of 30 mA.

K70:6 Thyristor trigger circuits

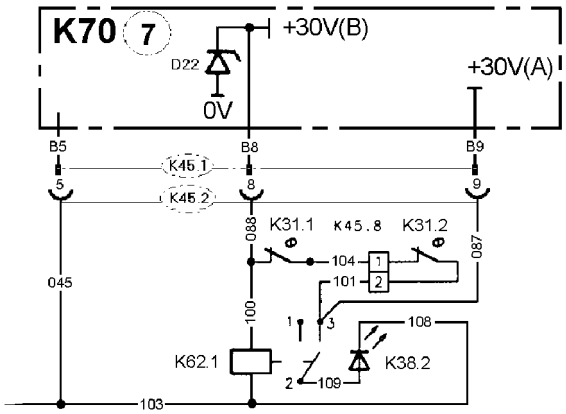


The trigger unit converts the DC signal from the control amplifier to ignition pulses that fire the thyristors at the correct point in the cycle.

The unit consists of three identical sections, one for each thyristor. A synchronising winding K1s2, provides synchronising information for correct firing. The voltage between B13/B14/B15 is approximately 35 V.

The ignition pulses are connected to each thyristor. The gate connections are twisted together with the associated neutral connections in order to minimise the risk of interference in the gate circuit.

K70:7 Thermal overload switch

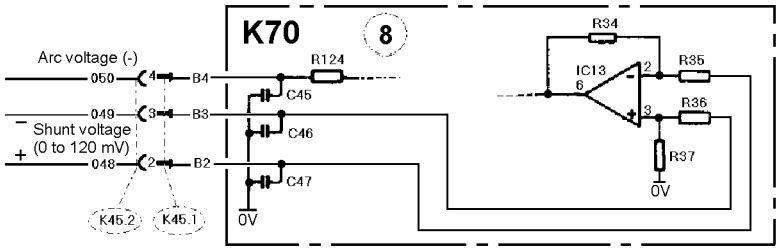


The thermal overload switches K31.1 and K31.2 interrupts the power supply to output transistors Q9, Q12 and Q15 in the trigger unit in the event of excessive temperature. The switches resets automatically when the temperature has fallen.

Switch K31.1 is fitted on the thyristor heatsink. Switch K31.2 is fitted in the winding of the main transformer. See page 5 for information on switch temperatures.

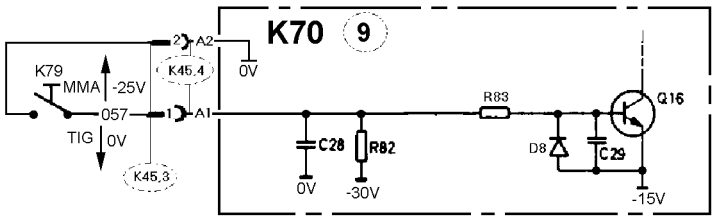
Operation of the thermal overload switch prevents the thyristors from receiving any trigger pulses. The current flowing in the main welding circuit is then limited to the basic current of 8 A.

K70:8 Shunt amplifier



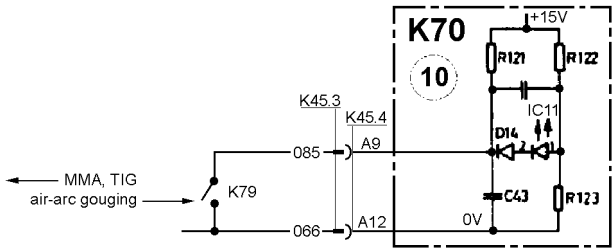
The shunt amplifier amplifies the voltage signal from the shunt.
The shunt provides an output voltage signal of 120 mV for the maximum welding current of each power source. (250 A, 400 A, 630 A and 800 A respectively.)

K70:9 The MMA / TIG selector switch



Changeover between MMA and TIG welding modes is controlled by transistor Q16, which is controlled by switch K79.
In the MMA welding mode, the control voltage at A1 is about –25 V (switch K79 open), while in the TIG welding mode it is 0 V (K79 closed).

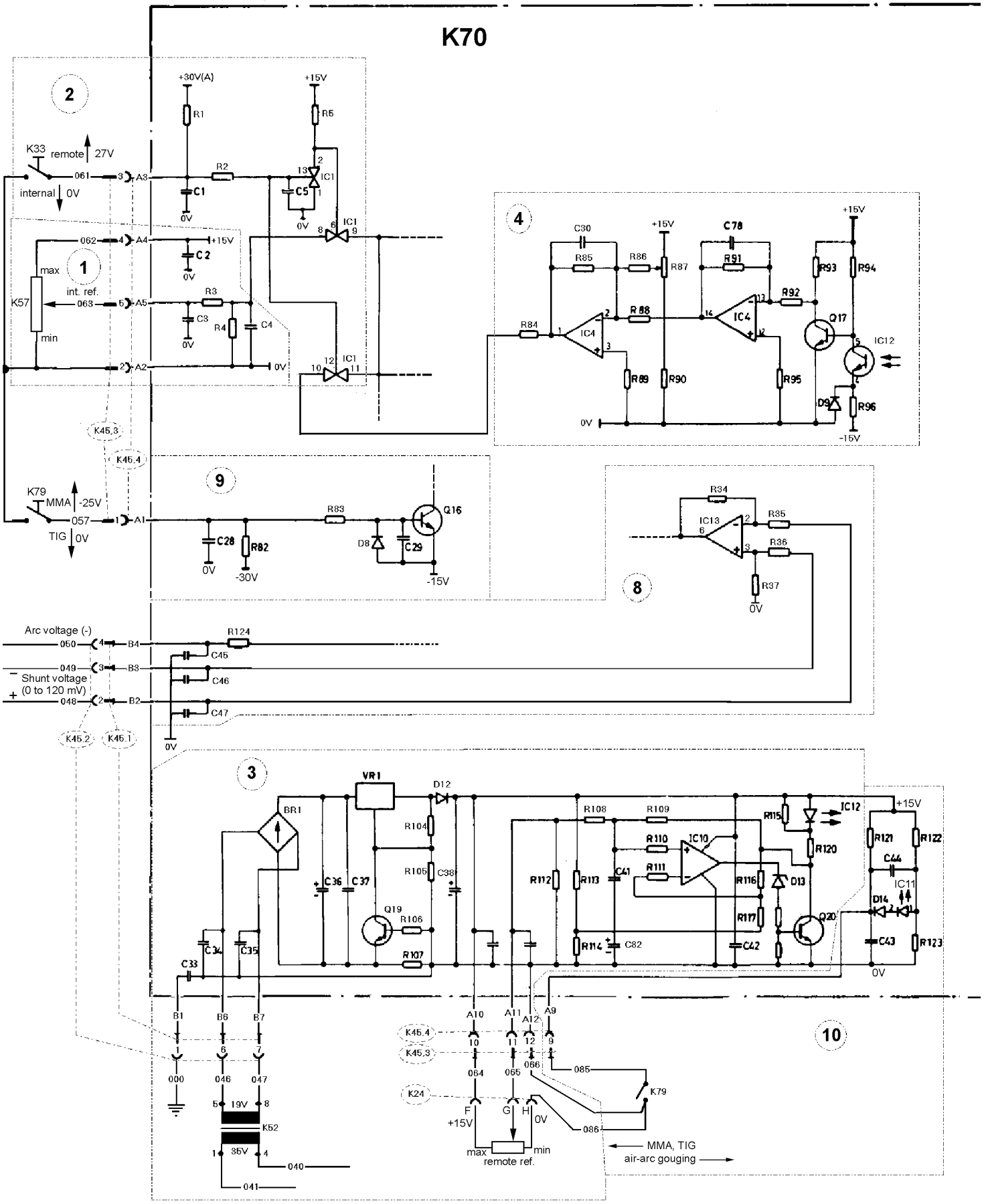
K70:10 Air-arc gouging / MMA changeover

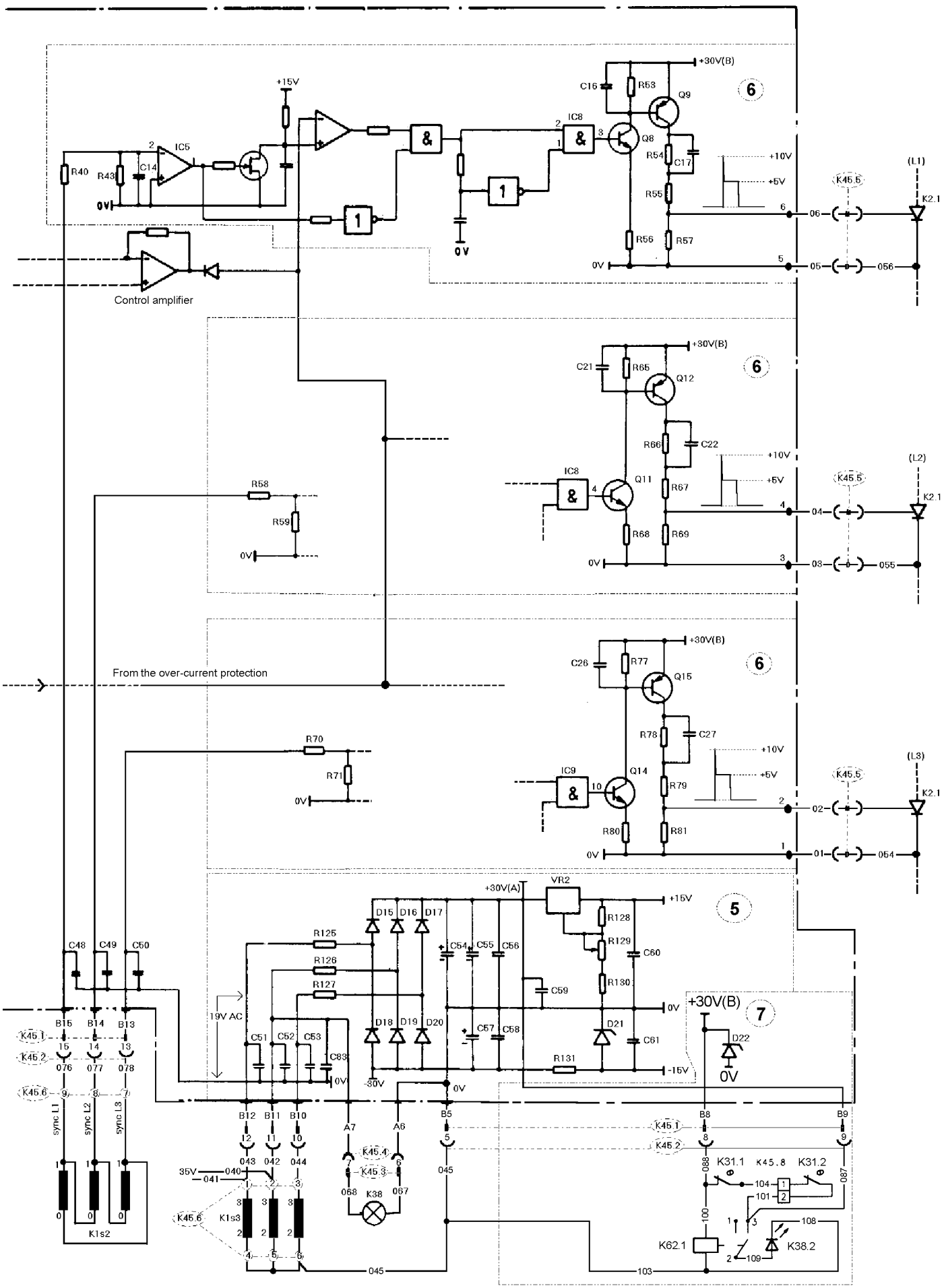


This function is only avilable in the LHF 630 and LHF 800.

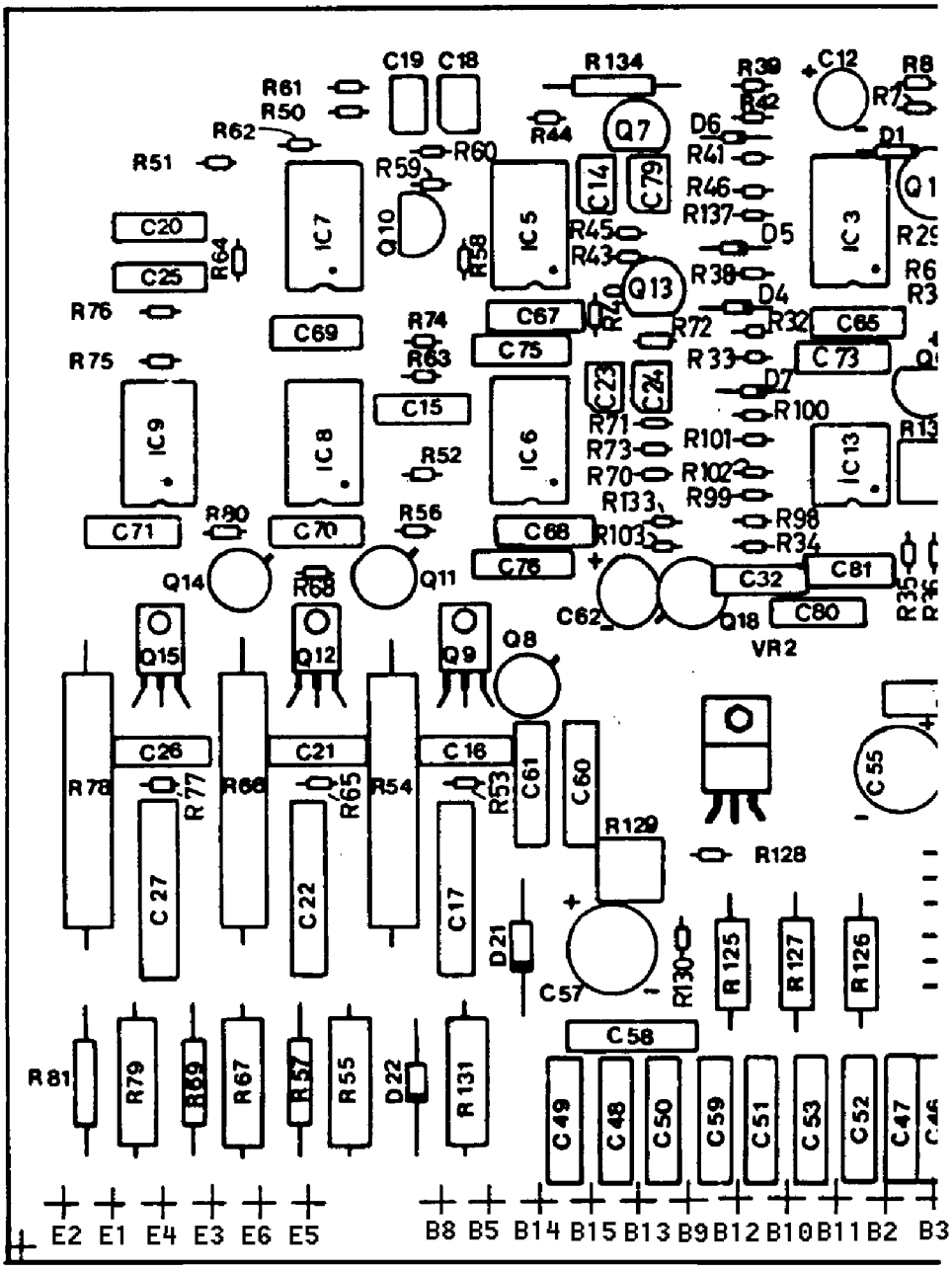
A contact on switch K79 links contacts A9–A12 in the galvanically isolated remote control circuit to change the operating mode to air–arc gouging. (Switch K79 also selects MMA or TIG welding modes.)
Optocoupler IC11 is activated in the air–arc gouging mode, and in turn activates the air–arc gouging control circuits.

K70 Block diagram

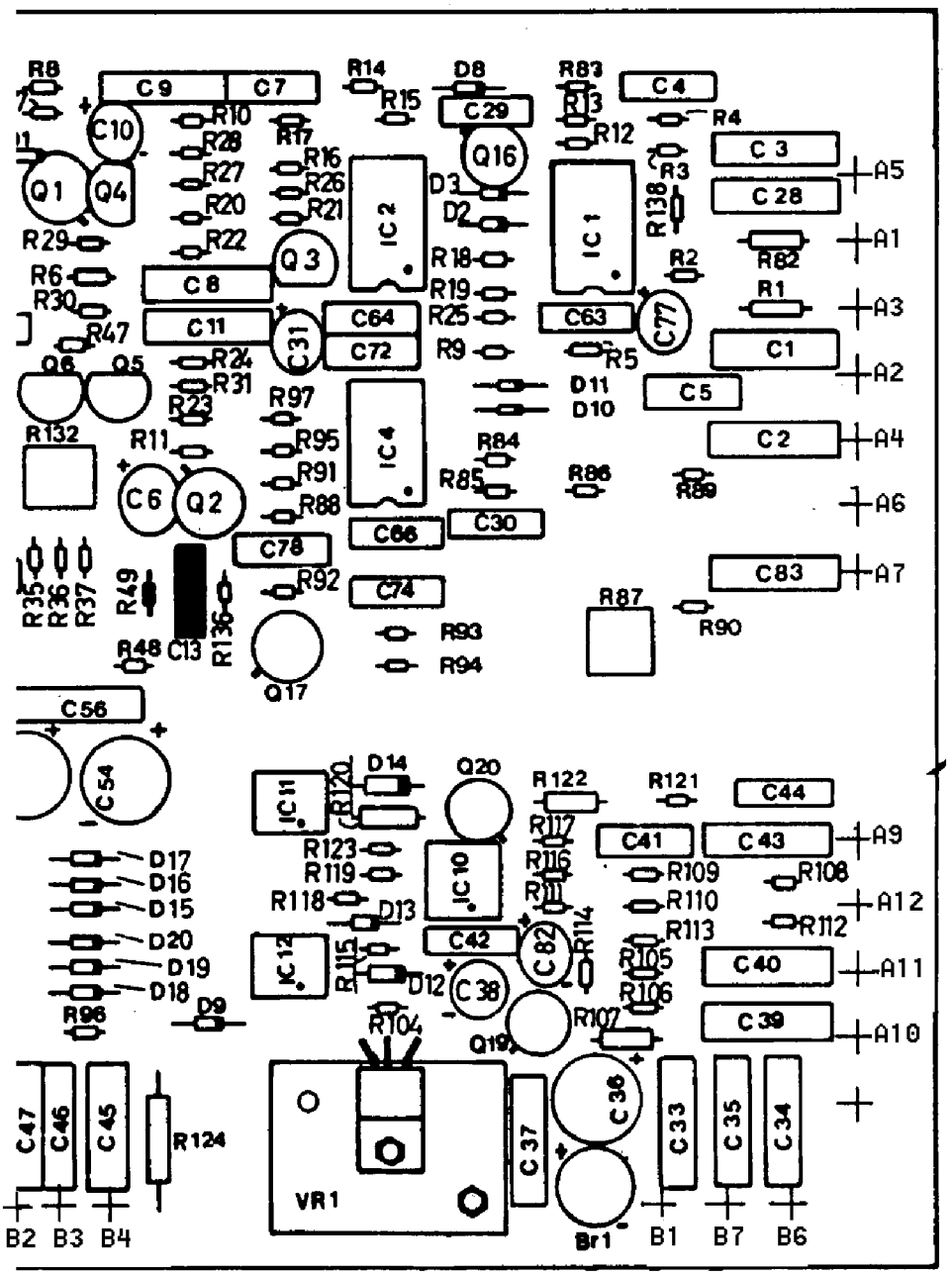



Control amplifier
From the over-current protection
+15V
+30V(B)
+30V(A)
0V
-15V
-30V
IC5
IC8
IC9
R40
R43
C14
C16
R53
Q9
R54
C17
R55
R56
R57
C21
R65
Q12
R66
C22
Q11
R67
R68
R69
R58
R59
C26
R77
Q15
R78
C27
Q14
R79
R80
R81
R70
R71
VR2
R128
R129
C60
R130
C59
R125
R126
R127
C48
C49
C50
C51
C52
C53
C83
C54
C55
C56
C57
C58
R131
D15
D16
D17
D18
D19
D20
D21
D22
C61
19V AC
+10V
+5V
(L1)
(L2)
(L3)
K45.5
K2.1
K45.1
K45.2
K45.3
K45.4
K45.6
K38
K62.1
K38.2
K31.1
K45.8
K31.2
K1s2
K1s3
sync L1
sync L2
sync L3
35V
B15
B14
B13
B12
B11
B10
B8
B9
B5
A7
A6
06
056
05
04
055
03
02
054
01
088
087
100
101
104
108
109
103
045
041
040
043
042
044
068
067
076
077
078

K70 Component positions



cmva2eba


R8
C9
C7
R14
D8
R83
C4
C10
R15
C29
R13
R4
R10
R17
Q16
R12
C3
R28
R16
R3
A5
Q1
Q4
R27
R26
D3
R138
C28
R20
R21
IC2
IC1
R29
R22
Q3
D2
R2
A1
R6
C8
R18
R82
R30
R19
R1
A3
C11
C64
R25
C63
C77
R47
C31
C72
R9
R5
C1
Q6
Q5
R24
R31
D11
A2
R23
R97
C5
D10
R132
R11
R95
IC4
R84
C2
A4
C6
Q2
R91
R85
R86
R89
R88
A6
C66
C30
C78
C83
A7
R35
R36
R37
R49
R92
C74
R87
R48
C13
R136
R93
R90
Q17
R94
C56
C54
IC11
R120
D14
Q20
R122
R121
C44
R117
C41
C43
A9
D17
R123
R116
R109
R108
D16
R119
IC10
R111
R110
A12
D15
R118
D13
R113
R112
D20
C42
C82
R114
IC12
R115
R105
C40
A11
D19
D12
C38
R106
D18
R104
R107
C39
R96
D9
Q19
A10
C47
C46
C45
R124
C37
C36
C33
C35
C34
VR1
B2
B3
B4
Br1
B1
B7
B6

cmva2ebb

REPLACEMENT OF THYRISTORS

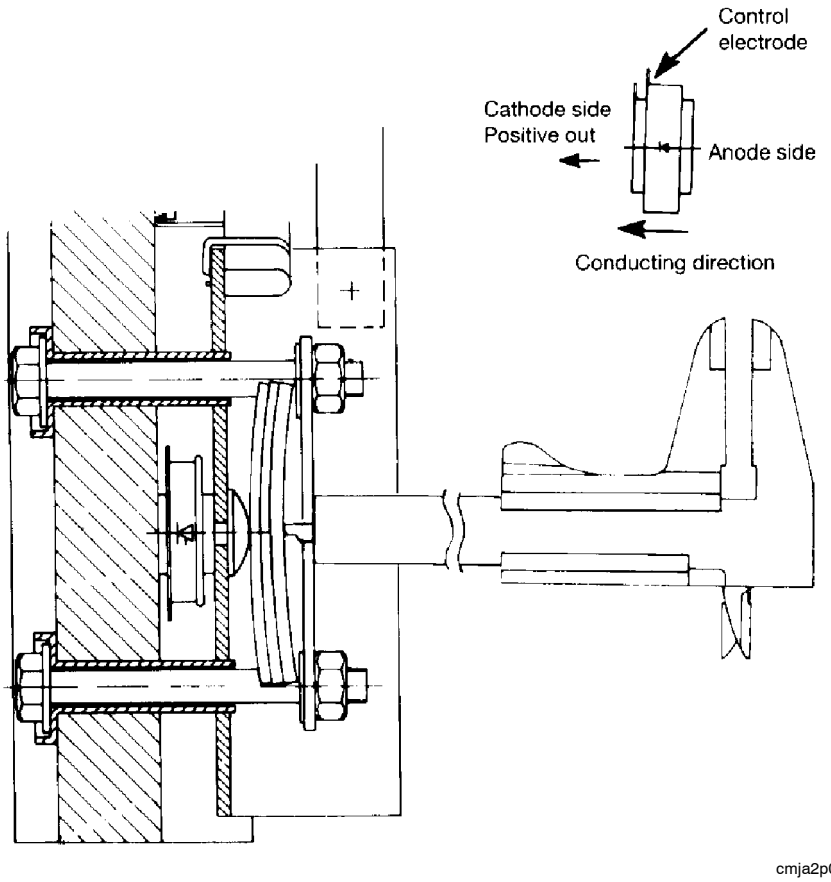
LHF 400 Offshore, LHF 630 and LHF 800

When fitting replacement thyristors, it is extremely important that they are correctly secured, i.e. with a clamping force of 4500 N (450 kp) ±10% for LHF 400 Offshore and LHF 630. For the LHF 800 the claming forc is: 5490–5530 N.

Clean the flat surfaces of the thyristors and heat sinks carefully, and remove any burrs or traces of grease or oil. Apply a very thin film of silicone grease to the contact surfaces of the heat sink, and position the thyristor between the surfaces with the symbol on the thyristor facing in the direction as shown in the diagram below. Centre the thyristor by locating the pin projecting from the pressure cap in the depression in the thyristor body.

Start by finger–tightening the nuts enough to remove play between the nuts and washers. Then, using a dial gauge or depth gauge, measure the distance from the plate to the spring as shown in the diagram below.
Tighten the nuts alternately with a spanner until the distance has decreased by 0.9 ±0.05 mm for LHF 400 Offshore and LHF 630. For the LHF 800 the measure is 1.0 ±0.05 mm.

Fitting of thyristors



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INSTRUCTIONS LHF 250-800

This chapter is an extract from the instructions for the LHF 250, LHF 400, LHF 630 and LHF 800.

SAFETY

WARNING

ARC WELDING AND CUTTING CAN BE INJURIOUS TO YOURSELF AND OTHERS. TAKE PRECAUTIONS WHEN WELDING. ASK FOR YOUR EMPLOYER'S SAFETY PRACTICES WHICH SHOULD BE BASED ON MANUFACTURERS' HAZARD DATA.

ELECTRIC SHOCK - Can kill
- Install and earth the welding unit in accordance with applicable standards.
- Do not touch live electrical parts or electrodes with bare skin, wet gloves or wet clothing.
- Insulate yourself from earth and the workpiece.
- Ensure your working stance is safe.

FUMES AND GASES - Can be dangerous to health
- Keep your head out of the fumes.
- Use ventilation, extraction at the arc, or both, to keep fumes and gases from your breathing zone and the general area.

ARC RAYS - Can injure eyes and burn skin.
- Protect your eyes and body. Use the correct welding screen and filter lens and wear protective clothing.
- Protect bystanders with suitable screens or curtains.

FIRE HAZARD
- Sparks (spatter) can cause fire. Make sure therefore that there are no inflammable materials nearby.

NOISE - Excessive noise can damage hearing
- Protect your ears. Use ear defenders or other hearing protection.
- Warn bystanders of the risk.

MALFUNCTION - Call for expert assistance in the event of malfunction.

READ AND UNDERSTAND THE INSTRUCTION MANUAL BEFORE INSTALLING OR OPERATING.

PROTECT YOURSELF AND OTHERS!

INTRODUCTION

LHF 250/400/630/800 are thyristor controlled welding rectifiers designed for welding with coated electrodes, TIG welding and arc air gouging.

The welding rectifiers can be used with the following remote control devices:
PHA 1, PHA 2, PHA 5, PHB 1, PHB 2, och PHC 2.
An auxiliary control unit is required for TIG welding with high frequency arc ignition.

LHF 400/630, versions with meters and timed cooling fan.

These welding rectifiers are equipped with a volmeter, ammeter and a circuit that reduces the idle speed of the cooling fan.
The meters allow current and voltage settings to be read from the front of the rectifier.

To minimise the amount of dust and dirt that is drawn into the rectifier the fan runs at a reduced idle speed of 300 rpm. When welding with currents greater than 30 A the fan speed increases to its working speed of around 1350 rpm. A timer relay maintains the higher speed setting for 6 1/2 minutes after welding has stopped to ensure adequate cooling of the rectifier.

INSTALLATION

The installation shall be executed by a professional.

WARNING!

This product is intended for industrial use. In a domestic environment this product may cause radio interference. It is the user's responsibility to take adequate precautions.

- Installation must be carried out by a qualified electrician.
- Check that the welding rectifier is configured for the **available mains supply** before connecting it to the mains.
- See Connecting to mains for cable rating and fuse rating.
- Connect the mains cable to the rectifier according to the relevant regulations and install a suitable fuse in the main fuse box.
- Make sure the welding rectifier is not covered or positioned so that cooling is obstructed.

Connecting to mains

	LHF 250	**LHF 400**	**LHF 630**	**LHF 800**
Frequency	50 Hz	50 Hz	50 Hz	50 Hz
Voltage	230/400/ 415/500 V	230/400/ 415/500 V	230/400/ 415/500 V	230/400/ 415/500 V
Current at				
100% duty cycle	20/11/11/9A	34/19/19/16 A	65/38/38/30 A	86/49/49/40 A
60% duty cycle	25/14/14/11 A	42/24/24/20 A	81/47/47/38 A	107/62/60/50A
35% duty cycle	31/18/18/14 A	53/31/31/25 A	102/59/59/47A	136/79/79/63A
Fuse, slow	25/16/16/16 A	63/25/25/20 A	80/50/50/35 A	100/63/63/50A
Cable area (4xmm2)	4/1.5/1.5/1.5	10/4/4/2.5	25/10/10/6	35/10/10/10

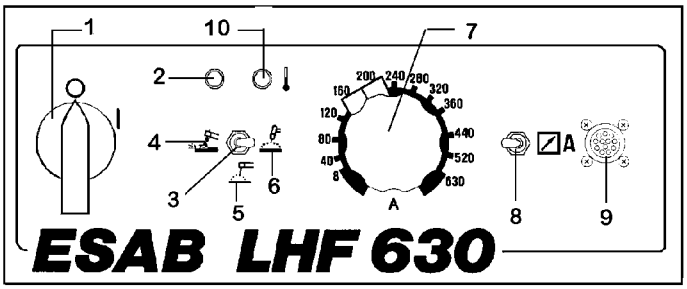
	LHF 250	**LHF 400**	**LHF 630**	**LHF 800**
Frequency	60 Hz	60 Hz	60 Hz	60 Hz
Voltage	230/440/550V	230/440/550V	230/440/550V	230/440/550V
Current at				
100% duty cycle	20/11/9 A	34/19/16 A	65/38/30 A	86/49/40 A
60% duty cycle	25/14/11 A	42/24/20 A	81/47/38 A	107/62/50 A
35% duty cycle	31/18/14 A	53/31/25 A	102/59/47 A	136/79/63 A
Fuse, slow	25/16/16 A	63/25/20 A	80/50/35 A	100/63/50 A
Cable area (4xmm2)	4/1.5/1.5	10/4/2.5	25/10/6	35/10/10

Cable areas comply with Swedish regulations.

OPERATION

- Set switch (1) to position ”I”. The white lamp (2) will light and the fan will start.
- Select the welding method using the toggle switch (3).
- Adjust the welding current using the knob (7) on the front, and set the toggle switch (8) to the position nearest the socket.
- Select suitable earth and return cables and connect them to the terminals marked + and – on the front of the rectifier. Connect the return cable to the work piece.
- The rectifier is now ready for welding.

Controls and connections



bh10d001

1. On/Off
2. White lamp (power on)
3. Method selector switch
4. Arc air gouging
5. MMA
6. TIG
7. Current setting
8. Remote switch
9. Remote socket
10. Yellow lamp (thermal cut–out)

The yellow lamp comes on when the thermal cut–out trips.
When the rectifier has cooled down the thermal cut – out is automatically reset.

MAINTENANCE

Note:
All warranty undertakings given by the supplier cease to apply if the customer attempts to rectify any faults on the machine during the warranty period.

Only those persons who have appropriate electrical knowledge (authorised personnel) may remove the safety plates to connect or carry out service, maintenance or repair work on welding equipment.

Cleaning

Check regularly that the power source is free from dirt.

How often, and to what extent, cleaning should be carried out depends on the welding process, arc time, disposition and the surrounding environment. It will normally suffice to blow the power source clean using compressed air (reduced pressure) once a year.

If the power source is very dirty, brushing and vacuuming are recommended.

- Disconnect the welding power source from the mains current supply.
- Remove the adapter from the socket. Lock the socket to prevent unauthorised connection.

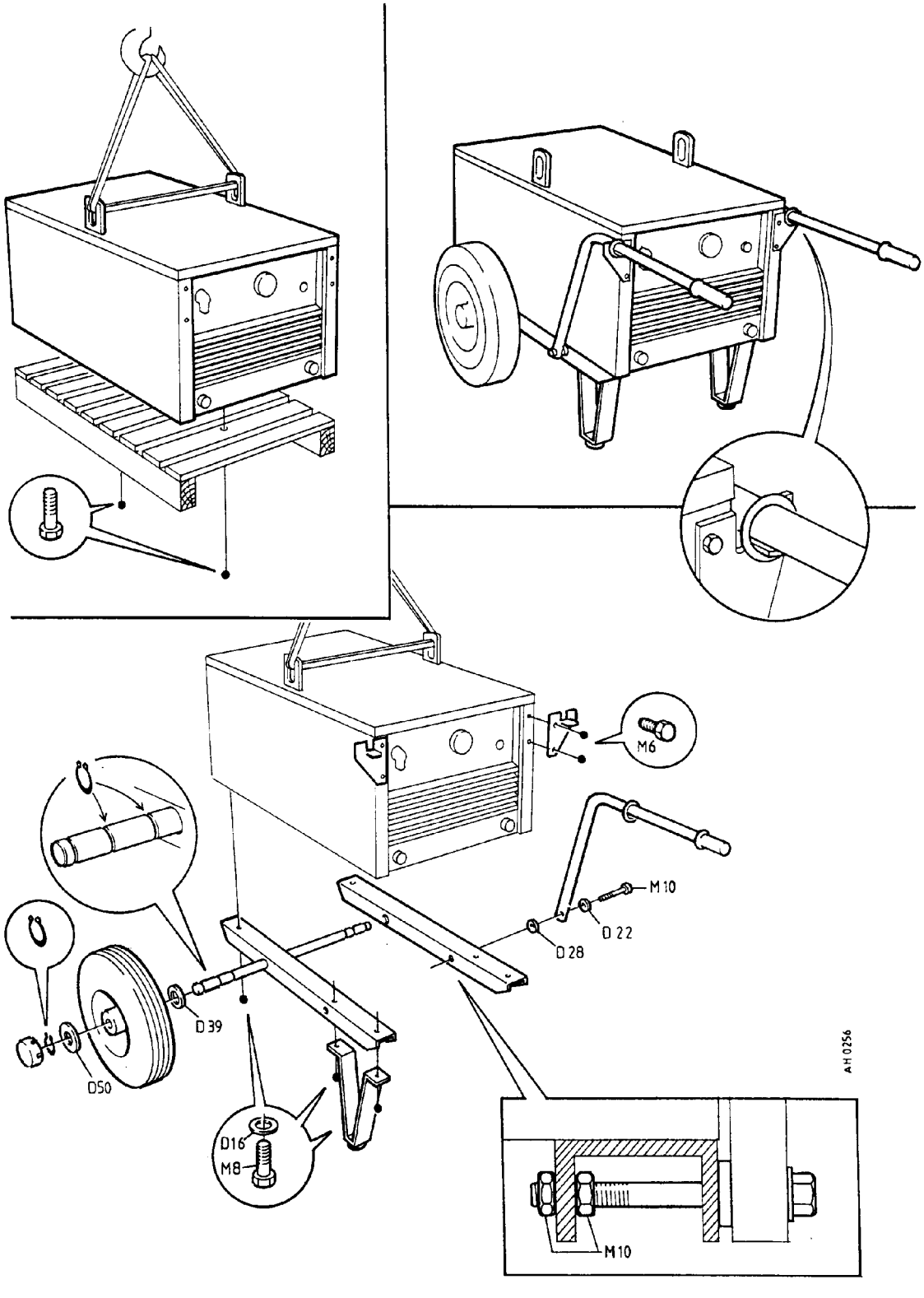
  At fixed installations, the safety switch should be set to the off position. Lock the switch.
- Remove the power source's safety plates for best access.

After cleaning, all safety plates must be mounted before you connect the power source to the mains supply.

ORDERING OF SPARE PARTS

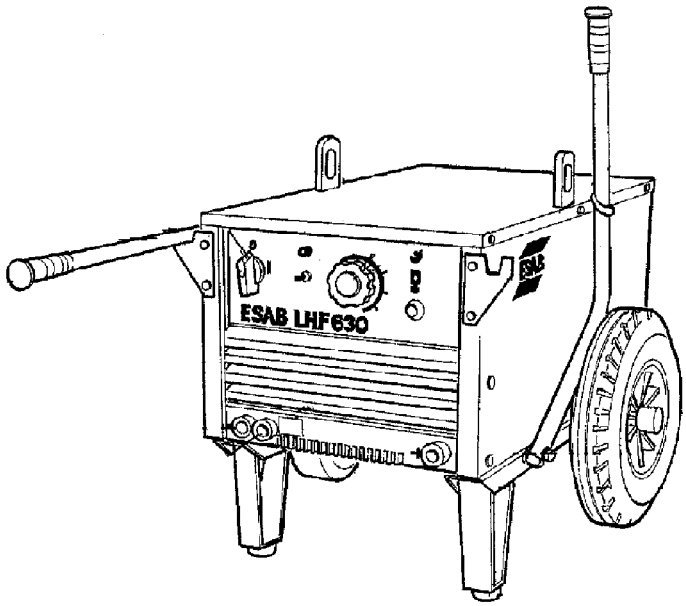
LHF 250, LHF 400, LHF 630, LHF 800 is designed and tested in accordance with the international an European standards IEC/EN 60 974-1 and EN 60 974-1.
It is the obligation of the service unit which has carried out the service or repair work to make sure that the product still conforms to the said standard.

Spare parts are ordered through your nearest ESAB representative, see back cover. When ordering spare parts, please state machine type and number as well as designation and spare part number as shown in the spare parts list on page 27.
This will simplify dispatch and ensure you get the right part.



bh10d002

Spare parts list



Valid for serial no. 906-xxx-xxxx

Ordering numbers for LHF 250, LHF 400, LHF 630, LHF 800

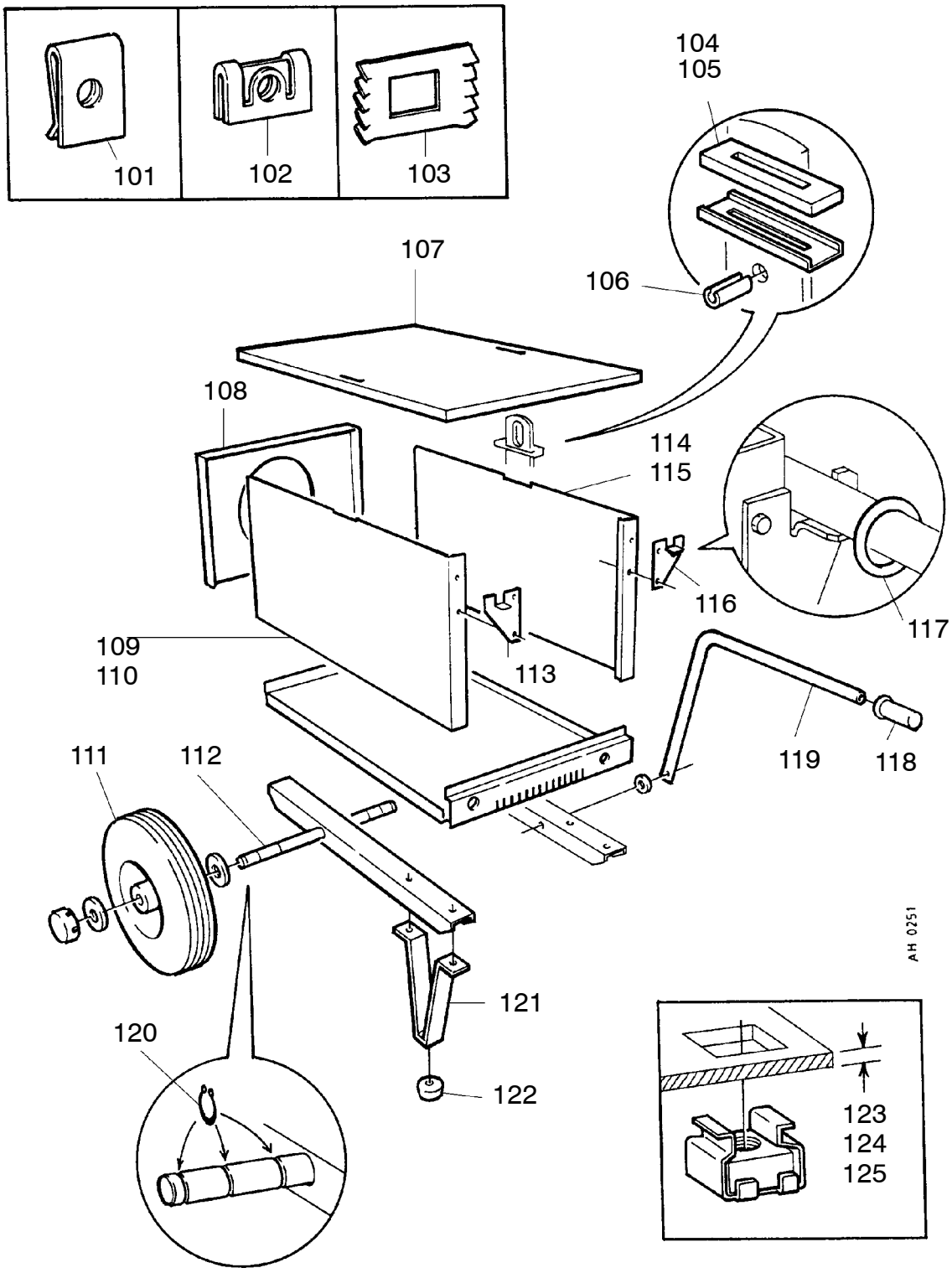
0319 782 882	LHF 250, 230/400/415/500V 50Hz, 230/440/550V 60Hz
0319 783 882	LHF 400, 230/400/415/500V 50Hz, 230/440/550V 60Hz
0319 783 886	LHF 400 Offshore, 230/400/415/500V 50Hz, 230/440/550V 60Hz
0319 950 882	LHF 630, 230/400/415/500V 50Hz, 230/440/550V 60Hz
0319 950 882	LHF 630 Offshore, 230/400/415/500V 50Hz, 230/440/550V 60Hz
0319 951 884	LHF 800 Offshore, 230/400/415/500V 50Hz, 230/440/550V 60Hz

Spare parts are to be ordered through the nearest ESAB agency as per the list on the back of the cover. Kindly indicate type of unit, serial number, denominations and ordering numbers according to the spare parts list.

Maintenance and repair work should be performed by an experienced person, and electrical work only by a trained electrician. Use only recommended spare parts.

C = component designation in the circuit diagram

Item no.	Qty	Ordering no.	Denomination	Notes	C
101	12	0151 270 001	Quick-locking nut		
102	4	0192 547 001	Nut		
103	6	0320 029 002	Ground link		
104	2	0468 797 001	Gasket		
105	2	0468 796 001	Support plate		
106	2	02121 030 05			
107	1	0321 497 001	Top cover		
108	1	0455729 001	Side plate		
109	1	0469 937 002	Cover plate with screen		
110	1	0466 931 002	Cover with text	LHF 250	
111	2	0365 038 001	Wheel		
112	1	0365 046 001	Axle		
113	1	0320 939 002	Bracket left		
114	1	0469 937 001	Cover plate with screen		
115	1	0466 931 001	Cover with text	LHF 250	
116	1	0320 939 001	Bracket right		
117	2	0321 001 001	Ring		
118	2	02188 012 02	Rubber handle		
119	2	0321 000 001	Handle		
120	6	02157 010 19	Circlip		
121	2	0319 738 001	Foot		
122	2	0319 455 002	Foot		
123	8	0192 562 105	Nut	M6/t=0.7-1.6	
124	4	0192 562 106	Nut	M6/t=1.8-2.6	
125	21	0192 562 108	Nut	M8/t=1.8-2.6	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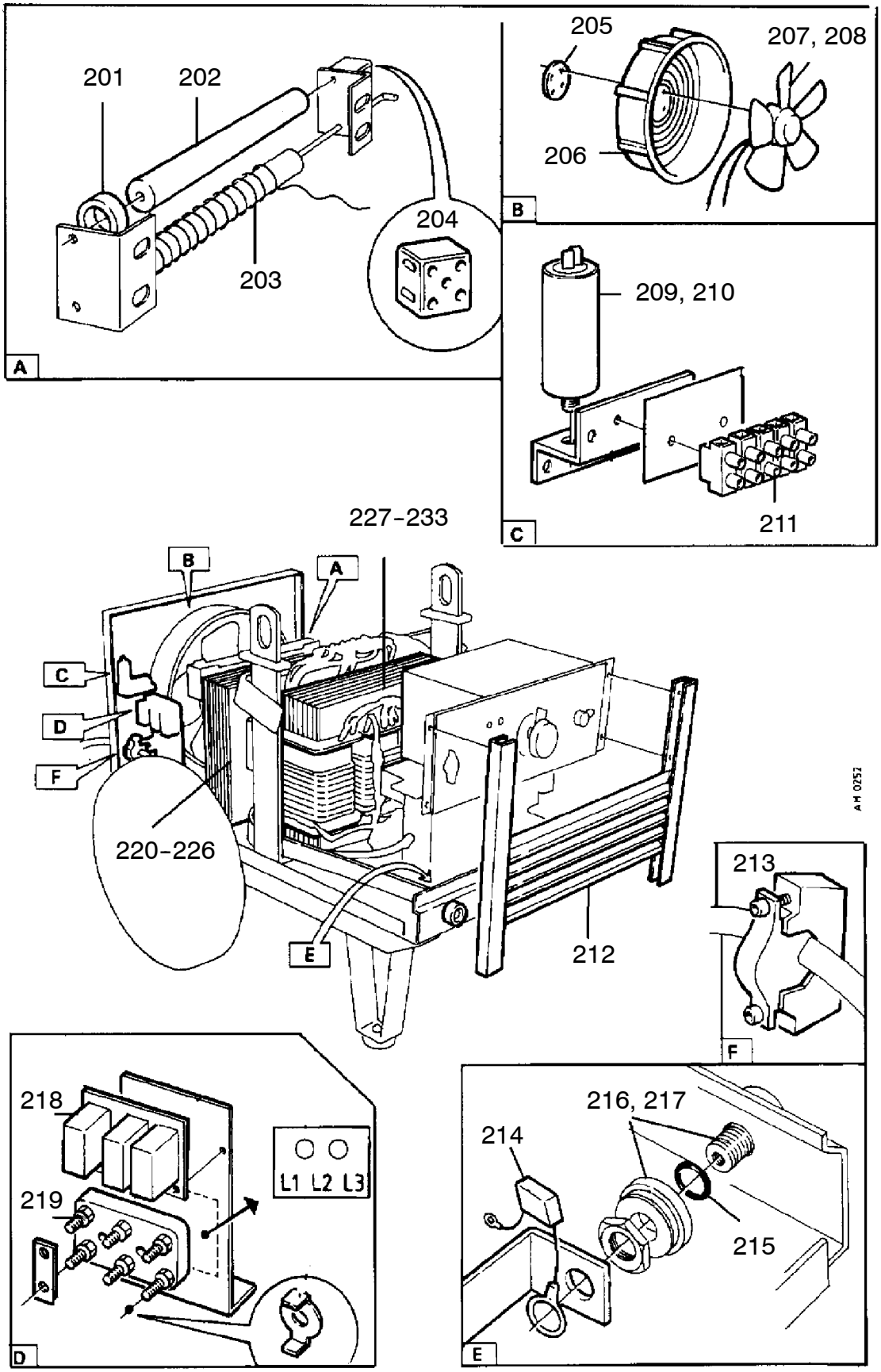
AH 0251

C = component designation in the circuit diagram

Item no.	Qty	Ordering no.	Denomination	Notes	C
201	2	0318 980 001	Insulating ring		
202	2	0317 660 001	Element rod		
203	1	0162 548 005	Resistor		K14
204	1	00407 055 01	Connection block	2 pole	
205	1	0320 178 001	Washer		
206	1	0319 838 001	Fan casing		
207	1	0162 430 001	Fan	LHF 250/400/800	K28
208	1	0162 430 002	Fan	LHF 800	K28
209	1	0191 085 202	Capacitor, 2uf, 400V	LHF 250/400/630	K47
210	1	0191 085 106	Capacitor	LHF 800	K47
211	1	0193 587 005	Connection block	5 pole	K50
212	1	0320 131 880	Front panel		
213	1	0469 950 880	Cable clamp		
214	2	0320 805 881	Capacitor		K27.3
215	2	0215 201 218	Seal o-ring, 24.2x3	LHF 250, LHF 400	
	3	0215 201 218	Seal o-ring, 24.2x3	LHF 630, LHF 800	
216	2	0160 362 881	Cable connector OKC 50	LHF 250, LHF 400	K13
	3	0160 362 881	Cable connector OKC 50	LHF 630	K13
217	3	0160 362 882	Cable connector OKC 120	LHF 800	K13
218	1	0486 216 880	Filter		K69
219	1	0162 772 001	Connection block		K11
220	1	0319 774 880	Choke	LHF 250	K12
221	1	0319 774 883	Inductor	LHF 250	K12
222	1	0319 774 881	Inductor	LHF 400	K12
223	1	0319 774 882	Inductor	LHF 400 Offshore	K12
224	1	0319 944 880	Inductor	LHF 630	K12
225	1	0319 944 882	Inductor	LHF 630 Offshore	K12
226	1	0319 944 883	Inductor	LHF 800 Offshore	K12
227	1	0469 920 880	Transformer	LHF 250	K1
228	1	0469 920 881	Transformer	LHF 250 Offshore	K1
229	1	0469 920 882	Transformer	LHF 400	K1
230	1	0469 920 883	Transformer	LHF 400 Offshore	K1
231	1	0469 923 880	Transformer	LHF 630	K1
232	1	0469 923 881	Transformer	LHF 630 Offshore	K1
233	1	0469 923 883	Transformer	LHF 800 Offshore	K1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AH 0252
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216, 217
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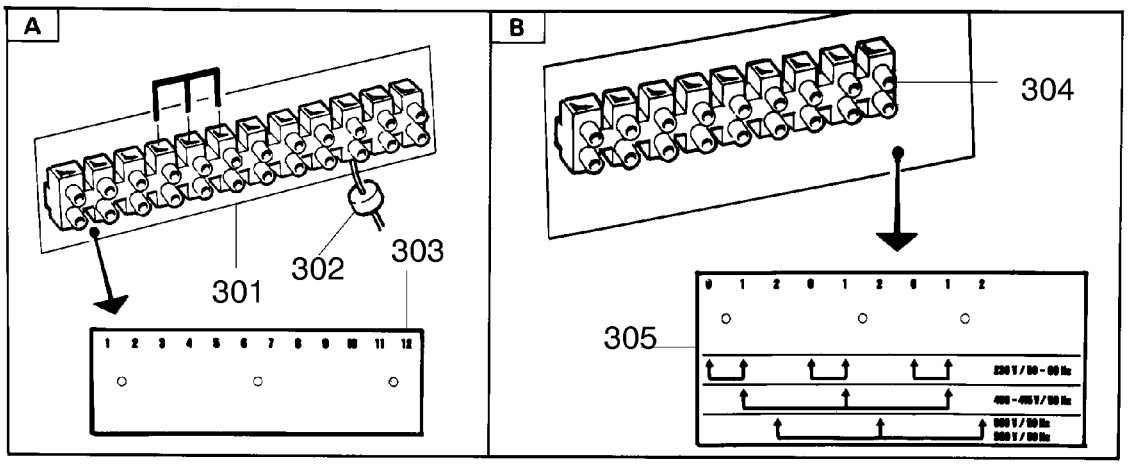
C = component designation in the circuit diagram

Item no.	Qty	Ordering no.	Denomination	Notes	C
301	1	0193 655 012	Terminal	12 pole	K45.6
302	6	0192 716 004	Diode	6A 400W LHF 250, LHF 400	K2.3
	3	0192 716 004	Diode	6A 400W LHF 630, LHF 800	K2.3
303	1	0469 947 001	Sign		
304	1	0162 781 008	Connection block	9 pole	K30
305	1	0456 111 001	Sign		
307	1	0341 035 880	Circuit board	Current relay	K25
308	1	0156 688 001	Magnetic plate		K25
309	1	0193 296 101	Contactor		K62.2
310	1	0193 764 001	Time relay		K51
311	1	0193 298 101	Bar		
312	1	0191 085 202	Capacitor	2uF, 400V	K27.5
313	1	0365 028 001	Control transformer		K52.2
314	1	0162 772 001	Connection block	3 pole	K30.2
315	1	0040 894 001	Connection block	6 pole	K30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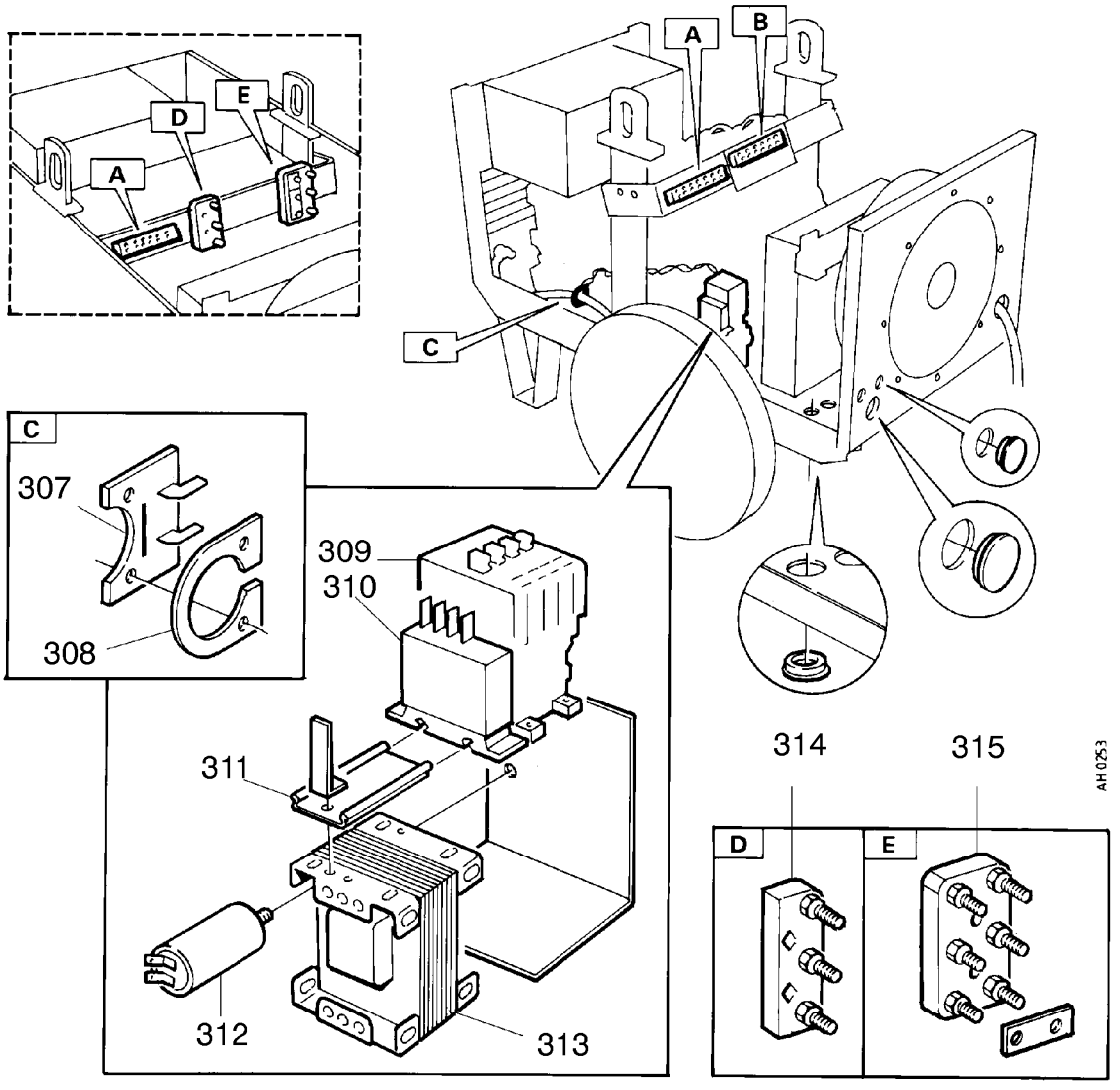
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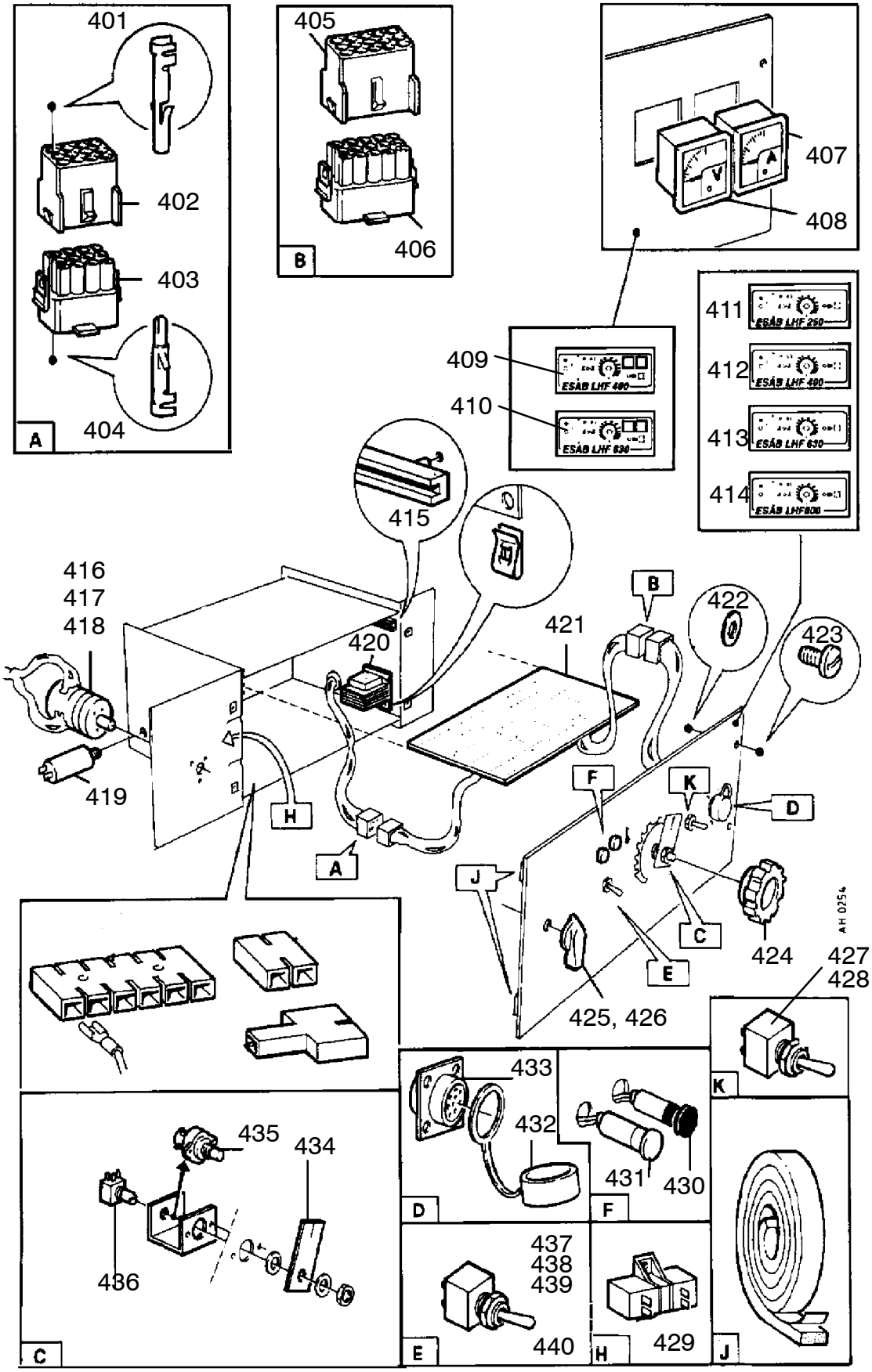
AH 0253

C = component designation in the circuit diagram

Item no.	Qty	Ordering no.	Denomination	Notes	C
401	23	0192 784 102	Cap		
402	1	0192 784 014	Socket	12 pole	K45.4
403	1	0192 784 013	Connector pin plug	12 pole	K45.3
404	23	0192 784 101	Pin		
405	1	0192 784 016	Sleeve plug	15 pole	K45.2
406	1	0192 784 015	Plug	15 pole	K45.1
407	1	0320 498 002	Ammeter		K19
408	1	0320 497 001	Voltmeter		K20
409	1	0469 929 001	Front plate	LHF 400 V/A	
410	1	0469 932 001	Front plate	LHF 630 V/A	
411	1	0469 927 001	Front plate	LHF 250	
412	1	0469 928 001	Front plate	LHF 400	
413	1	0469 930 001	Front plate	LHF 630	
414	1	0469 933 001	Front plate	LHF 800	
415	2	0365 745 001	Circuit card holder		
416	1	0320 745 001	Switch	LHF 250	K6
417	1	0320 745 002	Circuit braker	LHF 400	K6
418	1	0320 745 003	Switch	LHF 630/800	K6
419	1	0192 884 002	Capacitor	5uF	K27.4
420	1	0319 828 001	Transformer		K52.1
421	1	0319 876 880	Circuit card		K70, K45.1, K45.4
422	2	0468 797 001	Gasket		
423	4	02121 086 49	Screww	M6x12	
424	1	02188 107 84	Knob		
425	1	0318 113 003	Knob	LHF 250/400	
426	1	0318 113 004	Knob	LHF 630/800	
427	1	0147 866 001	Toggle switch		K79
428	1	0193 219 001	Toggle switch	Offshore	K79
429	1	0194 057 008	Relay		K62.1
430	1	0369 733 009	Indicating lamp	Yellow	K38.2
431	1	0369 733 008	Indicating lamp	White	K38.1
432	1	0366 285 001	Dust cap	12 pole	
433	1	0368 544 003	Burndy socket	12 pole	
434	1	0319 187 001	Indicator		
435	1	0317 942 001	Gearing for rheostat		
436	1	0192 724 007	Potentiometer		K57
437	1	0147 866 001	Toggle switch	LHF 250/400	K33
438	1	0193 219 001	Toggle switch	LHF 250/400 Offshore	K33
439	1	0147 866 002	Toggle switch	LHF 630/800	K33
440	1	0193 219 002	Toggle switch	LHF 630/800 Offshore	K33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ESAB LHF 250
ESAB LHF 400
ESAB LHF 630
ESAB LHF800
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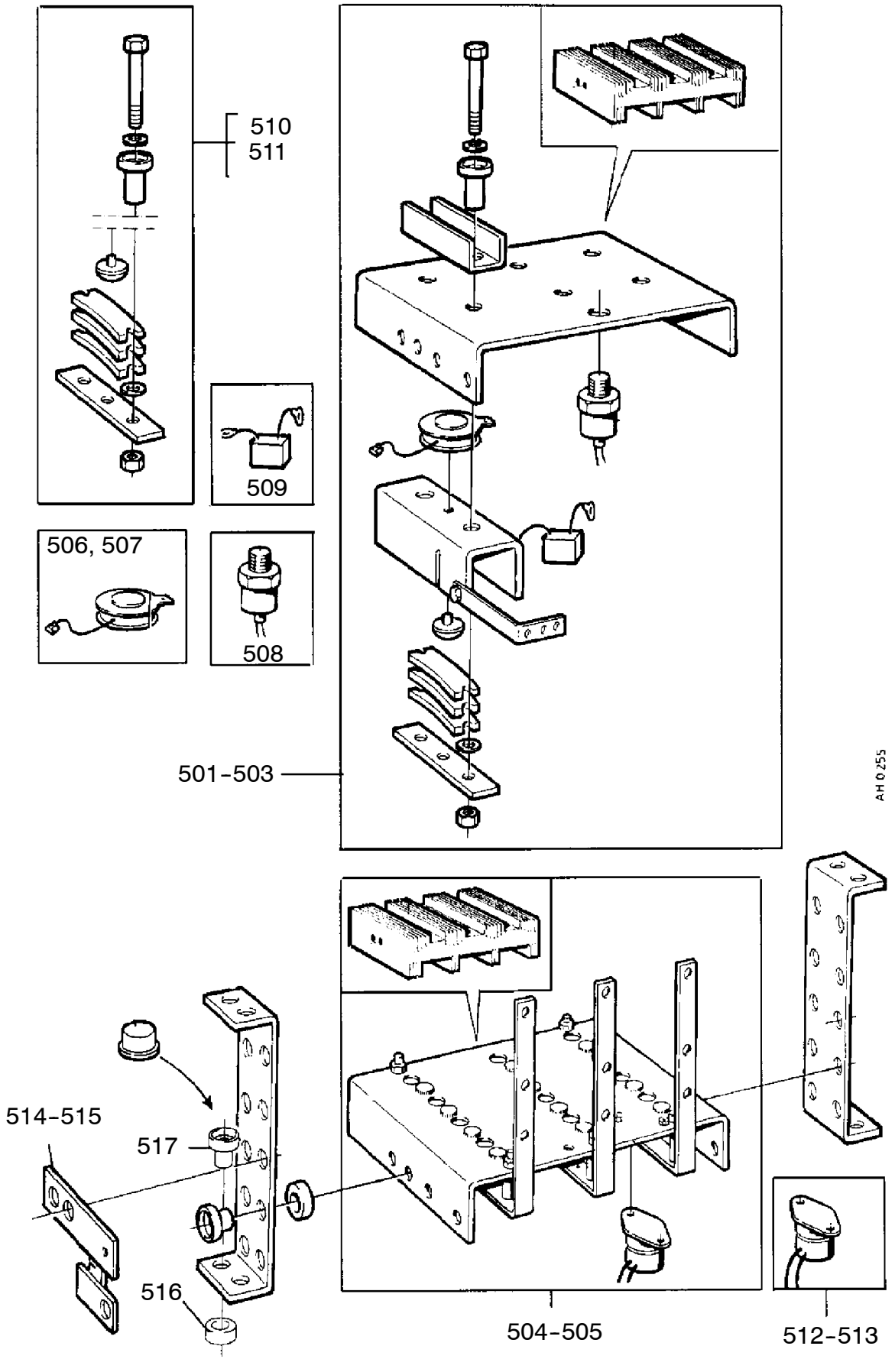
AH 0254

C = component designation in the circuit diagram

Item no.	Qty	Ordering no.	Denomination	Notes	C
			Rectifier bridge		
501	1	0319 690 884	Thyristor bridge	LHF 400 Offshore	K2.1
502	1	0319 690 882	Thyristor bridge	LHF 630	K2.1
503	1	0319 932 880	Thyristor bridge	LHF 800	K2.1
504	1	0319 904 880	Diode bridge	LHF 400 Offshore, LHF 630	K2.2
505	1	0319 923 880	Diode bridge	LHF 800	K2.2
506	3	0320 028 002	Thyristor	LHF 400 Offshore, LHF 630	K2.1
507	3	0320 946 001	Thyristor	LHF 800	K2.1
508	1	0490 600 606	Diode	LHF 400 Offshore, LHF 630	K2.4
	2	0490 600 606	Diode	LHF 800	K2.4
509	3	0041 051 606	Contact protection		K27.1
510	3	0319 690 883	Tensioning device	LHF 400 Offshore, LHF 630	
511	3	0319 932 881	Tensioning device	LHF 800	
512	1	0319 999 001	Thermal Relay	LHF 400 Offshore, LHF 630 Offshore, LHF 800	K31.1
513	1	0368 020 001	Thermal Relay	LHF 630	K31.1
514	1	0319 911 880	Shunt	LHF 630	K18
515	1	0319 911 881	Shunt	LHF 800	K18
516		0163 139 001	Bushing		
517		0162 414 002	Insulating tube		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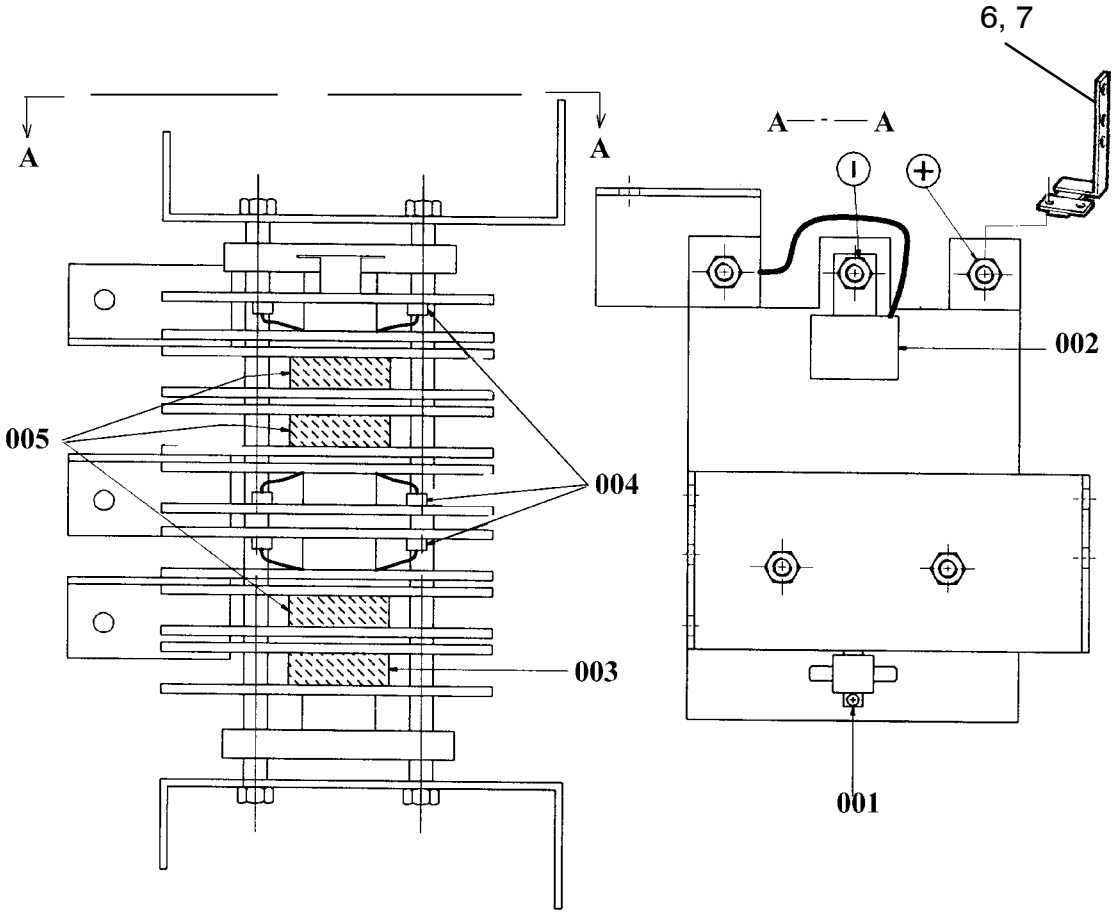
bh10s005

Rectifier bridge for LHF 250, LHF 400 From serial No. 906.

C = component designation in the circuit diagram

Item no.	Qty	Ordering no.	Denomination	Notes	C
		0458 219 880	**Rectifier bridge compl.**		
001	1	0458 219 001	Thermal cutout		K31.1
002	1	0458 219 002	Filter		K27.1
003	1	0458 219 003	Diode		K2.4
004	3	0458 219 004	Rectifier bridge		K2.2
005	3	0320 028 008	Thyristor		K2.1
006	1	0320 558 880	Shunt	LHF 400	K18
007	1	0320 558 881	Shunt	LHF 250	K18



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