REMEMBER, when replacing a part on this appliance, use only spare parts that you can be assured conform to the safety and performance specification that we require. Do not use reconditioned or copy parts that have not been clearly authorised by AGA.

PLEASE READ THESE INSTRUCTIONS BEFORE SERVICING THIS APPLIANCE
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Consumer Protection

As responsible manufacturers we take care to make sure that our products are designed and constructed to meet the required safety standards when properly installed and used.

IMPORTANT NOTICE: PLEASE READ THE ACCOMPANYING WARRANTY
Any alteration that is not approved by AGA could invalidate the approval of the appliance, operation of the warranty and could affect your statutory rights.

Health & Safety

This appliance may contain some of the materials that are indicated. It is the Users/Installers responsibility to ensure that the necessary personal protective clothing is worn when handling where applicable, the pertinent parts that contain any of the listed materials that could be interpreted as being injurious to health and safety, see below for information.

Firebricks, Fuel beds, Artificial Fuels
When handling use disposable gloves.

Fire cement
When handling use disposable gloves.

Glues and Sealants
Exercise caution - if these are still in liquid form use face mask and disposable gloves.

Glass Yarn, Mineral Wool, Insulation Pads, Ceramic Fibre
May be harmful if inhaled. May be irritating to skin, eyes, nose and throat. When handling avoid contact with skin or eyes. Use disposable gloves, face-masks and eye protection. After handling wash hands and other exposed parts. When disposing of the product, reduce dust with water spray, ensure that parts are securely wrapped.

Kerosene & Gas Oil fuels (mineral oils)
1. The effect of mineral oils on the skin vary according to the duration of exposure.
2. The lighter fractions also remove the protective grease normally present on the surface of the skin. This renders the skin dry, liable to crack and more prone to damage caused by cuts and abrasions.
3. ‘Oil acne’ is recognised by the presence of skin rashes. The arms are most often affected, but may occur where there is contact with oil or oily clothing.
   - Seek medical attention for any rash.
   - Avoid skin contact with mineral oil or clothing contaminated with mineral oil.
4. Inhalation of mineral oil vapours must be avoided. Never fire the burner in the open as unburnt oil vapours are likely to occur.
5. Use a suitable barrier cream which will give protection against mineral oil, lanolin based hand creams are usually very effective.

NOTE: SMOKE/SMELL Emitted During Initial Usage
Some parts of the cooker have been coated with a light covering of protective oil. During initial operation of the cooker, this may cause smoke/smell to be emitted and is normal and not a fault with the appliance, it is therefore advisable to open doors and or windows to allow for ventilation. Lift the lids to prevent staining the linings.
INTRODUCTION

To ensure the best performance from your Rayburn it should be serviced once a year; preferably at the start of the heating season.

This appliance must be commissioned by a competent engineer, such as OFTEC approved or a commissioning engineer as shown on the Rayburn list.

Failure to install and maintain appliances correctly could lead to prosecution.

An additional flueway and combustion chamber clean halfway through the heating season may be necessary in some cases.

The Rayburn cannot be serviced whilst hot, so both oven and boiler thermostats should be turned off on the evening before the service visit.

SERVICE SCHEDULE

Annual Service

During annual service flexible oil line, burner nozzles and burner head seals MUST BE CHANGED.

WIRING: Ensure there is no damage or loose connections. This should be carried out by a competent engineer.

BURNER REMOVAL - for cleaning and inspection.
CLEANING - Boiler heat exchanger flueways, oven and hotplate flueways together with ceramic fibre burner chambers.
BURNER SERVICING.
OIL PUMP SERVICING - Cleaning of fuel line strainer.
RE-COMMISSIONING.
REPLACEMENT PARTS.

Oven Door Fit - Both doors must be checked and adjusted if necessary to ensure the alignment with the door catch is correct, the keep is secure and the oven is sealed when the door is closed.

Additional Flueway Clean

It may be necessary in some installations to give the boiler flueways a clean out at the end of the heating season.

Balanced Flue Terminal

Check terminal housing for ingress of foreign matter - dust leaves etc.

Check terminal area is clear of any obstructions which would hinder the dispersal of the products of combustion and clean air entry.

If necessary remove Terminal Housing, for cleaning of ducts and airways, and ensure that all sealed joints are remade on re-assembly. Replace terminal guard.
WARNING: BEFORE REMOVING SERVICE ACCESS COVERS OR THE OIL BURNERS ENSURE THAT ALL ELECTRICAL SUPPLIES TO THE APPLIANCE HAVE BEEN ISOLATED

The burners can be removed without disconnecting the oil supply pipe. However if the filters are being cleaned or a pressure gauge fitted to the pump then the oil supply should be turned OFF and arrangements made to catch any oil which will leak from the oil pump.

BURNER ACCESS

SEE FIG. 1

1. Open up the bottom burner access door. Remove door and put in a safe place.
2. Remove the 4 inner panel securing screws and remove panel.
3. Remove the 3 plinth securing screws and remove plinth.

Fig. 1 DESN 511998
IMPORTANT: DURING BURNER REMOVAL CARE MUST BE TAKEN NOT TO DAMAGE THE CERAMIC FIBRE INSULATION.

SEE FIG. 2, 3 & 4

1. Place a sheet on the floor in front of the cooker to act as a working area.
2. Disconnect the 4-pin plug at the side of the burner.
3. Disconnect air intake.

SEE FIG. 3

4. Undo the central locking nut and remove head retaining bar.
5. Undo burner mounting plate.

SEE FIG. 4

6. Withdraw the burner unit.
7. To remove the burner unit completely, it maybe necessary to disconnect the air intake hose from the burner unit.
HEAT EXCHANGER CLEANING

IMPORTANT: DURING CLEANING CARE MUST BE TAKEN NOT TO DAMAGE THE CERAMIC FIBRE INSULATION.

SEE FIG. 5

1. Lift insulation covers and remove hotplate using lifting hooks provided.

SEE FIG. 6

2. Remove the 4 flue cleaning access door securing bolts and remove door.
3. Using the rods provided remove the boiler flueway baffles from between the boiler cross waterways.

The baffles are assembled in alternate directions to allow the gases to flow front to back through the assembly.

Each heat exchanger has two rows of baffles.

Ensure that the baffles are having the top and bottom plates of the same width and marked TOP are fitted last. One at top each flueway.

Total number of baffles fitted are:-

<table>
<thead>
<tr>
<th>Number</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>440</td>
<td>6</td>
</tr>
<tr>
<td>460</td>
<td>6</td>
</tr>
<tr>
<td>480</td>
<td>8</td>
</tr>
<tr>
<td>499</td>
<td>10</td>
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(2 x 3)  
(2 x 3)  
(2 x 4)  
(2 x 5)
ALL BAFFLES MUST BE STACKED AS DIAGRAMS BELOW

Fig. 6A
### Cleaning

SEE FIG. 7

4. Lift top plate enamelled cover panel (behind LH insulating cover) remove insulation pad and sealing plate.

5. Clean the boiler outlet flueway by inserting the flexible brush through the top plate aperture, directing it towards the flue outlet. Scrape the deposits towards the heat exchanger.

6. Thoroughly clean boiler heat exchanger flueway.

7. Carefully vacuum any debris that has fallen down into the burner chamber.

8. Clean and replace boiler flueway baffles in reverse order. Locate boiler flue access door, secure.

9. Replace sealing plate, insulation pad and cover panel.

---

### OVEN & HOTPLATE FLUEWAY CLEANING

SEE FIG. 8

1. Remove the top oven door and place in a safe position.

2. Remove side and base access doors use hex. driver.

3. Thoroughly clean top, side and base flueways through access apertures with brush.

4. Remove all debris with vacuum cleaner.

5. Replace side and base access doors. Secure in position using hex. driver.

6. Brush and clean in between hotplate ribs on underside.

7. Examine soft rope seal located around hotplate aperture in top plate and two rope seals on hotspot. Replace if frayed or damaged.

8. Replace hotplate ensuring the underside ribs lie over the oven, and that it seals the top plate.
INTRODUCTION

SEE FIG. 9, 10A, 10B & 10C

It is recommended that each side of the burner is serviced individually so as not to get the components from the two burners mixed up.

The correct combination of burner blast tubes and diffusers are shown.

To remove blast tube, slacken grub screws and pull forwards.

Fig. 9

Fig. 10A

Fig. 10B

Fig. 10C
Burner Servicing

**BURNER NOZZLE REMOVAL**

SEE FIG. 11

1. Disconnect ignition leads
2. Remove two socket head screws.
3. Remove head assembly complete.
4. Remove ignitor assembly, by removing countersunk screw and clamp.
5. Unscrew nozzle from its holder with a correctly fitting tubular spanner to avoid damage to hexagon.

**BURNER NOZZLE REPLACEMENT**

SEE FIG. 12

1. Replace nozzle by a new one of the same make and specification.

<table>
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<td></td>
<td>NOZZLE TYPE</td>
<td>BOM CODE</td>
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<tr>
<td>440KB</td>
<td>0.35 @ 80° S</td>
<td>RO4M 998940</td>
</tr>
<tr>
<td>460KB</td>
<td>0.40 @ 80° EH</td>
<td>RO4M 998391</td>
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<tr>
<td>480KB</td>
<td>0.40 @ 80° EH</td>
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</tr>
<tr>
<td>499KB</td>
<td>0.40 @ 80° EH</td>
<td>RO4M 998391</td>
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2. Ensure that mating faces are clean.
3. Hold nozzle holder with correct spanner when tightening nozzle.
4. Typically finger tight plus 1/4 turn with spanner is sufficient.
   **DO NOT OVERTIGHTEN.**
5. Ensure electrode gaps are correct.
**PHOTO ELECTRIC CELL (PEC) CLEANING**

SEE FIG. 13

Withdraw Photo Electric Cell from the burner head. Clean PEC sensing end with a soft cloth taking care not to scratch the light sensitive body. Re-insert PEC taking care to insert the correct way round.

Should the cell show signs of distortion or cracking, replacement will be necessary. See PEC replacement, page 19.

---

**FAN CLEANING**

440/460KB ONLY

1. Clean between the blades of the fan impellor with a small brush and remove any residue.

   The fan motor flange has 4 fixings to the fan case.

480/499KB ONLY

1. Remove 4 fixing screws and pull off fan case inlet.

2. Clean between the blades of the fan impellor with a small brush and remove any residue.

---

**RE-ASSEMBLE BURNER**

SEE FIG. 14 & 14A

Re-assemble the burner in reverse order.

**NOTE:** Burner head gaskets should be renewed at each service.

---

**FIG. 13**

Withdraw Photo Electric Cell from the burner head. Clean PEC sensing end with a soft cloth taking care not to scratch the light sensitive body. Re-insert PEC taking care to insert the correct way round.

Should the cell show signs of distortion or cracking, replacement will be necessary. See PEC replacement, page 19.

---

**FIG. 14**

Remove 4 fixing screws and pull off fan case inlet.

Clean between the blades of the fan impellor with a small brush and remove any residue.

---

**FIG. 14A**

Re-assemble the burner in reverse order.

**NOTE:** Burner head gaskets should be renewed at each service.
INTRODUCTION

To carry out servicing on the oil pump. Turn off the oil line isolating valve near to the appliance.

OIL PUMP STRAINER CLEANING

SEE FIG. 15

1. Remove 4 socket head screws.
2. Remove filter.
3. Wash with clean petrol or paraffin.
4. Re-assemble filter in reverse order.

OIL LINE FILTER CLEANING

1. Turn OFF the line isolating valve fitted prior to the oil line filter.
2. Follow manufacturer's instructions to remove filter element from the housing, taking care to collect Kerosene residue from the filter housing.
3. Wash filter thoroughly in clean petrol or paraffin.
4. Re-assemble in reverse order.

NOTE: Flexible fuel hose (s) must be replaced at each service.
**Re-commissioning**

**BLEED AIR FROM OIL SUPPLY**

SEE FIG. 17A

Disconnect the flexible oil pipe line at the pump inlet, open the stop valve slowly and run off some of the oil into a receptacle to establish an air free supply to the pump. Remake the connection oil tight and leave valve open.

**FIT PRESSURE GAUGE**

SEE FIG. 16

Remove the bleed screw from the manifold and fit an oil pressure gauge with R 1/8 connection to check the pump output pressure.

**SWITCH ON ELECTRICITY**

Set the boiler burner time clock to continuous and turn the boiler thermostat to maximum. The boiler burner should run on pre-purge for 7-15 seconds. With the ignition spark energised, the oil solenoid valve should open allowing the burner to fire.

Until all the air from the oil pump is flushed out there may be some flame instability resulting in the burner locking out. This will be shown by the burner stopping and the illumination of the signal light in the reset button of the control box (see Fig. 16). **IN THIS EVENT, WAIT AT LEAST ONE MINUTE**, then press the re-set button to restart.

**VENT OIL PUMP**

SEE FIG. 16

Whilst the burner is running, vent air from the pump by slackening the pressure gauge port sufficient to allow air to bleed air. When bubble free oil seeps out retighten.

**ADJUST OIL PRESSURE**

SEE FIG. 17

With the burner running check the oil pressure on the pressure gauge. If the pressure gauge is not indicating the correct reading then adjust the pressure by turning the pressure regulator clockwise to increase or anti-clockwise to decrease the pressure until the pressure gauge reads 10 bar (145lb/in²).

**NOTE: 440KB ONLY**

Increase/decrease pressure gauge until pressure reaches 8 bar (120lb/in²).

**NOTE: 499KB ONLY**

During initial start up, the pressure will indicate approximately 100 psi for 30 seconds then up to 10 bar (145lb/in). Any adjustments must be made after the sequence has been completed.
After 15 minutes of the boiler burner running.

Remove the enamelled top cover panel and the insulation pad.

Remove the plugging screw and insert the sensing end of a portable indicator to check the $\text{CO}_2$ (Carbon Dioxide) level. Adjust the boiler burner air intake until a reading of 11/11.5% $\text{CO}_2$ is recorded on the indicator.

Remove the plugging screw, insulation pad and cover panel.

Switch off the boiler burner.

COOKER BURNER - SEE FIG. 18 A

Switch on cooker burner

After 15 minutes of the cooker burner running.

Repeat the above procedures for the cooker burner. To sample the flue gases from the cooker burner lift up the R.H. insulating cover and remove the countersunk headed screw in the hotplate. The cooker burner should be set to 11.0/11.5% $\text{CO}_2$ with a maximum Smoke No. of 2.

Replace the countersunk headed screw on completion ensuring that it will not interfere with any pots and pans placed on the hotplate.
**FAN MOTOR**

SEE FIG. 19 & 19A

Follow instructions in sections BURNER ACCESS, Steps 1 to 3 and BURNER REMOVAL, Steps 1 to 6.

1. Remove 3-pin plug.
2. Remove solenoid plug (499KB ONLY).
3. Disconnect oil pipe.
4. Remove four socket head screws. Lift off motor.
   **NOTE: 440K ONLY** - Remove 4 screws and withdraw motor.
5. Remove grub screw, slide off fan. Re-assemble in reverse order.

**NOTE:** Ensure that gaskets and seals are in place and in good condition.

---

**IGNITION ELECTRODES**

Follow instructions in BURNER ACCESS, Steps 1 to 3 and BURNER NOZZLE REMOVAL, Steps 1 to 5.

SEE FIG. 20

1. Disconnect ignition leads.
2. Remove 2 socket head screws.
3. Remove head assembly complete.
4. Remove ignitor assembly, by removing countersunk screw and clamp.
5. Fit new ignition electrode assembly, re-assemble in reverse order.
6. Check electrode gap and reset if necessary.
**Replacement of parts (Burner)**

**IGNITOR**

SEE FIG. 21

Follow instructions in sections BURNER ACCESS, Steps 1 to 3, BURNER REMOVAL, Step 4.

1. Remove both HT leads from ignitor.
2. Remove mains plug from ignitor.
3. Remove earth screw.
4. Remove 2 ignitor securing screws.
5. Remove ignitor.
6. Fit new ignitor, re-assemble in reverse order.

**RELAY**

SEE FIG. 22

Follow instructions in sections BURNER ACCESS, Steps 1 to 3, BURNER REMOVAL Steps 1 to 6.

1. Remove push on connectors (noting position of each connector).
2. Remove two relay fixing screws.
3. Fit relay, re-assemble.

**SOLENOID COIL**

SEE FIG. 23

Follow instructions in sections BURNER ACCESS, Steps 1 to 3, BURNER REMOVAL, Steps 1 to 5.

1. Slacken solenoid plug securing screw.
2. Remove plug.
3. Remove solenoid securing nut and washer.
4. Remove solenoid coil.
5. Fit new solenoid coil, re-assemble in reverse order.
Replacement of parts (Burner)

CONTROL BOX

SEE FIG. 24

Follow instructions in section BURNER ACCESS. Steps 1 to 3.

1. Undo central fixing screw.
2. Gently pull control box away from base.
3. Fit new control box, re-assemble in reverse order.

PEC

SEE FIG. 25

Follow instructions in section BURNER ACCESS, Steps 1 to 3.

1. Withdraw P.E.C. from burner head.
3. Fit new P.E.C.
4. Re-insert P.E.C., taking care to insert the correct way round.
Replacement of parts (Burner)

PUMP ACCESS

SEE FIG. 26

Follow instructions in sections BURNER ACCESS, Steps 1 to 3 and BURNER REMOVAL, Steps 1 to 5.

1. Isolate fuel supply.
2. Disconnect flexible hose. (This must be replaced annually)
3. Remove solenoid plug.
4. Remove feed pipe.
5. Slacken three securing screws and remove pump.
6. Check drive, replace if worn or damaged.
7. Replace pump, re-assemble in reverse order.

NOTE: 499 KB ONLY

FIG. 26 A

1. SOFT START SOLENOID
2. RESTRICTOR DISC
BEFORE REMOVING SERVICE ACCESS COVERS ENSURE THAT ALL ELECTRICAL SUPPLIES TO THE APPLIANCE HAVE BEEN TURNED OFF (SWITCH OFF AND REMOVE PLUG).

SEE FIG. 27

1. Remove the controls door and place in a safe position.
2. Remove both thermostat control knobs.
3. Remove the 2 cover panel fixing screws.
4. Remove cover panel. It will be necessary to disconnect the push on tags from the selector switch.

SEE FIG. 28

5. Remove the four control panel fixing screws.
6. Tilt the chassis forwards from the top and lift out. To fully access the rear of the control chassis, the thermostat capillaries should be removed from their pockets.
Replacement of parts (Electrical controls)
Replacement of parts (Electrical controls)

**TO FIT NEW BOILER CONTROL THERMOSTAT**

SEE FIG. 30

Follow instructions in section ELECTRICAL COMPONENT ACCESS, Steps 1 to 6.

1. Undo the two screws on the front of the chassis which hold the thermostat in place.
2. Remove the two push on connectors from back of thermostat.
3. Replace thermostat. Take care to push thermostat phial correctly into the pocket provided. The thermostat should be mounted with tag P at the right hand side.
4. Re-connect push on connector wires. The RED wire to 1 and YELLOW wire to P.

To complete follow instructions in section RE-ASSEMBLE, Steps 1 to 6.

**TO FIT NEW BOILER PUMP OVERRUN THERMOSTAT**

SEE FIG. 31

Follow instructions in section ELECTRICAL COMPONENT ACCESS, Steps 1 to 6.

1. Undo the two screws on the front of the chassis which hold the thermostat in place.
2. Remove the three push on connectors from back of thermostat.
3. Replace thermostat. The thermostat should be mounted with tag P at the left hand side. Take care to push thermostat phial correctly into the pocket provided.
4. Re-connect push on connector wires. The RED wire from the pump to P, the other BROWN wire to 2 and the YELLOW to 1.

To complete follow instructions in section RE-ASSEMBLE, Steps 1 to 6.
Replacement of parts (Electrical controls)

TO FIT NEW COOKER SAFETY OVERHEAT THERMOSTAT

SEE FIG. 32

Follow instructions in section ELECTRICAL COMPONENT ACCESS, Steps 1 to 6.

1. Undo the two screws on the front of the chassis which holds the thermostat in place.
2. Remove the two push on connectors from the back of the thermostat. Open oven door to access the thermostat phial which passes into the oven at top LH corner.
3. Remove LH side plate, slacken screw where the phial passes through RH side and rotate. Slacken screw front phial mounting bracket rotate. (See Fig. 33).
4. Replace thermostat, thermostat phial should be repositioned in the same position as removed.

To complete follow instructions in section RE-ASSEMBLE, Steps 1 to 6.
TO FIT NEW BOILER SAFETY OVERHEAT THERMOSTAT

SEE FIG. 33

Follow instructions in section ELECTRICAL COMPONENT ACCESS, Steps 1 to 6.

1. Undo the central hexagon nut on the front of the chassis which holds the thermostat in place.
2. Remove the push on connectors from back of thermostat.
3. Replace thermostat. Take care to push thermostat phial correctly into the pocket provided.
4. Re-connect push on connector wires, as Fig. 33.

To complete follow the instructions in section RE-ASSEMBLE, Steps 1 to 6.

TO FIT NEW OVEN CONTROL THERMOSTAT

SEE FIG. 34

Follow instructions in section ELECTRICAL COMPONENT ACCESS, Steps 1 to 6.

1. Undo the two screws on the front of the chassis which holds the thermostat in place.
2. Remove the 2 push on connectors from back of thermostat.
3. Open roasting oven door to access the thermostat phial and capillary which pass into the oven at the top left hand corner.
4. Remove LH side plate. Slacken the screw where the phial passes through the roasting oven side and rotate the cover plate to open up the access hole. Slacken screw front phial, mounting bracket and rotate.
5. Replace thermostat. The thermostat should be mounted with tag P at the right hand side. Reposition the phial in same position as removed.
6. Re-connect push on connector. The VIOLET/BLACK wire to 1 and BLACK (3) wire to P, See Fig. 34A.

NOTE: Ensure phials do not make contact with oven sides.

To complete follow instructions in section RE-ASSEMBLE, Steps 1 to 6.
Replacement of parts (Electrical controls)

**TO FIT NEW PROGRAMMER**

SEE FIG. 35

Follow instructions in section ELECTRICAL COMPONENT ACCESS, Steps 1 to 4.

1. Slacken two screws at bottom of programmer.
2. Pull the bottom of the programmer forward and lift.
3. Replace with new programmer. Clip onto the hinges at the top. Press bottom into place. Tighten two securing screws.

To complete follow instructions in section RE-ASSEMBLE, Steps 3 to 6.

---

**TO FIT NEW SELECTOR SWITCH**

SEE FIG. 36

Follow instructions in section ELECTRICAL COMPONENT ACCESS, Steps 1 to 4.

1. To remove switch from the cover panel press the two toggles at the top and bottom of switch, push switch through panel.
2. Push replacement switch into aperture and click into place. The switch should be fitted with terminal 1 at the top.

To complete follow instructions in section RE-ASSEMBLE, Steps 3 to 6.
1. Locate thermostat phials into boiler pocket.
2. Locate the base of the control chassis into the bottom of the door way aperture, tilt the chassis backwards into position and secure with the four screws.
3. Thread the two wires for the selector switch through the aperture and connect them onto the rear of the selector switch fitted in the outer panel. Connect the ORANGE wire on 1 and the PURPLE wire on 2.
4. Refix the outer panel in position and secure with the 2 screws.
5. Replace the thermostat knobs.
6. Replace the controls door.

Fig. 37 DESN 511989
Replacement of parts (Vent fan)

VENT FAN

BEFORE REMOVING SERVICE ACCESS COVERS ENSURE THAT ALL ELECTRICAL SUPPLIES TO THE APPLIANCE HAVE BEEN TURNED OFF (SWITCH OFF AND REMOVE PLUG).

SEE FIG. 38

1. Remove (2) fan cover securing screws, remove cover.
2. Disconnect green/yellow lead from earth post.
3. Disconnect blue and brown leads from terminal block.
4. Break fan duct connection, remove fan assembly.
5. Remove (2) venturi securing screws.
6. Remove fan venturi assembly and gasket from fan.
7. Fit new fan, re-assemble in reverse order.

VENT FAN SWITCH

SEE FIG. 39

1. Remove (2) fan cover securing screws, remove cover.
2. Disconnect push on leads.
3. To remove switch of the cover panel press the two toggles, at top and bottom of switch, push switch, through panel.
4. Push replacement switch into aperture and click into place. The switch should be fitted with terminal 1 at the top.
5. Re-assemble in reverse order.
When the programmer switches off the BOILER channel then the water circulating pump will be switched off. If during the period shortly after this the residual heat in the appliance causes the water temperature in the boiler to rise above 65°C then the pump overrun thermostat will change over. This will switch on the circulating pump.

This thermostat is a safety cut-out device which is intended to operate if the other controls fail. This control will “lock-out” and switches everything off except for the programmer clock and the “Pump Overrun” facility.

This thermostat has to be manually reset once the temperature has cooled down.

This thermostat is a safety cut-out device which operates if the oven control thermostat fails.

This thermostat automatically resets once the temperature has cooled down.
# Electrical Controls

## CONTROL CIRCUIT-EXTERNAL

### TERMINAL STRIP CONNECTIONS

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>OVEN VENT FAN</td>
<td>SPARE NEUTRAL TERMINAL</td>
</tr>
<tr>
<td>N</td>
<td></td>
</tr>
<tr>
<td>SW/L BOILER</td>
<td>SWITCH LIVE TO OPERATE BOILER FROM ROOM STAT OR CYLINDER STAT VIA ZONE VALVES IF FITTED</td>
</tr>
<tr>
<td>HTG ON</td>
<td>TO ROOM STAT/ZONE VALVE(S) ETC (IF FITTED)</td>
</tr>
<tr>
<td>H/W OFF</td>
<td>FROST STAT (SEE NOTE BELOW)</td>
</tr>
<tr>
<td>H/W ON</td>
<td>TO CYLINDER STAT/ZONE VALVE(S) ETC (IF FITTED)</td>
</tr>
<tr>
<td>PN NEUTRAL</td>
<td>PUMP SUPPLY (THE CIRCULATING PUMP MUST BE CONNECTED DIRECTLY TO THIS SUPPLY)</td>
</tr>
<tr>
<td>PL LIVE</td>
<td>PUMP SUPPLY (THE CIRCULATING PUMP MUST BE CONNECTED DIRECTLY TO THIS SUPPLY)</td>
</tr>
<tr>
<td>L LIVE</td>
<td>3 AMP PERMANENT SUPPLY</td>
</tr>
<tr>
<td>N NEUTRAL</td>
<td></td>
</tr>
<tr>
<td>E EARTH</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:**

If no Hot Water System Controls are used a link **MUST** be fitted between H/W ON and SW/L BOILER.

If no Central Heating System Controls are used a link **MUST** be fitted between HTG ON and SW/L BOILER.

If a Frost Thermostat is fitted it **MUST** be connected to SW/L BOILER and H/W OFF.
Electrical Controls

CONTROL CIRCUIT-BOILER

BOILER CONTROL CIRCUIT

PROGRAMMER

INTERNAL WIRING

HTG/ON (ROOM STAT.)
SELECTOR SWITCH
WATER HEATING

HW ON
(CYLINDER STAT.)

HW OFF
(FROST STAT.)

PUMP N

PUMP L

BOILER OVERHEAT
STAT.

PUMP OVERRUN STAT.
SWITCHES AT 65°C

BOILER STAT.

L1

TO BURNER

SW/L
(FROM AUXILIARY
CONTROLS)

PERMANENT
SUPPLY

APPLIANCE NOT CALLING FOR HEAT
AND IN A COLD CONDITION

Fig. 40

31
Electrical Controls

CONTROL CIRCUIT-COOKER

Fig. 41

COOKER CONTROL CIRCUIT

PROGRAMMER

INTERNAL WIRING

N  L  1  2  3  4

COOKER STAT.

COOKER OVERHEAT STAT.

OVEN VENT (MAINS TERMINAL BLOCK)

VENT FAN SWITCH

VENT FAN

TO BURNER

APPLIANCE NOT CALLING FOR HEAT AND IN A COLD CONDITION
VENT FAN & SWITCH BALANCED FLUE ONLY

PERMANENT SUPPLY
Fault Finding

**BURNER DOES NOT START**

**Burners**

Check that the burners have not gone to lock-out.

Causes of lock-out can be:-

- No ignition, ignition electrode incorrectly positioned, insulation cracked, spark generator fault.
- No oil supply.
- Poor combustion.
- Photo electric cell incorrectly positioned, cracked or needs cleaning.
- Live and Neutral connections reversed.
- Faulty control box.
- Faulty fire valve.
- Faulty relays.

REFER TO FLOW DIAGRAM FOR ELIMINATION PROCEDURE.

**General**

You can carry out some checks on the controls before you need to access the controls compartment behind the control door.

If only one of the burners is not running then the fault must be after the safety overheat thermostat.

Conversely if both burners are affected then the fault lies before the programmer connections.

For access to individual controls refer to section Replacement Parts and for wiring continuity checks refer to Figs. 40, 41 and 42 for detailed and schematic wiring diagrams.

To check out the electrical wiring at the burners you will first have to access the burner chamber. Use the following procedure:-

1. Isolate the electrical power supply.
2. Open up the bottom burner access door. Remove door and put in a safe place.
3. Unscrew the 4 screws holding the inner panel in place and remove panel.
4. Unscrew the 3 screws holding the louvered plinth in place and remove plinth.

The external mains connections are made to a terminal block situated in the front left-hand corner of the burner chamber. Re-connect the electrical supply and check that there is 230V power supply available across the mains input connection L & N on the terminal block, if not then check connecting leads, fuses and whether power is available at mains plug.

If power is available across L & N then check to see whether the overheat cut-out switch has cut-out, if it has been reset by pushing the centre with a small round tool (i.e. a pencil). Check for continuity across the cooker overheat thermostat.
Cooker Burner (Control Box Type - DKO 970)

Information system
The information system communicates with the outside world using a LED (the used Flash-Code is similar to the Morse Code). The messages are optically transmitted by flashing appropriately a LED. Using an (optional) additional terminal the messages can be recorded and displayed in easily readable form.

Programming sequence display
The built-in microprocessor controls not only the programming sequence but the information system too. The individual phases of the programming sequence are displayed as Flash-Code. The following messages can be distinguished:

![Flash-Code Diagram]

Fig. 43
Cooker Burner (Control Box Type - DKO 970)

In case of failure the LED is permanently illuminated. Every 10 seconds the illumination is interrupted by a flash code which indicates the cause of the error. Therefore the following sequence is performed which is repeated as long as the unit is not reset.

Sequence:

<table>
<thead>
<tr>
<th>Illuminated Phase</th>
<th>Dark Phase</th>
<th>Flash Code</th>
<th>Dark Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>for 10 sec</td>
<td>for 0.6 sec</td>
<td></td>
<td>for 1.2 sec</td>
</tr>
</tbody>
</table>

Error diagnosis

<table>
<thead>
<tr>
<th>Error Message</th>
<th>Flash Code</th>
<th>Possible Fault</th>
</tr>
</thead>
<tbody>
<tr>
<td>lockout</td>
<td>1 1 1 1</td>
<td>within lock out safety time</td>
</tr>
<tr>
<td></td>
<td>1 1 1 1</td>
<td>no flame establishment</td>
</tr>
<tr>
<td>stray light</td>
<td>1 1 1 1</td>
<td>stray light during monitored phase, detector may be faulty</td>
</tr>
</tbody>
</table>

Low-voltage protection

at 220 / 240V (110 / 120V) nominal usage

The mains voltage has to be more than 187V_{eff} (94V_{eff}) in order to allow the unit to perform a start-up. The mains voltage is not only mentioned in the start-up phase but also permanently during operation. If the voltage drops below <160V_{eff} (80V_{eff}) during start-up or run time the control box goes into lock-out mode. If the voltage rises again, the control box performs automatically a start-up as soon as the mains voltage is >187V_{eff} (94V_{eff}).

Stray Light Monitoring

The stray light check is performed at the end of the pre-purge timer for the duration as mentioned in the table of timings.

Table of timings (sec.)

<table>
<thead>
<tr>
<th>Model</th>
<th>Pre-purge and pre-ignition time</th>
<th>stray light monitoring</th>
<th>safety time ts</th>
<th>post-ignition time ln</th>
<th>delay time to V2 DKO 972 only tv2</th>
</tr>
</thead>
<tbody>
<tr>
<td>05</td>
<td>15</td>
<td>5</td>
<td>5</td>
<td>7</td>
<td>20</td>
</tr>
</tbody>
</table>
Cooker Burner (Control Box Type DKO 970N) - Information system

The information system is microprocessor based and reports on all aspects of burner control box operation and flame supervision. It informs continuously about the actual programming sequence the unit is just performing. Besides monitoring of the programming sequence it also allows to identify errors during start-up of operation without any additional testing devices. The automatically performed diagnoses is a valuable tool which facilitates service/maintenance work and therefore saves costs. The analyses of the error cause can be done directly on stage or if not possible afterwards at the lockout reason is stored in a non-volatile lock out mode memory.

The information system communicates with the outside world using a LED (the used Flash-Code is similar to the Morse-Code). The messages are optically transmitted by flashing appropriately a LED. Using an (optional) additional terminal the messages can be recorded and displayed in easy readable form.

Programming sequence display

The built-in microprocessor controls not only the programming sequence but the information system too. The individual phases of the programming sequence are displayed as Flash-Code.

The following messages can be distinguished:

<table>
<thead>
<tr>
<th>Message</th>
<th>Flash-Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>start</td>
<td>! ! !</td>
</tr>
<tr>
<td>burner in operation (from end of safety time)</td>
<td>!</td>
</tr>
<tr>
<td>stop</td>
<td>! ! ! !</td>
</tr>
</tbody>
</table>

Description

! = short pulse

<table>
<thead>
<tr>
<th>Description</th>
<th>Flash-Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stray Light Monitoring</td>
<td></td>
</tr>
</tbody>
</table>

In case of failure the LED is permanently illuminated. Every 10 seconds the illumination is interrupted by a flash code, which indicates the cause of the error. Therefore the following sequence is performed which is repeated as long as the unit is not reset.

Sequence:

- illuminated phase: for 8 sec
- dark phase: for 1 sec
- Flash-Code: for 1.5 sec

Blinking Codes: See Fig. 44A

Table of timings (sec.)

<table>
<thead>
<tr>
<th>Model</th>
<th>Pre-purge and pre-ignition time tv1</th>
<th>stray light monitoring tf</th>
<th>safety time ts</th>
<th>post-ignition time after v1 tn</th>
<th>delay time to V2 DKO 972-N-only tv2</th>
</tr>
</thead>
<tbody>
<tr>
<td>05</td>
<td>15</td>
<td>5</td>
<td>5</td>
<td>7</td>
<td>20</td>
</tr>
</tbody>
</table>
### Fault Finding

#### Blinkcode Dxx-N

**1 Normal Operation**

<table>
<thead>
<tr>
<th>Blinkcode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>●</td>
<td>Idle state, no heat demand</td>
</tr>
<tr>
<td>● ●</td>
<td>Power supply not ok (frequency or voltage)</td>
</tr>
<tr>
<td>● ● ●</td>
<td>Start delay (cooling down ignition device, RT is on)</td>
</tr>
<tr>
<td>● ● ● ●</td>
<td>Waiting for FT-on, LW-off, LK-open</td>
</tr>
<tr>
<td>● ● ● ● ●</td>
<td>Burner is starting</td>
</tr>
<tr>
<td>● ● ● ● ●</td>
<td>Burner is in operation (from end of safety time)</td>
</tr>
<tr>
<td>● ● ● ● ●</td>
<td>Burner is stopping (e.g. in post-purge)</td>
</tr>
</tbody>
</table>

Code is sent every 5 s; in between the LED is off.

**2 Special Codes (no lock-out)**

<table>
<thead>
<tr>
<th>Blinkcode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>● ● ● ● ●</td>
<td>Device in Status „Parameter-Download“</td>
</tr>
<tr>
<td>● ● ● ●</td>
<td>Parameter set for test; device will start only after release with serial communication</td>
</tr>
<tr>
<td></td>
<td>“End of Life” warning</td>
</tr>
</tbody>
</table>

Code is sent every 5 s; in between the LED is off.

**3 Burner lock-out**

<table>
<thead>
<tr>
<th>Blinkcode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>● ● ● ●</td>
<td>False flame</td>
</tr>
<tr>
<td>● ● ● ●</td>
<td>No flame at end of the safety time</td>
</tr>
<tr>
<td>● ● ● ●</td>
<td>Flame failure in operation</td>
</tr>
<tr>
<td>● ● ● ●</td>
<td>Flame present after the end of operation phase</td>
</tr>
<tr>
<td>● ● ● ●</td>
<td>No flame signal during ignition spark supervision</td>
</tr>
<tr>
<td>● ● ● ● ●</td>
<td>Two flame sensors connected</td>
</tr>
<tr>
<td>● ● ● ●</td>
<td>Air pressure switch (LW) opened during supervised phase</td>
</tr>
<tr>
<td>● ● ● ●</td>
<td>Air pressure switch (LW) didn’t close</td>
</tr>
<tr>
<td>● ● ● ●</td>
<td>Air pressure switch (LW) didn’t open</td>
</tr>
<tr>
<td>● ● ● ●</td>
<td>Oil pre-heater release temperature couldn’t be reached (FT didn’t close)</td>
</tr>
<tr>
<td>● ● ● ●</td>
<td>Oil temperature below threshold during supervised phase (FT opened)</td>
</tr>
<tr>
<td>● ● ● ● ●</td>
<td>Manual lock-out</td>
</tr>
<tr>
<td>● ● ● ● ●</td>
<td>Unknown error code</td>
</tr>
</tbody>
</table>

Code is sent every 10 s; in between the LED is always on.

**4 Special Codes (lock-out)**

<table>
<thead>
<tr>
<th>Blinkcode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>● ● ● ● ●</td>
<td>„End of Life“ lock-out</td>
</tr>
<tr>
<td>X X X X X X</td>
<td>Other 6-pulse code indicates system lock-out (internal failure)</td>
</tr>
</tbody>
</table>

Code is sent every 10 s; in between the LED is always on.

**Legend:**
- Flashlight signal
- Long (½ s)
- Short (0.1 s)
- RT: Heat demand
- FT: Pre-heater release thermostat
- LW: Air proving switch
- LK: Air damper

Fig. 44A

DESN 516838
**Fault Finding (Boiler)**

**Is there 230V to the Appliance**

**Testing:**
- Power supplied
- Programmer boiler slider set to 'cont'; boiler stat set to max.
- Auxiliary controls calling for heat

**Boiler Burner Not Operating**

Ensure power to L1

**No Flame Ignition**
- Check fuel supply & nozzle
- Check oil pressure (10 bar)
- Check nozzle
- Check air setting
- Check PEC (min detector current 35 microamps)
- Check control box

**No sequence lock-out**
- Excessive light to PEC
- Check control box

**No**
- Is pump & fan operating?
  - Yes: Adjust pressure
  - No: Change pump

**Yes**
- Is there 230V to pump?
  - Yes: Change control box
  - No: Change relay

**Check that relay KA is in the NC position**
- Yes: Change relevant solenoid
- No: Change control box

**Check solenoids operate**
- Yes: Change relay
- No: Change igniter

**Check relay IS in the NC position**
- Yes: Change igniter
- No: Change control box

**Check igniter operates**
- Yes: Check electrodes, electrode gap & high tension leads
- No: Change relay

**Note:** On 499K & KB only Vg is a soft start solenoid for the boiler - failure of this component causes the boiler to start up noisy.
FAULT FINDING - COOKER

TESTING:
- POWER ON
- PROGRAMMER COOKER SET TO 'CONT'
- COOKER STAT SET TO MAX

COOKER BURNER NOT OPERATING
- SEE INFORMATION SYSTEM PAGE 35-36

CONTROL BOX GONE TO LOCKOUT
- ENSURE POWER TO L2
- RESET CONTROL BOX

NO FLAME IGNITION
- CHECK FUEL SUPPLY & NOZZLE
- CHECK OIL PRESSURE (10 BAR)

NO
- IS PUMP & FAN OPERATING

NO
- IS THERE 230V AT MOTOR

NO
- CHANGE CONTROL BOX

NO
- CHECK RELAY KA OPERATES

NO
- IS THERE 230V AT RELAY

NO
- CHANGE RELAY

NO
- CHANGE CONTROL BOX

YES
- IS VgC & VgSC OPERATING

YES
- IS THERE 230V AT SOLENOIDS

YES
- CHECK IGNITOR OPERATES

NO
- CHECK RELAY KA1 OPERATES

NO
- IS THERE 230V AT RELAY

NO
- CHANGE RELAY KA1

YES
- CHECK RELAY KA1 OPERATES

YES
- CHANGE IGNITOR

WITH IGNITION
- CHECK NOZZLE
- CHECK AIR SETTING

YES
- CHECK PEC (MIN DETECTOR CURRENT 35 MICROAMPS)

YES
- CHECK CONTROL BOX

NO SEQUENCE LOCK-OUT
- EXTRANEOUS LIGHT TO PEC
- CHECK CONTROL BOX
For further advice or information contact your local distributor/stockist

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