CH/CX Automatic Oil Burner

Installation
Maintenance
Spares

BY APPOINTMENT TO HER MAJESTY THE QUEEN MANUFACTURERS OF COMBUSTION EQUIPMENT NU-WAY HEATING PLANTS LTD. DROITWICH

NU·WAY
HEATING PLANTS LIMITED
A SUBSIDIARY COMPANY OF WOLSELEY-HUGHES LTD.

NU·WAY

P.O. Box 1, Vines Lane, Droitwich, Worcestershire WR9 8NA. Telephone: Droitwich (0905) 772331 Telex: 338551

The following information should be completed and used in any communication concerning your Burner.

SERIAL NUMBER .....

SPECIFICATION NUMBER .....

Contents

ILLUSTRATIONS

WIRING DIAGRAMS

KEY: H/L — High Low

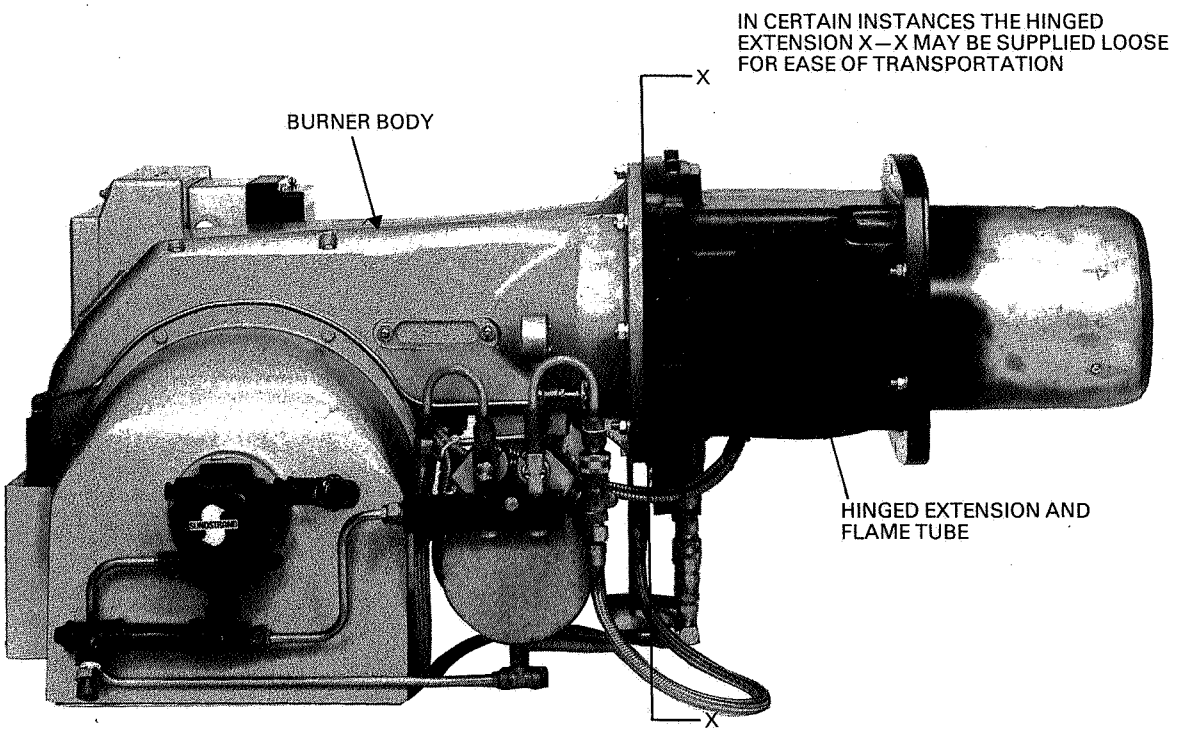

IN CERTAIN INSTANCES THE HINGED EXTENSION X—X MAY BE SUPPLIED LOOSE FOR EASE OF TRANSPORTATION
X
BURNER BODY
HINGED EXTENSION AND FLAME TUBE
X

FIG. 1

1. INTRODUCTION

The manual covers two types of burner:

Models CH 6 — 7 High/Low Burners
Models CX 6 — 7 High/Low Burners.

Where an instruction or information is applicable to only one of the burner types, then it is identified in the text.

The CH/CX high/low burners are manufactured for two stage operation (Low Fire/ High Fire).

CH and CX modulating burners are the subject of a separate manual.

1.1 GENERAL

The Nu-way CH/CX manual is structured to enable the user to proceed from the delivery of the burner to its commissioning and use.

Burner assembly, components, controls used and adjustments to be made are dealt with in a sequence that should be followed for correct assembly, installation and use. Pre Commissioning and Live Run are described and the locations of components are illustrated and supported by appropriate tabular matter and graphs.

Routine Maintenance, Fault Finding, Spare Parts identification and Wiring Diagrams complete the manual. Literature on proprietary components is included.

1.2 SAFETY

Before attempting to assemble, install or commission the Nu-way CH or CX burner series, it is essential that the following instructions are carefully read and understood. It is also recommended that such work is carried out only by experienced and qualified oil burner commissioning engineers.

The manufacturer cannot be held responsible for any consequential damage, loss or personal injury as a result of customers failing to follow these instructions, or as a result of mis-use.

1.3 DESPATCH FOR TRANSIT

The CH/CX burners may be supplied in partly assembled form in one of two alternative modes:

Mode One: Complete burner unit fully assembled. (Fig. 1)

Mode Two: (Comprises two units) (Fig. 1)

(a) Burner body complete with control panel.
(b) Hinged Extension and flame tube assembly.

Ancillary components, i.e. flexible oil pipes, filters, etc. are supplied separately.

2. BURNER

2.1 ASSEMBLY — Mode Two

At this stage it may be more convenient to fit the hinged extension/flame tube assembly to the appliance before attaching the burner body. Ensure the gasket provided is fitted between the appliance and mounting flange.

Alternatively the hinged extension may be attached to the burner body and the complete burner assembly then fitted to the appliance. Ensure the gasket provided is fitted between the appliance and mounting flange.

The hinged extension is fitted to the burner body with the 8 studs and nuts provided. Ensure the oil manifold block is at the bottom. (Fig. 1)

Open the hinged extension and connect the ignition leads to the electrodes. Close the hinged extension. (Fig. 2)

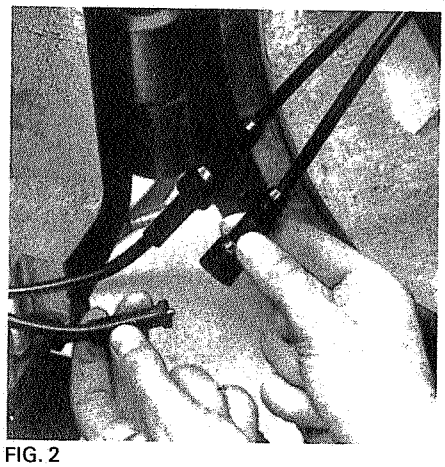


FIG. 2

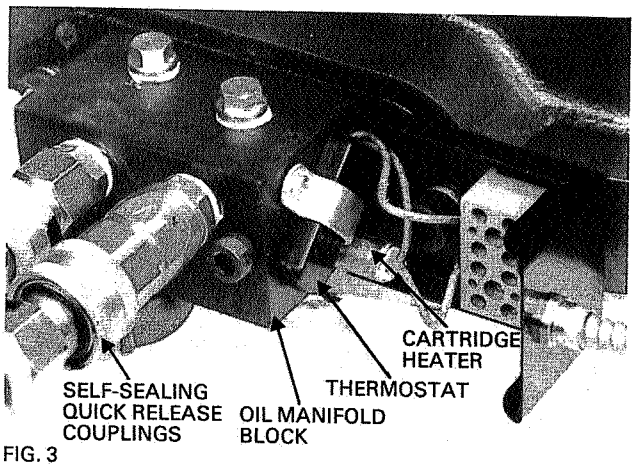


FIG. 3

Connect the cartridge heater and thermostat socket lead to the plug located in the oil manifold block terminal box. Secure the terminal box cover. (Fig. 3)

Connect the self sealing quick release flexible oil pipes between the magnetic valve manifold block and the oil manifold block. (Fig. 4)

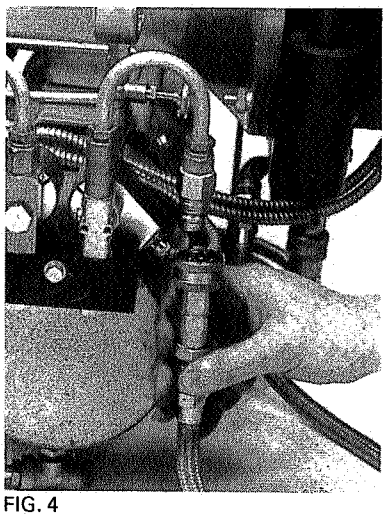


FIG. 4

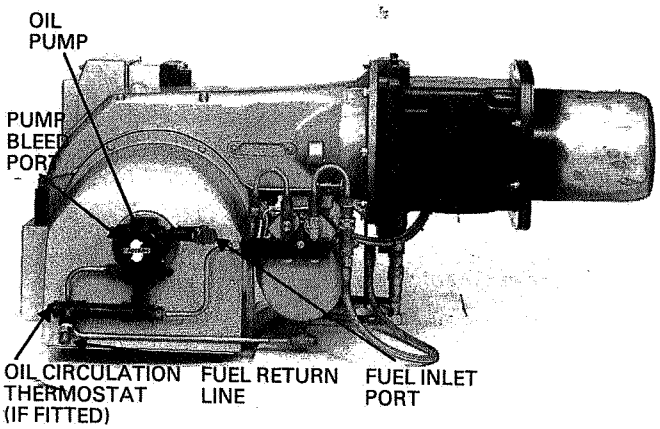


FIG. 5

Connect the flexible oil pipes from the oil inlet and return ports on the burner to the main oil supply pipework. (Fig. 5)

Check that the main oil filter is installed correctly. (Fig. 6)

BURNER	Inlet Size	Return Size
C6—28C/D C6—34A/B/C/D C7—38A/B/C/D	½" BSP	¾" BSP
C6—28E C6—34E C7—38E/F	¾" BSP	¾" BSP

2.2 FITTING TO THE APPLIANCE

If the burner is to be fitted to a new packaged unit with over pressure conditions, refer to the Manufacturer's recommendations.

If the burner is to be used with an existing appliance, the chimney, flues, passage-ways and heat transfer surfaces must be cleaned. Prepare burner mounting plate (see dimensional drawing in Data Sheet). Ensure that the joint between the appliance and the burner is effectively sealed by using the gasket provided.

2.2.1 Flue and Chimney Requirements

The top of the chimney/flue should be above all roofs within a radius of 10 metres.

Ensure that the flue pipe from the appliance does not protrude into the chimney beyond the wall thickness.

If more than one appliance is connected to a common flue/chimney, ensure that the cross section of the flue/chimney is adequate for the total volume of flue gases from all the appliances, and complies with Local Regulations.

It is recommended that each appliance should be exhausted into a separate flue.

2.2.2 Combustion Chamber Conditions

When the burner is fitted to an appliance designed to work under balanced or negative combustion chamber conditions, the over fire draught must not exceed 0.05 kPa (0.2 inches W.G., 0.5m Bar, 5mm w.g.)

Should the over fire draught exceed this figure, then steps should be taken to reduce it to this level.

2.2.3 Plant Room Ventilation

An adequate dust-free supply of fresh air is required for the burner at both high and low level in accordance with the appropriate standards.

3. SITE SERVICES

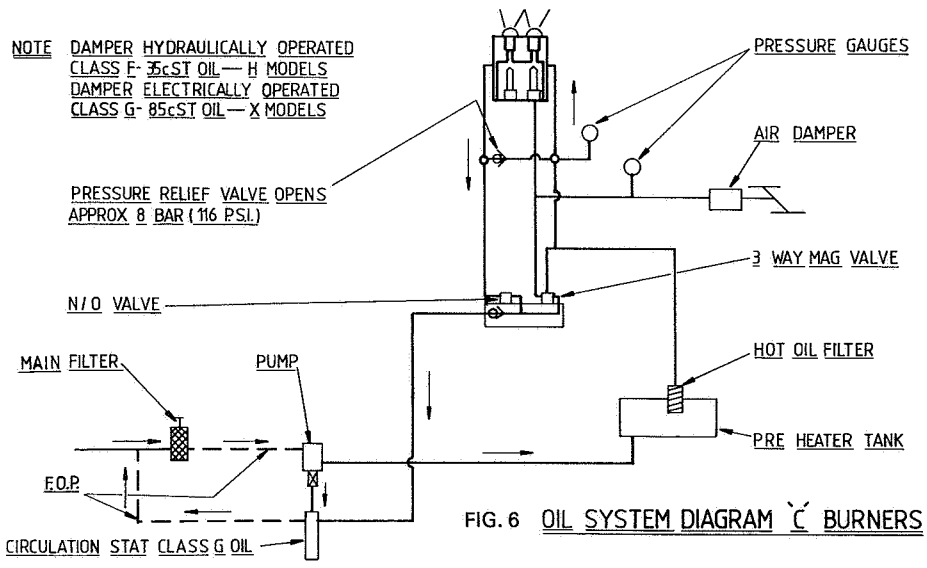


FIG. 6 OIL SYSTEM DIAGRAM 'C' BURNERS

3.1 ELECTRICAL POWER SUPPLY

Connect the appropriate electricity supply to the burner observing all applicable Codes and Standards. Refer to specific burner wiring diagrams included in the manual, burner instruction pack (attached to the burner) or the appliance manufacturer's handbook. Connect external auxiliary control circuits by reference to the appropriate wiring diagram. Check all systems and circuits are correctly fused.

3.2 OIL SUPPLY

'C' Burner oil system diagram (Fig. 6)

3.2.1 Main Oil Storage Tank

Residual oils must be maintained at all times to a temperature specified by the Supplier.

3.2.2 Oil Supply to the Burner

Oil from the tank to the burners may be supplied by:—

(a) Single pipe gravity feed system, (Fig. 7)
(b) Pumped ring main system. (Fig. 8)

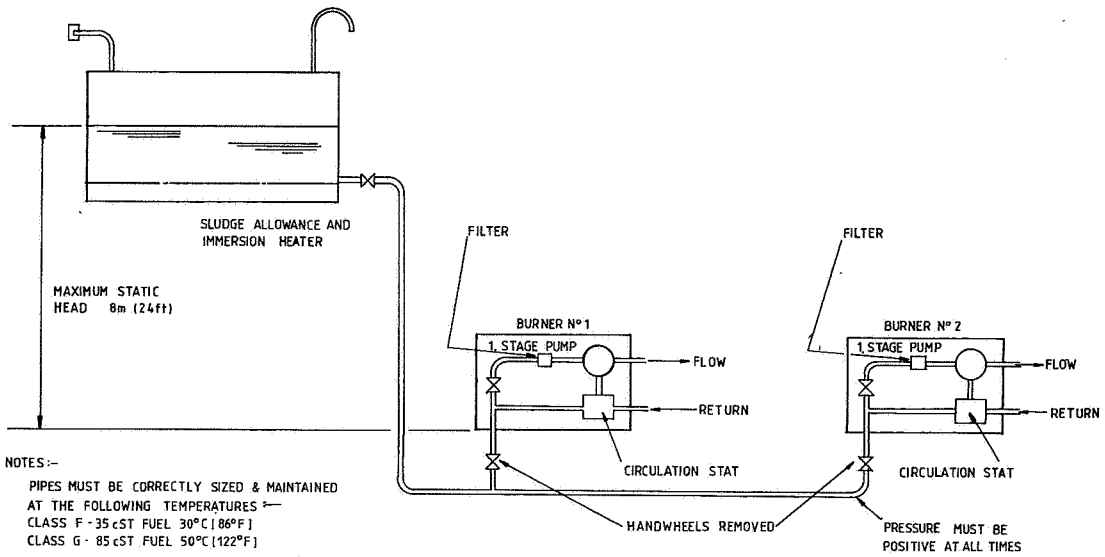


FIG. 7 GRAVITY FEED OIL SUPPLY SYSTEM FOR RESIDUAL OIL BURNER.

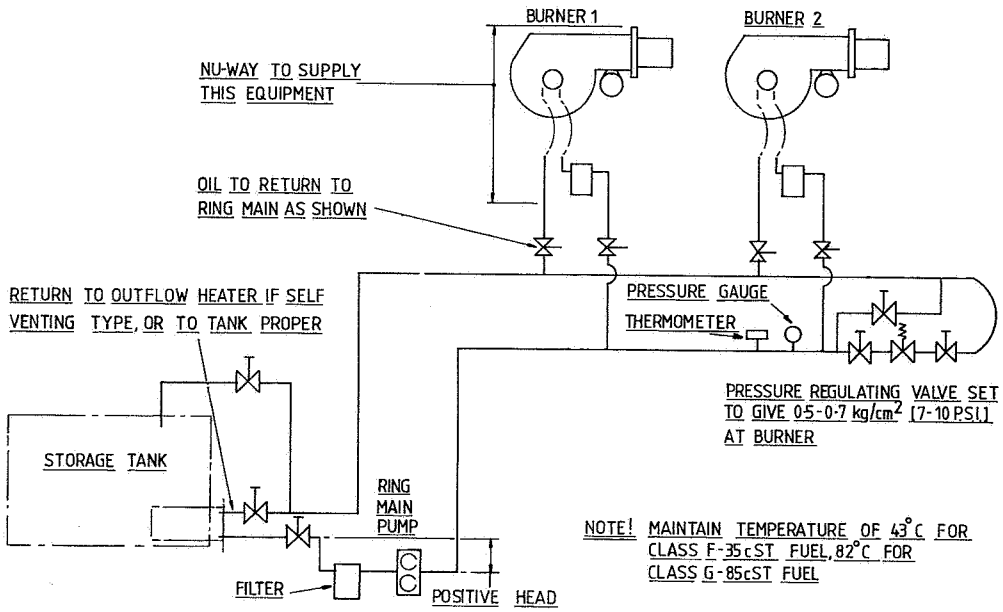


FIG. 8 SUGGESTED RING MAIN FOR RESIDUAL OIL BURNERS

3.3 SINGLE PIPE SYSTEM

The height of the main storage tank outlet above the burner and the sizing of pipe to the burner must be designed so that the oil pressure at the burner pump inlet is not less than 0.35 Bars (5.07 psi — 0.356 Kg/cm²) under any operating conditions. The maximum oil pressure at the burner pump inlet must not exceed 0.689 Bars (10 psi — 0.702 Kg/cm²) under any operating conditions. (Fig. 7)

The pipe must be sized to the full swept volume of the pump/pumps and not the capacity of the burner nozzles. (Minimum of 1.5 inches BSP for single burner installation).

3.4 PUMPED RING MAIN SYSTEM

The preferred system of oil supply. Essential for multiple burner installations and where heavy residual fuel oils are to be used.

The ring main pumps and pipe size must be designed to 1.25 times the total full swept volume of the burner pump/pumps it is to supply. (See Fig. 6/8).

All oil supply pipes must be constructed and installed to comply with local conditions and appropriate codes and standards. All pipework must be firmly supported, lagged traced and thermostatically controlled. (See Fig. 6/8)

3.5 OIL TEMPERATURE FOR RESIDUAL FUEL

Fuel Class BS 2869 1970	Max Fuel Viscosity at 80°C in cST	Minimum Storage Temperature		Minimum Oil Supply Line Temperature		Temperature Required at Burner Unit		Atomising Oil Temperature	
		°C	°F	°C	°F	°C	°F	°C	°F
F	35	25	77	30	86	43	110	110	220
G	85	40	104	50	122	82	180	132	270

3.6 BURNER PUMP CAPACITIES

BURNER TYPE	TOTAL CAPACITY Litres/Hour
C 6 A	250
C 6 B	250
C 6 C	250
C 6 D	250
C 6 E	379
C 7 A	250
C 7 B	250
C 7 C	250
C 7 D	250
C 7 E	379
C 7 F	379

4. BURNER DESCRIPTION

The Nu-way CH and CX high/low series fully automatic pressure jet oil burner units are of packaged design and meet the relevant national and international standards based on the ISO system of measurement and fastenings.

The CH/CX burners are of monobloc construction and form a single unit for mounting on to the frontplate of the appliance.

The system of pressure atomisation is used throughout the range. The method of operation is the well proven two stage (high/low) constant pressure twin nozzle system. Each nozzle is controlled by a pressure operated cut off valve integral with the nozzle block assembly. The burner air control device takes the form of a single blade with operating linkage and simple adjustment for high and low air setting. The operation of the air control device is by a pressure operated hydraulic system. (Fig. 9)

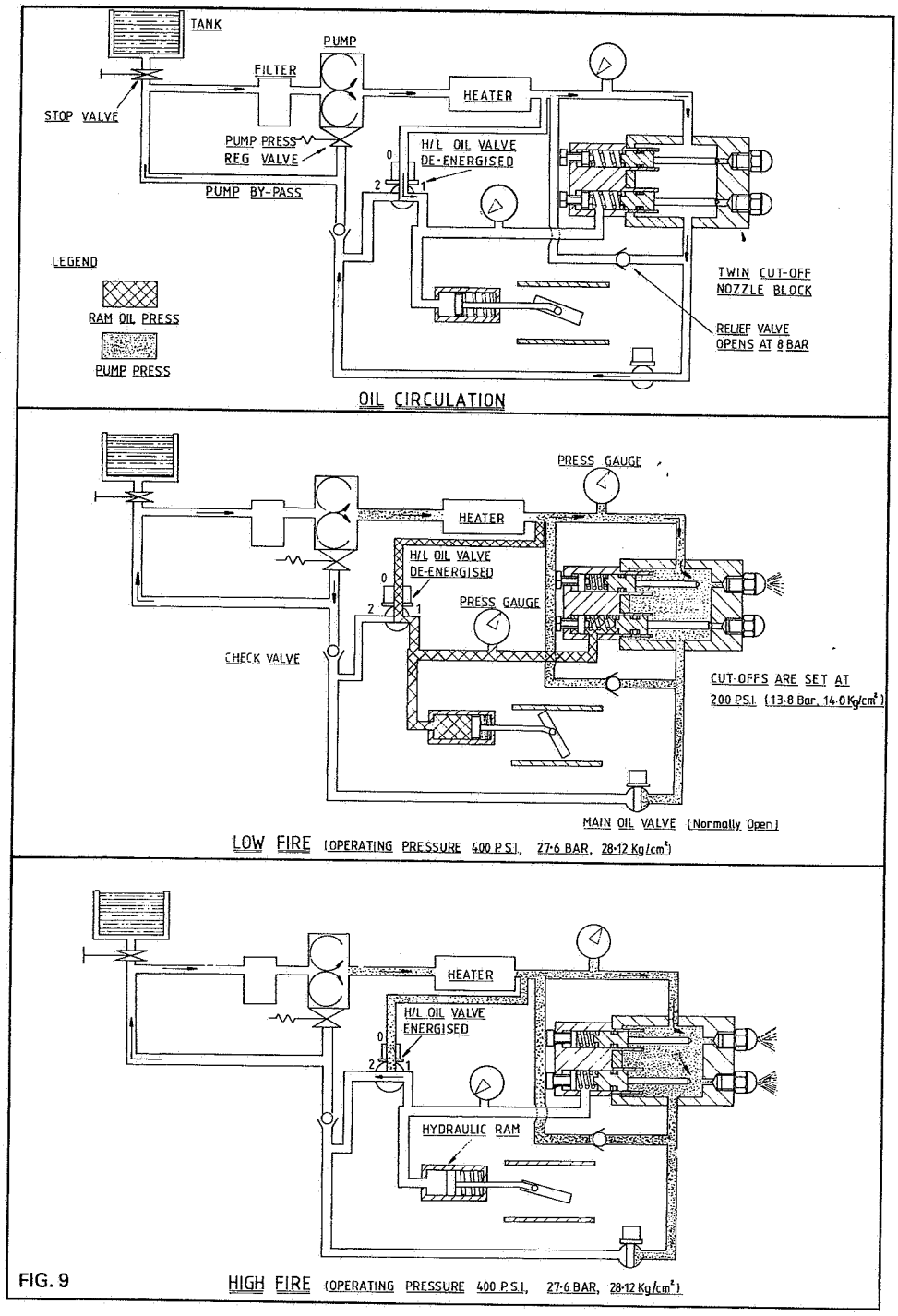


FIG. 9

CX models for Class G. fuel are based on the principle outlined above except the air control device is operated by an electric Servomotor with an additional fully closing air control device to shut off air supply during the burner "off" periods. (See Fig. 10)

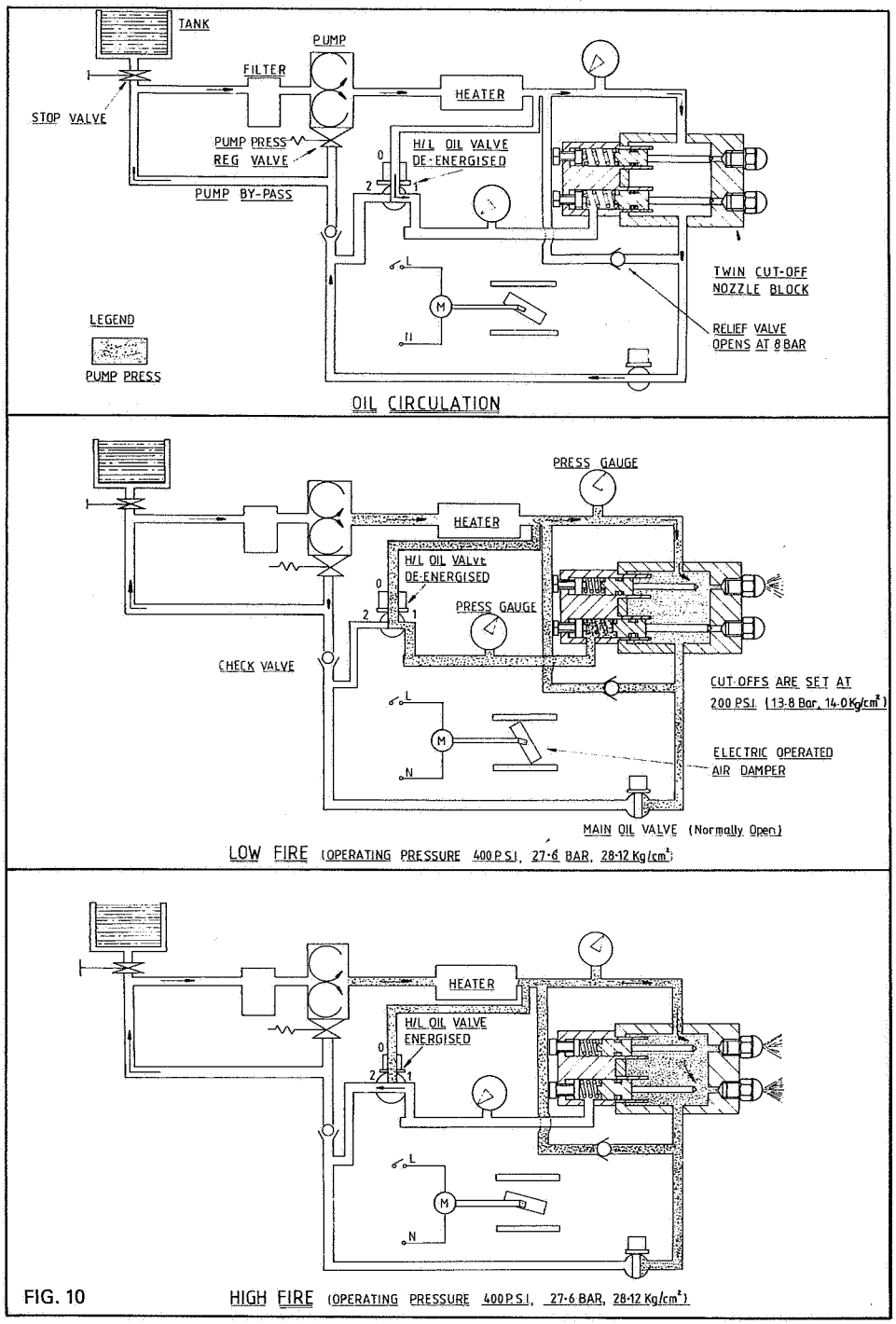


FIG. 10

4.1 BURNER AIR CONTROL AND ADJUSTMENTS

4.1.1 Air Control Damper — Fig. 11

Located inside the air inlet to the burner, its purpose is for the fine and final adjustments of the combustion air.

Adjustable stops and hydraulic ram for setting high and low flame air are located beneath the cover on the rear of the air inlet casing. (Fig. 11/12).

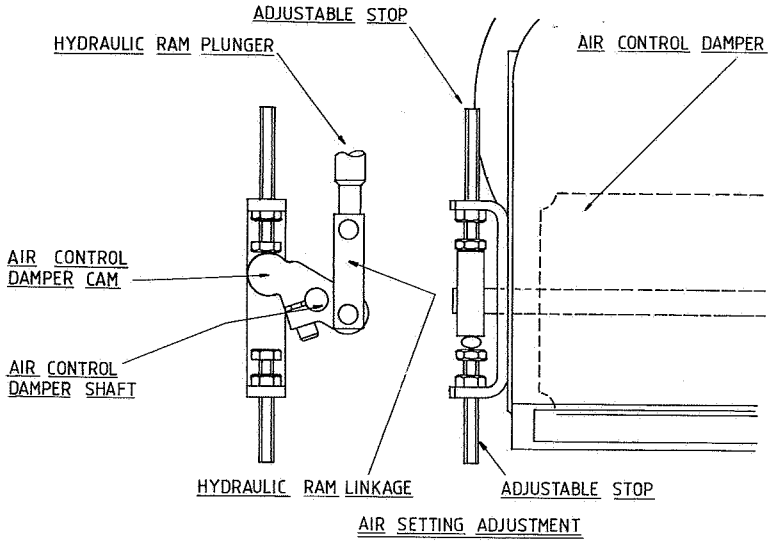


FIG. 11

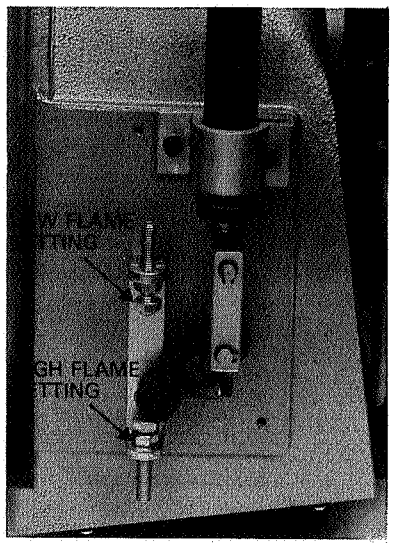


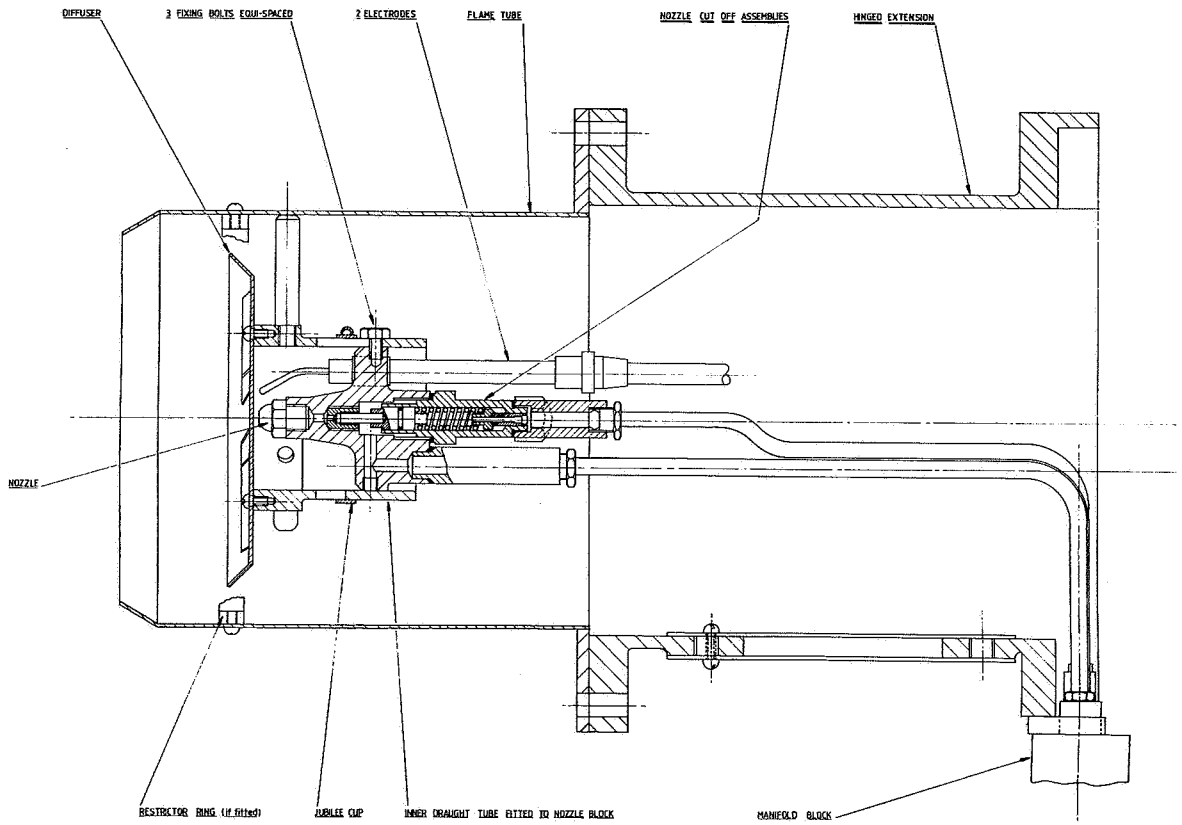
FIG. 12

4.1.2 **Air Diffuser** — Fig. 13

The air diffuser is fitted to the front end of the inner assembly of the burner and located within the flame tube attached to the hinged extension.

The function of the air diffuser is to control the volume of combustion air and create a pressure drop over the burner head to ensure a stable flame with good fuel/air mixing.

The position of the air diffuser is constant. (Fig. 13)



HEAD ARRANGEMENT FOR CH H/L BURNERS

4.1.3 **Primary Air Tube** — Fig. 13

Forms part of the burner inner assembly. Its function is to regulate the volume of primary combustion air passing through the centre of the air diffuser and over the oil nozzles. The regulating holes may be fully exposed or partially restricted depending upon the burner firing rate and characteristics of the appliance to which it is fitted. However under no circumstances should the primary air holes be restricted by more than 75%.

4.1.4 **Restrictor Ring** — Fig. 13

Located in the flame tube and fixed in position at the Factory. Restrictor rings are included in CH/CX burners only when required. Restrictor rings when fitted are used to create a high air pressure drop across the burner head to ensure good fuel/air mixing.

4.2 BURNER OIL COMPONENTS

4.2.1 **Inner Assembly** — Fig. 13

The oil inner assembly is located in the hinged extension/flame tube of the burner. Its primary function is to carry preheated oil from the manifold block to the atomising nozzles.

Other items and components included in or attached to the oil inner assembly are:—

4.2.2 **Nozzle Block** — Fig. 13

The multiple nozzle block is located at the forward end of the inner assembly. It houses the oil burner nozzles, the spring loaded and spring loaded/hydraulic piston cut off assemblies.

4.2.3 **On/Off Low Fire Spring Loaded Piston Cut Off Valve** — Fig. 13/14

Its function is to provide an immediate and positive cut off of the oil supply through the nozzle. It opens when the atomising oil pressure reaches 13.8 Bars (200 psi — 14 Kg/cm²) and exceeds the spring pressure behind the piston. It closes immediately the burner motor is de-energised and the pump pressure begins to fall.

4.2.4 **High Fire Hydraulic Spring Loaded Piston Cut Off Valve** — Fig. 13/14

The valve is operated by the three way magnetic oil valve. When the burner is on low fire the oil pressure is maintained behind the piston which together with the spring resistance keeps the nozzle cut off valve closed. On change to high fire the three way magnetic valve allows oil to be discharged from behind the piston so that the oil pressure on the nozzle side of it exceeds the spring resistance and allows the cut off valve to open and the nozzle to spray oil.

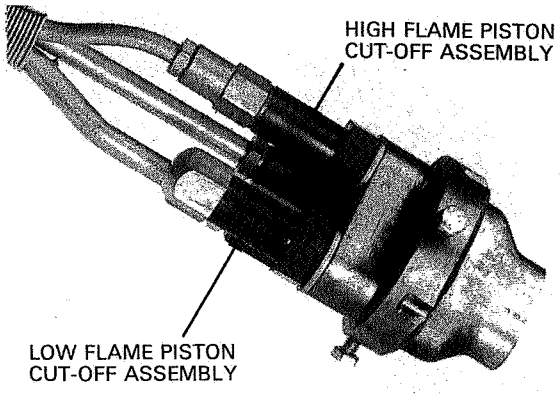


FIG. 14

4.2.5 Oil Nozzles

The oil nozzles are fitted into the forward end of the nozzle block. The function is to spray oil into the combustion chamber at atomising temperature and pressure and in a volume commensurate with the capacity of the appliance to which the burner is fitted.

IMPORTANT NOTE: When fitting nozzles to the CH/CX burners the nozzle filters must be removed.

In calculating the correct size of nozzles to be fitted, the following should be taken into account:

Nozzles are marked for capacity and calibrated at an oil pressure of 7 Bars/100 psi. The correction factor to be used to establish the nozzle sizes is as follows:

Nozzle marking x 1.66 = Imperial Gallons at 27.6 Bars — 400 psi.

Nozzle marking x 7.16 = Kg/Hr at 27.6 Bars — 400 psi.

Primary Air Tube — See (Fig. 13) above.

AIR DIFFUSER — See (Fig. 13) above.

4.3 IGNITION ELECTRODES

These are located and fitted as an integral part of the inner assembly. The function is to provide a source of spark ignition to the atomised oil discharge from the nozzles.

4.4 OIL MANIFOLD BLOCK — Fig. 3

The oil manifold block is located beneath the hinged extension. It includes a cartridge heater and controlling thermostat designed to keep residual oils in the inner assemblies at pumping viscosity during the burner off periods. The thermostat is factory set at 45°C and is unalterable.

The oil manifold block also includes a pressure relief valve fitted between the flow and return ports to relieve excessive pressure build up during the initial oil circulation period following a long burner shut down in cold environmental conditions. The pressure relief valve is set to operate at 8 Bars (116 psi — 8.1 Kg/cm²).

Two pressure gauges are fitted to the oil manifold block to show atomising and hydraulic oil pressures.

4.4.1 Magnetic Valve and Manifold Unit

The magnetic oil valves are fitted to a manifold directly mounted on to the surface of the oil preheater tank. Its location is designed to make use of residual heat from the oil preheater tank so as to keep the body of the magnetic valves as warm as possible. A non return valve is fitted in the manifold to prevent oil spillage from it during service work.

4.4.2 Magnetic Valve (Two Way)

The function of the two way magnetic valve is to control the oil at atomising pressure through the inner assembly to the burner nozzles via the nozzle cut off valve assembly.

4.4.3 Magnetic Valve (Three Way)

Its function is to control the supply of oil to the hydraulic/spring loaded nozzle piston cut off assembly and hydraulic ram mechanism operating the air control unit during the change to low fire. On the change from high to low fire the three way magnetic valve exhausts oil to the return side of the oil pump system.

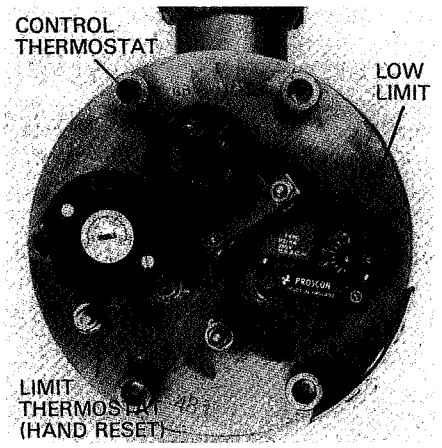


FIG. 15

4.5 OIL PREHEATER TANK — Fig. 15

The oil preheater tank is mounted on the burner ahead of the fan housing. Its function is to preheat the oil to the correct atomising temperature. The unit is equipped with three thermostats "low temperature", "operating" and "limit". A thermometer and hot oil filter are mounted together as one unit on the top left hand side of the pre-heater tank viewed from the rear of the burner.

4.6 OIL PUMP — Fig. 5

The oil pump is mounted on the right hand side of the burner viewed from the rear. It is directly driven from the burner motor and provides a sufficient volume of oil to the nozzles via the preheater tank at the correct pressure for atomisation.

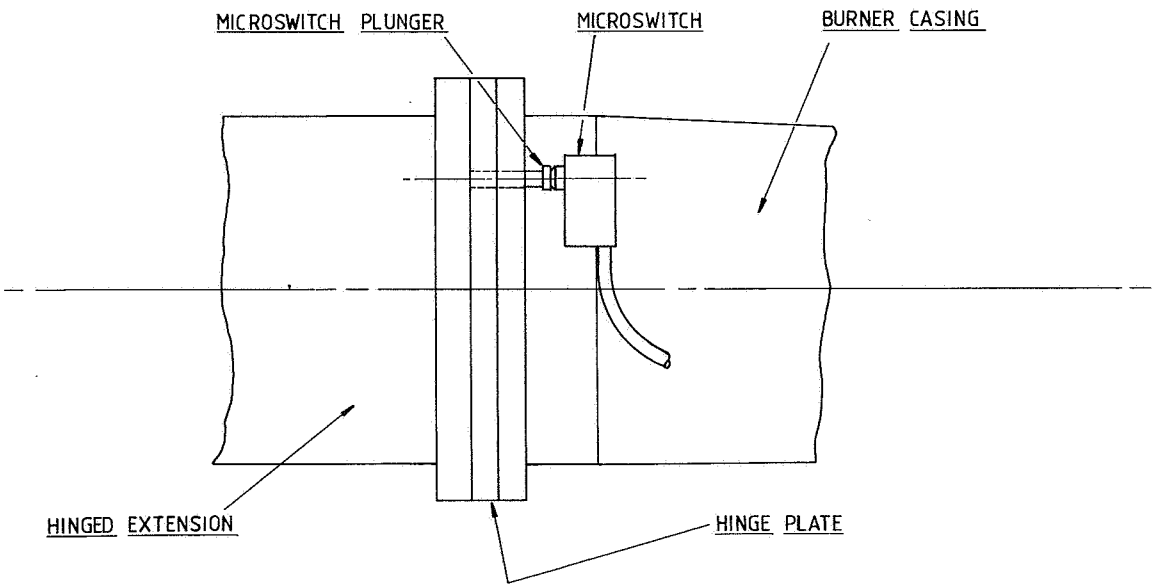


FIG. 16 MICROSWITCH POSITION C BURNERS

4.7 MICRO SWITCH — Fig. 16

Located on the burner body. Its function is to interrupt the burner sequence controller and prevent a re-start when the burner hinged extension is open.

4.8 OIL CIRCULATION THERMOSTAT — Fig. 5

This unit is included as standard equipment on all extra heavy fuel oil Class G burners. It can be supplied as an extra item on Class F and light residual fuel burners if required.

The intermittent circulation thermostat is fitted in the return line from the pump to the oil supply line.

Its function is to energise the burner oil pump via the motor so that hot oil at low pressure will be available at the nozzles at all times and particularly in those cases where cold environmental conditions are experienced.

When a circulation thermostat is fitted to the CH/CX burners it is vitally important that the burner is switched 'off' at the on/off switch on the burner control panel. 'NEVER AT THE MAINS ISOLATOR' except when maintenance and servicing is being carried out.

4.9 CONTROL PANEL

Is mounted on the left hand side of the burner viewed from the rear. It includes the Sequence Controller, Ignition Transformer, Motor and Preheater Contactors, Low Flame/Auto Hand Switch, On/Off Switch, Lights and Terminal connections.

A separate auxiliary panel for steam boilers (AOTC) requirements can be supplied on request.

5. PRE-FIRING CHECK AND INITIAL SETTINGS

1. Check that the burner is built to the correct specification for the appliance.
2. Check that the burner nozzles are fitted and are of the correct size for the appliance rating.
3. Check that the power supply to the burner is correct and all ancillary control circuits are connected.
4. Check that the oil supply is adequate and installed according to local Codes of Practice.
5. Check that the appliance to which the burner is fitted is in a proper state to be fired. (For instance: Is there water in the boiler?)
6. Check that the oil and electric supplies to the burner are turned off.

5.1 PRE-COMMISSIONING

Remove the cover from the hydraulic ram mechanism situated at the rear of the air inlet. Adjust the low flame travel stop so that the air control is approximately 15% open. Adjust the high flame travel stop so that the air control is approximately 50% open. Tighten all locking nuts after the adjustments have been made.

NOTE: 1. These initial recommendations are for general guidance at this stage. Final adjustments may be necessary later to suit the appliance requirements and possible variable site conditions.

2. At this stage it is important to establish that the preheater is full of oil. It is vitally important since the oil preheater tank may have been drained of oil at the Factory after testing so as to comply with shipping conditions under the heading "Hazardous Cargo". This operation can be carried out out by removing the filter/thermometer block. (Fig. 17)

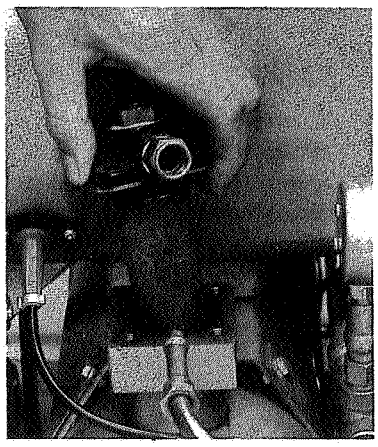


FIG. 17

3. It will also be necessary to manually prime the pump for the reasons outlined in 2 above. Turn on oil supply to burner. Remove the bleed port plug and purge the pump of air.

5.2 COMMISSIONING

Turn on the oil supply to the burner.

Open the control panel and set the low flame hold switch in the low flame position. Close the control panel. (Fig. 18)

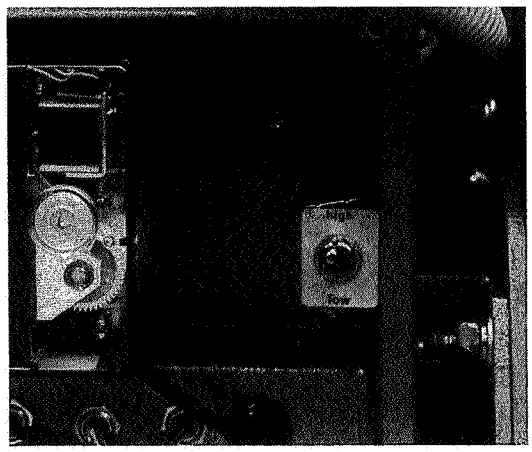


FIG. 18

Check that all auxiliary controls are correctly set.

Turn on the power to the burner.

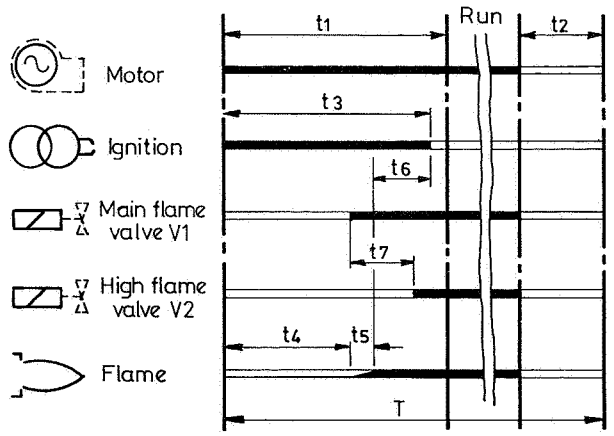
The oil preheater will become energised and take approximately 10—15 minutes before it reaches a temperature to satisfy the low oil temperature thermostat.

5.3 PRE-HEATER THERMOSTAT SETTINGS

FUEL	Low Limit		Control		High Limit	
	°C	°F	°C	°F	°C	°F
Class F — 35 cST	71	160	110	230	127	260
Class G — 85 cST	94	200	132	270	149	300

5.4 PRE PURGE OF BURNER FUEL SYSTEM — Fig. 9/10

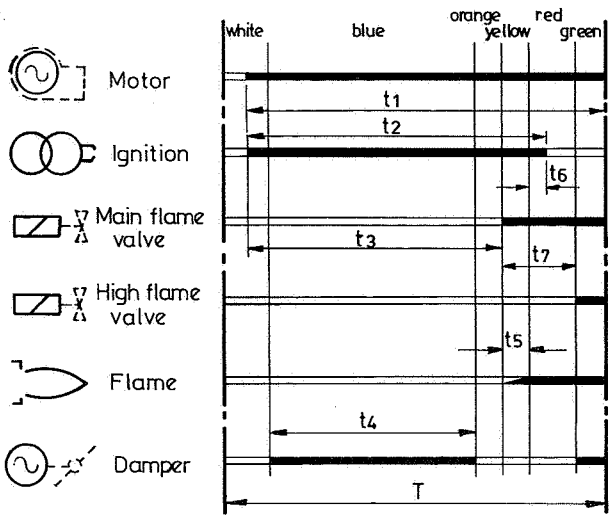
The burner fuel system is designed to prevent cold oil in the burner pipework passing through the nozzles during the starting cycle. On receiving a signal from the low temperature thermostat of the oil preheater, via the sequence controller, (Fig 19) the burner motor which drives the combustion air fan and fuel pump will start. For a pre determined period oil from the pump will pass through the oil preheater, the inner assembly, nozzle block and the on/off magnetic oil valve and return to the suction side of the pump. During this pre-determined purge period no oil will be discharged through the burner nozzles since the spring loaded/hydraulic and spring loaded nozzle cut off valves will remain closed.



LAL 1·25 Series 02

T	Total cycle time	97·5
t1	Start-up time	82·5
t2	Post-purge time	15
t3	Ignition time	47·5
t4	Prepurge time	32·5
t5	Safety time	5
t6	Post-ignition time	10
t7	Delay V1 - V2	15

Time in seconds.



TMO 720-4

T	Total cycle time	60
t1	Start-up time	55
t2	Ignition time	47
t3	Pre-purge time	40
t4	Damper open time	30
t5	Safety time	5
t6	Post-ignition time	2
t7	Delay V1 - V2	10

Time in seconds.

FIG. 19

Little or no oil pressure will be recorded on the pressure gauges.

At the same time the ignition spark will occur across the electrodes.

5.5 STARTING — LOW FIRE (ONE STAGE)

At the end of the pre-determined purge period the on/off magnetic oil valve will be energised and close thus preventing the return of oil to the suction side of the pump. Simultaneously the hydraulic lines to the ram operating the air control and the high fire nozzle cut off assembly will be pressurised. The oil pressure will immediately rise and both the atomising pressure gauge and the hydraulic circuit pressure gauge will show 27.6 Bars (400 psi — 28.12 Kg/cm²). The low flame spring loaded nozzle cut off valve will open as the pressure rises through 13.8 Bars (200 psi — 14 Kg/cm²) and allow oil to be sprayed through the low fire nozzle. (Fig. 9)

The burner will now operate on low flame.

At this stage it may be necessary to make adjustments to the air control low flame setting to give a clear but not sparky flame when viewed through the burner inspection window.

Allow the burner to operate under these conditions until the appliance and flue system are at normal operating conditions.

Check the oil temperature on the gauge. It should be approximately:

Class F — 35 cST Fuel 110°C
Class G — 85 cST Fuel 132°C.

Check that the atomising oil pressure is in accordance with the figures given above. Inspect the flame through the inspection window provided. It should be clear with a steady bright light visible through the slots in the air diffuser and a continuous halo is visible around the outer edge of it.

With the burner now working on low fire, a check may now be carried out with suitable instruments to establish combustion efficiency.

It may be necessary to make some further adjustments to the low flame air control settings.

Flue gas analysis of approximately 10—11% CO2 with a smoke number of 3—4 should be achieved at this stage of commissioning and dependent upon site conditions.

After each adjustment of the air control further combustion efficiency checks should be made.

Switch off the burner. The flame should be extinguished immediately and the oil pressure shown on both the atomising and hydraulic pressure gauges should quickly fall to zero or slightly above zero.

5.5.1 High Flame Operation

Open the control panel, set the Low Flame hold switch to the High Flame/Auto position. Close the control panel.

Switch on the burner.

The burner will again follow the sequence described above in the Low Flame section. After a pre-determined time, see logic diagram, the sequence controller will signal the three way magnetic valve. The valve will now close internal ports preventing oil at pressure reaching the high flame nozzle cut off valve and hydraulic circuit operating the air control. A further port in the three way valve will open simultaneously and discharge the fuel behind the high flame nozzle cut off valve and air control circuits to the suction side of the pump. This operation allows the high flame nozzle cut off valve to open and the hydraulically operated air control to move to the high flame air setting. The pressure shown on the hydraulic system gauge will fall to zero. The atomising pressure will remain at 27.6 Bars (400 psi — 28.12 Kg/cm²). The burner is now in the high flame operating position. (See Fig. 9)

Check the oil temperatures. These should be approximately: —

Class F 35 cST fuel 110°C
Class G 85 cST fuel 132°C.

Check that the atomising oil pressure is in accordance with the figures given above. Inspect the flame through the inspection window provided. It should be clear with a steady bright light visible through the slots in the air diffuser and a continuous halo is visible around the outer edge of it.

With the burner now working on high fire, a check may be carried out to establish combustion efficiency.

It may be necessary to make some adjustments to the high flame air control settings.

Flue gas analysis of approximately 12—13% CO2 with a smoke number of 3—4 should be achieved at this stage of commissioning and dependent upon site conditions.

After each adjustment further combustion efficiency checks should be made.

With the burner on high fire, open the control panel and set the low flame switch to low flame hold. This operation should be repeated a number of times to establish that a smooth change-over from high to low and low to high fire is evident.

Air in the system may result in a sluggish operation. Bleed the air from the burner and re-check.

When taking combustion efficiency tests care should be taken to eliminate any ingress of air around the sampling point. If such air is present false readings will be recorded.

In commissioning Nu-way CH or CX burners supplied as part of a packaged unit, the appliance manufacturer's instructions and figures relative to combustion efficiency, smoke density and exit flue gas temperatures should be followed.

5.6 CHECKING THE SEQUENCE CONTROLLER

Remove the photo electric cell from its holder while the burner is running and cover it with a clean cloth to exclude any light. The burner will stop within two seconds. The control circuit will recycle and the burner will go through a normal light up procedure. A flame will be established but since the photo electric cell can see no light the burner will go to lock-out.

The safety flame failure sequence is thus proved.

Replace the photo electric cell. Re-set the sequence controller and allow the burner to establish the normal operating sequence.

Check that the appliance auxiliary controls are correctly set and within safe limits.

Burner commissioning is now complete.

The burner will now operate until switched off by:—

(a) the controlling instruments of the appliance,
(b) manually,
(c) power failure. Upon restoration of the power after failure the burner will re-start automatically and follow its sequence through post purge to a stop situation followed by a normal re-start.

6. ROUTINE MAINTENANCE

When carrying out routine maintenance always turn off the power supply to the burner.

Regularly clean the fan blades with a stiff brush. Access is through the top cover secured by 4 screws. (Fig. 20)

FIG. 20

Frequently inspect the air inlet to the burner and ensure there are no obstructions to air flow and that it is dust free.

To clean the following components the inner assembly must be removed:

6.1 IGNITION ELECTRODES

Clean and check for cracks in the porcelain. If cracks are found the electrodes must be renewed.

Check the setting of the electrodes and re-set if necessary to dimensions shown. (Fig. 21/22)

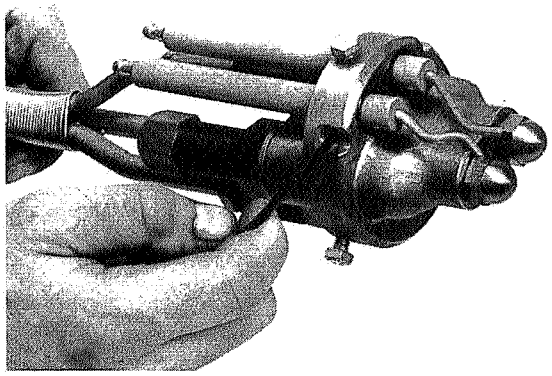


FIG. 21

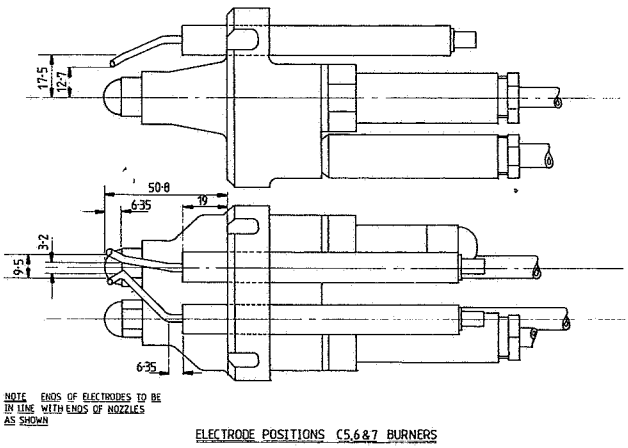


FIG. 22

6.2 AIR DIFFUSER

Clean with a stiff brush. Remove any soot particles or light carbon which may have accumulated. (Fig. 23)

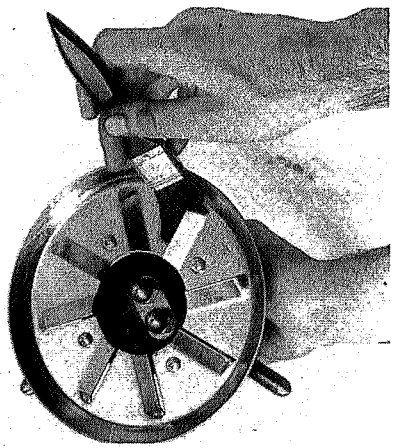


FIG. 23

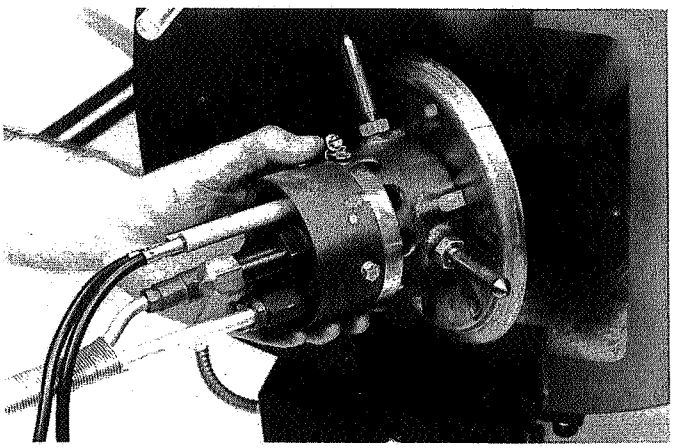


FIG. 24

6.3 NOZZLES

If nozzles have to be cleaned care should be taken not to scratch or damage the finely finished surfaces.

IMPORTANT NOTE: Nozzle life is approximately 2000 hours of operation. Unless replaced there will be a noticeable deterioration in atomisation and plant efficiency.

To remove inner assembly proceed as follows: (Fig. 24)

The oil fuel system of the burner must be allowed to cool down before attempting to remove the inner assembly.

Disconnect the self sealing quick release couplings at the inner assembly manifold block and magnetic oil manifold block. Open the hinged extension by removing the securing nuts. Disconnect the ignition leads from the electrodes. Remove the two Allen screws from the manifold union block.

The inner assembly complete may now be removed. Special attention should be given to the security of the three 'O' rings which form the seal between the inner assembly and the oil manifold block.

Reverse the above procedure when replacing the inner assembly ensuring the three 'O' rings sealing the triple union block to the oil manifold block are in position.

Failure to replace the 'O' rings will result in serious oil leakage.

Reconnect the ignition leads to the electrodes.

Close and secure the hinged extension.

Reconnect self sealing quick release couplings.

6.4 PHOTO CELL

Clean the photo electric cell lens with a dry clean cloth. (Fig. 25)

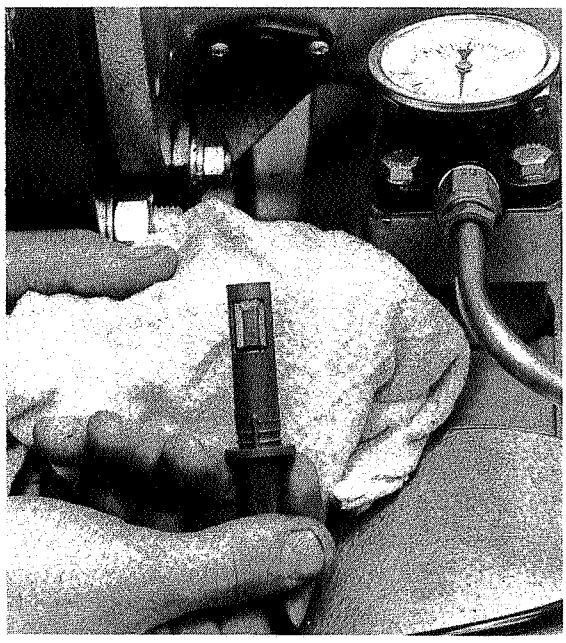


FIG. 25

6.5 COLD OIL FILTER

Rotate the cleaning knob daily.

The plug in the sump should be removed approximately every month/4 weeks to drain off any sludge or water that may have accumulated there.

6.6 HOT OIL FILTER — Located in Oil Preheater

Remove and clean filter at regular intervals (i.e. weekly). (See Fig. 17)

A fall off in atomising pressure is an indication that the filter needs cleaning.

Replace all covers and secure all fittings before switching on the burner.

During routine plant room cleaning and maintenance it is advisable to cover the burner so as to prevent fouling and damage to occur.

7. FAULT FINDING

7.1 BURNER MOTOR FAILS TO START

Check power supply to the burner and that burner is correctly wired.

Check fuses and motor overloads in burner control panel.

Check that hinged extension micro switch is closed.

Check that control box is not locked out — reset.

Check that control box is operating correctly by checking for a feed from the control box to terminal 95 on the contactor. If found to be faulty — replace.

Check that control instruments are "calling for heat".

Check that oil preheater limit thermostat has not tripped.

7.2 FAN STARTS — NO FLAME. BURNER GOES TO LOCK-OUT

SYMPTOM	POSSIBLE REASON	REMEDY
No Ignition:	Check electrode setting. Cracked electrode porcelains. Ignition leads disconnected. Faulty transformer.	Reset. Renew. Reconnect. Replace.
No Flame:	Interrupted oil supply. Low oil pressure. Magnetic oil valve fails to close. Faulty oil pump. Fire valve closed. Choked nozzles.	Rectify. Check coil. Replace. Reset. Clean and replace.

7.3 BURNER STARTS. FAILS TO RUN

If a flame is not properly established around the air diffuser the photo electric cell will not see sufficient light and so lock out.

SYMPTOM	POSSIBLE REASON	REMEDY
Burner starts — fails to run	Partially choked nozzle.	Clean or replace.
	Soot/carbon on diffuser.	Clean.
	Low oil temperature.	Check thermostat settings.
	Too much air.	Adjust air control.
	Dirty photo cell lens.	Clean.
	Wrongly positioned photo cell.	Adjust.
	Oil shortage.	Check supply.
	Faulty wiring.	Crossed polarity.

IMPORTANT: Check that the Sequence Controller and Photo Electric Cell are compatible.

7.4 BURNER STARTS. FAILS TO CHANGE TO HIGH FLAME

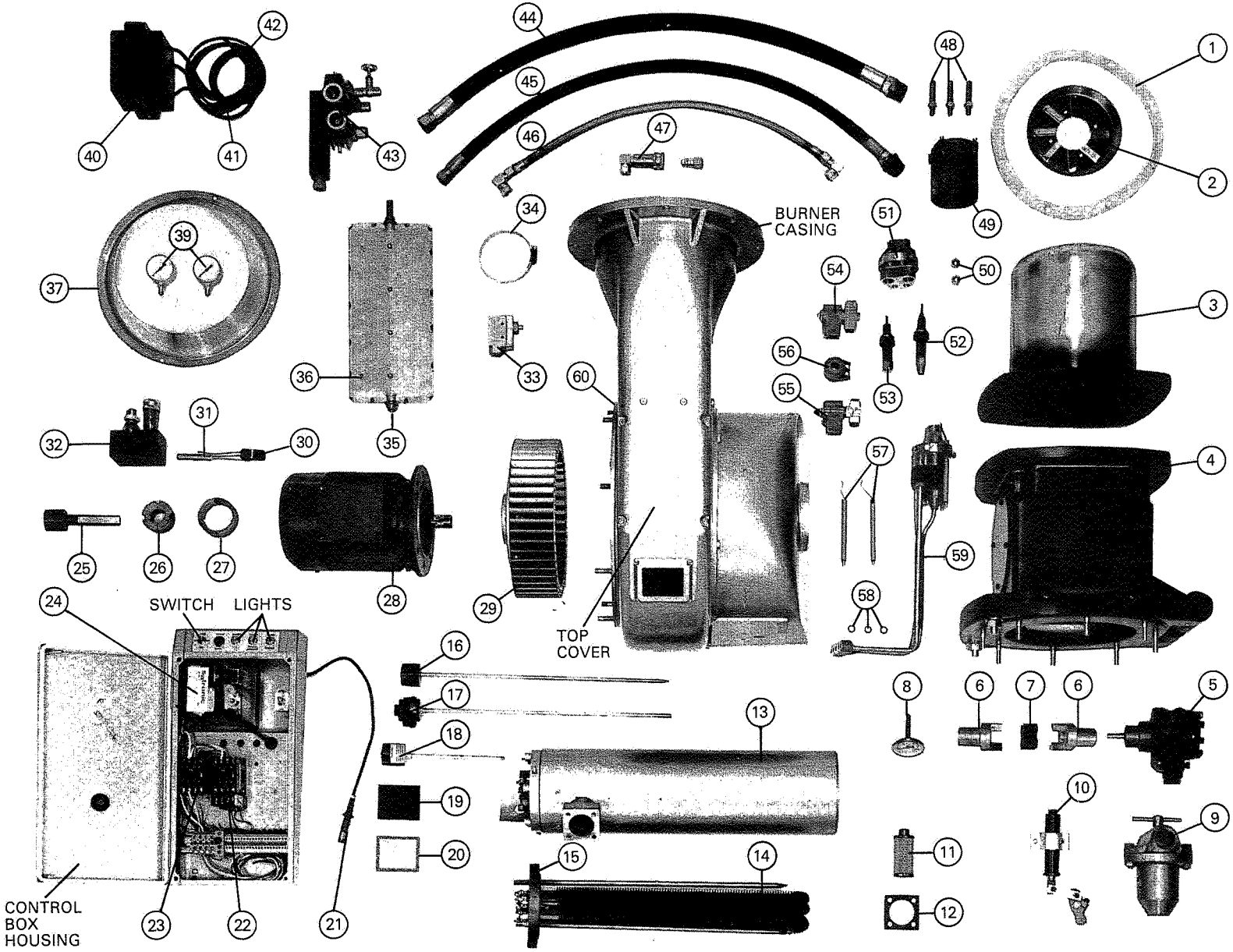
Three way oil valve fails to change over. Check wiring and valve coils.

Check storage tank to ensure that there is sufficient oil and at the required temperature.

Check and ensure that the high/low switch is set to High Flame position.

8. SPARE PARTS IDENTIFICATION (Fig. 26)

Separate illustrated lists, containing an item number, description and code number, are included in this section for High/Low burner components. The variations on a component are included and care must be taken when making any reference to a component to use the correct description and code number.


BURNER CASING
TOP COVER
SWITCH
LIGHTS
CONTROL BOX HOUSING

BURNER SERIES: CH/X 6—7 OIL BURNERS

ITEM	CODE NO	DESCRIPTION	USE
1	G09—001N	Gasket — Hinge Mounted	All
2	L04—115W	Diffuser Plate 6" x 2" Hole	CH6—28C, D, E. CH6—34A, B. CH7—38A, B.
—	L04—118H	Diffuser Plate 7" x 2½" Hole	CH6—34C, D, E. CH7—38C, D, E, F.
3	N04—278J	Flame Tube S.S.	CH6—28C — 34C. CH7—38C.
—	N04—277H	Flame Tube S.S.	CH6—34A, B. CH7—38A, B.
—	N04—279K	Flame Tube S.S.	CH6—28D, E — 34D, E. CH7—38D, E, F.
4		Hinged Extension	All
5	E02—005T	Fuel Pump Sundstrand E6	CH6—28C, D. CH6—34A, B, C, D. CH7—38A, B, C, D. CH6—28E. CH6—34E. CH7—38E, F.
—	E02—006U	Fuel Pump Sundstrand E7	
6	Z04—722Y	Flexible Coupling (Pump End)	All
—	Z04—723Z	Flexible Coupling (Motor End)	All
7	G03—017X	Flexible Coupling (Rubber)	All
8	G24—002V	Thermometer 0—300°F	All
9	E03—026Q	Cold Oil Filter	CH6—28C, D, E. CH6—34A, B, C, D, E. CH7—38A, B, C, D.
—	E03—010U	Cold Oil Filter	CH7—38E, F.
10	E19—001X	Hydraulic Ram	All
11	E03—019Z	Hot Oil Filter Element	All
12	G09—018N	Filter Gasket 3/4.5/6 Kw Heater	CH6—28C, D. CH6—34A, B, C, D. CH7—38A, B, C, D.
—	G09—019P	Filter Gasket 7.5 Kw Heater	CH7—38E, F.
13	E04—012K	Preheater Tank 3 Kw	CH6—34A. CH7—38A.
—	E04—013L	Preheater Tank 4.5 Kw	CH6—34B. CH7—38B.
—	E04—014M	Preheater Tank 6.0 Kw	CH6—28C, D. CH6—34C, D. CH7—38C, D. CH6—28E. CH6—34E. CH7—38E.
—	E04—015N	Preheater Tank 7.5 Kw	
—	E04—020X	Preheater Tank 9.0 Kw	CH7—38F.
14	E04—025Q	3 Kw Preheater Battery Only	CH6—34A. CH7—38A.
—	E04—026R	4.5 Kw Preheater Battery Only	CH6—34B. CH7—38B.
—	E04—027J	6.0 Kw Preheater Battery Only	CH6—28C, D. CH6—34C, D. CH7—38C, D. CH6—28E. CH6—34E. CH7—38E.
—	E04—028T	7.5 Kw Preheater Battery Only	
—	E04—031N	9.0 Kw Preheater Battery Only	CH7—38F.
15	G09—065M	Gasket for 3/4.5/6 Kw Preheater Tank	CH6—28C, D. CH6—34A, B, C, D. CH7—38A, B, C. D. CH6—28E. CH6—34E. CH7—38E, F.
—	G09—066N	Gasket for 7.5/9 Kw Preheater Tank	
16	C40—031C	Thermostat P2 279mm	CH6—34A. CH7—38A.

N.B. 1. Code numbers and types of electrical items listed are based on standard electrical supplies of 220—240V, 1-phase, 50 Hz., or 415V, 3-phase, 50 Hz. only.

2. When ordering spare parts it is essential to quote the serial and specification numbers shown on the burner or burners.

BURNER SERIES: CH/X 6—7 OIL BURNERS

ITEM	CODE NO	DESCRIPTION	USE
—	C40—032D	Thermostat P2 457mm	CH6—28C, D, E. CH6—34B, C, D, E. CH7—38B, C, D, E. F.
17	C40—029J	Thermostat P3 279mm	CH6—34A. CH7—38A.
—	C40—033E	Thermostat ACS 457mm	CH6—28C, D, E. CH6—34B, C, D, E. CH7—38B, C, D, E, F.
18	C40—028R	Thermostat (Hand Reset) NU3—178mm	All
19	G16—007S	Inspection Window	All
20	G09—003Q	Gasket for Window	All
21	C31—017R	Photocell L & G QRB (For LAL)	All
—	C31—023P	Photocell Satronic FZ711 (For TM0720)	All
22	C55—036U	Overload — Danfoss (1.8—2.3 amps)	All } State Motor Size and Voltage
—	C55—038E	Overload — Danfoss (4.0—6.2 amps)	All
—	C55—039F	Overload — Danfoss (6.0—9.0 amps)	All
—	C55—040L	Overload — Danfoss (8.0—12.0 amps)	All
—	C55—041H	Overload — Danfoss (10.4—16.0 amps)	All
23	C56—003D	Contactor — Danfoss 240V CU10	All } State Burner Size and Contactor Use (i.e. Heater Etc.)
—	C56—005F	Contactor — Danfoss 240V CH16	All
—	C56—008J	Contactor — Danfoss 240V CH10	All
—	C56—009K	Contactor — Danfoss 240V CH16	All
23a	B16—028Z	220V Contactor Coil for Above	All
24	C21—106W	Control Box L & G LAL 1.25	All
—	C21—066Y	Control Box Satronic TM0720—4	All
25	M04—309N	Motor Shaft Adaptor	CH6—28C. CH6—34A, B.
—	M04—301E	Motor Shaft Adaptor	CH6—28D, E. CH6—34C, D, E. CH7—38A, B, C, D.
—	M04—308M	Motor Shaft Adaptor	CH7—38E, F.
26	G02—015U	Taperlock Bush 1610 24mm Bore	CH6—28C. CH6—34A, B.
—	G02—013S	Taperlock Bush 1215 28mm Bore	CH6—28D, E. CH6—34C, D, E.
—	G02—019G	Taperlock Bush 1610 28mm Bore	CH7—38A, B.
—	G02—023V	Taperlock Bush 1615 28mm Bore	CH7—38C, D, E, F.
27	G01—005A	Taperlock Adaptor 1610A	CH6—28C. CH6—34A, B, C. CH7—38A, B.
—	G01—003G	Taperlock Adaptor 1215A	CH6—28D, E. CH6—34C, D, E.
—	G01—007C	Taperlock Adaptor 1615A	CH7—38C, D, E, F.
28	A13—004K	Motor 2.2 Kw (3.0 HP) 415V	CH6—28C. CH6—34A, B.
—	A14—001R	Motor 3.0 Kw (4.0 HP) 415V	CH6—28D, E. CH6—34C. CH7—38A, B.

N.B. 1. Code numbers and types of electrical items listed are based on standard electrical supplies of 220—240V, 1-phase, 50 Hz., or 415V, 3-phase, 50 Hz. only.

2. When ordering spare parts it is essential to quote the serial and specification numbers shown on the burner or burners.

BURNER SERIES: CH/X 6—7 OIL BURNERS

ITEM	CODE NO	DESCRIPTION	USE
—	A16—001K	Motor 4.0 Kw (5.5 HP) 415V	CH6—34D, E. CH7—38C, D.
—	A17—002M	Motor 5.5 Kw (7.5 HP) 415V	CH7—38E.
—	A18—002W	Motor 7.5 Kw (10.0 HP) 415V	CH7—38F.
—	A13—003J	Motor 2.2 Kw (3.0 HP) 380V	CH6—28C. CH6—34A, B.
—	A14—005M	Motor 3.0 Kw (4.0 HP) 380V	CH7—28D, E. CH6—34C. CH7—38A, B.
—	A16—006Q	Motor 4.0 Kw (5.5 HP) 380V	CH6—34D, E. CH7—38C, D.
—	A17—003N	Motor 5.5 Kw (7.5 HP) 380V	CH7—38E.
—	A18—004Y	Motor 7.5 Kw (10.0 HP) 380V	CH7—38F.
29	D11—004N	Fan Impeller 279 x 76	CH6—28C.
—	D11—006Q	Fan Impeller 279 x 102	CH6—28D, E.
—	D13—002N	Fan Impeller 337 x 63	CH6—34A, B.
—	D13—003P	Fan Impeller 337 x 76	CH6—34C.
—	D13—005R	Fan Impeller 337 x 89	CH6—34D, E.
—	D15—002Q	Fan Impeller 381 x 76	CH7—38A, B, C.
—	D15—007M	Fan Impeller 381 x 95	CH7—38D, E, F.
30	C40—072M	Oil Manifold Thermostat	All
31	E04—061U	Cartridge Heater 80W	All
32	M04—603D	Manifold Block	All
33	B01—016X	Microswitch	All
34	G14—019T	Jubilee Clip	All
35	G10—001A	Air Flap Bush	All
36	P04—033Y	Air Flap	All CH6
—	P04—034Z	Air Flap	All CH7
37	L04—011Z	Air Inlet Ring	CH6—28D, E.
—	L04—012S	Air Inlet Ring	CH6—28C.
—	L04—006D	Air Inlet Ring	CH6—34C.
—	L04—005C	Air Inlet Ring	CH6—34D, E.
—	L04—003A	Air Inlet Ring	CH7—34A, B, C, D, E, F.
38	N04—042Z	Scoop	CH6—34A, B.
39	G04—005D	Pressure Gauge 0—600 psi	All
40	C04—002H	Transformer Parmeko P76476	All
41	U90—400G	HT Leads (Pair) (State Length)	All

N.B. 1. Code numbers and types of electrical items listed are based on standard electrical supplies of 220—240V, 1-phase, 50 Hz., or 415V, 3-phase, 50 Hz. only.

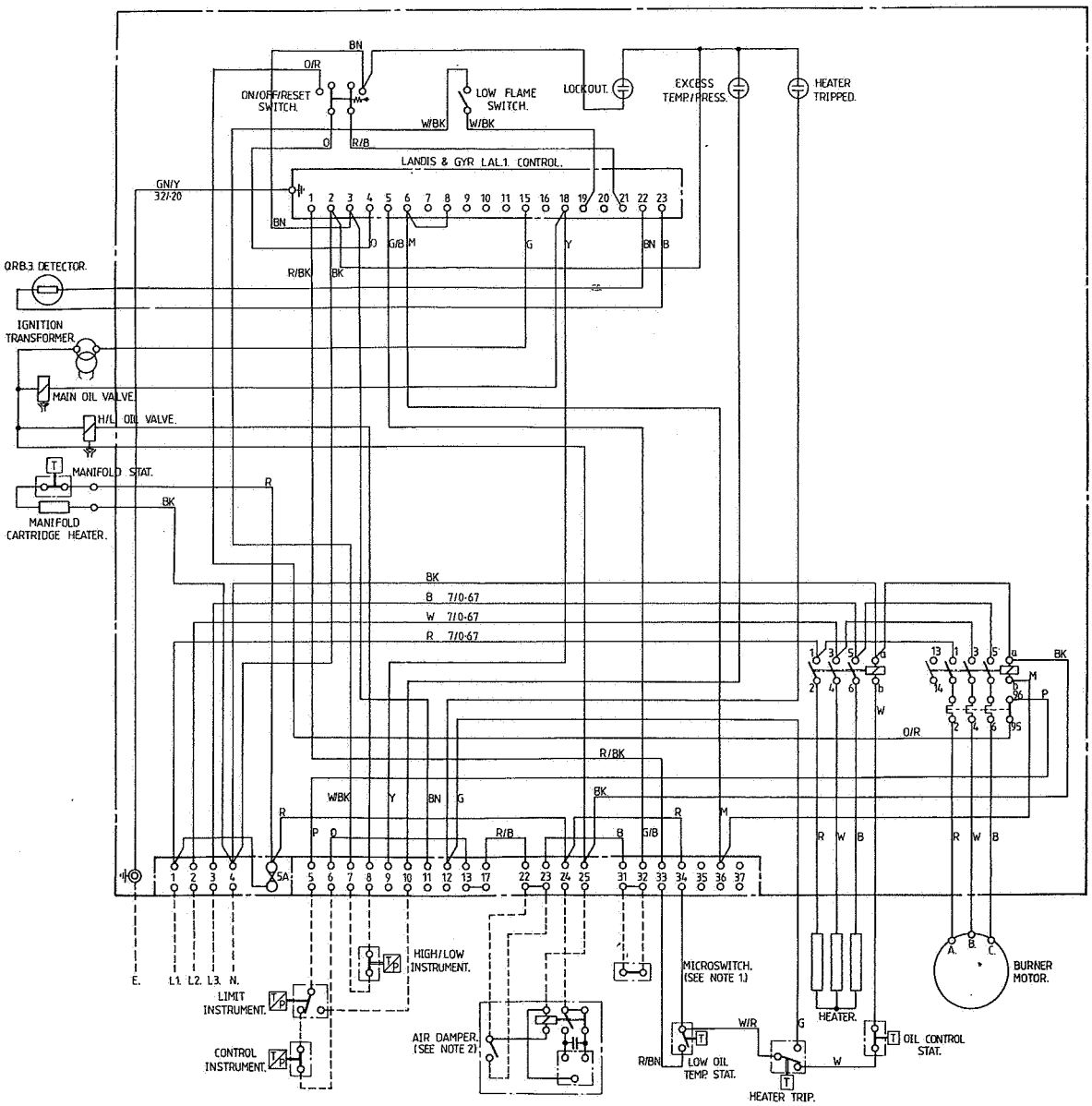
2. When ordering spare parts it is essential to quote the serial and specification numbers shown on the burner or burners.

BURNER SERIES: CH/X 6—7 OIL BURNERS

ITEM	CODE NO	DESCRIPTION	USE
42	G20—001C	Champion Plug Covers	All
43	E09—100J	Pressure Gauge Cock	All
44	E05—004V	Flexible Oil Pipe ¾" BSP x 914mm	All
45	E05—038W	Flexible Oil Pipe ½" BSP x 914mm	All
46	E05—013M	Flexible Oil Pipe ⅜" BSP x 686mm	All
47	G03—019H	Quick Release Coupling ⅜" BSP	All
48	M04—133M	Support Leg	All
49	Z04—315Y	Inner Draught Tube	All
50	—	Nozzles (State Size, Type & Spray Angle)	All
51	Z04—503W	Nozzle Block	All
52	T04—501A	High/Low Needle Valve Assembly	All
53	T04—520G	On/Off Needle Valve Assembly	All
54	E01—004Z	Solenoid Valve 121K63 N.O.	CH6—28C, D. CH6—34A, B, C, D. CH7—38A, B, C, D.
55	E01—103Z	Solenoid Valve 133K6301 3 Way 240V	All
—	E01—022J	Solenoid Valve 322H 7506 240V	CH6—28E. CH6—34E. CH7—38E, F.
56	B16—027Q	220V Coil for Lucifer Valves	All
57	U90—319H	Electrodes (Pair) (Twin Nozzle)	All
58	G05—017Z	'O' Ring	All
59	—	Inner Assembly Complete (Quote Serial & Spec. No.)	All
60	Z04—201F	Motor Adaptor Plate	CH6—28C.
—	Z04—203H	Motor Adaptor Plate	CH6—28D, E. CH6—34C, D, E.
—	Z04—226X	Motor Adaptor Plate	CH6—34A, B.
—	Z04—229A	Motor Adaptor Plate	CH7—38A, B, C.
—	Z04—234X	Motor Adaptor Plate	CH7—38D.
—	Z04—235Y	Motor Adaptor Plate	CH7—38E, F.
	E02—061S	Shaft Seal Sundstrand E6 Pumps	All

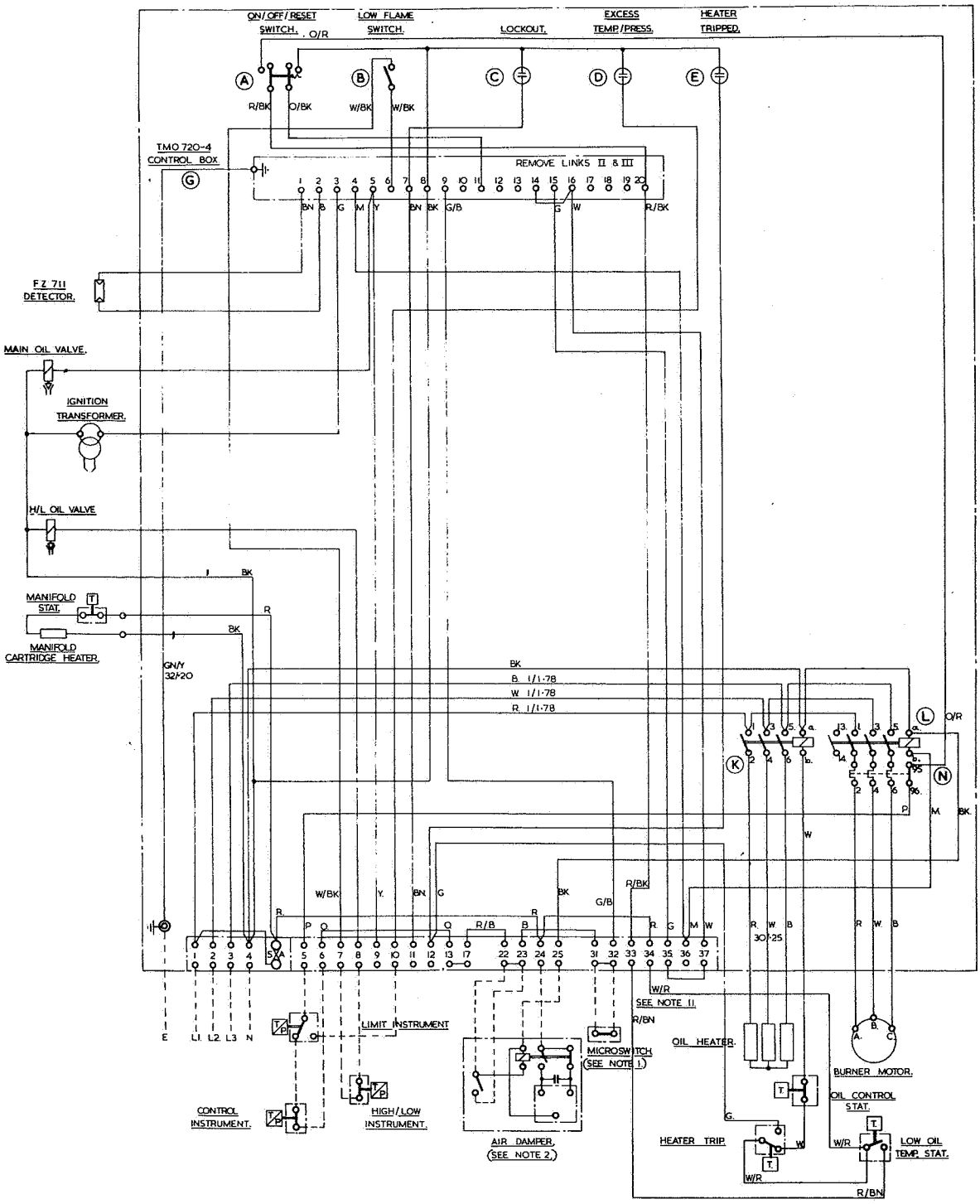
N.B. 1. Code numbers and types of electrical items listed are based on standard electrical supplies of 220—240V, 1-phase, 50 Hz., or 415V, 3-phase, 50 Hz. only.

2. When ordering spare parts it is essential to quote the serial and specification numbers shown on the burner or burners.



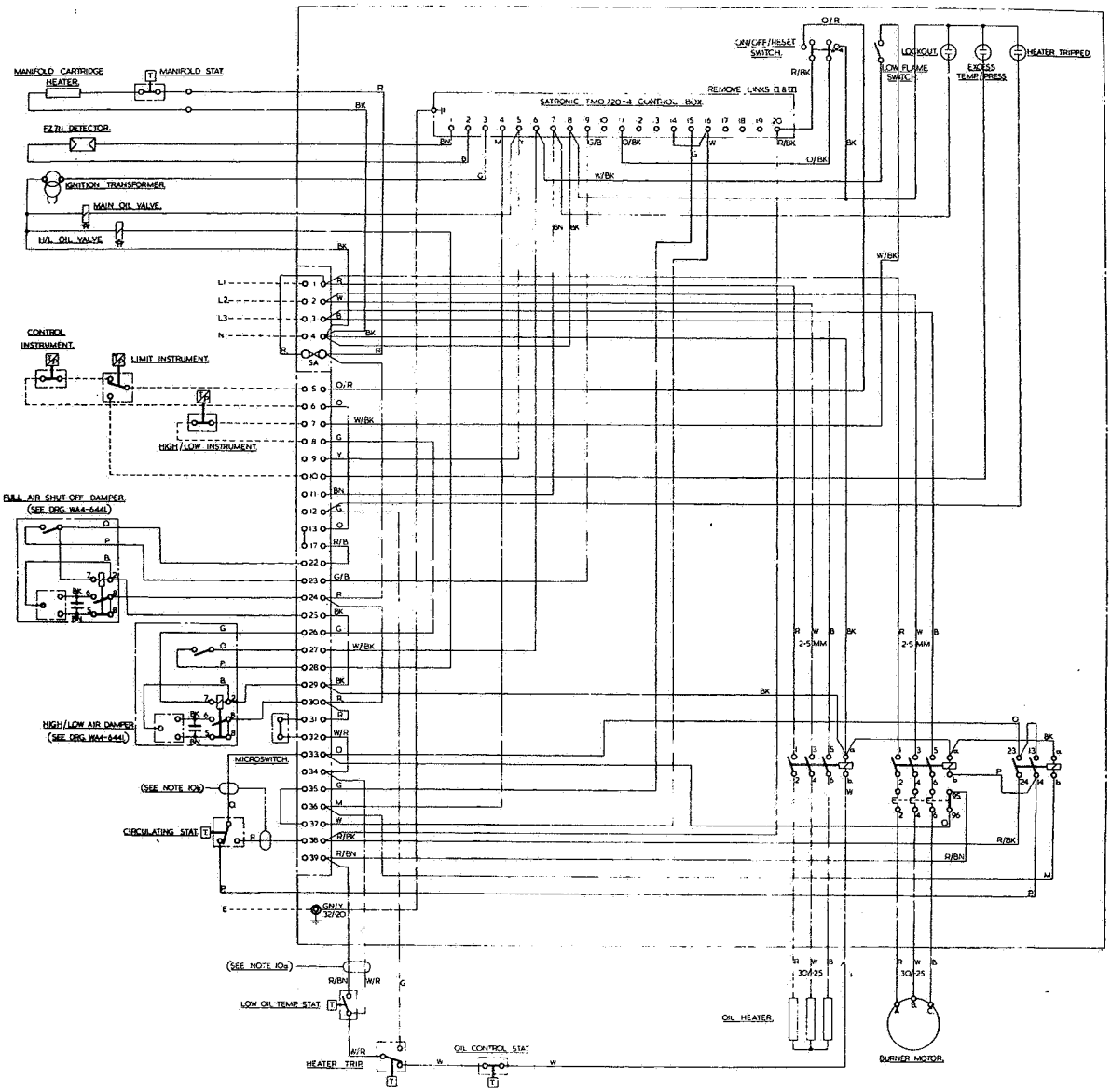
PANEL AND EXTERNAL WIRING FOR CH6 AND CH7 H/L (3PH) ON LANDIS & GYR LAL1. CONTROL

WA2—6987



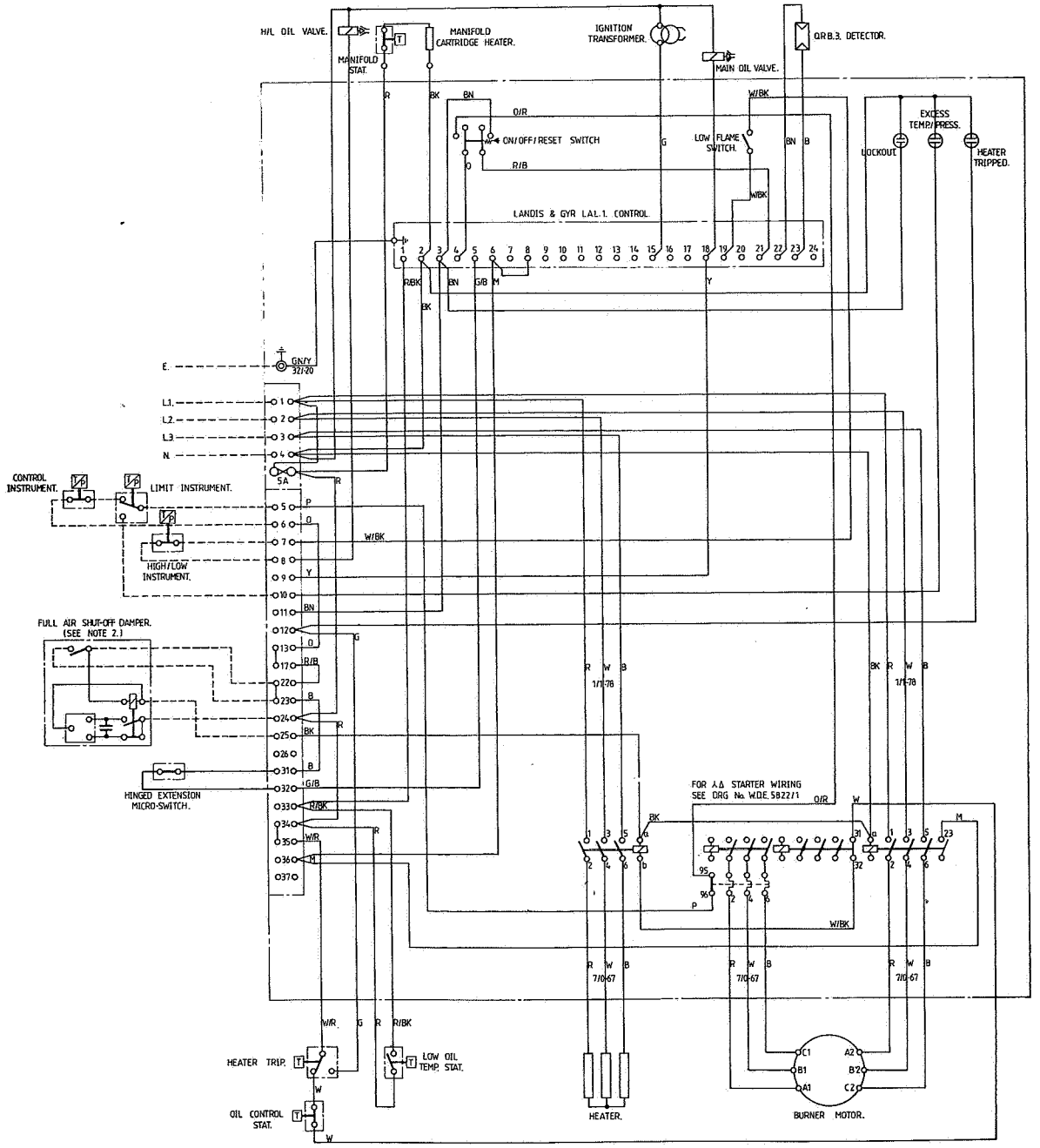
PANEL AND EXTERNAL WIRING FOR CH6 AND CH7 H/L (3PH) ON SATRONIC TMO 720-4.

WA1—6984



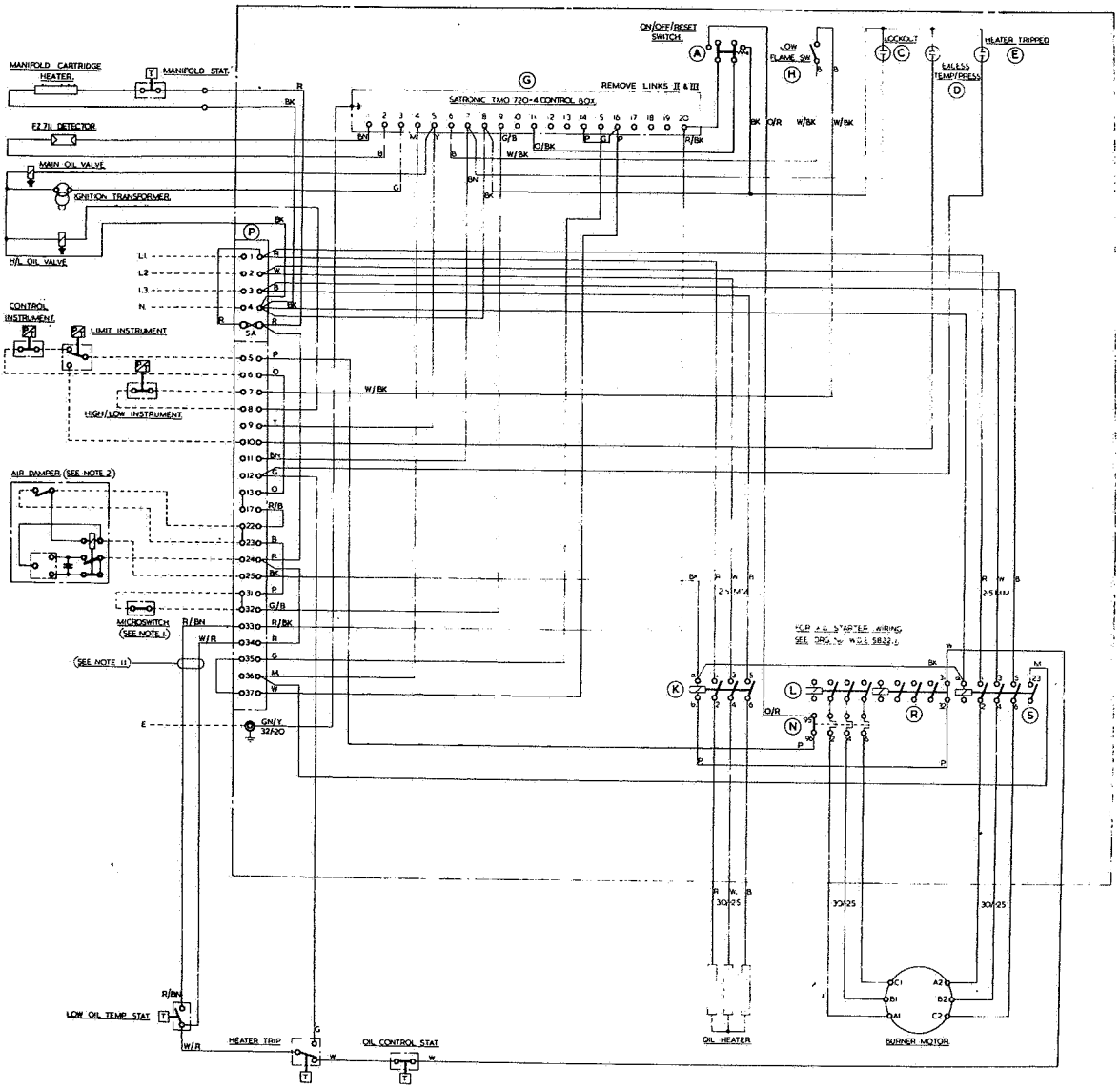
PANEL AND EXTERNAL WIRING FOR CX6 & 7 H/L (3PH) ON SATRONIC TMO 720-4 CONTROL.

WA1—6980



PANEL AND EXTERNAL WIRING FOR CH7-38E. & F. H/L ON LANDIS & GYR LAL.1. CONTROL (3PH)

WA1—6979



PANEL AND EXTERNAL FOR CH7-38E & F (3PH) ON SATRONIC TMO 720-2 CONTROL

WA1—6985

BURNER MODIFICATIONS

Date	Details of Modification