FEBRUARY 1977

Revision 1

VULCAN OIL HEATING

SERVICE INSTRUCTIONS

40 SERIES OIL HEATERS

Revised February 1977

INDEX

TO BREAKDOWN HEATER INTO MAJOR COMPONENTS

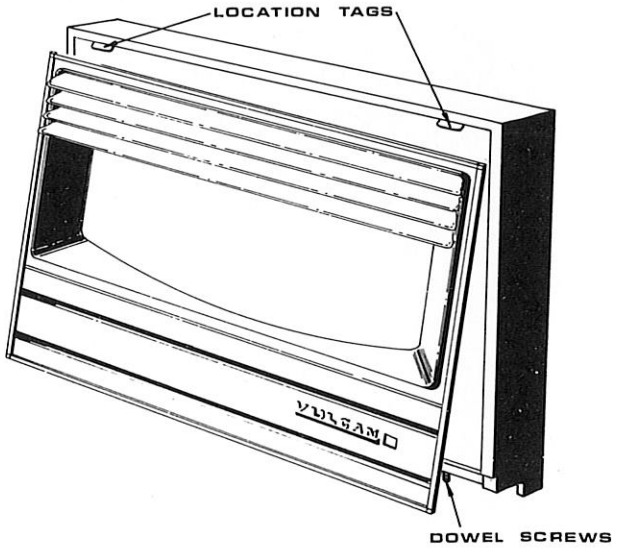
40 SERIES

BREAKDOWN A

To remove front assembly –

1. Ensure power is disconnected from heater.
2. Loosen the two captive dowel screws at bottom of front frame assembly.

FIG. 1



3. Pull bottom of front panel forward and then lower slightly to clear tags locating the top and pull out.

BREAKDOWN B

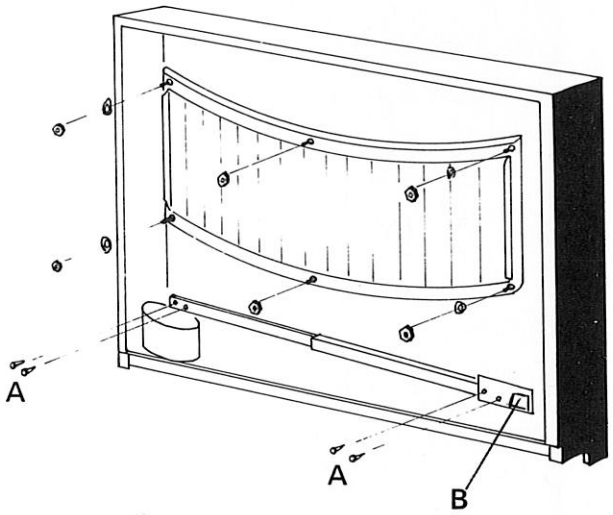
To remove burner –

1. Remove front panel. (Breakdown A)
2. Remove oil control valve cross bar by removing two screws "A" each end. [Fig. 2]

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

BREAKDOWN B (cont.)

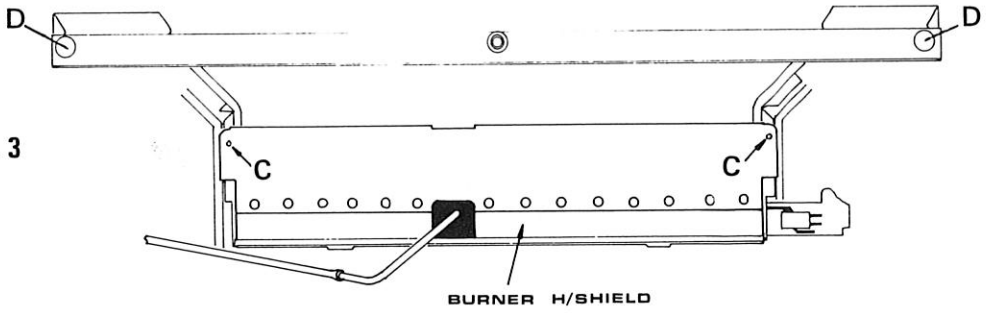
FIG. 2



3. Push cam rack and pinion to the right. – "B"

4. Remove burner heat shield (two screws "C"). [Fig. 3]

FIG. 3



5. Disconnect oil line from burner assembly and gently push the fuel line below the burner bottom deck to facilitate removal of the burner.

6. Remove combustion chamber door. Take off 6 x ¼" nuts "B" and 4 corner washers. The door assembly should be handled carefully to avoid glass damage. [Fig. 4]

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

BREAKDOWN B (cont.)

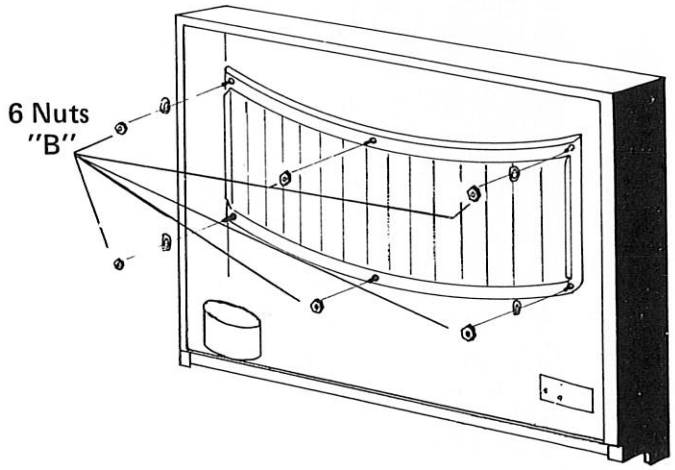


FIG. 4

7. Remove the radiants to prevent their accidental damage.
REMEMBER RADIANTS ARE FRAGILE AND MUST BE HANDLED WITH EXTREME CARE.
8. Remove two nuts holding burner in (see bolts "D" in Fig. 3).
9. Burner can be pulled forward. It may be necessary to prise the burner out of its home position with a screwdriver, but be careful not to damage or bend the burner top deck or mating combustion chamber ledge.
10. Remove burner part way, disconnect wiring from heat switch and ignition element, then pull all the way out.

BREAKDOWN C

To remove blower assembly –

1. Carry out Breakdown B – removal of burner.
2. Remove springs from fan assembly scrolls, and lower fan to floor level. [Fig. 5]
3. Remove two self tapping screws holding heat shield on right hand side to gain access to wiring. Unplug connector. [Fig. 5]
4. Fan may be removed for cleaning and testing.

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

BREAKDOWN C (cont.)

5. Re-installation is in reverse of removal. Be sure fan is installed in its correct position. [Fig. 6]

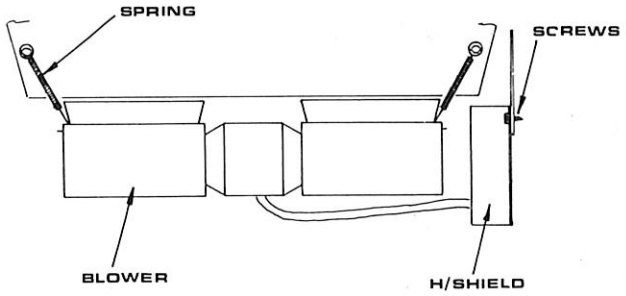


FIG. 5

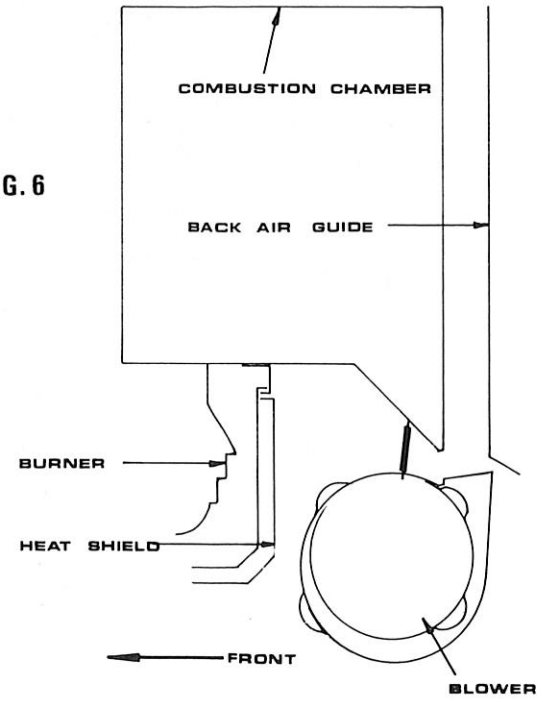


FIG. 6

BREAKDOWN D

To remove valve assembly –

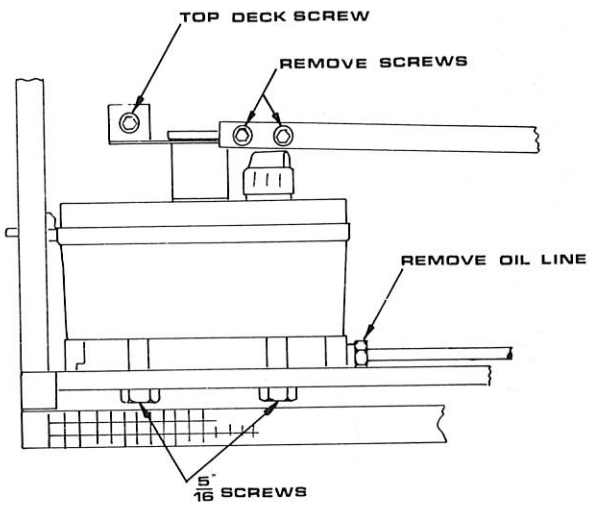
1. Turn off oil at tank. Put rag under valve to keep oil spillage to a minimum.
2. Remove front panel as per Breakdown A.
3. Remove valve operating cross bar (2 screws each end). [Fig. 2, page 2]
4. Remove burner heat shield (2 self tapping screws). [Fig. 3, page 2]

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

BREAKDOWN D (cont.)

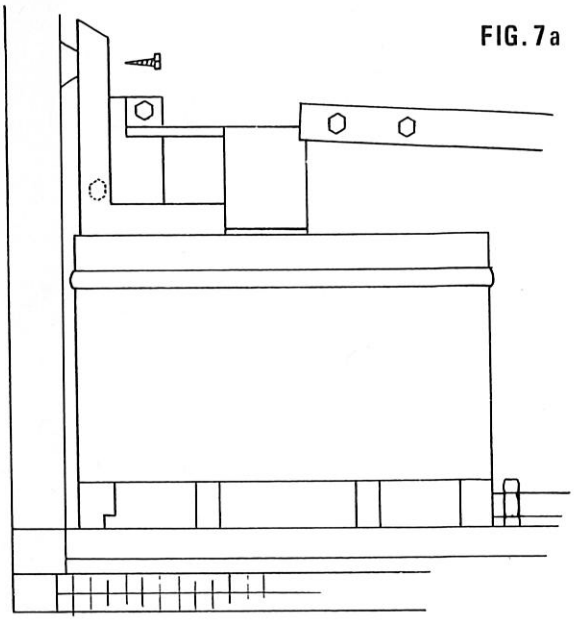
5. Disconnect oil pipe union at burner, disconnect fuel line at the valve. Open valve and drain some fuel into a container or old rag. This lowers the oil level in the valve and helps prevent oil spillage when handling the valve [Figs. 7 and 7a]

FIG. 7



1976 PRODUCTION

FIG. 7a



1977 PRODUCTION

6. Remove top deck screw holding bracket to frame.

7. Remove 2 x 5/16" screws and aluminium sealing washers from base of valve. Valve can be removed.

   Keep valve upright and level to avoid unnecessary oil spillage.

   Reassembly is in reverse of dismantling. In addition, check –

   (i) BM valve has spacer plate underneath, AP does not.
   (ii) New sealing washers should be used under 5/16" screws.
   (iii) New sealing washer should be used in oil line inlet.

BREAKDOWN E

To remove heat exchanger and combustion chamber assembly –

1. Dismantle unit as per Breakdown A.

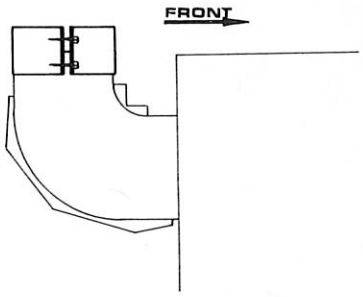
2. Remove top air guide by pushing back slightly, lifting and pulling out [Fig. 9]. See note on re-assembly.

3. Loosen screws on flue clamp, push clamp down on to elbow [Fig. 8].

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

BREAKDOWN E (cont.)

FIG. 8



4. Undo four nuts holding front frame assembly and combustion chamber assembly. [Fig. 9]

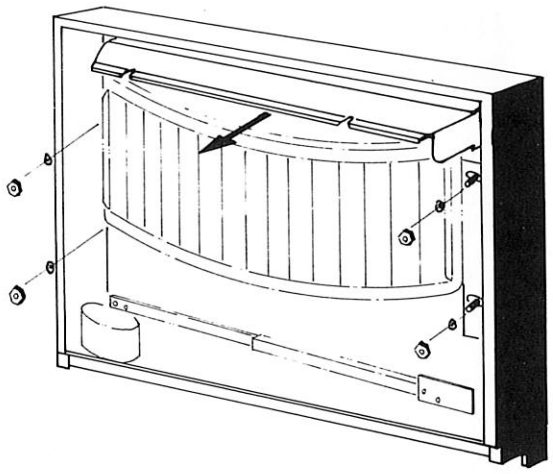


FIG. 9

NOTE: When replacing air guide on re-assembly – ensure it locates into "V" in heatshield.

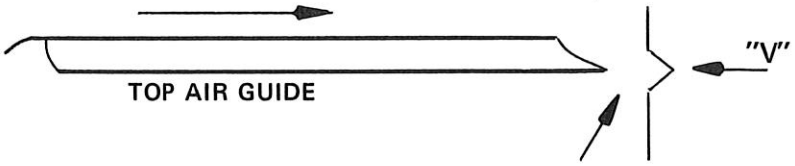


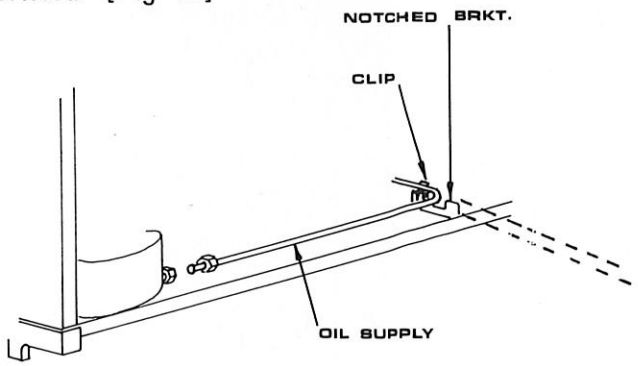
FIG. 9A

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

BREAKDOWN E (cont.)

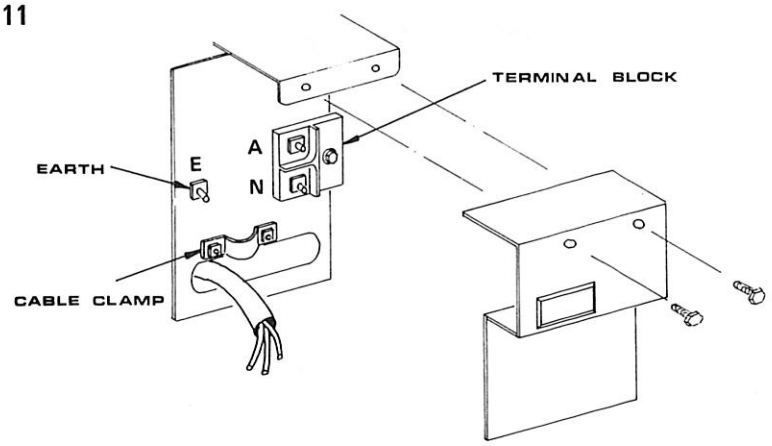
5. Disconnect oil inlet line at valve and bend forward to clear combustion chamber assembly when it is pulled forward. [Fig. 10]

FIG. 10



6. Unplug flex or disconnect power supply at electrics bracket. [Fig. 11]

FIG. 11



7. The heat exchanger assembly and combustion chamber can be pulled forward out of the case.

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

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DISMANTLING BURNER FOR SERVICE

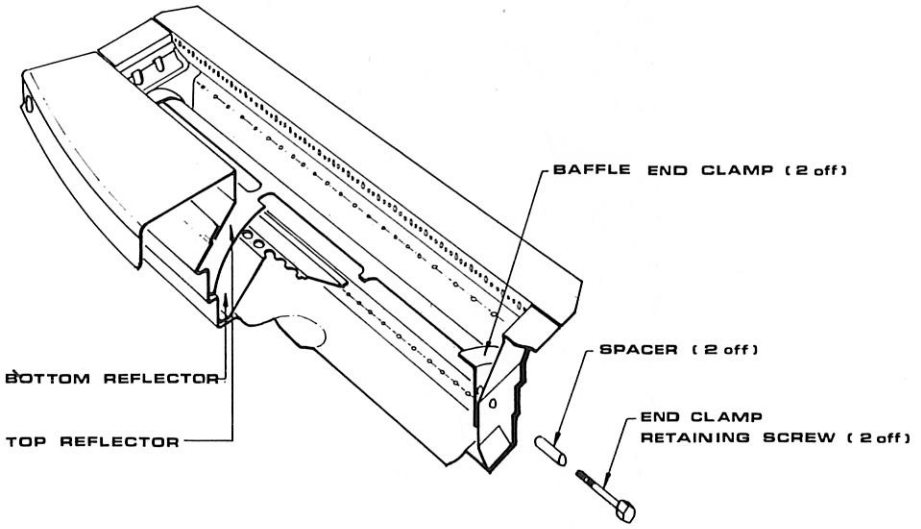
1. To remove heat shields –

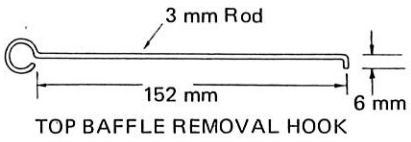
   (a) Remove right hand heat shield (2 screws).

   (b) Remove element cover by removing screw and lifting off.

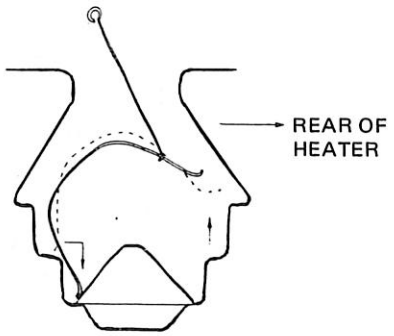
   (c) Remove four screws (two at each end at top of burner) and remove burner from heat shield box, left hand end first.

2. To remove end covers and baffles (reflectors) – [Fig. 12]





TOP BAFFLE REMOVAL HOOK



Insert hook into a hole near the centre of front side of the top baffle.
Lift the front of the baffle and drop the back down into the space between the bottom baffle and the burner.
The baffle may then be lifted out of the burner.

FIG. 12

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

DISMANTLING BURNER FOR SERVICE (contd.)

(a) Remove hex head cap screws and tubular spacer from each end of burner assembly.

(b) End covers will lift out. If they are not able to be lifted out with fingertips, carefully prise out with a screwdriver. Be careful not to distort end covers, top baffle (reflector) or burner body.

(c) The baffles are free to be lifted out once the end covers are clear. Tilt the top baffle with the aid of the tool illustrated and lift out. The bottom baffle removal is identical. Should carbon deposits prevent full tilting of the baffle, **do not force.** Lower baffle to its home position, clean off the carbon and resume normal dis-assembly procedure.

(d) Ignition element may be removed after removing the two hex nuts securing it. (See also page 11).
When replacing the ignition element ensure that it is located properly. (To be parallel with the burner baffle ledges and top deck.)
DO NOT RE-INSTALL ELEMENTS WHICH ARE PITTED OR WHICH HAVE DISCOLOURED OR OIL SOAKED INSULATION AT TERMINAL ENDS.

(e) To replace baffles, re-assemble in reverse of dis-assembly.
Make sure that the sealing edges are straight and clean. Baffles which are distorted will not seal on the burner ledge and will result in a poor flame pattern and rapid carbon formation.

Also ensure both baffles are clamped securely after assembly.

Note:
Top baffle in its correct shape is as wide as vertical faces of burner.
See Fig. 13 – dimension 122 mm.
If notched bottom baffle is used, notched end must be placed at right hand side, i.e., ignition element end.

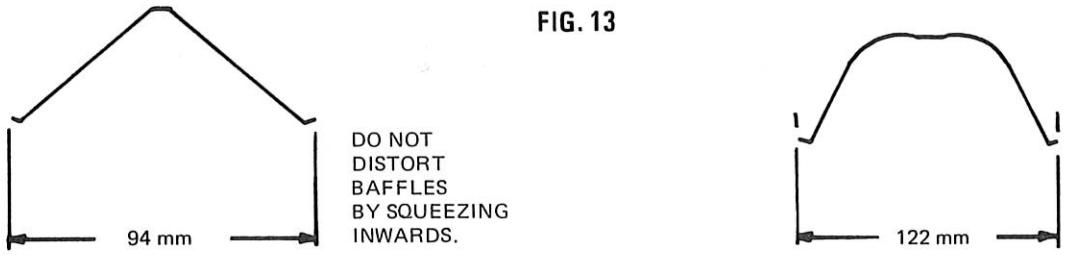


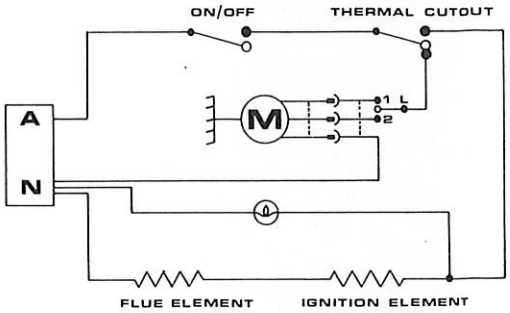
FIG. 13

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

ELECTRICAL CIRCUITRY AND WIRING DIAGRAM

FIG. 14

CIRCUIT DIAGRAM



FLUE ELEMENT	IGNITION ELEMENT
1500 W	475 W
182 V	58 V
22 Ω ± 1	7 Ω ± .5

Power from the electrical supply into the unit is connected to the electric terminal connections (an earth connection is made here also). Power is isolated from the unit by the ON/OFF (micro) switch actuated by the control knob. No power is available to any circuit until the control knob is moved from the "OFF" position. When the control knob is moved to "ignition" section (or any position other than "OFF") the ON/OFF micro switch provides current to the ignition element and flue element as well as the neon indicator light thus giving a visual indication to the operator that power is in fact switched to the heater ignition circuit.

The fan cannot operate while the ignition cycle is in progress because the fan selector switch (Part No. 1001-869) is isolated by the cut-out switch actuated by a bi-metal strip mounted on the burner body. This cut-out switch has two functions:

(1) With the burner cold it isolates power from the fan circuit and provides power to the ignition circuit.

(2) When the burner reaches operating temperature the bi-metal strip actuates the cut-out switch to cut off power to the ignition circuit and at the same time provides power to the fan circuit.

This circuitry prevents the fan from cooling the heat exchanger and burner during the warm up period of the ignition cycle and automatically switches on the fan when ignition is complete, and the burner temperature is high enough to sustain burning.

Therefore the fan selector switch becomes a "pre"-selector switch and may be left on HI or LO at all times, whichever is desired by the operator.

Moving the control knob to "OFF" isolates all power from the unit and the fan is turned off. The bi-metal strip will resume its original position when the burner cools off, switching back to the ignition position again, but as there is no power available, the ignition element will not operate.

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

IGNITION ELEMENT

Removal and replacement of ignition element is covered under "DISMANTLING BURNER FOR SERVICE".

Be sure that an element is not re-installed if it is severely pitted or is discoloured at the insulation indicating oil contamination.

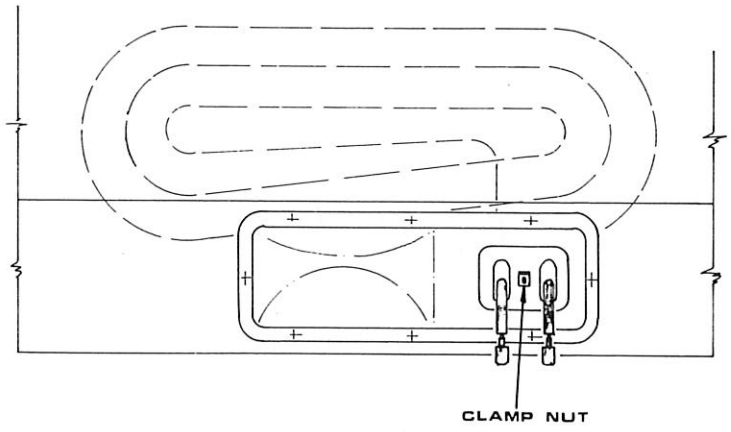
Be careful when handling ignition elements so that oil is kept away from the terminal ends. **Do not handle with oily hands.**

FLUE ELEMENT

REMOVAL

Dismantle heater as per Breakdowns A, B and C. Loosen clamp nut and remove 8 screws from access plate in heat exchanger.

FIG. 15



Note:
Flue elements come in three different shapes but their wattages etc. are constant. Refer to Circuit Diagram for details.

Remove flue element by rotating it in a clockwise direction to feed it out. Replacement is done in reverse of dis-assembly.

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

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REMOVAL OF SWITCHES

1. ON/OFF MICRO SWITCH

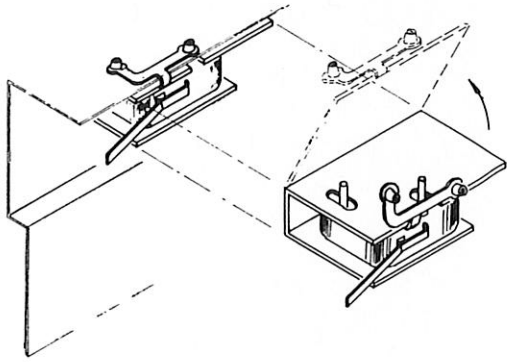
Remove electrics cover plate (Fig. 11, page 7).

Disconnect spade connections.

Turn cover plate over [Fig. 16].

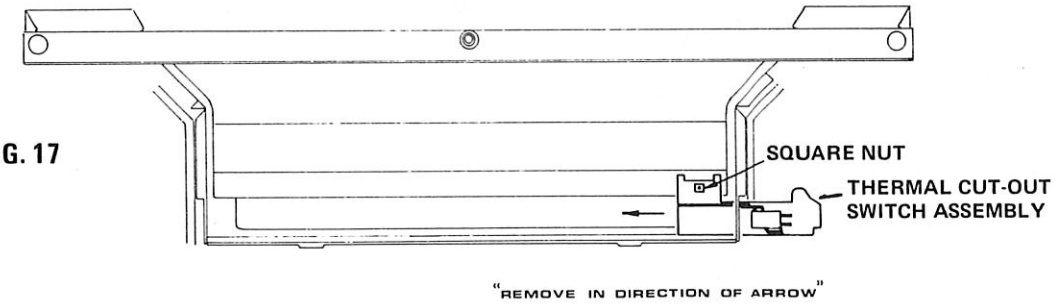
Lift plastic strap retainers from dowels and switch can be removed from the plate.

FIG. 16



2. THERMAL CUT-OUT SWITCH ASSEMBLY [Fig. 17]

FIG. 17



Disconnect power from unit. Carry out Breakdown A. Remove burner heat shield. Remove spade connections from micro switch. Remove square nut retaining assembly on burner, and remove whole assembly.

Symptoms which would indicate that thermal cut-out switch is defective –

(i) Too long or too short ignition times (indicates bi-metal strip defective).

(ii) No indicator light with heater cold when there is power to the switch assembly.

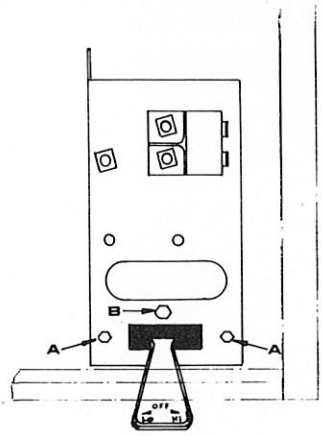
Important: **Do not attempt to service bi-metal as this is factory set and must be replaced as a complete assembly.**

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

3. FAN PRE-SELECTOR SWITCH [Fig. 18]

Disconnect power from unit. Remove front as per Breakdown A. Remove self tapping screw from switch bracket assembly. Push switch assembly rearward and disconnect spade connections. Installation is in reverse of removal.

FIG. 18



BLOWER ASSEMBLY

To remove blower assembly carry out Breakdown C. The blower requires no maintenance except to remove any dust and fluff accumulation when air output is reduced noticeably, or if the resulting imbalance causes vibration or rattling. Should a damaged or inoperative blower be encountered it should be replaced with a replacement blower available from all Vulcan Service Depots or Parts Distributors.

FREE OPERATION OF CONTROLS

1. Racks, gears, drive fork and cam surface must be free of dust and grit. Any worn or damaged parts should be replaced.
   Ensure that all above parts have adequate lubricant — Molybond HE-50.
2. Teflon washer must be fitted between rack and gear on valve.
3. Dashpot must be correctly seated and sitting vertically. Misalignment will cause binding.

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

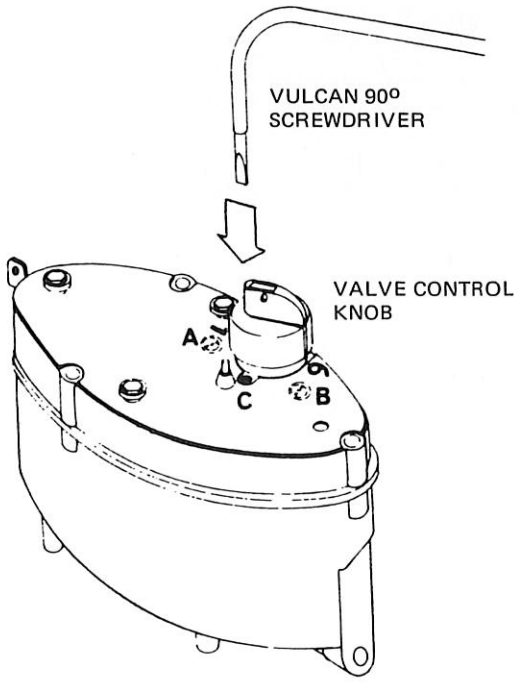
OIL CONTROL VALVE

As the oil control does not come out of adjustment during service all other components should be checked before the valve is suspect. Variations of output and flame pattern are caused by carbon build-up in burner, draught conditions, blockage or air lock in fuel lines, and cannot be corrected by oil control adjustment. Be particularly careful to change the filter first on a heater which has been in operation a few seasons.

Heaters are fitted with either A.P. or B.M. makes of oil control valves.

Both are similar in operation and are fully interchangeable as assemblies.

FIG. 19



A.P. Valve Setting Screws : (A and B)

For the A.P. valve both the high fire (B) and low fire (A) adjustment screws are visible at the same time. To decrease flow on low fire turn screw (A) anti-clockwise. To decrease flow on high fire turn screw (B) clockwise.

B.M. Valve Setting Screw : (C)

View shows high fire adjustment screw. Low fire adjustment screw appears when oil control knob is on setting No. 1. To increase the flow on either screw turn it anti-clockwise, to decrease flow turn clockwise. Before making any adjustments carefully read the following page.

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

TO CHECK HIGH AND LOW FIRE ADJUSTMENTS

High Fire

Make sure heater has been burning long enough on high setting to heat the flue system and properly stabilise – 30 minutes MINIMUM from cold start.

Measure draught with draught meter and observe that it reads ·06" to ·065" W.G. If necessary adjust high fire screw to give yellow tips at least 2"–3" long right across top row of holes.

Adjust only one-eighth turn at a time and leave sufficient time to observe change in flame pattern. (See page 14 – Oil Control Valve)

Low Fire

Turn oil setting down to "Lo"' (This should be 5½ cc's or 5.5 ml/min.) and allow burner temperature to stabilise. Allow at least 10 minutes. Measure draught with draught meter and set air control screw to give .01". Flame should burn up to but not out of top holes of the burner. Adjust low fire screw at valve if this is not so. (See page 14 – Oil Control Valve)

If an unserviceable oil control valve is encountered during service it should be replaced with a change-over assembly, available at any Vulcan Spare Parts Depot.

DRAUGHT BREAKER ROD (AIR SCREW) ADJUSTMENT [Figs. 20, 22]

Turn operating knob to LO and wait for burner temperature to stabilise (15 – 20 minutes MINIMUM from cold start, 10 minutes after turning down from high setting).

Take draught meter reading and adjust air screw [Fig. 20] until .01" W.G. is obtained. First ensure that the draught breaker rod is contacting cam plate as illustrated.

Note: Air screw can only be adjusted after stabilising on Lo fire.

Air screw adjustment will not be made correctly if heater is not LEVEL fore and aft.

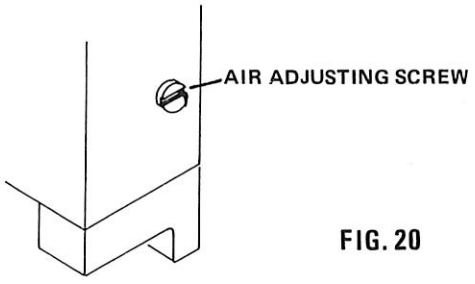
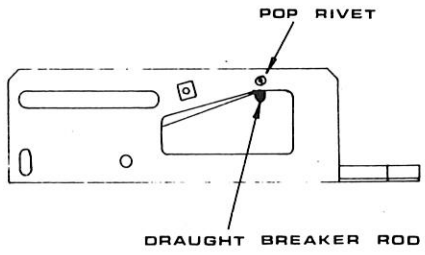


FIG. 20

NOTE;
ON LO ROD MUST
CONTACT CAM



Clockwise to increase draught – anti-clockwise to reduce draught.

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

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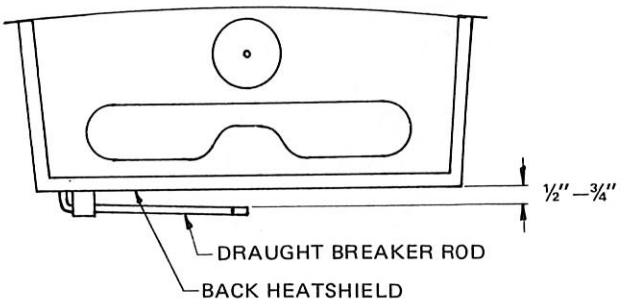
DRAUGHT BREAKER ASSEMBLY

REMOVAL

Carry out Breakdowns A and E. Pull out heat exchanger and place on a work surface.

1. Remove screw "A".
2. Remove screw "B".
3. Slide pivot bracket to left until it clears needle on draught breaker.
4. Draught breaker can be removed from unit.

FIG. 21



Re-assemble in reverse of dis-assembly, but on re-assembling draught breaker pivots, check end float does not exceed .010".

Take care not to damage spring. Ensure flap operates freely and seals all round.

Draught rod must operate between indicator marks on the heat shield.

Note: Draught-breaker rod must be clear of heat shield at the spring end.

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

FUEL/AIR LINKAGE AND DASHPOT

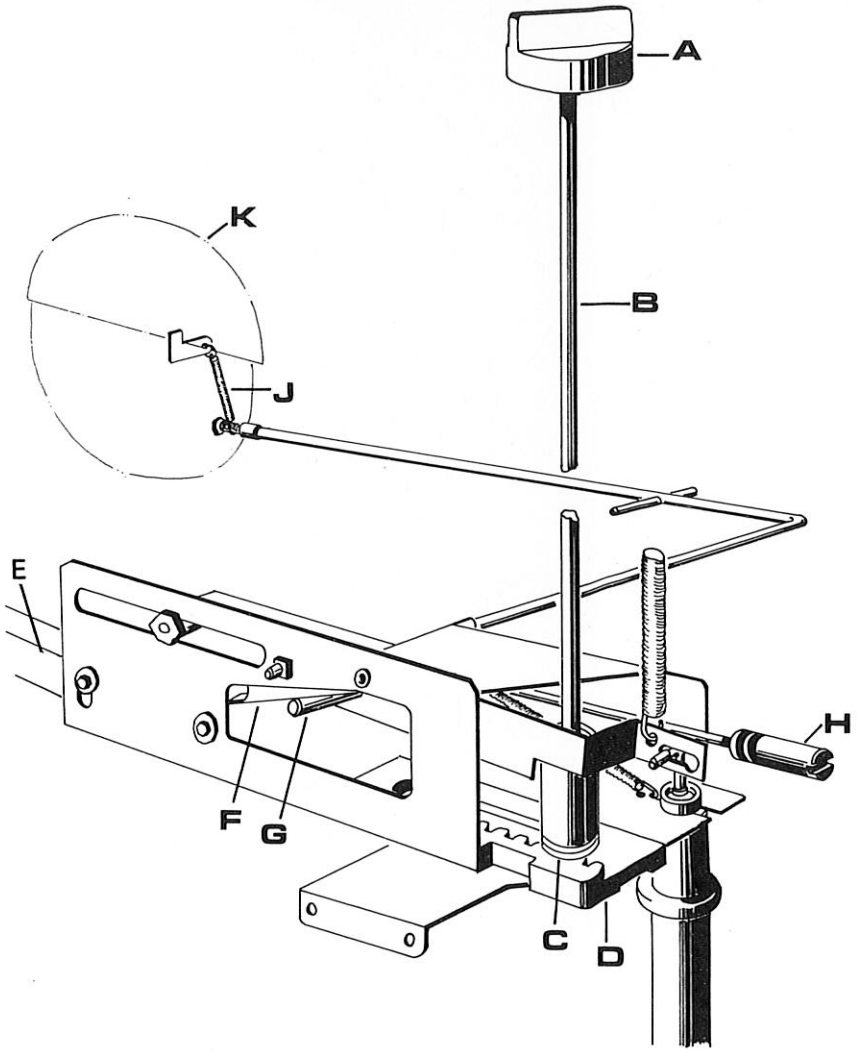


FIG. 22

DESCRIPTION OF OPERATION

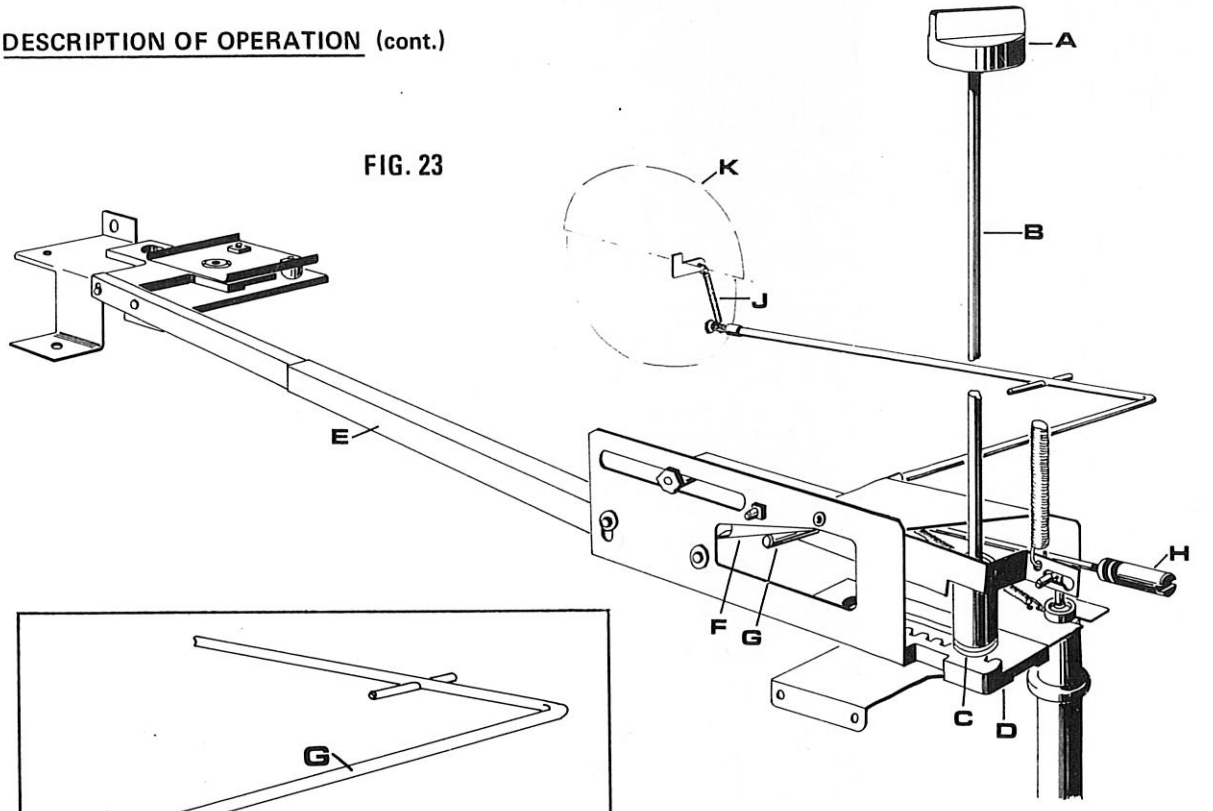
The 40 Series oil heater is designed to be operated by a single control knob 'A'. This knob is connected to an operating rod 'B' on which a gear is fitted at the lower end. See illustration ref. 'C'. The gear or pinion actuates a rack 'D' to which is connected a cross bar 'E' for fuel valve control and a cam 'F' which operates the draught breaker operating rod 'G'.

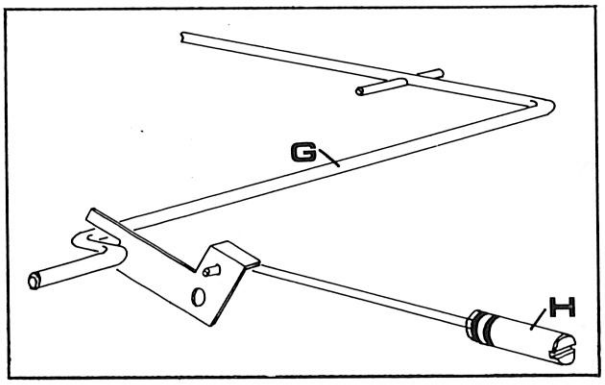
For any given fuel setting at the valve, there is a cam position to mechanically select the correct air flow into the burner by the exact tensioning of the draught breaker linkage spring 'J'.

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

DESCRIPTION OF OPERATION (cont.)

FIG. 23





Note:
The draught breaker will not operate as designed unless the heater is LEVEL fore and aft.
If the heater is out of level either way the oil valve will also be adversely affected.

If the air/fuel ratio is not correct it will be evidenced by flaring or overdraughting. Adjustment of the air control linkage is simple and is covered under "To Check High and Low Fire Adjustments" (see page 15).

QUICK VISUAL CHECK –

To ensure that the draught linkage is in approximately correct adjustment –

(1) On LO draught breaker will be partially open. Draught breaker rod 'G' is resting on cam 'F' [Fig. 23].
(2) On IGN draught breaker will be just closed.
(3) On HI draught breaker is closed, spring will have no tension, but also should not be bent (compressed).
(4) To check draught breaker flap for correct operation –
  (i) Set control to LO (breaker should be open approximately ¼").
  (ii) Deflect breaker by hand to fully open position.
  (iii) Let breaker go, it should return to its original position.
  If this is not so, replace draught breaker flap.

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

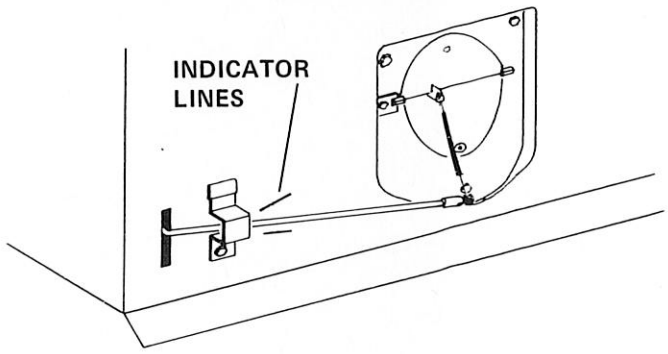
DESCRIPTION OF OPERATION (contd.)

NOTE: Any rough handling or accidental bending of the draught breaker rod will upset the air/oil balance. Check that the rod operates between lines marked on the back of the heat shield when the knob is turned from Lo to Hi.

If the rod does not operate between the lines as shown [Fig. 24] replace the rod complete. Be careful when handling the new rod, as its shape is critical. As the rod is fully protected inside the case there is very little likelihood of accidental damage.

When the knob is turned to Hi, there should be no tension on the spring.

FIG. 24



The heater knob may be turned from any position to any other position (e.g. say from Lo to Hi position) without affecting the air/fuel balance, and the flame pattern will remain good. At worst a slight overdraughting (a loss of yellow tips) may occur temporarily when going from Lo to Hi.

When operating from Hi to Lo there is a simple delay mechanism built into the linkage in the form of a dashpot. When the fuel is reduced from Hi to Lo or Off, there is always a residual amount of fuel in the burner and it will take several seconds for this to burn off.

To eliminate flaring during this period, the dashpot allows the draught breaker to remain shut even when the cam is fully clear. The hydraulic action slowly allows the draught breaker to open, by which time the draught through the burner is appropriate for the needs of correct combustion.

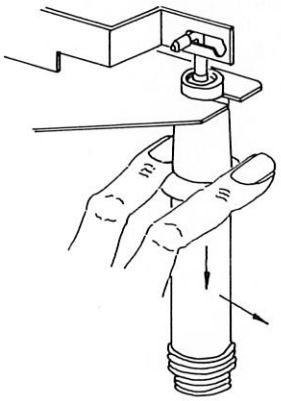
DASHPOT SERVICE

If the heater flares when turned down more than 2 numbers ensure that the dashpot is correctly connected and is working. Removal is accomplished by moving the rod across to the large diameter hole in the linkage arm, and withdrawing. The whole body of the dashpot can be pushed down to compress the coil spring and the top of the body will clear the mounting bracket. [Fig. 25]

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

DASHPOT SERVICE (cont.)

FIG. 25



To check the operation of the dashpot turn from Hi to Lo. Dashpot arm should move slowly upwards until draught rod contacts cam. This could take up to 3 minutes. If time to return linkage cold is less than 1 minute, replace the dashpot. If the draught breaker rod does not return to the cam face, check that return spring is correctly fitted and is not distorted. Replace spring if necessary.

The heater will still operate satisfactorily even without a dashpot, but it would require turning the operating knob down in two or three stages from Hi fire to avoid flaring.

NOTE: The dashpot assembly is filled with a special constant viscosity fluid. If for any reason the fluid is lost, DO NOT substitute with mineral or any other oil. Replace the assembly.

DASHPOT TRANSPORT POSITION

In a new heater the dashpot rod is pushed fully home into the retracted position and will remain there until physically pulled out of this transit position. Failure to do this will result in over-draughting on all control knob settings except Hi fire [Fig. 26].

FIG. 26

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

BASIC LINKAGE (CROSSBAR) ADJUSTMENT

If a heater has been stripped down by another person and/or there are control linkage parts missing, it will be necessary to follow the procedure below to ensure the new linkage is in the basic correct alignment.

(1) Turn valve knob **at valve** to Lo.

(2) Ensure pop rivet in link is directly above draught breaker rod [Fig. 27]

(3) If it is not –

(a) Remove the two screws from the centre of the crossbar [Fig. 28]

(b) Ensure the valve is on true Lo position (No. 1).

(c) Align the cam plate so that the pop rivet is directly over the draught breaker rod.

(d) Re-fix the crossbar at its new length.

(e) Re-check that the pop rivet on the cam plate is directly over the draught breaker rod when the valve knob is on Lo.

(See also Footnote, page 22)

NOTE;
ON LO ROD MUST
CONTACT CAM.

FIG. 27

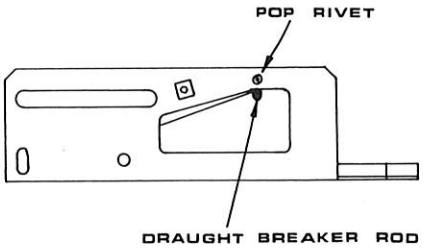
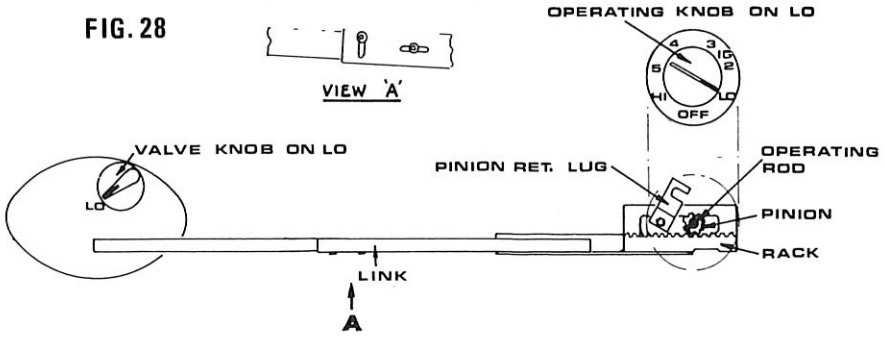


FIG. 28



MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

Revised February 1977

BASIC LINKAGE (CROSSBAR) ADJUSTMENT (cont.)

(4) Check that the control knob registers with Lo on the escutcheon after operation (2) has been completed. If it is not, loosen pinion retaining lug screw and rotate lug to clear the pinion.

(5) Keep the cross bar held to ensure valve knob is on Lo position. Lift operating knob, rod and pinion clear of rack teeth and re-mesh with the knob on Lo position on the escutcheon. Swing pinion retaining lug back over the pinion and tighten screw.

(6) To check that the draught breaker operating rod is not distorted or bent, operate the control knob from Lo to Hi. The rod at the back of the heat exchanger should operate between the lines on the heat shield. See page 19, Fig. 24.

(7) Rotate the operating knob again from Lo to Hi to Lo and ensure that knob of the valve is on Lo when operating knob registers with Lo on the escutcheon.

(8) The linkages are now set, and the unit is ready to commence adjustment of the air screw. (This adjustment described below, is in fact the basic Lo fire setting of the draught breaker assembly and rod.)

FOOTNOTE: IF ROD DOES NOT CONTACT CAM, CHECK FOR THESE CAUSES –

(1) SPRING IS STRETCHED, WEAK OR DISTORTED;
(2) AIR ADJUSTMENT SCREW IS OUT OF ADJUSTMENT;
(3) DASHPOT IS BINDING BEFORE "HOME" POSITION;
(4) ROD IS BENT.

IGNITION CYCLE

After control knob is turned to "IGNITION" :

A) Time to ignition – 2 to 3 minutes.
B) Time to neon light out – 5 to 6½ minutes.

AIR ADJUSTMENT

1. **Basic Setting**

After ignition and allowing minimum 15 – 20 minutes for burner temperature to stabilise on Lo fire, adjust air screw until the draught breaker just cracks open. This can be verified visually before installation when the heater is out of its case. The draught breaker should just open in response to screw adjustment. With the heater operating, the following methods can be used :

(a) A draught meter will register a rapid drop from over .02" W.G. back to .01" W.G. as draught breaker cracks open.

(b) Adjust air control screw with unit at stabilised temperature on Lo so that there is yellow content in the flame pattern.

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

AIR ADJUSTMENT (cont.)

2. Mid Fire Adjustment

If Lo fire flame pattern is satisfactory turn control knob to 3½, draught should read .035" W.G. after stabilizing for 10 minutes. If this is not so, cam adjustment is required.
To adjust cam –

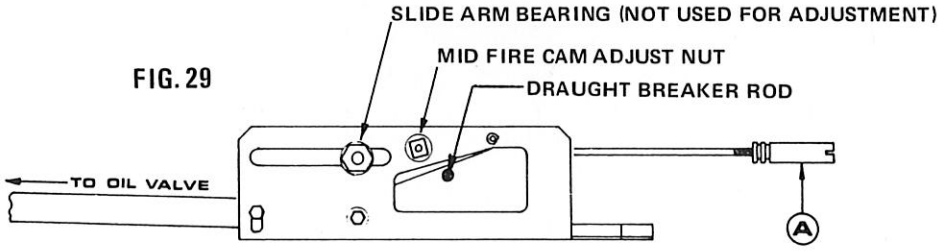
(i) Loosen square nut;
(ii) Lift cam upwards to decrease draught;
(iii) Push cam downwards to increase draught;
(iv) Re-tighten square nut.

3. Hi Fire Adjustment

Turn control knob to Hi, draught should read .06" W.G. – .065" W.G. If this is not so, flue system should be checked as there is no Hi fire draught adjustment within the heater.

4. Re-check Mid and Lo fire.

FIG. 29



NOTE:

Once Lo fire is set AND THIS MUST BE THE FIRST ADJUSTMENT MADE SINCE IT IS THE BASIC SETTING, mid fire and Hi fire adjustment should be made as described above. If the mid fire adjustment is correct or is made correct, Hi fire MUST be correct and no further re-adjustment should be made at the cam plate. Any Hi fire flame pattern problem will be the result of –

(1) Draught provided by flue system insufficient.

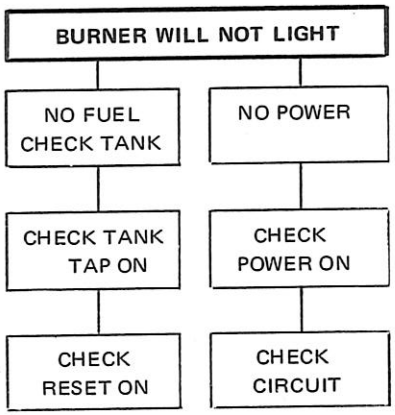
(2) Oil control valve Hi fire adjustment incorrect.

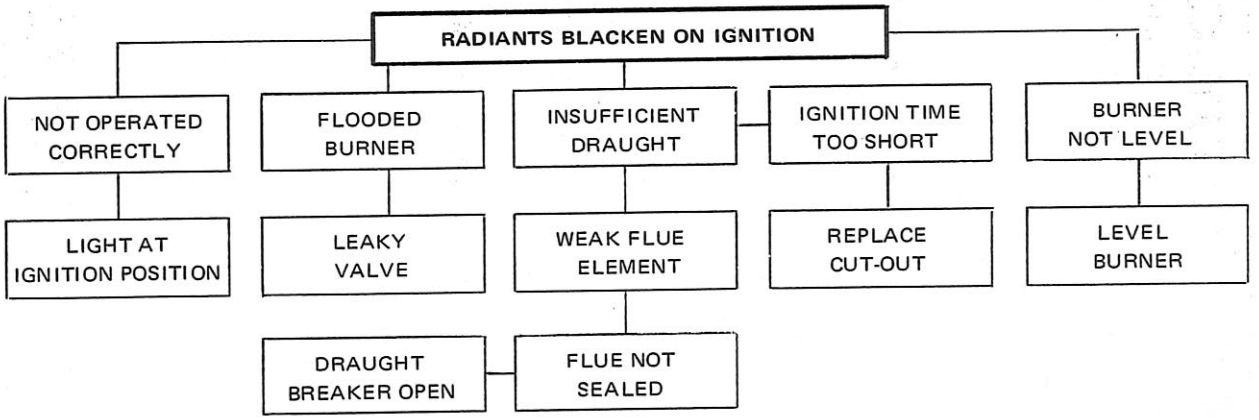
(3) Burner assembly dirty or baffles not seating.

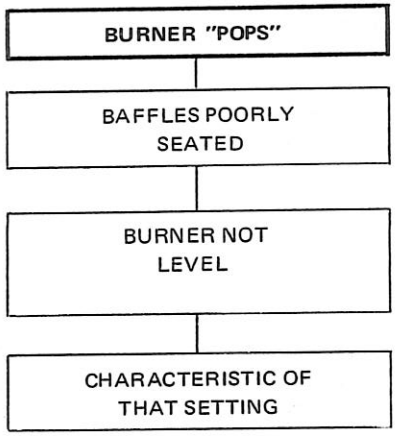
MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

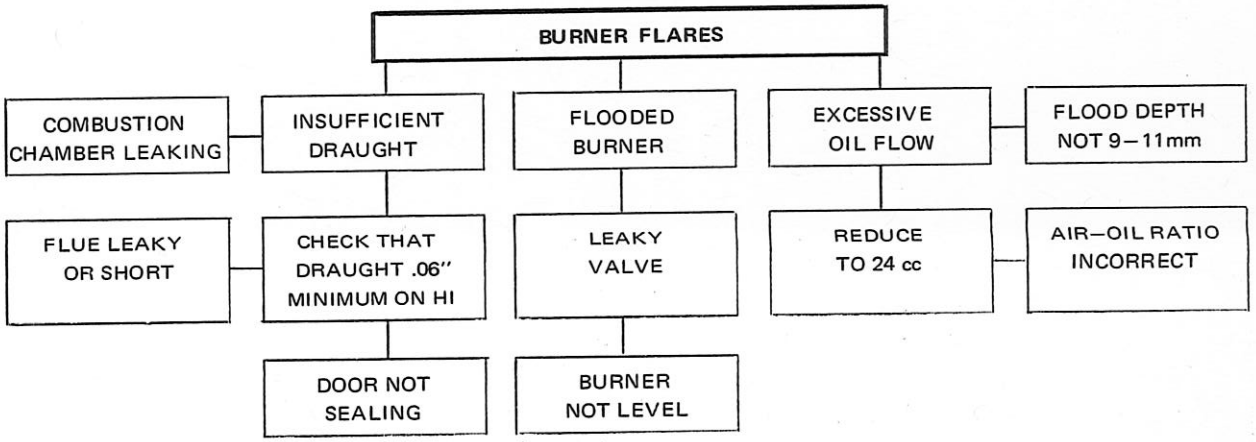
TROUBLE-SHOOTING CHART – 40 SERIES OIL HEATER

(Addition)



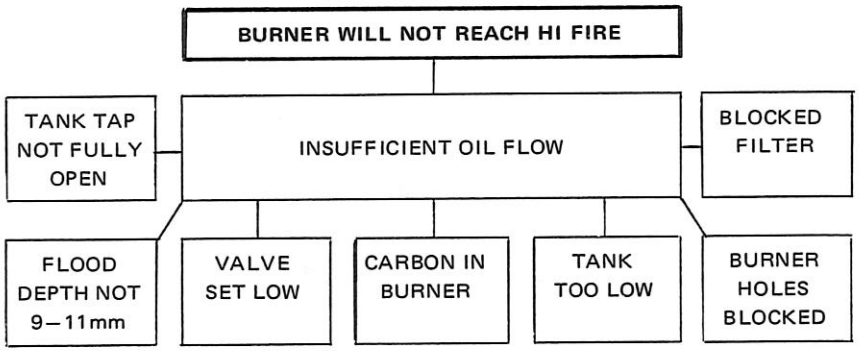


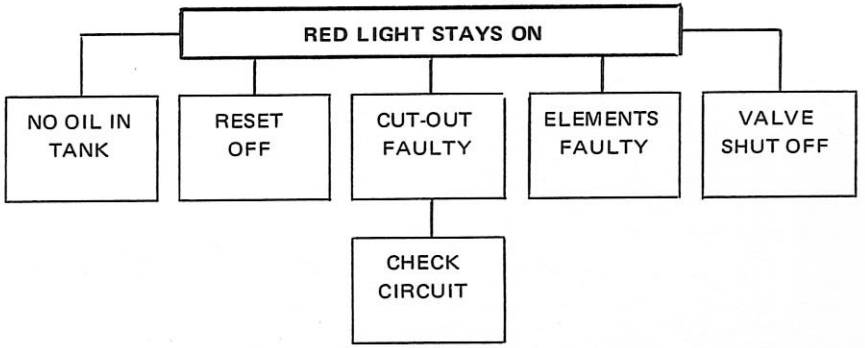


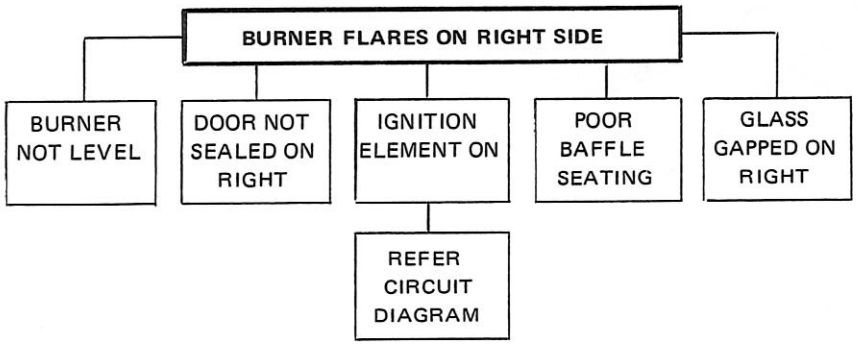


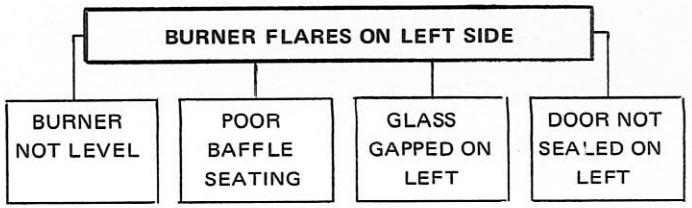
TROUBLE-SHOOTING CHART – 40 SERIES OIL HEATER (cont.)

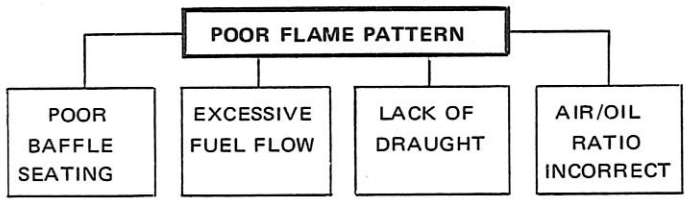
(Addition)

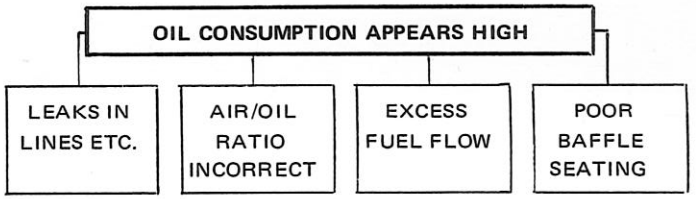












TROUBLE SHOOTING CHART

Burner will not light	1. When control knob is on "Ignition", check that red Indicator Light is on – if not, find cause and correct. Refer to electrical circuit diagram. 2. Check that fuel is being delivered to valve (tank has fuel tap turned on). 3. Ensure oil valve switch is "on". (Left hand side of heater front frame.) 4. Check starting draught (.01" W.G.). If this is not obtained, check draught breaker and flue element. If these check out O.K. and pressure relief lid and door sealing is satisfactory, the flue system should be removed, sealed properly and re-installed.
Radiants blacken on ignition	1. Operator not following lighting instructions properly. (Turn control knob to "Ignition" position.) 2. Burner flooded. Valve leaking oil into burner when knob is in "off" positon – replace valve. 3. Flue element weak – check starting draught – .01" W.G. If not, test flue element – replace if defective. 4. Flue assembly not sealed at joints or not long enough. Check with draught meter – repair or extend flue. 5. Ignition time too short (2–3 minutes is correct). Replace thermal cut-out switch assembly. 6. Low fire adjustment set too high – check draught and if O.K. (.01" W.G.) adjust low fire at valve. 7. Draught breaker jammed open – free draught breaker, adjust pivots. 8. Burner out of level – check that burner is level. 9. Check that baffles are correctly located.
Burner flares	1. Insufficient draught – check with draught meter – if below .06" on Hi fire check draught breaker and flue assembly. 2. Overfuelling – if .065" draught available on Hi fire – reduce Hi fire valve adjustment. 3. Burner flooded. (Will stop flaring once heater is up to temperature) – Check valve for leaking in "off" position. To check for flooded condition, turn control knob to Hi and then immediately to Lo. Continue this until flame pattern stabilises. (Refer operating instructions). If flaring is eliminated, flooding of burner has ceased, and flooding of burner was cause of incorrect flame pattern. Should this occur at subsequent ignition periods, valve should be replaced.

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

TROUBLE SHOOTING (cont.)

Burner flares (cont.)	4. Door gasket not sealing – door assembled without gasket, or gasket is out of position, check gasket, renew if necessary. 5. Air leaks in heat exchanger combustion chamber, or at pressure relief lid. 6. Heater out of level fore and aft, i.e., rear of heater is lower than front. This affects the draught breaker operation and the air screw will **not** adjust this characteristic out of the heater. Level the heater fore and aft and re-adjust the air screw on Lo-fire to specifications – see page 15.
Burner flares on left hand side	1. Burner assembly not level transversely – check and position correctly. 2. Door seal not airtight on left hand side. 3. Glass excessively gapped or broken glass strips on left hand side. 4. Check that baffles are correctly located.
Burner flares on right hand side	1. Wiring incorrectly connected, bypassing cut-out switch – re-wire correctly so that ignition element is "off" when red light is out (refer wiring diagram on page 10). 2. Door gasket not sealing on right hand side or glass strips excessively gapped – reseal and adjust glass strips at time of repacking asbestos strips. 3. Burner is not level – position correctly.
Unstable flame pattern (cyclic flaring)	Wind gusts over cowl – ensure flue temination is clear of pressure areas. Termination of flue to be as per specifications, and also clear of pressure areas. Vulcan cowl must be used.
Orange flame in centre of burner. Poor flame pattern. Glass constantly carbons up. (Burner has been dismantled, cleaned and re-assembled.)	1. Baffles are not seating correctly. Ensure baffles are fitted in accordance with instructions on pages 8 and 9, Figs. 12 and 13. 2. Incorrect air/fuel mixture – check draught breaker cam adjustment (air screw) and mid fire cam setting. See page 23. 3. Excessive fuel flow – check valve adjustments. 4. Insufficient combustion chamber draught – check available draught with draught meter and look for cause if insufficient. See page 22.
Burner will not come to Hi fire. Flame pattern is normal on Lo to mid settings, but overdraughted (no yellow tips) mid to Hi fire.	1. Fuel tank tap not fully open – open. 2. Filter in fuel line at tank partially blocked – replace filter. 3. Burner inlet restricted with carbon – clean. 4. Fuel valve maladjusted – adjust or replace. 5. Check mid fire cam adjustment.

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

TROUBLE SHOOTING (cont.)

Burner will not come to Hi fire (cont.)	6. Primary air holes (bottom row) in burner blocked – clean out. 7. Fuel tank height lower than specified (problem exists when tank is not full). 8. If B.M. valve – check that mounting plate is underneath valve. Note: In this case valve switch will foul escutcheon.
Burner "pops"	1. Baffles (reflectors) poorly seated – clean and re-assemble burner assembly, fit new baffles if distorted. 2. Characteristic of that particular setting of control knob – slightly alter control knob position – up or down. 3. Burner out of level – check burner is assembled level.
Red light stays on	1. **No sustained flame at burner** (a) No oil in fuel tank. (b) Valve flooded – has shut off automatically. Switch valve on after ensuring cause of flooding has been eliminated. (NOTE: If valve has just been replaced, ensure it is level and located correctly as this will affect the fuel level in the valve chamber and possibly trip off.) (c) Re-set switch is off. 2. **Flame pattern is reasonable – heater operates correctly except flaring on right hand side** (a) Thermal cut-out switch is not functioning – check operation and replace if necessary. (b) Check that wiring is connected as per wiring diagram. 3. **No ignition** IGNITION OR FLUE ELEMENT OPEN CIRCUITED. (NOTE: Red light can still remain on.) See wiring diagram – replace affected element.
Oil consumption appears high	1. Check that oil tank, oil line and valve are not leaking. 2. Check that low fire adjustment is correct. 3. Use the following figures as a guide. Low fire 24 hours a day (5½ ml/min.) – 50 gallons (230 litres) minimum per month. Where higher settings sometimes used – 80 to 100 gallons (360–450 litres) per month. 4. Incorrect fuel/air ratio requiring oil control to be turned to higher setting for more heat output – check draught breaker cam adjustment (air screw and mid fire cam). 5. Check baffles are in correct location. NOTE: Position of oil control knob is the only influencing factor affecting oil consumption, if no leaks exist.

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

TROUBLE SHOOTING (cont.)

Air screw adjustment cannot achieve as low as .01" W.G. on LO fire	If valve Lo-fire is correct (5½ cc's per minute), check: 1. Draught breaker assembly should operate freely, should open under spring pressure when knob turned down to Lo from high settings – remember delay cylinder will control speed of air linkage returning to Lo fire. 2. Unit is out of level, with front lower than rear. This affects draught breaker holding it closed – level heater fore and aft.
Not enough heat (heater appears to function properly)	1. Hole left in base of hearth from previous solid fuel heater installation. Repair hearth. 2. Large area within chimney around heater case – insulate case of heater. 3. Draughts within chimney cooling the case – insulate. 4. Lack of heat is characteristic of lack of oil and the causes of this in order of probability are: (a) Tank, tap or fuel line restrictions. (b) Clogged or partially clogged filter. (c) Carbon accumulation in burner and/or burner inlet. (d) Blocked metering stem in fuel control valve. (e) Malfunction in fuel control valve. Flame pattern would appear overdraughted if these problems exist.
Oil odours	1. Leaking of oil at any joint – seal joint affected. 2. Leaking oil valve – replace. 3. Oil lying in tray – overflow pipe to be made good. 4. Oil lying in overflow line. Relay correctly and flush out with water and detergent. 5. Chimney soot dropped on to case – remove heater and case and clean off. Sweep chimney and re-install heater.
Stains or deposits on ceilings, walls, etc.	Particles in suspension entering with airflow over heat exchanger and becoming incinerated and deposited on cooler surfaces. (It should be noted that heat exchanger cracks or holes will NOT cause products of combustion to enter the room.)
Fan noisy	1. Fan not located properly. Refer pages 3 and 4, Fig. 6, and re-position correctly. 2. Fan impellers dirty (imbalance) causing vibration. Clean. 3. Fan defective – replace fan. 4. Foreign matter (toys, paper, etc.) caught in, or impinging on, fan impellers.
Fan air output reduced	1. Top air guide position incorrect – re-position. 2. Fan dirty – clean fan, impellers. 3. Fan position (see pages 3 and 4, Fig. 6). 4. Fan bearings tight – replace fan. 5. Electric supply voltage very low.

MAKE ABSOLUTELY SURE HEATER IS DISCONNECTED FROM POWER BEFORE REMOVING OR REPLACING ANY COMPONENTS

PARTS LIST — 40 SERIES OIL HEATER

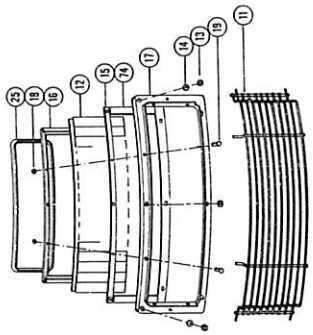
REF. NO.	PART NO.	DESCRIPTION
1	4001-1	Top and bottom trim
2	4001-2	Side trim
3	4001-156	Corner block
4	4001-814	Louvre assembly
5	4001-5	Window panel
6	4001-238W	Lower panel — walnut vinyl
7	4001-140	Name plate
8	2201-71	Name plate retainer
9	S074-18	Pop rivet
10	4101	3" Surround kit — walnut vinyl
	4102	3" Surround kit — bull hide vinyl
11	4001-817	Door guard
12	4001-83P	Door glass (single piece)
13	S026-8	Nut — door retaining, 1/4" B.S.W. hex.
14	4001-322	Washer — door retaining
15	4001-247	Asbestos door seal, top and bottom
16	4001-209	Door — inner frame
17	4001-82	Door — outer frame
18	S031-1	Nut — door assembly, 5/32" Hex. brass
19	S014-1	Screw — door assembly, 5/32" B.S.W. x 3/8" St. St.
20	4001-187	Left hand side radiant
21	4001-186	Right hand side radiant
22	GC -83S	Radiant (centre) single
23	4001-205	Radiant support bar
24	4001-200	Radiant support bar bracket
25	4001-289	Door seal
26	4001-222	Door spacer
27	4001-263	Insulator
28	4001-369	Micro switch

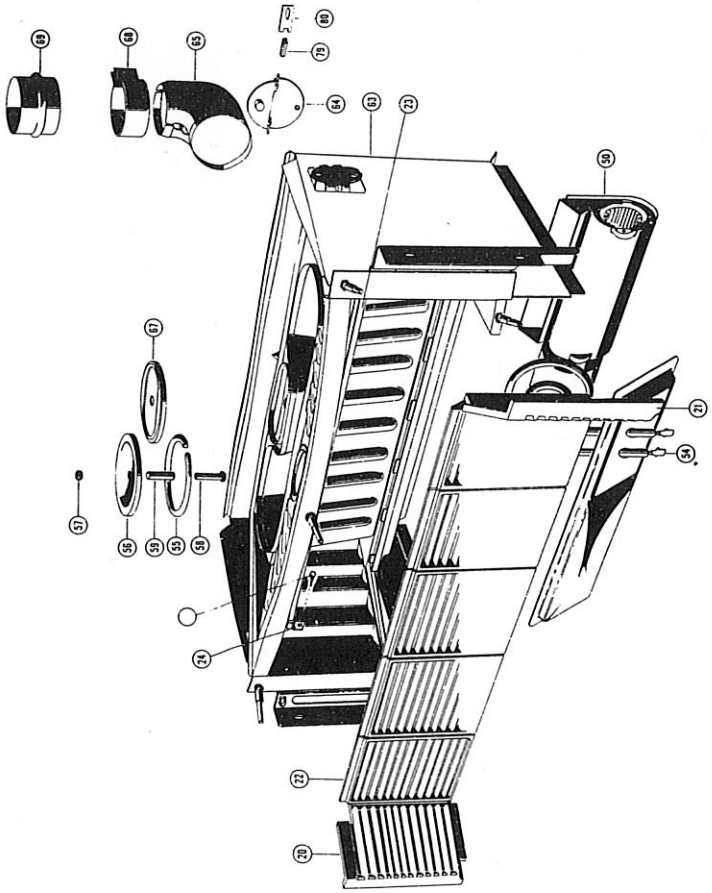
PARTS LIST (cont.)

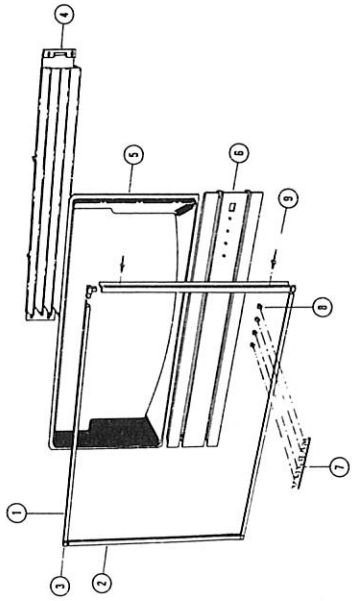
REF. NO.	PART NO.	DESCRIPTION
29	4001-804B	Control rod assembly – brown knob
30	S010-4	Screw – valve mounting, 1/4" B.S.W. x 3/4" Hex. Hd.
31	4001-838	Valve deck complete
32	4001-820	Valve to burner pipe
33	OC -487	3/8" Sealing washer
34	OC -403	5/16" Sealing washer
35	4001-868	Valve assembly – B.M.
	4001-868C	Valve assembly – B.M. – change over
	4001-870	Valve assembly – A.P.
	4001-870C	Valve assembly – A.P. – change over
36	4001-843	Control rod rack and slide arm
37	4001-251	Control rod rack and slide arm spacer nut
38	4001-225	Delay cylinder spring
39	4001-806	Delay cylinder assembly
40	4001-218	Delay cylinder return spring
41		
42	1001-869	Fan switch
43	4001-812	Bi-Metal assembly cut-out
44	4001-372	Burner top baffle
45	4001-335	Burner bottom baffle
46	4001-827	Burner baffle clamp
47	S175-2	Screw – baffle clamp retaining St. St.
48	4001-822	Burner
49	4001-813	Burner ignition element
50	1210	Fan
51	4001-272	Screw – front frame retaining
52	4001-871W	Front frame – walnut vinyl
	4001-871B	Front frame – bullhide vinyl
53	4001-268	Oil tray end cap – left hand
	4001-269	Oil tray end cap – right hand

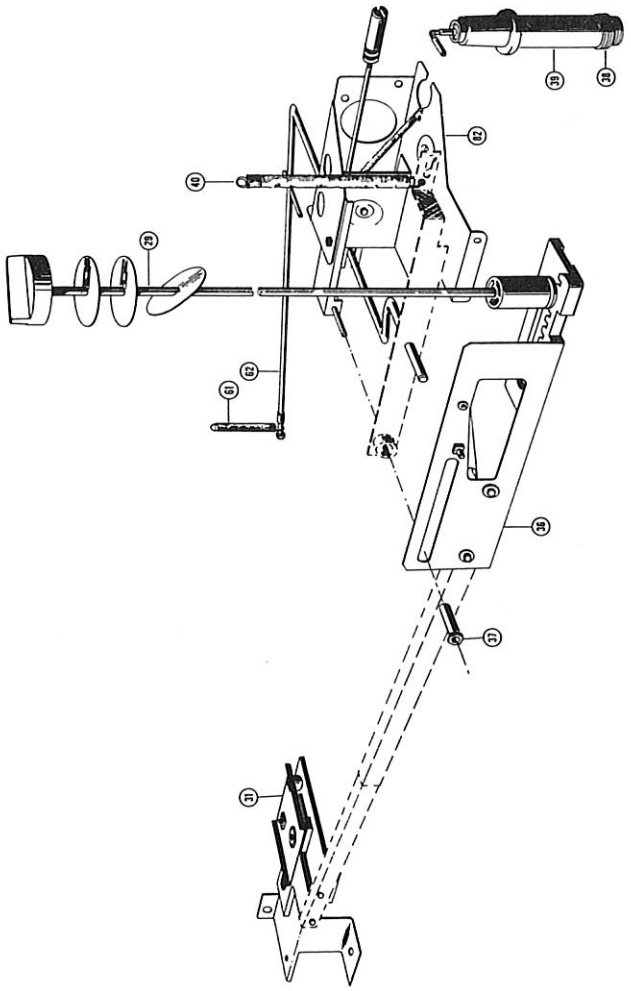
PARTS LIST (cont.)

REF. NO.	PART NO.	DESCRIPTION
54	4001-821	Flue element
55	4001-278	Pressure relief lid asbestos seal
56	OC -23	Pressure relief lid
57	S064-1	Lock nut — pressure relief lid — special
58	S010-5	Screw — pressure relief lid, 1/4" B.S.W. x 1-1/4" Hex. Hd.
59	1001-192	Spacer — pressure relief lid
60	1001-178	Screw — door retaining
61	4001-53	Spring — draught breaker
62	4001-824	Draught breaker crank
63	4001-831	Heat exchanger
64	4001-811	Draught breaker assembly
65	4001-866	90° Flue elbow
66	4001-842	Inbuilt cast
67	4001-93	Flue outlet cover
68	4001-841	Flue clamp
69	4001-347	Flue adaptor
70	1101	Cowl
71	1706	Filter
72		
73		
74	4001-248	Side door seal
75		
76	4001-342B	Escutcheon — oil knob
77	4001-368B	Escutcheon On/off oil
78	4001-333	Spacer — top burner baffle retainer
79	4001-116	Draught breaker pivot
80	4001-208	Draught breaker pivot bracket
81	1001-64	Neon
82	4001-873	Air control





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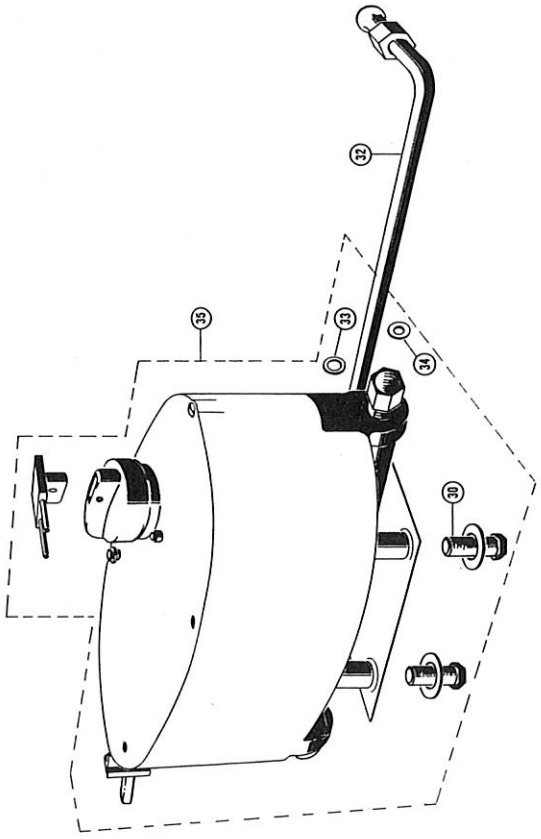
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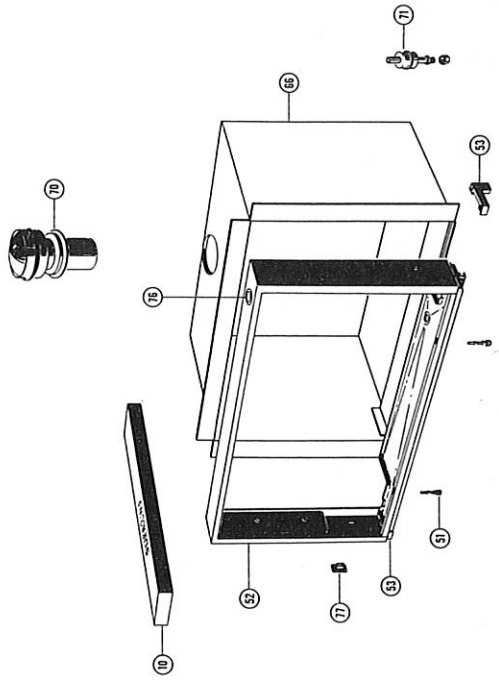
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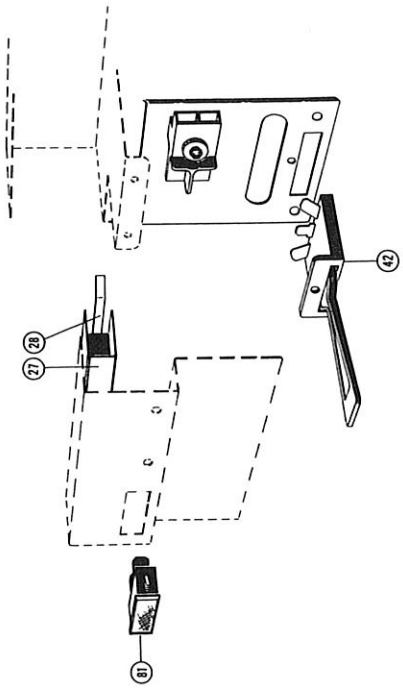
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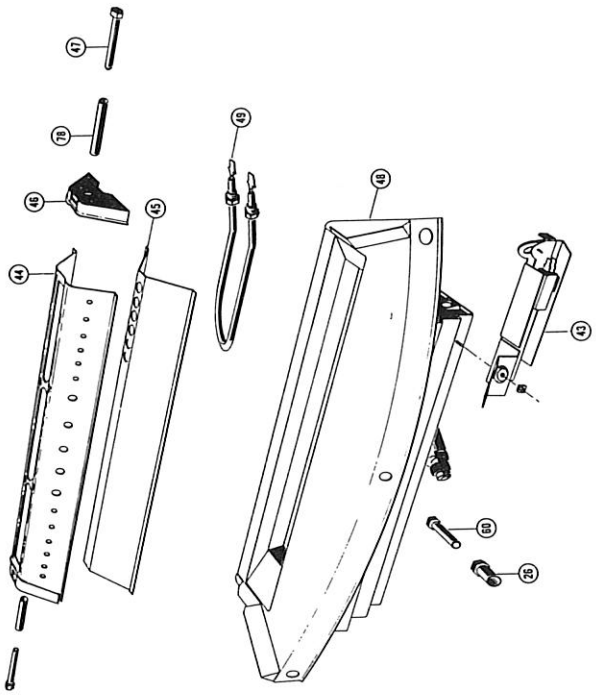
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