



ELJAN 4/SE
CIRCULATOR WATER HEATERS
INSTALLATION, COMMISSIONING & SERVICING INSTRUCTIONS
G.C. No 53 416 19

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This appliance is tested and certified by B G Technology for use with natural gas only.

IMPORTANT: These instructions apply to an ELJAN 4/SE that is either already fitted to a Johnson & Starley HI-SPEC J25SC or SCS25 MkI air heater, or is to be retro-fitted to either of these appliances. These instructions are to be read in conjunction with the relevant air heater Installation, Commissioning and Servicing Instructions.

WARNING: THIS APPLIANCE MUST BE EARTHED

1. GENERAL DESCRIPTION

- 1.1 ELJAN 4/SE is a gas fired circulator which can generate up to 62.5 litres per hour (13.7 gal/h) of hot water when installed in a Johnson & Starley HI-SPEC J25SC or SCS25 MkI air heater in SE-duct applications. The appliance is suitable for use in a fully pumped circuit comprising radiators and/or an INDIRECT cylinder. If the intention is to use ELJAN 4/SE with a direct cylinder, then the local Water Authority should first be consulted. ELJAN 4/SE may be used in a sealed system application when fitted with an Overheat Cut-off Device (CK1 kit).
- 1.2 The gas supply to the main burner is controlled by a multifunctional gas control valve. In addition, an electrically operated solenoid valve is fitted to permit the main burner to be remotely switched on and off. The main burner operates in conjunction with a permanent pilot burner and a thermoelectric sensing device. Pilot ignition is by means of a Piezo unit.

2. TECHNICAL DATA

2.1 NATURAL GAS.

Injector:	Amal type 340.
Setting pressure:	17.5 mbar (7.0 in wg).
Gas rate:	0.42m ³ /h (14.85ft ³ /h).
Input:	4.4kW (15,000Btu/h).
Output:	3.32kW (11,340Btu/h).
Gas connection:	8mm o/d gas feed pipe.

2.2 WATER.

Maximum output:	62.5 litres/h (13.7 gal/h) with 44.5°C (80°F) rise.
Maximum water temperature:	77°C (170°F).

User temperature control allows settings below maximum.

Maximum working head:	20m (65ft).
Minimum circulation head:	610mm (24in) with indirect cylinder, 356mm (14in) with direct cylinder.
Water connections:	Rp ³ / ₄ (³ / ₄ ” BSP internal parallel).

- 2.3 **ELECTRICAL SUPPLY:** 230V, 50Hz connection to solenoid valve via pre-wired plug and lead.

3. GENERAL REQUIREMENTS

3.1 RELATED DOCUMENTS (refer to current issues).

This appliance MUST BE installed in accordance with the relevant requirements of the Gas Safety (Installation and Use) Regulations, local Building Regulations, the I.E.E. regulations and the Bye-laws of the local Water Company. It should also be in accordance with any relevant requirements of the local Gas Region and Local Authority, and the relevant recommendations of the following British Standard Codes of Practice:

BS 6798:	Specification for installation of gas fired hot water boilers of rated input not exceeding 60kW.
BS5546:	Installation of gas hot water supplies for domestic purposes (2 nd family gases).
BS5440 Pt. 1:	Flues.
BS5440 Pt. 2	Air supply.
BS6891:	Installation of low pressure gas pipe work up to 28mm (R1) in domestic premises.
BS6700:	Design, Installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.

- 3.2 **GAS SUPPLY.** Installation of pipework is to be in accordance with BS6891. Pipework from the gas meter is to be of adequate size, and pipes of a smaller diameter than the appliance are not to be used. The complete installation must be tested for gas soundness, and purged as detailed in BS6891.

3.3 **WATER CIRCULATION SYSTEM.** Detailed recommendations for the water circulation system are given in BS6798, BS5449 (for small bore and microbore central heating systems), and BS5446.

3.3.1 To ensure good circulation in gravity circuits, flow pipes should be designed to run vertically from the water heater before running laterally. Any lateral run should be less than 2 x the previous vertical run. Pipework should be installed with a rise towards the vent point.

Note: For ease of removal of the circulator, the use of compression fittings is recommended.

3.3.2 Drain cocks must be located in accessible positions, which permit the draining of the whole system, including the appliance and hot water storage vessel. A drain cock should be fitted at the lowest point of the water heating circuit and, in the case of an indirect system, another must be fitted at the lowest point of the cold feed. Drain cocks should be at least $\frac{1}{2}$ in nominal size, and be in accordance with BS2879.

3.3.3 Economy valves can only be used in a DIRECT installation.

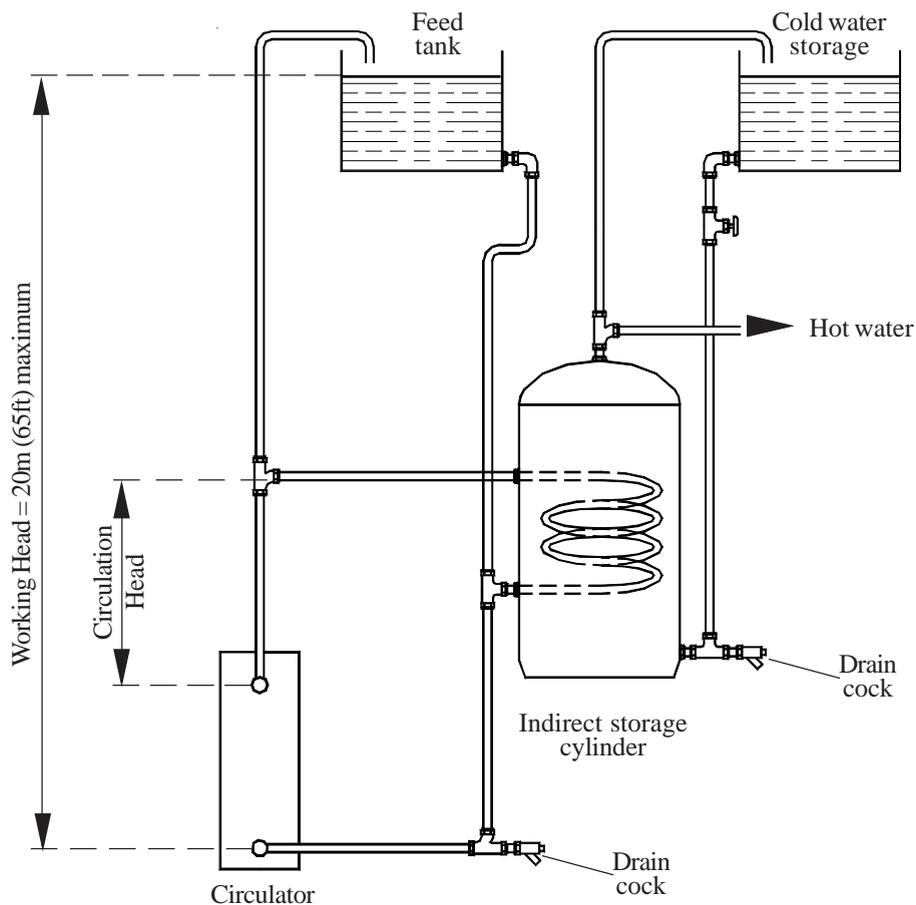


Fig. 1a.
Typical ELJAN 4/SE Indirect System application.

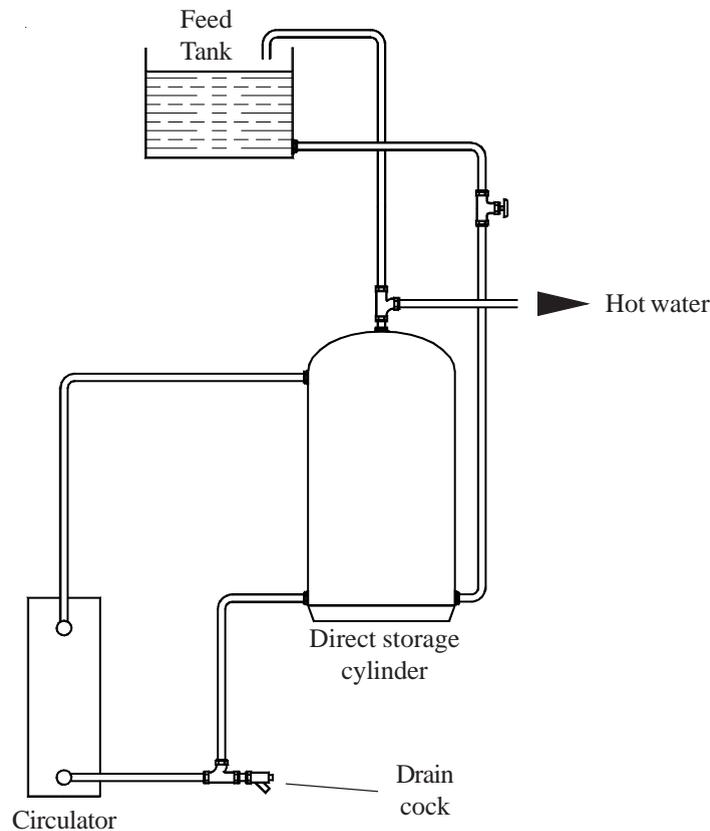


Fig. 1b
Typical ELJAN 4/SE Direct System application.

- 3.4 **ELECTRICAL SUPPLY:** Wiring external to the appliance must be in accordance with the Institute of Electrical Engineers (I.E.E.) regulations 488 (current edition), and any other local regulations which may apply.

4. INSTALLATION

- 4.1 Turn OFF the gas supply at the service cock and isolate the electrical supply to the air heater.
- 4.2 Disconnect the gas supply pipe at the union, and remove the pipe if it causes an obstruction to the circulator compartment.
- 4.3 Referring to the Installation, Commissioning and Servicing instructions provided with the air heater, remove the air heater Burner and Controls assembly.
- 4.4 Remove and retain the 2 screws securing the blanking plate to the underside of the fan compartment floor, withdraw and discard the blanking plate.
- 4.5 Loosen but **do not remove** the M6 nut securing the blanking plate assembly to the bottom of the circulator compartment, withdraw and discard the blanking plate. **Do not allow the T-bolt to drop behind the duct.**
- 4.6 Fit the rope ring seal (provided) to the spigot.
- 4.7 Carefully slide the ELJAN 4/SE circulator into position, and partially fit the two M6 screw (provided) through the slotted holes at the base of the unit, **but do not fully tighten.**
- 4.8 Align the holes in the insulation pad (provided) with the holes in the flue clamping plate, position the plate and pad assembly with the holes to the front, and ensure that the rear edge locates OVER the joggle strip on the air heater rear panel. Secure the plate and pad assembly using the two screws previously removed, ensuring that the sealing gasket is correctly positioned (refer to Fig. 2).

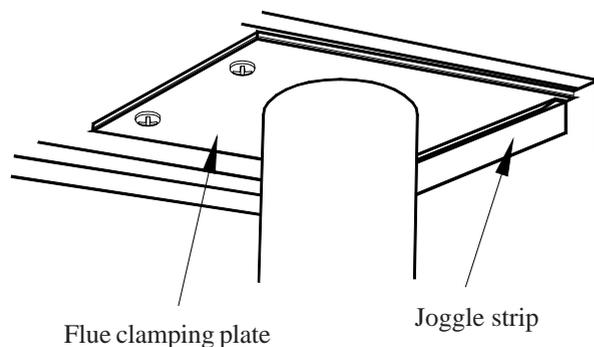


Fig. 2
ELJAN 4/SE Flue Clamping.

- 4.9 Fully tighten the two screw M6 screws at the base of the unit.
- 4.10 Remove the plug from the air heater Burner and Controls assembly gas supply pipe and fit the stud coupling (provided) using a proprietary sealing compound to seal the thread.
- 4.11 Referring to the air heater Installation, Commissioning and Servicing instructions, refit the Burner and Controls Assembly.
- 4.12 Assemble the flared connector to the gas feed pipe (both supplied), and connect the assembly to the stud coupling previously fitted to the air heater gas supply pipe and the gas supply port situated on the underside of the circulator multifunctional control.
- 4.13 Remove the two screws securing the air heater fan compartment door and hinge down the door to gain access to the air heater electrical panel.
- 4.14 Feed the circulator solenoid valve supply lead through the grommet in the fan compartment floor and cable clamp.
- 4.15 Referring to the air heater Installation, Commissioning and Servicing instructions, connect the circulator solenoid supply lead as follows:
- BROWN** conductor to terminal '10'
 - BLUE** conductor to terminal '9'
 - GREEN/YELLOW** conductor to the Earth stud.
- 4.16 Retain the circulator solenoid supply lead in the double return edge of the circulator compartment using the cable clips provided, and tighten the cable clamp in the fan compartment.
- 4.17 Close and secure the air heater fan compartment door.
- 4.18 **WATER CONNECTIONS:**
- 4.18.1 Connect 22 mm flow and return pipes (Rp $\frac{3}{4}$, $\frac{3}{4}$ in BSP) as required, in accordance with the guidelines detailed in Sect 3.3. To facilitate subsequent dismantling of the heat exchanger, use compression fittings at the point of connection to the appliance and prior to the appliance exit. Ensure that return pipe work does not restrict access to the thermostat phial or the top panel.
- 4.18.2 **Side Exit:** Use the holes in the sides of the air heater cabinet for external pipe routing.
- 4.18.3 **Top Exit:** Remove the plastic plugs in the air heater top panel and fan chamber floor, and feed pipe work through the holes from the rear, ensuring that the return pipe is to the rear. Fully tighten the connections to the circulator main body before completing connections at the top ends of the flow and return pipes.
Note: Fittings on the main body must be well supported when making these connections.
- 4.18.4 Seal around the pipe work where it passes through the air heater fan chamber floor and top panel using good quality duct tape.

5. COMMISSIONING

- 5.1 With the pump fitted (if required), fill the water circulation system, clear any air locks and check for water soundness.
- 5.2 Ensure the Thermostat capillary is fully inserted into the pocket in the flow connection of the circulator.
- 5.3 ELJAN 4/SE is factory set to provide a flow temperature of 60°C (140°F). If a higher flow temperature is required, proceed as follows:
- 5.3.1 Remove Multifunctional control Temperature/Control knob, (this is a push fit only)
- 5.3.2 Referring to Figs. 3, identify stop screws 1 and 2.
- 5.4.3 Dependant upon the required water temperature, remove:
- Stop screw 1 to provide a maximum temperature of 68°C (155°F), or,
 - Stop screws 1 and 2 to provide a maximum temperature of 77°C (170°F).
- 5.3.4 Refit Multifunctional control Temperature/Control knob, ensuring that it fully engages on the valve spindle.

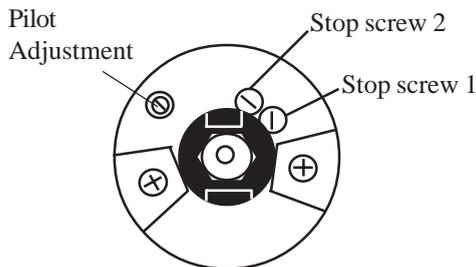


Fig. 3a
Stop screw positions

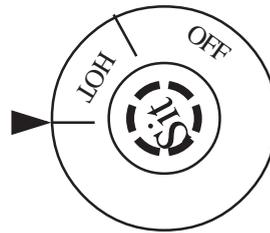


Fig. 3b
Minimum Setting 60°C

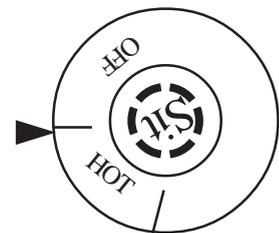


Fig. 3c
Maximum Setting 77°C

Fig. 3
Water Temperature Control Settings

5.4 GAS PRESSURE SETTING:

- 5.4.1 Referring to fig. 4, remove Outlet Pressure Test Point cover and connect Gas Pressure Test Gauge.
- 5.4.2 Turn the gas supply ON at the gas service cock and turn ON the electrical supply to the appliance..
- 5.4.3 Referring to lighting instruction label, ignite the pilot burner and ensure the pilot flame envelopes the thermocouple tip, adjusting the Pilot Adjusting screw if necessary by removing the Multifunctional control Temperature/Control knob to gain access.
- 5.4.4 Set the Multifunctional control Temperature/Control knob fully anticlockwise and ensure the main burner ignites. The appliance will now operate under thermostatic control.
- 5.4.5 Test the appliance for gas soundness, sealing any leaks found.
- 5.4.6 Referring to Fig. 4 and Table 1 (para 2.1), set Multifunctional control Pressure Adjuster to provide the required setting pressure for the installation.

5.5 SYSTEM OPERATION:

- 5.5.1 With the appliance ignited, ensure all controls operate correctly.
- 5.5.2 Carry out spillage test as detailed in the Installation, Commissioning and Servicing instructions for the relevant air heater
- 5.5.3 Allow system to reach working temperature and switch appliance OFF, rapidly drain and refill the system, clearing any air locks and test for water soundness.
- 5.5.4 Turn OFF Gas supply cock.
- 5.5.5 At Multifunctional control, remove Gas Pressure Test Gauge and refit Inlet Pressure cover.
- 5.5.6 Fit Control Cover.
- 5.5.7 Turn Gas supply cock ON.
- 5.5.8 Relight the appliance and set the appliance to the User's requirements.

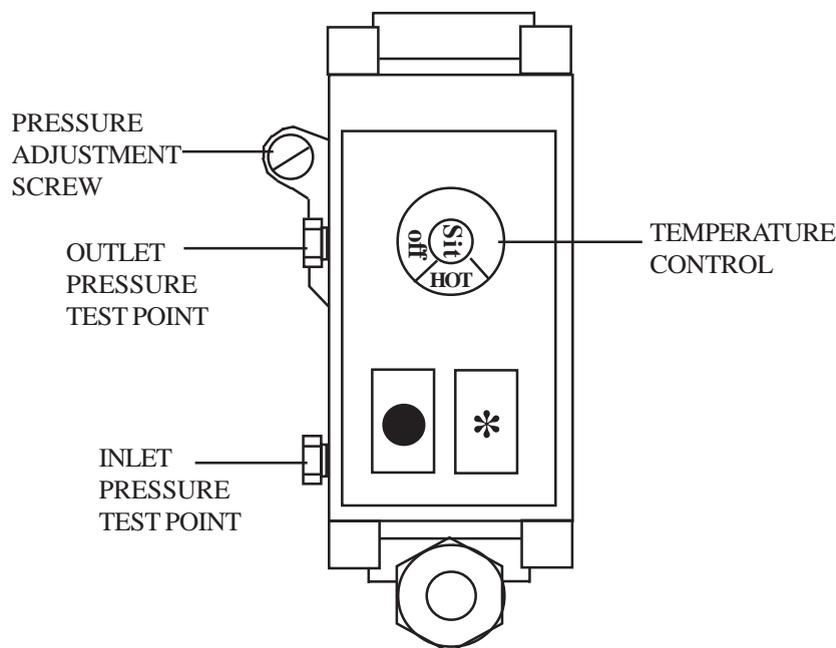


Fig. 4
Multifunctional control Component Identification

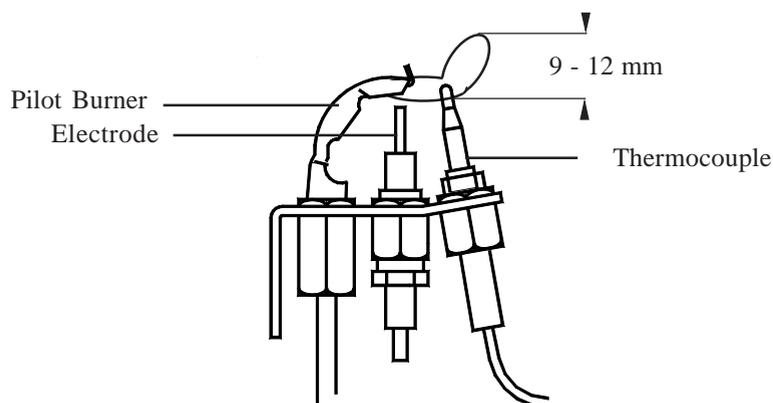


Fig. 5
Pilot burner and flame profile

6. INSTRUCTIONS FOR USER

- 6.1 If the building is unoccupied, ensure that the User Instructions (including those for the air heater) are left with the appliance for the user. Leave THESE Installation Instructions with the appliance for use on future service calls.
- 6.2 If the building is occupied, hand the User Instructions to the occupier and ensure that the user is instructed on the following:
- 6.2.1 How to use the circulator independently from the air heater.
 - 6.2.2 How to light the appliance.
 - 6.2.3 How to adjust the water temperature.
 - 6.2.4 That the appliance must be serviced at least once a year by a competent person, to ensure efficient and safe operation.
 - 6.2.5 The instructions for safe use have been read and understood.
 - 6.2.6 That if persistent failure of the pilot burner occurs, expert help must be obtained.
 - 6.2.7 What actions to take in an emergency shutdown.
 - 6.2.8 What actions to take if there is an escape of gas, i.e. turn off the gas supply at the gas meter, extinguish any naked flame, ventilate the area, **DO NOT** operate any **electrical switches**, call the emergency service of the local gas authority.

MAINTENANCE

7.

IMPORTANT: Ensure gas and electricity supplies are isolated before commencing any maintenance or replacement of components. After completion of any maintenance, always test for gas soundness and carry out a complete functional test of the appliance in accordance with Commissioning Instructions at Sect 5.1 to 5.5 inclusive.

7.1 ROUTINE MAINTENANCE

- 7.1.1 Operate the appliance and check for correct function of the burner and controls.
- 7.1.2 Remove and inspect the Burner and Control Assembly, cleaning the main burner, pilot burner and injectors as required.
Note: The Main Burner should be gently cleaned with a soft brush, and **under no circumstance** should the burner holes be enlarged, or distorted.
- 7.1.3 Inspect the Thermocouple and ignition lead for signs of damage, cleaning or replacing as required.
- 7.1.4 Inspect the Heat Exchanger flueways, clean by brushing from above and below and taking care to avoid damaging the surrounding insulation. Remove debris from the Heat Exchanger and Burner aperture using a vacuum cleaner or air duster. Clean any debris from the heat shield at the base of the appliance.
- 7.1.5 Ignite the appliance and test for gas soundness.
- 7.1.6 Recommission the appliance in accordance with section 5 of these instructions.
- 7.1.7 Ensure the appliance and controls are operating correctly.
- 7.1.8 Carry out spillage test to ensure flue products are clearing satisfactorily.

7.2 BURNER AND CONTROLS ASSEMBLY REMOVAL:

- 7.2.1 Ensure the gas supply is turned OFF at the supply cock, and the electrical supply is isolated.
- 7.2.2 Remove the front door of the air heater.
- 7.2.3 Disconnect ignition lead from Piezo unit.
- 7.2.4 Withdraw retaining plug from thermostat pocket and remove thermostat phial, taking care to avoid damage to the thermostat.
- 7.2.5 Release the securing screw and disconnect the solenoid plug.
- 7.2.6 Disconnect gas feed pipe.
- 7.2.7 Release the 7 x Burner Mounting Plate Screws and withdraw burner and control assembly.
Refitment or replacement is in reverse order, ensuring that:
 - a. Lug on rear of main burner engages into the bracket at the rear of the appliance body.
 - b. When refitting thermostat phial care is taken to avoid damaging the phial.
 - c. The thermostat capillary and retaining clip are secured using the Burner Mounting Screw.

7.3 PILOT ASSEMBLY REMOVAL:

- 7.3.1 Remove the Burner and controls assembly as detailed in para 7.2
- 7.3.2 Disconnect ignition lead from electrode.
- 7.3.3 Release thermocouple connection from Multifunctional control.
- 7.3.4 Disconnect the pilot gas feed pipe from the Multifunctional control
- 7.3.5 Release 4 x screws securing Pilot assembly to the Burner Mounting plate, and withdraw pilot assembly.
- 7.3.6 Gently tap the pilot burner to release the pilot injector.
- 7.3.7 Refitment or replacement is in reverse order, ensuring that the thermocouple connections and ignition lead connections are not overtightened (finger tight + 1 flat only).

7.4 MAIN BURNER AND MAIN INJECTOR REMOVAL:

- 7.4.1 Remove Burner and Controls assembly as detailed in para 7.2
- 7.4.2 Remove Pilot Assembly as detailed in para 7.3.1 to 7.3.5
- 7.4.3 Release 4 x screws securing the main burner to the mounting plate and withdraw the main burner.
- 7.4.4 Unscrew main injector from the injector housing.
- 7.4.5 Unscrew the main injector housing and release the 4 x screws securing the main gas feed pipe to the burner mounting plate.
- 7.4.6 Refitment or replacement is in reverse order, ensuring that:
 - a. The thermocouple connections and ignition lead connections are not overtightened (finger tight + 1 flat only).
 - b. If the main injector is to be replaced, the replacement is correctly marked (referring to the data badge).

7.5 HEAT EXCHANGER ASSEMBLY INSPECTION & ACCESS:

- 7.5.1 Remove Burner and Controls assembly as detailed in para 7.2
- 7.5.2 Remove the 4 x securing screws and withdraw the flue hood inspection cover.

7.6 MULTIFUNCTIONAL CONTROL REMOVAL:

- 7.6.1 Remove Burner and Controls assembly as detailed in para 7.2
- 7.6.2 Disconnect the pilot feed pipe and thermocouple capillary from the Multifunctional control.
- 7.6.3 Release the 4 x securing screws and withdraw the Multifunctional Control.
- 7.6.4 Disconnect and retain the gas inlet connection from the inlet side of the Multifunctional control.
- 7.6.5 Refitment or replacement is in reverse order, ensuring replacement 'O' ring seal, and transfer of the data badge in the event of replacement.

7.7 CIRCULATOR BODY REMOVAL:

- 7.7.1 Remove the Burner and Controls assembly as detailed in para 7.2
- 7.7.2 Drain down the water system and disconnect the flow and return connections from the circulator.
- 7.7.3 Referring to the air heater Installation, Commissioning and Servicing instructions, remove the air heater burner assembly.
- 7.7.4 Release the nut securing the flue sealing collar to the flue outlet.
- 7.7.5 Release the 2 x screws securing the circulator and withdraw the circulator body from the air heater cabinet.
- 7.7.6 Refitment or replacement is in reverse order, ensuring that:
 - a. Any replacement circulator body is clearly marked ELJAN 4/SE.
 - b. Fittings on the circulator body are well supported when remaking water connections.

7.8 SOLENOID VALVE REMOVAL:

- 7.8.1 Remove the Burner and Controls assembly as detailed in para 7.2
- 7.8.2 Unscrew the solenoid valve assembly from the gas feed pipe.
- 7.8.3 Refitment or replacement is in reverse order, ensuring that the solenoid valve is mounted correctly, (i.e., the direction of the flow arrow) with the coil pointing to the RIGHT, and horizontal.

7.9 SOLENOID VALVE COIL REMOVAL:

- 7.9.1 Remove the Burner and Controls assembly as detailed in para 7.2.
- 7.9.2 Release the circlip and remove the solenoid valve coil.
- 7.9.3 Refitment or replacement is in reverse order.

8.

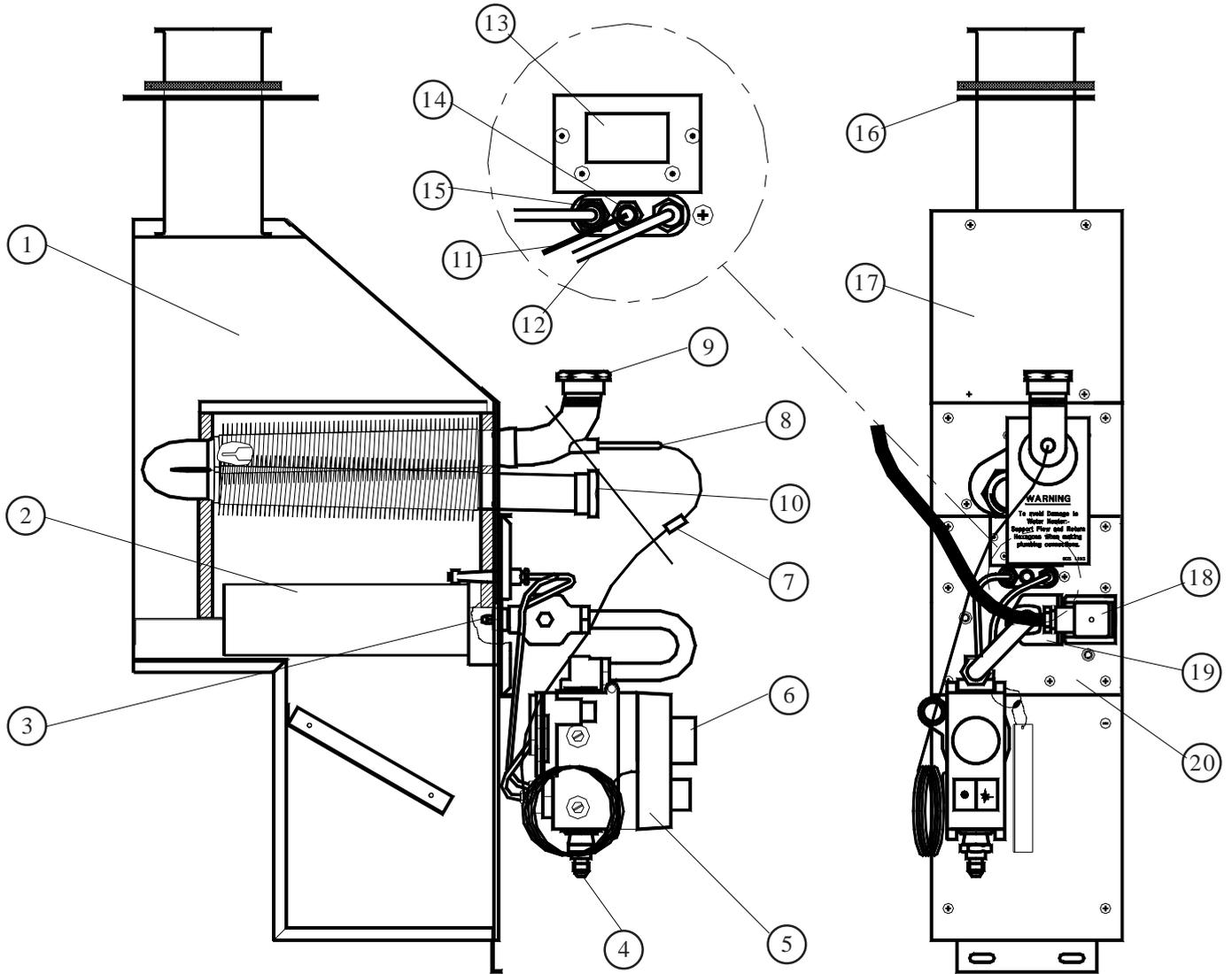
DEFECT DIAGNOSIS

IMPORTANT: If an electrical defect occurs after installation of the appliance; preliminary earth continuity, polarity, and resistance to earth checks should be carried out with a multimeter. On completion of any maintenance/fault-finding task that has required the breaking and remaking of electrical connections, then checks of continuity, polarity, and resistance to earth must be repeated.

NOTE: When purging or checking gas supplies ensure that, there is adequate ventilation to the room or cupboard, and all naked lights are extinguished.

SYMPTOM	POSSIBLE CAUSE	RECTIFICATION
a. Pilot fails to light.	<ul style="list-style-type: none"> i No gas supply to water heater. ii Gas supply not purged. iii Pilot injector orifice restricted. iv Piezo faulty. 	<p>Check for gas at inlet pressure test point on Multifunctional control.</p> <p>Purge gas supply pipe in accordance with BS6891.</p> <p>Clean pilot orifice or replace pilot assembly.</p> <p>Check/replace piezo unit, lead or pilot burner assembly.</p>
b. Pilot fails to remain lit when START button released or during normal operation	<ul style="list-style-type: none"> i. Connection between thermocouple and multifunctional control not secure ii Multifunctional control faulty iii Thermocouple defective. iv Pilot flame out of adjustment. v. Air inlet/flue outlet not fitted correctly. 	<p>Check for security of connection</p> <p>Replace.</p> <p>Replace.</p> <p>Adjust.</p> <p>Check that the inlet/outlet arrangements conform to Fig. 3 of the air heater Installation instructions and that seals are airtight.</p>
c. Main burner fails to	<ul style="list-style-type: none"> i. Thermostat phial too hot. ii. Thermostat faulty. iii. Multifunctional control faulty. iv. Solenoid valve coil faulty. v. Solenoid valve faulty. 	<p>Draw off quantity of hot water and check that burner lights when thermostat phial has cooled.</p> <p>Replace Multifunctional control.</p> <p>Replace.</p> <p>Replace.</p> <p>Replace.</p>
d. Insufficient hot water.	<ul style="list-style-type: none"> i. Burner operation cycle too short due to incorrect plumbing. 	<p>Check plumbing, in particular lateral runs.</p>
e. Water temperature outside usable range.	<ul style="list-style-type: none"> i. Thermostat out of calibration. ii. Gas rate incorrect. iii Thermostat phial or capillary damaged. 	<p>Set thermostat for required water temperature or replace Multifunctional control.</p> <p>Check burner pressure, main injector for blockage, replace main injector if faulty.</p> <p>Replace Multifunctional control.</p>

IMPORTANT: If a faulty heater control may have resulted in excessively high water temperatures, (above 85°C, 185°F), the hot water cylinder should be checked to establish whether it is a SELF-PRIMING type. If so, the circuit should be drained and refilled to ensure that the air seal between the primary and secondary circuits in the cylinder is properly established.



- | | | | |
|----|---------------------------|----|-----------------------|
| 1 | Circulator body | 11 | Electrode lead |
| 2 | Main burner assembly | 12 | Thermocouple |
| 3 | Main injector | 13 | Viewing port |
| 4 | Gas inlet connection | 14 | Igniter electrode |
| 5 | Multifunctional control | 15 | Pilot burner |
| 6 | Temperature control | 16 | Flue clamping plate |
| 7 | Thermostat retaining plug | 17 | Cover plate |
| 8 | Thermostat phial | 18 | Solenoid valve coil |
| 9 | Water Flow connection | 19 | Solenoid valve body |
| 10 | Water Return connection | 20 | Burner mounting plate |

Fig. 6
ELJAN 4/SE Component Layout

10.		<u>SHORT LIST OF SPARES</u>		
Key	GC.No	J&S Part No	Description	Qty
1		S252-0705000	Waterways replacement assembly (HI-SPEC J25SC)	1
	245 440	S250-0705000	Waterways replacement assembly (SCS25)	1
2	245 546	S252-0710000	Burner and Controls Assembly (HI-SPEC J25SC)	1
	245 451	S250-0710000	Burner and Controls Assembly (SCS25S)	1
3	245 486	S00560	Burner bar and plate assembly (SCS25)	1
	245 574	S00844	Burner bar and plate assembly (HI-SPEC J25SC)	1
4	397 445	1000-0703460	Main Injector Amal 340	1
5		BOS01104	Multifunctional control	1
6	245 482	S00556	Pilot burner assembly	1
7	392 935	S00254	Pilot burner injector kit	1
8	381 713	1000-0702030	Thermocouple	1
9	386 775	BOS01970	Igniter electrode	1
10	397 819	BOS02394	Electrode lead	1
11	397 823	1000-0505790	Solenoid valve	1
12	397 824	1000-0505805	Solenoid valve coil	1
12	245 466	1000-0511920	Solenoid lead	1
13		S252-0140000	Cover plate assembly (HI-SPEC J25SC)	1
		S250-0140000	Cover plate assembly (SCS25)	1

Johnson and Starley prides itself on its ability to supply spare parts quickly and efficiently. If your service engineer indicates a problem in obtaining a spare part, advise him to contact Johnson and Starley Spares Department at the address

below.

Telephone: 01604 762881

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