
ABBAY ELECTRONIC CONTROLS

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FX30xxx

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APPLICATION NOTES FOR
FULL SEQUENCE CONTROL

BOARD
(OEM Copy)

This document may be updated at any time without notification. It is therefore advised that a check is made to see if there is a later release copy.



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1 Introduction.

- 1.1 The FX30xxx¹ is an electronic full sequence control (FSC) board designed for combustion appliances.
- 1.2 It is a dual fan speed controller allowing two air rates for the appliance under control. It incorporates, by design, features to allow many variations of the board as will be explained later under "Nomenclature".
- 1.3 It provides electronic ignition and flame detection by means of an ionisation probe which can also be configured as the spark electrode. Otherwise the spark and flame electrodes are kept separate. The control is also available with a volatile or a nonvolatile lockout option.
- 1.4 The FX30SPT has no fan function at all but can be used with the FX30PPT fan proving board which provides adjustable pre-purge timing (refer to the appendix).

2 Pin Details.²

- 2.1 **TB1:-** Pin 2 goes high (20 V nominal) during ignition. It may be used to activate events which need to be synchronised with ignition such as forcing a low or high fire.

The output current from the pin is limited by a resistor, R2, but this resistor could have a zero value enabling the pin to power an external relay directly. The relay should be able to work at 18 V and have a coil resistance of not less than 1k.

<u>Pin Assignment:-</u>	1	---	>	0 V
	2	---	>	Output

- 2.2 **TB2:-** Fan connection across pins 2 and 4.

A functional earth connection from the fan to pin 1 **must** be provided. This is used to provide an earth return path for the flame electrode in the case of a dual probe arrangement, and also for the spark in the case of single probe arrangement.

This assumes electrical continuity between the fan's frame and the appliance.

¹ The FX30xxx is based on the F007xxx. Differences between the two boards are itemised in Appendix IV on page 7.

² Does not apply to FX30SPT. See Appendix I for pin and wiring details.

<u>Pin Assignment:-</u>	1	---	Earth
	2	---	Neutral
	3	---	N/C
	4	---	Fan Live

2.3 **TB3:-** Air Pressure Switch terminal.

<u>Pin Assignment:-</u>	1	---	Normally Open
	2	---	N/C
	3	---	Common
	4	---	Normally Closed

2.4 **TB4:-** Terminal for safety lockout device which is supplied with each board for panel mounting in the case of a non-volatile lockout board. This device carries with it an integral reset button.

In the case of a volatile lockout control, this terminal is not present as it is replaced with an on-board volatile lockout device (a PTC thermistor).

2.5 **TB5:-** When a change-over to a different preset fan speed is required, 24 V d.c. is applied to pins 1 & 2 of this pin header for 2-speed RSF application. The fan is thus switched between high and low speed in sympathy with demand magnitude as required.

The lower speed setting is adjustable via an on-board potentiometer.

The other 3 pins on this terminal block are the volts-free change-over contacts of the speed relay which are used for control interlock to ensure a safe fan control scheme. Refer to Application Example on page 14.

<u>Pin Assignment:-</u>	1	---	Relay coil +ve
	2	---	Relay coil -ve
	3	---	N/C
	4	---	Normally Closed
	5	---	Common
	6	---	Normally Open

2.6 **TB6:-** Demand input. A live signal on pin 3 will start the control through its sequence. It is recommended that a fuse of no greater than 3 ampere rating be used to protect this line somewhere within the appliance. Pin 1 is the Neutral and pin 2 is not used.

2.7 TB2:- Gas valve outputs.

Pin Assignment:-

1	---	Neutral
2	---	Solenoid (Safety) Gas Valve.
3	---	Neutral ³
4	---	Demand (Electrically same as pin 3 on TB6).

2.8 TB8:- Lockout indicator⁴. A neon indicator connected to this terminal will light up if a lockout has occurred, or if the lockout device is missing or faulty.

The neon may flicker during ignition but will extinguish after flame detection.

2.9 TAG1:- Flame detection electrode. Not required for a single probe arrangement.

If flame is not established within a specified safety time, the board proceeds into lockout.

2.10 TAG2:- Ignition electrode, hot end. In the case of a single probe control, this terminal also detects the flame.

2.11 TAG3:- Ignition electrode, earth end. Not required for a single probe arrangement.

3 Nomenclature.

3.1 The name FX30xxx, or simply FX30, refers to the basic full sequence control board which can be offered in various configurations according to the appropriate major designation of the x's as follows:-

3.1.1 1st Letter:- Fan speed arrangement.

N -	No Fan
S -	Single Fan
L -	Dual Fan Default Low.
H -	Dual Fan Default High.

³ This pin is not backwardly compatible with the F007.

⁴ There is a 47k resistor in series with this terminal.



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- 3.1.2 **2nd Letter:-** Lockout mode/Safety time.
L - Non-volatile lockout with 5 seconds safety time.
M - Non-volatile lockout with 10 seconds safety time.
N - Non-volatile lockout with 15 seconds safety time.
V - Volatile lockout with 10 seconds safety time.
W - Volatile lockout with 15 seconds safety time.
- 3.1.3 **3rd Letter:-** Probe(s) arrangement.
D - Dual probe.
S - Single probe.
- 3.2 It therefore follows that at least 32 versions of the FX30xxx configurations are possible. Not all of these are viable commercially and it will be expected that the actual number of variants will be much less. There are two standard versions:-
- 3.3 **FX30LLD and FX30LWD.** FX30LLS and FX30LWS are also possible popular versions. Others are available subject only to volume and requirement.
- 3.4 Other minor suffixes may be applied in addition where needed. For example, the low fan speed may be factory set for a customer. This would carry extra suffix(es) to distinguish the product.

4 Classification.

4.1 The classification of this control is:-

FMRLXK

or **FMRVXK** depending on variant.

Please refer to nomenclature on page 5.

5 Specifications⁵.

5.1 Supply:-

Supply Voltage	230	Volts
Supply Voltage Tolerance	+10, -15	%
Supply Frequency	50/60	Hz

5.2 Power Consumption:- (Excluding all peripherals)

Maximum Peak	75	VA
Steady State	16	VA

5.3 Fan²:-

Maximum Fan Current	1	Ampere
Fan Relay Voltage(coil)	24 ±10%	V d.c.

5.4 Safety Valve:-

Maximum Current	0.3	Ampere
-----------------	-----	--------

5.5 Ignition:-

Maximum Spark Frequency	50	Sparks/Sec.
Minimum Spark Frequency	No limit	

⁵ Where there have been design revisions, please note that the specification refers to that of the existing current issue of the design which may be different from the original specification.



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Spark Energy (gross)	20	mJ
Maximum Length of Lead	1.5	m
Type of Lead	EHT Multi-strand with break down voltage of at least 25kV.	

5.6 Spark Gap:-

Recommended Setting	3 +1,-0	mm
---------------------	---------	----

5.7 Safety Time:-

Maximum	15 ⁶ /10/5	s
Minimum	3/2	s

5.8 Flame:-

Type of detection	Ionisation.	
Flame Current Sensitivity:-	2.0	μA
Nominal Probe Voltage	230	V a.c.
Probe Impedance	≥3	MΩ

5.9 Environmental:-

Operating Temperature:-	0 - 75 ⁷	°C
Enclosed FX30SPT:-	0 - 60	°C
Humidity:-	90	%RH
(No condensation)		

Enclosure:- Depends on application but a minimum of IP40 is recommended. The enclosure must be of one of the following:-

- i) All-metal construction with earthing provision to the main frame of the appliance.
- ii) Totally non-conductive construction with no possible path of direct conduction onto the board.

⁶ Volatile lockout only.

⁷ This refers to the temperature immediately around the FX30 thus taking into consideration the effects of any enclosure.



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Board Mounting:- Any attitude but not upside down.

5.10 Exclusions To Use.

5.10.1 The FX30xxx is currently not phase sensitive but the FX30SPT is. It is therefore not suitable for applications where phase-sensitivity is necessary for safety requirements. In such cases, however, provided double insulation wiring (cable with an overall sheath) is used for connection between

- a) The FX30 and the safety gas valve
- b) The overheat protection device

it will be possible for the FX30 to be used.

5.10.2 This control is not meant for inter-building controls application.



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Appendix I.

- 6.1 Peripheral Wiring Diagram.
- 6.2 Timing Diagram. (Ignore the fan for the FX30SPT).
- 6.3 Board Layout.
- 6.4 Wiring Diagram for FX30SPT.
- 6.5 Data on FX30PPT Fan Proving Board.

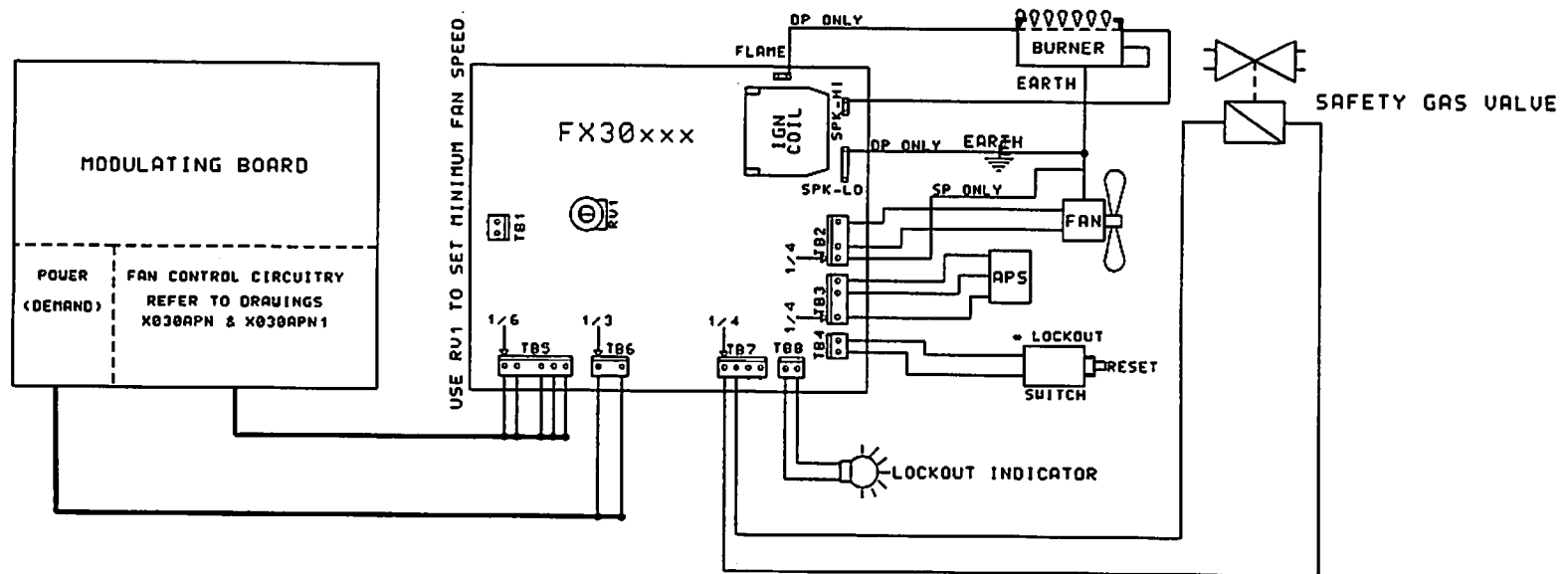


Fig. 4 A TYPICAL PERIPHERAL WIRING DIAGRAM.

DRG. NO. X030WDG	ISS.	DATE: 16/02/96	DESIGNER P. A. BODE	CHECKED	NOTES(*) :- ** Value depends on application. Dotted line shows alternative connection for Default High Fan use.	ALL RESISTORS 0.25W 5% ALL ZENERS 0.5W ALL DIMENSIONS IN mm DIM'S TO 1DP = ± 0.1 mm DIM'S TO 2DP = ± 0.02 mm ANGLES TO $\pm 0.5^\circ$ SCALE = 100%	MATERIAL :-
	X = 1	16/02/96					
	P = 1	16/02/96					
TITLE :- WIRING DIAGRAM FOR FSC BOARD FX30xxx.			DRAWN :- P. A. BODE	APPROVED		UNLESS STATED OTHERWISE	SCALE :- A4

NOTES

dt1 = Settling Time $\approx$ 1 sec.
dt2 = Air Proving Device Reaction Time
dt3 = Safety Time within which flame
must be detected to avoid lockout.

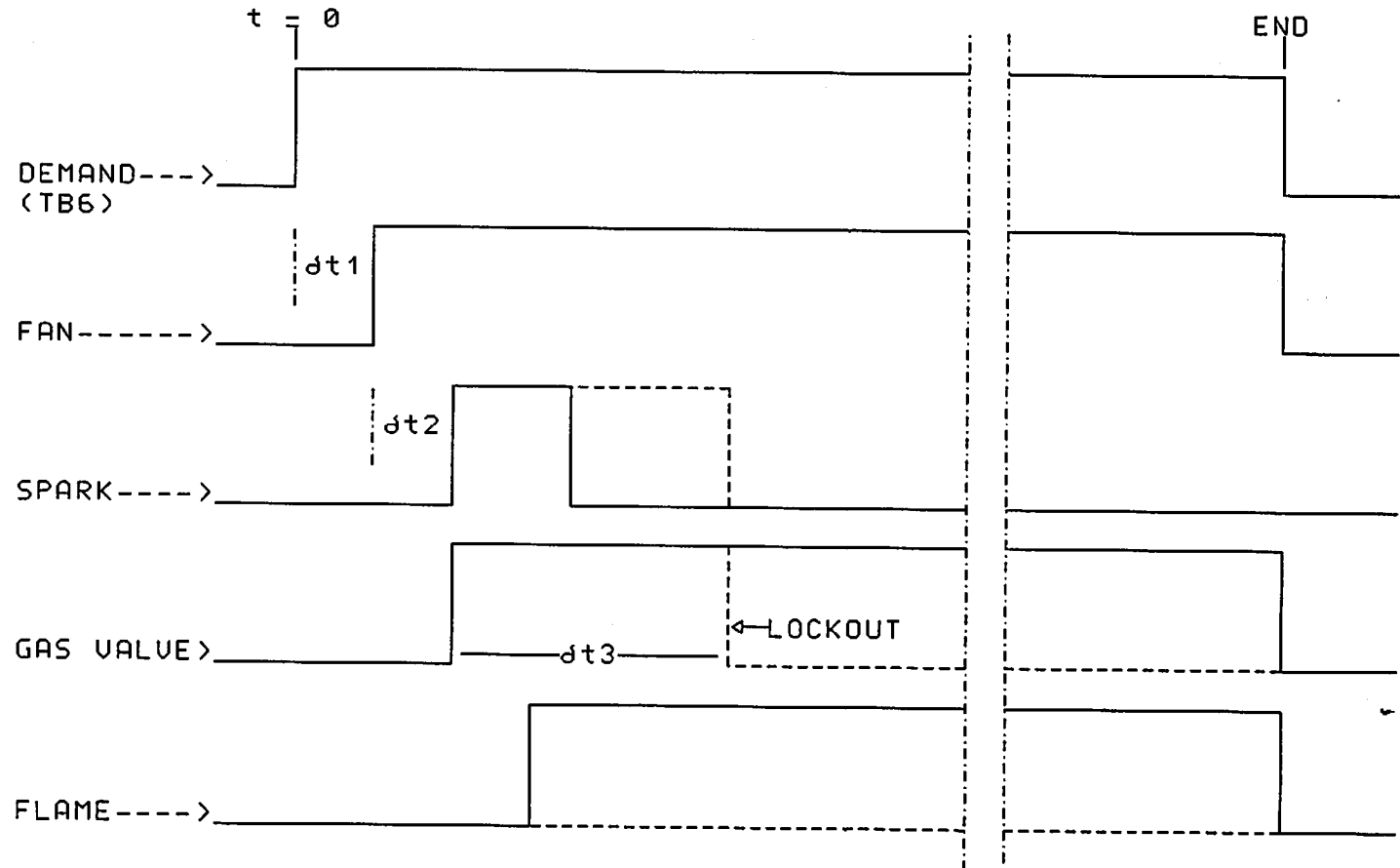
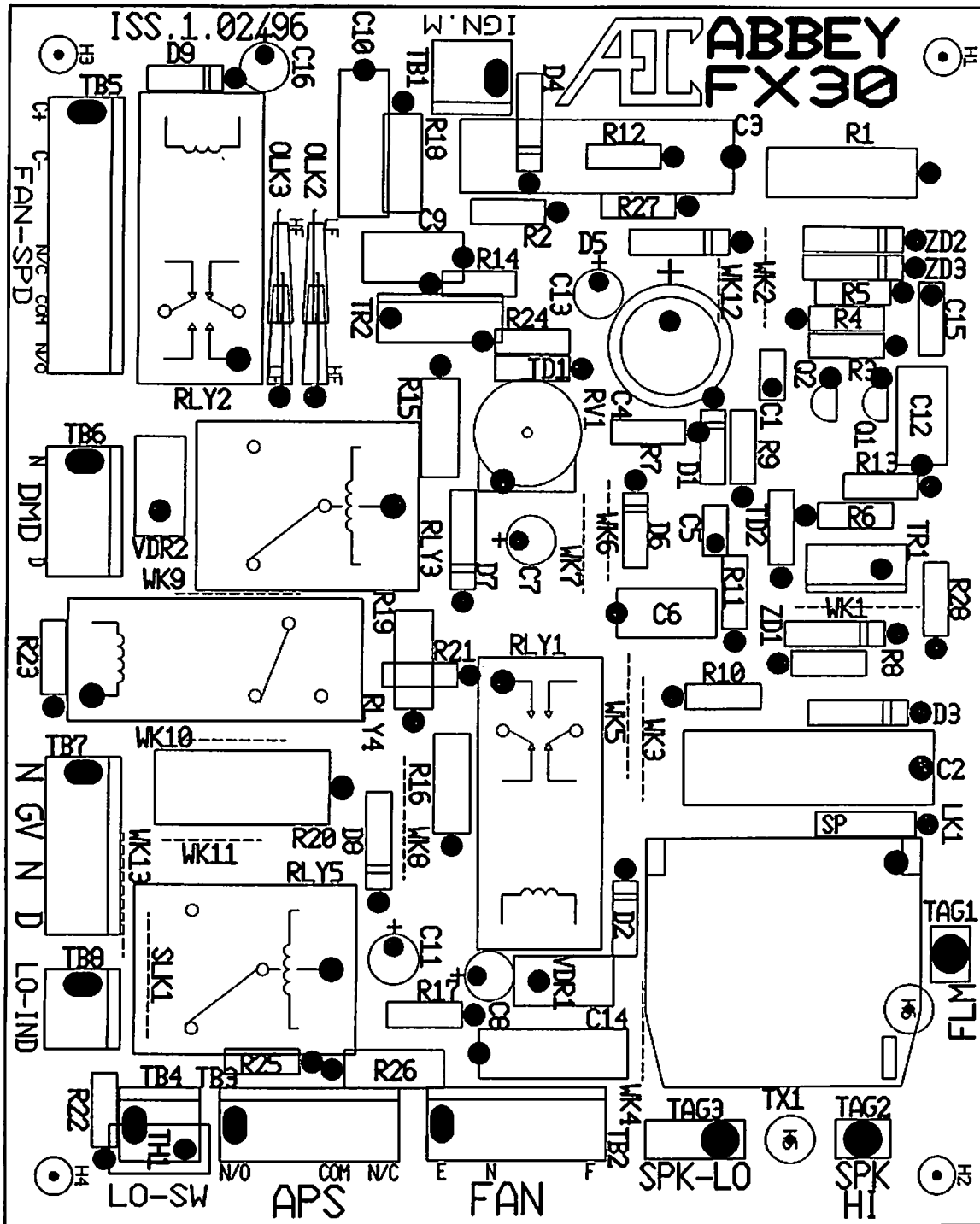


Fig.5 TIMING DIAGRAM FOR FX30xxx.

DRG. NO. X030TDG	ISS.	DATE: 16/02/96	DESIGNER P. A. BODE	CHECKED	NOTES(*) :- ** Value depends on application. Dotted line shows alter-native connection for Default High Fan use.	ALL RESISTORS 0.25W 5% ALL ZENERS 0.5W ALL DIMENSIONS IN mm DIM'S TO 10P = ± 0.1 mm DIM'S TO 20P = ± 0.02 mm ANGLES TO $\pm 0.5^\circ$ SCALE = 100% UNLESS STATED OTHERWISE	MATERIAL :- SCALE :- A4
	X = 1	16/02/96					
	P = 1	16/02/96					
TITLE :- TIMING DIAGRAM FOR FSC FX30xxx.			DRAWN :- P. A. BODE	APPROVED			

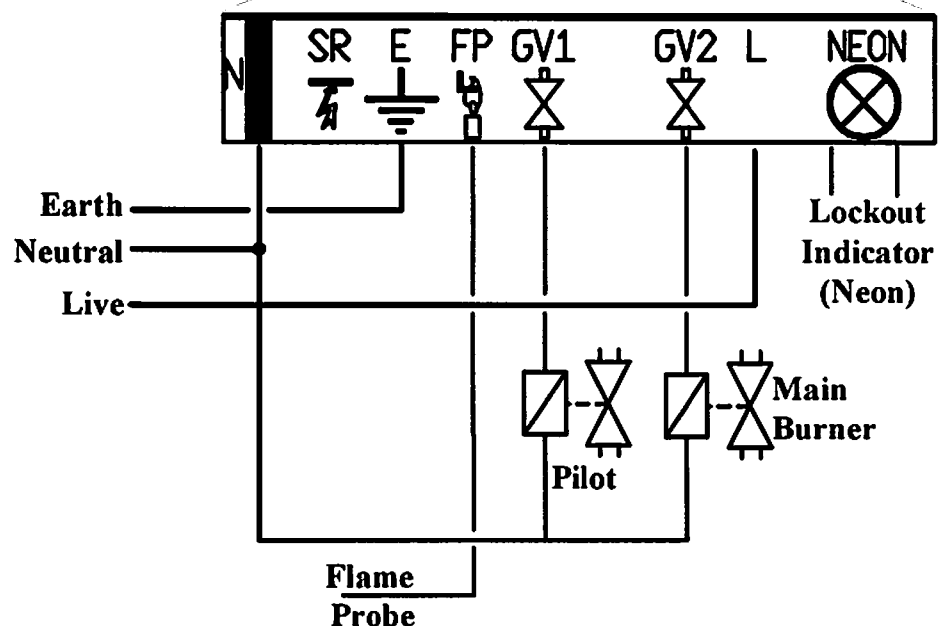
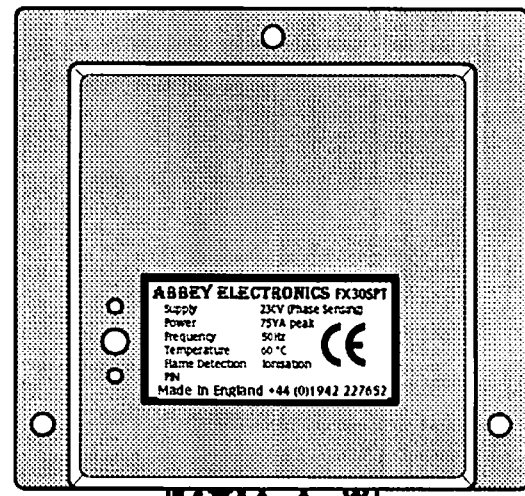


X030.L3 (Feb. 27, 1996) (13:25) (A.E.C.) SCALE: 150%
 Drill Ref Pnt: 0.034, 0.020 (inch)

The FX30SPT is an electronic ignition Full Sequence Controller for gas burning appliances. It provides ionisation flame detection and offers a choice of separate or combined ignition and flame electrodes.

Uniquely the FX30SPT also offers a choice of top or front electrode the latter ensuring that all connections can be made from one face.

The control can be mounted in any orientation.



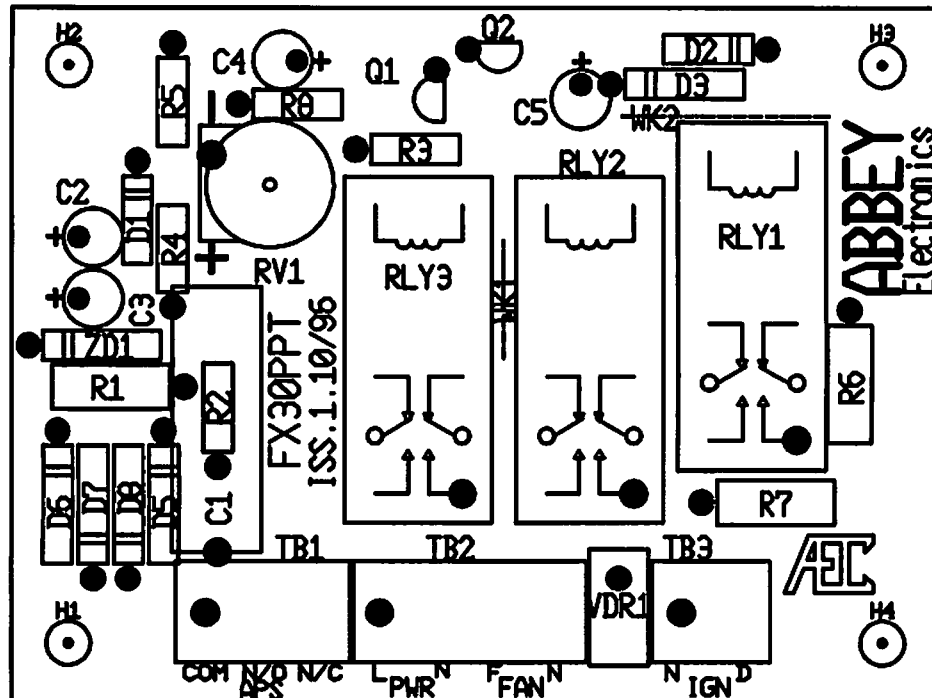
Connection to the FX30SPT is via the special 10-Way connector obtainable from Abbey Electronics. The board should be wired as shown above for Permanent Pilot application. The flame should be sensed on the pilot. For direct burner ignition (DBI) use GV1 as the burner.

For dual probe (separate spark/flame sensing) operation connect SR to earth.

For single probe (combined spark/flame sensing) connect SR to FP. The spark electrode will thus sense flame as well.

The OEM should observe all the normal rules and regulations governing electrical wiring and safety.

DRG. NO. FX30SWDG		ISS:-	X	1	ALL RESISTORS 0.25W 5% ALL ZENERS 0.5W ALL DIMENSIONS IN mm DIM'S TO 10P= ±0.1 mm DIM'S TO 20P= ±0.02 mm ANGLES TO ±0.5° SCALE = 100% UNLESS STATED OTHERWISE
TITLE: - WIRING DIAGRAM FOR FX30SPT					
DATE:- 10/10/96	X	10/10/96	MATL. NOT APPLICABLE		
DESIGNER: P. A. BODE		DRAWN: P. A. BODE			
CHECKED:-		SCALE: NOT SCALED			
APPROVED:-					



Board Size:- 80 x 60 x 30

Fixing:- 4 x 4.0mm Holes on rect. pitch 70 x 50

Rated Voltage: 230V 50Hz

Current Rating

Fan: 8A max

IGN: 3A max

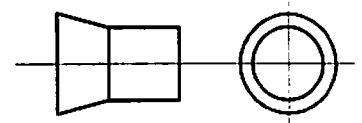
Prepurge Time* Adjustable 15 to 30s -0,+25%

The IGN terminal is live after the prepurge period provided the pressure switch works correctly. Both the FAN and IGN outputs can be used to drive contactors or external relays for higher current handling.

Suitable external fuse no greater than T10A should be used to protect the board and appliances under control.

* If there is ever any need to restart the purge sequence at least 5 seconds must be allowed between removing power and reapplying it to the board.

DRG. NO. FX30PPT		ISS:-		X	1	ALL RESISTORS 0.25W 5% ALL ZENERS 0.5W ALL DIMENSIONS IN mm DIM'S TO 10P= ±0.1 mm DIM'S TO 20P= ±0.02 mm ANGLES TO ±0.5° SCALE = 100% UNLESS STATED OTHERWISE
TITLE : - PREPURGE TIMER FOR FX30SPT						
DATE:-		X	17/09/96		MATL. NOT APPLICABLE	
17/09/96		P				
DESIGNER: P. A. BODE			DRAWN: P. A. BODE			
CHECKED:-			SCALE: NOT SCALED			
APPROVED:-						



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Product Revisions

7.1 Conventions

- 7.1.1 The details below refer to modifications carried out to the design of a previous issue of FX30 in order to arrive at a subsequent issue of the design.
- 7.1.2 The issue numbers referred to are the product issue numbers and not the development issue number both of which are shown on the circuit diagram denoted "P" and "X" respectively under the "ISS." column.
- 7.1.3 All references to components refer to either the previous issue or the subsequent one, or both. Where ambiguity may arise due to the possibility of a component reference on one issue having no relationship to similar reference on another, the issue being referred to is explicitly made known by the inclusion of a "/" followed by the issue number e.g. R15/2 meaning "R15 on issue 2 board".
- 7.1.4 Pin numbers on components are referred to by specifying the component followed by an hyphen and the pin number e.g. IC1-1 meaning "pin 1 of IC1".

Issue 2

B. Reasons for Change

(No revisions yet)

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