

## SERIES 5 AUTOMATIC FAN AND HEATER BANK CONTROLLERS

### Operating instructions

These units are micro processor based monitoring and control units, operating on humidity and/or temperature, for the control of crop drying fans equipped with supplementary heaters.

### INSTALLATION

The control panel can be mounted either within the main starter panel of the unit to be controlled or when fitted to existing installations it should be wall mounted in a convenient position to obtain a 240v 50 Hz single phase power supply, which should be connected via the plug and lead supplied, to input (4) Fig. 1 in the bottom of the casing. When the unit is supplied mounted in the starter cabinet the mains supply will be internally connected.

The relay board supplied with these units should be mounted in the control panel and connected with the lead supplied to input (3) Fig 1 on the bottom of the control unit casing. The relays then operate the fan and heaters upon commands from the controller. An enclosure can be obtained as a separate item to house the relay board if required.

The humidity\temperature sensor supplied should be mounted on an external face of the main air tunnel within the fan house area. The sensor element which is protected by a plastic filter is located at the bottom of the sensor box and in order to obtain effective operation of the unit a "bleed of air" should be directed onto this filter from a pipe inserted through the tunnel wall in order that an adequate supply of air from within the tunnel is blown onto the sensor when the fan is running. In this way the fan can be operated on both ambient air and blown air and thus avoid the need to have regular fan start-ups to test the air humidity. The bleed pipe should not exceed 50cm (18") in length on the outside of the tunnel and should be approximately 25mm (1") in diameter and be positioned to blow directly onto the sensor. Inside the tunnel allow the pipe to run 2 to 3M downstream of the fan. The cable supplied with the sensor should then be connected to input (1) Fig 1 on the bottom of the controller casing. This single connection provides for both temperature and humidity sensing.

Input (2) Fig 1 is used when an Economy 7 interface is required or can be used to monitor only a second temperature sensor positioned in the stored crop. Where gas burners are concerned the Economy 7 interface can be used as a burner interlock.

### OPERATION

When switched ON the display will show numbers or dashes, this indicates POWER is on. If the display remains blank check console fuse, supply to the controller and all mains connections before calling for service.

## SELECTING PROGRAMS

Ensure that the SELECT FUNCTION knob (8) Fig 2 is turned to MANUAL OFF before making programme adjustments.

The PROGRAM SELECT switch (2) Fig 2 should be turned to the desired operating programme.

PROGRAM 1, FAN ONLY operation utilizing RH% high and temp set points only. This program can be used for drying or cooling the stored grain using ambient air only. FIG 3 ILLUSTRATES THE PROGRAM SEQUENCE.

To set up programme 1 for drying.

(a) Select program 1 on PROGRAM SELECT switch (2)

(b) Turn SET UP knob (7) to RH HIGH

The display will read the previous set point and an "S" will flash on the left-hand end of the display. This indicates that set up mode is in use, "S" FOR SET UP.

(c) To adjust the set up point use rocker switch (9) to move RH set point up or down. To obtain the required set point consult the equilibrium tables for the relevant crop in Fig (8) at the rear of this booklet.

(d) The set point is now in memory and the fan will only start when the ambient air RH% meets this requirement and it will run until the RH% exceeds the set point again when it will stop.

(e) Turn SET UP knob (7) to TEMP 1, display will read previous temperature set point and will flash on left.

(f) If it is desired to operate the fan within temperature as well as humidity limits set the required temperature by using rocker switch (9) as in (c) above.

Selection of this temperature set point will mean that both RH% and temperature of the ambient air must meet these set requirements for the fan to operate and that should either of these set points be exceeded during fan running time the fan will stop.

(g) If it is not necessary to use both RH% and Temp. set points in conjunction the following action should be taken:-

(i) RH% High only required - for drying grain  
Set the TEMP 1 set point to a temperature higher than any ambient temperature likely to be achieved in your area during the time you wish to run the fan, eg. 30 deg C. The fan will now be controlled on RH% only since ambient temperatures are unlikely to exceed 30 deg C.

(ii) Temperature only required - for cooling dry grain.

Set TEMP 1 to the temperature of the air you wish to blow through the grain. However, it is also advisable to set RH% at a point where re-wetting of the grain is not likely to take place on cool wet nights, eg. wheat and barley at 15% moisture content will re-wet if air over 75% RH is blown through it for any length of time. In this case set RH HIGH to 75% to avoid re-wetting since when this set point is exceeded the fan will turn off even if the temperature of the ambient air is suitable for cooling.

(h) To check set points turn SET UP knob (7) to RH HIGH. The display will show the flashing "S" and the RH HIGH set point. Turn to TEMP 1 and the temperature set point will be displayed. When both set points have been set and checked return the SET UP knob (7) to MONITOR. Turn SELECT DISPLAY (6) to RH. The display will change to read the actual air RH% at that moment. Turning SELECT DISPLAY knob to TEMP 1 will display the actual air temperature.

#### IMPORTANT

TO ENABLE THE PROGRAM TO OPERATE TURN THE SELECT FUNCTION KNOB (8) TO AUTO. THE PROGRAM WILL NOW OPERATE WHEN SET CONDITIONS ARE MET.



PROGRAM 2 FAN ONLY operation utilizing RH% high, RH% low and temperature set points.

This program can be used as Program 1 but the provision of an RH% low set point is designed to prevent over-drying of the grain.

FIG 4 ILLUSTRATES THE PROGRAM SEQUENCE

To set up Program 2 for drying.

- (a) Ensure that SELECT FUNCTION knob is turned to MANUAL OFF position.
- (b) Select program 2 on PROGRAM SELECT knob (2)
- (c) Set up procedure is identical to PROGRAM 1, sections (a) to (h) with the exception of the SET LOW position.
- (d) To set RH% low set point turn SET UP knob (7) to RH low. The display will read the previous set point and the "S" will flash. Adjust the set point to the desired low limit with switch (9) as in (c) above.

The set point is now in memory and the fan will only start when the ambient air RH% meets this requirement and it will run until the RH% exceeds the set point again when it will stop.

Note:- The Low limit cannot be set with less than a 4% RH gap between it and the High limit. This is to prevent an overlap of Low and High limits which would prevent the fan from starting at all.

The Low limit set point is used to prevent air which is too dry from being blown into the crop thereby overdrying the bottom layers.

- (e) When all set points have been programmed in return the SET UP knob (7) to MONITOR. Turn the SELECT DISPLAY knob (6) to RH. The display will change to read actual air RH% at that moment. Turning SELECT DISPLAY TO TEMP 1 will display the actual air temperature.

To check set points turn the SET UP knob (7) Fig 2 to RH HIGH, the display will show the flashing "S" and the RH HIGH set point. Turn to RH LOW and the low set point will be displayed. Turn to TEMP 1 and the temperature set point will be displayed. Return knob to MONITOR position.

#### IMPORTANT

TO ENABLE THE PROGRAM TO OPERATE TURN THE SELECT FUNCTION KNOB (8) TO AUTO. THE PROGRAM WILL NOW OPERATE WHEN SET CONDITIONS ARE MET.



PROGRAM 3 FAN AND HEATER operation with RH HIGH SET POINT.

Fig 5 ILLUSTRATES THE PROGRAM SEQUENCE. (except for gas modulating valve where figs 9 or 10 apply)

IMPORTANT NOTE :- THE TYPE OF HEATER BANK TO BE CONTROLLED IS IMPORTANT

The following combinations can be catered for:-

1. Electric 3 stage heater banks.
2. Electric 7 unequal stages of heat.
3. Fully modulating propane fired heaters.
4. Simple on/off control of propane heaters.

The programming for these five different functions is by means of internal switch settings. Program 3 will only operate one of these five sub routines and the specific type of heater control required should have been specified at time of purchase. If this has been done your unit will have been correctly programmed prior to despatch.

DO NOT ATTEMPT TO ALTER ANY INTERNAL PROGRAMME SWITCHES. UNAUTHORIZED INTERFERENCE WITH THE INTERNAL SWITCH SETTINGS WILL NEGATE ALL WARRANTIES. IF IN DOUBT CONTACT YOUR SUPPLIER FOR ASSISTANCE.

To set up Program 3 for drying

- (a) Ensure that the SELECT FUNCTION knob (8) is turned to MANUAL OFF position.
- (b) Select program 3 with PROGRAM SELECT knob (2).
- (c) Turn SET-UP knob (7) to RH HIGH. The display will read the previous set point and an "S" will flash on the left hand side of the display. This indicates that set-up mode is in use.
- (d) To adjust the set point use rocker switch (9) to move RH set point up or down. To obtain the required set point consult the equilibrium tables for the relevant crop in Fig 8 at the rear of this booklet.
- (e) Turn SET-UP knob (7) to RH OFF SET. In grain drying supplementary heat is used to expand the water carrying capacity of the air. In the past it has been necessary to run fans and heater banks at regular intervals to purge the system to check the effect of the heat on the air humidity. The RH OFFSET facility removes the necessity for regular purging.

Trial runs with the heater at full power will indicate the reduction in the humidity of the ambient air achieved by the heater. This figure can then be noted and used as the guideline for the RH OFFSET figure.

For example, if the target RH% of the drying air is 70% and trials with the heater indicates that an RH reduction of 20% can be obtained, then target RH% of the air with the heater banks at full power can be attained when ambient conditions are below 90% RH. In this case the RH HIGH figure would be set at 70% and the RH OFFSET figure set at 18% to allow some room for slight variation. In this way the fan will start at 88% RH ambient and bring on sufficient heat to reduce the RH to the target of 70%.

As ambient conditions become drier the controller reduces the amount of heat required to reach the target of 70%. Conversely, if conditions become wetter and the heater cannot reduce the RH% to meet the target, both the fan and heater will turn off and wait for conditions to improve. Details of the recommended test procedure for obtaining the max RH OFFSET figure available in your particular installation are provided on page        of this manual.

- (f) To check set points turn SET UP (7) to RH HIGH. The display will show the flashing "S" and the RH HIGH set point. Turn to RH OFFSET and the offset value will be displayed. Return to MONITOR position. Turn SELECT DISPLAY (6) to RH. The display will change to read the actual air RH% at the moment.

#### IMPORTANT

TO ENABLE THE PROGRAM TO OPERATE TURN THE SELECT FUNCTION KNOB (8) TO AUTO. THE FAN AND HEATER BANK WILL NOW OPERATE WHEN CONDITIONS ARE SUITABLE.

THE PROCEDURE OUTLINED ABOVE APPLIES TO ALL TYPES OF HEATER BANKS LISTED IN THE NOTE AT THE HEAD OF THIS SECTION. THE CONTROLLER WILL AT ALL TIMES SELECT THE OPTIMUM LEVEL OF HEAT TO ACHIEVE THE TARGET AIR HUMIDITY.

PROGRAM 4 FAN AND HEATER operation with RH HIGH using Economy 7 off peak electricity, an Economy 7 interface unit is needed to run Program 4.

- (i) The addition of an Economy 7 interface is relevant to fans fitted with electric heater banks. This facility automatically prevents the operation of the heater banks outside the designated Economy 7 tariff hours.
- (ii) For fans fitted with propane gas fired heaters the Economy 7 interface can be utilized to detect for gas empty or gas failure situations. Please consult your supplier or installer for details.

FIG 6 ILLUSTRATES THE PROGRAM SEQUENCE ( except for modulating gas heaters, refer to fig 10 )

The programming of functions carried out in program 4 is by means of internal switch settings. This programming is carried out by the manufacturer prior to despatch.

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To set up program 4 for drying

The setting up of Program 4 is identical to the method used for Program 3, follow steps (a) to (F) but substituting Program 4 for Program 3 in step (b). After completing these steps the program will operate as required.



PROGRAM 5 Temperature control only of fan with heater bank. This program is primarily designed for the control of a modulating propane gas fired heater unit where temperature control is more important than control of air humidity.

FIG. 6 ILLUSTRATES THE PROGRAM SEQUENCE.

The programming of functions carried out in program 5 is by means of internal switch settings. This programming is carried out by the manufacturer prior to despatch.

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To set up Program 5

- (a) Ensure that the SELECT FUNCTION knob (8) is turned to MANUAL OFF position.
- (b) Select Program 5 with PROGRAM SELECT knob (2)
- (c) Turn SET UP knob (7) to TEMP 1. The display will read the previous set point and an "S" will flash on the left hand side of the display. This indicates that set-up mode is in use.
- (d) To adjust the set points use rocker switch (9) to move the temperature set point up or down.
- (e) The set point is now in memory and the fan heater unit will start when the SELECT FUNCTION knob (8) is turned to AUTO. The heater will then modulate to achieve the temperature set point.

**IMPORTANT**

TO ENABLE THE PROGRAM TO OPERATE TURN THE SELECT FUNCTION KNOB (8) TO AUTO. THE PROGRAM WILL NOW OPERATE WHEN SET CONDITIONS ARE MET.

**PROGRAM 5** Temperature control only of fan with heater bank. This program is primarily designed for the control of a modulating propane gas fired heater unit where temperature control is more important than control of air humidity.

**FIG. 6 ILLUSTRATES THE PROGRAM SEQUENCE.**

The programming of functions carried out in program 5 is by means of internal switch settings. This programming is carried out by the manufacturer prior to despatch.

**DO NOT ATTEMPT TO ALTER ANY INTERNAL PROGRAMME SWITCHES. UNAUTHORISED INTERFERENCE WITH THE INTERNAL SWITCH SETTINGS WILL NEGATE ALL WARRANTIES. IF IN DOUBT CONTACT YOUR SUPPLIER FOR ASSISTANCE.**

**To set up Program 5**

- (a) Ensure that the SELECT FUNCTION knob (8) is turned to MANUAL OFF position.
- (b) Select Program 5 with PROGRAM SELECT knob (2)
- (c) Turn SET UP knob (7) to TEMP 1. The display will read the previous set point and an "S" will flash on the left hand side of the display. This indicates that set-up mode is in use.
- (d) To adjust the set points use rocker switch (9) to move the temperature set point up or down.
- (e) The set point is now in memory and the fan heater unit will start when the SELECT FUNCTION knob (8) is turned to AUTO. The heater will then modulate to achieve the temperature set point.

**IMPORTANT**

**TO ENABLE THE PROGRAM TO OPERATE TURN THE SELECT FUNCTION KNOB (8) TO AUTO. THE PROGRAM WILL NOW OPERATE WHEN SET CONDITIONS ARE MET.**

**MANUAL OPERATION** - Read this section if your system has 3 STAGE ELECTRIC heat.

- (a) To select manual control turn SELECT DISPLAY knob (6) to \* and turn SELECT FUNCTION knob (8) to MANUAL ON.

The fan will start and continue to run until MANUAL OFF is selected on the SELECT FUNCTION knob (8). This applies to all program selections.

- (b) To operate manual control of heater banks utilise rocker switch (9). Heater bank operating mode is factory programmed as previously described in program 3 page 5

The following shows the method of operation for this particular type of heater bank.

**1. 3 stage electric heater bank**

- (a) Turn SELECT FUNCTION knob (8) to MANUAL ON display reads "0"  
Fan only running.
- (b) Press rocker switch (9) up and hold until display reads "1"  
Fan running plus heater bank 1 on.
- (c) Press rocker switch up and hold until display reads "2"  
Fan running plus heater banks 1 and 2 on.
- (d) Press rocker switch up and hold until display reads "3"  
fan running plus heater bank 1, 2 and 3 on  
(maximum heat)
- (e) To turn off all heater banks press rocker switch down and hold until display reads "0"  
Fan only running.

To re-apply heat repeat stages (b) to (d) above as required.

The effectiveness of the heater banks in reducing the air humidity to meet the target figure can be monitored at any time by turning the SELECT DISPLAY knob (6) to RH and the SET UP knob (7) to MONITOR. The figure appearing in the display will be the actual RH% of the air. When continuing to make manual adjustments to heater output ensure that the SELECT DISPLAY knob (6) is turned to \*.



**MANUAL OPERATION - Read this section if your system has 6 or 7 STAGE ELECTRIC heat.**

- (a) To select manual control turn SELECT DISPLAY knob (6) to \* and turn SELECT FUNCTION knob (8) to MANUAL ON.

The fan will start and continue to run until MANUAL OFF is selected on the SELECT FUNCTION knob (8). This applies to all program selections.

- (b) To operate manual control of heater banks utilise rocker switch (9). Heater bank operating mode is factory programmed as previously described in program 3 page 5

The following shows the method of operation for each particular type of heater bank.

**2. Six/Seven unequal sized electric heater bank stages**

In this program the microprocessor permutes combinations of the unequal sized heating elements which comprise the complete bank to obtain a more accurate control of heat in six/seven stages rather than in three as in 1, page 9

- (a) Turn the SELECT FUNCTION knob (8) to MANUAL ON display reads "0"  
Fan only running.
  - (b) Press rocker switch (9) up and hold until display reads "1"  
Fan running plus heater bank 1 on.
  - (c) Press rocker switch up and hold until display reads "2"  
Fan running plus heater bank 2 on.
  - (d) Press rocker switch up and hold until display reads "3"  
Fan running plus heater banks 1 and 2 on.
  - (e) Press rocker switch up and hold until display reads "4"  
Fan running plus heater bank 3 on.
  - (f) Press rocker switch up and hold until display reads "5"  
Fan running plus heater banks 1 and 3 on.
  - (g) Press rocker switch up and hold until display reads "6"  
Fan running plus heater banks 2 and 3 on.
  - (h) Press rocker switch up and hold until display reads "7"  
Fan running plus heater banks 1,2 and 3 on (maximum heat)
  - (i) To turn off all heater banks press rocker switch down and hold until display reads "0"  
Fan only running.  
To re-apply heat repeat stages (b) to (h) above as required.
- (Continued on page 11)

The effectiveness of the heater banks in reducing the air humidity to meet the target figure can be monitored at any time by turning the SELECT DISPLAY knob (6) to RH and the SET UP knob (7) to MONITOR. The figure appearing in the display will be the actual RH% of the air. When continuing to make manual adjustments to heater output ensure that the SELECT DISPLAY knob (6) is turned to \*.

**MANUAL OPERATION** - Read this section if your system has Propane Gas heater High/Low Burner.

**3. Propane Gas fired heater with High/Low Burner**

- (a) Turn SELECT FUNCTION knob (8) to MANUAL ON display reads "0"  
Fan only running.
- (b) Press rocker switch (9) up and hold until display reads "1"  
Fan running plus Low flame and master heat.
- (c) Press rocker switch up and hold until display reads "2"  
Fan running plus Low flame plus High flame and master heat  
(maximum heat)
- (d) To turn off all heat press rocker switch down and hold until  
display reads "0"  
Fan only running.

To re-apply heat repeat stages (b) to (c) above as required.

The effectiveness of the heater banks in reducing the air humidity to meet the target figure can be monitored at any time by turning the SELECT DISPLAY knob (6) to RH and the SET UP knob (7) to MONITOR. The figure appearing in the display will be the actual RH% of the air. When continuing to make manual adjustments to heater output ensure that the SELECT DISPLAY knob (6) is turned to \*.

**MANUAL OPERATION** - Read this section if your system has Fully modulating Propane heater.

**4. Fully modulating propane gas fired heater**

- (a) Turn SELECT FUNCTION knob (8) to MANUAL ON display reads "0"  
Fan only running, gas valve not powered, open or shut.
- (b) Press rocker switch (9) Fig. 2 up and hold until display reads "1"  
Fan running - gas valve closing (reducing heat). If left in this mode the gas valve will close in pulses of approx 2 secs ON/OFF.  
Setting thereby reducing heat to lowest level.
- (c) If more heat is required press rocker switch up and hold until display reads "2". Fan running gas valve opening (increasing heat). If left in this mode the gas valve will open in pulses of approx 2 secs ON/OFF to maximum to give highest heat output.
- (d) To obtain the optimum level of heat required it is necessary to operate the rocker switch control either up or down and monitor the result as far as the RH% of the drying air is concerned. When the desired RH level is achieved press rocker switch down until display reads "0"  
The fan is now running with valve not powered, open or closed. The level of heat will be maintained until further manual adjustments are made.

## MANUAL DETERMINATION OF RH OFFSET FIGURE

As described in the automatic program section the determination of the RH OFFSET figure helps greatly in reducing drying time and making most efficient use of heat.

### METHOD OF DETERMINATION

- (a) Turn SELECT DISPLAY knob (6) to \*
- (b) Turn SET UP knob (7) to MONITOR
- (c) Turn SELECT FUNCTION knob to MANUAL ON. The fan will start, display reading "0"
- (d) Run fan for 5 minutes and then turn SELECT DISPLAY knob (6) to RH. The figure on the display will show the actual RH% of the air without the use of heat. Make a note of this figure.
- (e) Turn SELECT DISPLAY knob (6) back to \*
- (f) Determine the type of heater bank fitted to your fan and turn to the relevant section entitled MANUAL OPERATION.
- (g) Follow the procedure described in order to obtain maximum heat output and leave the fan running for 10 minutes with maximum heat.
- (h) With the fan running and the heater at maximum output turn the SELECT DISPLAY knob (6) to RH (Ensure that SET UP knob (7) is on MONITOR).

The display indicates the RH% of the drying air with the heater at maximum output. Note this figure.

- (i) To calculate the RH OFFSET for your fan and heater combinations subtract the figure obtained in (h) from the figure obtained in (d) above. The figure thus obtained is the MAXIMUM RH offset which can be achieved.

**EXAMPLE** If the RH% of the air without heat is determined to be 80% and the RH% of the air with maximum heat is reduced to 60% then the RH OFFSET figure is 20% (Deduct 2 or 3% to allow for ambient temperature variations)

**IMPORTANT:** It is important to note that the RH reduction obtained from heating air is totally dependant upon the volume of air and the amount of heat applied to that air. The end result will be further influenced by temperature and weather conditions. Calculations for one site may not apply to another unless all the conditions are accurately replicated.



## ADDITIONAL FEATURES

### 1. Program Status

This facility allows verification of the flow diagrams (Fig 3 to 7) with reference to the operation of the controller. The diagrams comprise sections (boxes) in which the text describes the action being considered. Each box is numbered, this corresponds to the numbers displayed by the controller in STATUS mode.

To enter STATUS mode..

- (a) Turn SELECT FUNCTION knob (8) to AUTO
- (B) Turn SET UP knob (7) to MONITOR
- (c) Turn SELECT DISPLAY knob (6) to STATUS
- (d) Turn to relevant program flow diagram in instruction book.
- (e) Turn PROGRAM SELECT knob (2) to the desired program number (1 to 5)
- (f) The controller will automatically follow the programmed sequence carrying out the task allotted in each box of the diagram. The digits appearing on the right hand side of the display corresponds to the numbers allocated to each box of the flow chart. The digit on the left hand side is the program selected to run. By following the sequence of numbers appearing on the display the progress of the program can be traced on the flow chart.
- (g) When the program enters a box in which a time delay is requested the program can be run through that box instantly by pressing the rocker switch (9) up. The program will then continue to run. Repeat the above process on any occasion when you wish to bypass a time delay period when checking the program.

NOTE: Throughout each program sequence the controller is constantly up-dating its information. The fan or heater will only stop when conditions fall outside the targets required or when the controller is turned to MANUAL OFF on the SELECT FUNCTION knob (8).

### SUMMARY OF PROGRAMS AND THEIR FLOW DIAGRAM REFERENCES.

PROGRAM 1.FAN ONLY OPERATION , RH SET HIGH & TEMPERATURE.....REF.FIG.3  
 PROGRAM 2.FAN ONLY OPERATION , RH SET HIGH,LOW & TEMPERATURE..REF,FIG 4  
 PROGRAM 3.FAN & HEATER OPERATION ,RH SET HIGH .....REF.FIG.5  
 PROGRAM 3.FAN & HEATER OPERATION ,RH SET HIGH (modulating gas)REF.FIG 9  
 PROGRAM 4.FAN & HEATER OPERATION ,RH SET HIGH with E7 control.REF.FIG.6  
 PROGRAM 4.FAN & HEATER OPERATION ,RH SET HIGH  
 (modulating gas heaters with "no gas"interlock).....REF.FIG.10  
 PROGRAM 5.FAN & HEATER OPERATION ,TEMPERATURE .....REF.FIG. 7

NOTE...PROGRAMS are selected on the front panel,control knob 2.  
 HEATER types are selected by the internal programming switches.

## FAN HOURS

The hours for which the fan has been running are automatically recorded within the controller.

### To read fan hours:-

- (a) Turn SET UP knob (7) to MONITOR
- (b) Turn SELECT DISPLAY knob (6) to FAN RUN TIME
- (c) The display will show the number of hours the fan has run since last re-set in hours and tenths.
- (d) The fan run hours can be left to accumulate through the drying period or set back to zero by pressing rocker switch (9) and holding until the display reads zero, counting will then recommence when the fan is next turned on. Fan run hours are counted whether fan operation is automatic or manual.

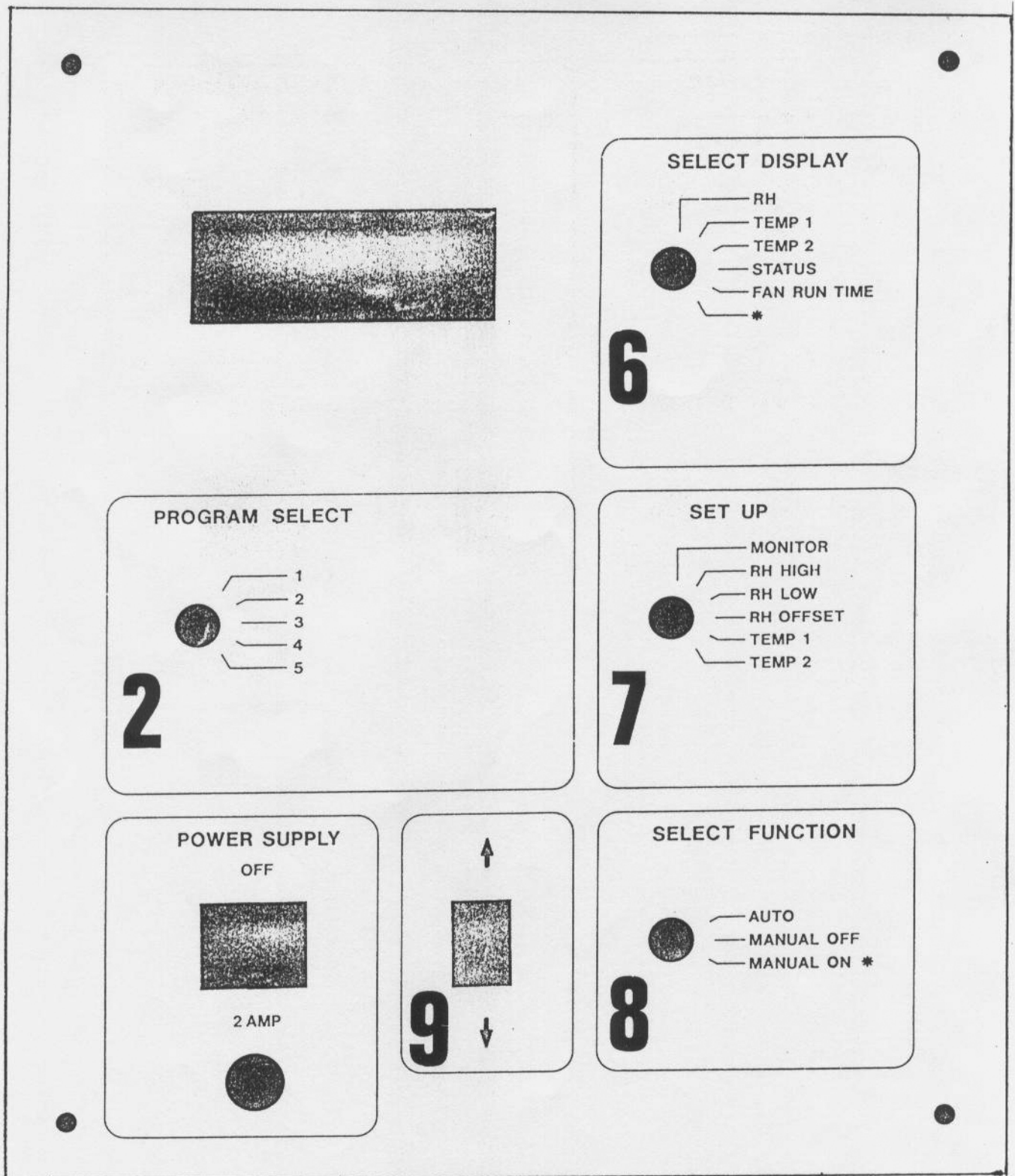
Robydome strongly recommends that this control system is used in conjunction with a sound **DRYING AND STORAGE STRATEGY**.

**ADAS BOOKLET 2447 "Managing Bulk Grain Driers"** outlines the principles involved, with advice on day to day operation.

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ROBYDOME ELECTRONICS

Series 5 Controllers

Fan and Heater Controller

Front Panel Control Layout

Fig 2.

**FIG 2**

## FIG 3 ROBYDOME ELECTRONICS

Series 5 controllers

Flow diagram 5015-1

## Program 1

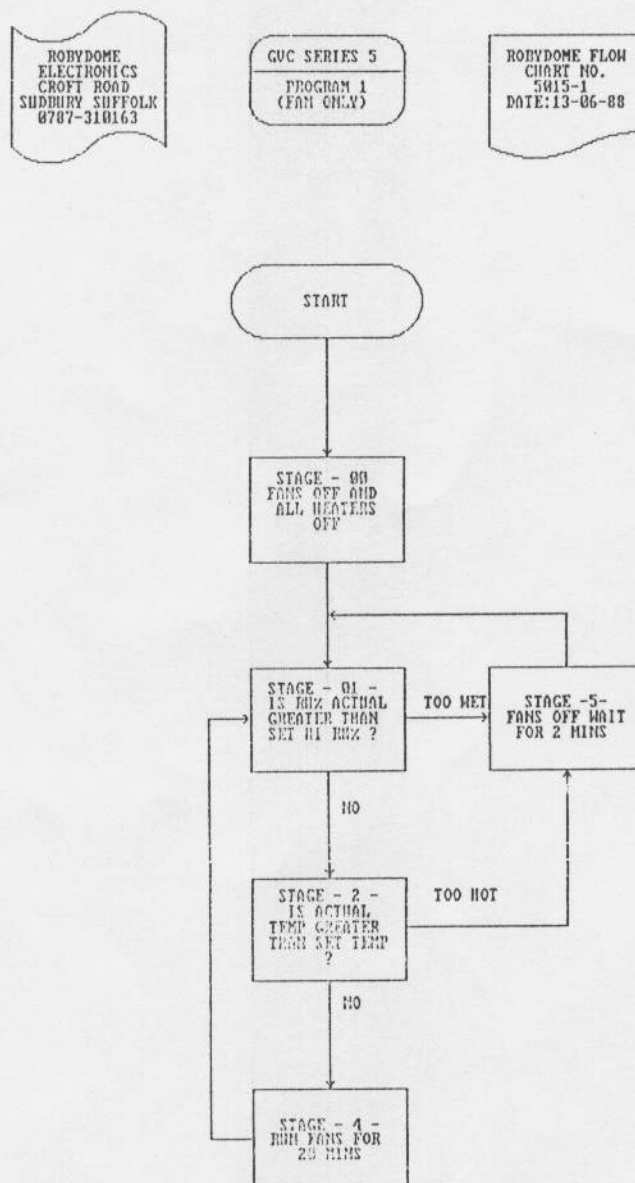




FIG 4 ROBYDOME ELECTRONICS

Series 5 controllers

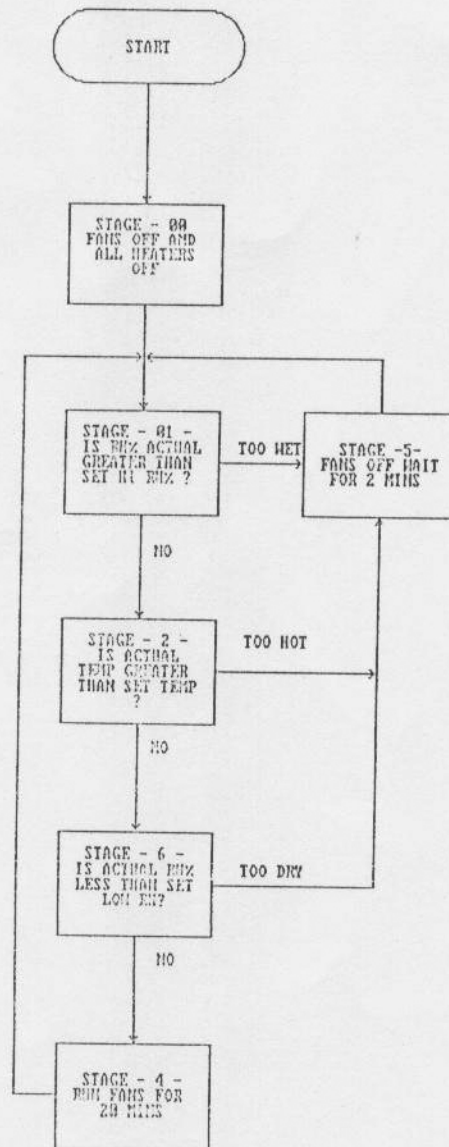
Flow diagram 5016-1

Program 2

ROBYDOME  
ELECTRONICS  
CROFT ROAD  
SUDBURY SUFFOLK  
0787-310163

GVC SERIES 5  
PROGRAM 2 (FAN  
ONLY AND LOW)

ROBYDOME FLOW  
CHART NO.  
5016-1  
DATE:13-06-83

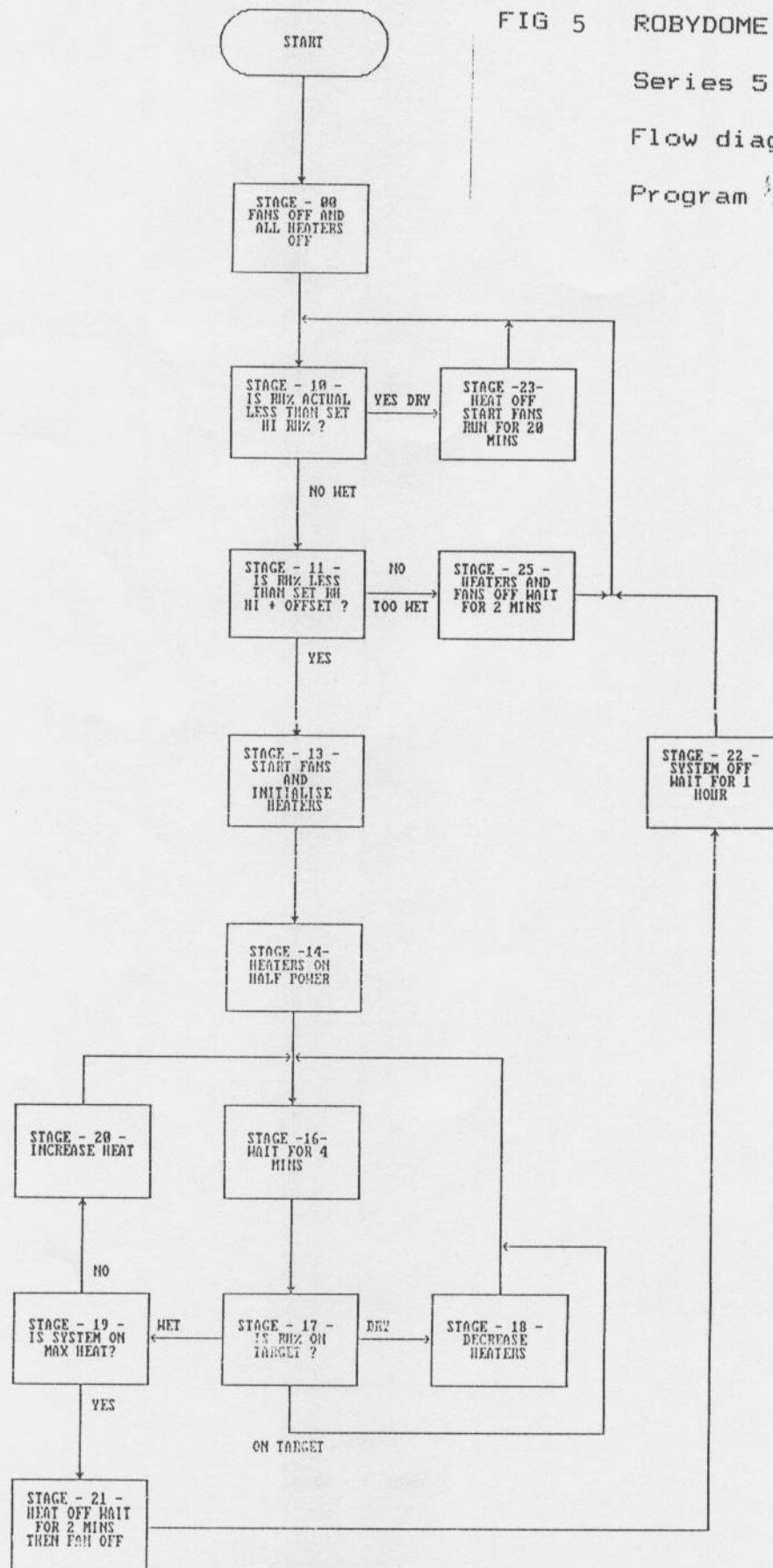


ROBYDOME  
ELECTRONICS  
CROFT ROAD  
SUDBURY SUFFOLK  
0787-310163

GVC SERIES 5  
PROGRAM 3  
(HEAT)

ROBYDOME FLOW  
CHART NO.  
5017-1  
DATE:14-06-80

FIG 5 ROBYDOME ELECTRONICS  
Series 5 controllers  
Flow diagram 5017-1  
Program 3



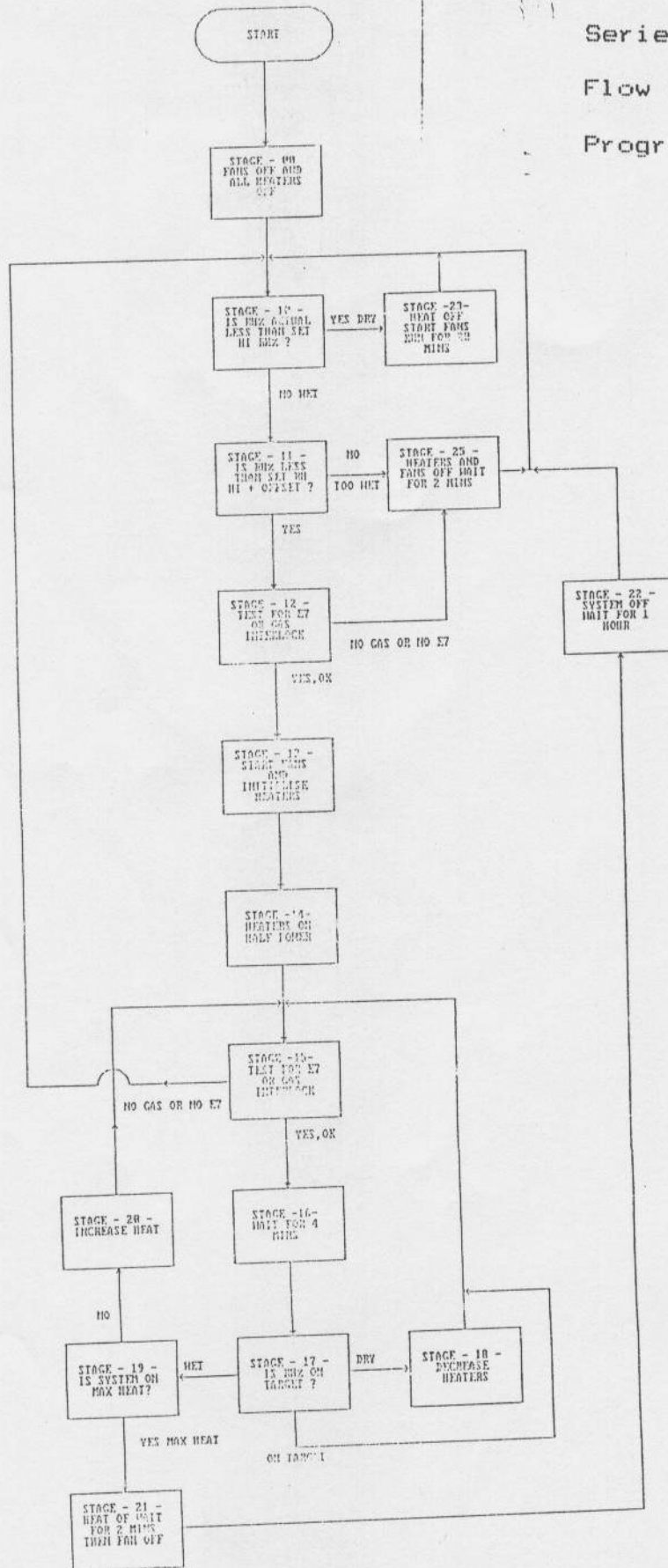
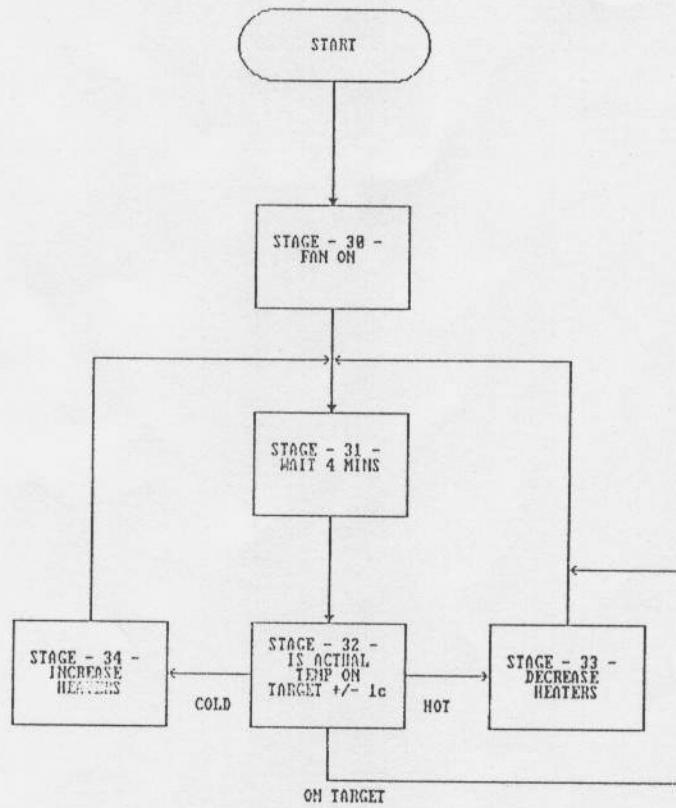


FIG 7 ROBYDOME ELECTRONICS  
Series 5 controllers  
Flow diagram 5019-1  
Program 5

ROBYDOME  
ELECTRONICS  
CROFT ROAD  
SUDBURY SUFFOLK  
0787-310163

GVC SERIES 5  
PROGRAM 5

ROBYDOME FLOW  
CHART NO.  
5019-1  
DATE: 03-06-88

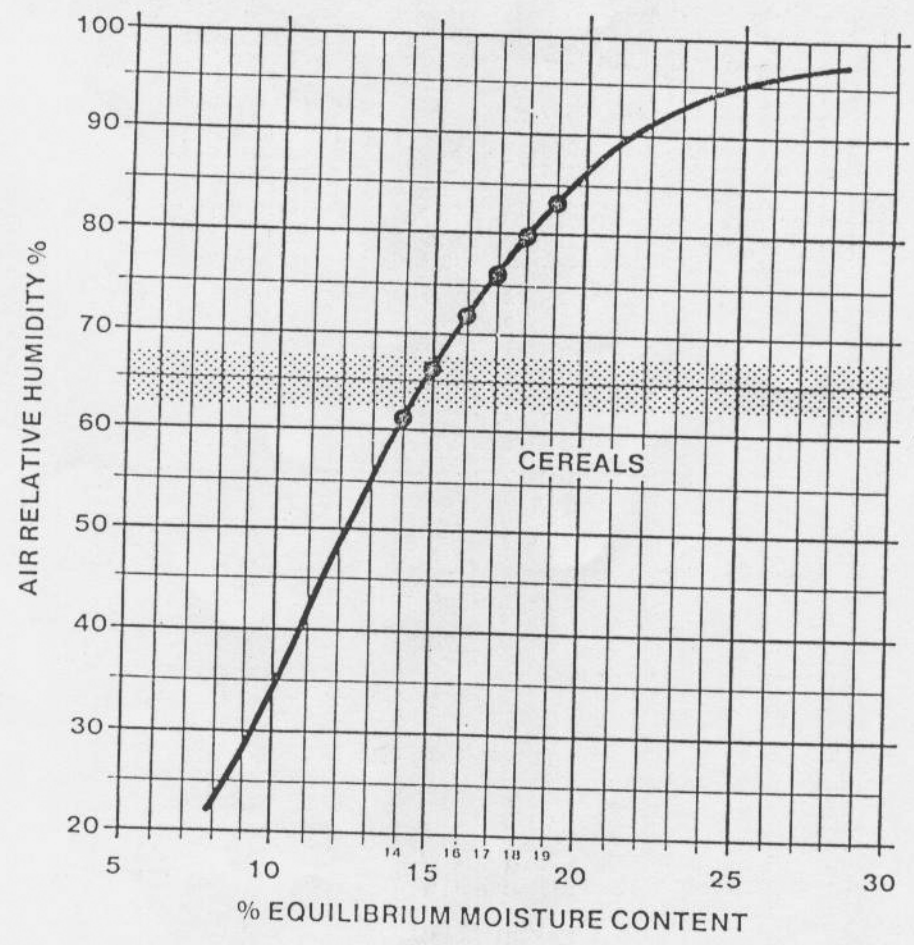




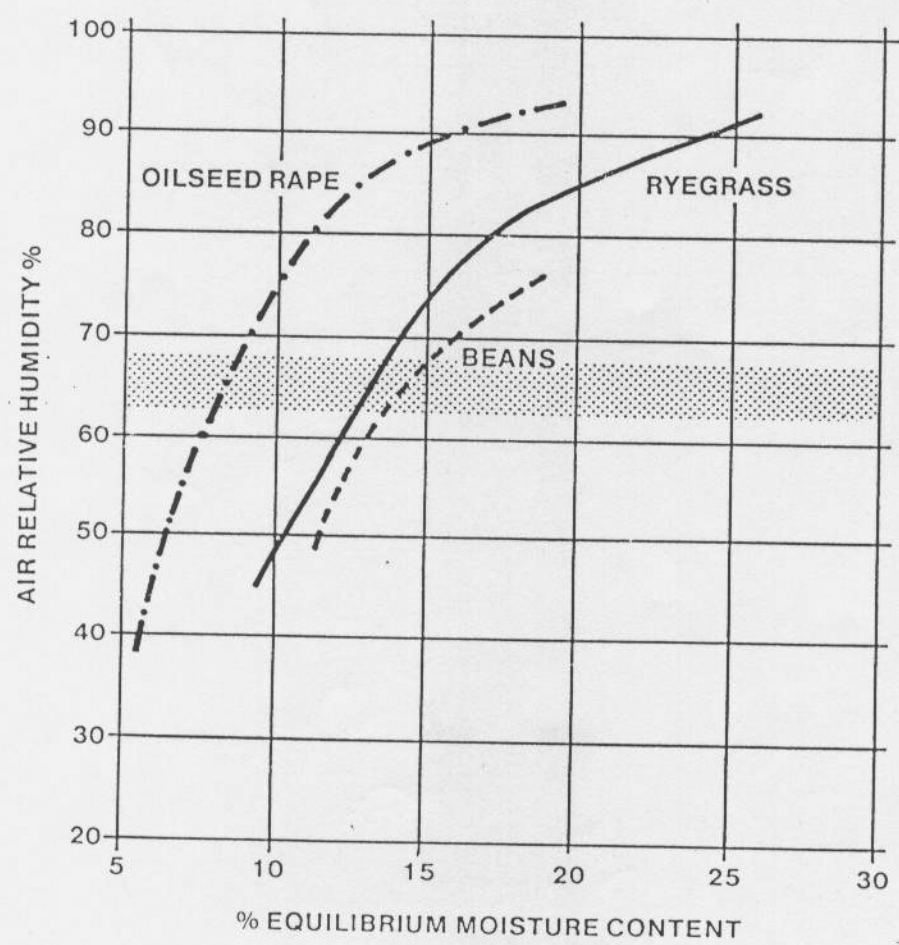
GRAIN MOISTURE CONTENT/AIR RELATIVE HUMIDITY

Use these charts to establish Set Point Values for the controller.

FIG 8



Storage moisture content achieved at a common 65%RH.



Storage moisture content achieved at common 65%RH.

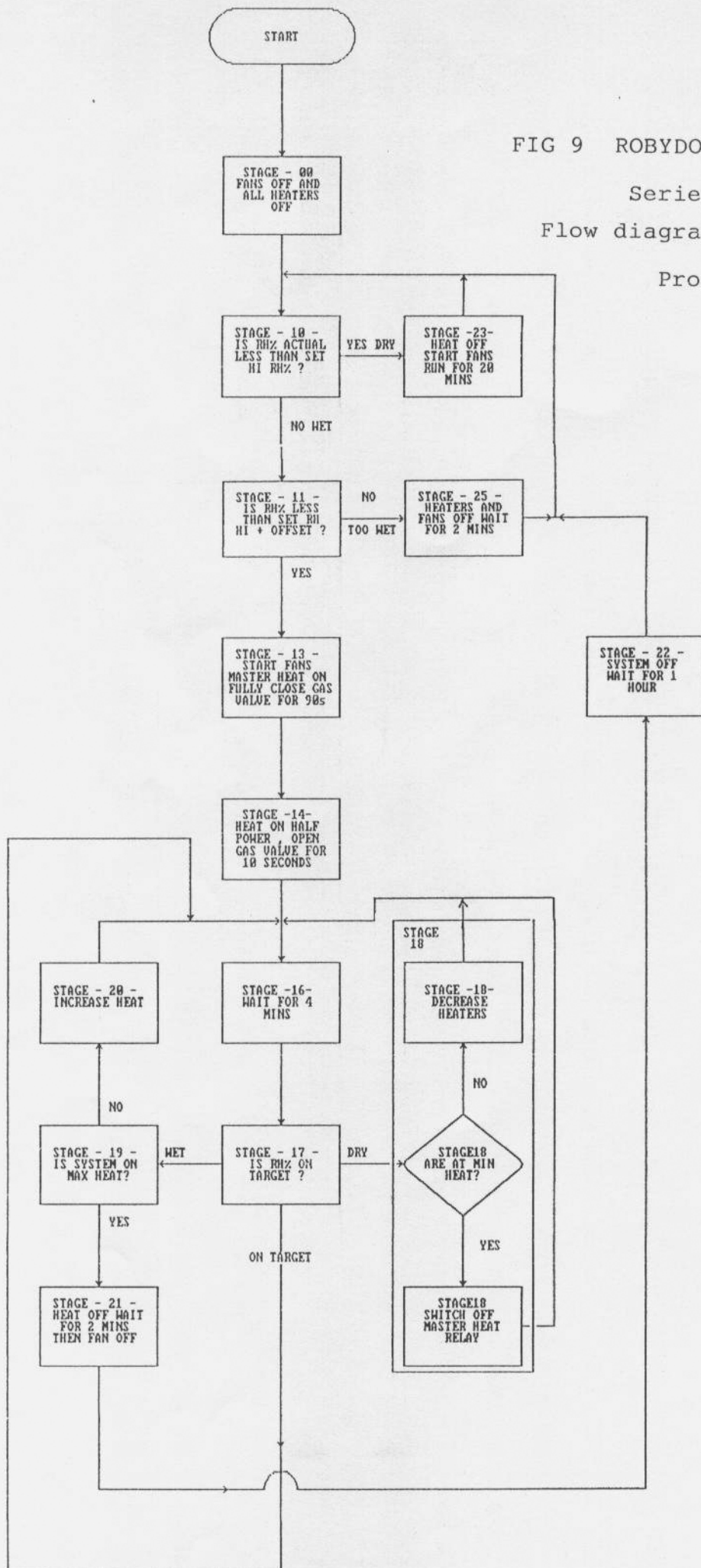
**FIG 8**

FIG 9 ROBYDOME ELECTRONICS

Series 5 controllers

Flow diagram 5020 1

Program 3



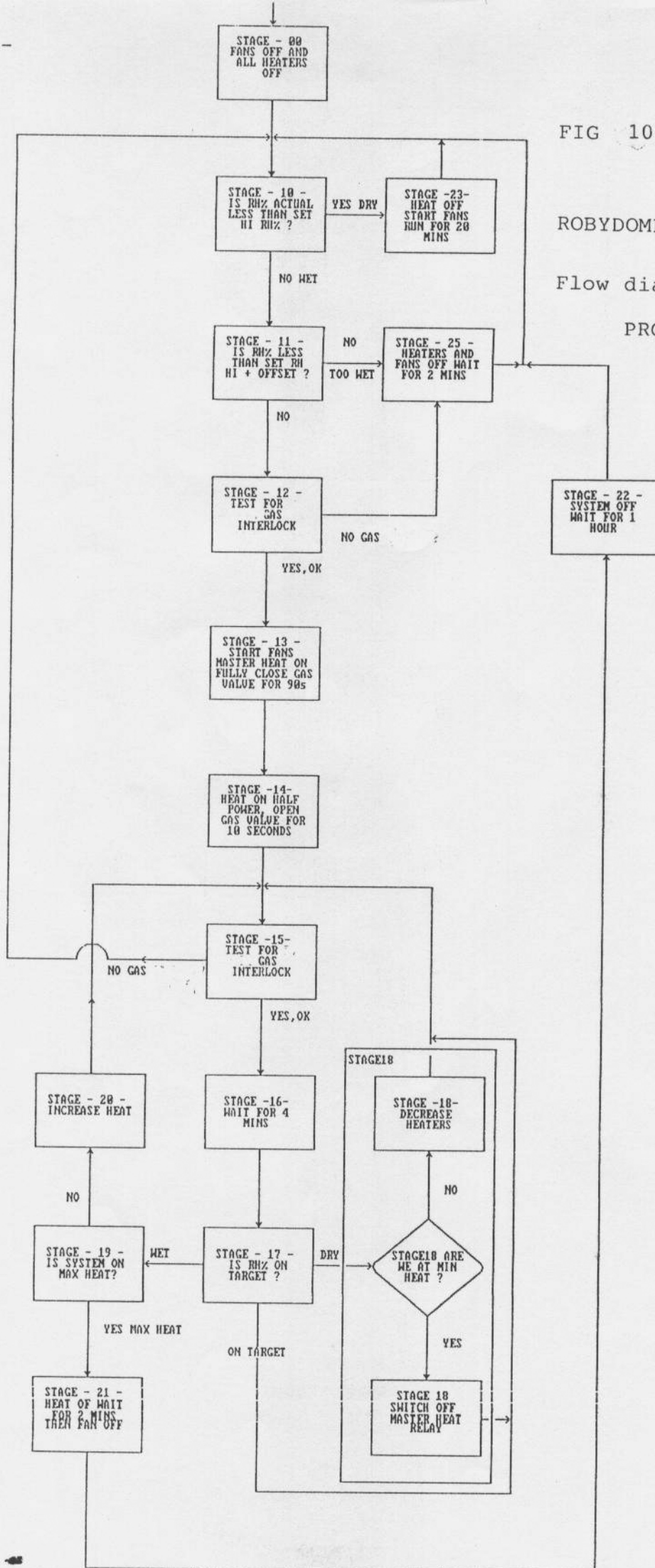


FIG 10

ROBYDOME ELECTRONICS

Flow diagram 5022 1

PROGRAM 4

GVC5 BULK GRAIN DRYING CONTROL SYSTEM  
INDEX

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| 1. GENERAL DESCRIPTION AND INSTALLATION DETAILS.....                                                                                                                                                                                                                                          | (1      |
| 2. AUTOMATIC PROGRAMS .....                                                                                                                                                                                                                                                                   | (2 to 8 |
| This section outlines the various programs which are included with each unit. Each controller is pre-programmed to operate the specified type of heater bank prior to supply. The operating instructions are therefore common to all types of heater bank when in the AUTOMATIC PROGRAM mode. |         |
| (a) Program 1 RH% HIGH + TEMPERATURE SET POINTS<br>(FAN ONLY OPERATION) .....                                                                                                                                                                                                                 | (2,3    |
| (b) Program 2 RH% HIGH + RH% LOW + TEMPERATURE<br>SET POINTS (FAN ONLY OPERATION) .....                                                                                                                                                                                                       | (4      |
| (c) Program 3 RH% HIGH set point with\without<br>photocell. (FAN + ALL TYPES OF<br>HEATER BANK) .....                                                                                                                                                                                         | (5,6    |
| (d) Program 4 RH% HIGH set point with Economy 7<br>interface (FAN + ALL TYPES OF HEATER BANK) .....                                                                                                                                                                                           | (7      |
| (e) Program 5 TEMPERATURE set point only. (FAN +<br>modulating propane gas burner) .....                                                                                                                                                                                                      | (8      |
| 3. MANUAL OPERATION - FAN ONLY .....                                                                                                                                                                                                                                                          | (9      |
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| (2) Six\Seven unequal stages of electric heat .....                                                                                                                                                                                                                                           | (10,11  |
| (3) Propane gas heater - High\Low control .....                                                                                                                                                                                                                                               | (11     |
| (4) Propane gas heater - Fully modulating .....                                                                                                                                                                                                                                               | (12     |
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## ROBYDOME ELECTRONICS

### Series 5 Controllers

Fan and Heater Controller.

#### INSTALLATION NOTES AND DIAGRAMS.

1. See page 1 of user manual for notes on general installation.
2. Use Fig 1 for connection details to controller.
3. Installation notes for the RH and temperature sensor are enclosed with the sensor assembly.
4. Check that controller is pre-programmed for the type of heater bank to be controlled. See the rear of controller housing. Changes can be made, see internal switch setting diagram BUT FIRST refer to Robydome Service Department 0787 310163 Extension 4.
5. Relay board connection details are on the relevant diagram eg 3 Electric Heater Banks. The schematics are meant as suggestions only on site equipment will dictate final system connection configuration.
6. Refer to manual operation, page 9 onwards to check function of system.
7. Commission the system using the AUTO mode on the controller in conjunction with Program STATUS, page 14.
8. Observe ALL IEE regulations on external electrical system - NOTE, this controller must be earthed. Power required is 240v 50Hz 0.5Amp.

# FIG 1

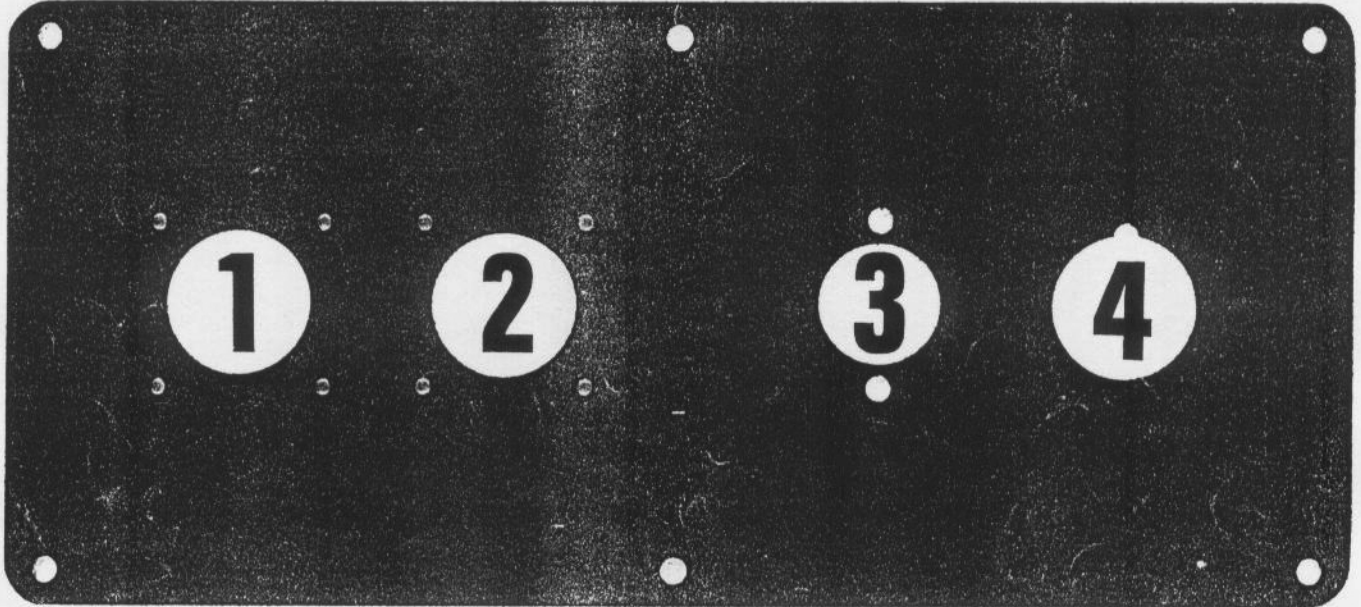
ROBYDOME ELECTRONICS

Series 5 Controllers

Fan and Heater Controller

Connection Plate Assembly

Fig 1.



1. RH Sensor Input.
2. E7 Interface/Monitoring Temperature Sensor.
3. Relay Drive Output.
4. Mains 240v 50hz Input.

NB. This unit MUST be earthed.

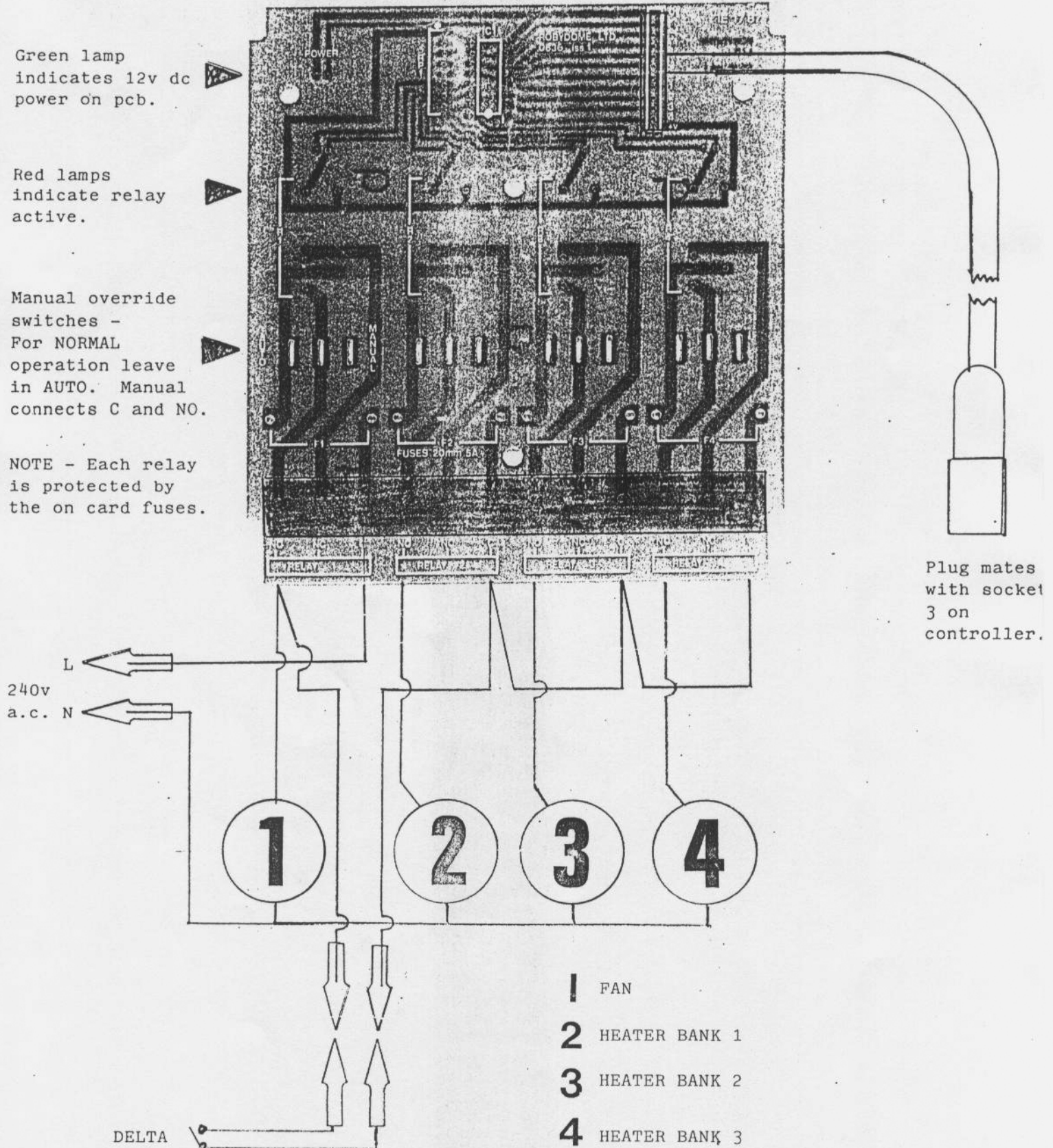
INSTALLATION NOTES - Connection of Fan and Heater System to Relay Board.

Green lamp  
indicates 12v dc  
power on pcb.

Red lamps  
indicate relay  
active.

Manual override  
switches -  
For NORMAL  
operation leave  
in AUTO. Manual  
connects C and NO.

NOTE - Each relay  
is protected by  
the on card fuses.



- 1 FAN
- 2 HEATER BANK 1
- 3 HEATER BANK 2
- 4 HEATER BANK 3

INTERLOCK - Prevents  
Heaters activating  
if Fan not running.

DIAGRAM FOR 3 ELECTRIC HEATER BANKS



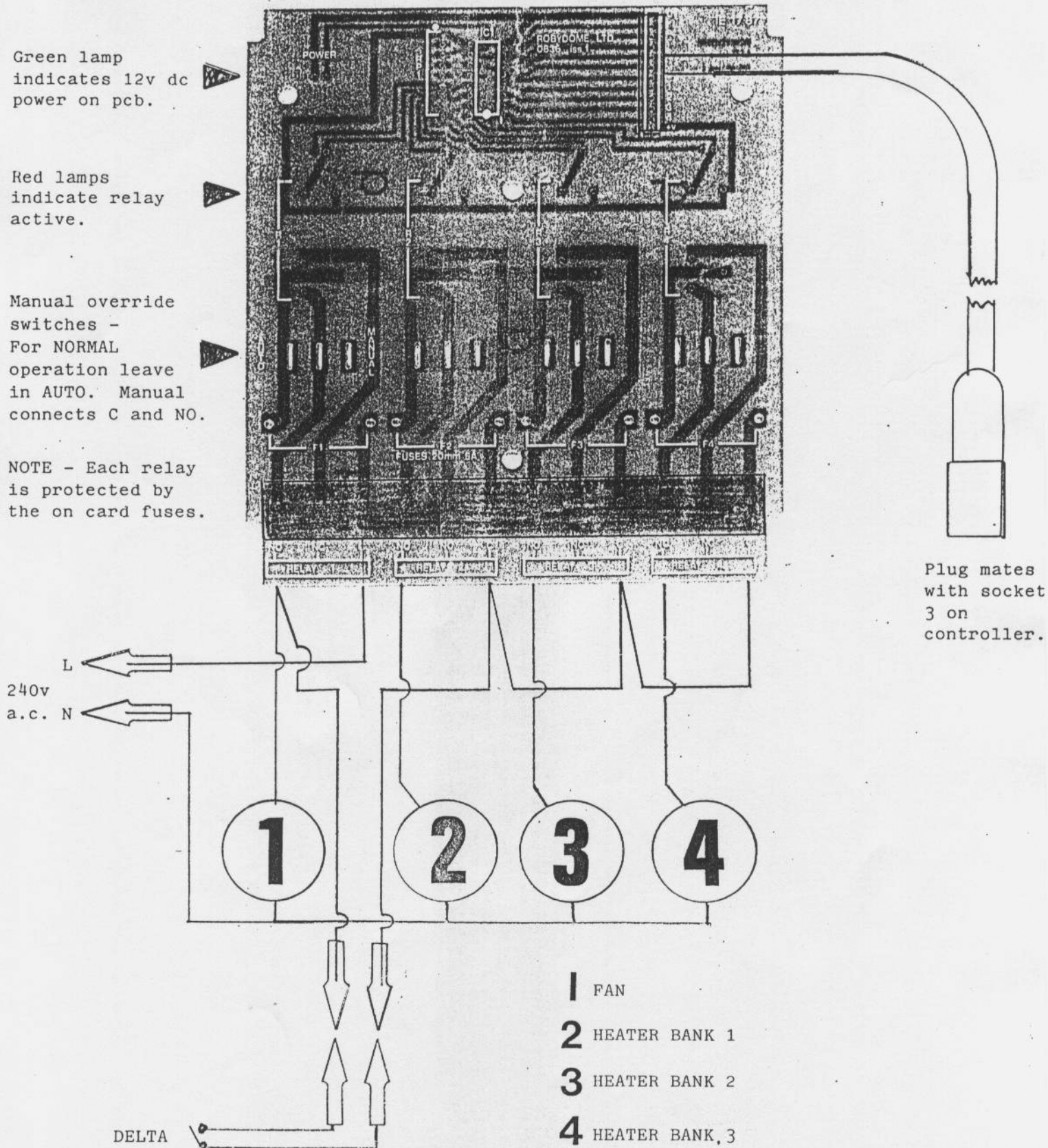
INSTALLATION NOTES - Connection of Fan and Heater System to Relay Board.

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Red lamps  
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Manual override  
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For NORMAL  
operation leave  
in AUTO. Manual  
connects C and NO.

NOTE - Each relay  
is protected by  
the on card fuses.



Plug mates  
with socket  
3 on  
controller.

DELTA

INTERLOCK - Prevents  
Heaters activating  
if Fan not running.

DIAGRAM FOR 6/7 UNEQUAL ELECTRIC  
HEATER BANKS



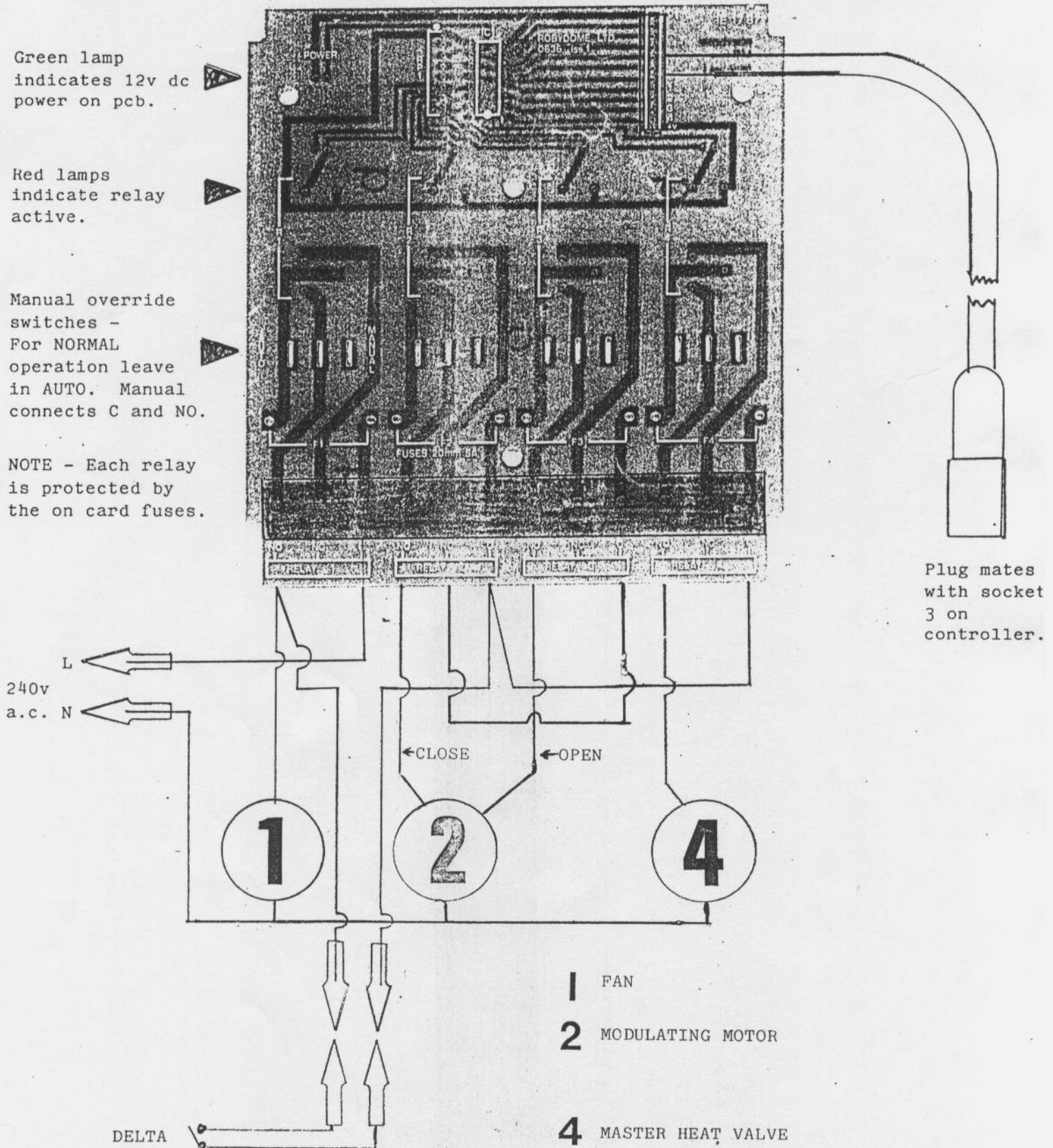
INSTALLATION NOTES - Connection of Fan and Heater System to Relay Board.

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power on pcb.

Red lamps  
indicate relay  
active.

Manual override  
switches -  
For NORMAL  
operation leave  
in AUTO. Manual  
connects C and NO.

NOTE - Each relay  
is protected by  
the on card fuses.



INTERLOCK - Prevents  
Heaters activating  
if Fan not running.

DIAGRAM FOR MODULATING GAS VALVE.

NOTE: RELAY 2 IS CLOSING  
RELAY 3 IS OPENING

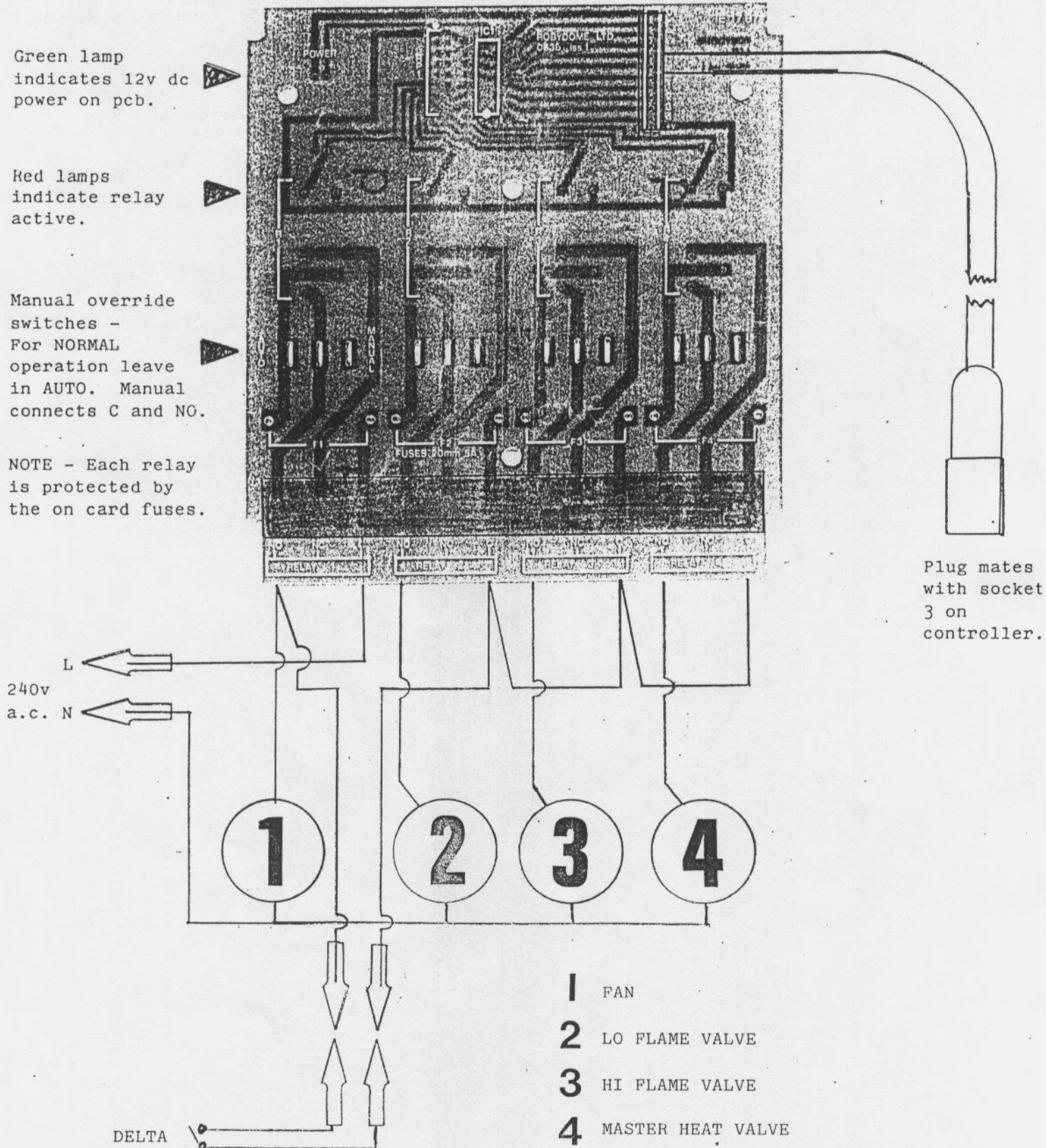
INSTALLATION NOTES - Connection of Fan and Heater System to Relay Board.

Green lamp  
indicates 12v dc  
power on pcb.

Red lamps  
indicate relay  
active.

Manual override  
switches -  
For NORMAL  
operation leave  
in AUTO. Manual  
connects C and NO.

NOTE - Each relay  
is protected by  
the on card fuses.

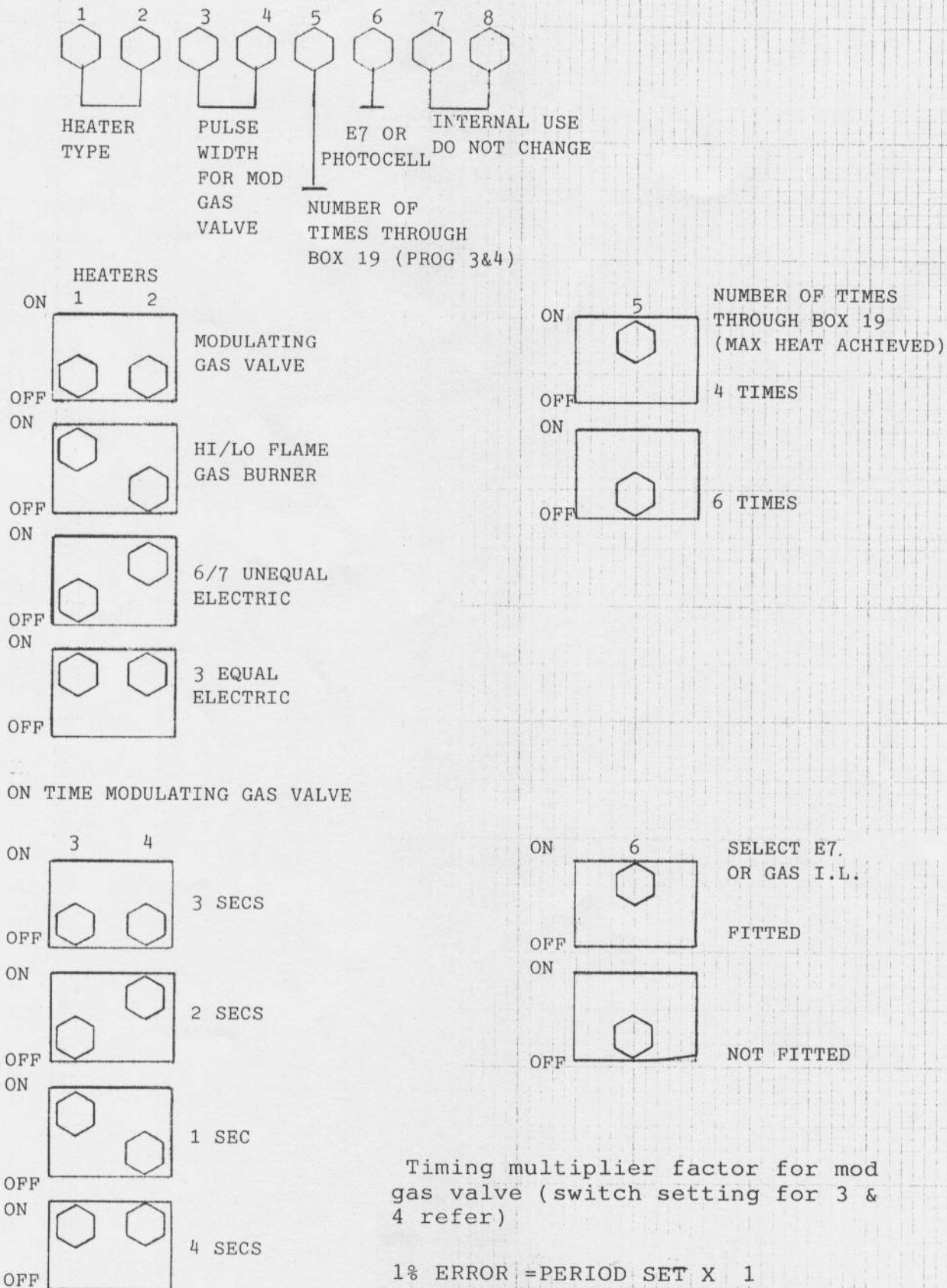


- 1 FAN
- 2 LO FLAME VALVE
- 3 HI FLAME VALVE
- 4 MASTER HEAT VALVE

INTERLOCK - Prevents  
Heaters activating  
if Fan not running.

DIAGRAM FOR GAS HI/LO BURNER

Internal switch setting to program heater configurations.



Timing multiplier factor for mod gas valve (switch setting for 3 & 4 refer)

1% ERROR = PERIOD SET X 1  
 5% ERROR = PERIOD SET X 2  
 10% ERROR = PERIOD SET X 3  
 20% ERROR = PERIOD SET X 5



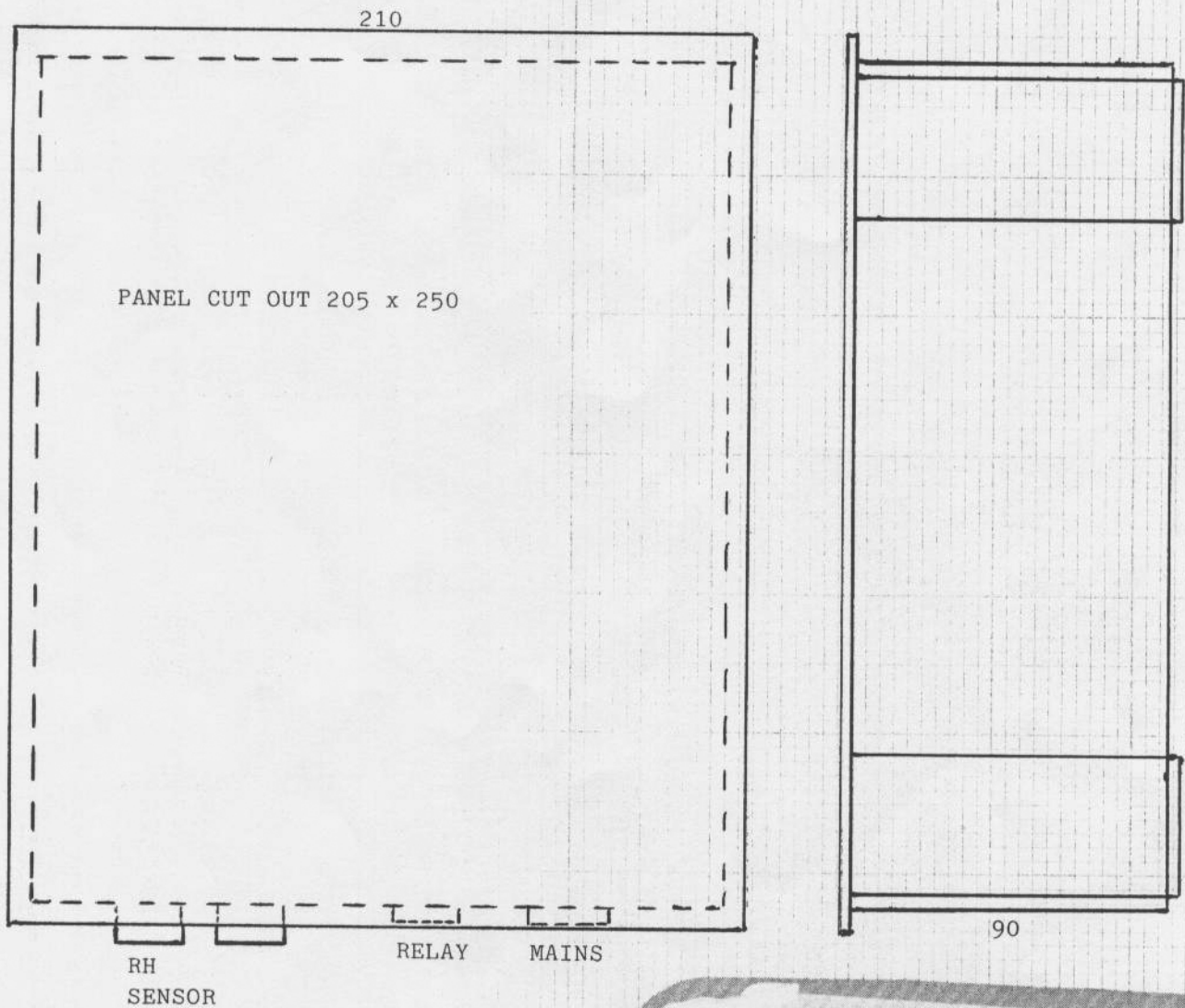
ROBYDOME ELECTRONICS

SERIES 5 CONTROLLER FRONT PANEL AND CHASSIS

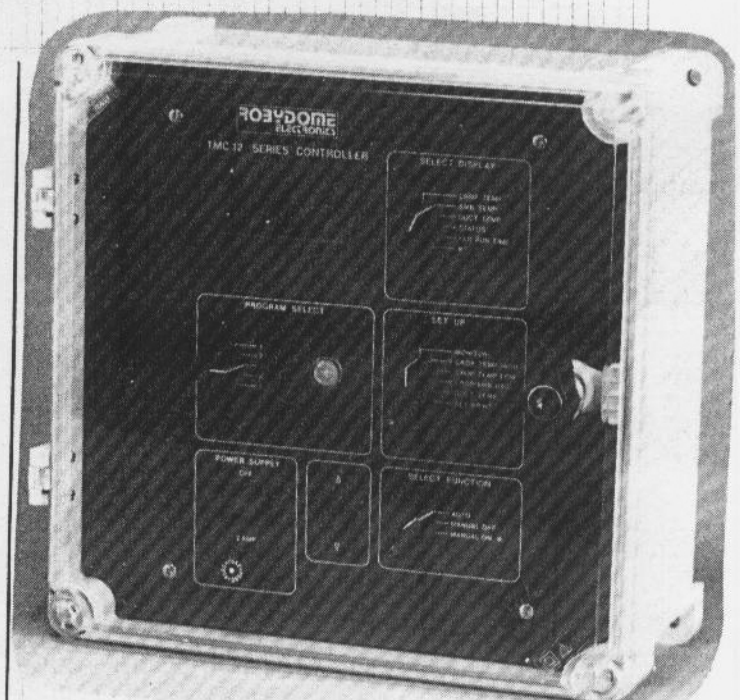
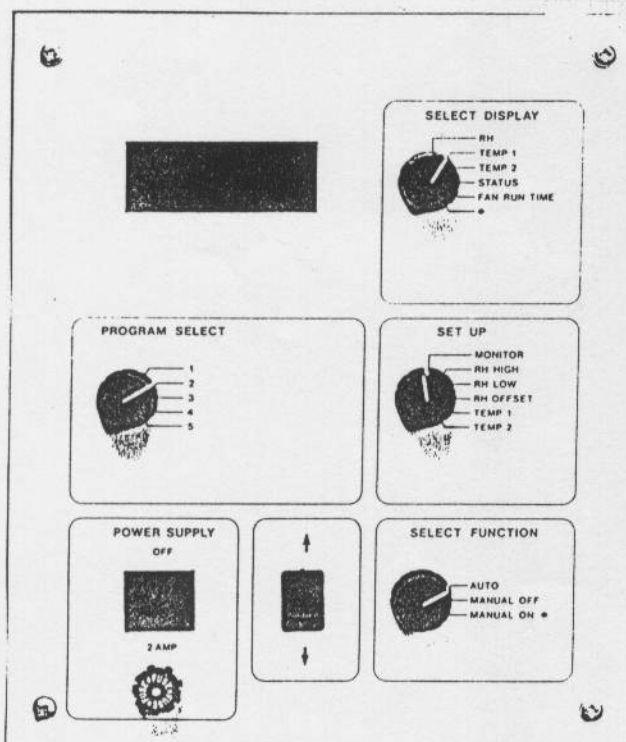
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FRONT PANEL



CONSOLE IN MPE5 ENCLOSURE