HC322 MANUAL

SOFTWARE VERSION 0481/2.03

INSTALLATION

Refer to drawing HC322 system. All component parts of the system are shown for up to 8 crop sensors, the printer is optional.

DO NOT POWER THE SYSTEM UP UNTIL ALL PARTS ARE CONNECTED.

Console

To mount the console use the mounting bracket fixings, there are four of them.
Connect the console to a 230V AC supply ensuring it is correctly earthed.
There is no need to remove the enclosure cover (console front panel).
The console should be installed within a building and not exposed to outside conditions.

MPX Box

This box plugs into the console.
To mount this unit remove its lid and use the four fixing centres located at the bottom of the box - take care, as the MPX electronics are mounted here. The crop sensors connect to this unit: The PCB mounted LED shows power on.

Relay Card

This PCB assembly should be mounted within the ventilation switch gear housing or an enclosure where it is protected from the environment and cannot be touched in normal use, it will have mains power present. See HC322 Relay Card schematics 1 & 2 for connection details. **Relay card 2 is not required if a heater and switched alarm is not controlled by HC322 system.**

Crop Sensor Junction Boxes

Four mounting lugs are provided for fixing these boxes, if severe condensation is normal within the store mount in a vertical position. Each box has a 20m lead and they are connected directly into the MPX box. Up to four crop sensors plug into each box, 10m or 20m extension leads can be obtained separately.

Ambient Sensor

Normally a 10M temperature sensor is supplied and connects to the console AMBIENT sensor socket. Mount the sensor itself slightly away from any structure and on a northerly face of the building to avoid the direct effect of the sun. Additional shielding may be required in exposed situations.

Duct Sensor

Any RHS3 humidity and temperature sensor supplied can be connected to the console DUCT sensor socket. Mount the sensor itself away from any structure and where it will sense air that is completely mixed downstream of the ventilating fan, at least 3m minimum.

Crop Sensors

Crop Sensors should be evenly distributed throughout the stored crop. Ensure connecting cables are mounted where they will not be walked on or damaged. The sensors should be situated in the stored onions about 150mm below crop surface, the sensor location should be marked (eg plastic pipe) above the crop surface (however specialised advice on this is **STRONGLY** recommended).

HOW TO USE THE SYSTEM

WARNING

This product should only be used in conjunction with a crop conditioning and storage management regime.

If in doubt a qualified agronomist should be consulted, Robydome Limited cannot give detailed advice.

1. **Overview**

   The system is designed to control the conditioning of onions through the use of heat (Stage 1), drying with a fan, louvres and heat (Stage 2) and cooling with a fan and louvres (Stage 3). Additionally a refrigeration plant can be used to cool when ambient conditions are unsuitable (Stage 4).

   To understand how the system will achieve control review the computer flow diagrams carefully. Each "box" represents an action or decision made by the console known as "steps". Following the sequence of operation or "steps" can be done by using the CHECK key, the display will show program sequences as they occur.

Console- General

The power ON/OFF switch is located on the lower panel of the enclosure.
All system functions are controlled from the keys and a rocker switch on the front panel.

During long periods of non-use keep the console powered up, the small amount of heat it dissipates will help keep out moisture. Ensure connected equipment is switched off to avoid unwanted operation.

Getting Started

Isolate the ventilation system in order that console familiarisation can proceed without starting and stopping the fan and associated equipment.

Check the clock first, press the CLOCK key to do this.
Now use the HELP key to gain familiarisation with the help system on the console.
Read the information as it appears on the display, it will automatically scroll the next message up or, if you want to proceed faster, press HELP again and the next piece of information will appear.
Use this technique on all other keys, no matter what mode the controller is in, the HELP system will always give relevant information at that point, the system is contextual, and is designed to prompt the user when key operation is uncertain. Always refer to the manual for detailed information.

Secret Set Up Routine

Some basic and important set-up information has to be programmed into the console before it is used.

The following steps need to be carried out as a commissioning stage.

1, Ensure console is switched OFF.

2. Hold the SET UP key and switch ON.

3. When the display reads "SECRET MODE" release the SET UP key.

4. Now set each function as follows using the SET UP key to page through each function, use + and - keys to change settings.

a) Maximum crop sensors; 4, 8, 12 or 16 set according to number of sensors connected.

b) Crop Read; set for average calculation of temperature on crop sensors or for ventilation to be initiated on the highest (extreme) reading sensor. Average is recommended.

c) Pre-set Time; this is the wait time once the main FAN has started, typical time

is 10 to 15 minutes to avoid more than 4 start-ups per hour (also refer to flow diagrams, eg Prog 1, Stage 1, Step 3).

d) Pre-set time 2; check flow diagrams for this setting, particularly Prog 4, Stage 4 step 14, "Start Fridge" etc. Typical setting is 5-10 minutes.

e) Recirc. Time; this is the time the FAN runs for during the recirculation period. Recirculation is useful to even out temperature gradients within the crop, particularly in Stage 3 cooling. It operates when the system has not run for the recirculation PERIOD below, this program runs in the background operating the fan and keeping the ambient louvres closed and recirc. louvres fully open.

f) Recirc. Period; the number here is in hours and is the time between recirculation sequences. The lower the setting the more frequent the recirculation times per day.

g) Pulse Time; set this depending on the operating speed of the louvre system, it is the ON time of the motors in seconds. Therefore setting for a few seconds implies fast operating motors.

h) Valve Pulse Time: in seconds, this sets operating time of the heater modulating valve motor, if the system is to control a heater. Specialised advice from a heating engineer should be sought where the controller is to control a gas heater with modulating valve.

Continue to use the set-up key until the end of the secret sequence is reached, the display will read "set exit" and will now revert back to normal operation. Alternatively switch the console OFF at any time during "Secret" operation and upon switching ON normal operation is restored. **IMPORTANT** - the secret setting changed MUST be confirmed to the console by pressing the SET-UP key before reverting back to normal operation.

Using the Console

1. Select MANUAL control on the MODE SELECT rocker switch on the front panel.

2. Use the HELP system as before to receive prompt instructions on how to use this and other functions, in MANUAL the fan (use left and right arrows) and louvres (use + and - keys) can be controlled only.

3. Now select AUTO and choose which program is required, use PROGRAM key and refer to the flow diagrams to help with this selection. The arrow keys will scroll programs on the display to allow selection, - key to ascend and + to come back, press Enter to confirm program change.

A summary of the programs is on page 8.

4. Scroll through system settings using the SET UP key, in a similar manner as in "Secret Set Up". Adjust settings to your requirements. The first set of numbers are temperatures in degrees celsius followed by %RH settings.

Refer to the program you have selected and its relevant flow diagram to check on settings.

a) SET CROP HIGH; in degrees Centigrade, see Prog 3/4, represents the highest temperature within the crop before cooling is initiated.

b) SET CROP LOW; in degrees Centigrade, see Prog 3/4, the system will continue to cool until the crop has reached this low setting.

c) SET DUCT; in degrees Centigrade, see Prog 1/3/4/5/6. When controller is programmed for heater control (Prog 1/5/6) this setting either acts as a safety setting when the heater is controlled separately or will set the target duct (heater) temperature when the system is directly controlling the heater. In prog 3/4 this setting controls the louvres to use either ambient air, mixed air (store/ambient mix) or recirculated air, eg, review Prog 3, step 6.

d) SET DIFFERENTIAL; See Prog 3/4, the controller checks ambient air against crop temperature and only allows ventilation if ambient is cool enough. A 2°C setting means ambient air must be 2°C cooler than the crop. In Prog 4 the system will go to refrigeration control if ambient conditions are unsuitable.

e) SET DUCT ALARM; If relay card 2 is fitted then relay 4 can be connected to an alarm system to indicate a temperature anomally in the ventilation duct. Refer to prog 5/6. Should the heater malfunction the system will shut it down and put on the alarm signal. The fan will continue to run until the system automatically restarts.

The setting represents the value of temperature over the heater operating temperature (duct setting) that can rise before the alarm triggers, eg, set duct = 30, alarm = 5, therefore the alarm triggers at 35°C.

f) SET FROST; see prog 3/4, the system checks the duct temperature during the operation of the cooling programs, should it go below this "FROST" setting then the fan is stopped, the alarm is activated for one hour. After this the system automatically restarts.

g) SET CROP HIGH RH; % RH, see Prog 2, crop high is the maximum value of RH within the crop the system will allow; once reached, ventilation will begin to reduce humidity levels to dry the crop.

h) SET CROP LOW RH; % RH, see Prog 2, crop ventilation will stop once the humidity level within the crop reaches this low set point.

i) SET DUCT RH; % RH, see Prog 1/2/5/6, the RH target point for the duct controls louvre operation to reduce or increase humidity levels ventilating the crop. Opening ambient air louvres will reduce RH levels.

j) REST FAN RUN HOURS; press the + and - keys together to re-set the hours reading to zero.

k) SET PRINT TIME; disregard if no printer is fitted. The + and - keys adjust setting, after each change press ENTER to step to the next time adjustment.

Time is the actual time of the FIRST print after adjusting.

Interval is the time in hours between printing.

Next print shows the actual time of the next print sequence.

Settings are now complete.

5. The controller is now ready for use, switch on ventilation system control gear. Use the MONITOR key to review sensor readings. Press once for general information and again for crop sensor readings.

6. As the console works through the flow diagram relevant to your PROGRAM selection use the CHECK key to follow its progress on the display.

7. Use the SENSOR key to select and de-select crop sensors. It is useful when controlling a partially filled store, for example. Select sensors with +/- keys and ENTER to toggle ON/OFF.

8. REMEMBER - use the HELP key to find information on various aspects of the console and to get textual assistance without the need of a paper manual.

IT IS GOOD PRACTICE TO CHECK SENSOR READINGS AND CONSOLE SETTINGS ON A REGULAR BASIS.

During the working life of the system sensors need to be checked for accuracy whilst wiring and associated equipment needs to be checked for damage. Consult your supplier if in doubt.

Summary of Control Programs

Important Note:- Where the system controls a heater (using relay card 2) use and refer to Program 5 for crop heating and program 6 for crop drying and **NOT** programs 1 or 2.

Stage 1 is crop heating.
Stage 2 is crop drying.
Stage 3 is crop cooling.
Stage 4 is crop cooling.

Program 1, Stage 1

CROP HEATING with rh control of the duct using louvres.

Program 2, Stage 2

CROP DRYING with rh control of the duct using louvres.

Program 3, Stage 3

CROP COOLING, differential (ambient/crop) mode with temperature control of the duct using louvres.

Program 4, Stage 4

CROP COOLING, differential and refrigeration mode with duct temperature control using louvres.

Program 5, Stage 1

CROP HEATING, heater control with duct rh control using louvres.

Program 6, Stage 2

CROP DRYING, heater control with rh control of duct using louvres.

HC322 SYSTEM

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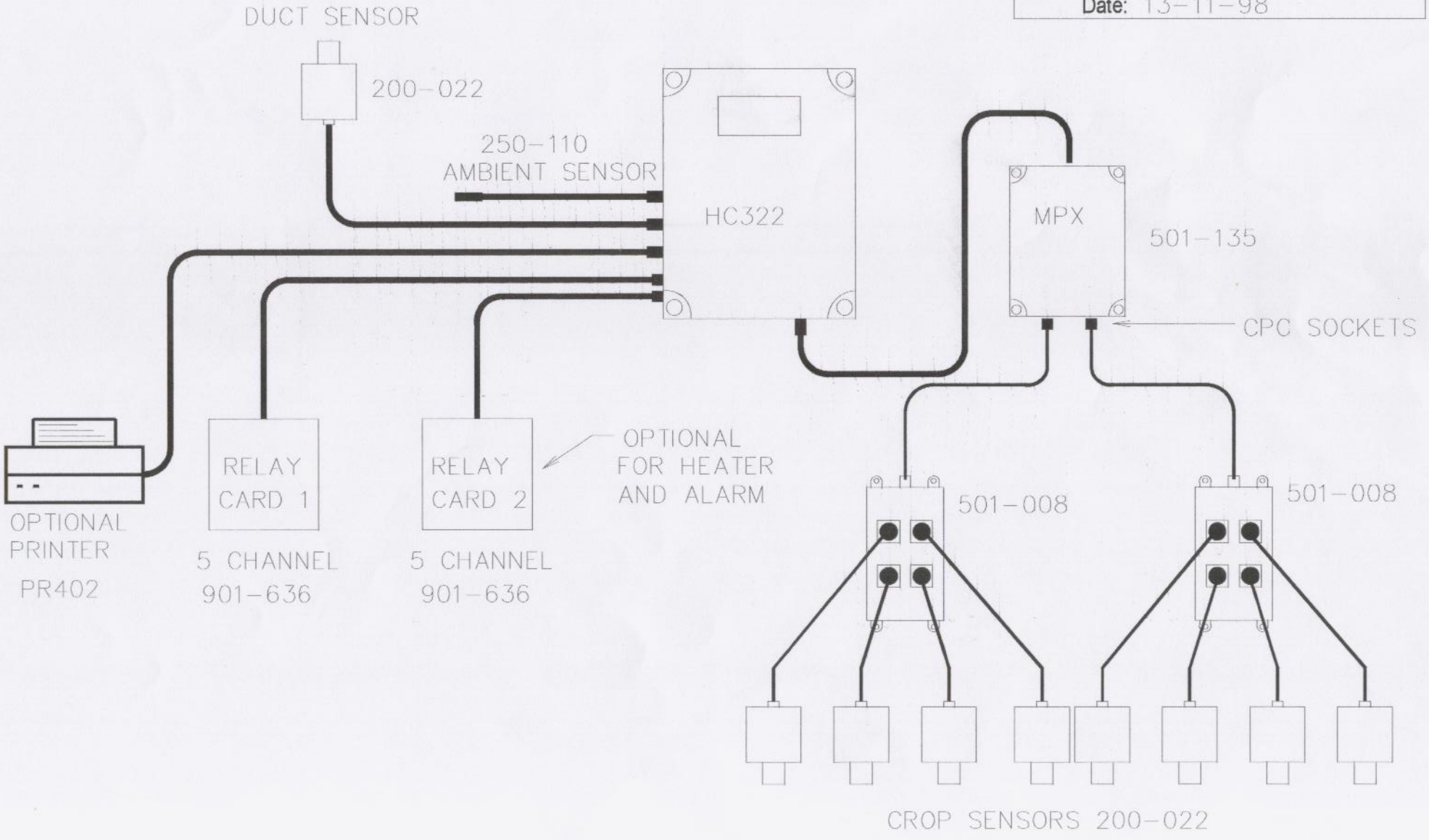
Approved By:	G.M
Date:	13-11-98



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Title:	HC322 RELAY CARD 1
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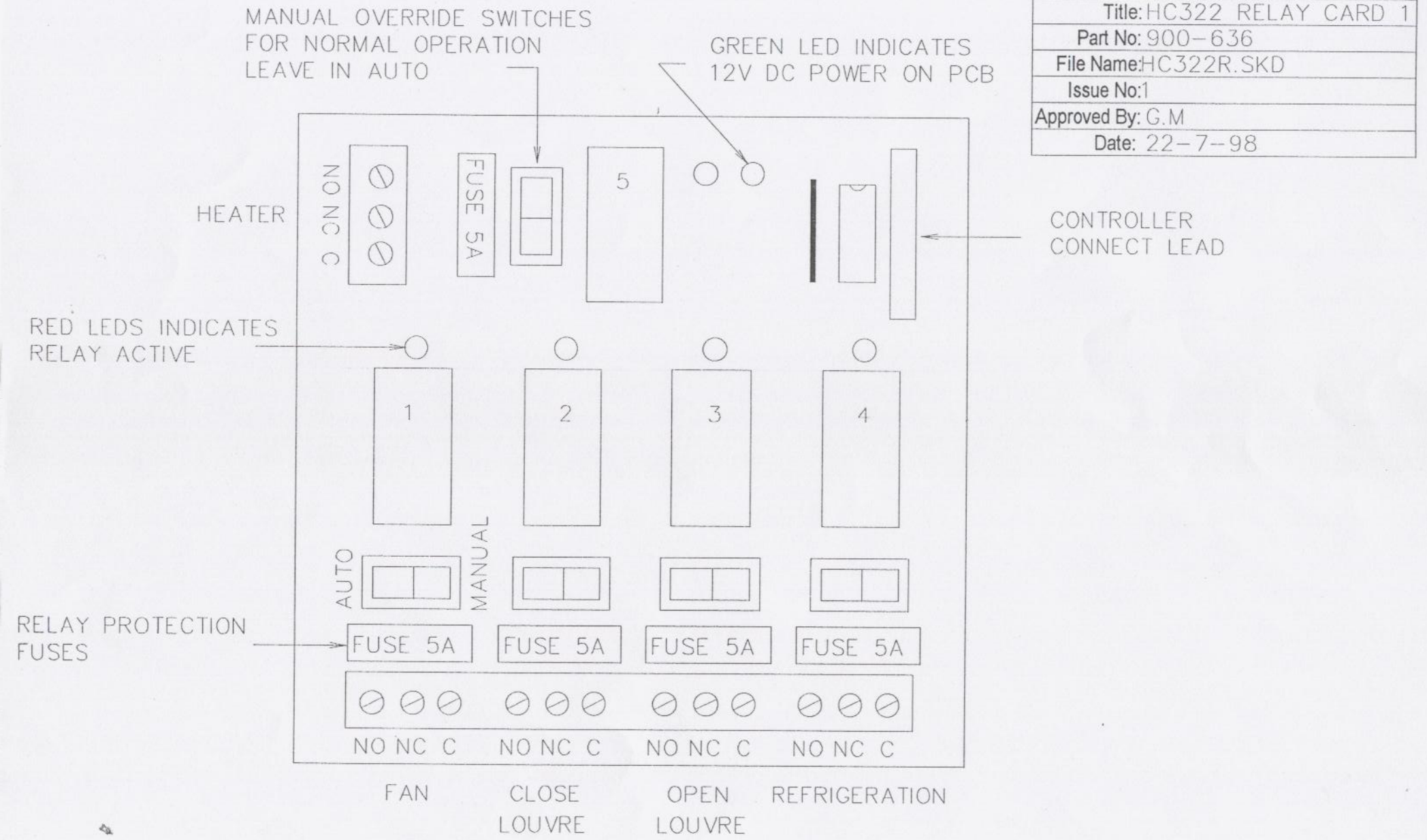

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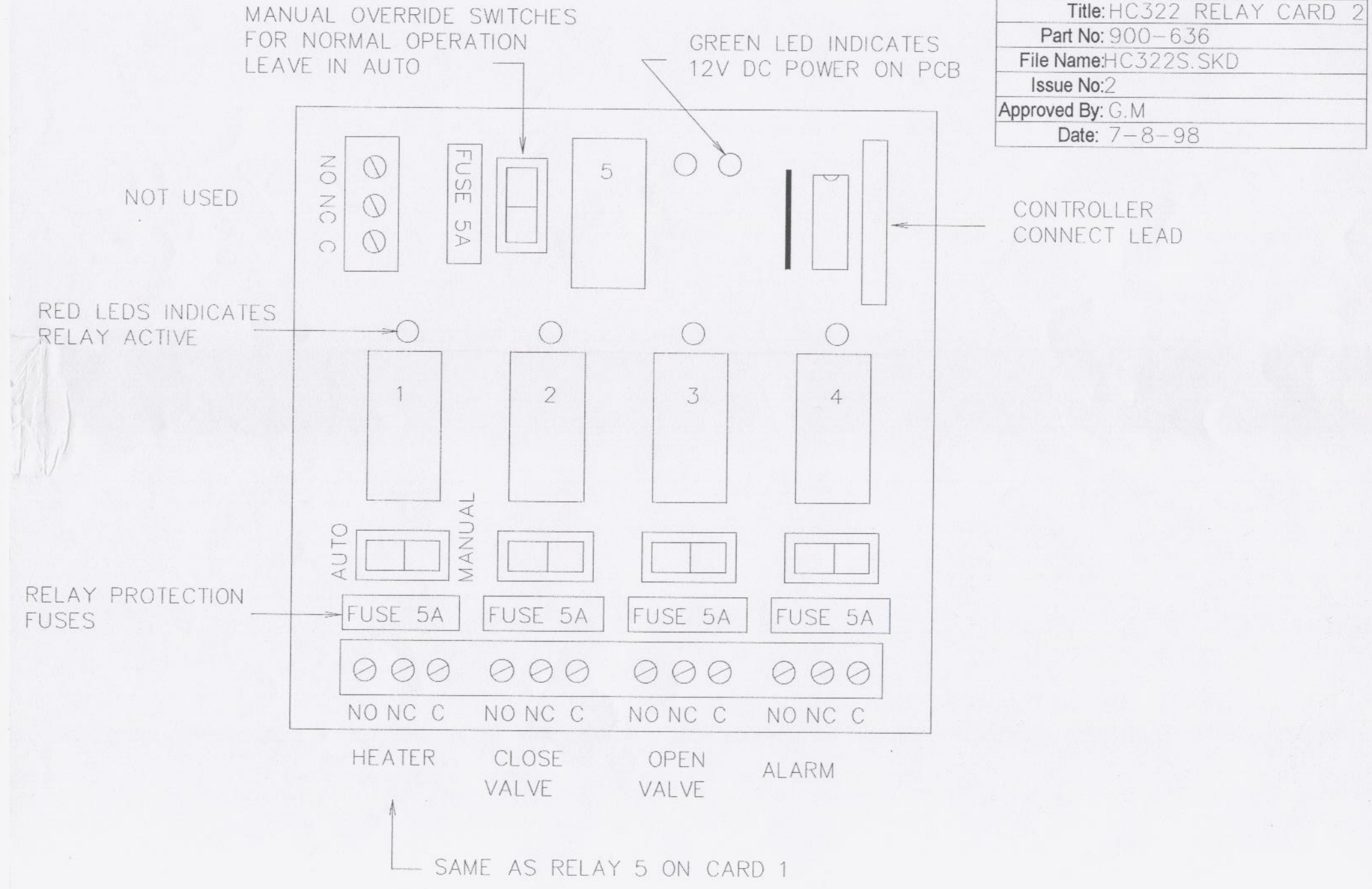
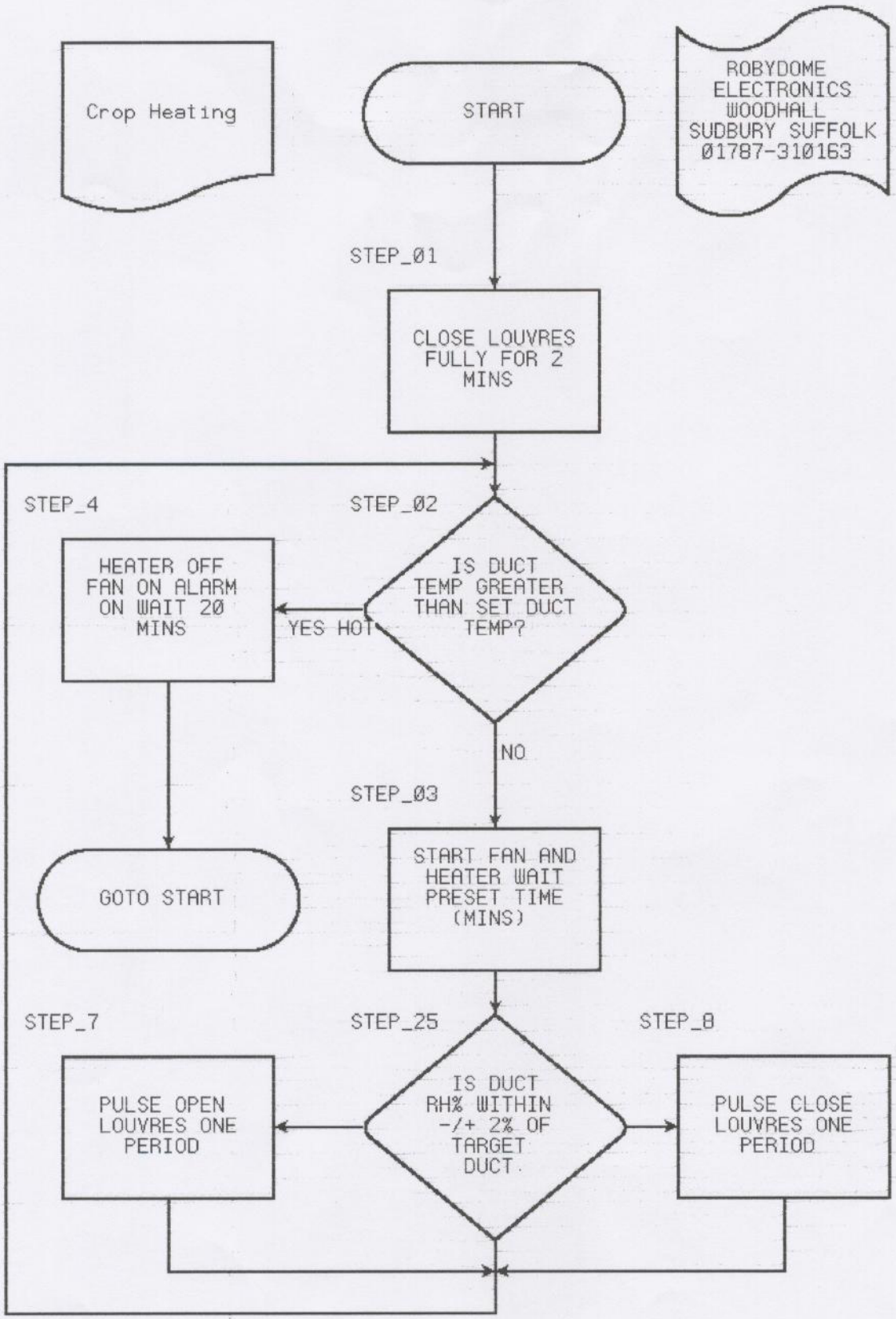


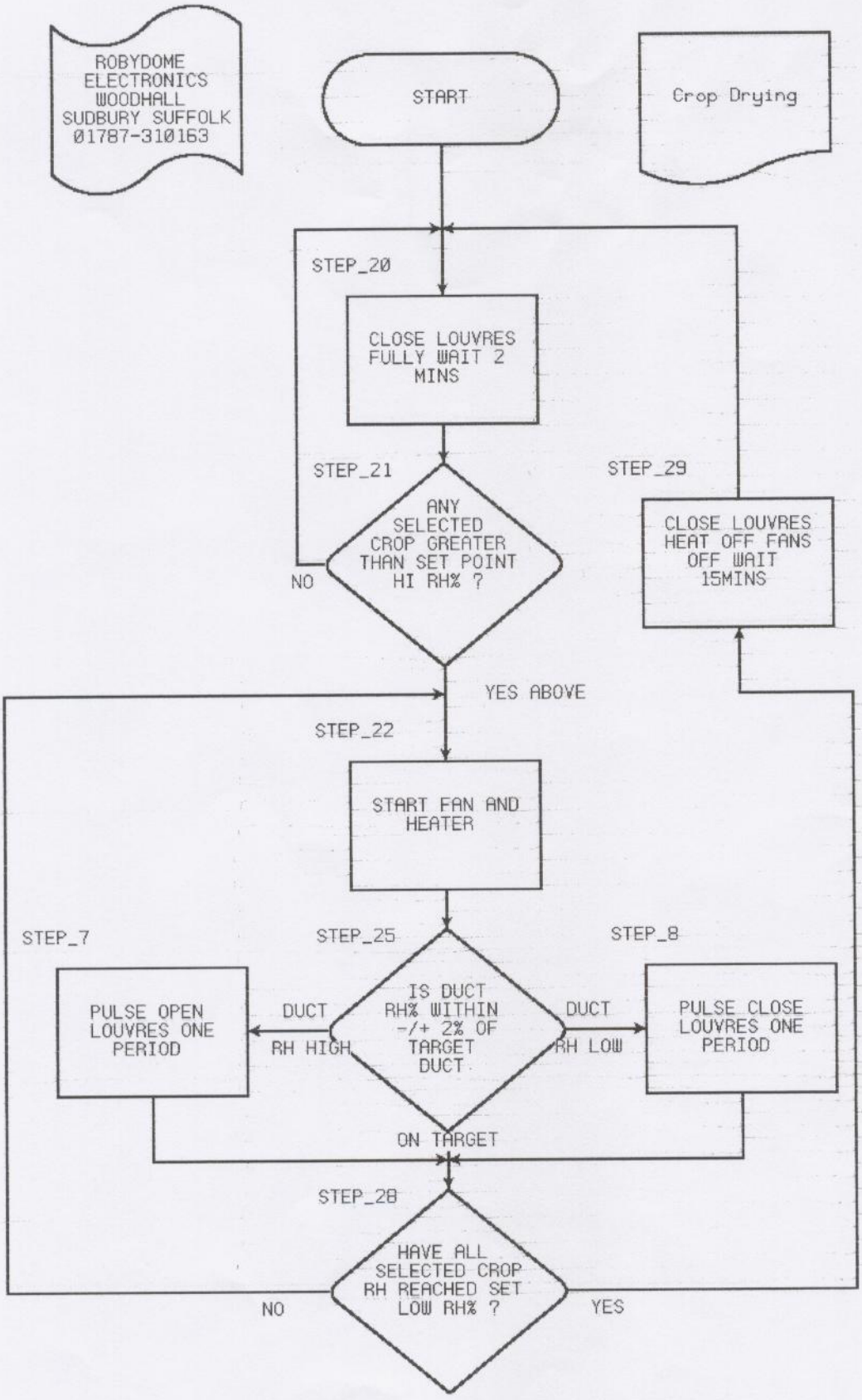
Program 1 Stage 1

HC322 6010-01 02-Aug-98



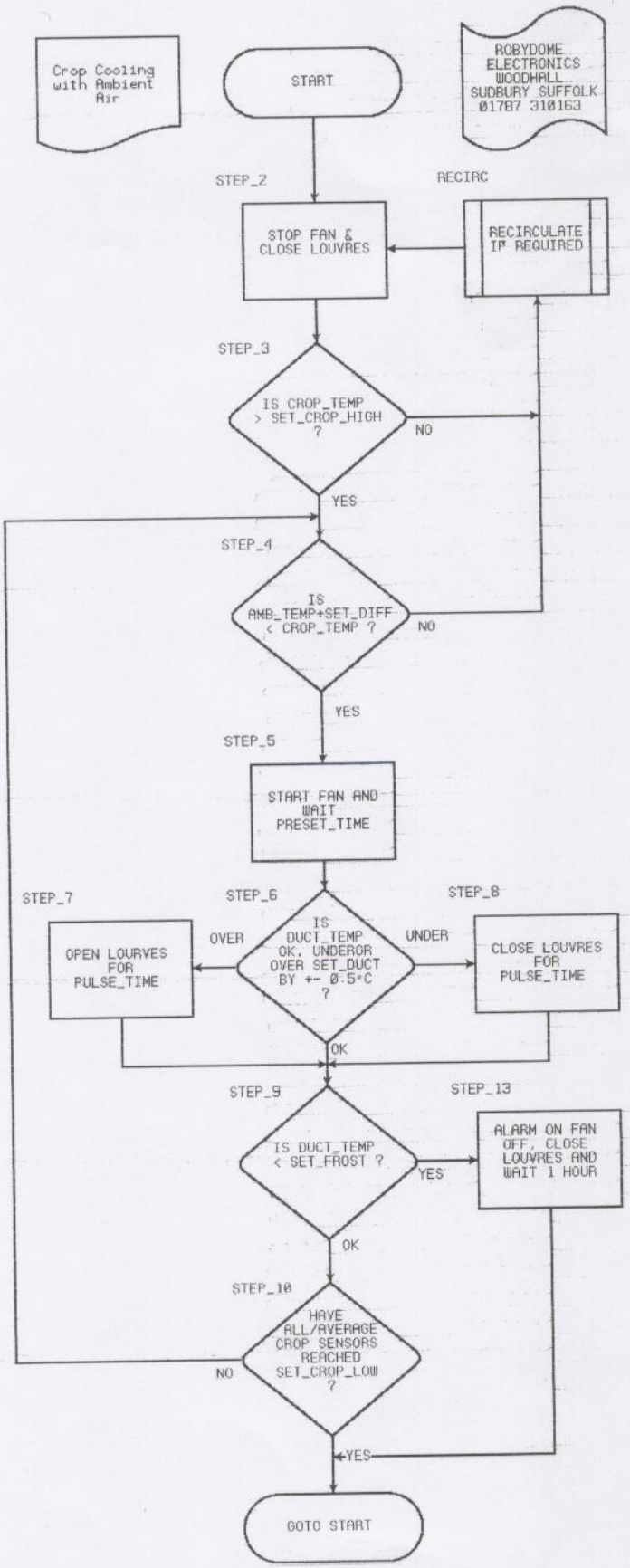
Program 2 Stage 2

HC322 6009-01 02-Aug-98



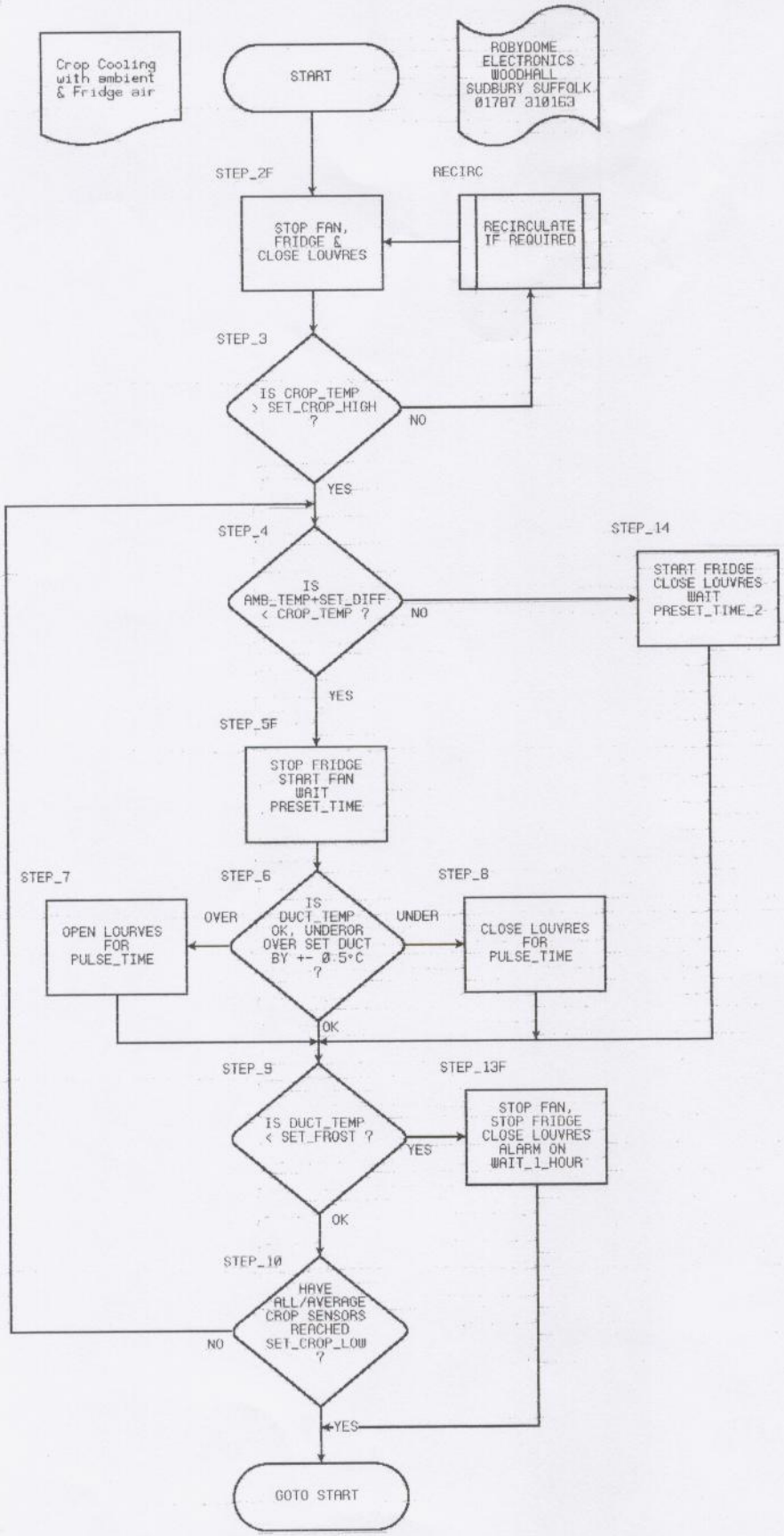
Program 3 Stage 3

HC322/TC322 6002-02 02/08/98

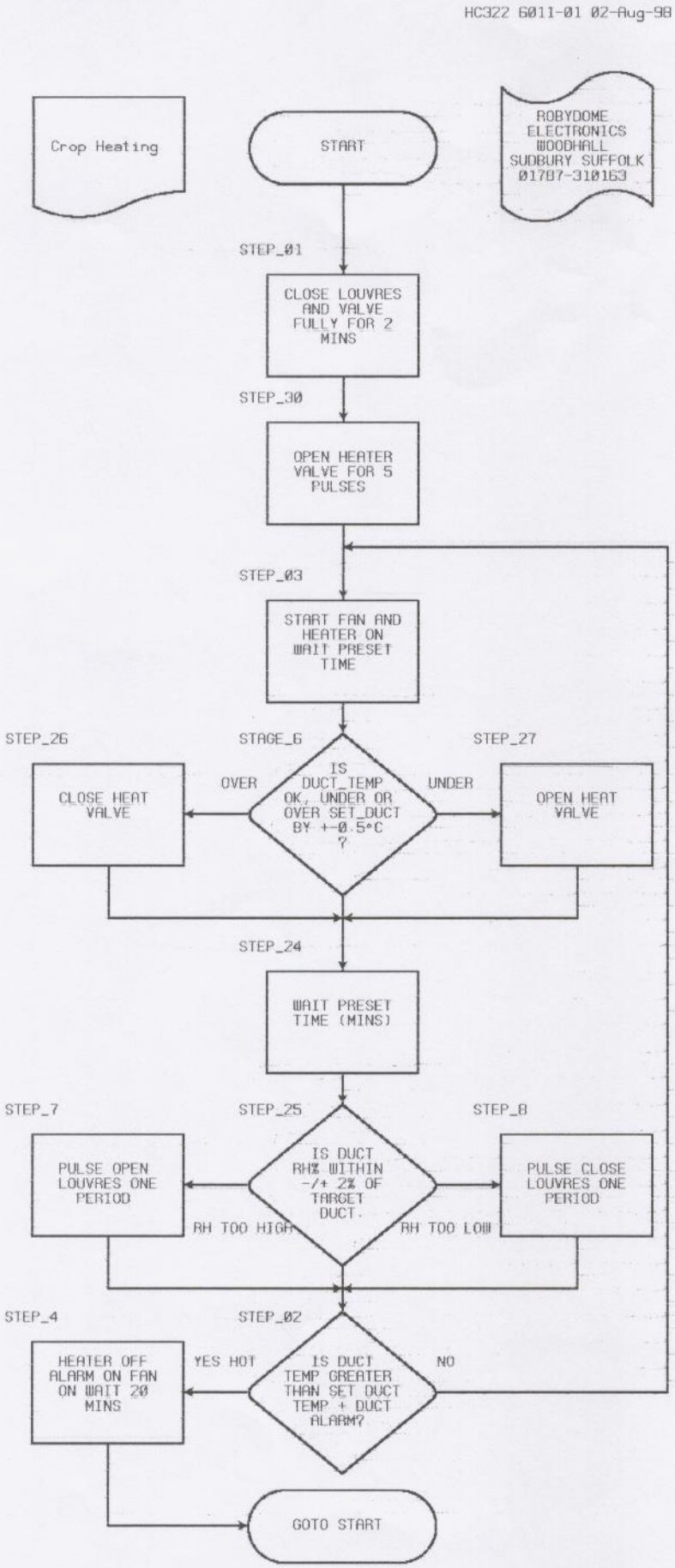


Program 4 Stage 4

TC322/HC322 6003-2 02/08/98



Program 5 Stage 1



Program 6 Stage 2

HC322 6012-01 02-Aug-98