CHORE-TIME®

Model 16 Control

Installation & Operator's Instruction Manual

MT1733-001 07/02

October 2002 **MT1732A**

Chore-Time Warranty

Chore-Time Equipment ("Chore-Time") warrants each new Chore-Time product manufactured by it to be free from defects in material or workmanship for one year from and after the date of initial installation by or for the original purchaser. If such a defect is found by the Manufacturer to exist within the one-year period, the Manufacturer will, at its option, (a) repair or replace such product free of charge, F.O.B. the factory of manufacture, or (b) refund to the original purchaser the original purchase price, in lieu of such repair or replacement. Labor costs associated with the replacement or repair of the product are not covered by the Manufacturer.

Conditions and Limitations

1. The product must be installed by and operated in accordance with the instructions published by the **Manufacturer or Warranty will be void**.
2. Warranty is void if **all components** of the system are not original equipment supplied by the **Manufacturer**.
3. This product must be purchased from and installed by an authorized distributor or certified representative thereof or the Warranty will be void.
4. Malfunctions or failure resulting from misuse, abuse, negligence, alteration, accident, or lack of proper maintenance, or from lightning strikes, electrical power surges or interruption of electricity, shall not be considered defects under the Warranty.
5. This Warranty applies only to systems for the care of poultry and livestock. Other applications in industry or commerce are not covered by this Warranty.

The **Manufacturer** shall not be liable for any **Consequential or Special Damage** which any purchaser may suffer or claim to suffer as a result of any defect in the product. **"Consequential"** or **"Special Damages"** *as used herein include, but are not limited to, lost or damaged products or goods, costs of transportation, lost sales, lost orders, lost income, increased overhead, labor and incidental costs and operational inefficiencies.*

THIS WARRANTY CONSTITUTES THE MANUFACTURER'S ENTIRE AND SOLE WARRANTY AND THIS MANUFACTURER EXPRESSLY DISCLAIMS ANY AND ALL OTHER WARRANTIES, INCLUDING, BUT NOT LIMITED TO, EXPRESS AND IMPLIED WARRANTIES AS TO MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSES SOLD AND DESCRIPTION OR QUALITY OF THE PRODUCT FURNISHED HEREUNDER.

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Effective: **October 2002**

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Thank You

The employees of Chore-Time Equipment would like to thank your for your recent Chore-Time purchase. If a problem should arise, your Chore-Time distributor can supply the necessary information to help you.

Contents

* Legend: C = Customer (end user), D = Distributor (sales), I = Installer of equipment

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General

Support Information

The Chore-Time Model 16 Control is used to control the Climate in a structure to insure efficient growth of Livestock. Using this equipment for any other purpose or in a way not within the operating recommendations specified in this manual will void the warranty and may cause personal injury.

This manual is designed to provide comprehensive planning, installation, safety, operation, and parts listing information. The Table of Contents provides a convenient overview of the information in this manual. The Table of Contents also specifies which pages contain information for the sales personnel, installer, and consumer (end user).

Distributor and Installer Information

Please fill in the following information about your Product.
Keep this manual in a clean, dry place for future reference.

Distributor's Name _____

Distributor's Address _____

Distributor's Phone _____ **Date of Purchase** _____

Installer's Name _____

Installer's Address _____

Installer's Phone _____ **Date of Installation** _____

System Specifications _____

_____

About This Manual

The intent of this manual is to help you in two ways. One is to follow step-by-step in the order of assembly of your product. The other way is for easy reference if you have questions in a particular area.

Important ! **Read ALL instructions carefully before starting installation.**

Important ! **Pay particular attention to all SAFETY information.**

- *Metric measurements are shown in millimeters and in brackets, unless otherwise specified.* " ' " equals inches and " ' " equals feet in English measurements.
  Examples:
  1" [25.4]
  4' [1 219]
- Optional equipment contains necessary instructions for assembly or operation.
- Major changes from the last printing will be listed on the back cover.

- This Planning Symbol is used in areas where planning needs to take place before construction continues.
- Very small numbers near an illustration (*i.e.*, 1257-48) are identification of the graphic, not a part number.

Safety Information

Caution, Warning and Danger Decals have been placed on the equipment to warn of potentially dangerous situations. Care should be taken to keep this information intact and easy to read at all times. Replace missing or damaged safety decals immediately.

Using the equipment for purposes other than specified in this manual may cause personal injury and/or damage to the equipment.

Safety Information

Follow Safety Instructions

Carefully read all safety messages in this manual and on your equipment safety signs. Follow recommended precautions and safe operating practices.

Keep safety signs in good condition. Replace missing or damaged safety signs.

Decal Descriptions

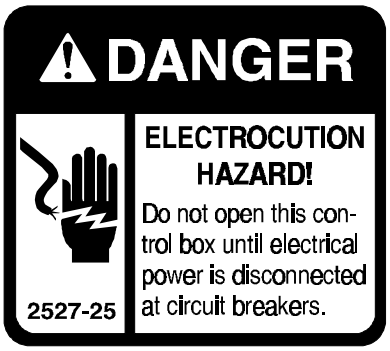
DANGER: Electrical Hazard

Disconnect electrical power before inspecting or servicing equipment unless maintenance instructions specifically state otherwise.

Ground all electrical equipment for safety.

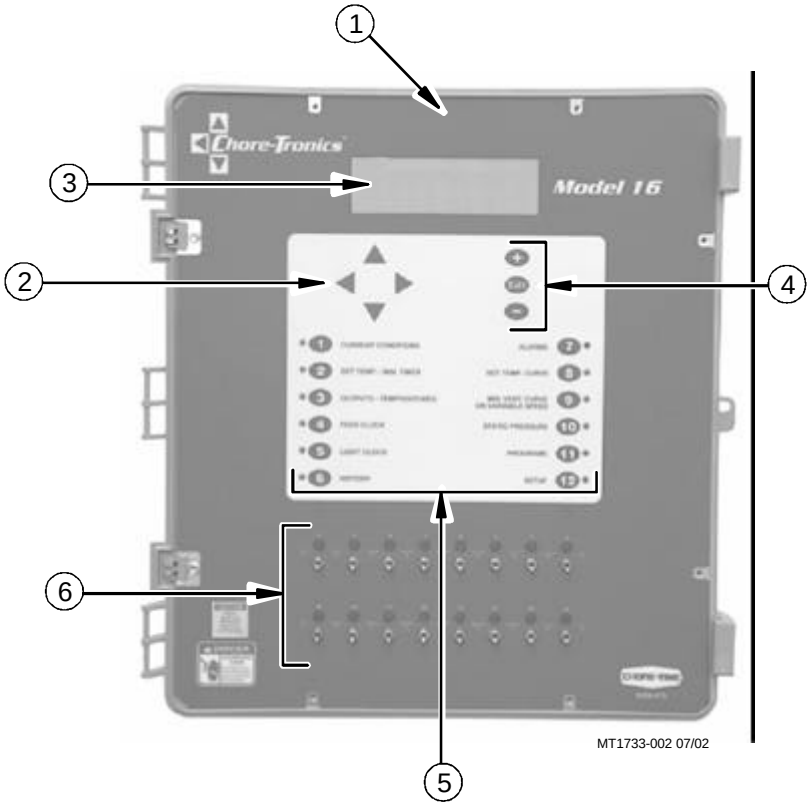
All electrical wiring must be done by a qualified electrician in accordance with local and national electric codes.

Ground all non-current carrying metal parts to guard against electrical shock.



Introduction to Control

Description of Control Front Panel



Item	Description
1	Model 16 Main Box
2	Navigation Buttons
3	Viewing Screen
4	Edit Buttons
5	Subject Buttons
6	Relay Switches

Viewing Screen

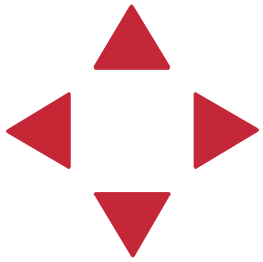
The viewing screen has a display which has 8 lines, each containing 40 characters. This is the area that will display the requested information when a subject button is pressed. The viewing screen always remains lit. Normally the *Current Conditions screen* shows **(Figure 1)**.

```
          POWER mode Sensor   71.8
          Set temperature   72.0
 Sensor #1  71.9      Sensor #4  72.4
*Sensor #2  71.8      Sensor #5  71.5
 Sensor #3  72.0      Sensor #6  72.2
 Static pressure  0.05      Humidity  62
(CHECK SWITCHES)        (CHECK ALARMS)
 Date: 11 May 1998          Time: 8:05a
```

Figure 1. Current Conditions Screen.

Navigation Buttons

These buttons allow you to scroll up and down in the screens that have more than 8 lines. Continuously pressing the up or down arrow button increases the scrolling speed. When you are in the *Edit Mode* the left and right arrow keys move the cursor to editable (changeable) positions. The cursor highlights the areas that can be changed.



Edit Buttons

When the button labeled **EDIT** is pressed and you are looking at a screen that has editable fields, the cursor appears. With the *Navigation Buttons*, you can move the cursor to the parameter on the screen that you want to edit. By pressing the “+” or “–” buttons, the numerical values are changed. If you are changing text (i.e. “yes” or “no”), the "+" and "–" keys scroll through the possible text choices. Pressing the **EDIT** button a second time exits the edit mode.

Fast Edit

While editing a number on the screen, you will notice that the digit you are changing is underlined. For example: (72.0). If you wish you can move to different digits of the number in order to change the number more rapidly. To do this **See Figure 2 below.** Fast Edit is very useful when making large changes to numbers.

Action	Result
Press the Edit button	72.0
Press "+" followed by "-"	72.0
Within 3 seconds, Press the Left arrow twice	72.0
Press "+" twice arrow	92.0

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Figure 2. Fast Edit.

Security

To provide for security in setting your Controls, there is a security feature that appears when you press the *Edit* button. The Control automatically asks for an access code at that time, The access code is a four digit number that you have selected while setting up the Control and is explained under the "**Changing the Access Code**" section on **Page 39**. Once you have inserted the correct code, the Control allows you to make changes. If five minutes pass since your last change, the access code has to be re-entered.

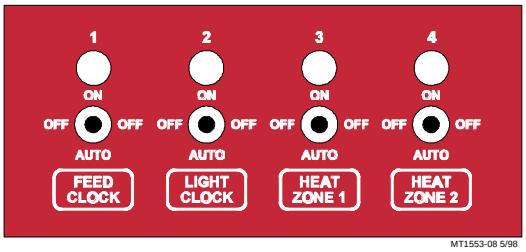
Subject Buttons

On the front of the Control are 12 subject keys. As each subject button is pressed, the light beside that button turns on and the subject that is described beside the button appears on the screen. If no other buttons are pressed for 5 minutes, the Control automatically returns to the *Current Conditions screen.*

Indication Lights and Auto/Manual Switches

Each Relay Output has its own three position Switch that allows the user to manually control each Relay. The Relays and their corresponding Switches are located in a seperate adjoining box. Decals are supplied to label each Switch according to the output function that is assigned to that Switch. The Switches can be placed in three positions — “on”, “off”, or “auto”. The “auto” position is for normal automatic operation. Changing a Switch to “on” or “off” overrides "auto" operations. When a switch that is assigned is placed in a position other than “auto”, a message will appear in the *Current Conditions* screen advising you to “Check Switches”.

The light above each Switch indicates that the Switch’s Relay is activated.



How to Maneuver in the Viewing Screen

- The procedures below give a brief overview on the use of the *Navigation Buttons* and the *Edit Buttons.*
- Screen 12, Setup is used for this example.

Using the Navigation Buttons

1. Press BUTTON 12. **Figure 3** appears in the display.

Control number	1
Temperature units	FAHRENHEIT
Units of measurement	NON-METRIC
Clock type	12 HR
Time of day	8:05a
Date	11 May 2002

Figure 3. Setup and Screen.

2. Press the **DOWN ARROW** once.
   The view shown on the screen will scroll down one line as shown in **Figure 4.** If you push the **UP ARROW** once the text scrolls back to where it was.

Temperature units	FAHRENHEIT
Units of measurement	NON-METRIC
Clock type	12 HR
Time of day	8:05a
Date	11 May 2002

Figure 4. Setup and Screen.

3. The left and right arrow keys are used during the Edit Mode.

Using the Edit Buttons

The Edit Mode is entered by pressing the Edit Button. Pressing the Edit Button a second time exits the Edit Mode.

1. Press **BUTTON 12**.
   The *Setup* screen appears **(Figure 5).**

Control number	1
Temperature units	FAHRENHEIT
Units of measurement	NON-METRIC
Clock type	12 HR
Time of day	8:05a
Date	11 May 2002

Figure 5. Setup Screen.

2. Press the **EDIT** button.
   This activates the cursor which allows settings to be edited. **Figure 6** shows what the cursor looks like. If the Control asks you for an "Access Code", enter it at this time **(See Page 39)**.

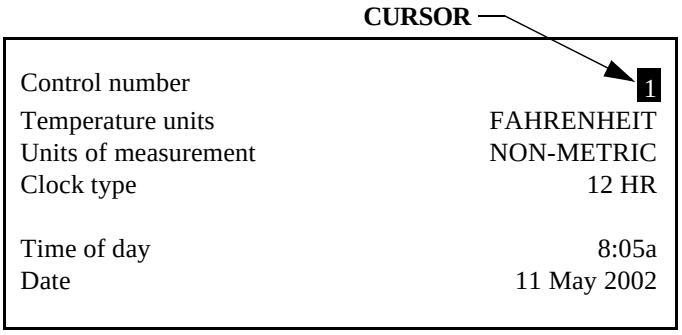


Figure 6. Setup Screen in Edit Mode.

3. Press the (+) or (–) buttons to edit the House #.
   The (+) key increases the value and the (–) key decreases the value.

4. Press the **DOWN ARROW (Figure 7).**

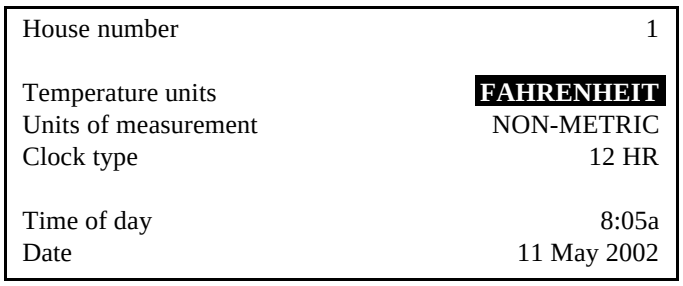


Figure 7. Setup Screen in Edit Mode.

5. Press the (+) or (–) buttons to change from Fahrenheit to Celsius. In this case the (+) and (–) buttons select different text choices.

6. If two or more editable settings are on the same line, the *left* and *right* arrow buttons are used to move between those positions.

When a value or text is edited, it is saved in the memory within a few seconds. If you make a mistake, rechange it to what you really want.

Glossary of Terms

Anticipation

When the Control is cycling Minimum Ventilation Timer Fans with the Minimum Ventilation Timer, the Control will open the Inlets to the correct position for Static Pressure Control before the Fans are turned on. The Control teaches itself how much adjustment was required during the previous cycle, and uses that amount of "anticipation" for the next cycle. If any of the Minimum Ventilation Timer Fans are on due to temperature, or any other Fans are on, the "anticipation" does not occur.

Bend Point (BP)

The Bend Points (BPs) are simply the points on the curve that define the curve. For the Set Temperature and Minimum Ventilation Timer curves, the curve values are gradually changed between bend points. The bend point values are the exact values at midnight beginning the day # of each bend point. The curve takes over when you turn the curve "on" and the day number is equal to or greater than the day number assigned to BP #1.

Cool Pad Output

The COOL PAD output is a special function for controlling evaporative cooling that allows you to modulate the addition of water to the cooling pad in such a way that the usual large temperature swings associated with a cooling pad are avoided.

Curve

A "curve" is a listing of up to 10 points in time (bend points) that defines how you want a parameter to automatically vary as the animals age.

Curve Value

The Control will list what the current value(s) the curve would be, if the current day number is greater than the day # of bend point #1, and the curve is "on", and there is no "offset" to the curve.

Day Number

The intention is that the day # is the age of the animals whose environment is being controlled. Day # 0 does not exist. Negative days (down to – 7) are allowed. Changing the day # in any screen that shows the day number, will change the day # in all the other screens that show the day #.

Event

This term applies to the time clock outputs. An "event" is an "on at" time combined with an "off at" time. Each clock output can have up to 8 events.

Mode Sensor(s)

The concept of Mode Sensor(s) is essential to the understanding what makes the Control change from one mode to another. The Mode Sensor(s), of a currently operating mode, determines when the Control will leave that mode. As an example, while in the Power Mode, the Power Mode Sensor(s) determines when it's too hot to stay in the Power Mode (i.e. above the tunnel "on" temperature). Because of this, it converts to the Tunnel Mode (assuming there is no Natural Mode) at the tunnel "on" temperature. It comes back to the Power Mode from the Tunnel Mode, when the Tunnel Mode Sensor(s) say it's too cold to stay in the Tunnel Mode (i.e. below the tunnel "off" temperature).

Natural Mode

Natural Mode requires the house to be equipped with Curtains in the side walls that are powered by Drive Units (Curtain Machines). The Control converts to this mode of operation when the temperature(s) inside the house raise to a level that the Fans of the Power Mode can't keep the temperature(s) under control. While in the Natural Mode of operation, the Curtains are opened or closed, as required, to control the temperature(s). This mode of operation generally happens during moderate weather.

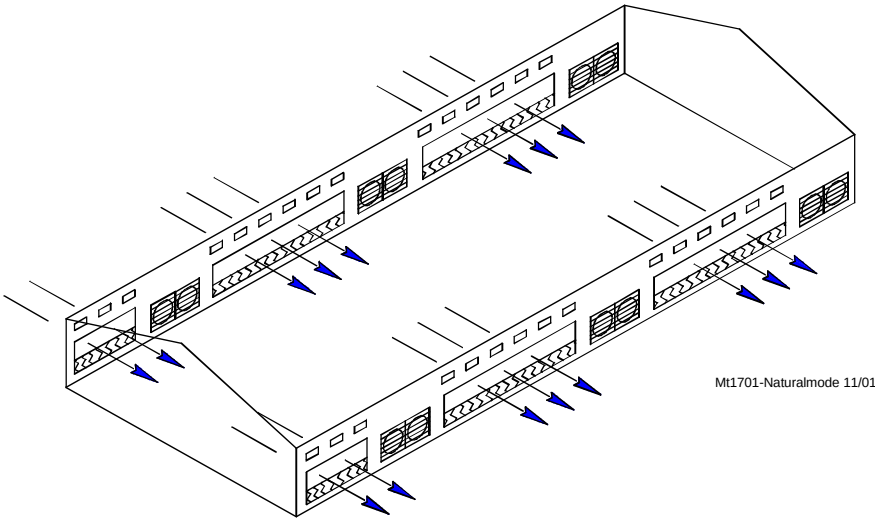


Figure 34. Natural Mode

Noticing an Alarm

"Noticing" an alarm is a very important part of using the alarm system. With button presses, you can tell the Control that you have "seen" the alarm message. The simplest way to do this is to first press the alarm button to read the alarm message(s) at the top of the alarm screen. Each additional press of the alarm button (while you're still looking at the alarm screen) "notices" the alarm(s), one at a time.

Offset

The term “offset” applies to the Set Temperature and Minimum Ventilation Timer curves only. If you manually adjust either the Set Temperature or the Minimum Ventilation Timer settings, while the curve is on, you create an “offset” to that curve relative to it’s “curve value”. The “curve value” is not changed. (see the “curve value” definition above.) The curve value is shown as a convenience so that you know what you have to change it back to in order to get back on the actual curve’s table listing. While an “offset” is in effect, the parameter of the curve is still modified versus time. However, the actual parameter value is the “curve value” modified by the “offset”.

Power Mode

The building is closed up except for Inlets (usually Baffle Doors) which are powered open and close in order to control the static pressure level. In some cases Gravity Inlets are used where the static pressure is not controlled directly. The only ventilation provided is due to Fans mounted in the end or side walls. This mode of operation generally happens when the outside temperatures are somewhat lower than the set temperature.

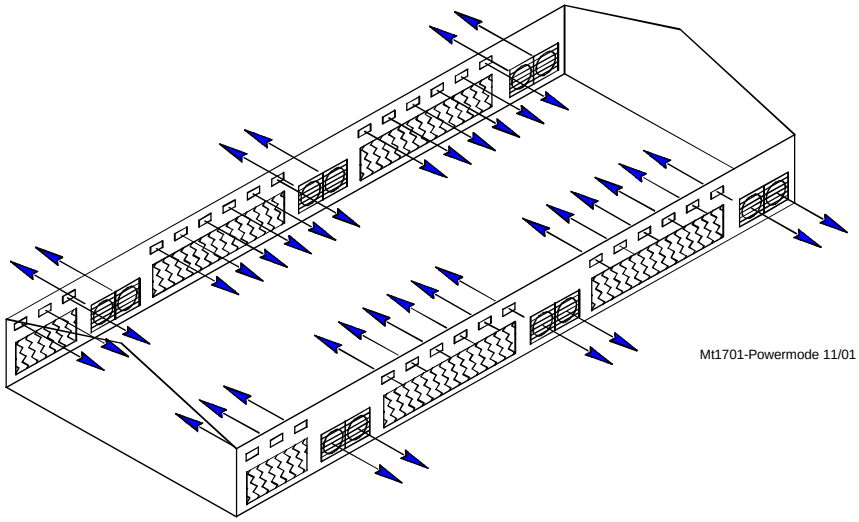


Figure 35. Power Mode

Program

A “program” is a complete set up of all the screens of a Control. In screen 11, five different “programs” can be saved and later activated. This can be very convenient when it is desired to change the set up at different points during the grow out or barn cycle, or times of the year.

Set Temperature

The set temperature is another very important, basic, concept. All temperatures are referenced to the set temperature. When the set temperature is adjusted either manually, or because the set temperature curve is on, all other temperature settings move up or down by the same amount. For instance, even though you program an actual temperature for each Fan to come on and off, when you change the set temperature, those Fan’s on and off temperatures are adjusted by the same amount you changed the set temperature.

Static Pressure

Static pressure refers to the pressure difference that exists between the inside of the house and the outside of the house. This pressure difference is the result of Fans in the walls running. The air that they exhaust enters the house through various types of air Inlet openings. In the Power Mode the typical powered Baffle Inlets is where the vast majority of the air enters. In the Tunnel Mode, the Tunnel Inlet at the end of the house is where the air enters. The pressure drop, due to the resistance to the air flowing through the Inlets, is the reason a static pressure difference exists. If the Inlets are all the same size, the same amount of air will enter through each Inlet. In the Natural Mode of operation, the outside wind is the source of the air, with no Exhausting Fans running. In general there is no static pressure during the Natural Mode due to the huge area of the open Side Wall Curtains.

When the incoming air is cooler than the inside air, it will tend to drop down onto the birds before it is warmed up. Adequate static pressure brings the air into the house high and fast so that it heats up before it can fall.

Tunnel Mode

This mode of operation requires a group of large (usually 48 in.) Fans at one end of the house with a large air Inlet area at the opposite end of the house. The Control converts to this mode of operation from the Power or Natural Mode (if used), when the temperature(s) while in those modes get too high. The typical 5 or 6 mph. breeze, which can be created by the Tunnel Fans running, produces a wind chill effect that is significant. This mode of operation happens during warm to hot weather.

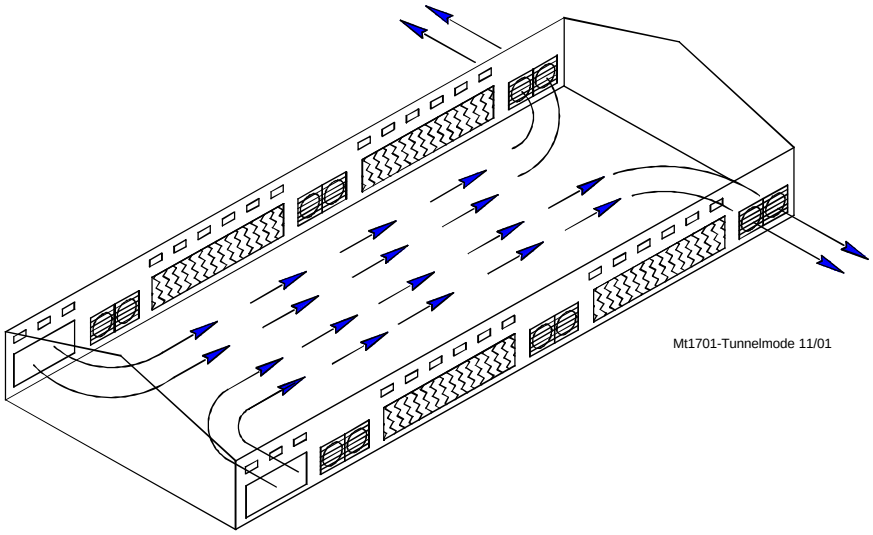


Figure 36. Tunnel Mode

Wind Delay

The static pressure has to be out of the Control limits continuously for the “wind delay” amount of time before the Inlets are adjusted. If a Fan or Fans has turned on or off within the last 10 seconds, the wind delay does not happen and the Inlets respond as soon as the static pressure leaves the Control limits.

Overview of Screens

Screen 1: Current Conditions

Screen 1, (Figure 8) shows a brief summary of the current conditions of the house. There are no editable values in this screen; it is for viewing only.

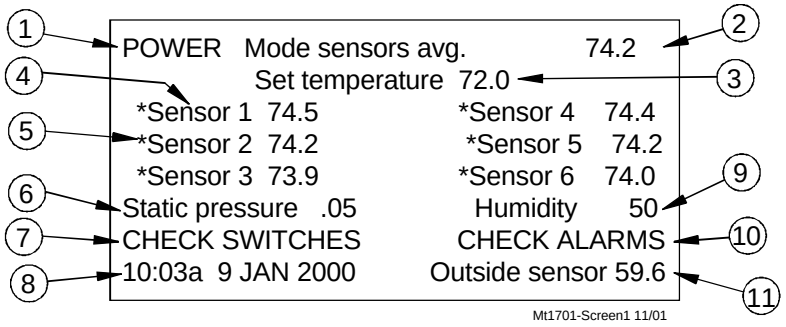


Figure 8. Current Conditions Screen

1. **Operating Mode -** this indicates the mode of the current Control. The three possible modes are **Power**, **Natural**, and **Tunnel**.

2. **Control Temperature** - this is the reading of the current Mode Sensor (or Sensors). The Sensor or Sensor(s) that make up the Mode Sensor is indicated by an (*) in the list of Sensors. The current mode sensor determines when the Control changes to a different mode.

3. **Set Temperature** - this is the temperature you want to achieve in your house through the use of heating, cooling, and ventilation.

4. **Sensors** - each Sensor that is being used in the house will show a current temperature. If a Sensor is not used, the area will be blank. If a Sensor is out of range, it will be indicated by “#” in place of a temperature.

5. **(*) -** this indicates that this Sensor is a Mode Sensor for the current mode. If more than one (*) appears, the Mode Sensor(s) temperature will be the average of those Sensors.

6. **Static Pressure** - indicates the current static pressure in the house. If static pressure is not being used this area will be blank. If there is a reading that is out of range, it will be indicated by “#” in place of a static pressure reading.

7. **Check Switches -** this will appear (flashing) if any of the manual switches are in a position other than “auto”, except for any switches that are not used. It can be **DANGEROUS** to operate with switches in the **"Off"** Position.

8. **Time and Date** - shows the current time and date.

9. **Relative Humidity** - indicates the current relative humidity in the house. If relative humidity is not being used this area will be blank.

10. **Check Alarms** - this will appear (flashing) if the Control detects an alarm condition. This will continue to appear until the condition is corrected.

11. **Outside Sensor -** This is where the outside Sensor reading is displayed if the outside Sensor choice is set up in screen 12.

Screen 2: Set Temp./Min. Timer

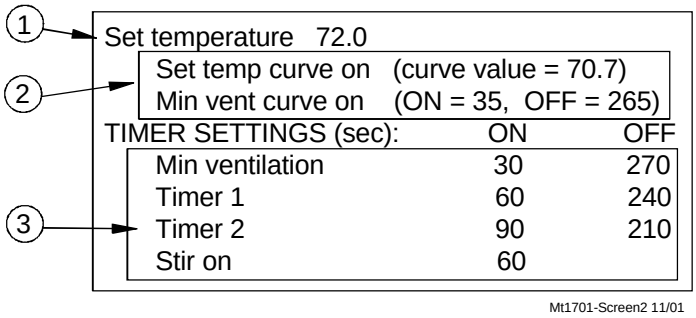


Figure 9. Set Temp./Min. Timer Screen

Screen 2, (Figure 9) is mostly an editable screen where several important parameters are programed.

1. The “set temperature” is a very important parameter. All other temperatures are keyed to the set temperature. When the set temperature is changed, all other temperature settings are also changed by the same amount to maintain the same temperature differences relative to the set temperature.

2. The Temp Curve and Min Vent Curve “on” indications are not editable. They only indicate that the curve(s) are “on” and the curve’s value. If a curve is not “on”, there is no indication in this area. The values shown in the parentheses are the current curve’s values. If the actual values are different, the difference represents the “offset”. Editing the actual values to be the same as the values shown between the parentheses will erase the offset(s). An "offset" is caused if you change a value when its curve is on.

3. The Minimum Ventilation Timer can be attached to Exh Fan, Tun Fan, and Stir Fan outputs in screen 3. The “on” and “off” times for this Timer are set up here in screen 2. The Timer turns the Fan on or off when the temperature is below the Fan’s "on" temperature. A Timer can only be attached to a Tun Fan output if the "on" temperature setting of the Tunnel Fan is set lower than the “on” temperature of the Tunnel Mode. Allowable “on” times for this Timer are 0 or greater than 30 seconds (1 through 29 seconds is not allowed). Allowable “off” times for this Timer are 0 or greater than 60 seconds (1 through 59 seconds is not allowed). The “on” and “off” times cannot both be set at 0.

Timers 1 and 2 can be attached to Cool, Tun Fan, Exh Fan, and Stir Fan outputs in screen 3. The “on” and “off” times for these Timers are set in this screen. These Timers behave like the minimum ventilation Timer except when they are attached to a Cool output. When attached to a Cool output, the timer has no effect until the Cool output is “on” due to it’s temperature settings. At that point the Cool output goes on and off with the Timer. The Cool output never comes on continuously when Timer 1 or Timer 2 is attached to it. There are no limitations to the “on” and “off” settings for Timer 1 and Timer 2 except that the “on” time and “off” time cannot both be set at 0.

The “stir on” Timer is different than the other Timers. It can only be attached to Stir Fan outputs in screen 3. The “stir on” time value is set in this screen. The purpose of this feature is to allow you to cause a Stir Fan output to run for the “stir on” amount of time immediately following the end of the Minimum Ventilation Timer’s “on” time. Because of this, the Stir Fan is synchronized with the minimum ventilation Timer. The "stir on"setting can be any value up to the “off” time of the minimum ventilation Timer. The Stir Fan outputs will come on full when the temperature rises to the "on" temperature value set in screen 3.

Screen 3: Outputs-Temperatures

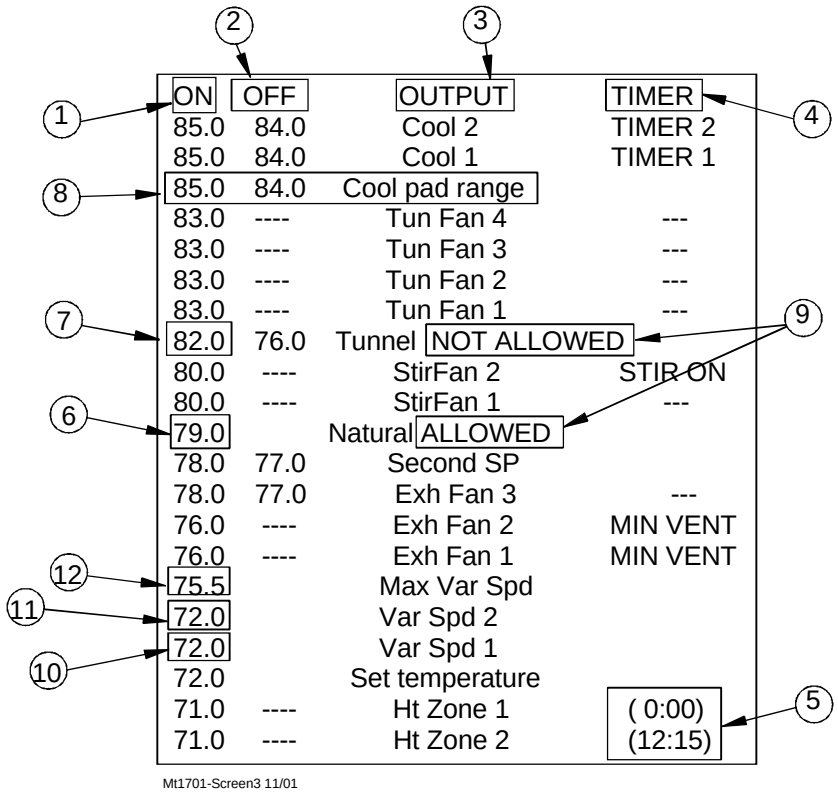


Figure 10. Outputs-Temperatures Screen

Screen 3, (Figure 10) is a very important screen. It is the screen that determines at what temperatures Outputs operate.

An important tip regarding the use of this screen is to get in the habit of asking yourself which Temperature Sensor (or combination of Temperature Sensors) is assigned to the various outputs shown on this screen. For instance, in the above example, where Exh Fans 3 and 4 are set to come “on” and “off” at the same temperatures, they may not go “on” and “off” together if they are assigned to different Sensors in screen 12.

1. This column lists the “on” temperatures of the outputs listed in column 3. For outputs above the set temperature, the output goes from “off” to “on” with rising temperature. For the Heat Zone outputs, below the set temperature, they go from “off” to “on” with falling temperature. After changing any temperatures in the “on” column, the screen will re-sort itself according to the “on” temperatures the next time you select this screen.

2. This column lists the “off” temperatures of the outputs listed in column 3. All Heat Zone output’s “off” temperatures (as the temperature rises) are fixed to be 0.5 degrees above their “on” temperatures. The “on-off differentials’’ of all other outputs are adjustable. For Fan outputs the “off” temperatures are either the value of the next lower Fan’s “on” temperature or the value you specify in the OFF column for that output. The default “off” temperature for the lowest temperature Fan output is the set temperature if an "off" temperature is not entered. The minimum “on-off differential” allowed for Fan outputs is 0.5 degrees F.

3. The output names listed in column 3 are a result of what is programed into screen 12.

4. In column 4 you attach a Timer to those outputs you want to be affected by a Timer. See the screen 2 description regarding how the various Timers behave and which outputs can have which Timers attached to them.

5. The amount of time since midnight of each day that each of the Heat Zone outputs have been “on”. These values are zeroed at midnight of each day. Time is measured in hours and minutes.

6. This is the temperature of the Power Mode Sensor(s) where the Control will change from the Power Mode to the Natural Mode.

7. The “on” and “off” temperatures of the Tunnel Mode are entered here. The Control will convert to the Tunnel Mode when the Natural (if used) or Power Mode Sensor(s) raises to the Tunnel “on” temperature. The Control will convert back to the Natural (if used) or Power Mode when the Tunnel Mode Sensor(s) reaches the “off” temperature. The minimum allowed difference between the Tunnel “on” and “off” temperature is 3 degrees F.

8. The Cool Pad Range’s “on” and “off” temperatures have a very different meaning from the “on” and “off” temperatures of the other outputs. The “on” temperature is the high limit of the desired range while the "off” temperature is the low limit of the desired range. See the **"Cool Pad Function"** section of this Manual for more details regarding the COOL PAD function.

9. For both the Natural and Tunnel Modes it is possible to ALLOW or NOT ALLOW the mode to occur in these fields of screen 3. Do not use the YES/NO questions in screen12 to temporarily disable either mode.

10. If the sensor(s) assigned to Variable Speed 1 are at or below the temperature set here, the Variable speed 1 fans will run at the minimum speed set in Screen 9. If the Min Vent timer is assigned to this output the Variable speed 1 fans will cycle on the timer at the minimum speed if the sensor(s) are at or below this temperature.

11. If the temperature here is set to the same temperature as the Variable Speed 1 temperature then the Variable Speed 2 (if used) fans will run at the minimum speed set in Screen 9 when the sensor(s) assigned to Variable Speed 2 are at or below this temperature.

12. If the temperature set here is different from the Variable Speed 1 temperature (at least 1.5 degrees F) then the Variable Speed 2 fans will shut off when the sensor(s) assigned to Variable Speed 2 are at or below this temperature. The Variable Speed 1 fans will reach maximum speed (100 percent) .5 degrees F below this temperature.

The temperature set here defines at what temperature Variable Speed 1 and Variable Speed 2 reach maximum speed. When Variable Speed 1 and Variable Speed 2 (If used) are set to the same temperature then the variable speed fans will reach maximum speed when the sensor(s) assigned to each output reach .5 degrees F below the Max Var Spd Temperature. The Max Var Spd temperature must be at least 1.5 degrees F above the Variable Speed 1 and Variable Speed 2 temperatures.

If Variable Speed 1 and Variable Speed 2 are set to different temperatures then Max Var Spd defines at what temperature the Variable Speed 2 fans reach maximum speed only. Variable Speed 2 fans will reach maximum speed when the sensor(s) assigned to Variable Speed 2 reach .5 degrees F below the Max Var Spd temperature. The temperature at which Variable Speed 1 reaches maximum speed is defined by Variable Speed 2 temperature.

Note: No other fans’ on and off temperatures may be placed in between the set temperature and the Max Var Spd temperature. When editing the temperatures of the Variable Speed outputs, it is recommended that the Max Var Spd temperature be edited first and then the Variable Speed temperature(s).

Screen 4 and 5: Feed Clock, and Light Clock.

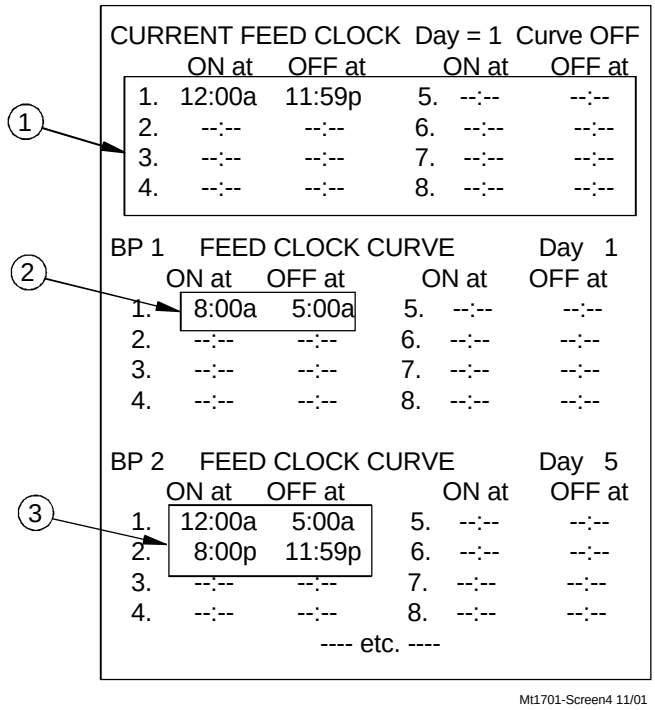


Figure 11. Feed Clock Screen

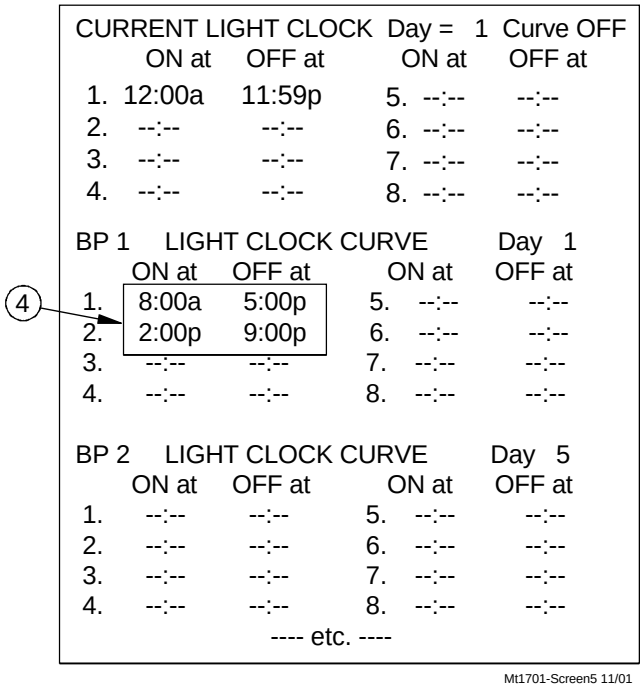


Figure 12. Light Clock Screen

Screens 4 and 5, (Figures 11, and 12) are identical in all ways except for the words “feed” and “light”. The use of these different words is for convenience only. An event is defined as an “on plus off" time combination for the Relay(s) assigned to each clock. The “on at” and “off at” times refer to the contacts of the output Relay(s). “On” means the contacts are closed and “Off” means the contacts are open. 12:00a is midnight.

1. The first group of events, at the top of the screen, indicates the current settings of the clock. If the curve is ON, and today’s day # is equal or greater than BP1’s (Bend Point one’s) day #, you cannot change the current clock area of the screen. (For more information about Bend Point see **Bend Point** in the Glossary of Terms section of this Manual) If you want to change the clock’s schedule temporarily, turn OFF the curve and adjust the current clock events to the temporary settings. Turning the curve back ON will return the clock to the curve’s settings.

2. The “on at” and “off at” times cannot span across midnight. The example shown above, “on at 8:00p” and “off at 5:00a “is not allowed.

3. In order to accomplish “on at 8:00p” and “off at 5:00a“, you need to program 2 events as shown above. This results in the output Relay being “on” from 8:00p to 5:00a. without interruption.

4. The software will not allow you to overlap events. The example shown above will not be allowed. If you do this you are telling the Control you want the output Relay to be on twice during the overlapped time. A Relay can only be “on” or “off”. If you overlap the events you have made a mistake in your settings.

In screen 12 you can also set up one or two spare clocks. Spare Clock 1 shows in screen 4, and Spare Clock 2 shows in screen 5. The Spare Time Clocks do not have the curving capability.

Screen 6: History

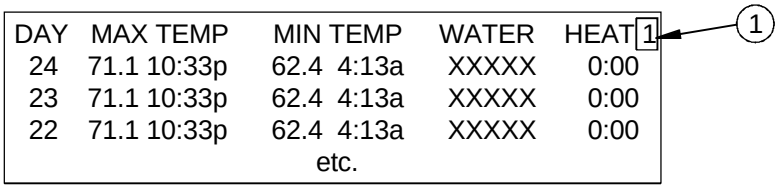


Figure 13. History Screen

Screen 6, (Figure 13) shows historical data for the most recent 99 full days plus today up to the present moment. Today's data is at the top line of the list when first looking at the screen. The second line has yesterday's data and so forth. The high and low temperatures of the Control Sensor(s) (with a time of day stamp), the water usage, and the total heat zone run time for each of the heat zones are listed. In that the Control Sensor(s) may be different for the different possible modes, it is quite possible for the max temp to be the temperature of a different Sensor or average of a group of Sensors than the min. temp. For instance, the maximum max temperature would normally happen in the afternoon when the Control is in Tunnel Mode. The min. temperature would usually happen in the early morning when the Control is in Power Mode

1. The heat zone index is editable to choose which heat zone's data to look at.

Screen 7: Alarms

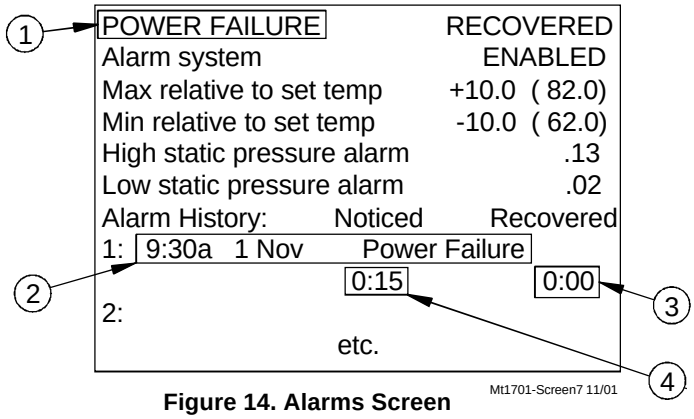


Figure 14. Alarms Screen

At the top of **Screen 7, (Figure14)** a current alarm condition(s) will be listed. If there are no alarm conditions, the status of the alarm system will show at the top of the screen. The three possible statuses are ENABLED, DISABLED, and TEST. The status field is editable. See the **"Alarms"** section on **Page 47** of this Manual for more Alarm information

1. For this example where a power failure has occurred and recovered, this information is shown at the top of the screen, and will remain there until it is NOTICED.

2. The time, date, and kind of alarm of the most recent 10 alarms are listed in the lower part of the screen.

3. The amount of time (hh:mm) it took for the alarm to recover is shown here. 0:00 means the alarm recovered within the first minute.

4. The amount of time that elapsed (hh:mm) from the time the alarm condition occurred, until the alarm is NOTICED is also shown. For this example the alarm was NOTICED between the 15^{th} and 16^{th} minute after the alarm occurred.

Screens 8 and 9: Set Temp. Curve and Min. Vent Timer.

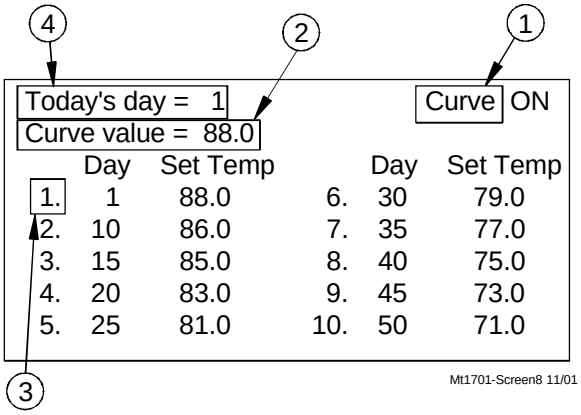


Figure 15. Set Temp. Curve Screen

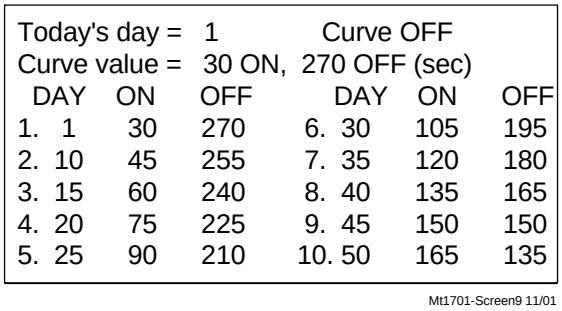


Figure 16. Min. Ventilation Timer Curve Screen

Screens 8 and 9 (If Variable Speed is not being used)

Screens 8 and 9, (Figures 15, and 16) are very similar in layout and how they behave. There are several terms that need to be defined in order to understand the description of these two screens,

1. A “curve” is a listing of up to 10 points in time (bend points) that defines how you want a parameter to automatically vary as the animals grow. You make the Control do that by turning the curve “on”.

2. This indicates the current value(s) of the specified curve.

3. The Bend Points (BPs) are points on the curve that define the curve. For the set temperature and Minimum Ventilation Timer curves, the curve values are adjusted between the Bend Points. The bend point values are the exact values at midnight of the day # of each Bend Point. The curve takes over when you turn the curve “on” and the day number is equal to or greater than the day number assigned to BP #1.

4. The intention is that the day # is age of the animals. Negative days (down to – 7) are allowed if it is desired to preheat the house, for example, prior to the arrival of the animals. The day # of a BP can also be negative, if desired. Changing the day # in any screen that shows the day number, will change the day # in all the other screens that show the day #.

Screen 9 (If Variable Speed is being used)

If Variable Speed is being used **Screen 8** remains the same but **Screen 9** becomes the Variable Speed Screen **(See below)**.

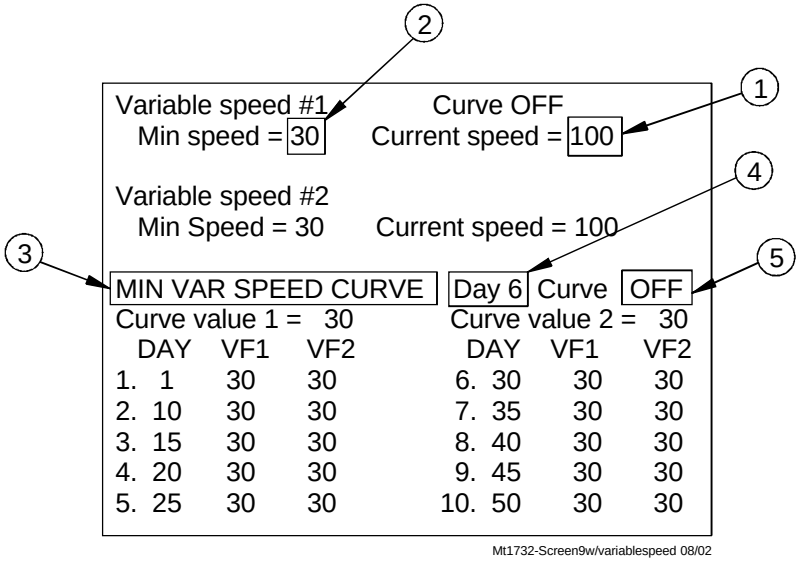


Figure 17. Variable Speed Screen

1. Current Speed of Variable Speed 1(2). This field is not editable.
2. Minimum Speed allowed for Variable Speed 1(2). This field is editable.
3. This Curve allows the minimum speed of the Variable Speed Fans to be changed automatically with animal age.
4. Current day; usually the age of the animals.
5. Turns the Min Var Speed Curve on or off.

Screen 10: Static Pressure

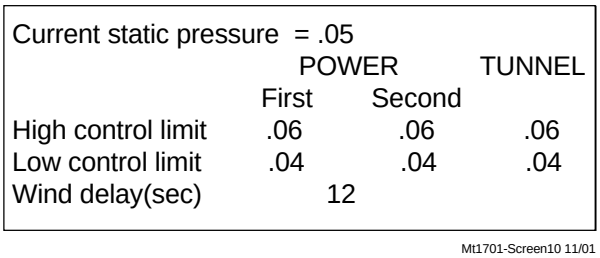


Figure 18. Static Pressure Screen

Screen 10, (Figure 18) indicates the current static pressure plus provides the fields that can be edited to set the Static Pressure Control limits and the wind delay. The open and close Inlet Relays respond as required to keep the static pressure within the control limits while in the Power Mode and the open and close Tunnel Curtain Relays do the same to control the static pressure during the Tunnel Mode. If it is not desired to control the static pressure during the Tunnel Mode, the high control limit in the Tunnel Mode must be edited to be .00.

Static Pressure Control limits

The Static Pressure Control limits are the values of static pressure the Control attempts to maintain by using the powered Inlets, the Tunnel Curtain, or both. A second level of Power Mode static pressure can be chosen in screen 12. The temperature at which the second static pressure takes over is entered in screen 3. The Temperature Sensor(s) ,(Inside Only), that measure that temperature is defined in screen 12.

Static Pressure Alarm limits

The static pressure levels, above and below the control limits, that will cause an alarm when the static pressure stays continuously outside these limits for 1 minute and a Fan or Fans is running. The static pressure alarm limits are programed in screen 7.

Static Pressure Safety limits

When the static pressure stays above 0.20 for a continuous minute, the Tunnel Curtain (if in Power Mode) and the Inlets (if in Tunnel Mode) will open until the static pressure reduces below 0.20. Once the problem is fixed and the static pressure reduces below 0.18, the Control returns to normal operation. This situation will always result in a High Pressure Alarm.

Wind delay

The wind delay is the amount of time the static pressure has to be continuously outside of the control limits before the appropriate open or close Relay will be energized to bring the static pressure back within the control limits. The wind delay is bypassed if a Fan or Fans turning on or off is what causes the static pressure to move outside the Static Pressure Control limits.

Static Pressure Control w/ Tunnel Curtain during Power Mode

If, in the Power Mode, there is inadequate inlet area to keep the static pressure within the high control limits, the Tunnel Curtain will open to give additional air inlet area. The Inlets are given continuous open signals as the Tunnel Curtain takes over the responsibility of controlling the static pressure. The static pressure has to be above the high Static Pressure Control limit continuously for one minute with 3 or more Fans running for this to happen. Responsibility for Static Pressure Control is passed back to the Inlets as soon as there are fewer than 3 Fans running or the Tunnel Curtain cannot bring the static pressure back into the control range (while closing) from the low side. The static pressure has to be below the low Static Pressure Control limit continuously for one minute for this to happen.

Screen 11: Programs

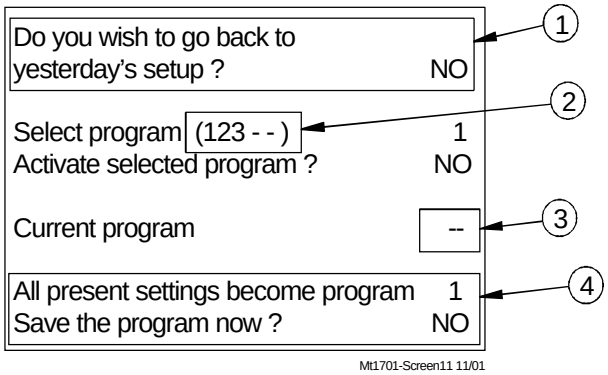


Figure 19. Programs Screen

Screen 1, (Figure 19) is a very powerful screen that allows you to store up to 5 complete setups of the Control that can be re-activated at any time.

1. At each midnight, the setup of the Control is saved which can also be re-activated at any time during the following day. This can be helpful if a mistake is made while changing the setup and you wish to "undo" the changes.

2. The programs listed in the parentheses after "Select program" shows which program numbers have been saved making them available to activate.

3. The "Current program" indicates the program that is currently active. This field changes back to a (-) as soon as you change any parameter that affects the operation of the Control. This lets you know that there has been a modification to the most recently activated setup.

4. A program is saved by first carefully setting up all the screens of the Control to be what you desire that program to be. Editing the number to be the program number you want to give that set up, and then answering YES to the last question on the screen is how you save that setup to be the program number you have chosen.

Screen 12: Setup

Screen 12 Continued.....

Control number

Temperature unit	FAHRENHEIT
Units of measurements	NON-METRIC
Clock type	12HR
Time of day	10:03a
Date	10 May 2002

HOUSE EQUIPPED FOR:

Natural	YES
Main 1 curtain	YES
Main 2 curtain	YES
Tunnel	YES
Water Meter	YES
Low water pressure switch	YES
Cool pad	YES
Var speed output 1	YES
Humidity sensor	YES
Outside temp sensor	OS
Static pressure	YES
Second static pressure	YES
Select sensor	1-----

LOW STAT PRES ALARM:

In power mode	YES
in tunnel mode	YES

MAIN 1 CURTAIN:

Desired first movement	5"
Desired full movement	40"

MAIN 2 CURTAIN:

Desired first movement	5"
Desired full movement	40"

TUNNEL CURTAIN:

Tunnel speed,	18" per 90 sec
Full movement	48"

TUNNEL MODE

Minimum # of tunnel fans on	2

COOL OUTPUT

Cool outputs desabled above RH	100%

WATER METER

Gallons per pulse	100

COOL PAD SETTINGS

Water pre fill time	8 sec
Water incr /decr time	5 sec
Repetition rate (mm:ss)	5:00
Temp check every	4 repetition rates
Time to wet dry pad	90 sec
Actual water on time	-sec
Flush cool pad at	--:-- for --:--

MODE SENSORS:

Power mode sensor	-2----
Natural mode sensor	--3---
Tunnel mode sensor	-----6

WHILE IN NATURAL MODE:

Main 1 curtain sensor	-3----
Main 2 curtain sensor	--4---
Tunnel curtain sensor	-----6

OUTPUT NAME	RELAY	MODE	SENSOR(S)
Cool 1	1	T	---4--
Cool 4	-	T	---4--
Cool pad	2	T	---4--
Tun Fan 1	3	T	-----6
Tun Fan 16	-	T	-----6
Stir Fan 1	-	N	--3---
Stir Fan 6	-	N	--3---
Exh Fan 1	-	P	--3---
Exh Fan 16	-	P	--3---
Heat Zone 1	-	P	--2---
Ht Zone 8	-	P	
Feed Clk	- - - -		
Lite Clk	- - - -		
Spare Clk 1	- - - -		
Spare Clk 2	-		
Inlet OP	-		
Inlet CL	-		
Tunnel OP	-		
Tunnel CL	-		
Main 1 OP	-		
Main 1 CL	-		
Main 2 OP	-		
Main 2 CL	-		
Var Spd 1	-	PNT	12----
Var Spd 2	-	PNT	--34--

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Screen 12 Continued on next page.....

Figure 20. Setup Screen

Screen 12 Continued.....

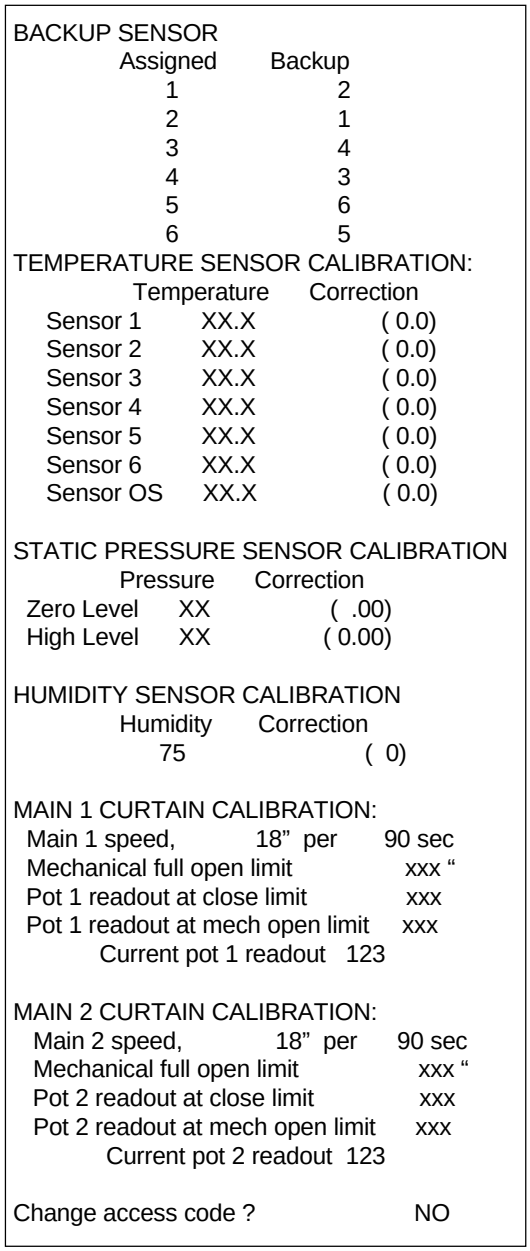

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Figure 20. Setup Screen (Continued...)

Screen 12, **(Figure 20),** the Setup Screen is where you tell the Control what it is controlling. You tell the Control which Relays you want to control based on which Sensors (if the output is controlled by temperature). You also specify which modes of operation the various Relays are allowed to operate in. Many settings that you specify in this screen will determine what appears in several of the other screens.

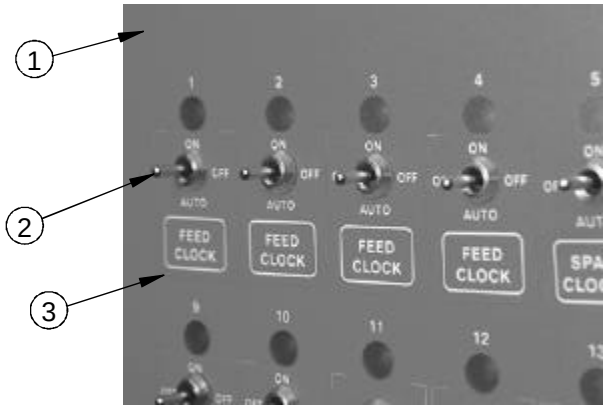
You also define which Sensors will determine when the Control changes to a different mode of operation. Towards the bottom of the screen, you have the ability to calibrate the Sensors. The Sensors initial tolerance is such that calibration is not generally required. The Curtain calibration procedure (for Natural Mode operation only) is required in that it is telling the Control where the full open and close positions are.

Initial Setup Procedure

Once the Control has been properly installed and all outputs have been tested manually, the Control is now ready to be set up. The following section should be used only as guide to setting up the Control. This section will provide a general overview and procedures for programming and setting up the Control.

Before beginning to set up the Control, make sure that all of the Toggle Switches in the Relay Box have been placed in the manual “off” position **(See Figure 21).** This will insure that no outputs will accidentally turn on during setup. Also make sure that the Output Stickers have been placed over the correct Toggle Switch. This will aid in programming the Control.

Special Note: When first powering up and setting up the Control, the light next to the alarms button (button #7) may flash. Ignore this flashing light until the Control is fully set up.



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Item	Description
1	Control Box. Door (Front)
2	Toggle Switch in "Off" Position
3	Manual Switch Sticker

Figure 21. Toggle Switches in "Off" Position

Setup Screen (Button #12)

Begin setting up the Control by going to the setup screen (button #12). The following screen should appear.

Control number	1
Temperature unit	FAHRENHEIT
Units of measurements	NON-METRIC
Clock type	12 HR
Time of day	10:03a
Date	10 May 2000

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Figure 22. Setup Screen

Change the Control number so it matches the house number. (This is especially important if C-Central is being used or might be used). Continue scrolling down the screen setting up the units of measurement, time of day, date, etc.

The next section of the setup screen tells the Control what the house is equipped for and what equipment is present in the house.

HOUSE EQUIPPED FOR:	
Natural	NO
Main 1 curtain	NO
Main 2 curtain	NO
Tunnel	NO
Water meter	NO
Low water pressure switch	NO
Humidity sensor	NO

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Figure 23. Setup Screen

Continue to answer the "House equipped for:" questions until all questions have been answered. Once all of the "House equipped for:" questions have been answered the Control may ask for additional information depending how the questions were answered. For example, if Tunnel was answered "Yes" then there will be information needed for the Tunnel Inlet Curtain. For details on what can appear in this part of the set up screen, please see **Screen 12** on pages **32 through 34**.

The next section of the setup screen is where Relays are assigned to outputs.

OUTPUT NAME	RELAY	MODE	SENSOR(S)
Cool 1	-		
Cool 2	-		
Cool 3	-		
Cool 4	-		
Tun Fan1	-		
TunFan2	-		
Tun Fan3	-		

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Figure 24. Assigning Relays

Every desired output needs to have a Relay assigned to it, a mode of operation (Power, Natural, Tunnel, or combinations of the three) and Temperature Sensor(s) assigned to it. For example, Tunnel Fan 1 is wired to Relay #8, operating in both Power and Tunnel Modes, and is being controlled by the average temperature of Sensors 1,2,and 3. In the setup screen scroll through the output names until the line "Tun Fan1" is found. Then under the Relay column change the "-" to "8." Under the Mode column make sure the line reads "P T", and under the Sensor column make sure the line reads "123."

OUTPUT NAME	RELAY	MODE	SENSOR(S)
Cool 1	-		
Cool 2	-		
Cool 3	-		
Cool 4	-		
Tun Fan1	8	P T	123---
TunFan2	-		
Tun Fan3	-		

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Figure 25. Assigning Relays

Continue assigning Relays until all desired outputs have had a Relay assigned to them. Verify the Relay assignments with the output stickers on the manual toggle switches. **(See Figure 53)**.

Assign; Inlet Open and Close, Feed and Light Clock Relays, Variable Speed mode of operation (If used), and Sensor assignment.

Feed Clk	9	10	-	-	
Lite Clk	11	12	-	-	
Spare Clk 1	-	-	-	-	
Spare Clk 2	-	-	-	-	
Inlet OP	20				
Inlet CL	21				
Tunnel OP	22				
Tunnel CL	23				
Main 1 OP	-				
Main 1 CL	-				
Main 2 OP	-				
Main 2 CL	-				
Var Spd 1	PNT				--34-
Var Spd 2	PNT				12----

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Figure 26. Assigning relays

The last section of the setup screen involves assigning back-up Temperature Sensors, calibration of inputs (Temperature Sensors, Static Pressure Sensor, etc.), and changing the access code. It is strongly recommended that every Sensor have a back-up assigned to it. This back-up Sensor will take over operation if the primary Sensor fails. It is recommended that the Back-up Sensor be in the same general area as the Primary Sensor.

BACKUP SENSOR

Assigned	Backup
1	2
2	1
3	4
4	3
5	6
6	5

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Figure 27. Backup Sensor

Calibrations

The calibration section of the setup screen allows the user to re-calibrate inputs if necessary. This section should not need to be used at initial installation and start-up of the Control unless natural ventilation is used. If natural ventilation is being used then the Potentiometers will need to be calibrated at this time. If it is felt that one of the inputs needs to be re-calibrated **Perform the Following Steps...**

Temperature Sensors

To re-calibrate the Temperature Sensors, first obtain a digital thermometer that has a readout of at least .1°. **Do not use a temperature gun**. A temperature gun takes object temperatures, not air temperatures. Place the digital thermometer next to the Temperature Sensor that is being re-calibrated. Take the reading from the digital thermometer and enter that number under the temperature column, **(Item 1 Figure 28),** of the Sensor being calibrated. The Correction column, **(Item 2, Figure 28),** is used only for service information and to return the Control to the factory settings. The settings should be reset to factory whenever a re-calibrated Temperature Sensor is replaced. To return to factory settings change the number under the correction column by one digit. This will cause the correction to automatically zero out and return to factory setting.

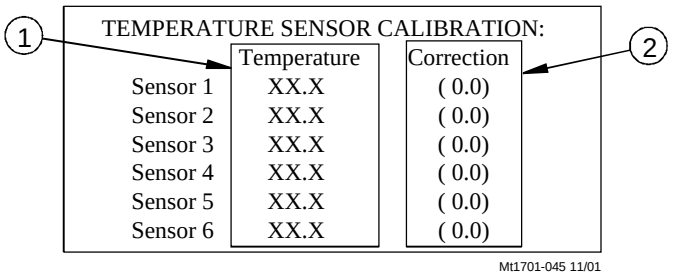


Figure 28. Temperature Sensors

Static Pressure Sensor

To re-calibrate the static pressure Sensor first obtain a manometer or other static pressure measuring device. Then disconnect both hoses from the Static Pressure Sensor. Go to the static pressure portion of the setup screen **(Figure 28)**

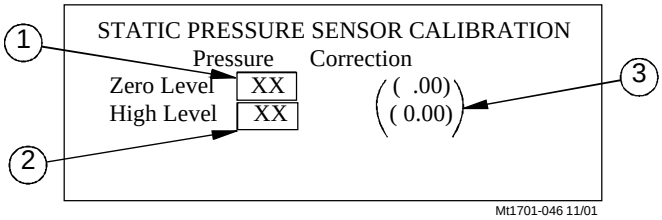


Figure 29. Static Pressure Sensor

Look at the Pressure reading on the Zero Level line **(Item 1, Figure 29)**. If the reading is not zero then change the zero level pressure to read zero. The zero level has now been calibrated.

To calibrate the high level, first make sure that the Manometer has been installed in the house and reconnect the hoses to the Static Pressure Sensor. Then open the Inlets slightly and turn on enough Fans to create a static pressure of at least 0.15 inches of w.c. at the Manometer. Then compare the Manometer reading to the reading on the High Level line of the Chore-Tronics Control **(Item 2, Figure 29)**. If the readings do not match, edit the pressure reading on the High Level line to match the reading of the Manometer. As with the Temperature Sensors, the Correction column, **(Item 3, Figure 29)**, of the static pressure calibration is used for service, and to return the Control to factory settings only. This completes the re-calibration of the static pressure Sensor.

Relative Humidity Sensor

To recalibrate the Relative Humidity Sensor first obtain a sling psychrometer or other humidity-measuring device. Operate the psychrometer in the same area that the Relative Humidity Sensor is installed. Take the reading on the psychrometer and compare it to the reading in the Relative Humidity Sensor Calibration section of the setup screen.

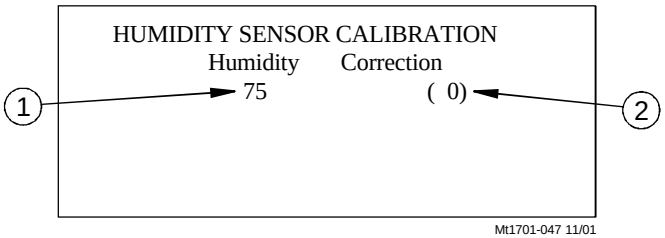


Figure 30. Relative Humidity Sensor

If the readings do not match, then change the reading under the Humidity column, **(Item 1, Figure 30)**, to match the reading of the psychrometer. The correction column, **(Item 2, Figure 30)**, is to be used for service information and for returning to factory settings only.

Potentiometer Calibration (Natural Ventilation Only)

Caution! This procedure involves using the manual toggle switches for the Main Curtains open and close outputs. Always place the open or close switch in its manual “on” position by itself. Never place both the open and close switches in the manual “on” position at the same time. This will cause the Curtain Machine to try to open and close at the same time and could cause motor or Relay failure.

To calibrate Potentiometer 1, go to the "Main 1 Curtain Calibration" portion of the setup screen **(Figure 31, below)**.

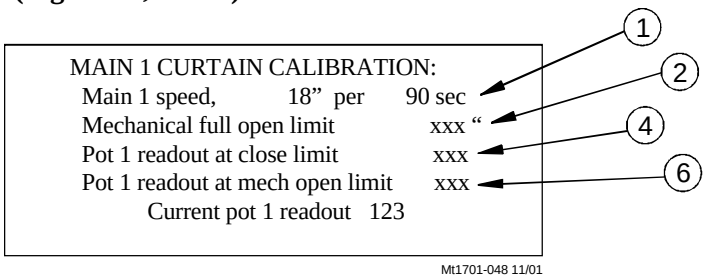


Figure 31. Potentiometer Calibration

1. Begin by measuring how long it takes the Main 1 Curtain to move 18 inches. Enter this amount time at the "Main 1 speed" line.

2. Measure the total travel distance of the Curtain from the closed limit switch to the open limit switch. Enter the number of inches at the "Mechanical full open limit" line. Return open Toggle Switch to the "off" position.

3. Turn the close toggle switch to manual “on” position and run the Curtain completely closed. When the Curtain is completely closed turn the toggle switch to the manual “off” position.

4. Enter the Current pot 1 readout value with Curtain completely closed at the “Pot 1 readout at close limit” line.

5. Turn the open toggle switch to manual “on” position and run the Curtain completely open. When the Curtain is completely open turn the toggle switch to the manual “off” position.

6. Enter the Current pot 1 readout value with the Curtain completely open at the “Pot 1 readout at mech. open limit” line.

Repeat the procedure above if Main 2 Curtain is used.

Changing the Access Code

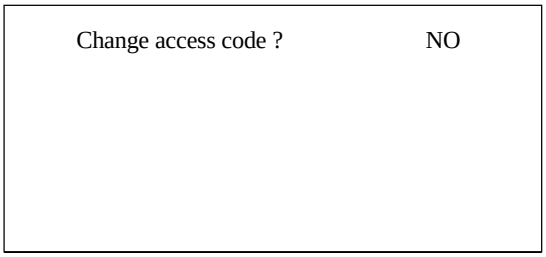


Figure 32. Changing the Access Code

The Control comes set from the factory with no access code required to make changes. If an access code is desires first change the “NO” to a “YES” at the change access code line of setup screen. The Control will then ask for the old password. From the factory the old password is 1111. This is entered by pushing the number 1 (Current Conditions) button 4 times. You can then enter a new access code by using the subject buttons as the numbers that you want to use. For example, an access code of 1952 would be entered by pressing in succession the Current Conditions button (button #1), the Minimum Ventilation Timer Curve button (button #9), the Light Clock button (button #5), and the set temp/min vent button (button #2). The Control will then ask you to confirm your access code. Once an access code has been entered, the Control will ask for that code any time the Control has set idle, (no buttons pressed), for more than 5 minutes, and the edit button is pushed. If an access code is no longer desired, change the access code back to the factory setting of 1111, and no code will be required to make changes.

After screen 12 is set up, use the "**Overview of Screens**" section of this Manual as a reference to set up the other screens.

Control Operation Overview

Standard Mode Functionality

Power Mode

All Curtain(s) are given a continuous close signal. Inlets are controlled by static pressure (if used). All outputs that are allowed to operate in Power Mode turn on and off per screen 3 trying to satisfy their Sensors assigned in screen 12.

Natural Mode

Each Curtain is closed or opened independently by its own control sensor(s). Each movement of the Curtain is 1.2 inches per degree F. relative to the set temperature. There is a pause of 2 minutes between each open or close movement. If the Curtain's Control Sensor(s) return to within + or - 1.5 degrees F. of the set temperature, the open or close Relays are turned off. This range of + or – 1.5 degrees F. is termed the "temperature control range" of natural operation. If the temperature of the Curtain's Control Sensor gets to be more than 8 degrees F. above the set temperature, that Curtain's open Relay will be energized the amount of time to move the Curtain 24 inches or until the temperature control range is reached. If the temperature of the Curtain's Control Sensor gets to be more than 8 degrees F. below the set temperature, that Curtain's close Relay will be energized until the first opening position is reached (causing the transition to Power Mode) or the temperature's control range is reached.

All outputs that are allowed to operate in Natural Mode turn on and off per screen 3 trying to satisfy their Sensors assigned in screen 12.

Tunnel Mode

The Main Curtains, if used, are given continuous close outputs. The Tunnel Curtain is given continuous open outputs (or adjusted to control static pressure). The outputs that are allowed to operate in Tunnel Mode turn on and off per screen 3 trying to satisfy their Sensors assigned in screen 12.

Mode Transitions

There are six possible mode transitions:

1. Power to Natural
2. Power to Tunnel
3. Natural to Power
4. Natural to Tunnel
5. Tunnel to Natural
6. Tunnel to Power

The sequences of events that happen for each transition are very different and deal with the various considerations that must be dealt with in order to safely get from one mode to another. These events are described below.

Power to Natural

In the Power Mode, the Main and Tunnel Curtains are completely closed. When the Power Mode Sensor reaches the temperature in screen 3 that you have defined to go to Natural, the Main and Tunnel Curtains will open for the amount of time required to open each Curtain the distance that you have indicated in screen 12 as the desired first opening movement. The Control calculates this amount of time based on the speed you have specified in screen 12 for each of the different Curtain's speeds.

If the temperature drops 0.6 degrees F. within the first 2 minutes after the Curtain reaches the desired first opening, the Control will immediately close all the Curtains, returning to the Power Mode. This represents the "fast temperature drop test". If the temperature does not drop this fast, the Control will proceed to normal Natural Mode operation, opening or closing depending on whether the temperature is above or below the set temperature by an amount greater than 1.5 degrees F. The distance the Control moves each of the Curtains each time is based on the temperature difference between each Curtain's controlling Sensor(s) and the set temperature (1.2 inches per degree F. temperature difference with the set temperature when they move). There is a 2 minute pause between each Curtain's movement. Once the temperature returns to being within 1.5 degrees of the set temperature for an individual Curtain, that Curtain will stop moving until the temperature for that Curtain once again gets more than 1.5 degrees away from the set temperature.

Power to Tunnel

This transition begins when Natural is not allowed in screen 3 (or natural ventilation is not even a part of the set up in screen 12) and the Power Mode Sensor reaches the temperature to go to the Tunnel Mode. The transition proceeds as follows:

1.) The Tunnel Curtain starts to open.

2.) Thirty seconds before the Tunnel Curtain reaches the half open position, the Inlets go continuously closed.

3.) The Fans that are running immediately prior to the transition continue to run until the Tunnel Curtain gets to the half open position. At that point, the Fans that are called for to be on in tunnel take over. It is quite possible that some, if not all, of these two sets of Fans are the same Fans, depending on what is programed in screens 3 and 12.

4.) Thirty seconds after reaching the half open position, the Tunnel Curtain begins to control static pressure. This happens if the upper control limit of the tunnel Static Pressure Control limits in screen 9 is set to a value other than .00. If the upper limit is set at .00, the Tunnel Curtain does not pause at the half open position and goes continuously open.

The amount of time necessary to get to the half open position is calculated by the Control using the Tunnel Curtain speed and full open distance that you specify in screen 12.

Natural to Power

The natural to power transition occurs when the Main Curtain returns to it's "first opening" position, while going closed. If there are two Main Curtains, (Main1 and Main2), the transition occurs as soon as both Curtains are at or past their first opening positions in the process of going closed. It must be cooler than 1.5 degrees below set temperature for the Curtains(s) to move in the close direction, but temperature by itself does not cause the transition from Natural to Power Mode. The Fans that are called for to be on in the Power Mode are delayed from coming on until the Main Curtain(s) have enough time to get closed. The Tunnel Curtain is given a continuous close signal during the entire Natural to Power transition. Heat zone outputs are disabled for an additional 2 minutes to minimize fuel waste while the temperatures stabilize after the transition is over.

Natural To Tunnel

The Natural to Tunnel transition occurs when the Natural Mode Sensor reaches the temperature in screen 3 for Tunnel to be "on". The Main Curtain(s) are given a continuous close signal as the Tunnel Curtain is given an open signal that lasts enough time to reach the half open position if the Tunnel Curtain is set up to control static pressure, or else continuously open if the Tunnel Curtain is not set up to control static pressure. While the Main Curtains are going closed and they reach the desired first opening position , the Tunnel Fans turn on that are called for to be on. The Main Curtains are given a continuous close signal as the Control continues in the Tunnel Mode.

Tunnel to Natural

The Tunnel to Natural transition occurs when the Tunnel Mode Sensor drops to the temperature in screen 3 for tunnel to be “off”. The Tunnel Fans that are running turn off and the Main Curtains are given continuous open signals for the amount of time required to completely open the Main Curtains. At that point the Control proceeds with the normal Natural Mode operation, opening and closing the Main and Tunnel Curtains depending on how far each Curtain’s assigned Sensor(s) are different than the set temperature.

Tunnel to Power

The Tunnel to Power Mode transition occurs when the Tunnel Mode Sensor drops to the temperature in screen 3 for Tunnel to be “off” and Natural Mode is either “not allowed” in screen 3 or not even a part of the installation in screen 12. The Fans that are called for to be on due to being in the Power Mode turn on immediately as the Fans that have been on because of Tunnel Mode turn off. Similar to the Power to Tunnel transition, several or even all of the Fans that were on in Tunnel, just prior to the transition, may stay on after the full transition to Power depending on the way the Control is set up. The Side-wall Air Inlets are given a full open signal during the transition. The Sidewall Inlets begin to control static pressure once the transition is completed.

Minimum # of Tunnel Fans On

In screen 12 the “Minimum number of Tunnel Fans on” is set up. This puts a limit on the temperature rise from one end of the house to the other while in Tunnel Mode. As the animals grow this "Minimum number of Fans" value should normally be increased. This parameter has no effect on how many Fans are on in the Power Mode just prior to the transition to Tunnel. The temperature settings set up in screen 3 determine the number of Fans that operate while still in the Power Mode before making the transition from Power to Tunnel.

The actual “TUN FAN” outputs that make up this min. group of Fans are those "Tun Fans" that have the lowest temp. settings in screen 3. If more than one “TUN FAN” output is set at the same temperature in screen 3, the Control will arbitrarily pick enough of those TUN FANS to add up to the minimum # specified in screen 12.

Cool Pad Function

The COOL PAD output is very different from a COOL output. It is not intended that the COOL PAD output and the COOL output would be used together, even though they could be. They are both there to give the choice of which to use. The COOL PAD’S Relay operation is designed to begin the cooling caused by the cooling pad by first adding 5 seconds of water to the pad every 5 minutes. If the temperature is still within the “Cool Pad Range” after 4 doses of 5 seconds of water, the amount of water added to the pad every 5 minutes is neither increased nor decreased. If the temperature at the temperature check point is above or below the temperature limits of the “Cool Pad Range”, the amount of water "on" time each 5 minutes is increased or decreased 5 seconds. The temperature is only checked every 20 minutes.

On a very hot day it would be possible for the water to be running continuously and the temperature to be in the “Cool Pad Range”. A more moderate day might result in the water running a very small amount of time in order to keep the temperature within the “Cool Pad Range”. Similarly, on a low humidity day the amount of water required to keep the temperature within the “Cool Pad Range” would be less than for a high humidity day. The Control will adjust the water as required to keep the temperature in the “Cool Pad Range”. The parameters that determine what the COOL PAD output does are set up in screen 12.

In screen 12, **(Figure 32)** the parameters that determine exactly what the Relay does are listed. Unless you see poor control of temperatures during pad operation, Chore-Time strongly recommends that you use the initially supplied settings (except for the two parameters described below). We also request that you contact the CTB service department to discuss your situation before you try different values.

Measure the number of seconds it takes for water to start coming out of the holes in the pad system's top distribution pipe after you turn the Toggle Switch "on" to the COOL PAD Relay. This should be entered as the "Water pre-fill time", **(Item 1, Figure 32)** and is likely to be different for different pad system manufacturers. This amount of time is added to the water run time each repetition in that the top distribution pipe drains out between each on-off cycle.

Measure the number of seconds it takes for water to start dripping out the bottom of a dry pad after you turn the toggle switch "on" to the COOL PAD Relay. This should be entered as the "Time to wet dry pad", **(Item 2, Figure 33)**. This will be less than the amount of time to make the pad completely soaked. When the actual water on time reaches this "Time to wet dry pad" value, the next step is to run the water continuously, assuming the temperature is above the Cool Pad Range at the next temperature check point. Once the temperature decreases back below the Cool Pad Range, the actual water on time will return to the "Time to wet dry pad" value again. From there the water on time changes in the normal way, with 5 second changes every 20 minutes, depending on the temperatures at the temperature check points.

The "actual water on time", **(Item 3, Figure 33)**, is for information only. Showing the value makes it possible to create a graph of it's variations if you have the PC connection (C-central).

The "Flush cool pad", **(Item 4, Figure 33)**,is a feature that allows you to run the water continuously at a time of day each day for the duration you specify. This will guarantee that at least once a day the pad will be flushed to keep it as clean as possible and help lengthen the Pad life. Leaving dashes for the settings disables this feature. Flushing the Pad in the night will have the advantage of causing very little unwanted temperature drop.

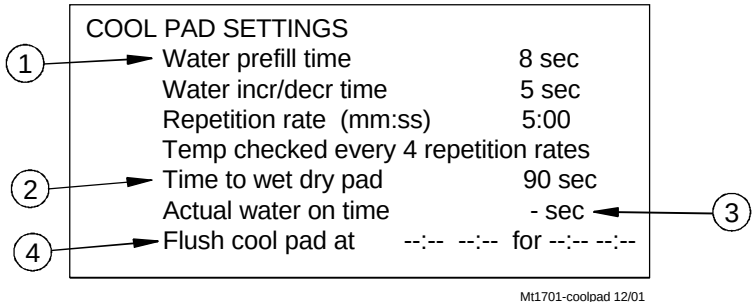


Figure 33. Cool Pad Settings

Curves

The clocks, Set Temperature and Minimum Ventilation Timer can be curved, if desired. This means that the settings for these parameters can be automatically changed by the Control. The “bend points” (BP) of the curves are the day numbers (age of birds, for instance) combined with the desired values of the settings at those day numbers. In the case of the Clock Curves, the settings stay the same from one bend point to the next bend point. For the set point and minimum ventilation Timer curves, the Control adjusts the settings gradually between the bendpoints.

When the curves are turned “on”, the Control will refer to the curve values and automatically adjust the settings to the curve value beginning at midnight of BP1’s day number. Negative day numbers are allowed (Max= - 7). (Day number 0 does not exist). Day 1 would normally be the day the birds are placed.

Refer also to the glossary of terms for this subject.

Timers

There are four different Timers available for different purposes:

Minimum Ventilation Timer

This is explained in the "**Overview of Screens: Set Temp./Min. Timer**" section of this Manual.

Timer 1 and Timer 2

These Timers can be attached to COOL, TUN FAN, EXH FAN, and STIR FAN outputs in screen 3. The “on” and “off” times for these Timers are set in screen 2. These Timers behave like the Minimum Ventilation Timer except when they are attached to a COOL output. When attached to a COOL output, the Timer has no effect until the COOL output is also “on” due to it’s temperature settings. At that point, the COOL output goes on and off with the Timer. The COOL output never comes on full when Timer 1 or Timer 2 is attached to it. There are no limitations to the “on” and “off” settings for Timer 1 and Timer 2 except that the “on” time and “off” time cannot both be set at 0.

Stir on

The “stir on” Timer is different than the other Timers. It can only be attached to STIR FAN outputs in screen 3. The “stir on” time value is set in screen 2.The purpose of this feature is to allow a STIR FAN output to run for the “stir on” amount of time immediately following the end of the minimum ventilation Timer’s “on” time. The setting can be any value up to the “off” time of the minimum ventilation Timer. This function is in parallel with the STIR FAN output in the same manner that the minimum ventilation Timer is in parallel with outputs it is attached to. The STIR FAN outputs will come on full when the temperature rises to the value set in screen 3.

Alarms

At the top of screen 7 a current alarm condition(s) will be listed. If there are no alarm conditions, the status of the alarm system will show at the top of the screen. The three possible statuses are ENABLED, DISABLED, and TEST. The status field can be changed.

Enabled

If the alarm system is ENABLED and one or more alarms arise, there will be alarm message(s) at the top of the screen. After pressing the screen 7 button the first time, the alarm Relay will be changed to the non alarm state for one minute and the alarm-screen will be shown. By pressing the screen 7 button a second time the alarm message will change from ALARM to the status NOTICED. This second button press is the manner that you tell the Control that you are aware of the alarm condition and, in so doing, NOTICE the alarm condition. If there is more than one alarm condition, you NOTICE each additional alarm condition with an additional button press for each additional alarm condition. If you fail to NOTICE an alarm with the additional button press(s), the alarm Relay will return to the alarm state one minute after the initial screen 7 button press. If the alarm condition is still present when you NOTICE the alarm, the word ALARM to the right of the condition will (for most alarm conditions) change to OFF FOR 24:00. The time setting is editable. It gives you time to deal with the problem. If you do not fix the problem, the alarm Relay will once again trigger your alarm system at the end of the time period. If the alarm condition has RECOVERED by the time you NOTICE the condition, the alarm message disappears when you NOTICE it and it is added to the alarm history at the bottom of the alarm screen.

Disabled

It is possible, but not recommended, to DISABLE the alarm system of the Control. One reason for this could be that the house is empty. The light beside the screen 7 button will flash slowly to remind you that the alarm system is disabled, but the alarm Relay will not change to the alarm state. The alarm history shown at the bottom of screen 7 does list that the alarm system was disabled, when, and for how long.

Test

If the user chooses TEST, the alarm Relay will immediately change to the alarm state. This allows testing the alarm system that is external to the Control (telephone dialer, for instance.) NOTICING the ALARM TEST, as you would a normal alarm, erases the alarm message and returns the alarm Relay to the non alarm state. Also, an ALARM TEST notification will be listed in the alarm history.

Warning

There also is an alarm message status called WARNING. This does not change the state of the alarm Relay, but alerts you that something isn’t right. It needs to be NOTICED in the same way as a “hard” alarm in order to turn off the flashing lights, etc. An example is a failed Sensor.

Alarm History

At the bottom of the alarm screen is a listing of the most recent 10 alarms. The date and time of each alarm is shown. The amount of time elapsed (hh:mm) from the time the alarm occurs until the alarm is noticed and recovers is also show.

Alarm Messages

Sensor Failure

If a Sensor that is assigned (used) for any purpose gets below 0 °F or above 120 °F for 1 minute, a **silent** alarm (WARNING) will be given. The temperature of the backup Sensor defined in screen 12 will be used while the failed Sensor situation exists. If there are multiple, concurrent Sensor failures such that it is impossible for the Control to determine a temperature or temperature average that is needed, a **loud** alarm will be given (the alarm Relay changes to the alarm state). At the same time, the Relay(s) using the failed Sensors turn off. If Mode Sensors are involved, the current mode will not change as long as the alarm condition exists. When an average of Sensors is involved, all of those Sensors, plus the backup Sensor for each Sensor used in that average, would have to fail in order to result in a hard alarm.

Min / Max Rel Sensor

The Minimum and Maximum Relative Temperature Alarm limits refer to the set temperature. A +10.0 maximum relative alarm means that one or more of the Sensors that are a part of the current mode's Control Sensor get to be greater than 10 degrees higher than the set temperature. The alarm message indicates which of the Sensors is outside the limits. Between the parentheses to the right of the Min and Max Relative Alarm limits are the resulting actual temperature limits. They are simply the addition or subtraction of the limit to or from the current set temperature

Pressure Alarm Min / Max

The Static Pressure Alarm limits are only considered by the software when a Fan or Fans is running or would be running if the toggle switch(s) were in the automatic position.

For the Static Pressure Alarm to occur, the static pressure has to be outside of the Alarm Limits for 1 minute of accumulated Fan run time. Any reading within the alarm limits while a Fan or Fans are running resets the accumulated run time to zero. For the case where the only Fans running are cycling with a Timer, it can take more than one cycle of the Timer for the alarm to happen. This is true when the "on" time of the Timer is less than 1 minute. The "off" time of the Timer does not add to the accumulated "on" time.

Pressure Failure

If the pressure measurement gets outside of the Static Pressure range of -.05 to 0.40 continuously for 1 minute, regardless of the Fans on/off status, a static pressure failure alarm will happen. The Inlets will be given continuous open signals if this occurs.

Low Water Pressure

An optional mechanical water pressure switch can be attached to the left 2 terminals of the D2 input to the I/O board in order to detect a low water pressure condition. The switch contacts need to be closed when the pressure is above a safe lower limit. In screen 12 you can program an alarm delay time in order to screen out transient low water pressure conditions. The Low Pressure Switch alarm is set at the factory to come on at 5 PSI and goes back off when the pressure rises above 10 PSI.

Program # Activated

Activating a program in screen 11 does not represent a hazard, but it is very helpful to evaluate where you have been in terms of the program(s) used. The alarm history shows activity of program activation. The alarm light will flash, and when you NOTICE the alarm message, it will disappear to the alarm history. The Alarm Relay does not change to the alarm state.

Pot # Not Responding (Natural ventilation only)

This alarm is generated whenever 2 minutes of open or close time does not result in at least 10 counts of change to the pot readout. Changing direction resets the 2 minute Timer. This alarm is also generated if there are 10 or fewer counts to the pot readout during the first opening transition. The 2 minute Timer does not advance and is reset to zero whenever the pot readout is within 10% of either calibration limit.

Pot # Outside Limits (Natural ventilation only)

This alarm is generated whenever the pot readout is more than 10% past the calibration limit at either end.

Listed below are additional alarm codes that relate to the internal operation of the Control. Contact CTB service personnel, if any of these alarms occur.

SYSTEM FAILURE 100
SYSTEM FAILURE 111
ERROR 1
ERROR 2
ERROR 3
ERROR 4
ERROR 5
ERROR 6
ERROR 7
ERROR 8
ERROR 20
ERROR 21
ERROR 22
ERROR 23
ERROR 27
ERROR 29
ERROR 30
ERROR 33
ERROR 34
ERROR 35
ERR 103

Figure 34. Alarm Codes Table

Programs

The following parameters are not saved when you save a program setup in screen 11

Day number
Time of day
Date
History
Alarm history
Control number
Calibrations
Access code

It would be inappropriate to reset these parameters to what they were when you saved the various program numbers.

Limp Modes

A limp mode is an abnormal type of operation that takes place whenever certain conditions occur. The object is to take action to minimize the effect of a Sensor failure. The following four limp modes exist:

Failed Temperature Sensor

A Temperature Sensor is considered to be failed if the reading of the Sensor is less than 0 degrees F. or greater than 120 degrees F.

The Limp Mode is: The backup Sensor for the failed Sensor is used instead with no alteration to normal function. A quiet alarm is given (the Alarm Relay does not change states, but the Alarm Light beside button 7 flashes). If the backup Sensor also fails, and there are no other Sensors assigned to a given output, that output will turn off and the Alarm Relay changes to the alarm state. There very likely will be either high or low temperature alarms as well.

Failed Static Pressure Sensor

A Static Pressure Sensor is considered to be failed if the Sensor indicates that the static pressure is less than -.05 or greater than .40 continuously for 1 minute.

The Limp Mode is: If the Control is in the Power Mode, the Inlets will be given a continuous open signal and the Tunnel Curtain will be given a continuous close signal. If the Control is in the Tunnel Mode when the Static Pressure Sensor fails, the Tunnel Curtain is given a continuous open signal, while the inlets are given a continuous close signal.

Pot not responding

This failure mode can only happen in the Natural Mode. It happens when the pot for either the Main1 or Main2 Curtain does not change at least 10 counts during 2 minutes of accumulated open or close signals. The 2 minute time count stops whenever the pot readout gets within 10% of the number of counts of the calibration limits. The time count resets to zero each time the Curtain changes directions. This failure mode also occurs if there are not more than 10 counts of change when the Main Curtain(s) open to it's first opening position.

The limp mode is:

1. The Main Curtain Relays continue to be energized to go open or closed according to temperature as if there Potentiometers were responding correctly.

2. All outputs that are set up in screen 12 to be allowed to come on in the Power Mode will now come on in the Natural Mode.

The reason for this is that if, in fact, the Curtain(s) are not moving, the Curtain could be closed, and it is essential that the exhaust Fans run. If the pot(s) is not responding, the Control can not actually return to the Power Mode because the transition from Natural to Power Mode is based on the Potentiometer position.

Pot outside limits

This failure mode is mainly an indication that the pots are not properly calibrated. The pot readout is outside the range of 10% past the pot limit values. For instance, if the pot limits were 150 and 350, the pot would be outside the limits if the readout was ever less than 135 or more than 385. The limp mode is exactly the same as for "pot not responding".

Relative Humidity

If a relative humidity Sensor is installed, it can be used simply as a management tool for your awareness. It also can be used to block the COOL and COOL PAD outputs if the relative humidity rises above the limit set in screen 12. If you don't want the humidity to block the COOL and COOL PAD outputs, simply adjust the limit to 100%.

Access Code

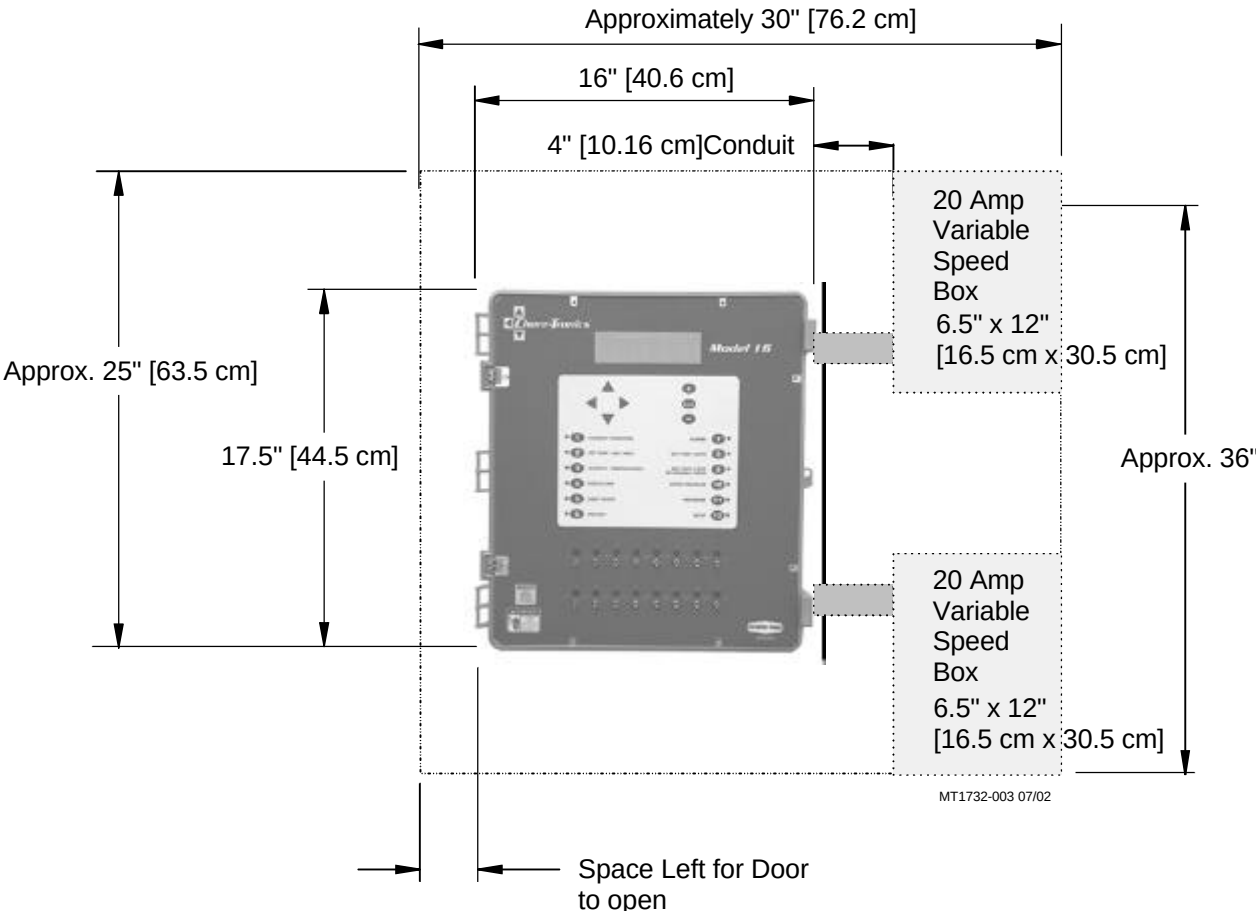
There is always an access code. From the factory the value is set at 1111. The 1111 access code is special, however, in that it won't ask you for this code except if you want to change the code to something else. If you do choose to use an access code, be sure to write it down in a safe place. The choice to change the access code is at the bottom of screen 12. It must be 4 numbers. The numbers are entered by pressing the buttons on the face of the Control. The screen numbers correspond to the digits you are choosing for your access code. If you have installed an access code and it can not be recalled and has not been recorded, contact Chore-Time for assistance.

Control Installation

Mounting the Control

The Chore-Tronics Model 16 requires a minimum mounting area of approximately 21" x 21" [55.9 cm x 55.9 cm] This dimension is allowing extra room for the Control Door to open. **(See Figure 35 below)**. If one 20 amp Variable Speed Kit is used the approximate minimum mounting area becomes 30" x 25"[76.2 cm x 63.5 cm] and if two 20 amp Variable Speed Kits are used the mounting area becomes approximately 30" x 36"[76.2 cm x 91.4 cm] The box should be mounted level on a solid backing using the mounting holes provided.

No other electrical equipment (transformers, light dimmers, additional relays, etc.) should be mounted inside the control box.



Note: Cover Not Shown for Clarity.

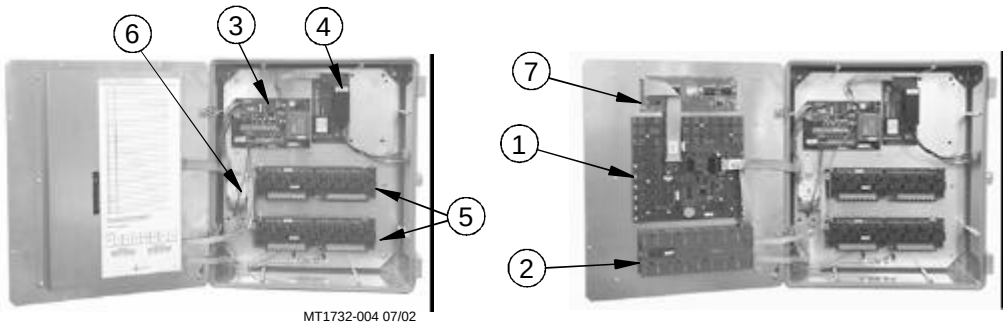
Figure 35. Mounting Area

Wiring the Control

Note **As with all electronic controls, we recommend the use of a backup system. This will provide continuous operation in the unlikely event of Control failure.**

Use the current Back Up Box Manual for wiring instructions

The Chore-Tronics Model 16 consists of six different types of boards shown in **Figure 36**. The Boards involved in wiring the Controls are the I/O Board, **(Figure 36, Item 3),** the Relay Module **(Figure 36, Item 5)** also known as the RM Board, and if used, the varable speed modules(s).

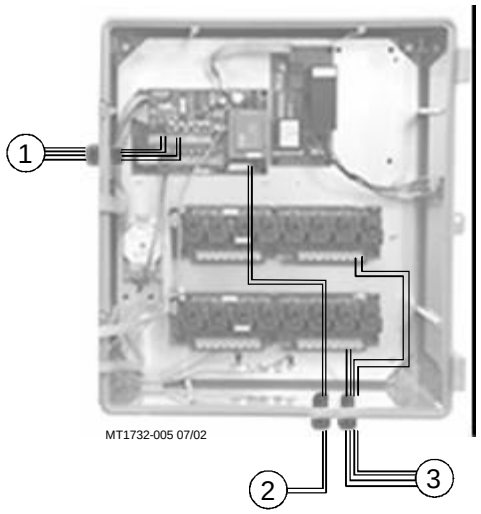


With Board Cover On With Board Cover Removed

Item	Description
1	KD Board
2	Manual Switch (MS)Board
3	I/O Board
4	Variable Speed
5	RM Board (Relay Module)
6	SP (Static Pressure) Sensor
7	Display Board

Figure 36. Different Types of Boards

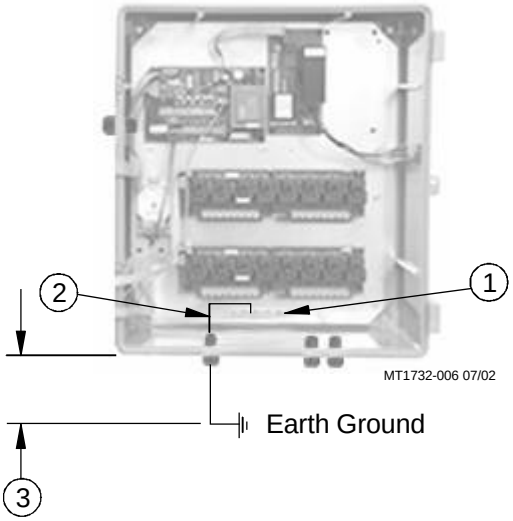
When wiring the Model 16 it is recommended that the line voltage wires be brought into the bottom of the Control Boxes and the low voltage wires (Temperature Sensors, Potentiometers, relative humidity, etc.) be brought in the side of the Control Box **(See Figure 37)**.



Item	Description
1	Temperature Sensor, Potentiometer, relative humidity wires etc. (Low Voltage)
2	Line Voltage Wires
3	Input/Output wires (High Voltage)

Figure 37. Low Voltage Wire Routing

It is recommended that a ground rod be located no more than 8’-10’ (2.438 m-3.048 m) away from the Control. The Chore-Tronics Control should be connected to ground using a 12 gauge wire or larger. As always, check the local electric code for additional requirements.

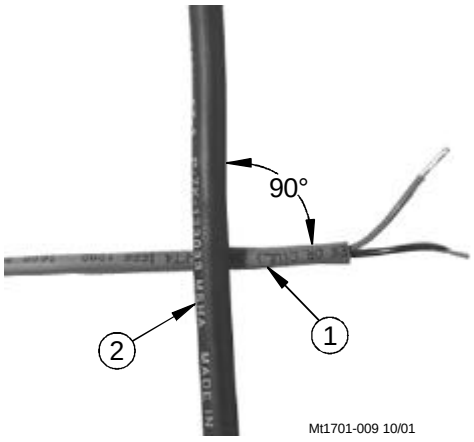


Item	Description
1	Ground Rails
2	Ground Wires
3	8’-10’[2.438 m-3.048 m] Max.

Figure 38. Ground Wire Routing

Temperature Sensors

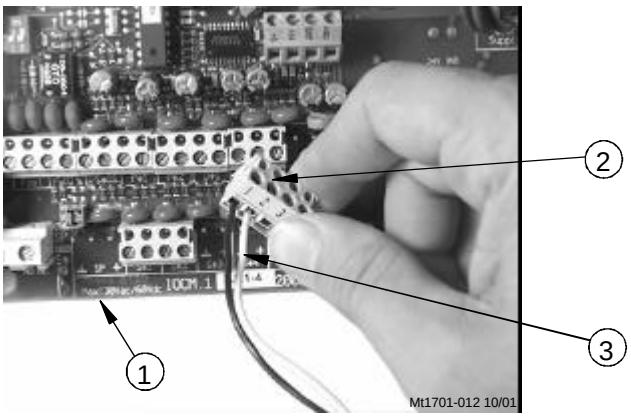
The Temperature Sensors require Non-Shielded 20 Guage Twisted Pair Wire **(See Figure 39)**. This wire is available through Chore-Time. When routing this wire in the house be sure to keep the wire a minimum of 12"(305mm) away from line voltage wiring. If there is a need for the Sensor wire to cross line voltage wires cross them at a 90° angle to each other as shown below in **Figure 39.**



Item	Description
1	Non-Shielded Twisted Pair Wire
2	Line Voltage Wiring

Figure 39. 90° Cross-over

The Temperature Sensor wires are connected to the Chore-Tronics Control at the I/O Board. **(See Figure 40, Item 3)** Please note that the Terminal Connectors on the I/O Board can be detached for easy connection **(See Figure 40)**. See also the I/O Board wiring diagram in the "**Wiring Diagram**" section of this Manual. There are no polarity restrictions for the Temperature Sensors.

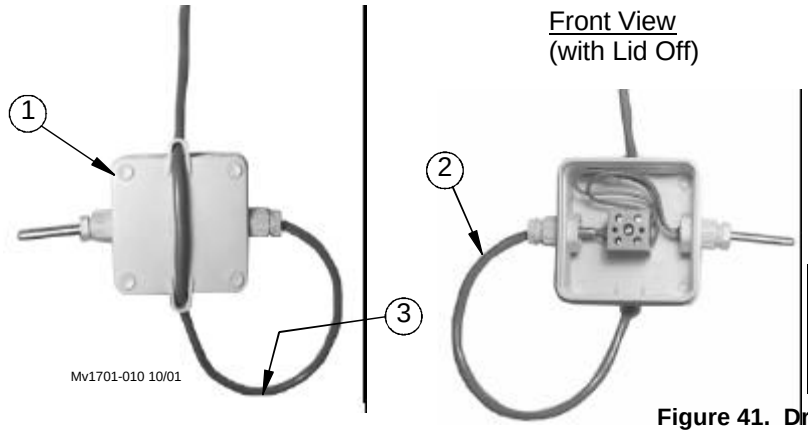


Item	Description
1	I/O Board
2	Terminal Connectors
3	Non Shielded Temp. Sensor Wires

Figure 40. I/O Board Terminal Connectors

Temperature Sensors Continued.....

The Sensor wire can now be connected at the other end to the Sensor itself and the wire routed around the box of the Temperature Sensor to form a drip loop **(See Figure 41)**.

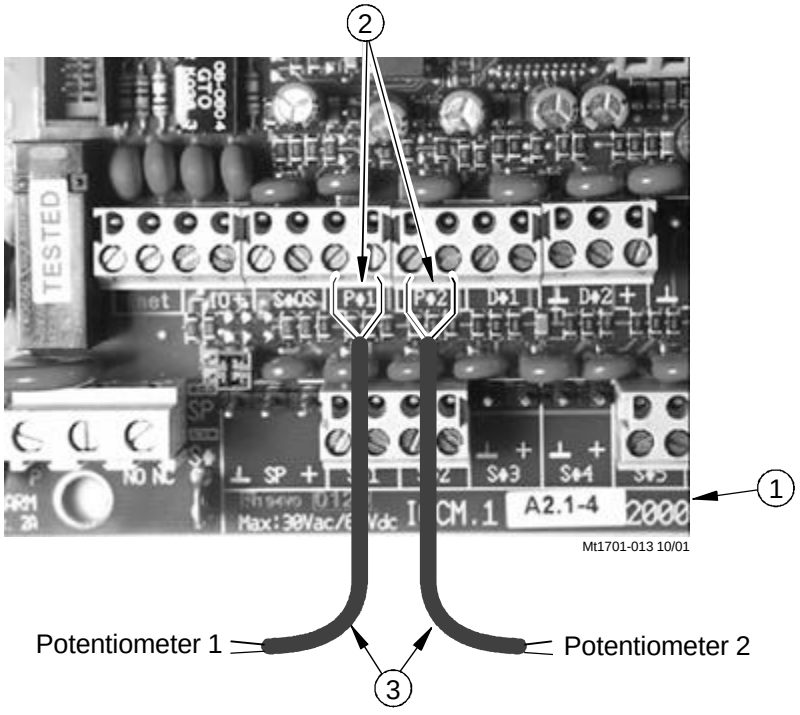


Item	Description
1	Temperature Sensor (Back Side)
2	Non-Shielded Twisted Pair
3	Drip Loop

Figure 41. Drip Loop

Potentiometer Wiring (Natural Ventilation Only)

If natural ventilation is being used the Potentiometer that is attached to either the Main Curtain machines (Internal Pot.) or the Main Curtain cables (External Pot.) needs to be wired to the Chore-Tronics Control. The Potentiometers need to be connected using the same Twisted Pair Wire that is used for the Temperature Sensors and follows the same wire routing rules. The Potentiometer wire is connected to the Control at terminals P1 and P2 on the I/O Board **(See Figure 42).** If only one Potentiometer is being used then only wire the Potentiometer to the P1 terminals on the I/O Board. To connect the Sensor wire to the Potentiometer, please see Chore-Time Instruction Manual Mv1251 for Internal Potentiometer wiring or Mv1566 for External Potentiometer Wiring.

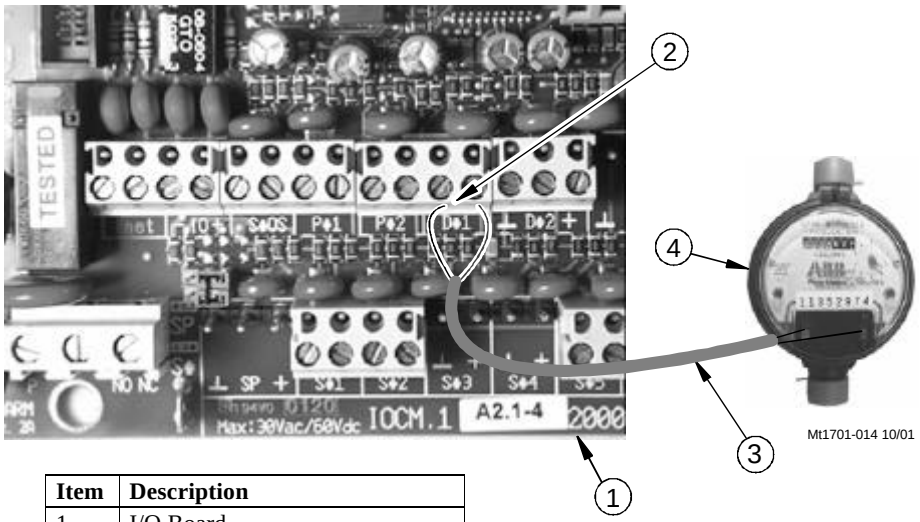


Item	Description
1	I/O Board
2	P1 & P2 Terminals
3	Non-Shielded Twisted Pair Wire from Potentiometer

Figure 42. Potentiometer Wiring

Pulsed Water Meter and Water Pressure Switch Wiring

If the optional Pulsed Water Meter is used, it needs to be connected to the D1 terminals on the I/O Board **(See Figure 43)**. Use Twisted Pair Wire to connect the terminals on the Water Meter with the Chore-Tronics Control. If a Water Meter not sold by Chore-Time is used make sure that it has a dry contact output. **Do not** use a Water Meter that sends voltage out with every pulse.

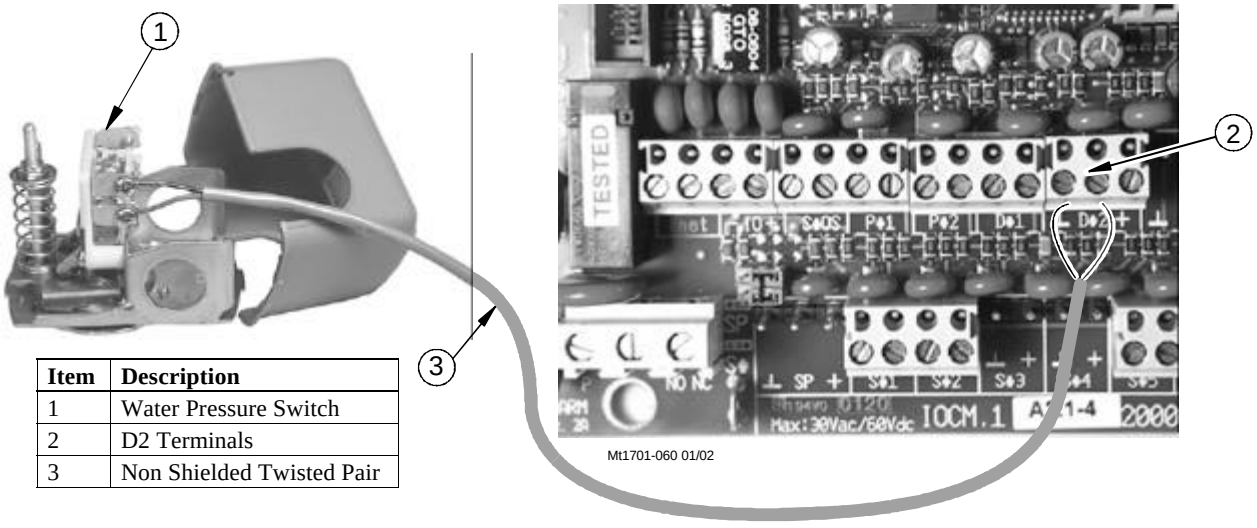


Item	Description
1	I/O Board
2	D2 Terminals
3	Non Shielded Twisted Pair Wire
4	Water Meter

Figure 43. Pulse Water Meter

Low Water Pressure Switch

If the Low Water Pressure Switch (Chore-Time Part Number 46597) is used, it needs to be connected to the left two D2 terminals on the I/O Board **(See the I/O Board wiring Diagram** in the **"Wiring Diagram"** section of this Manual) Use Twisted Pair Wire to connect the Switch to the Chore-Tronics Control **(See Figure 44).** If a non-Chore-Time Pressure Switch is used, make sure it is a low pressure, reverse action Switch.



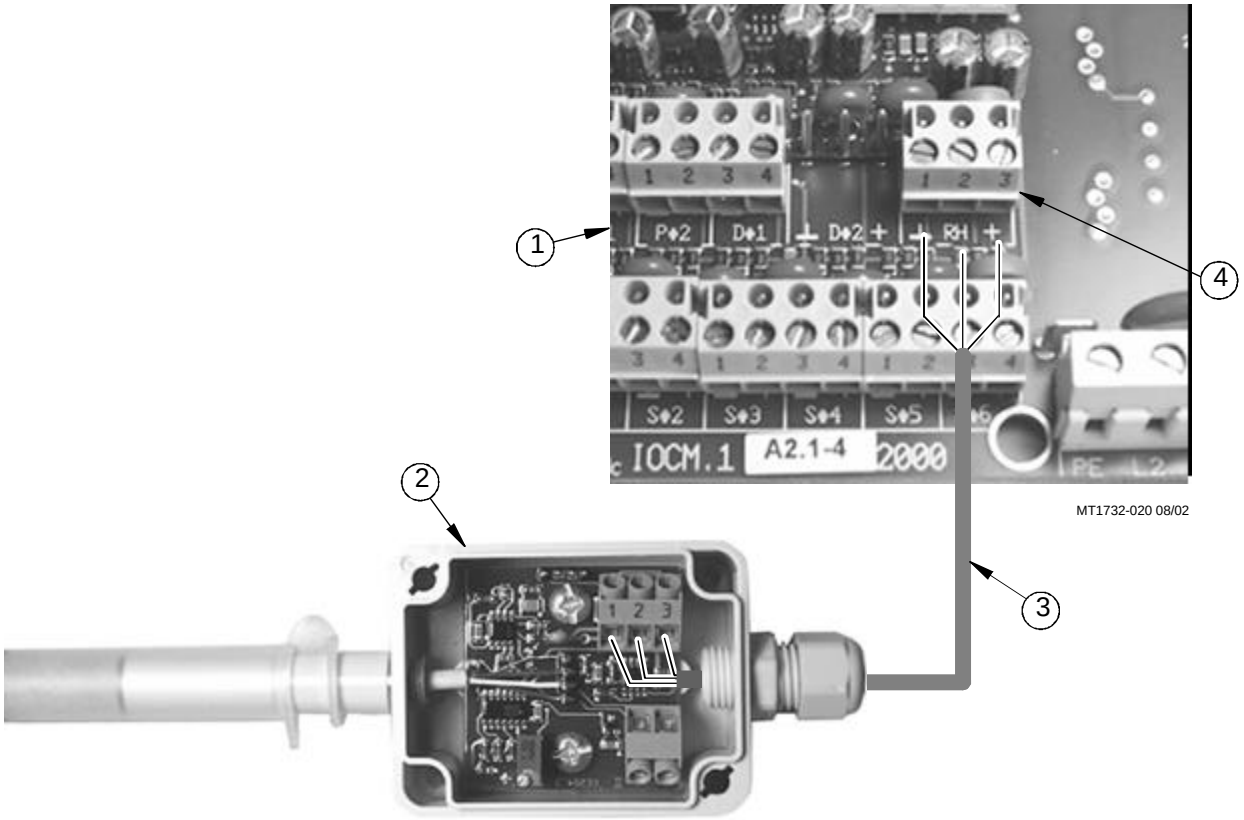
Item	Description
1	Water Pressure Switch
2	D2 Terminals
3	Non Shielded Twisted Pair

Figure 44. Water Pressure Switch Wiring

Relative Humidity Sensor Wiring

The optional Relative Humidity Sensor requires a three-conductor wire to connect the Sensor to the Chore-Tronics Control. The Sensor wire is connected to the RH terminals on the I/O Board **(See Figure 45)**.

Note: The #1 terminal on the I/O Board Terminal Block is wired to the #3 terminal on the Relative Humidity Sensor Terminal Block. The #2 terminal is wired to the #2, and the #3 is wired to the #1 respectively. There is an actual Wiring Diagram printed on the back of the Relative Humidity Sensor.

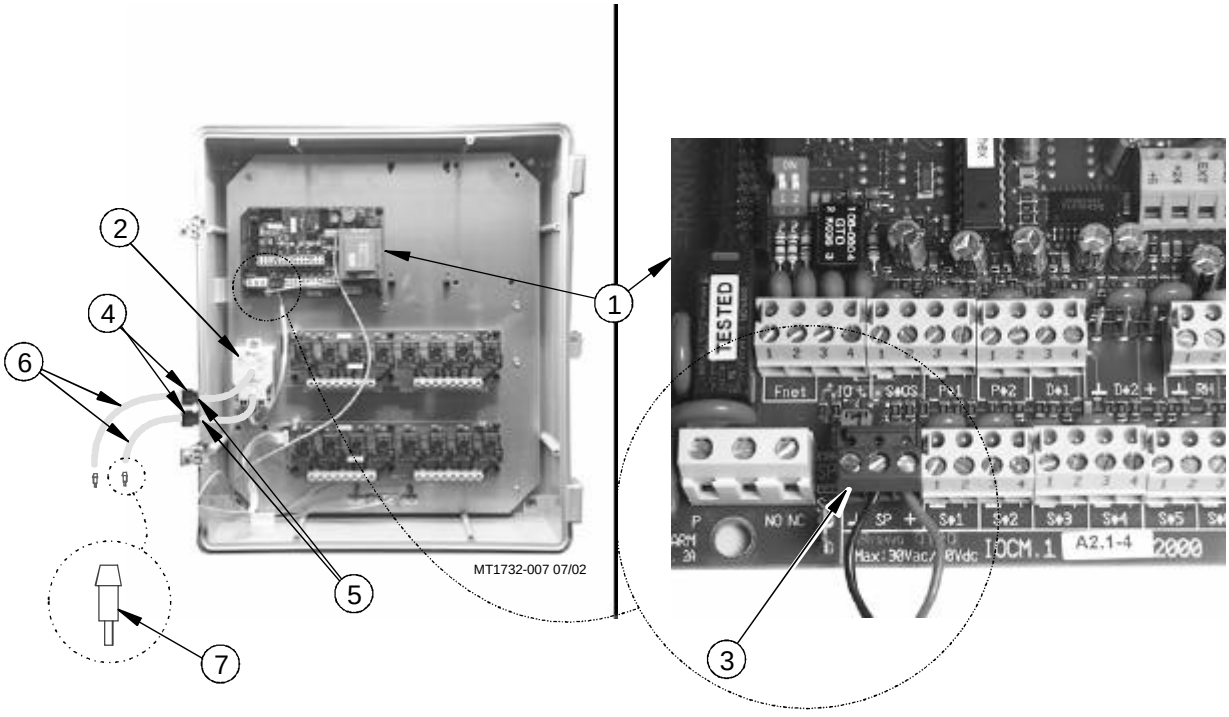


Item	Description
1	I/O Board
2	Relative Humidity Sensor
3	Three Conductor Wire
4	Relative Humidity Terminal Connector

Figure 45. Relative Humidity Sensor Wiring

Static Pressure Kit

If the optional Static Pressure kit is used, mount the Static Pressure Module in the space provided under the I/O Board **(Figure 46, Item 2)** using the hardware provided in the kit. Once the kit is mounted the Module can be connected to the I/O Board using the pre-wired 3-terminal connector **(Figure 46, Item 3)**. Once the Static Pressure Module is mounted, drill two 5/8" (15.875 mm) holes in the side of the Chore-Tronics box next to the Module **(See Figure 46)**. Place a 1/2" Water Tight Connector **(Item 5)** (provided with the Static Pressure Kit) into each hole. Then route a 3/16" I.D. Hose (Chore-Time Part No. 43071) **(Item 6)** through each of the Water Tight Connectors. Connect one Hose to the Low Pressure Barb on the SP Module. Then run that Hose into the house. Connect another Hose to the High Pressure Barb on the SP Module. Run that Hose into the attic or to outside air. Make sure the high pressure is in still air. Once the hoses have been routed and connected, place the Barb Reducer Plugs **(Item 7)** into the end of the hose opposite of the Static Pressure Module.



Item	Description
1	I/O Board
2	Static Pressure Module
3	Static Pressure Terminal Connector
4	Water Tight Connector
5	(2) 5/8"[15.875 mm] Dia. Holes
6	3/16" I.D. x 5/16" O.D Hose
7	Barb Reducer Plugs

Figure 46. Static Pressure Sensor Wiring

Wiring of Outputs

The Outputs for the Chore-Tronics Controls (Fans, Curtain Machines, Brooders, etc.) are wired to one of the Relays on the Relay Module or (RM Board(s)) **(See Figure 36, Item 5).** The RM Board consists of eight 1hp motor load Relays. Each Relay has single-pole, single-throw normally open contacts. It is strongly recommended that the assignment of outputs to the Relays be done before starting to wire the Control. This will make routing of the electrical wires through the Relay box much easier **(See Figure 47)**.

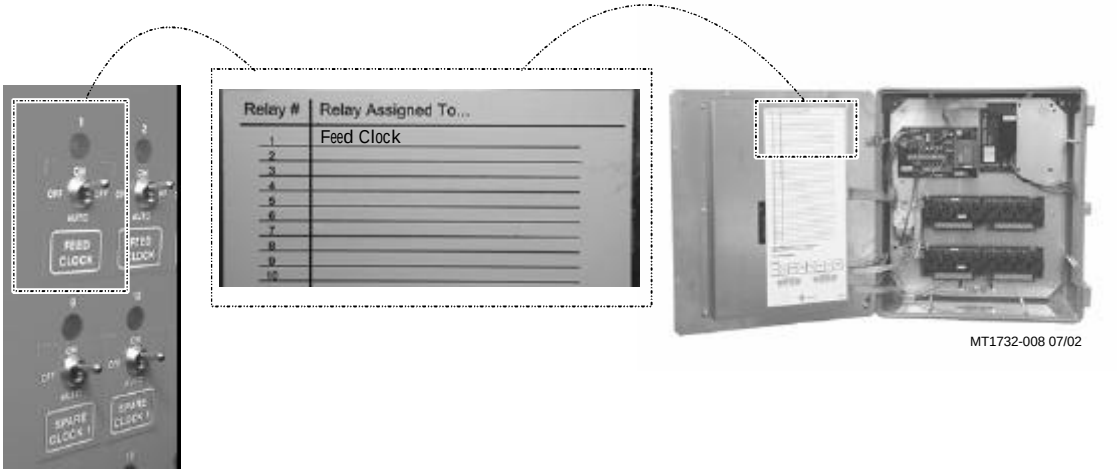


Figure 47. Relay Assignments

The appropriate output stickers should be placed over the toggle switches used, if it has not already been done prior to mounting. Please see the wiring diagrams on the following pages for wiring Chore-Time ventilation equipment. (Wiring diagrams for Fans, Linear Lifts, Super Lifts, Brooders, Turbo Cool, Mister Cool). For other types of equipment please refer to wiring diagrams supplied with the equipment.

Back Up Box Wiring

Use the current Back Up Box Manual for wiring instructions.

Note: **As with all electronic controls, we strongly recommend the use of a backup system. This will provide continuous operation in the unlikely event of Control failure.**

Important: **Do not wire the Control and the Back-up Box to the same Breaker!**

Starting the Control

Once the Control, Back Up Box, and all outputs have been installed and wired properly, power should be turned on to the Control. When power is first turned on to the Control the screen should look like **Figure 48**.

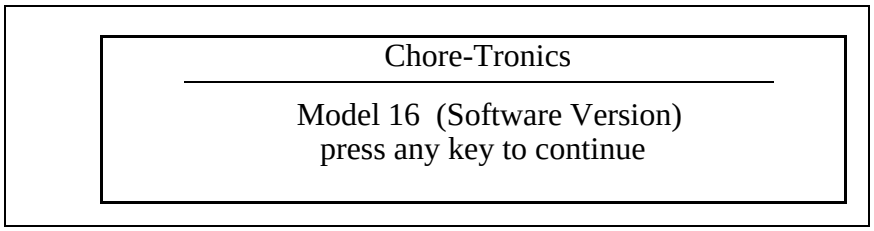
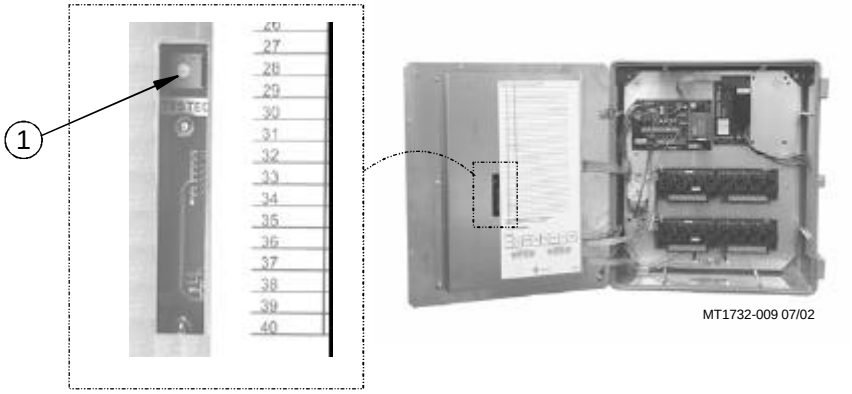


Figure 48. Power on Screen

The light next to the alarms button (Button 7) should be flashing. If the screen is hard to read, open the door of the main box and look for a slot cut in the left-center portion of the back cover **(Figure 48).** In that slot is a blue Potentiometer with a white adjustment screw. Turning the screw clockwise darkens the screen, turning the screw counter-clockwise lightens the screen. Adjust the screw until the screen is clear and easy to read. If the Control is mounted in a non-insulated area the screen may need to be adjusted periodically because temperature can effect the readability of the screen.

Warning: Voltage present in back of Box Line

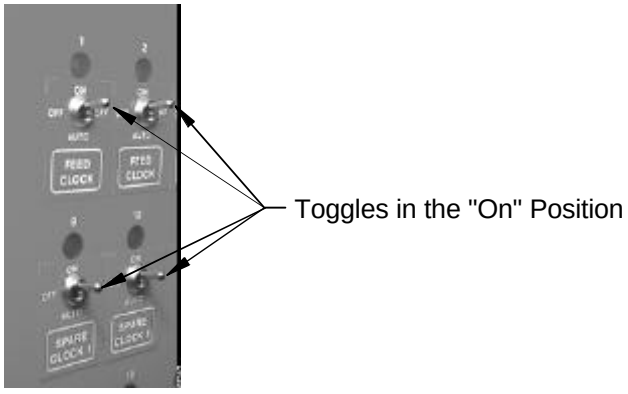


Item	Description
1	White Adjustment Screw

Figure 49. Adjusting Screen Intensity

Once the screen has been adjusted, all assigned Outputs should be tested individually by placing the Manual Switches located on the Relay Box to the "**MANUAL ON**" position **(See Figure 50)**. This will also serve as a way of verifying that the proper output was wired to the proper Relay and/or the proper Output Sticker was placed over the Toggle Switch.

Caution: Before turning any Switch to the on position, make sure all people and objects are clear of the device being turned on to avoid injury or damage.



Mt1701-061 1/01

Figure 50. Manual "On"

Note **When testing the Toggle Switches for the Curtain and Inlet Machines, be sure to test them one Switch at a time.**
After testing the open switch, place it in the manual "off" position before placing the close switch in the manual "on" position. If you try to put both switches in the manual "on" at the same time you will send a double signal to the Curtain Machine Motor.

Testing the Back Up Box

To test the Back Up Box, first turn the power off to the Chore-Tronics Control only. This should cause the Tunnel Curtain to open and the first set of Back Up Fans should activate. If this test is successful, turn the power back on to the Chore-Tronics Control. Then adjust thermostat number one until it activates. Then adjust the second thermostat until it activates. This should cause the second set of Back Up Fans to activate. After all Back Up Fans are operating, deactivate the first two thermostats. Than adjust the third thermostat until it activates. This should cause the Back Up Heaters to activate.

After all of the Outputs and Back Ups have been successfully tested, make sure all manual toggle switches are in the manual "off" position and proceed to the **"Initial Set Up"** portion of this manual beginning on **Page 34**.

Trouble Shooting

Programming Trouble Shooting

Problem	Possible Cause	Possible Solution
Can not lower set temperature below 40.0° F. and can not raise the set temperature above 120.0° F.	Normal set temperature range.	The Control has been set up so that set temperature range is between 40.0° F. and 120.0° F.
Have one Fan set to come on at 80°F and another Fan to come on at 80.3°F, but the Control won't accept the 80.3° setting.	Offsets too close.	There must be at a .5°F difference between any two Fan outputs. Two or more Fans may be set to come on at the same temperature. Heater outputs follow the same rules, however the cool out puts do not.
Fan(s) turns on, Mode Sensor(s) temperature is at set point.	A.) Fan is assigned to a Timer. B.) Temperature Sensor(s) assigned to operate the Fan are different than the mode Sensor(s). C.) Fan's manual switch is set to the manual "on" position. D.) Bad Relay Module/MS Board.	A.) If Timer is not wanted on Fan remove the Timer in Screen 3. B.) Change Temperature Sensor(s) assignments if desired. C.) Put manual switch in "automatic" position. D.) Replace Module/Board
Fan(s) will not turn on when mode Sensor(s) reach the Fan's on temperature.	A.) Fan's assigned Sensor(s) are different than the mode Sensor(s) B.) Fan is set to run in a different mode (example: Tunnel instead of Power). C.) Fan's manual switch is set to the "off" position. D.) Bad Relay Module/MS Board.	A.) Change Temperature Sensor(s) assignments if desired. B.) Go to the Setup screen (Screen 12) and change modes of operation if desired. C.) Put manual switch in "automatic" position. D.) Replace Module/Board
Fan(s) will not shut off.	A) Fan has not reached the "off" temperature. B.)Fan assigned Temperature Sensor(s) is different than mode Temperature Sensor(s). C.) Fan's manual switch is set to the manual "on" position. D.) Bad Relay Module. E.) Back-up thermostat is overriding the Control.	A.) The Fan's "off" temperature is the "on" temperature of the next Fan below it, or if desired you can program the "off" temperature. B.) Change Temperature Sensor(s) assignments if desired. C.) Put manual switch in "automatic" position. D.) Replace Module/Board. E.)Check setting of back-up thermostat and correct if necessary.

Programming Troubleshooting Continued.....

Problem	Possible Cause	Possible Solution
Fan assigned to operate in Power Mode only is running in Natural Mode.	A.) A "Pot Not Responding" or a "Pot Outside Limits" alarm has occurred. B.) Fan Switch in "Manual ON" position	A.) Find out cause of alarm and correct. Please see Potentiometer troubleshooting section for suggestions. B.) Move Switch to automatic
Fan anticipation feature is not working.	A.) Minimum Ventilation Fans assigned to something other than Minimum Ventilation Timer, or no Timer at all. B.) Other Fans (example: Stir Fans) are already operating due to temperature settings. C.) Minimum Ventilation Fans are coming on due to Temperature.	A.) All Fans intended for minimum ventilation must be assigned to the Minimum Ventilation Timer. B.) If any other Fans are operating at the time the Minimum Ventilation Timer reaches its On Time, the anticipation function is disabled. C.) Anticipation Feature is disabled when Minimum Ventilation Fans operate due to temperature settings.
Have a power-natural house with 8 stir Fans. There are only 6 stir Fan outputs.	Limited Relay assignments	A.) Pair up two of the Fans providing that the total load on the Relay does not exceed 1HP. If pairing Fans exceeds the 1HP limit, an external Relay can be used. B.) Assign two of the Fans as Exhaust Fans and then assign those Fans to run in the Natural Mode only.
Tunnel Curtain does not completely open when going into Tunnel Mode.	A.) If in the static pressure screen (Screen 10) the high Control limit is set to something other than .00 under Tunnel Mode, than the Control will adjust the Tunnel Curtain for static pressure. B.) Limit Switches on Curtain machine are not set properly C.) Problem with Curtain and/or cabling.	A.) To stop Static Pressure Control on the tunnel, set the high static pressure limit to .00 under Tunnel Mode in the static pressure screen (Screen 10). B.) Check limit switches and adjust as necessary. C.) Correct cabling and/or Curtain problem.
Tunnel Curtain opens completely before adjusting to static pressure.	A.) Tunnel Curtain speed and/or full movement distance improperly entered in the Setup screen (screen 12) B.) .00" static pressure setting in screen 10.	A.) Correct Tunnel Curtain speed and/or full movement numbers. B.) Set desired static pressure settings for Tunnel Mode

Programming Trouble Shooting Continued.....

Problem	Possible Cause	Possible Solution
Tunnel Curtain opens in Power Mode.	A.) Power-Tunnel Mode Transition. B.) High static pressure alarm safety feature has taken over. C.) Additional inlet area through the Tunnel Curtain feature has taken over.	A.) Normal Operation B.) Static pressure had quickly built to above 0.20" and stayed there for over the wind delay setting. Tunnel Curtain will open to maintain a static pressure of between 0.18 and 0.20." This is usually accompanied by a high static pressure alarm. Find cause of high static pressure and correct. C.) Normal operation. Whenever the air Inlets do not provide enough air, the Tunnel Curtain will also open enough to maintain static pressure within the Power Mode limits.
When half-house brooding the Minimum Rel. alarm is continually going off. The Sensor(s) indicated are always in the non-brood end.	One or more brood end Sensors are assigned as Mode Sensors.	Remove non-brood Sensor(s) as Mode Sensors when brooding. Sensor(s) can still be assigned to heaters, etc. to keep non-brood end temperature above freezing.
It is a cool-breezy day, and when the Control goes into Natural Mode the Curtains open to the first opening position (example: 12 inches on a 48-inch Curtain). After about 30 seconds the Control goes back into Power Mode and the Curtains close right back up. It does this several times.	Normal Operation	If the temperature drops .6° F in the first two minutes, the Curtains are given a continuous close signal and the Control goes back into Power Mode. This is the quick temperature check as described in the Mode Transitions, "**Power to Natural**", section of this Manual.

Equipment and Potentiometer Troubleshooting

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Display difficult to read	A.) Display adjustment potentiometer on KD board needs to be adjusted. B.) Back light on display board unplugged or defective.	A.) Adjust pot until screen can be read (for adjustment procedure see page #). B.) Check two wire plug on Display board. Replace if defective.
Display Completely Blank	A.) Flat cable between KD board and Display board is unplugged or defective. B.) Defective Display board. C.) Defective KD board.	A.) Check flat cable connections. Replace cable if defective. B.) Replace Display Board. C.) Replace KD board.
The control is stuck on a screen other than screen 1 (For example Screen 4). The control immediately returns to that screen after another subject button is released	There is a nut that holds the KD board screwed in too tight and is causing button 4 to be held in constantly.	Open the control and find the nut closest to button 4 and loosen it until the button is disengaged.
One of the Subjects on the KD board will not come up on the screen when the subject button is pushed. The button can not be felt.	There is a nut that holds the KD board that is too loose.	Find the nut closest to the screen causing the problem and tighten it until the button will activate.
The control says that the pressure in the house is -.10” and will not calibrate to .00”. It will only calibrate to a -.05”.	There is a wire connection problem between the static pressure monitor and the IO board. When the static pressure monitor is disconnected from the IO Board the control defaults to a reading of -.10”.	Check for wires being switched, broken wires, wires not making a good connection, etc. An easy way to remember the wiring is that the red wire is connected to the positive terminal of both the IO board and the static pressure monitor.
All Temperature sensors are Frozen at 32°F.	The I/O Chip is improperly installed.	Chip is either upside down, has a bent pin, or in not pushed completely into the socket. Check out chip and correct.
Temperature Sensor reading very low, but is not stuck on 32° F.	A.) Connections in temperature sensor, junction box, and/or I/O Board have become loose and/or corroded. B.) Defective temperature sensor.	A.) Check all temperature sensor connections correct any problems. B.) Replace temperature sensor.

Equipment and Potentiometer Troubleshooting Continued.....

Temperature Sensor reading very high or shows a "#" in place of a temperature reading.	A.) Moisture inside temperature sensor box, or junction box causing short. B.) Break in temperature sensor wire is causing a short. Defective temperature sensor.	A.) Remove moisture from sensor box and recheck temperature. B.) Check sensor wire and wire connections. Correct any problems. C.) Replace temperature sensor.
Temperature readings are not steady (changing half a degree or more at a time every five seconds). It is causing tunnel fans and heaters to run at the same time.	There is excessive noise on the temperature sensors. This can be caused by not using a twisted pair wire for the temperature sensor, running the sensor wire inside conduit with high voltage wire, or using a shielded wire and grounding the shield.	To prevent noise from bothering the sensors, use non-shielded twisted pair wire (Chore-Time part no. 42208) and run the wire by itself away from high voltage wires. Preferably the wire should also enter the control in a separate place from the high voltage wire, but this is not always possible. Do not use Romex, SJO cord, etc. as temperature sensor wire.
Water meter not recording gallons used on the Chore-Tronics control.	A.) Loose connection on water meter and/or I/O Board on Chore-Tronics. B.) Wrong type of water meter. C.) Faulty I/O Board. D.) Faulty water meter.	A.) Check connections and correct. B.) Make sure water meter is a dry contact pulsed water meter (Chore-Time part no. 13228-GP) and that the pulser unit is working correctly. C.) Replace I/O Board. D.) Replace/repair water meter.
Low Water pressure switch alarm going off constantly; water pressure is NOT low.	A.) Wrong style or pressure switch. B.) Bad or loose connection on water pressure switch and/or I/O Board on the Chore-Tronics control. C.) Faulty switch.	A.) Switch needs to be a reverse action low water pressure switch (Chore-Time part no. 46597). B.) Check connections and correct. C.) Replace switch

Equipment and Potentiometer Troubleshooting Continued.....

Error 3 Alarm (I^2C communications error)	A.) Loose, misalign, or defective flat cable. B.) Defective KD, MS, or I/O Board.	Check all flat cables and correct or replace as necessary. Replace Defective Board.
MS Board not functioning correctly, or Outputs not functioning correctly	A.) The DIP switches found on the side of the MS board are in the wrong position. B.) Defective MS Board or Relay Module. C.) Defective I/O-MS Flat Cable.	A.) Make Sure Dip Switches are in the correct position. B.) Replace Board C.) Replace Flat Cable
The lights above the manual switches are dimmer when on in the automatic mode than in the manual mode. Also Lights flash bright for a second in automatic mode.	No Problem	The indicator light is wired directly across the coils of the output relay. When the switch is placed in the manual on position the full 24 volts are placed on the coil, causing the light to glow bright. When the relays are told to come on by the control in automatic the full 24 volts is applied to pull the contacts in and then the voltage is reduced to hold the contacts in. This causes the light to glow dim. When the relays are on in automatic mode, the control puts full voltage across the coils to make sure the relay is still engaged.

Equipment and Potentiometer Troubleshooting Continued.....

Relays are constantly blowing.	A.) Relays are overloaded. Maximum is 1HP B.) There is a short in the wiring connected to that relay. C.) One of the stand-offs holding the relay module is broken and is causing the board to touch the back plate.	A.) Reduce load on relays. B.) Find problem in wiring and correct. C.) Replace stand-off.
Blown Fuse.	Power surge, short in system, or overdraw in system.	A.) Check I/O Board and look at the loads on the 24 Volt output. B.) The Model 4b, NV, SP, 4, and 8 all require 63 milliamp fuses. The Model 16 and the Feeder control require a .1 amp fuse and the Models 32 and 40 require a 4 amp fuse. All of the fuses have a dimension of 5 mm x 20 mm. There are extra fuses shipped with the control.
Variable speed fan will not run in Automatic. Runs full speed in Manual.	A.) Blown Fuse B.) DIP switch settings incorrect. C.) Defective VSM board D.) Defective Toggle Switch	A.) Replace Fuse with a 10 A normal blow fuse B.) Set DIP switches to correct setting C.) Replace VSM board. D.) Replace toggle switch.
Variable speed fan runs in automatic but only at full speed. Fan will not slow down.	A.) Phases wired to fan are different than phases wired to control (3-phase power only). B.) Defective VSM board.	A.) If there is 3-phase power coming into the breaker box. The two legs used to operate the control must be the same two legs that wire to the fan. B.) Replace VSM board.

Equipment and Potentiometer Troubleshooting Continued.....

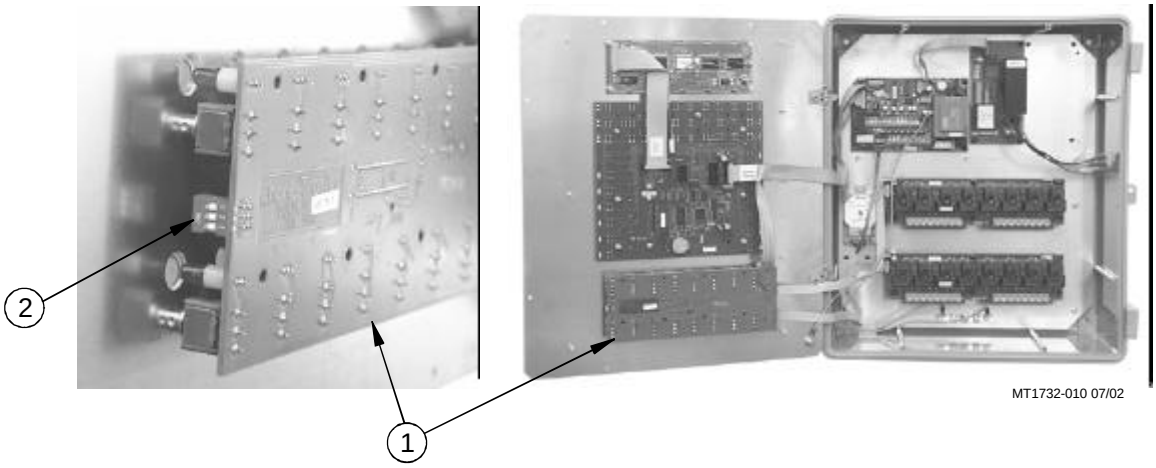
Pot not responding alarm (internal pot)	A.) Gear not making contact with screw. B.) Gear set screw not tight on potentiometer shaft. C.) Potentiometer not connected to control and/or bad connection between potentiometer and control. D.) Bad Potentiometer. E.) First Opening movement too small.	A.) Loosen potentiometer assembly mounting bolts and slide until gear makes contact with the screw. B.) Tighten gear set screw. C.) Connect potentiometer to the control and/or look for bad connection and correct. D.) Replace potentiometer. E.) Make Sure that the first opening movement causes at least a 10-count change potentiometer readings.
Pot not responding alarm (external pot)	A.) Main curtain cable and/or Potentiometer cable caught, or broken. B.) Return spring frozen or broke inside potentiometer assembly. C.) Potentiometer not connected to control and/or bad connection between potentiometer and control. D.) Bad Potentiometer E.) First Opening movement too small.	A.) Make sure that both the main curtain cable and the potentiometer cable can move freely. Make sure potentiometer cable does not drag on grommet. Make sure there is adequate weight to keep main curtain cable taught. B.) Check Cable wrap on wheel. Repair or replace spring. C.) Connect potentiometer to the control and/or look for bad connection and correct. D.) Replace potentiometer E.) Make Sure that the first opening movement causes at least a 10-count change potentiometer readings
Pot outside limits alarm (internal pot)	A.) Potentiometer has not been calibrated (especially new installations). B.) Gear not making contact with screw. C.) Limit switch(es) has been moved on the curtain machine. D.) Potentiometer not connected to control and/or bad connection between potentiometer and control. E.) Bad Potentiometer	A.) Go to the Setup screen and scroll down to the Main Curtain calibration to set up the open and close limits of the curtain. B.) Loosen potentiometer assembly mounting bolts and slide until gear makes contact with the screw. C.) If limit switches have been moved, then re-calibration is required. D.) Connect potentiometer to the control and/or look for bad connection and correct. E.) Replace potentiometer

Pot outside limits alarm (external pot)	A.) Potentiometer has not been calibrated (especially new installations). B.) Potentiometer cable is wrapping around the main curtain cable. C.) Limit switch(es) has been moved on the curtain machine. D.) Potentiometer not connected to control and/or bad connection between potentiometer and control. E.) Bad Potentiometer	A.) Go to the Setup screen and scroll down to the Main Curtain calibration to set up the open and close limits of the curtain. B.) Unwrap potentiometer cable from main cable. Consider installing Anti-twist balls to keep potentiometer cable from wrapping, or possibly change how the pot cable attaches to the main cable. C.) If limit switches have been moved, then re-calibration is required. D.) Connect potentiometer to the control and/or look for bad connection and correct. E.) Replace potentiometer
Pot reading is not stable (changing more than 3 counts when the curtain machine is not running).	A.) Did not use twisted pair wire. B.) Ran potentiometer wire close to, or in same conduit with high voltage lines.	A.) Make sure that the wire used to connect the potentiometer to the control is a twisted pair unshielded wire. B.) Keep potentiometer and temperature sensor wire away from high voltage lines. When high voltage lines must be crossed, be sure to cross as close to 90 degrees as possible.
Pot outside limits alarm (internal pot)	A.) Potentiometer has not been calibrated (especially new installations). B.) Gear not making contact with screw. C.) Limit switch(es) has been moved on the curtain machine. D.) Potentiometer not connected to control and/or bad connection between potentiometer and control. E.) Bad Potentiometer	A.) Go to the Setup screen and scroll down to the Main Curtain calibration to set up the open and close limits of the curtain. B.) Loosen potentiometer assembly mounting bolts and slide until gear makes contact with the screw. C.) If limit switches have been moved, then re-calibration is required. D.) Connect potentiometer to the control and/or look for bad connection and correct. E.) Replace potentiometer

Pot outside limits alarm (external pot)	A.) Potentiometer has not been calibrated (especially new installations). B.) Potentiometer cable is wrapping around the main curtain cable. C.) Limit switch(es) has been moved on the curtain machine. D.) Potentiometer not connected to control and/or bad connection between potentiometer and control. E.) Bad Potentiometer	A.) Go to the Setup screen and scroll down to the Main Curtain calibration to set up the open and close limits of the curtain. B.) Unwrap potentiometer cable from main cable. Consider installing Anti-twist balls to keep potentiometer cable from wrapping, or possibly change how the pot cable attaches to the main cable. C.) If limit switches have been moved, then re-calibration is required. D.) Connect potentiometer to the control and/or look for bad connection and correct. E.) Replace potentiometer
Pot reading is not stable (changing more than 3 counts when the curtain machine is not running).	A.) Did not use twisted pair wire. B.) Ran potentiometer wire close to, or in same conduit with high voltage lines.	A.) Make sure that the wire used to connect the potentiometer to the control is a twisted pair unshielded wire. B.) Keep potentiometer and temperature sensor wire away from high voltage lines. When high voltage lines must be crossed, be sure to cross as close to 90 degrees as possible.

MS Board Dip Switch Positions

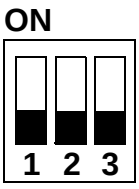
The MS Board Dip Switches are located on the ends of the Manual Switch Boards as shown in **Figure 50.** below.



Item	Description
1	Manual Switch (MS) Board
2	Dip Switch

Figure 51. Changing the Access Code

1. Manual Switch position on the board — one board being used



New controls will come from the factory pre-set. This information is provided only when a replacement board is used.

Variable Speed Dip Switch Positions

The Variable Speed Dip Switches are located at the top right corner of the Variable Speed Board as shown in **Figure 52 below**.

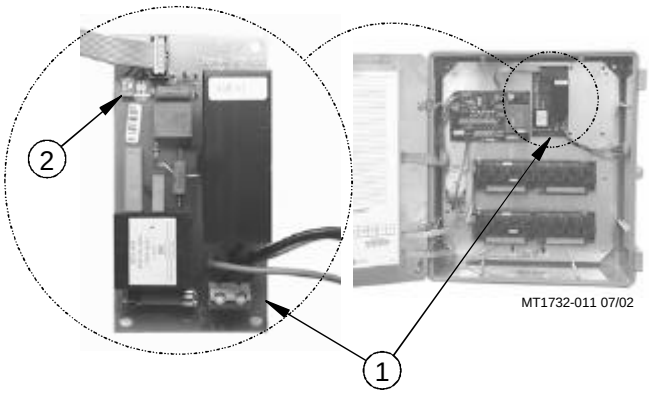
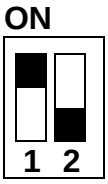
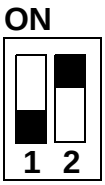


Figure 52. Variable Speed Dip Switches

1. Switch position for first variable speed module.



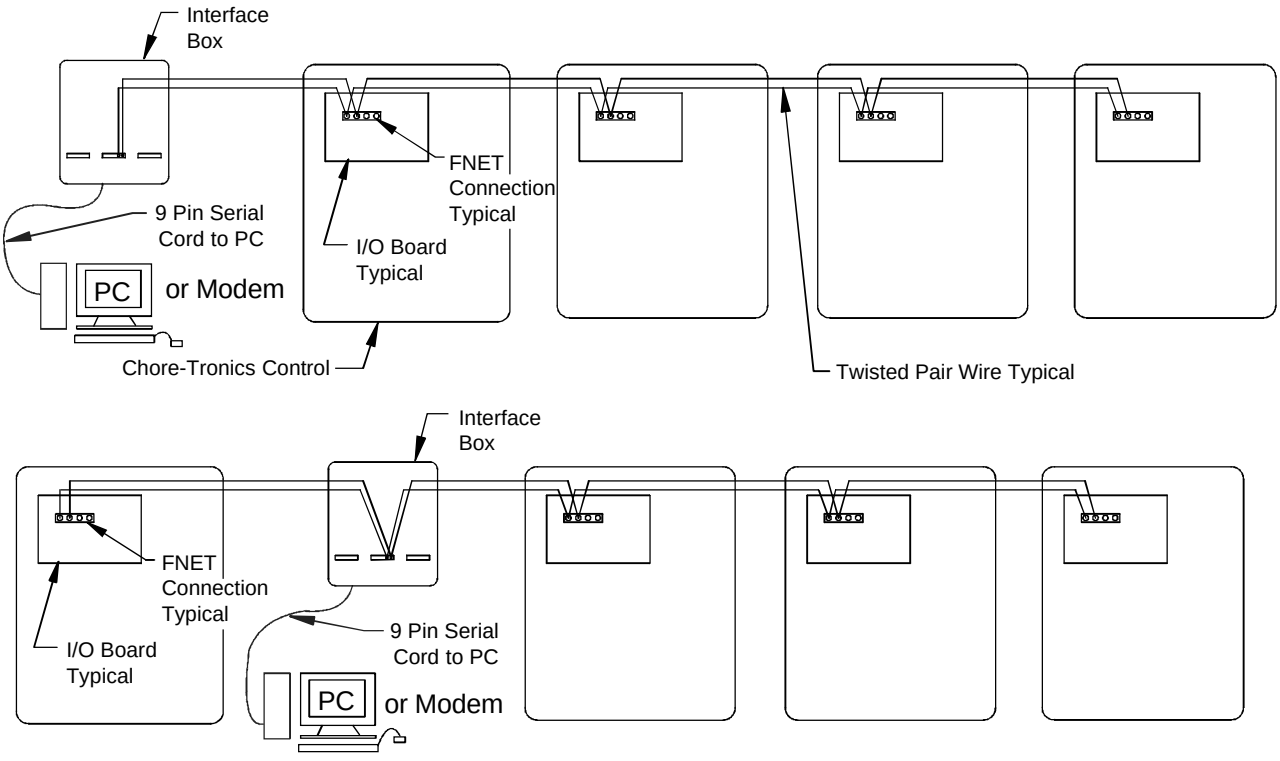
2. Switch position for second variable speed module.



{Note} **Since variable speed modules are added in the field, they will NOT come preset from the factory.**

PC Connection

The Controls in each house are connected together at the FNET Terminal Connectors as shown below. To see where the FNET Terminal Connectors are located on the I/O Board see **Figure 46**. Use only Twisted Pair Wire (Chore-Time Part No. 42208). The Interface Box can be wired in anywhere either at the beginning of your string, at the end, or between Controls; but not to more than one Control as shown in the **Figure 53.** below.



Incorrect Installation

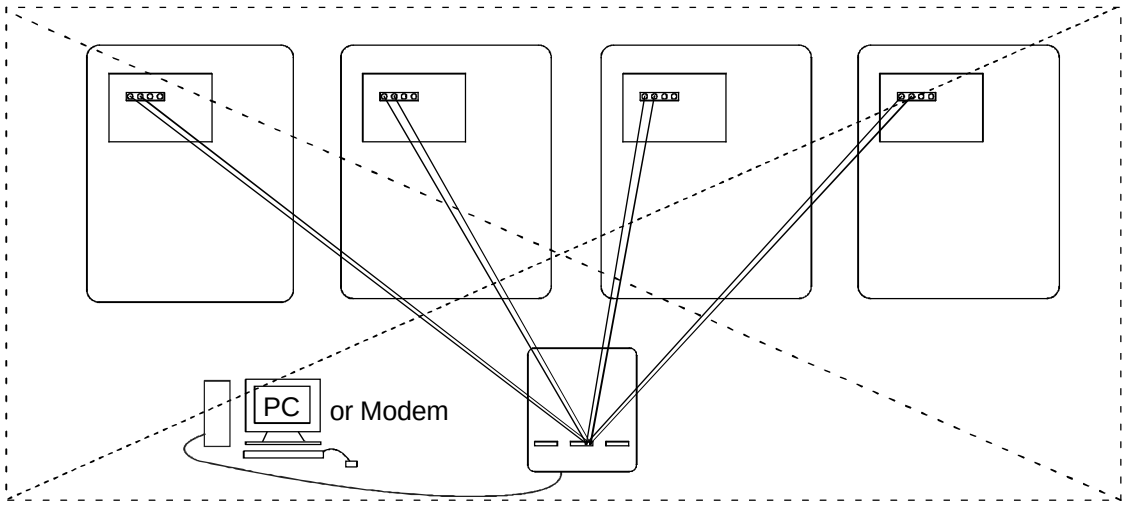


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Figure 53. PC Connection

Technical Specifications

Ambient Operating Temperature Range… -10°C to 50°C/14°F to 122°F

Set Temperature Range….4.4°C to 48.9°C/ 40°F to 120°F

Timer Ranges....
Timer 1, Timer 2: 0 to 2000 seconds on/0 to 2000 seconds off.
Min Vent Timer: 30-2000 or 0 seconds on/60-2000 or 0 seconds off.
Stir On timer: 0-Min Vent off time.

Supply Voltage……200-240 Vac 50-60 Hz

Supply Current……100 mA

Output Relays
Contacts……..SPST Normally Open contacts
Voltage……250 Vac max
Load……1 HP@ 240 Vac
.5 HP @ 120 Vac
1000 W Incandescent Light Load @ 120 Vac Coil……24 Vdc

Variable Speed Modules
Input Voltage Range….. 85-264 Vac
Load……6 A max-standard/20 A max optional

Operating Percentage….0 to 100%

External Power Output
Voltage…….24 Vdc $^{+}$/- 1.5V
Load……Back-up box only

External Battery Input (To temporarily operate outputs manually)
Voltage…….24 Vdc
Load…… (.6) A max

Temperature Sensors:
NTC Thermister range: -30°C to 50°C/-22°F to 122°F; 10KΩ @ 77°F $^{+}$/- .7°F

Sensor Wire…….20 gauge single twisted pair wire, 1 twist every 2 inches, unshielded wire. Use of Chore time part number 42208 strongly recommended.

Potentiometer (2-wire)…… 0-10KΩ 10-turns (Natural Ventilation Only)

Static Pressure sensor (2-wire)…….0-.4 inches w.c. range, 4-20 mA signal

Relative Humidity Sensor (3-wire)……..0-100% RH range, 0-10 V signal

Pulsed Water Meter (2-wire)…….Closed contact trigger, No voltage input

Low Water Pressure Switch…….Low Pressure Reverse-Action Switch.

Settings (on/off) 10/5 PSIG

FNET Data Voltage Range(C-Central)…….$^{+}$/-5 V

Alarm Relay
Voltage…..250 Vac 125 Vdc
Current……8.0 A @ 250 Vac, 5.0 A @ 30 Vdc

Improving Lightning Surge Suppression

Lightning can be a very destructive and expensive phenomenon. It does not always take a direct “hit” for lightning to cause extensive damage to electrical equipment. The Chore-Tronics controls do have components that help suppress and/or isolate power surges such as lightning. These components many times will protect the controls from the power surge or at least keep the damage isolated to one board on the control. However, more direct strikes or strikes that hit network wires such as alarm wires to phone dialers or the C-Central network can cause damage to numerous boards in numerous controls. If the farm is located in a lightning prone area or if there is a network of wires connecting all Chore-Tronics controls together (such as C-Central or an alarm system), then additional lightning protection should be considered. These products are available from Chore-Time. The products available will be discussed later in this section. It should also be noted that a back-up system consisting of mechanical back-up thermostats be installed in the event of a control failure. Chore-Time has a back-up box available (Part Number 40727).

Before obtaining lightning suppression devices, first check the system grounding of each house/room. Every building needs to have its own ground rod and that ground rod must be driven deep enough into the ground that it will have good contact year round. Please check with the local electrician and/or electrical inspector for specific ground rod requirements in your area. In some areas one ground rod may not be sufficient to provided a good ground to earth, in that case an electrician should be consulted to find alternate ways of obtaining a good Earth ground. Again, be sure to check with a qualified electrician for grounding requirements.

Once a good grounding system has been established, if lightning is still a concern, surge suppressors should be considered. It is recommended that there be a suppressor installed at the main distribution panel for the farm (Chore-Time Part Number 47663) and a suppressor installed on the service panel of each house/room (Part Number 47662). If C-Central and/or an alarm system is used then there should be a low voltage suppressor (Part Number 47660) installed at every control and a telephone line suppressor (Part Number 47661) installed at the phone line on the farm. **See Figures 54 through 57** on the following pages for the wiring diagrams and more information on location and installation of these devices.

Installing these devices does not guarantee that the farm will not be struck by lightning or that equipment will not be damaged from lightning strikes. However, they will greatly increase the amount of protection already there, and thus will reduce the chances of having lightning damage occur.

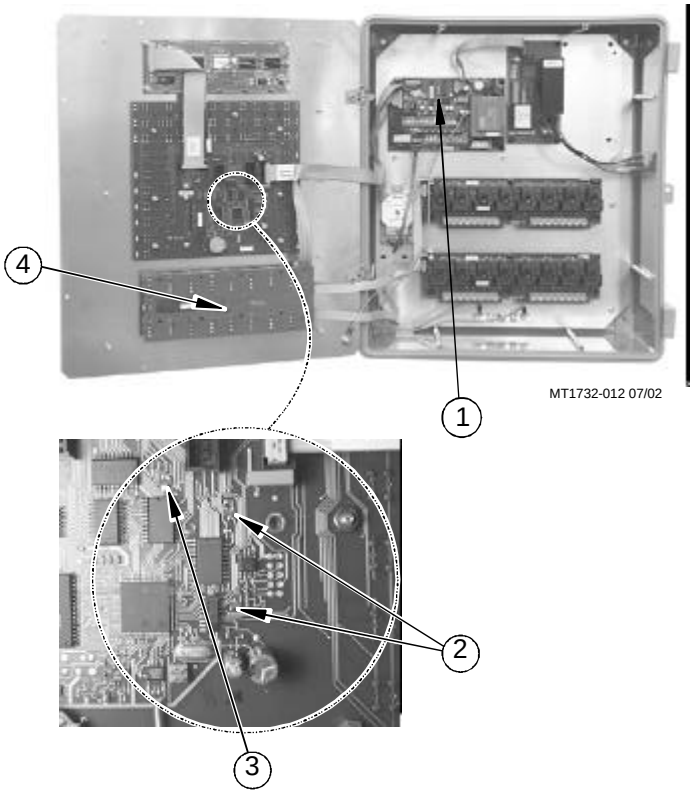
Troubleshooting after a Lightning Strike

On **page 95** there is a flow chart to help trouble shoot a Control that has taken a lightning strike. Keep in mind that the flow chart represents what can happen when lightning strikes a Control. Before using the chart please **see Figures 54-57 below** to become familiar with terms and location of equipment discussed in the chart. If after using the chart the Control still does not function please contact your Chore-Time distributor or Chore-Time Technical Service Department.

If the Control(s) located on the farm are taking multiple hits a year, please see the section following the trouble shooting chart on suggestions for improving lightning suppression on the farm. Look at this section particularly if you have C-Central installed on the farm and/or a telephone dialer system where all controls are connected to one dialer.

NOTE: If the display at the control is not functional (unreadable or no display), troubleshoot the other boards first because the display may not be bad.

If you think your Control has been subject to a lightning strike check to see if the Indicator Lights on each Board are either on or Flashing on and off. **(Figure 54)**. If an Indicator Light is not on then that is an indication that that Board has been damaged.



Item	Description
1	I/O Board Indicator Light (Should be Flashing)
2	KD Board Indicator Lights
3	KD Board Indicator Light (Should be Flashing)
4	Manual Switch (MS) Board Lights (Should be Flashing)

Figure 54. Board Indicator Lights

47662 Farm Main Service Panel Surge Suppressor Wiring Diagram

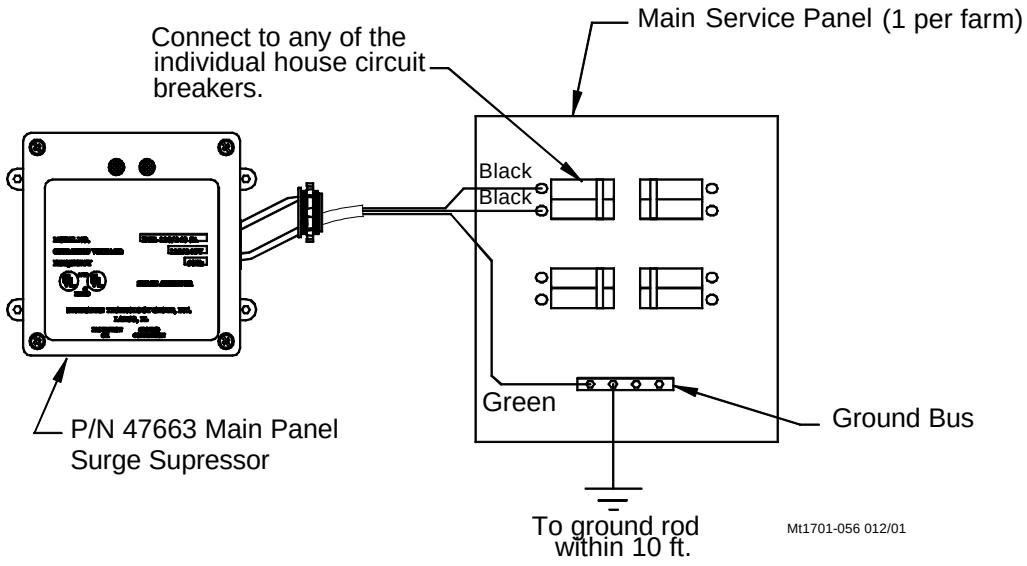


Figure 55. Service Panel Surge Supressor Wiring

47663 House Main Service Panel Surge Suppressor Wiring

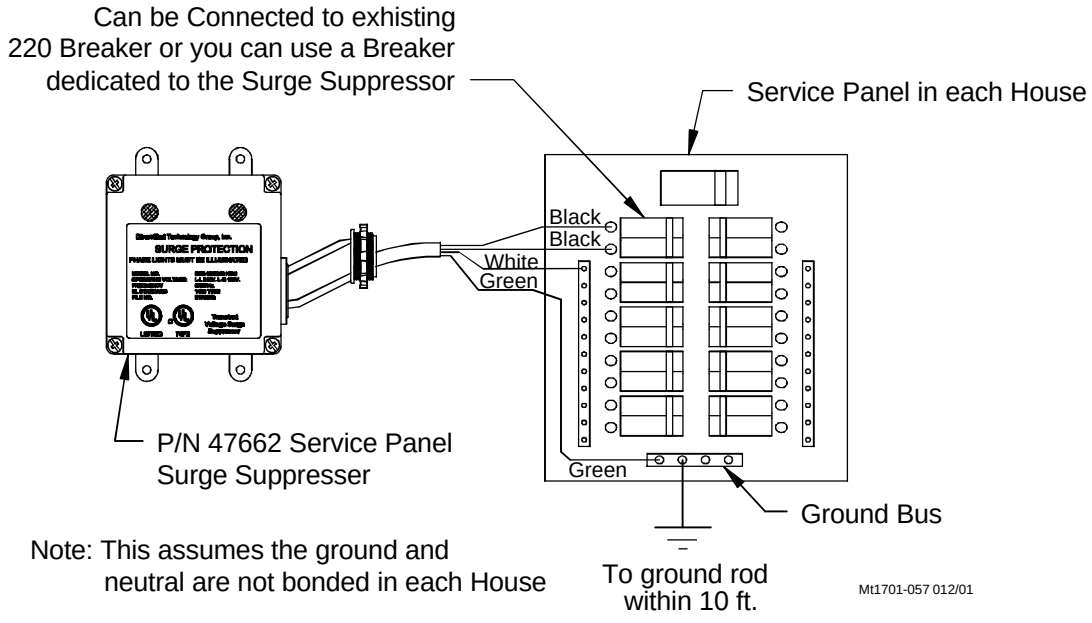
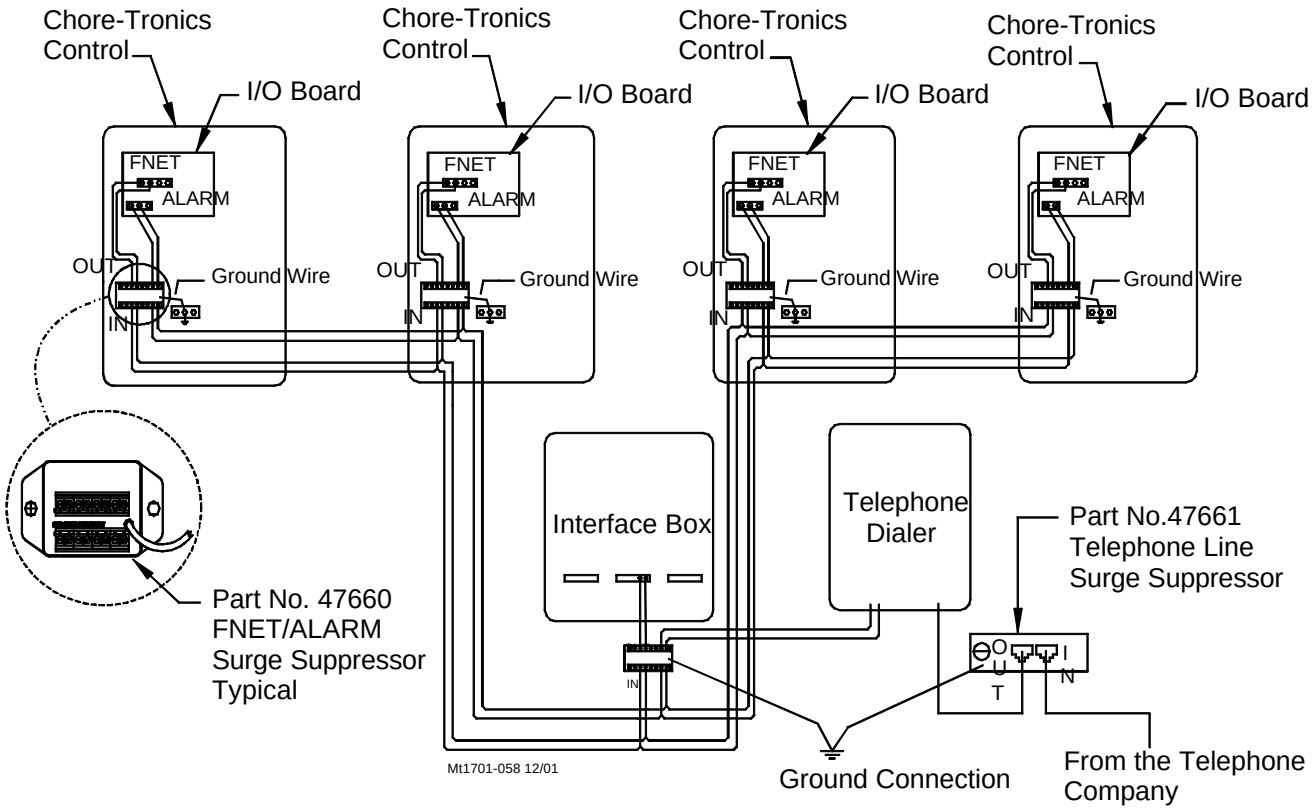


Figure 56. Main Service Panel Surge Supressor Wiring

47660 FNET/ALARM & 47661 Telephone Line Surge Suppressor Wiring

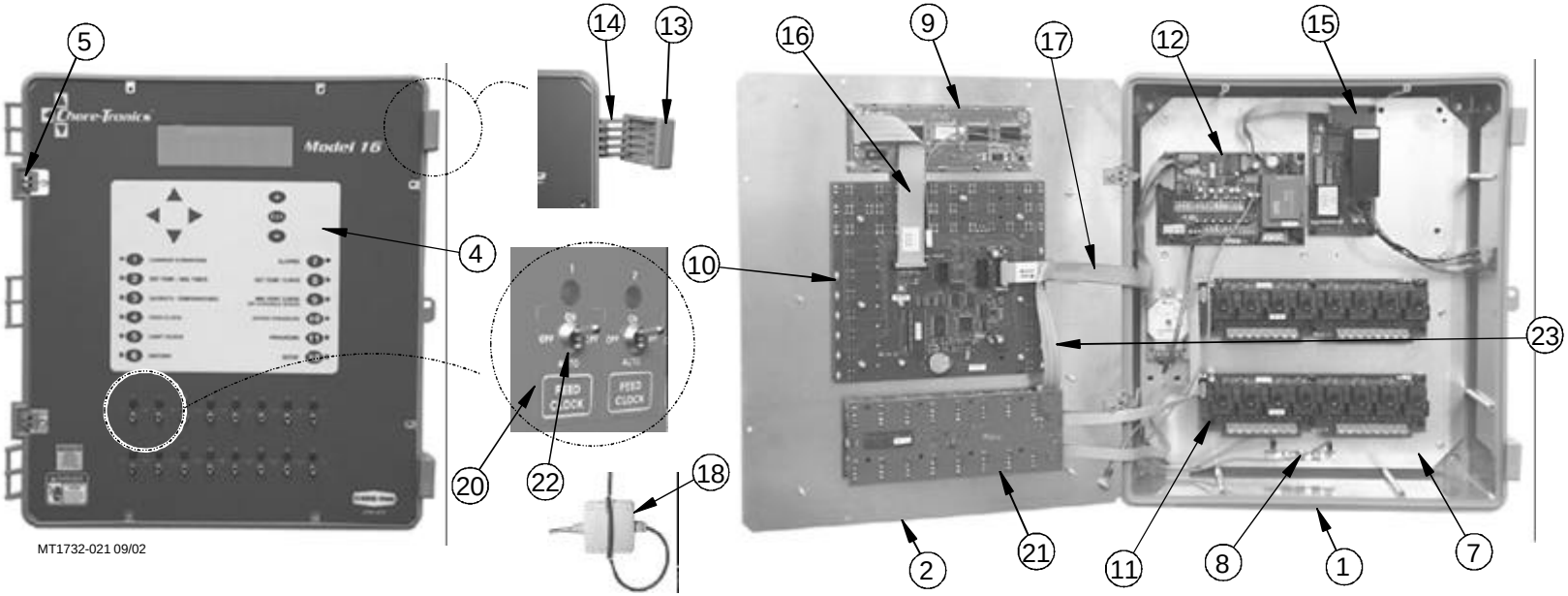


Note: There must be a ground rod within 10 ft. of the ground terminal of each surge suppressor. The wire size from the suppressor to the ground rod should be 12 gauge or larger.

Figure 57. FNET Alarm and Telephone Line Surge Supressor Wiring

Parts Lists and Kits

Model 16 (40726) Control Parts Listing



Item	Description	Part No.
1	Electric Box 14 x 16	42684
2	Mod 16 Top Plate	41322
3*	Electric Box Lid 14 x 16	42683
4	Model 16 Main Front Decal	2529-675
5	Front Panel Hinge	41016
6*	Cover Plate (See Page 61)	41323
7	Main Bottom Plate	41324
8	Grounding Rail	43384-2
9	Display 8 x 40	41317
10	KD Board	41315
11	RM8 Circuit Board	41306

Item	Description	Part No.
12	I/O Board	41312
13	Control Box Latch	30862
14	Control Box Latch Pivot	30863
15	Variable Speed Module (Optional)	Varies
16	KD-Display Flat Cable	41975
17	KD-I/O Flat Cable	41977
18	Temporature Sensor	40741
19*	Relay List Decal	2526-378
20	Manual Switch Decal	2529-684
21	Manual 16 Switch Board	41309
22	Decorative 9mm Nut	42803
23	IO-MS Flat Cable	41980
* Not shown		

Figure 58. Parts Listing

40730 Static Pressure Kit

Item	Description	Part No.
1	Static Pressure Sensor	44743
2	1/2" Water Tight Connector	23779
3	#8x.375 Hx WH Screw	13019
4	Conduit Lock Nut	3357
5	Reducer Barb	42777
6	Twisted Pair Sensor Wire	42208
7	3 Pos. Terminal Connector	41948

40727 Chore-Tronics Backup Box

Item	Description	Part No.
1	Thermostat	25708-CF
2	Control Box Lid	30859-2
3	Terminal Mount Bracket	34563
4	DPST Relay	34654
5	Relay Mounting Plate	34655
6	Warning Decal	2527-15
7	Control Box	30860-3
8	SPDT 220 VAC Relay	34702
9	12 Pole Terminal Strip	34925

40666 Potentiometer Kit

Item	Description	Part No.
1	Potentiometer Base	40612
2	10 Turn Potentiometer	40611
3	Reel Cable	40610
4	Electrical Box (Mach)	41499
5	Nylon Hose Clamp	37144
6	Wire Assembly	40666W
7	Gasket	42854
8	Tall 4 x 6 Box Lid	42852
9	Potentiometer Wiring Decal	2529-641
10	Potentiometer Decal	2529-640
11	Cable Guide	41428
12	3 Pole Terminal Strip	34925-3
13	.25 ID Coupler Hose	40667
14	Potentiometer Bracket	40668
15	Potentiometer Holder	40613

Variable Speed Kits

Variable Speed Kit 40729

Repair Parts	
Description	**Part No.**
Flat Cable	41982
VSM Board (6 AMP Output)	41314
Plastic Mount Connector	42529
Toggle Switch	20135

Variable Speed Kit 42520

Repair Parts	
Description	**Part No.**
Flat Cable	41982
VSM Board (PB20 Driver	45709
Plastic Mount Connector	42529
Model 20 Control	41521

Variable Speed Kit 42521

Repair Parts	
Description	**Part No.**
Flat Cable	41982
VSM Board (6 AMP Output)	41314
Plastic Mount Connector	42529
Toggle Switch	20135

Variable Speed Kit 42522

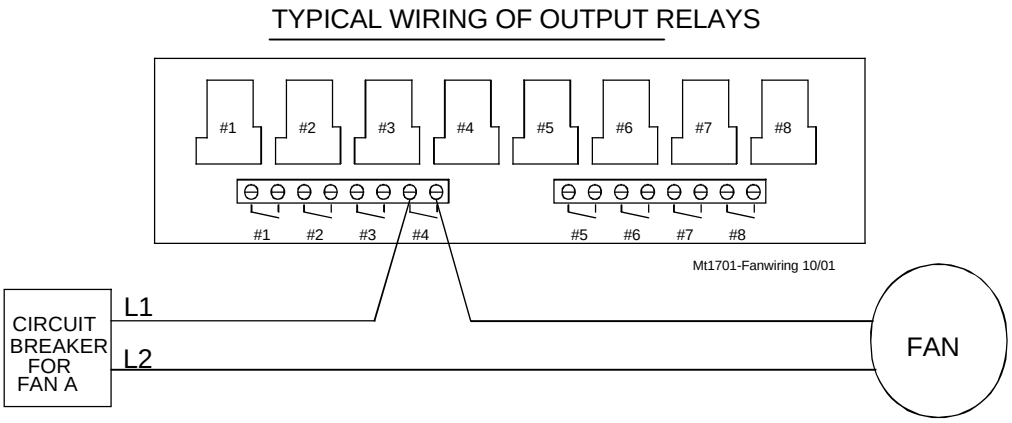
Repair Parts	
Description	**Part No.**
Flat Cable	41982
VSM Board (PB20 Driver	45709
Plastic Mount Connector	42529
Model 20 Control	41521

Variable Speed Kit 42523

Repair Parts	
Description	**Part No.**
Flat Cable	41982
VSM Board (PB20 Driver	45709
VSM Board (6 AMP Output)	41314
Plastic Mount Connector	42529
Model 20 Control	41521
Toggle Switch	20135

Wiring Diagrams

Fan Wiring Diagram



ALL OUTPUT RELAYS ARE SPST WITH DRY CONTACTS AS SHOWN. THIS SHOWS A TYPICAL SITUATION WHERE A FAN HAS BEEN ASSIGNED TO RELAY 4 IN THE SETUP SCREEN.

NOTE: EACH RELAY'S CONTACTS ARE CLOSED WHEN THE OUTPUT THAT IS ASSIGNED TO THAT RELAY IS SUPPOSED TO BE ON.

Figure 59. Fan Wiring

Super-Lift Wiring Diagram

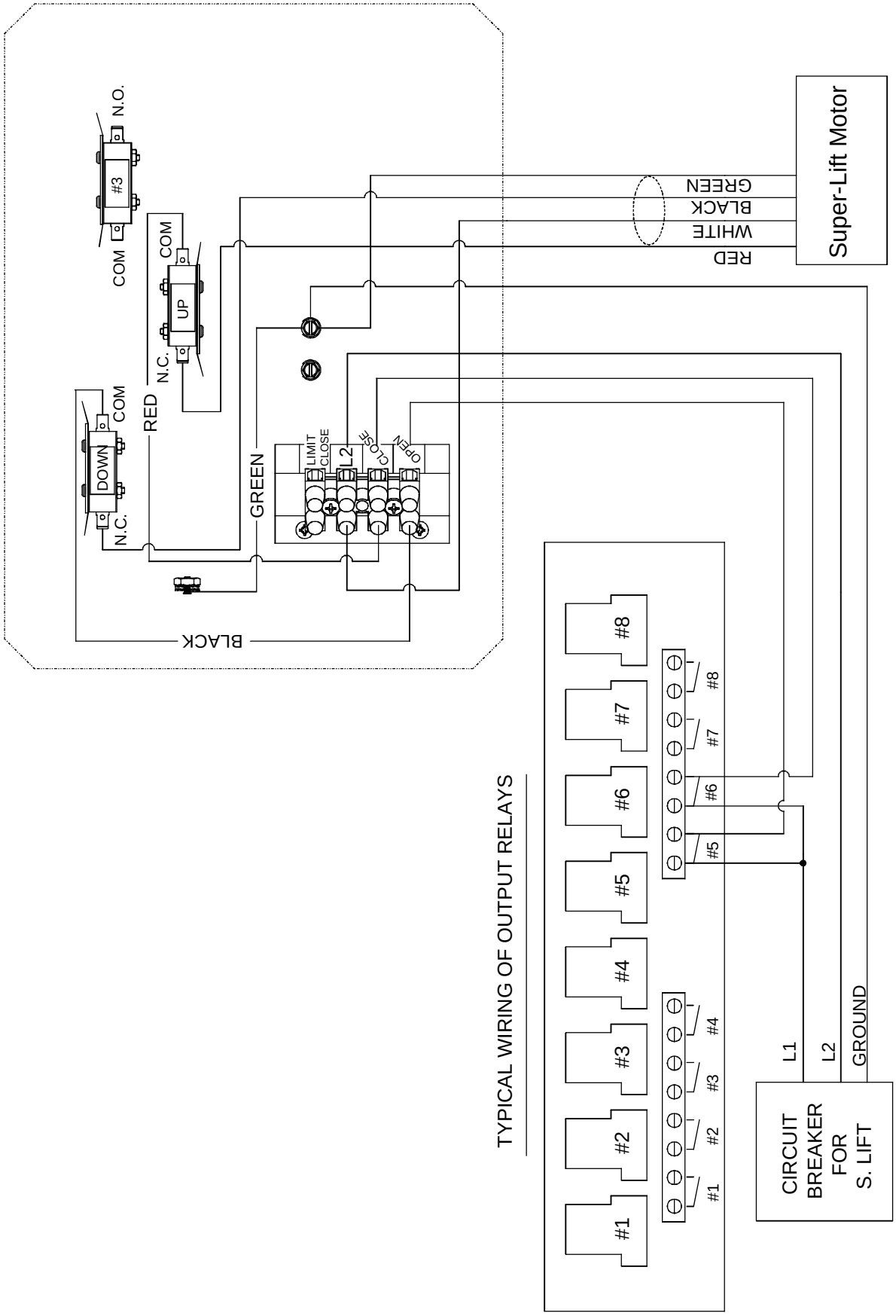
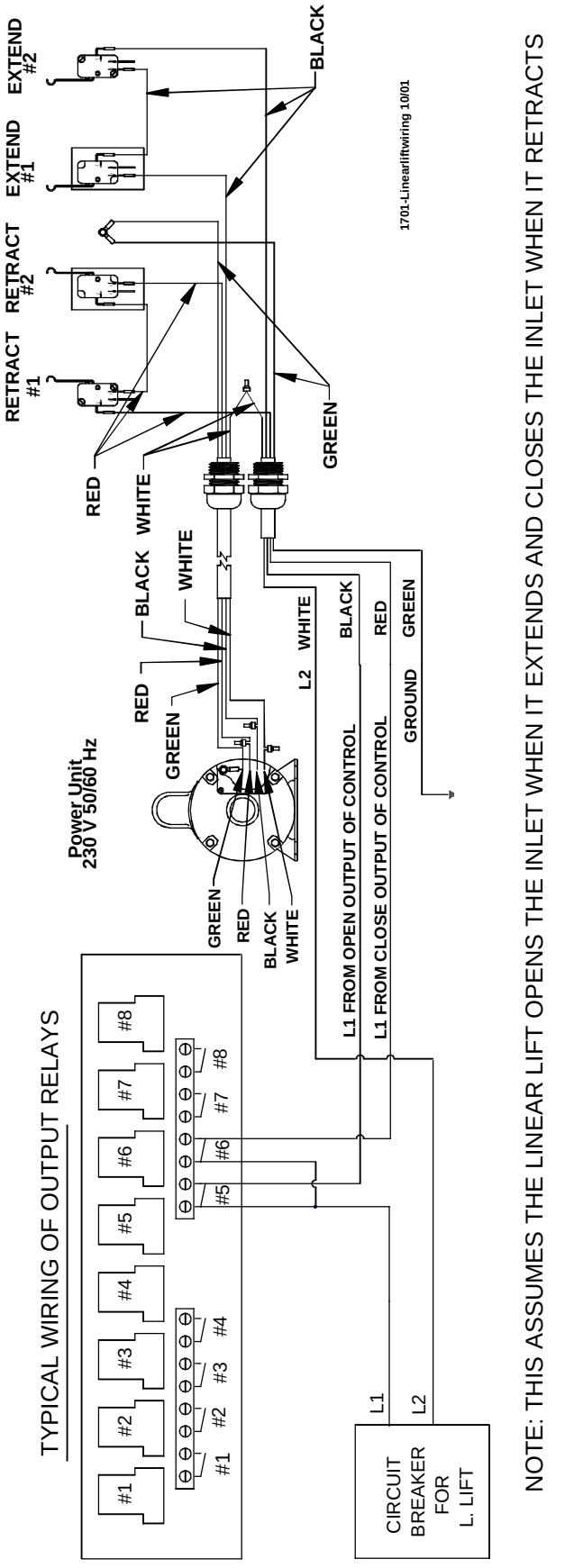


Figure 60. Super-Lift Wiring

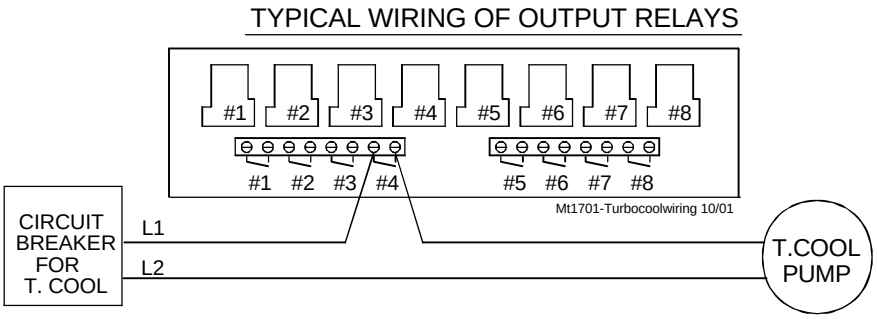
Linear Lift Wiring Diagram



NOTE: THIS ASSUMES THE LINEAR LIFT OPENS THE INLET WHEN IT EXTENDS AND CLOSES THE INLET WHEN IT RETRACTS

Figure 61. Linear Lift Wiring

Turbo-Cool™ Wiring

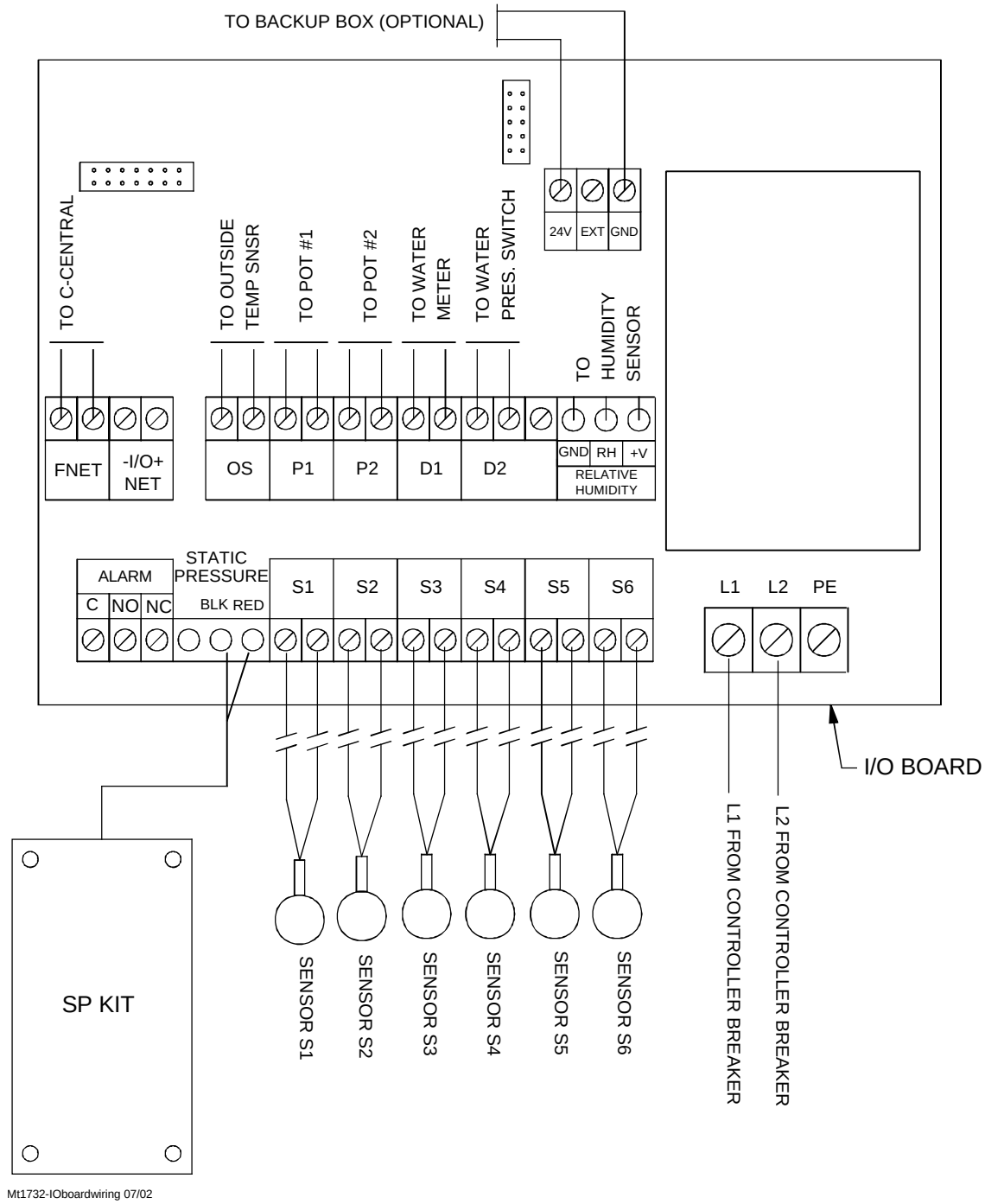


ALL OUTPUT RELAYS ARE SPST WITH DRY CONTACTS AS SHOWN. THIS SHOWS A TYPICAL SITUATION WHERE THE TURBO COOL PUMP HAS BEEN ASSIGNED TO RELAY 4 IN THE SETUP SCREEN.

NOTE: EACH RELAY'S CONTACTS ARE CLOSED WHEN THE OUTPUT THAT IS ASSIGNED TO THAT RELAY IS SUPPOSED TO BE ON.

Figure 62. Turbo-Cool Wiring

I/O Board Wiring



Mt1732-IOboardwiring 07/02

NOTE - THREE-CONDUCTOR WIRE REQUIRED FOR RELATIVE HUMIDITY.

Figure 63. I/O Board Wiring

Variable Speed Kit 40729 Wiring

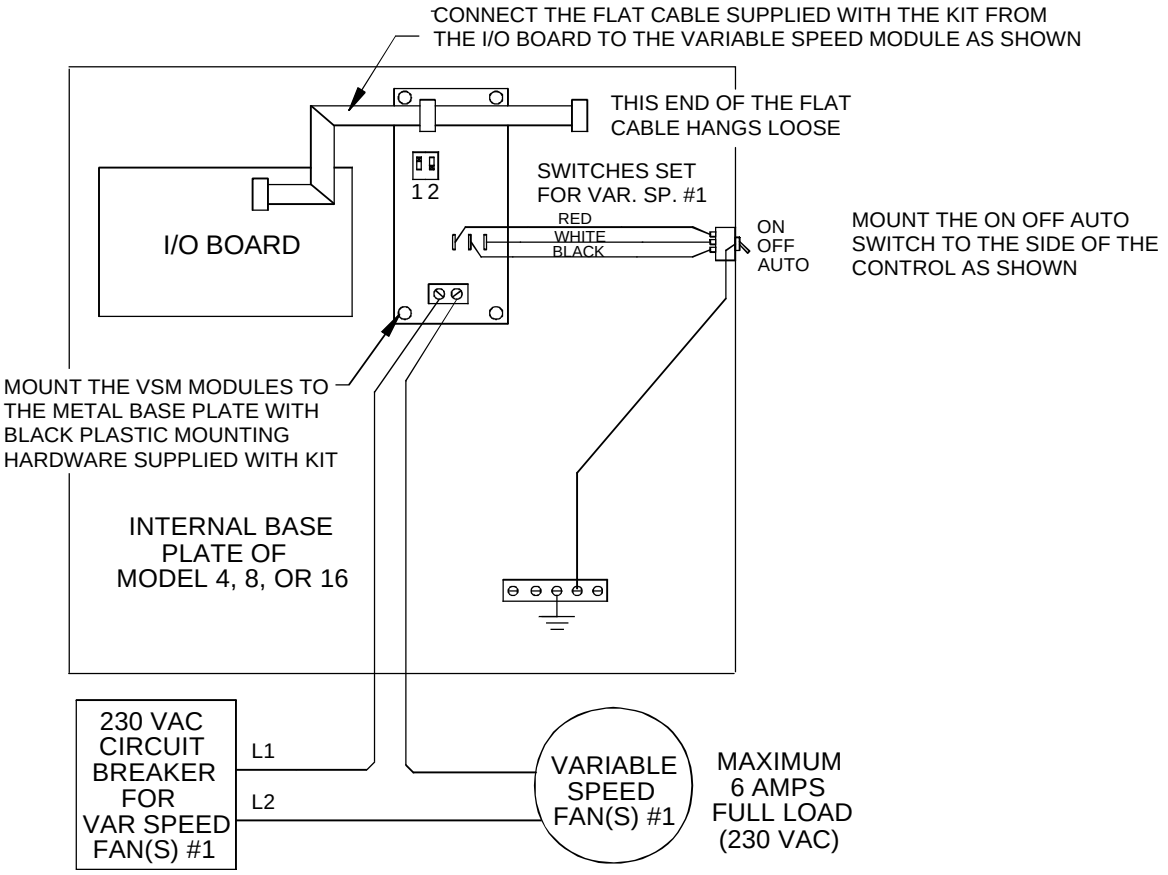


Figure 64. Variable Speed Kit 40729 Wiring

Variable Speed Kit 42520 Wiring

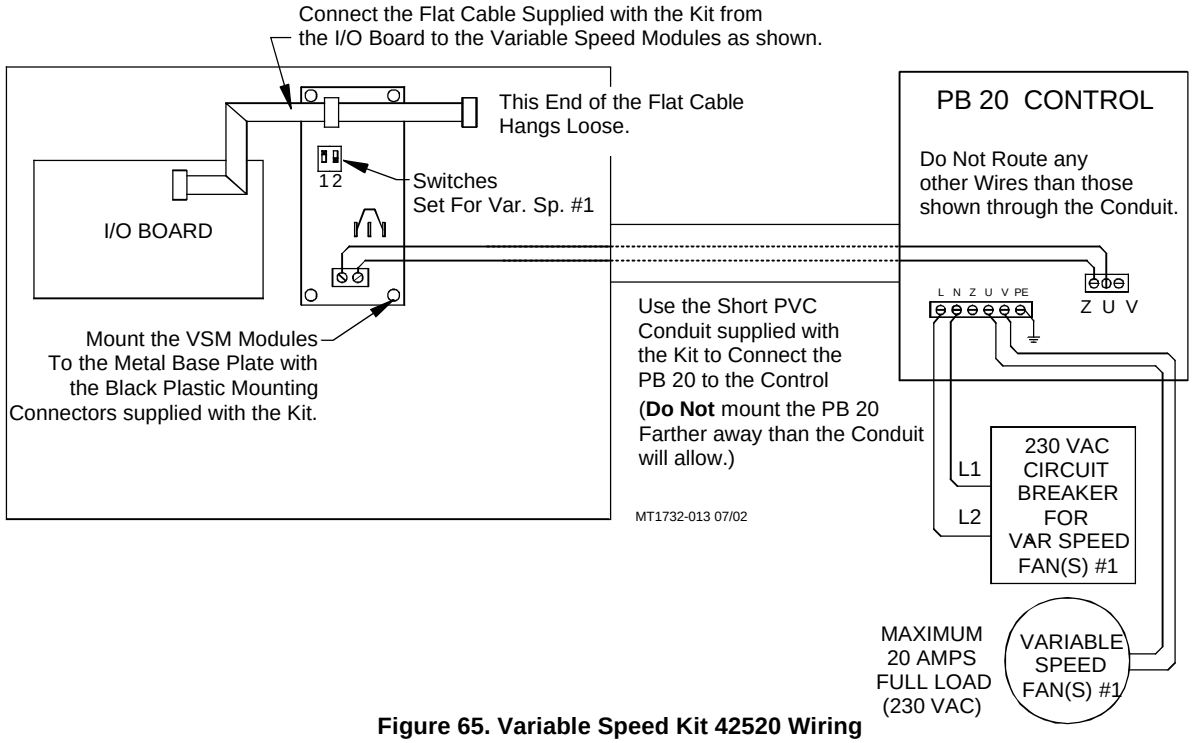


Figure 65. Variable Speed Kit 42520 Wiring

Variable Speed Kit 42521 Wiring

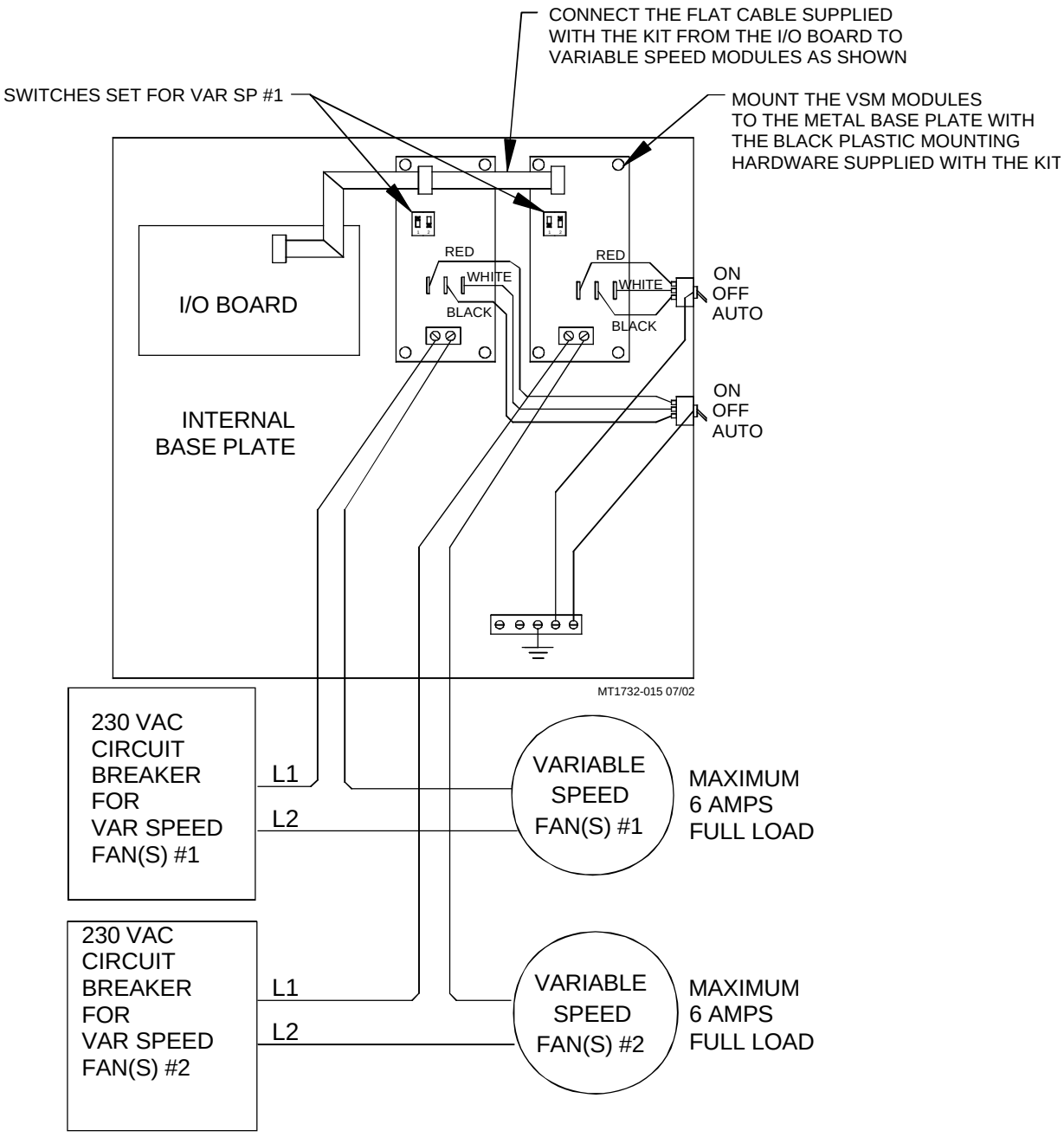


Figure 66. Variable Speed Kit 42521 Wiring

Variable Speed Kit 42522 Wiring

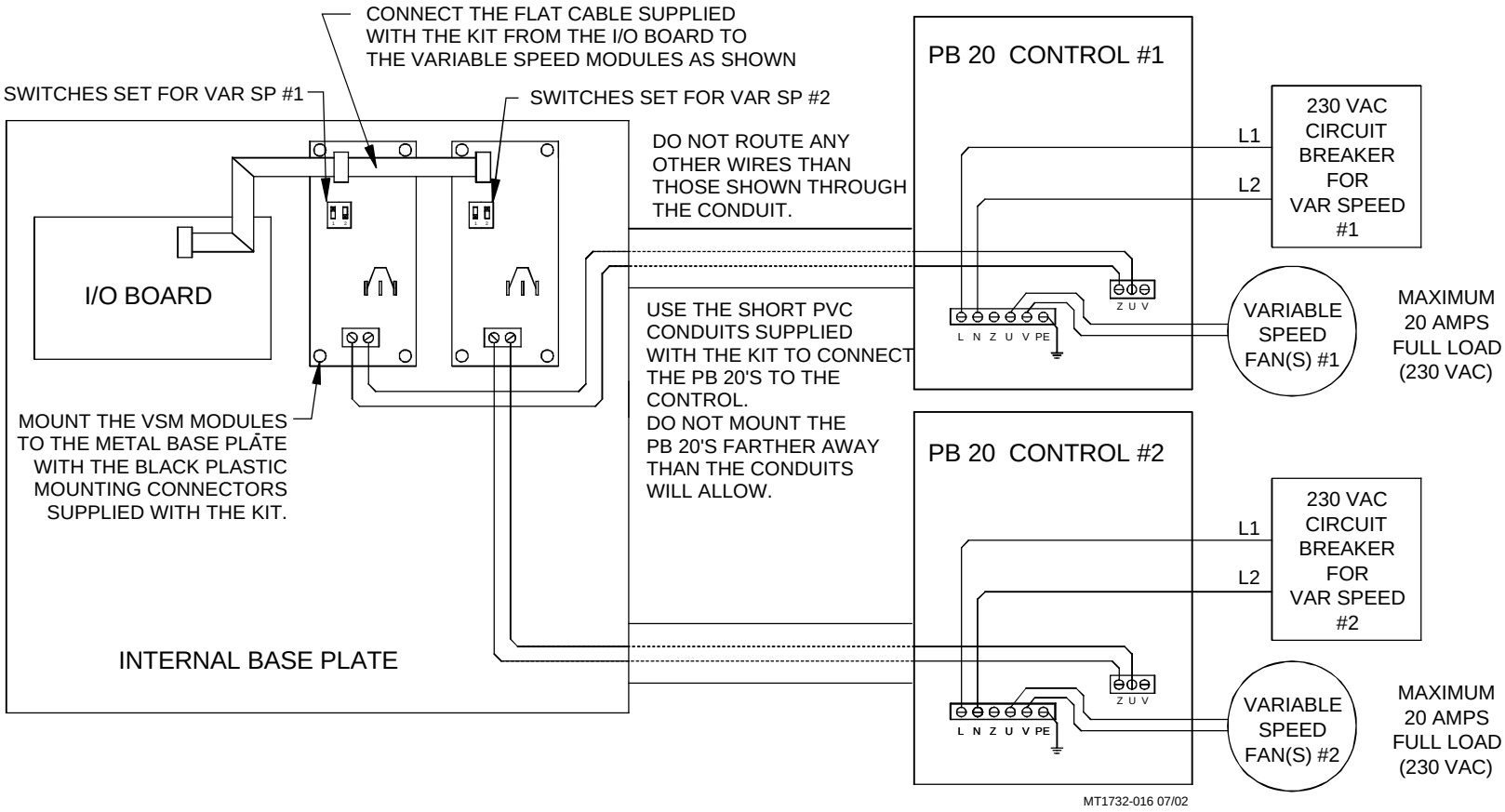


Figure 67. Variable Speed Kit 42522 Wiring

Variable Speed Kit 42523 Wiring

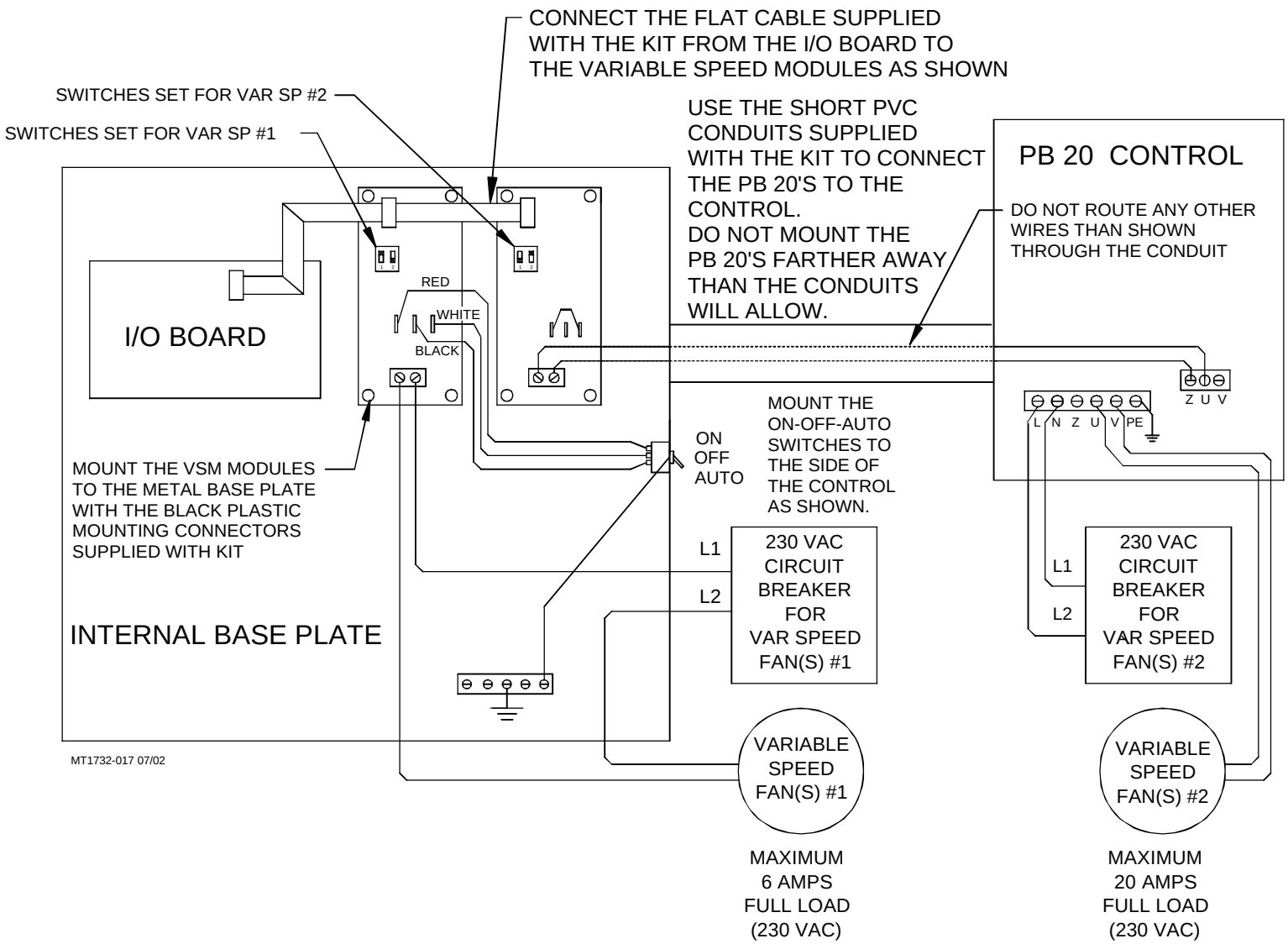


Figure 67. Variable Speed Kit 42523 Wiring

Brooder Wiring

Lightning Strike Troubleshooting Flowchart

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Made to work.
Built to last.

Revisions to this Manual

Page No.	Description of Change
	New Book

Contact your nearby Chore-Time distributor or representative for additional parts and information.

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