

HomeVision-Pro Overview for HomeVision Users

This document has two main purposes:

1. To describe the main differences between *HomeVision* and *HomeVision-Pro*.
2. To assist *HomeVision* users in converting to *HomeVision-Pro*.

HomeVision and HomeVision-Pro Comparison

Following is a summary of the important differences between *HomeVision* and *HomeVision-Pro*.

- The *HomeVision-Pro* software is extremely similar to the *HomeVision* software. The only significant difference is that the *HomeVision-Pro* software automatically enables or disables the functions appropriate to it.
- The *HomeVision-Pro* software can open a schedule file created in the *HomeVision* software. It will save it in the *HomeVision-Pro* format, after which the *HomeVision* software will not be able to read it. Although most of the conversion process is automatic, the user may have to make some manual adjustments.
- The 4 inputs analog inputs on *HomeVision-Pro* will be numbered 0 through 3. The first Multifunction Expansion Board's analog inputs will now be numbered 4 to 11, and the second board's will be numbered 12 to 19.
- All digital temperature sensors must be connected directly to *HomeVision-Pro*. The inputs on the Multifunction Expansion Board cannot be used with *HomeVision-Pro*.
- *HomeVision-Pro* Port A drives single-pole-double-throw (SPDT) relays. *HomeVision* Port A provided only relay drivers – it required external relays.
- *HomeVision-Pro* input Port B contains switches to disable the pullup resistors (these couldn't be disabled on *HomeVision*).
- *HomeVision-Pro* contains a jack to receive infrared signals from (in addition to the two built-in infrared optical receivers like *HomeVision* has). If this jack is used instead of the optical receivers, the optical receivers can be disabled with switches.
- In addition to the main serial port (#1), *HomeVision-Pro* contains two additional serial ports (numbered 3 and 4). These ports provide the same capabilities that the HomeVision-Serial add-on devices provide to *HomeVision*. These can use either RS232 or RS485 for communications.
- *HomeVision-Pro* contains a USB-to-serial converter that can be used with the main serial port (#1) or port #3. To do this, you might place appropriate jumpers on the "Serial Port Configuration Header". In addition, if the USB port will communicate with a PC, you must install the USB drivers on the PC.
- *HomeVision-Pro* contains a "Serial Port Configuration Header" that routes the various serial ports to the different connectors they can use. The user must place "jumpers" on the appropriate points to make the desired connections.
- *HomeVision-Pro* does not contain a "user LED".
- *HomeVision-Pro* requires a regulated 12VDC, 1.5Amp power supply. Lower voltage supplies may not be able to turn on the Port A relays. An unregulated supply will work, but the voltage may go well above 12V. This would cause higher power dissipation in the *HomeVision-Pro* 5V regulator, and long-term use could possibly damage it. Supplies with

as low as 1Amp of current will likely work if no accessories are connected to *HomeVision-Pro*, but a 1.5Amp supply is preferred to increase long-term reliability.

Converting a *HomeVision* Schedule File to *HomeVision-Pro*

The *HomeVision-Pro* software is a modified version of the *HomeVision* software, and performs virtually identically. The main difference is that the *HomeVision-Pro* software expects to be creating and loading schedules into a *HomeVision-Pro* unit. **You should not use it to load a schedule into a *HomeVision* unit**

The *HomeVision-Pro* software can open a schedule file created in the *HomeVision* software. It will save it in the *HomeVision-Pro* format, after which the *HomeVision* software will not be able to read it. Most of the conversion will take place automatically. However, there are some things the user may have to change manually:

- Analog inputs. If your *HomeVision* schedule enabled one or two Multifunction Expansion Boards, it will have created eight analog inputs for each board. These inputs will have been numbered 0 through 7 or 15. *HomeVision-Pro* provides an additional 4 analog inputs, and these will always be numbered 0 to 3. The first Multifunction Expansion Board's inputs will now be numbered 4 to 11, and the second board's will be numbered 12 to 19.

However, any analog input commands in your schedule will **not** automatically be renumbered. You will have to manually adjust these commands (unless you instead move the connections to the new ports). For example, assume your *HomeVision* schedule had a temperature sensor on the first analog input on the first Multifunction Expansion Board. This would have been referred to as analog input #0. After opening the schedule in the *HomeVision-Pro* software, a schedule command to read that input value into a variable will still refer to analog input #0. However, analog input #0 now refers to the first analog input on the *HomeVision-Pro* board. If you want to leave the temperature sensor connected to the same location, you must change the command so that it reads analog input #4. You should also then use the Analog Input Screen (under the Objects/Events menu) and adjust the analog input name. Alternatively, you could move the sensor to the first *HomeVision-Pro* input and leave it as number 0 in your schedule.

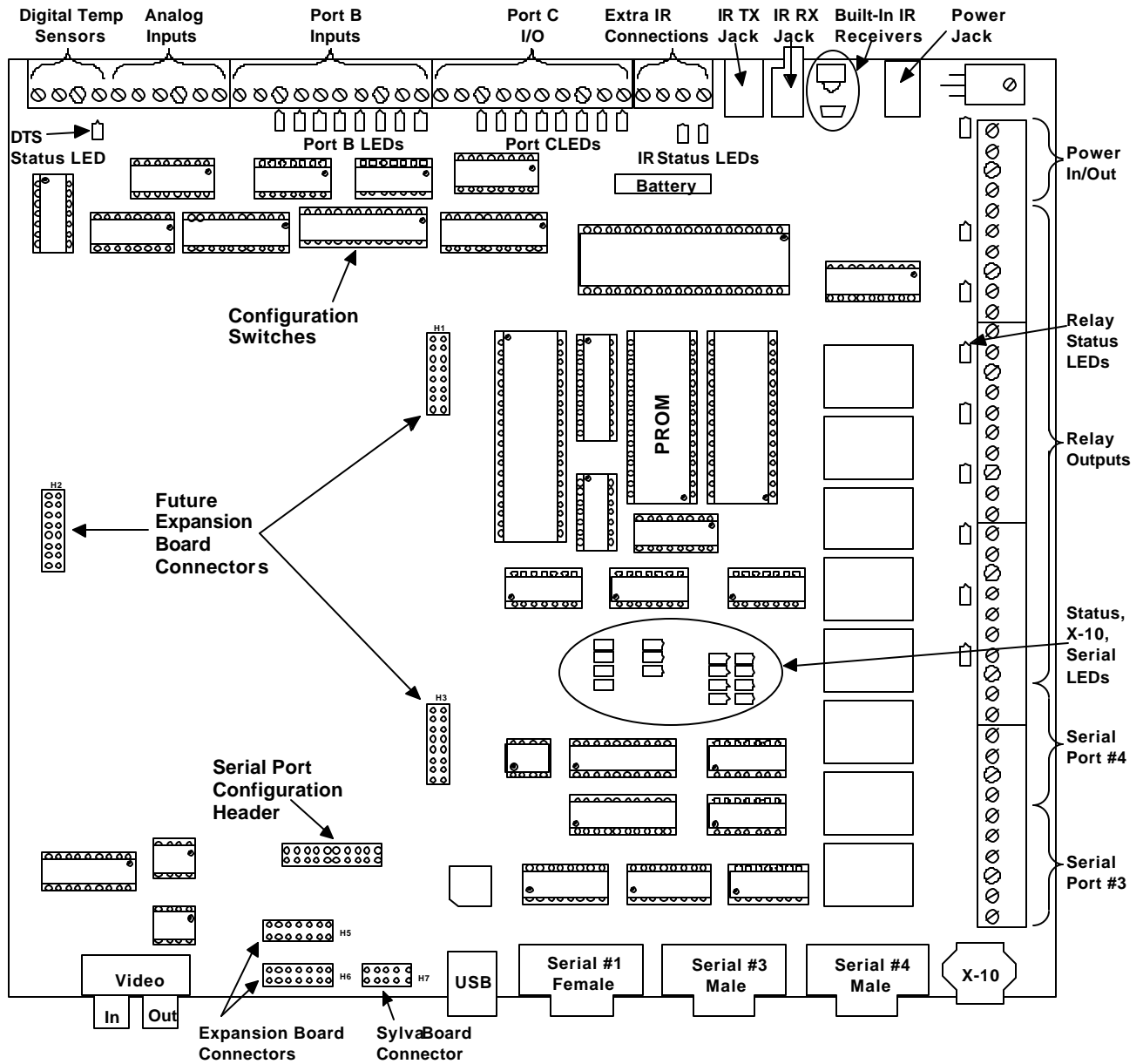
- Since *HomeVision-Pro* does not contain a "user LED", you should delete any user LED commands from your schedule (although leaving them in shouldn't cause any problems).

In addition to software changes, there are several hardware issues to consider when switching over to *HomeVision-Pro*:

- Digital temperature sensors. All digital temperature sensors must be connected directly to *HomeVision-Pro*. The inputs on the Multifunction Expansion Board cannot be used with *HomeVision-Pro*.
- Multifunction Expansion Boards or a *HomeVision-Phone* device can be connected to either of the two 14-pin expansion headers labeled H5 and H6 on the circuit board.
- Any Sylva 8O8I boards can be directly connected to the 10-pin header on *HomeVision-Pro*. They do not have to be connected to the 10-pin header on a Multifunction Expansion Board (although they may).
- Any relays you had connected to *HomeVision* Port A can now be eliminated and the on-board *HomeVision-Pro* relays may be used instead (assuming the single-pole-double-throw relays meet your needs). Alternatively, you could use the Port A relays to drive external relays (this is required if you need to switch higher currents or voltages than the *HomeVision-Pro* relays are rated for. They are rated for 10Amps at 125VAC, 6Amps at 277VAC, and 5Amps at 100VDC).

Board Drawing

The drawing below shows the *HomeVision-Pro* circuit board and the locations of important connectors and other devices.



HomeVision-Pro Circuit Board

LEDS

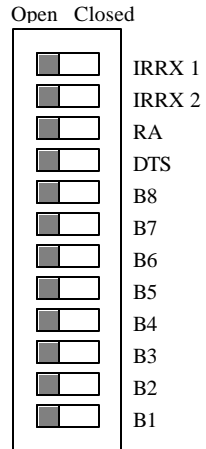
HomeVision-Pro contains 43 status LEDs, described below.

LED	DESCRIPTION
Power OK	Indicates 12VDC power is applied
Status 1	On steady when the controller is running normally. Blinking on and off approximately once per second when the controller is halted (if this happens, reload your schedule into the controller). While recovering from a power failure, this LED will be off and the X-10 Intf LED will be on.
Status 2	On (actually, blinking at a very fast rate that makes it appear on) when the "peripheral" chip is operating properly. If it is off, the "peripheral" chip is malfunctioning (which will cause X-10 and infrared problems).
Status 3	On (actually, blinking at a very fast rate that makes it appear on) when the serial port #3 chip is operating properly. If it is off, serial port #3 will not function.
Status 4	On (actually, blinking at a very fast rate that makes it appear on) when the serial port #4 chip is operating properly. If it is off, serial port #4 will not function.
8 Port A LEDs	On when the relay output is on (high)
8 Port B LEDs	On when the input port is high. The input ports are high when nothing is connected and the pull-up resistor is used, so the LEDs are normally on. When the pull-up resistor is not used, an unconnected input will be low and the LED will be off.
8 Port C LEDs	On when the port is high. When configured as inputs, the ports are high when nothing is connected, so the LEDs are normally on. When configured as outputs, the LED reflects the output state.
Infrared TX	Blinks on when transmitting an IR signal
Infrared RX	Blinks on when receiving an IR signal (either from the built-in receivers or an external receiver)
X-10 Intf	On when the X-10 interface device (TW-523 or equivalent) is connected and powered. Off when not connected or malfunctioning. Note: When the X-10 interface device is connected and using digital temperature sensors, the LED may blink at a very fast rate instead of being on steady.
X-10 TX	On when transmitting an X-10 signal
X-10 RX	On when receiving an X-10 signal. Note that the LED blinks very quickly and is very dim, and may be difficult to see.
Digital temp sensor	Flashes when communicating with a digital temperature sensor
Serial 1 TX	On when transmitting data out serial port #1. It will also be on when transmitting data out the USB port.
Serial 1 RX	On when receiving data in serial port #1. It will also be on when receiving data from the USB port.
Serial 3 TX	On when transmitting data out serial port #3
Serial 3 RX	On when receiving data in serial port #3
Serial 4 TX	On when transmitting data out serial port #4
Serial 4 RX	On when receiving data in serial port #4
USB TX	On when receiving data out the USB port ***
USB RX	On when transmitting data in the USB port ***

*** On the early HomeVision-Pro units, the USB port LEDs are backwards. The RX LED will flash when transmitting, and the TX LED will flash when receiving.

Configuration Switches

HomeVision-Pro has 12 switches that are used to configure certain functions. The 12 switches are located in a single device near the Port C terminal blocks. Each switch has a small slider that can be slid left or right. The circuit board has labels next to each switch indicating its function. The drawing below shows the switches and labels. Each switch can be moved to the left to open the switch, or to the right to close it. See the “Miscellaneous” chapter of the *HomeVision-Pro* owners manual for details on the switch functions.



Port B Inputs

Each of the eight B input ports has an optional “pullup” resistor (a 2200 Ohm resistor that connects between the input port and 5V). This resistor can be connected or disconnected from the port using the Configuration Switches. When connected (the default position), the resistor causes the input port to go “high” when nothing is connected. The switch can then be easily used to connect to “contact closure” devices like switches, motion sensors, etc. One wire from the device goes to the input port, a second wire to a *HomeVision-Pro* ground point. When the switch is open the input port will be “pulled” high by the resistor. When the device contact closes, the input will go to ground and be read as a “low”.

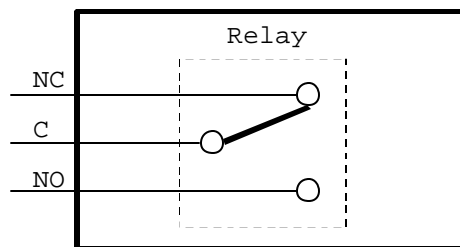
The above setting makes it easy connect switches, but it can be more difficult to connect devices that output voltages. For such devices, the pullup resistor should be disconnected. At this point, the input will go low. The signal wire from the device goes to the input port, the ground wire goes to a *HomeVision-Pro* ground point. When the external device outputs a voltage, the input port will go high.

Relays

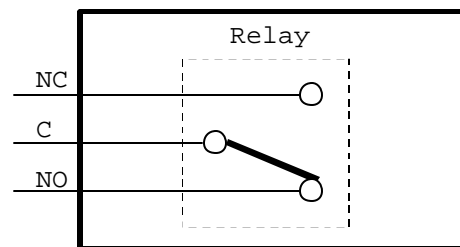
Output Port A contains 8 Single-Pole-Double-Throw (SPDT) relays. A SPDT relay is essentially a switch that can switch one point between two other points. The relays are rated for 10Amps at 125VAC, 6Amps at 277VAC, and 5Amps at 100VDC. Each relay contains three positions that you can wire to:

- Common (C). This position is connected to the Normally-Closed position when the relay is off. It is connected to the Normally-Opened position when the relay is on.
- Normally-Closed (NC). This position is connected to the Common position when the relay is off. It is disconnected from everything when the relay is on.
- Normally-Opened (NO). This position is connected to the Common position when the relay is on. It is disconnected from everything when the relay is off.

The following drawings show how this works:



Relay Off
(Output Low)



Relay On
(Output High)

Analog Inputs

HomeVision-Pro contains four analog inputs. If you have one or two Multifunction Expansion Boards, those boards each provide an additional 8 analog inputs. Those inputs function exactly the same as the *HomeVision-Pro* inputs. This gives a maximum of 20 analog inputs available with *HomeVision-Pro*. The *HomeVision-Pro* inputs will be the first four inputs listed on the "Analog Inputs Screen" under the "Objects/Events" menu. Any Multifunction Expansion Boards inputs will be listed after that. The following list shows how the ID numbers relate to the connection points:

ID #	Located On
0	<i>HomeVision-Pro</i> , input 1
1	<i>HomeVision-Pro</i> , input 2
2	<i>HomeVision-Pro</i> , input 3
3	<i>HomeVision-Pro</i> , input 4
4	MFEB #1, input 1
5	MFEB #1, input 2
6	MFEB #1, input 3
7	MFEB #1, input 4
8	MFEB #1, input 5
9	MFEB #1, input 6
10	MFEB #1, input 7
11	MFEB #1, input 8
12	MFEB #2, input 1
13	MFEB #2, input 2
14	MFEB #2, input 3
15	MFEB #2, input 4
16	MFEB #2, input 5
17	MFEB #2, input 6
18	MFEB #2, input 7
19	MFEB #2, input 8

The analog inputs operate from 0 to 5 VDC and provide 8bit (256 level) resolution. When an input is read, the voltage is converted into a value between 0 and 255 (00h to FFh). This gives a resolution of 19.61mV ($5V \div 255$ steps). To determine the actual voltage from the value read in, multiply the value by 0.01961V. To determine the value that corresponds to a particular input voltage, multiply the voltage by 51 (the reciprocal of 0.01961). The table below shows several input voltages and how they will be read:

Voltage	Value Read
0.000	0
0.020	1
0.040	2
1.000	51
2.500	128
4.980	254
5.000	255

To configure the analog inputs, select "Analog Inputs" from the "Objects/Events" menu. For each input you can enter the following:

- Name
- Description
- Gain and Offset Value. These values are used to automatically adjust the analog input voltage value. One major use is to convert the raw value read in (0 to 255) to a more meaningful value (like temperature in degrees F). This often requires multiplication or

addition, and can be accomplished with the gain and offset values. If you're unsure of how to use these values, simply leave them at their default settings.

HomeVision-Pro multiplies the input value (0-255) by the gain, then adds (or subtracts) the offset value. Mathematically:

$$\text{Final value} = (\text{Input Value} \times \text{Gain}) + \text{Offset Value}$$

where:

- The gain can range from 0 to 2.55 in increments of 0.01. The default value is 1.
- The offset voltage can range from +127 to -128. The default value is 0.

Note: If the result of this calculation is greater than 255, it is set to 255. If the result is less than 0, it is set to 0.

Example:

Assume:

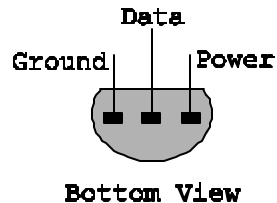
Gain = 2.00
Offset value = 30
Input voltage = 1V

HomeVision-Pro reads the 1V input and converts it to a value of 51 (as described earlier). It then multiplies it by 2 (the gain), giving a value of 102. Finally, it adds the offset of 30, giving the result of 132.

Digital Temperature Sensors

Connections

The digital temperature sensors connect to the controller terminal block in the upper-left corner of the board. The sensor's data wire connects to the "A" (always) or "S" (switched) position. The sensor's 5V and ground wires connect to the corresponding terminal block positions. The DS1820/DS18S20 pins are shown below (note that this is a bottom view).



The "A" (always) terminal block position is always connected to the controller circuitry. The "S" (switched) position is only connected when the "DTS" switch is in the closed position. These different positions are provided to simplify the reading of a sensor's address when first configuring it. When reading the address, only one sensor may be connected at a time. If you already have sensors connected, you would normally have to disconnect them. This switched position provides an alternative, and was intended to be used as follows:

- During normal operation, all sensors are connected to the "S" position. The DTS switch is closed so that the sensors are connected to the controller circuitry.
- When you need to read the address of another sensor, connect it to the "A" position. Open the DTS switch to disconnect the other sensors, leaving only the sensor in the "A" position connected. Read its address. When complete, move the new sensor to the "S" position and close the DTS switch.

In this way, you do not have to disconnect the existing sensors. However, it is OK to use both the "S" and "A" positions for normal operation if you prefer.

Reading a sensor address

To read a sensor's address:

- 1) Connect it to either the "A" or "S" position:
 - If using the "A" position, remove any other sensors that are connected to the "A" position. Place the DTS switch in the open position to disconnect any sensors connected to the "S" position.
 - If using the "S" position, place the DTS switch in the closed position. Remove any other sensors that are connected to the "A" and "S" positions.
- 2) In the Digital Temperature Sensor Configuration Screen, select the single-drop mode.
- 3) Click "Read Address". If successful, the 8-byte address will be displayed. Otherwise, an error message will be shown.
- 4) To add this sensor to the sensor table, click the "Add Sensor" button.
- 5) After reading the address, click "Paste Address" to copy it to the sensor selected in the table. This saves you from having to type the numbers in manually.
- 6) You can also click "Read Temp" to read the current temperature.

After adding sensors in this manner, you must download the schedule for the changes to take affect.

NOTE: The sensors shown in the software table must be present on the wires during normal operation. If not, an error will occur (although this error will not affect the operation of the rest of the system, it's not desirable).

Serial Ports

HomeVision-Pro contains three built-in serial ports that the user can control. In addition, one external port can be added on. The following table summarizes the port capabilities. Refer to the “Serial” chapter of the *HomeVision-Pro* owners manual for details on how the serial ports work.

Port #	Located On	Capabilities
1	<i>HomeVision-Pro</i> female DB9 connector “Serial 1”	<ul style="list-style-type: none">• Main serial port for downloading schedules and interfacing to PC.• Two operating modes:<ul style="list-style-type: none">- RS-232 (standard PC serial port)- USB (when serial port #3 is not using USB mode)• Supports baud rates of 300, 600, 1200, 2400, 4800, 9600, and 19200 (default is 19200).• RS-232 connection through female DB9 connector.• USB connection through USB connector.
2	HomeVision-Phone/Serial add-on device connector	RS-232 (standard PC serial port)
3	<i>HomeVision-Pro</i> male DB9 connector “Serial 3” or terminal block for serial port 3	<ul style="list-style-type: none">• Four operating modes:<ul style="list-style-type: none">- RS-232 (standard PC serial port)- RS-485 full-duplex (4-wire)- RS-485 half-duplex (2-wire)- USB (when serial port #1 is not using USB mode)• Supports baud rates of 300, 600, 1200, 2400, 4800, 9600, and 19200.• RS-232 connection through male DB9 connector or terminal block.• RS-485 connection through terminal block.
4	<i>HomeVision-Pro</i> male DB9 connector “Serial 4” or terminal block for serial port 4	Same as port 3, except that USB option is not available

Serial Port Configuration Header

The *HomeVision-Pro* serial ports may be configured in several different ways. The “Serial Port Configuration Header” routes the ports to the different connectors that they can use. The user must place “jumpers” on the appropriate points to make the desired connections, as described below. Refer to the “Serial” chapter of the *HomeVision-Pro* owners manual for details.