# Using the Two-Way X-10 Modules with HomeVision

## Module Description

X-10 recently introduced several modules (such as the LM14A lamp module) that can transmit their status via X-10. When these modules receive an X-10 "Status Request" signal, they will respond with either a "Status is On" or "Status is Off" signal. This allows HomeVision to determine whether the module is actually on or off. Note that there is no way to determine what level the module is at if it's on.

## Overview

Using the two-way capability of these modules requires two steps in your HomeVision schedule:

1) Requesting the module status.
2) Reading the module response and taking the appropriate action.

To request the status, use these two X-10 commands:

```
X-10: A 1 (Lamp module) Transmit House/Unit Code only
X-10: Transmit House Code 'A' STATUS REQUEST
```

When module A-1 receives this signal, it will transmit a single X-10 signal, specifically, either:

House Code A - Status is On

or

House Code A - Status is Off

There are two ways you can use HomeVision to read this response and take action on it:

1) Check for the X-10 signal with two If-Then statements where the condition is an "X-10 sequence", like this:

```
If
   X-10 sequence [A-Status is On] is received within 5 seconds
Then
   ; Do whatever you want when the module is ON
End If
If
   X-10 sequence [A-Status is Off] is received within 5 seconds
Then
   ; Do whatever you want when the module is OFF
End If
```

An X-10 sequence condition is normally used to receive and respond to multiple successive X-10 signals. However, in this case we're only looking for one signal. Note that the module's response does not contain a unit code (only the house code and status). Therefore, if we have more than one two-way module with the same house code, we need to know which one we requested the status of. The examples given later show how to handle this.

2) Check the module's status bits which indicate that a "Status is On" or "Status is Off" signal was received, like this:

```
If
   X-10: A 1 (Lamp module) "Status is On" bit is set
Then
   ; Do whatever you want when the module is ON
End If
If
   X-10: A 1 (Lamp module) "Status is Off" bit is set
Then
   ; Do whatever you want when the module is OFF
End If
```

Whenever the controller transmits a "Status Request" signal for a specific module, then receives a "Status is On" or "Status is Off" signal from the same house code, it sets the corresponding status bit (note that this is only true for HomeVision PROM version 2.5 or later). This allows HomeVision to determine the module's house and unit codes, even though the module only transmits its house code. The code shown above checks the status bits to determine which, if any, status response was received.

## Examples

There are two general ways to use these concepts in a schedule:

1) Request the status when you need it, wait a few seconds for the response, then do whatever you want based on the response. With this method, we'll check for the response with an "X-10 sequence" condition.

2) Request the status when you need it, then read the response in a periodic event and use it to update HomeVision's X-10 state table. With this method, we'll check the X-10 status bits to determine the response.

The first method works well in most cases, but there are times you might prefer the second. Examples of each are given below.

## Method 1

This approach is to use a single event to request the module status and decode it's response. Here's an example macro that reads the status of lamp module A-1, then sets HomeVision's internal state table to match the actual module state:

```
X-10: A 1 (Lamp module) Transmit House/Unit Code only
X-10: Transmit House Code 'A' STATUS REQUEST
Wait 0:00:05.00 with timer #0 (Status request timer), Then:
   If
      X-10 sequence [A-Status is On] received within 5 seconds
   Then
      X-10: A 1 (Lamp module) Set state to ON
   Else
      If
         X-10 sequence [A-Status is Off] received within 5 seconds
      Then
         X-10: A 1 (Lamp module) Set state to OFF
      Else
         ; No response received from module - Do whatever you want.
      End If
   End If
End Wait
```

This macro first transmits the "Status Request" signal for device A-1. A wait timer is then set to 5 seconds to allow time for the transmission and the response. When the timer goes off, we use two If-Then statements to determine if we received back a "Status is On" or "Status is Off" signal. The condition is an "X-10 sequence", which in this case is only one X-10 signal in length. If we receive one of these signals, we set HomeVision's internal state table to ON or OFF to indicate the correct module state.

You might want to do something in addition to updating HomeVision's state table. For example, if the module is on, you could turn it off, but if it's off, you might do nothing. However, if you want HomeVision's internal state table (and the X-10 TV screen) to be correct, you should also set the state to ON or OFF as done here.

Notice the last "Else" statement in this example. It will occur if no response is received by the time the timer expires. This could happen if there are other X-10 transmissions going on in the house when HomeVision tries to transmit. HomeVision may have to wait or retry multiple times, meaning the timer could expire before the module has responded. It could also happen if any of the X-10 signals didn't make it to their destination. In this case, you might want to request status again and give some sort of error indication.

## Improved Macro

One disadvantage of the above example is that it takes 5 seconds before HomeVision checks for the response and takes any action. You could shorten the wait timer to 2 seconds to speed it up, as the transmission and response will normally complete in less than 2 seconds. However, this increases the chance that the timer will go off before the response is received, resulting in missing the response.

A clever way to improve on this is to have the macro check for the response after 2 seconds, and if it wasn't received, wait several more seconds and check again. This is shown in the following macro. This has the advantage of providing a quick response most times, and only taking longer if the X-10 transmission was delayed a while. It is, however, more complex to write.

```
   X-10: A 1 (Lamp module) Transmit House/Unit Code only
   X-10: Transmit House Code 'A' STATUS REQUEST
   Wait 0:00:02.00 with timer #0 (Status request timer), Then:
      If
         X-10 sequence [A-Status is On] received within 5 seconds
      Then
         X-10: A 1 (Lamp module) Set state to ON
      Else
         If
            X-10 sequence [A-Status is Off] received within 5 seconds
         Then
            X-10: A 1 (Lamp module) Set state to OFF
         Else
            ; No response received from module, so wait 3 more seconds:
            Wait 0:00:03.00 with timer #0 (Status request timer), Then:
               If
                  X-10 sequence [A-Status is On] received within 5 seconds
               Then
                  X-10: A 1 (Lamp module) Set state to ON
               Else
                  If
                     X-10 sequence [A-Status is Off] received within 5 seconds
                  Then
                     X-10: A 1 (Lamp module) Set state to OFF
                  Else
                     ; No response received from module - Do whatever you want.
                  End If
               End If
            End Wait
         End If
      End If
   End Wait
```

## Method 2

The main problem with the previous method is the delay in receiving the module's response. One way around this is to transmit the status request whenever you need to (as shown previously), but check for the response in a separate periodic event. Set the periodic event to run "each loop" and it will catch the X-10 response almost immediately after it's received. This provides the fastest possible response time.

One obstacle with this is that the module does not transmit its unit code in its response. How can the periodic event know which unit code the response belongs to? If you have only one two-way module on each house code that you request status for, then it's easy: the response must be from that module. But what if you have more than one? The best solution is to use the controller's X-10 status bits. Whenever the controller transmits a "Status Request" signal for a specific module, then receives a "Status is On" or "Status is Off" signal, it assumes the signal is from the requested module and sets the corresponding status bit. Here's an example of how you would use these in a periodic event:

```
If
   X-10: A 1 (Lamp module) "Status is On" bit is set
Then
   X-10: A 1 (Lamp module) Set state to ON
   X-10: A 1 (Lamp module) Clear "Status is On" bit
   ; Do whatever else you want
End If
If
   X-10: A 1 (Lamp module) "Status is Off" bit is set
Then
   X-10: A 1 (Lamp module) Set state to OFF
   X-10: A 1 (Lamp module) Clear "Status is Off" bit
   ; Do whatever else you want
End If
```

Note that we clear the "Status is On" and "Status is Off" bits so the If-Then statement isn't repeatedly true. We only want the condition to be true after the module transmits the corresponding X-10 signal.

If you have multiple two-way modules, you can check for all the responses in one periodic event, like this:

```
If
   X-10: A 1 (Lamp module) "Status is On" bit is set
Then
   X-10: A 1 (Lamp module) Set state to ON
   X-10: A 1 (Lamp module) Clear "Status is On" bit
End If
If
   X-10: A 1 (Lamp module) "Status is Off" bit is set
Then
   X-10: A 1 (Lamp module) Set state to OFF
   X-10: A 1 (Lamp module) Clear "Status is Off" bit
End If
If
   X-10: A 2 (Family room lamp) "Status is On" bit is set
Then
   X-10: A 2 (Family room lamp) Set state to ON
   X-10: A 2 (Family room lamp) Clear "Status is On" bit
End If
If
   X-10: A 2 (Family room lamp) "Status is Off" bit is set
Then
   X-10: A 2 (Family room lamp) Set state to OFF
   X-10: A 2 (Family room lamp) Clear "Status is Off" bit
End If
If
   X-10: F 11 (Bedroom lamp) "Status is On" bit is set
Then
   X-10: F 11 (Bedroom lamp) Set state to ON
   X-10: F 11 (Bedroom lamp) Clear "Status is On" bit
End If
If
   X-10: F 11 (Bedroom lamp) "Status is Off" bit is set
Then
   X-10: F 11 (Bedroom lamp) Set state to OFF
   X-10: F 11 (Bedroom lamp) Clear "Status is Off" bit
End If
```

## Conclusion

There are several different ways to use these two-way modules with HomeVision.  Choose whichever method best fits your needs.  You can even use these to detect when a module is not responding and take appropriate action.