

User Guide

MD755

Programmable Motion Sensor for
BrightSign® Solid State Digital Sign
Controllers

Overview

The MD-755 offers unique motion triggering capabilities that directly interact with your BrightSign Controller. Together with BrightAuthor, you can design captivating presentations that are driven by viewer traffic.

This highly versatile sensor is compact, easy to install, and requires no power sources. Just plug it in and instantly add a new level of intelligence to your BrightSign display. Three dedicated GPIO lines can be used to create a wide variety of motion dependent presentations, allowing content triggering when motion is first detected and/or has ended. You can use the MD-755 for a variety of motion controlled applications including:

Applications include:

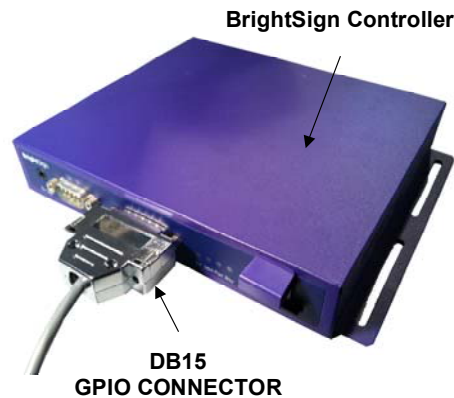
- ❑ Automatic sign wake-up/sleep
- ❑ Reset/redirect playback
- ❑ Cueing presentation segments with gestures
- ❑ Control audio levels based on attendance
- ❑ Change presentations
- ❑ Transfer presentations between different controllers
- ❑ Trigger seamless loops



Part 1 – Sensor Installation

Section 1.0: Basic Setup

1. Note: The MD-755 is intended for indoor use. Disconnect power from the BrightSign controller prior to making any connections.
2. Plug the MD-755 into the 15 Pin GPIO connector on the front panel (or back, depending on the model of the BrightSign Controller).



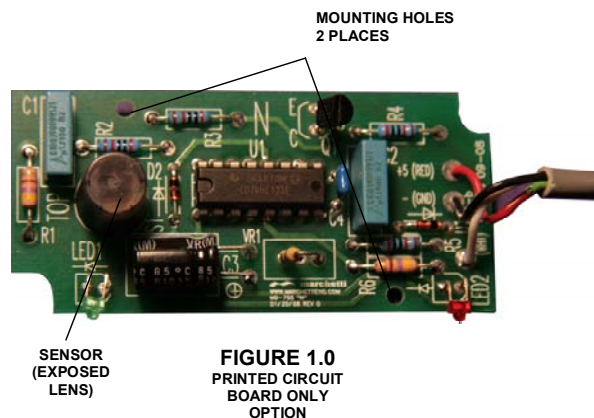
3. Re-connect the power and verify that the sensor's green power LED is on and that the BrightSign display boots properly.

Section 1.1: Mounting the Sensor

You can mount the MD-755 several ways. The easiest is to attach the bottom of the sensor's plastic enclosure to a clean surface using the supplied Velcro adhesive strips. This allows the sensor to be easily attached, adjusted, and/or removed. The following sections offer some additional, more permanent ways to install the sensor.

Section 1.2: Custom Installations using PC Board Only Option

The MD-755 PC-Board can be ordered without the standard plastic enclosure (PC Board Only option) as shown in Figure 1. 0.



This option is intended for installation in custom-built displays such as kiosks and podiums. Behind-panel mounting is among the more permanent installation methods for the MD-755 PC board. With the exception of a small portion of the lens, this installation protects and conceals the sensor unit behind the panel, as shown in Figure 1.1.

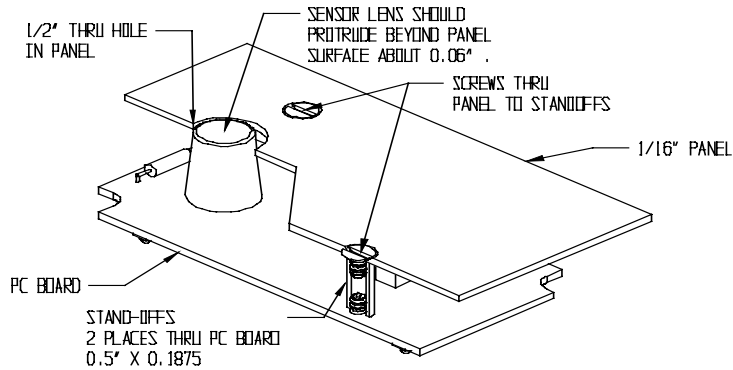
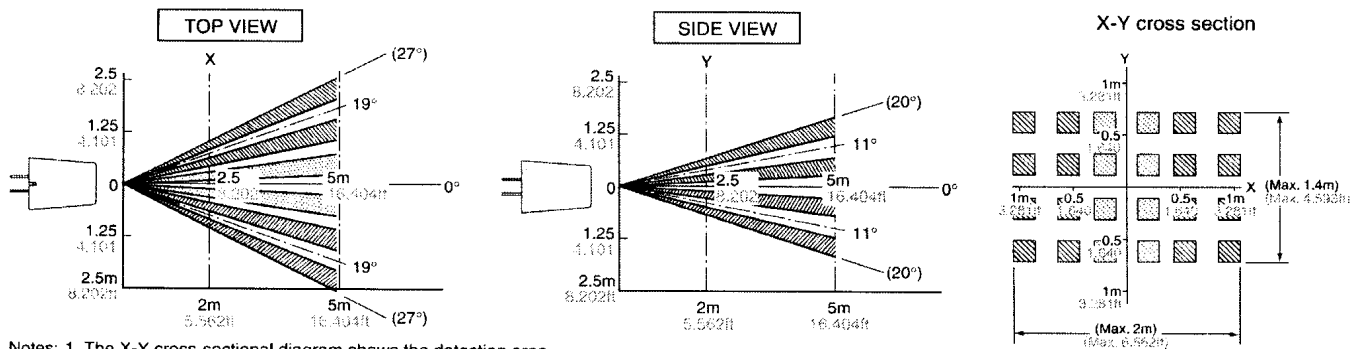


FIGURE 1.1

To detect full range motion, the top of the sensor's lens need only protrude about 1/16" through a 1/2" hole in the panel. A 1/16" thick panel will require two- 1/2" standoffs to provide adequate separation. (Standoffs of various sizes are available at most hardware stores). See Appendix 1 for the panels' drill template. Keep in mind that the thicker the panel, the more recessed the sensor lens will be. Thicker panels will require shorter standoffs. The PC-board only option ships with 5' length of cable terminated by a DB15 male connector. Be sure to specify the required cable length when ordering.

Section 1.3: Detection Area

The MD-755 uses a PIR (Passive Infra-Red) "spot" type motion sensor, which has a cone-like detection characteristic shown in Figure 1.2.



- Notes: 1. The X-Y cross-sectional diagram shows the detection area.
 2. The differences in the detection zone patterns are indicative of the projections of the 6 lenses with single focal point and with two optical axes. An object whose temperature differs from the background temperature and which crosses inside the detection zone will be detected.

FIGURE 1.2
 MD-755 DETECTION
 CHARACTERISTICS

The PIR detection pattern is highly sensitive and can distinguish movement even in strong sunlight with a range of 5 meters (~ 16 feet). **However, it will not detect motion if placed**

behind a transparent surface such as glass or clear acrylic. The sensor's lens must be directly exposed to the detection environment.

Section 1.4: Sensor Installation Tips

Sensor placement is key to the motion detector's performance. When using the MD-755 in heavily populated areas such as an exhibit, finding the ideal placement for the sensor often boils down to simple trial and error. For example, placing the MD-755 on a tabletop will have limited forward-looking ability. Referring to Figure 1.2, a person entering the detection zone will trigger the sensor if within 1.25 meters (~ 4') side-to-side, and 2 meters (~ 5.5') in front of the sensor. To minimize forward-looking detection, install the sensor closer to the floor and pointed slightly downward.

TIP 1: An earlier version of the MD-755 featured a sensitivity adjustment that has since been eliminated in the newer design. A simple way to limit detector sensitivity is to use adhesive tape to form a small "slit" that partially covers the exposed lens. A horizontal slit as shown in Figure 1.3 will limit top to bottom detection.

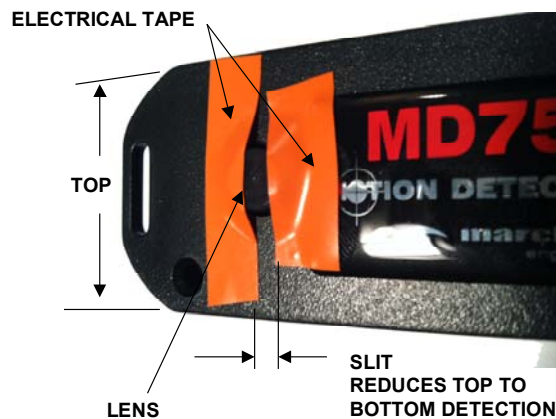


FIGURE 1.3

TIP 2: This tip can be used in custom installations having thicker panel surfaces. Here, a standard sensor with its plastic enclosure is mounted behind the panel. The sensor lens does not protrude beyond the aperture hole.

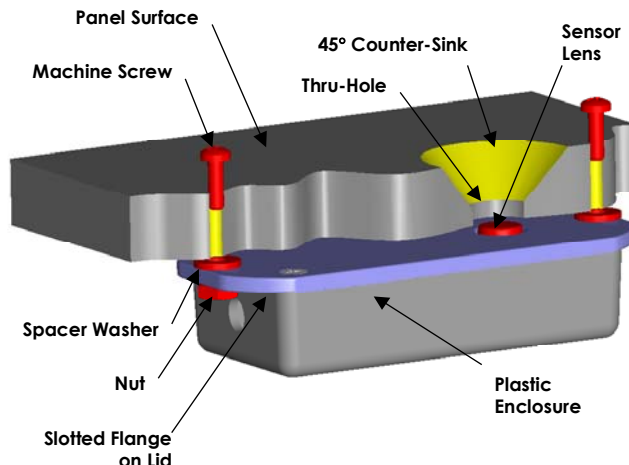


FIGURE 1.4

Start by drilling a hole in the panel to expose the sensor's lens. In this example, we added a 45-degree countersink to the drill hole to improve detector performance as shown in Figure 1.4. Refer to the section "Detection Area" which explains sensor detection angles in more detail. You can also experiment with various sized apertures (thru-holes) to reduce or increase detector sensitivity.

The supplied Velcro strips can be used to mount the MD-755 to the underside of the panel surface, however, for a more permanent installation, fasten the sensor to the panel using small machine screws/nuts/washers.

TIP 3: Use opaque construction paper to form a simple "blinder" tube which is slipped between the sides of the sensor lens and the plastic enclosure as shown in Figure 1.5. This will significantly reduce top to bottom and side to side detection. A tube about ¼" to 1" long should provide adequate results.

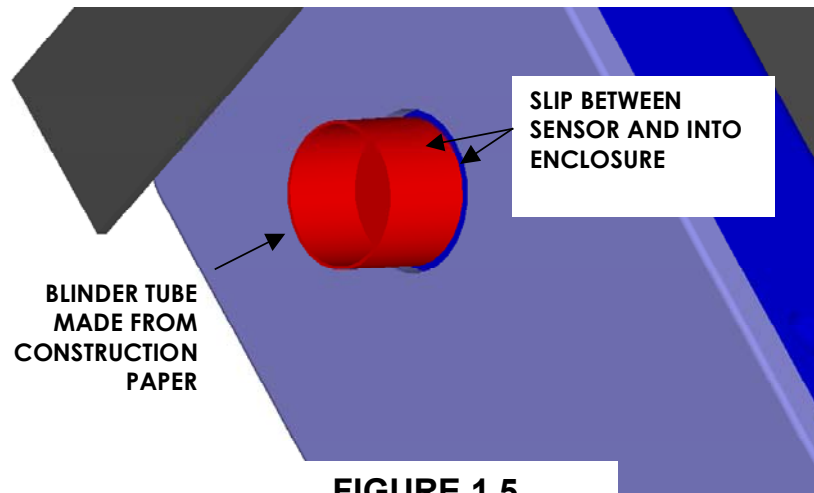


FIGURE 1.5

Part 2 - Using the MD-755 with BrightAuthor®

BrightAuthor is the software needed to create and publish BrightSign presentations and can be downloaded from the BrightSign website:

<http://support.brightsign.biz/entries/314637-brightsign-downloads>

The following sections explain how to use BrightAuthor commands to respond to motion using the MD-755. There are two ways to use the motion detector:

- ❑ Always On Triggering (default)
- ❑ GPIO Enabled Triggering

“Always On” continuously looks for motion within the sensor’s detection zone and no configuration is required. “GPIO Enabled” will trigger media clips that have been selectively configured to respond to motion. Both modes require a BrightSign GPIO (General Purpose Input Output) port.

Section 2.0: BrightSign GPIO

The MD-755 communicates with the BrightSign controller via two GPIO lines exclusively. GPIO “0” is used for triggering BrightSign content and GPIO “2” is used to enable or disable the sensor. The remaining GPIO lines are unaffected by the MD-755 and can be used for other inputs such as a button board. However, to use the MD-755 with other interactive GPIO devices requires the optional pass-through adapter option. Refer to the **BrightSign User Guide** for more details concerning GPIO functionality.

Section 2.1: GPIO and Button Events

Button Events

BrightAuthor offers a variety of predefined commands called “Events” that can be easily integrated into your presentation. The more frequently used events are built into the Events Toolbar shown in Figure 2.1. Included in this menu bar are eight “Button” events; 0 through 7, which correspond to GPIO lines 0 through 7 respectively. This toolbar is only available when the Playlist type is set to “Interactive”.

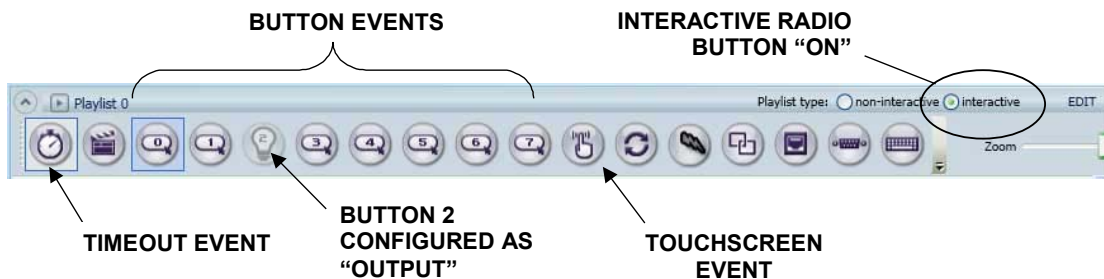
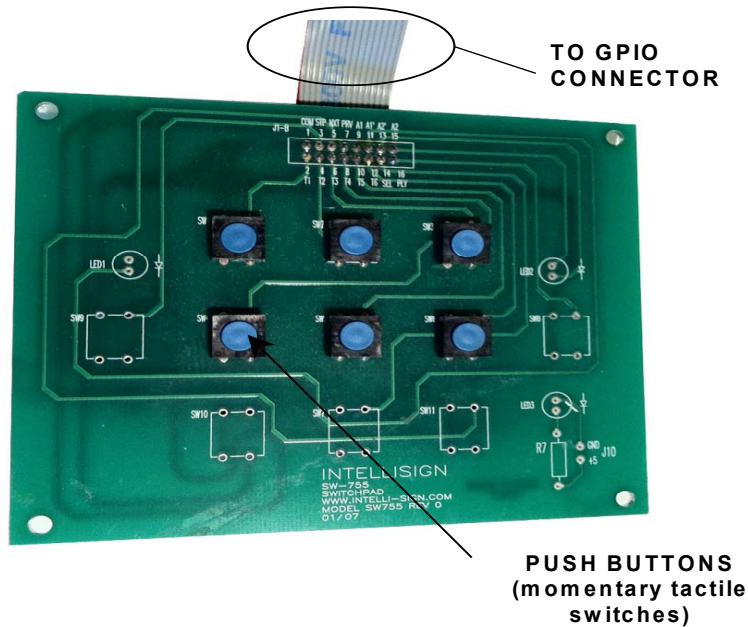


FIGURE 2.1
EVENTS TOOLBAR

Push-Button Boards

In BrightAuthor, button events were originally intended to provide a graphical way of interfacing with push-button boards. Push-button boards consist of momentary switches that when pressed, will trigger the content associated with that button. A six-button board is shown in Figure 2.2. Push-button boards are still widely used since they are low-cost, mechanically rugged, and can be integrated into a number of interactive display applications.



**FIGURE 2.2
PUSH BUTTON BOARD**

BrightSign continues to support button events via GPIO for a variety of applications including the MD-755. To use the MD-755 in conjunction with a button board (using the same GPIO input), you will need to order the MD-755 with pass-through adapter option. Button boards and other BrightSign options can be ordered through Marchetti Engineering's website.

Visit www.intelli-sign.com for more details.

Section 2.2: Configuring GPIO Enable Mode

Presentation Properties

When you create a new presentation, BrightAuthor uses the settings specified within the “Presentation Properties” dialog box shown in Figure 2.3. To access these settings, click the Edit tab and follow the menu sequence shown below. To configure the BrightSign controller’s GPIO lines, click on the I/O tab as shown.

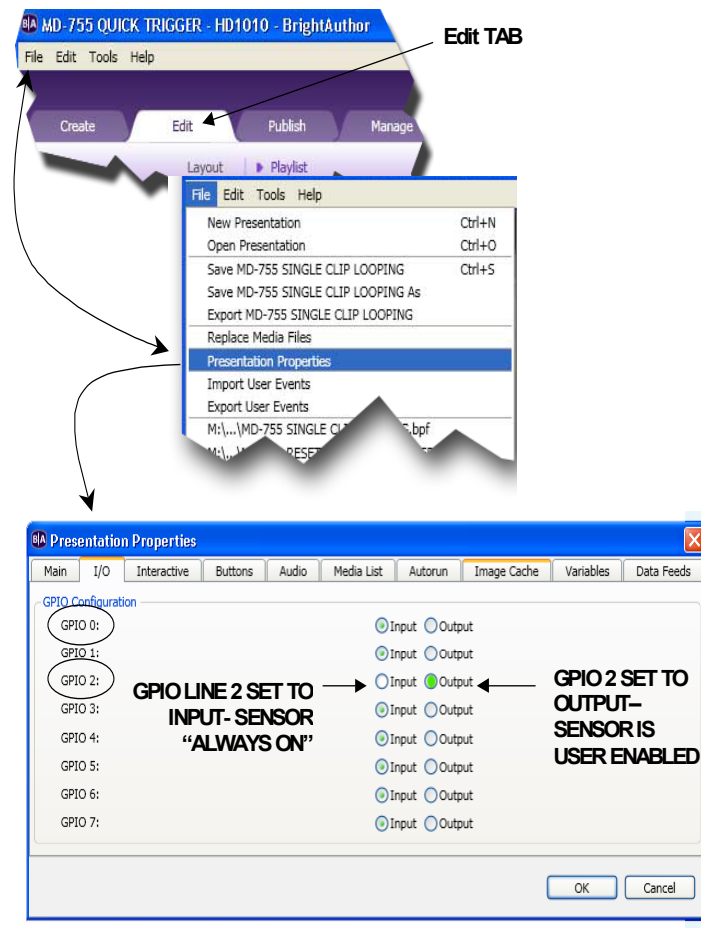


FIGURE 2.3
Presentation Properties
Dialog

Configuring “Always On” Triggering

When GPIO line 2 and GPIO line 0 are set as “Input”, the MD-755 will be configured for “always ON” detection. No further configuration is required.

Configuring GPIO Enabled Triggering

When GPIO line 2 is set as “Output” and GPIO line 0 is set as “Input”, motion triggering can be enabled or disabled for selected clips. Note that when GPIO line 2 is configured as “Output”, the icon for Button event 2 in the Events Toolbar (Figure 2.1) converts to a “light bulb” indicating that it is unavailable as an input event.

Saving Properties

The current GPIO settings depend on how they were saved in an earlier presentation. You can choose to save any property changes made using the options shown in Figure 2.4.

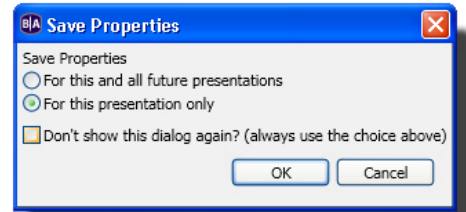


FIGURE 2.4

Enabling/Disabling a Media Clip from Triggering

Once GPIO line 2 has been configured, the next step is to double-click on a media clip (or event) to access its Properties sheet as shown in Figure 2.5. Click the “Advanced” tab followed by the “Add Command” button (plus sign). From the “Commands” drop-down list, select “GPIO” and set the “Command Parameters” to either On or Off for GPIO line 2. An “On” setting allows a button 0 event to trigger. An “Off” setting effectively takes the sensor off-line.

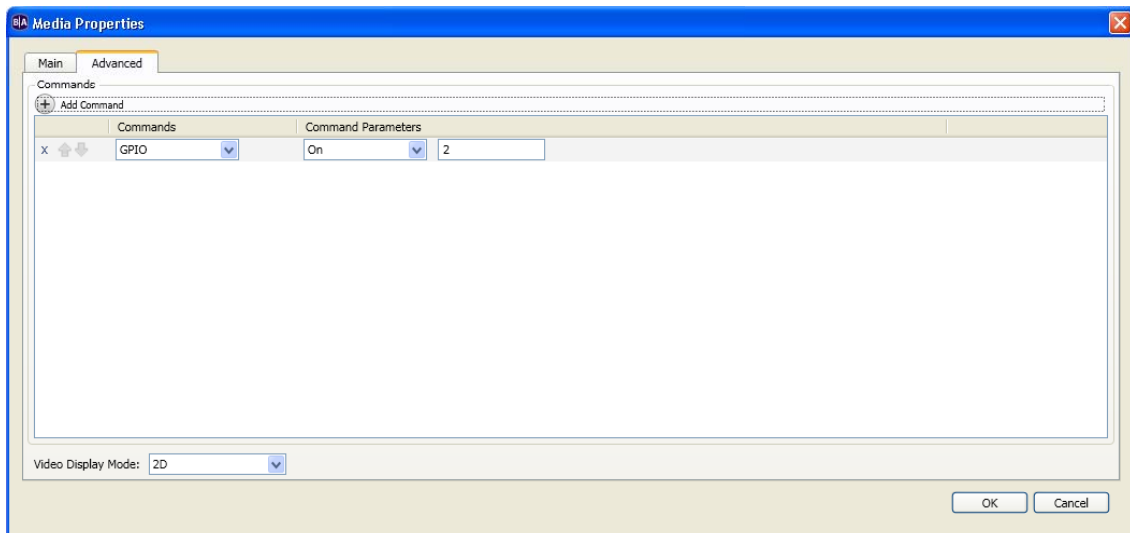


FIGURE 2.5
STATE OF GPIO 2 ADVANCED MEDIA PROPERTIES
DIALOG SHOWNG STATE OF GPIO 2 “ON”

Effect of Media Clip State on Triggering

The following applies to BrightAuthor presentations configured for "GPIO Enabled" triggering.

For button 0 to trigger a specific media clip, the state of the preceding media clip must be "On" (refer to Figure 2.5 for programming details). For example, if the GPIO state of "HOME CLIP" were set to "OFF", the sensor would effectively be off-line and will not see the subsequent button 0 event as shown in Figure 2.6. In this case, "HOME CLIP" is dead-ended and will loop indefinitely. On the other hand, if the GPIO state of "HOME CLIP" were ON, then Button 0 will trigger "NEXT CLIP".

Another point to keep in mind is that a clip's On/Off state is inherited from the previous clip. It's a good practice to set an initial state for the "HOME" clip, rather than leaving it unspecified which could lead to unpredictable results at start-up. Once the state of a clip has been set, it is, applied to each subsequent clip (or event) until set otherwise.

Part three offers some more programming examples for effectively applying GPIO enabled triggering.

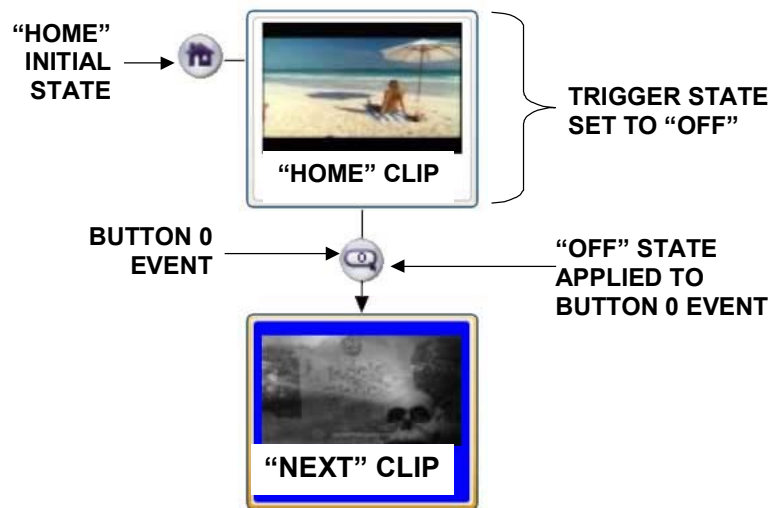


FIGURE 2.6

Summary: Using GPIO Enabled Triggering

- BrightAuthor provides a convenient graphical interface in which to organize the flow of your BrightSign presentation. The MD-755 relies on a "Button 0 Event" to form a path between two media clips once motion has been detected. The MD-755 sends detected motion to the BrightSign controller using GPIO port 0, which in turn triggers the corresponding button 0 event. A clip's GPIO state which precedes the button 0 event must be "on" for triggering to occur in all cases.

- If GPIO 2 is set to “Input” (default setting), button 0 is always enabled. Setting GPIO 2 as “Output” allows you to selectively enable certain clips to trigger at specific points in the presentation.

Part 3 – Example Presentations using MD-755

This section illustrates some of the more popular ways to apply the MD-755. Unless specified, all GPIO lines are set to “Input” (default) placing the sensor in “always on” state. Refer to Sections 2.2 “Configuring GPIO”.

Example 1 - Basic Triggering

In Figure 3.1, an interactive presentation was created in BrightAuthor with Button Event “0” placed between “Home Clip” and “Next Clip”. At start-up, “Home Clip” will loop indefinitely until the MD-755 detects motion.

When motion is detected, the presentation will:

- 1) Trigger Button Event “0”,
- 2) Interrupt “Home” Clip playback
- 3) Advance to “Next Clip”.

NOTE 1: When motion is detected, the MD-755’s red LED indicator turns ON. The sensor remains triggered and then re-arms in about ten seconds (red LED OFF). If the sensor continues to detect motion, then it will remain in a triggered state.

NOTE 2: “NEXT CLIP” is dead-ended and will loop indefinitely since there are no other events or clips after it.

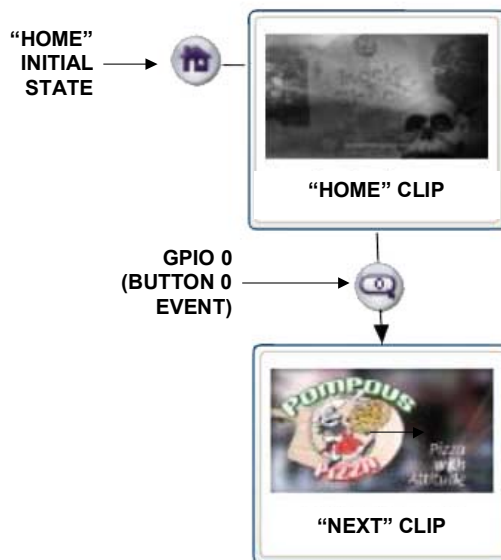


FIGURE 3.1

In Figure 3.1, button event 0 was used to interrupt the “Home” clip playback and advance the playlist to the “Next” clip. The following example offers a technique that can be used to interrupt a clip’s playback and restart the same clip from the beginning using a “placeholder” clip.

EXAMPLE 2 – Using Placeholder Clips to Control Triggering

Instead of using several short clips in your BrightAuthor presentation, a long single media clip can also be used. In many ways, this technique imitates the function of an ordinary DVD or VCR player, but with several advantages.

A BrightSign presentation that contains only a single clip will loop indefinitely. But when controlled by the MD-755, the presentation can provide unattended start/stop/pause, and “rewind” actions. However, to apply motion triggering requires at least two media clips between which, a button 0 event is placed. There are several ways to do this; one is to use a “placeholder” clip to serve as one the clips. Placeholders are typically blank JPG files that provide a transparent way to execute functions that ordinarily require a working media clip. In Figure 3.2, a placeholder clip serves as the “HOME” clip from which to attach a “Timeout Event” function.

“MAIN CLIP” is the subject of our presentation and if were the only media clip in the presentation, the playback would simply loop.

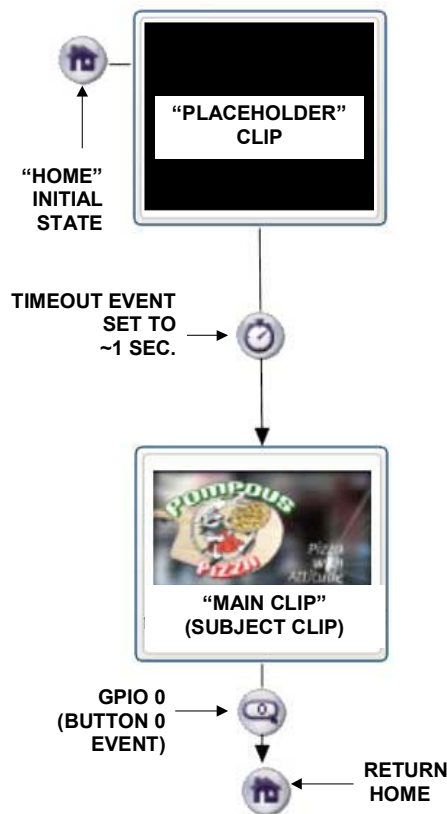


FIGURE 3.2

Procedure

To make the presentation "audience-aware" we'll use the MD-755 to detect and interrupt the "MAIN" clip during playback, and restart it from the beginning.

Start by adding the placeholder clip ahead of the "MAIN CLIP" and set it as the "Home" clip as shown in Figure 3.2. You can use a pixel editor program like PhotoShop to create this clip with your specific dimensions and content. Note that the placeholder doesn't have to be blank.

Next, create a path to "MAIN CLIP" using a "Timeout Event" placed between the two as shown. In our example, we set the Timeout Event value to one second (minimum value) to make the transition as quick as possible, although any time duration will work.

Last, use a Button 0 event to return back to the Home clip upon motion detection.

Upon start-up:

- 1.) The blank placeholder clip plays black content for 1 second.
- 2.) Playlist advances to "MAIN CLIP" where it will loop while awaiting interruption by the MD-755 via Button 0 Event.
- 3.) On motion detection, playback returns to the placeholder clip (HOME initial state) and the presentation repeats.

Notes: When triggered, you will notice a short delay before the MAIN CLIP stops prior to restarting. This delay depends on how much video data needs to be buffered.

Another factor to keep in mind is that the MD-755 takes ten seconds to re-arm before it can be triggered again. Assuming that no motion is detected, the Main clip will be ready for triggering in nine seconds, allowing for the 1 second Timeout event duration.

Realistically, detected motion may continue well after the sensor has been triggered. In this case, the sensor will remain in the triggered state allowing uninterrupted playback. When no further motion is detected, the ten-second countdown resumes and the sensor is re-armed.

Example 3 – Timeout “OR” Trigger

Figure 3.3 adds a “Timeout” event alongside of a button 0 event as an alternate path to the “MAIN CLIP”. If the “Start State” setting is set to “Remain on current state”, “HOME CLIP” will simply loop if no motion is detected. When motion is detected (Event #1), then button 0 triggers forcing the presentation to advance to “MAIN CLIP”.

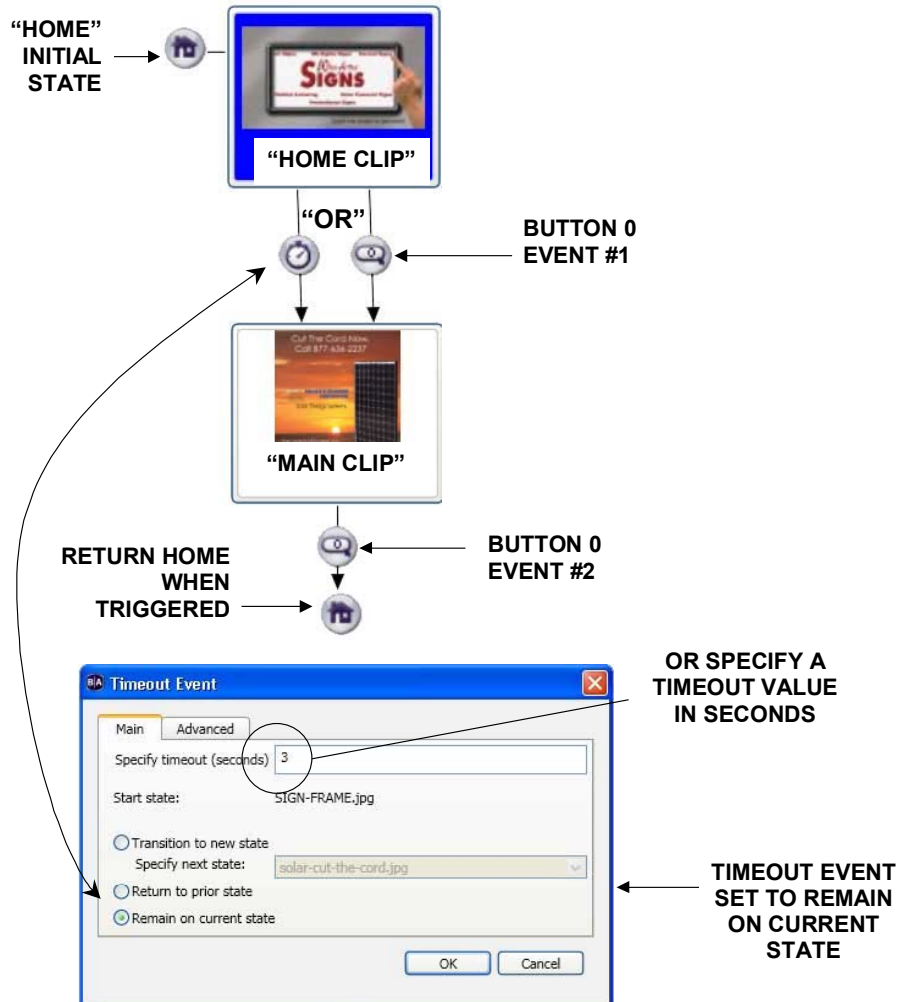


FIGURE 3.3

Rather than allow the “HOME CLIP” to loop, a more practical use for this technique is to specify a reasonable Timeout value, shown here as 3 seconds, and force the presentation to transition to the next state

“Main Clip” will also loop until motion triggers Button 0 to return Home (EVENT #2). A similar timeout event could also be placed alongside Button 0 (not shown).

Example 4 – Enabling Trigger Using Timecode

The following example uses GPIO enabled triggering.

You can use a Timecode Event applied to a media clip to specify when to enable the MD-755 for triggering. This lets you to postpone button 0 awareness for a portion of the clip.

Timecode in BrightAuthor is simply the length of the clip specified in milliseconds. For example, a 25,000-millisecond clip's duration is 25 seconds. In Figure 3.4, the time to wait before enabling GPIO line 2 is 25 seconds. Clearly, the clip's duration must be greater than 25 seconds for this technique to work.

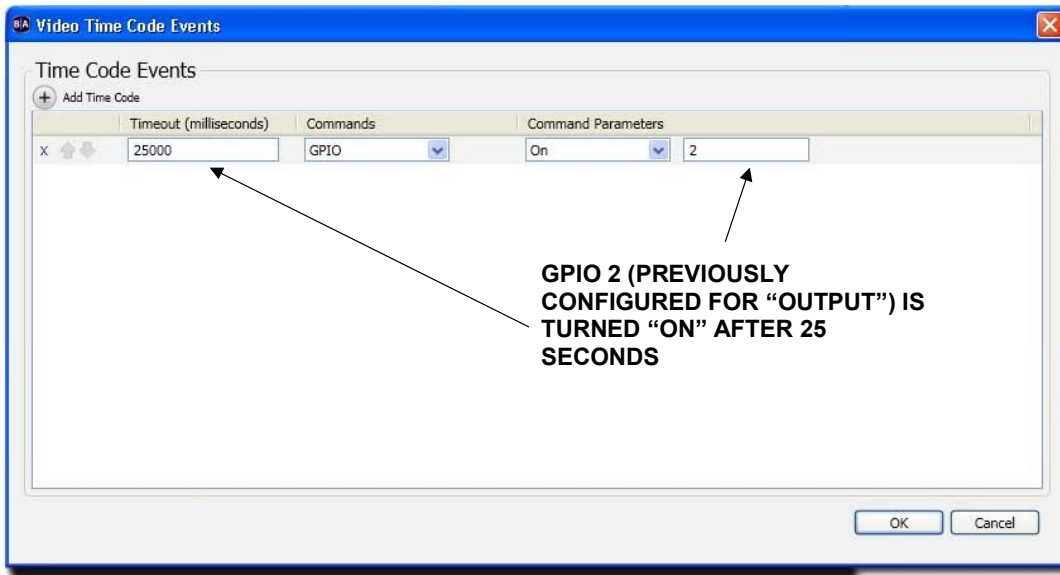


FIGURE 3.4

Timecode events have no path as shown in Figure 3.5. The goal of this BrightAuthor presentation is to ensure uninterrupted viewing of the "HOME" clip for the first 25 seconds. After 25 seconds has elapsed, button 0 is enabled (ON) allowing the presentation to transition to the "NEXT CLIP" when motion is detected. Otherwise, "HOME CLIP" will loop.

Since media clips inherit the preceding clip's ON/OFF state, be sure to set the initial state of the "HOME" clip to "OFF". Button 0 will become enabled for triggering after the 25 seconds has elapsed.

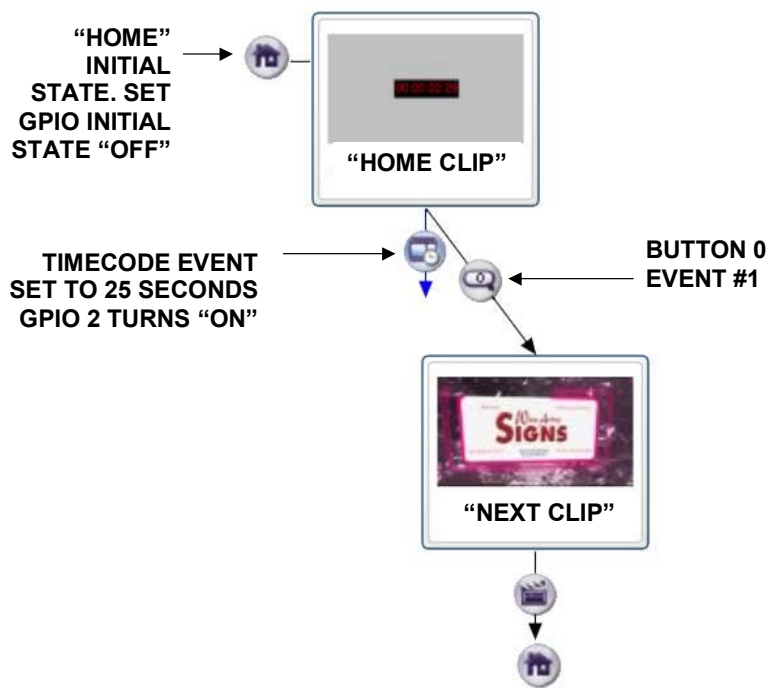


FIGURE 3.5

In Figure 3.6, a Timeout event is placed alongside of the button 0 event to provide an alternate path to "NEXT CLIP" similar to the example outlined in Example 3. The Timeout event ensures that "HOME" clip transitions to "NEXT" clip if no motion is detected.

A Media End event is used to return the presentation back to the "HOME CLIP".

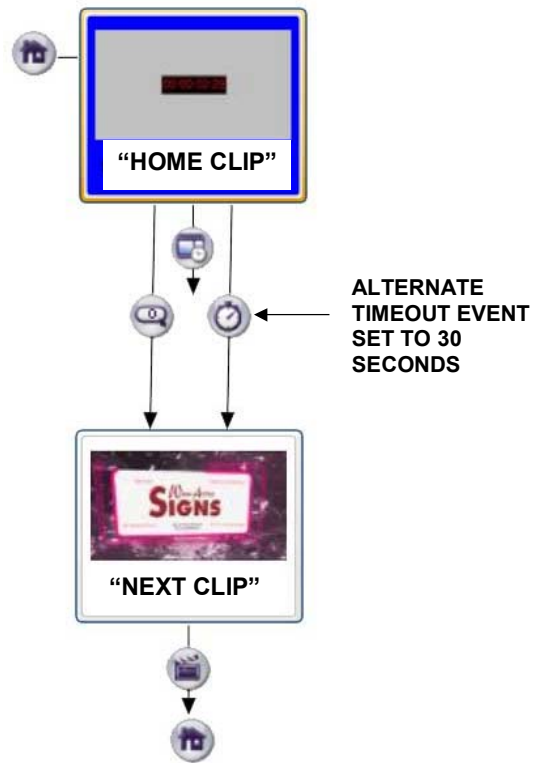


FIGURE 3.6

EXAMPLE 5 - Branching

Summary

By now, it should be clear that there are numerous ways to apply the MD-755. BrightAuthor gives you the tools to design highly elaborate presentations that possess a great deal of intelligence and viewer awareness. We leave you with this final example that demonstrates a basic branching example.

In Figure 3.7, button 0 will trigger the clip entitled “rocknshock2010.TS”. But in the absence of detected motion, the Timeout event forces a transition to the clip entitled “noel.mpg”. In any case, all paths lead back to the initial clip “Video-CRABS.mpg”.

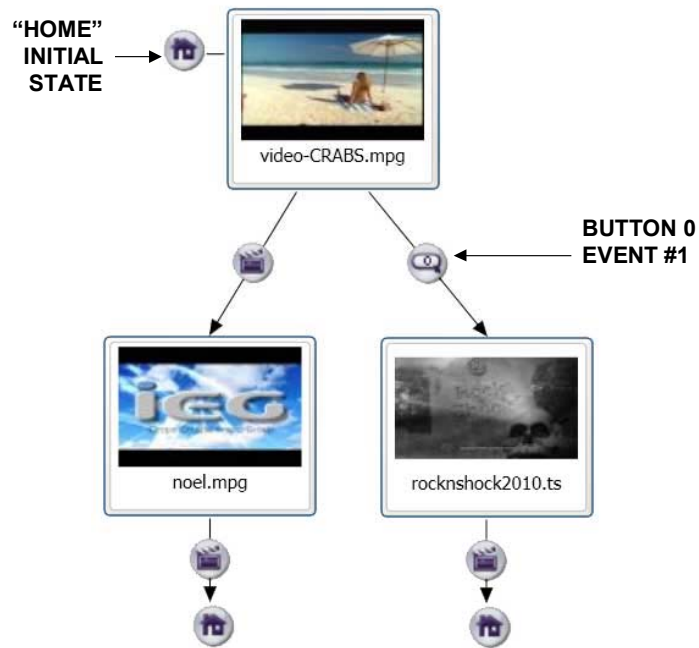
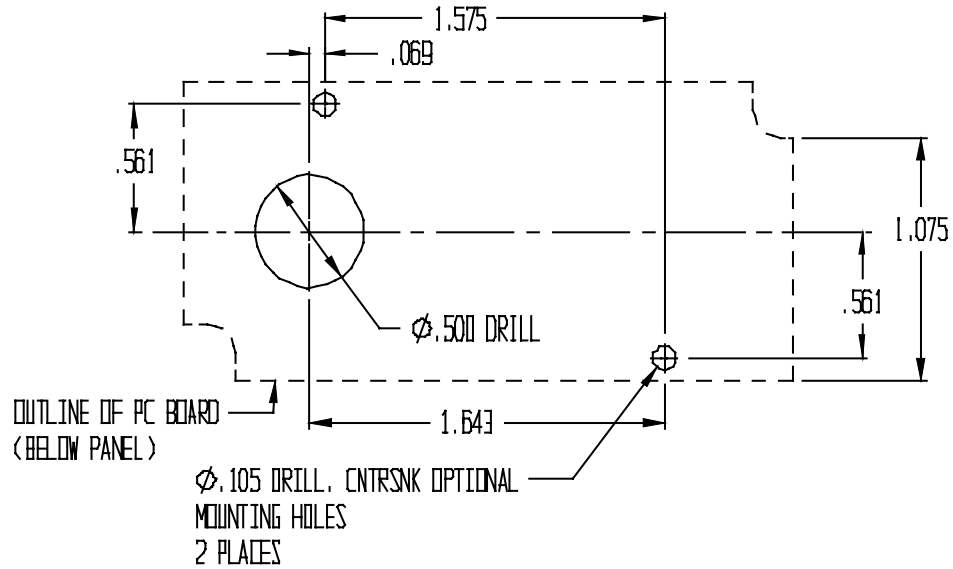
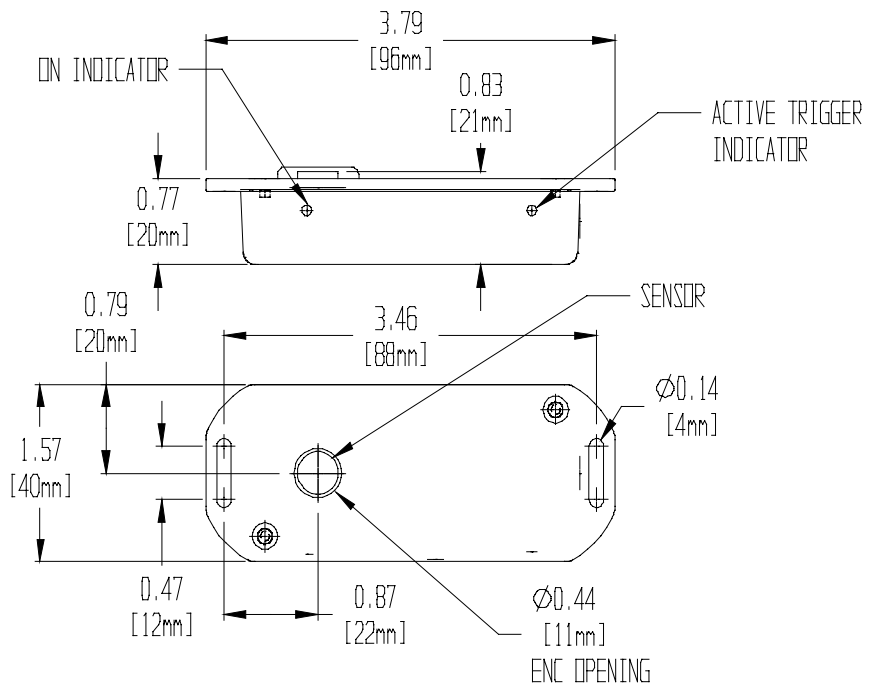


FIGURE 3.7

Appendix A – Panel Drill Dimensions (not to scale)



Appendix B - Sensor Dimensions



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