

# VMD1004



## 4 Camera Video Switcher with Video Motion Detection

### Operation and Programming Manual

**DigiSpec**<sup>TM</sup>

## Introduction

The VM D1004 is a 4 camera video switcher that has VMD (Video Motion Detection) on each camera. OSD (On-Screen) programming for switching dwell time, bypassing and motion dwell time along with the VMD setups is all done via 4 front panel pushbuttons. One video output will be able to drive two 75 ohm video loads at 1VP-P. One hard alarm output is provided whenever any camera goes into motion alarm mode.



Front Panel

## Overview of Operation

The main output of the video switcher will sequence or home any video camera to the video output. The dwell for each camera is independently set. Each camera in the normal sequence can be bypassed so it is not included in the sequence. Therefore if camera 1-3 was bypassed then the video output would show only camera 4 constantly. Any camera can be homed manually whether bypassed or not by pressing the corresponding front panel button once and its corresponding LED will be lit. Upon pressing it again the unit will return to the normal sequencing mode. If for any reason an input camera loses video then it will be automatically excluded from the sequence. Video loss is determined by loss of video sync which can occur from a powered down camera, cut cable or very low video level.

The VMD engine utilizes the internal bridging switcher. Each of the cameras will in turn be selected to be monitored by the VMD. Several frames of video will be analyzed to determine if motion is detected. If not, the engine will go to the next camera in sequence to determine motion. Any or all of the cameras can be selected to disable VMD, if so they will not be selected to determine motion. Each camera will be able to select an area of motion detection in the video view. This area is selected by 198 blocks on the screen, any or all can be enabled. This will allow accurate masking of the video view per camera so that unwanted areas of motion can be ignored. Sensitivity will be selectable from 0-99. This is a relative selection of change of gray scale so that the user can select the level of motion detection. This will allow the VMD to ignore small video changes that are not true motion detection determined by the user.

Upon a VMD alarm the switcher will home to that camera for a preset time and then go back to the switching sequence. If multiple VMD alarms occur then the switcher will alternate between them dwelling on each for the preset time. Therefore alarm dwell can be set independently for each camera. Upon any alarm the alarm output will be asserted low for the length of the entire alarm time.

## OSD Programming

All programming is done via OSD (On Screen Programming), Therefore, at least one camera and a video monitor will be required for programming. Programming will be done by Pressing and holding the Program Button of the front panel buttons for three seconds or when the main menu appears to enter the program mode. The Yellow LED will be lit when the user is in the programming mode and be turned off when they exit. A menu structure will select all of the video switcher functions such as bypass and dwell time. The VMD menu will allow alarm enable/disable, alarm dwell time and the setting of the motion areas and sensitivity for each camera. You must have at least one camera connected to the respective camera input to program the area setting for that camera.

The video output will be able to driver two terminated 75 ohm loads in parallel. However a user supplied "T" on the video will be required if more than one video output is connected.

## Functions-Programming for Switcher and VMD functions via OSD

### Switcher

Independent dwell times for all 4 cameras 1-30sec  
Bypass selection for each camera on/off  
Video loss automatic bypass  
Manual homing via front panel pushbuttons  
Alarm Output (Open Collector Transistor Normally Open)

### VMD

Enable / Disable VMD for any camera input  
Zone selection (Select area for VMD operation)  
Sensitivity  
Independent motion alarm dwell times for all 4 cameras Manual, 1-30sec

## Menu Structure

### Main-Menu

→ **Camera Switcher**  
**Motion Detection**

You will press "Program" button and hold for three seconds to see this menu. Press "Set" to select the line. Then press "right" button to select the next sub-menu. When you press Program again you will save the settings of the sub-menu and go back one menu level. You must go back to this main menu for each camera setting selection to be saved.

### Sub Menu - Camera Switcher

<b>Camera</b>	<b>1-4</b>
<b>Dwell Time</b>	<b>1-30 sec</b>
<b>Bypass</b>	<b>On/Off</b>

When you select camera 1-4 then the respective sub menu for each camera will appear. You then will program bypass and dwell time and when you press “Program” you will save the settings and go back one level so you can program the next camera number.

## Sequencing and Homing

Upon power up the unit will automatically start sequencing with the set programming. The factory default of all cameras enabled and a 2 sec dwell time per camera. To home any single camera press that select button once. The camera will then home to that camera until you press it again or power down and back up the unit. While the unit is manually homed the VMD alarm function is temporarily stopped until you exit the home mode.

## Exiting the Program Mode

Upon exiting the Program Mode, wait at least 8 seconds for the VMD engine to acquire stable images from each camera. At that time the unit will remained homed to camera one and then go immediately into the sequence mode after this delay time.

## Sub Menu - Motion Detection

<b>Camera</b>	<b>1-4</b>
<b>Sensitivity</b>	<b>0-99</b>
<b>Motion Detection</b>	<b>Enable/Disable</b>
<b>Alarm Output</b>	<b>On/Off</b>
<b>Dwell Time</b>	<b>Manual, 1-30 sec</b>
<b>Zone Selection</b>	

This programming mode is similar to the Camera Switcher menu. You will select a camera number and then move to the next submenu to program the settings. Pressing “Program” will go back one level and save your settings for a particular camera so you can program all without exiting the Program mode.

## Sensitivity

Sensitivity settings is basically how much contrast change in the video picture has to occur before we determine a motion alarm. The higher the sensitivity the less change in the picture is required for a motion alarm thus making it more sensitive. The lowest sensitivity of “0” means nothing will ever trigger a motion alarm and is similar to Disabling the Motion Detection. The sensitivity is increased in units of 3 so at the lowest you will need to change about 97% of the video image to trigger and at the most sensitive of 99 it will take only about 1% of the video change to trigger. The factory default is 45.

## Motion Detection Enable/Disable

This setting allows you selective remove any camera from the motion detection engine. Since all four cameras are shared by one motion detection engine, unused cameras are recommended to be disabled for this will increase the detection time and accuracy of the unit. Factory default is all cameras on.

## **Alarm Output**

One alarm output is provided if any camera gets a motion alarm. This is an open collector type transistor output that shorts to ground when the alarm is true. It can sink 12VDC @ 20MA and useful to trigger external recorders in the event motion is detected.

## **Dwell Time and VMD Alarming**

When any camera detects a motion alarm and homes to that camera it will remain there for the programmed dwell time. This is a "Timed" type dwell time which means if motion occurs, then the camera dwells for the programmed dwell time only, then exits regardless if motion is continuous within the dwell time. If motion is detected again after the dwell time then the camera will go into the alarm mode again. If multiple motion alarms occur at the same time then the cameras will switch to each alarming camera in sequence with the programmed dwell time.

The Dwell time has a first selection of Manual. This means when the particular camera gets motion it homes to the camera indefinitely and triggers the alarm if so selected. If another camera with Dwell set from 1-30 secs gets a motion alarm then that new camera will be homed. After the dwell time if no further motion has been detected on the Manual selected camera the unit will go back to the sequencing mode. You can also manually home another camera and then release that camera and will cancel the Manual motion alarm mode.

## **Zone Selection**

When programming Zone selections you will use "Up" and "Down" to navigate through all the areas to enable or disable. To Disable an area enter a "." and to enable enter a "0". You can alternate between enable and disable via the "Set" button. If you press and hold the set then that current setting will be held so you can use the "Up" and "Down" buttons to set all areas easily. The factory default is all 198 zones enabled.

The unit averages each line of video of only the selected areas of the odd field of video. During on field time and over several frame times, the unit dynamically compares to see if motion is occurring in any particular area of the video image. Therefore the more zones selected the less the accuracy of the unit. Select only the areas of key interest for motion to get maximum performance from your unit.

## **Video Loss**

The unit has a built in video loss detector. If any camera video is lost then it is automatically excluded from any sequencing or motion detection. When the video returns it is then re-acquired by the VMD engine and included in all sequencing and motion detection. Video loss is defined by absence of video or level below approximately 0.4 V P-P.

## **Factory Default Reset**

To reset the entire unit to the factory defaults you must power down. Then hold in the "Program" button while powering up. Continue to hold for 3 seconds. All programming will be lost and the following programming will be in place as from the factory, Sequencing 2 sec dwell, all enabled, VMD, all enabled, Sensitivity 45 and alarm on. Upon power up the unit you must wait 20 seconds for all cameras and the VMD engine to stabilize before sequencing or VMD will occur.

## VMD Hints

The unit sets all cameras to enable the VMD alarm but the factory default sensitivity is about 50% which is a good start for normal camera views. First verify the unit sequences normally with no motion in any camera view. If this can not be controlled then disable that particular camera and adjust one camera at a time. Then set the Zone areas to only the parts of the video view that the motion will occur in. If a person walks through the camera view and no motion is detected, then increase the sensitivity. Increase by small amounts until the target is reliably detected. If you increase too much then false alarms will occur. Continue this process for each camera until acceptable results are achieved.

## Problems and Restrictions

The unit is designed for indoor or fixed lighting outdoor applications. If there is continuous or intermittent motion in the camera view, the sensitivity must be set significantly low to ignore this motion. Therefore this motion or noise must be significantly less than the target size. This means if you are trying to detect a person that is 6 zones in size and looking at vegetated area with lots of bushes that can blow in the wind that covers the entire view, then the VMD will not work. The motion of the bushes is more than the target. Care must be taken in selecting the application and camera view. Looking at water with waves produces a large amount of motion with reflected and refracted light and must be avoided with the active detection areas.

Many types of sodium lighting are actually flickering at line frequency. This type of lighting will require the reduction of the sensitivity to accommodate. The more light on the camera view the better for gaining a contrast between the target motion and the stationary background. Therefore at night the performance of VMD is greatly reduced. If the use of IR lighting is used then will recover this loss of performance.

If you are using WDR, AGC, and auto iris cameras, make sure the settings are for average. This means set the camera for the slowest adjustment possible to lighting changes. If this is not done, then if a target walks through the camera view, the camera may adjust the AGC or backlight compensation instantaneously changing the video of the entire view. This will cause a VMD alarm. This can also be true for slow scan cameras. Since this type of camera averages many frames in one composite view, large changes of video level can be amplified. However in low light night vision applications this works fine for never any instant large changes due to car lights or other factors.

Make sure all cameras are securely mounted. If the camera shakes then the entire video image changes and thus a motion alarm. Drop ceilings or temporary walls should be avoided for constantly shake due to HVAC systems and people walking by.

Since the VMD engine only processes luminance information, B/W cameras can be used with equal or better performance than color ones. Usually the B/W has better low lux sensitivity so using a low light B/W for night use would be far superior.

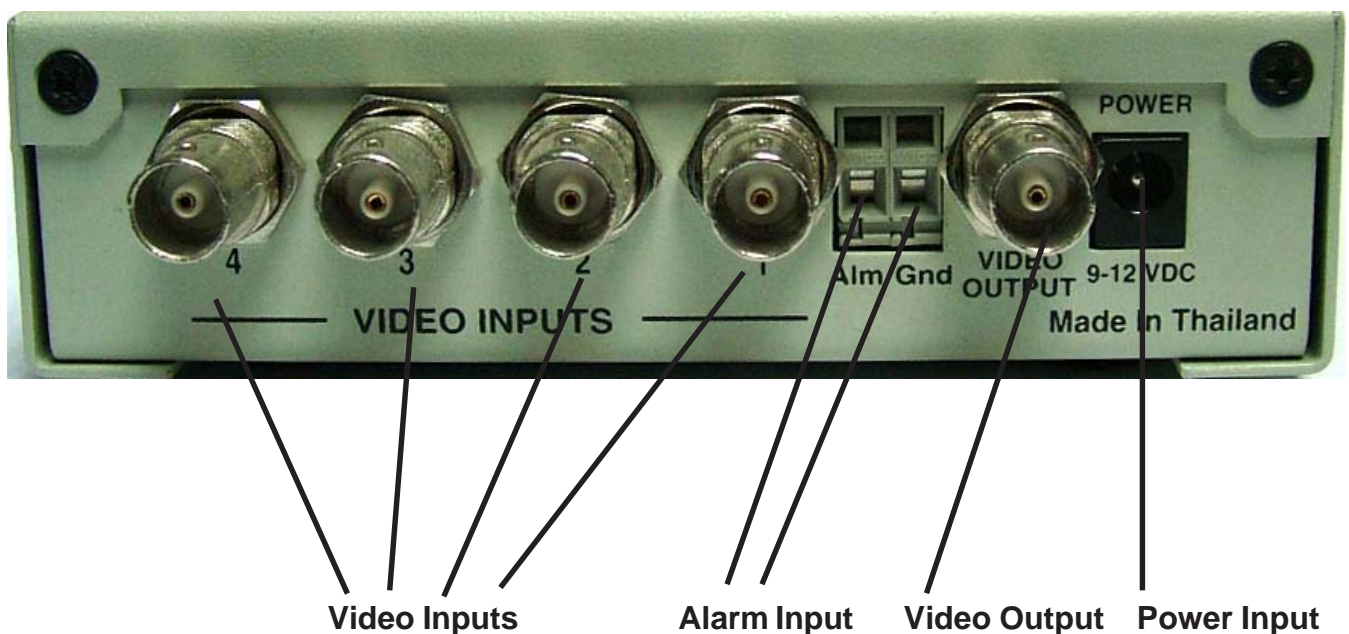
## Specifications

4 BNC Video Inputs 75 ohm Terminated 1VP-P +/- 20%  
1 BNC Video Output 1V P-P Terminated 75 ohms or Un-terminated  
Video Output can power two 75 ohm terminated loads  
4 Pushbuttons on Front Panel for Programming and Homing  
4 Red LEDs for signifying which camera is presently Homed or Output  
1 Alarm Output (Cage Clamp type connector, open collector transistor) 12VDC @ 20mA Max.  
All Program setups stored in Non volatile EEPROM Memory  
Video Loss Detection less than 0.5V P-P or no sync signal  
1 Green Power Status LED  
1 Yellow Program Mode LED  
12 VDC Power Input @ approx. 150mA Max. , 2.1mm x 5.5mm DC Coax Connector  
Case - Beige color in metal  
Size - approx. 5"Wx5"Wx1.5"H  
Weight -

## Mechanical

The case is a metal beige computer white color. The PCB inside is of a unitized design. That means all connectors are mounted on the PCB so it can be removed from the case and mounted inside OEM equipment. The unit will have a heatsink that will get warm when used with 24 VDC so venting if mounted inside an OEM enclosure should be considered.

## Connections



VMD1004 Rear Panel

TM

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