

## Video Multiplexer with Motion Detection



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# VIDEO PERCEPTION INCORPORATED

## VIDEO MULTIPLEXER WITH MOTION DETECTION

The Video Perception Inc. Video Multiplexer unit provides up to eight-channel operation with the incorporation of high-performance video motion detection. The unit provides an analog video output and a digital output. The digital output transmits alarm status, self-rest status, odd/even field status, motion tracking data and video sync timing for each channel. It also includes the current multiplexed channel selection. The video cameras of the system can be of the inexpensive power line synchronizing type of NTSC or PAL format. These cameras may operate over a wide variation of lighting; the lighting are compensated by the Video Multiplexer unit. This unit is controlled from the serial port of a computer to provide many dynamic control options. Those controls permit the discriminating of intruders by size allowing a pet to be undetected while detecting a person. The unit provides a means of loading a high-resolution mask configuration for each channel; motion is not detected in the masked regions.

The video motion detector of the unit uses patented principle of locating edges in both the horizontal and vertical directions. The edges are uniquely processed to provide substantially improved results that minimize false alarm conditions, while maximizing system sensitivity insuring positive detection. The image viewing area is subdivided into very small units (cells). The horizontal and vertical edge processed results are encoded into a single bit representing the boundary status of each cell. This approach provides a greatly reduced volume of data (128 times reduction) which represents the status of many pieces of the image. This condensed data format provides faster processing speed, as well as a significant reduction of support electronics. A Reference image, in this condensed format, is stored in RAM at timed intervals or when directed by a remote computer. While operating in the multiplexed mode at NTSC field rates, the currently processed image is compared to the corresponding channel Reference image at 6.67 samples-per-second rate for 8 channel operation and at 12 samples-per-second for 4 channel operation. If the degree of motion exceeds the computer-selected amount, an alarm will be set for each channel in alarm status. Additional information about the processing algorithm is provided in the data sheet for the IPP3000R (CMOS Real Time Image pre-Processor).

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U.S. Patent # 4,897,719

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The unit is designed to be satellite box of a complex security system. The box will service a cluster of up to eight video cameras. It *provides* "front-end" video motion detection. It process the sync signals from all of the video cameras to generate motion detection data; it transmits these timing data over a digital line to the receiving station. The receiving station can utilize this timing without repeating the processing. Video Perception Inc. offers an integrated circuit that processes this digital channel. It outputs the timing, the alarm status, the self-test status, the odd/even field status, and the tracking data for each channel. It outputs the multiplexed channel selection. It also provides the x-y addressing for a frame grabber. It provides control of an A/D Converter for digitizing the common analog video channel. Very simple circuitry is required at the receiving end to raster a selected channel to a monitor. **All of the data are available all of the time.** A receiving station could be developed to display several channels from one Video Multiplexer unit or to allocate these among several Video Multiplexer units. Enough data are present to computer-process the tracking data to identify the intruder profile and to track selected intruder profiles. The reduced volume, of these real-time data, makes it attractive to software processing to form autonomous threat discussions. The Video Multiplexed unit is a key building block of simple to very sophisticated security system.

The physical enclosure of the Video Multiplexer unit is expected to be approximately 13" x 5" x 2". There will be eight BNC connectors for input channels and one BNC connector for the analog video output signal. There will be a twinaxial connector for the digital output. There will be a power-input connector from a wall transformer (power supply), a power switch, and a power indicator. There will be a 9 pin D-Sub connector for the serial port connection to a computer. All of these components will be basically in-line and in a single row.

The Video Multiplexer unit can competitively priced due to its relatively simple construction. Since it also contributes to the simplification of construction of the receiving equipment and architecture of interconnect cabling, it offers system economy.

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### FEATURES (available on all 8 channels)

- Operates 8 or 4 channel multiplexing
- Does not require all 8/4 camera connected for multiplexing
- Can operate single channel - any of 8
- Provides one video and one digital output
- Provides discriminating motion detection
- Tolerates video camera performance variations
- Performs periodic self test
- Develops motion tracking data
- Enables object profile ID
- Provides Automatic Lighting Compensation (*ALC*)
- Performs Image Processing for motion data
- Processes at 12.6 MHz pixel sample rate
- Filters image Noise
- Supports high resolution masking
- Enables inexpensive data recovery @ receiver
- MicroController interface to computer
- Controllable from computer serial port
  - Threshold processing
  - Tolerance of intrusion
  - NTSC/PAL operation
  - Mask data transfer from computer
  - Single/4/8 channel operation
  - Single channel selection (1 of 8)
  - Mask On/Off
  - Edge/Change contrast detection mode
  - Track/Mask (provides tracking or config. of masking)
  - Timer Reference RAM load control
  - Computer Reference RAM load control
  - Mask load control

### APPLICATION ADVANTAGES (security systems)

- Provides Improved quality motion detection
- Permits size discrimination of Intruder
- Reduces false alarms
- Operates with Inexpensive power line sync cameras
- Performs under changing lighting conditions
- Provides high motion field sample rate
- Detects intruder attempts to disable system
- Provides means of tracking intrusions
- Provides means of Identifying intrusions
- Provides means of easily determining alarm channel(s)
- Tracking output provides video sync timing
- Simplifies system architecture
- Reduces system cost
- Reduces cost or receiver station
- Supports autonomous system design



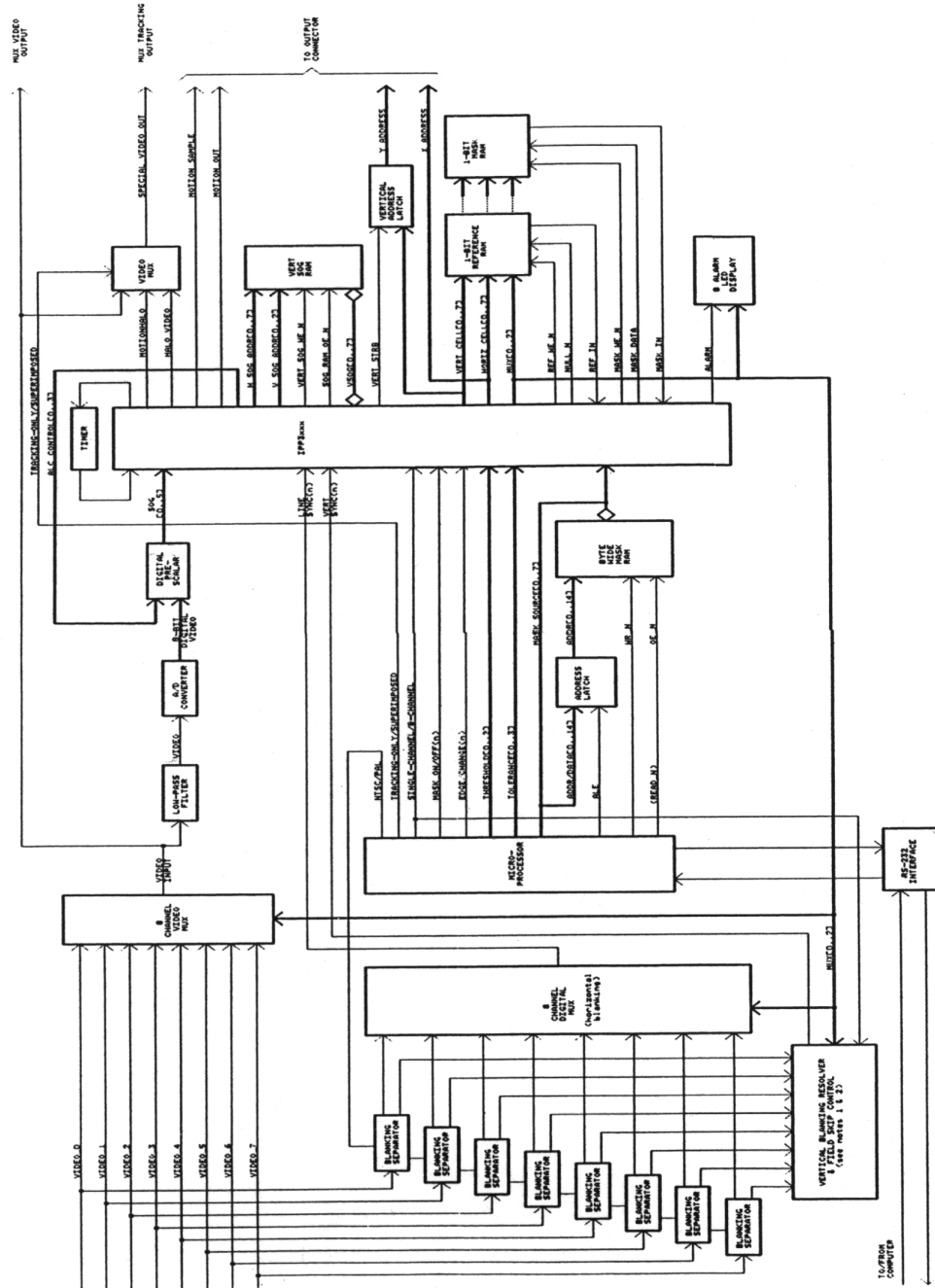
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FIGURE 1

BLOCK DIAGRAM OF 8 CHANNEL SECURITY DEMO BOARD



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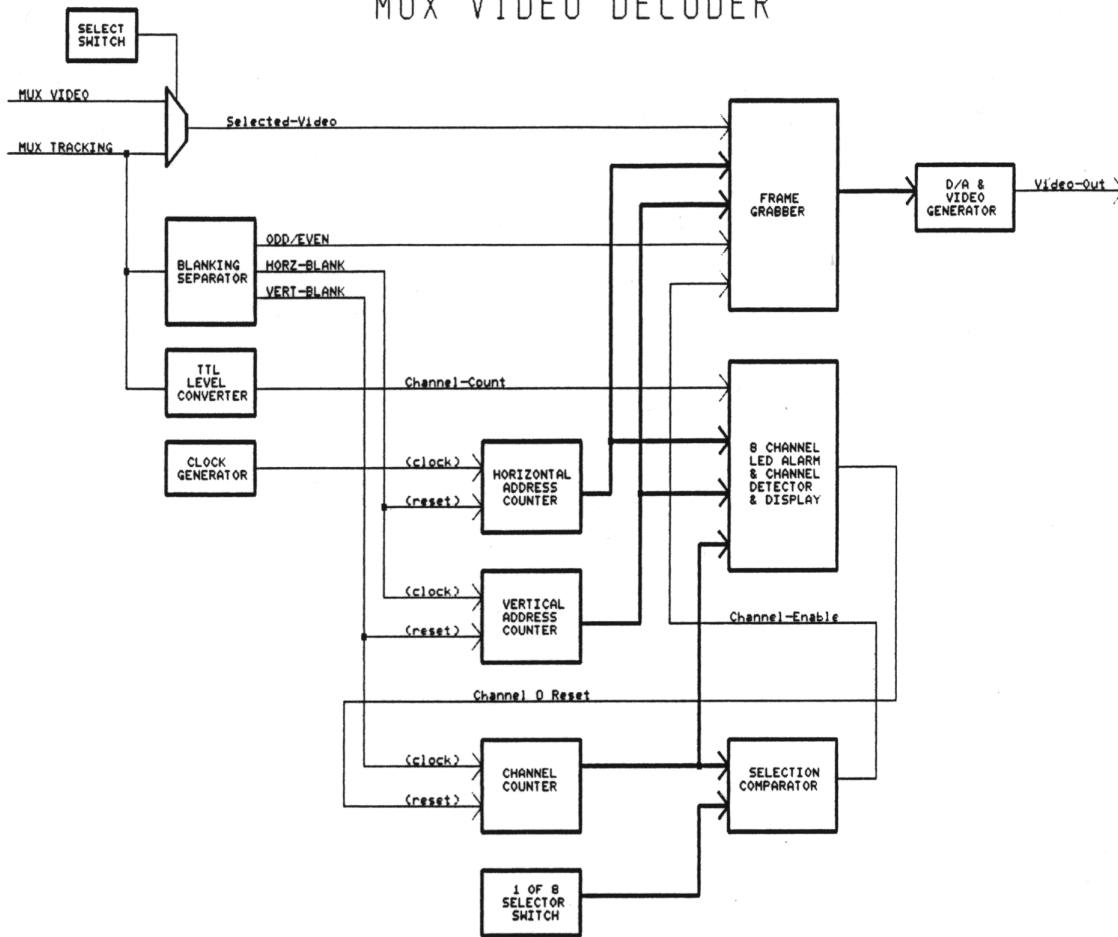


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## VIDEO PERCEPTION INCORPORATED

FIGURE 2  
BLOCK DIAGRAM OF  
MUX VIDEO DECODER



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