# VME Acquisition Modules

## Broad Range of Cameras and Sensors Supported

Each MaxVideo 250 and 200 VME-based, board-level image processor comes with your choice of one of four acquisition modules. These modules provide support for analog, general purpose digital, differential digital, and color inputs from a wide variety of acquisition devices. Each of them is fully supported by ImageFlow, Datacube's software library of programmable functions.

### Analog Scanner (AS)

The Analog Scanner (AS) is an 8-bit digitization module for the MaxVideo 250 and 200. It interfaces to most analog 1-D or 2-D cameras and sensors. Digitization rates from 100 KHz to 26 MHz are supported.

The AS provides complete conditioning of the selected analog source signals, including programmable gain, offset, filter response, and sync processing operations. The timing section of the AS is fully programmable and it can generate and/or slave to horizontal sync, vertical sync, composite sync, and pixel clock signals.

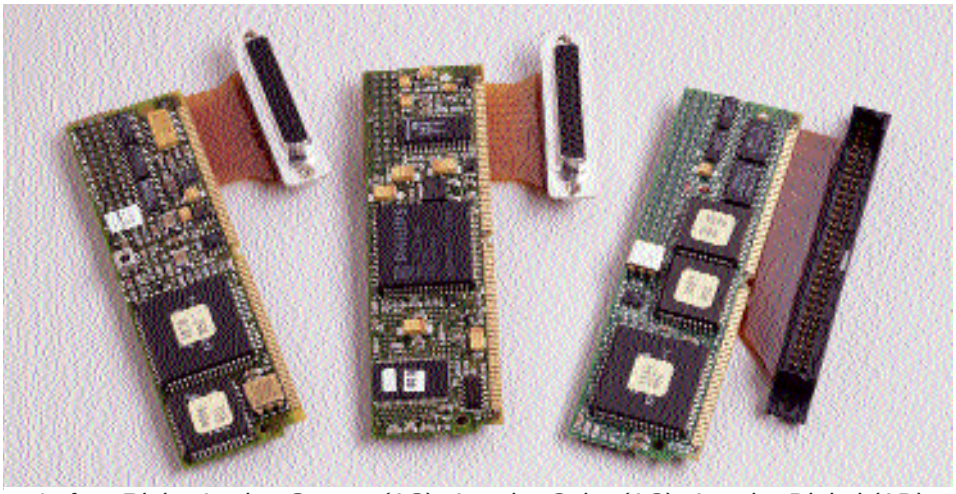
### Acquire Digital (AD)

The Acquire Digital (AD) is a 24-bit digital input module for the MaxVideo 250 and 200. It interfaces to most digital 1-D or 2-D cameras and sensors. It supports data rates from 100 KHz to 20 MHz.

The AD receives digital signals with up to 24 bits of resolution. A First In First Out (FIFO) is used to match input rates with the video pipeline. Data is output to the Architectural Adapter (AB) motherboard through up to three 8-bit module ports. The AD timing section is fully programmable and can generate and/or slave to horizontal sync, vertical sync, composite sync, and pixel clock signals. It accepts 24-bit single-ended or 12-bit differential digital data inputs.

### Differential Acquire Digital (AD)

The AD is also available in a differential-only mode. This model supports use of PECL, RS-422, and the Low Voltage Differential Signaling (LVDS) driver technology used by Kodak on certain sensor models. Lacking a single-ended mode, the Differential AD is less versatile than the standard AD, but it uses a lower voltage for reduced emissions and provides faster speeds.



*Left to Right: Analog Sensor (AS), Acquire Color (AC), Acquire Digital (AD)*
*Not pictured: Differential AD*

### Acquire Color (AC)

The Acquire Color (AC) is the color acquisition module for use with the MaxVideo 250 and 200. Features include two analog input ports that support separate 8-bit luminance and 8-bit chrominance inputs, or composite inputs. Also included is an Input Video Selector for camera selection between two input ports; color space conversion to RGB, monochrome, or YUV; and selectable resolution.

The AC supports three filter characteristics—a low-boost filter, a nominal filter, and a high-boost filter—for both composite video and S-Video. Capabilities include analog, color acquisition on one of two input channels and software-selectable input format. Supported formats are composite (PAL or NTSC), gray-scale (CCIR or RS-170), and YC (S-Video). The AC also works very well with low-quality or irregular signals such as those produced by VCRs. It can be used instead of an AS for standard RS-170 and CCIR video sources of poor quality.

The AC supports 24-bit RGB video or 16-bit interleaved YU/YV output to the MaxVideo 250 and 200. It outputs full resolution of 640x484 (NTSC) and 768x576 (PAL) or scaled resolutions of 512x484 (NTSC) and 512x576 (PAL).

### Camera and Sensor Support

This list is current as of 4/97, but is constantly being updated. Call Datacube at 978-777-4200 or check the Datacube web site at http://www.datacube.com for the most recent list.

***Area Cameras***
*Cidtec:* TN2250, 3710D
*Cohu:* 2100, 4810, 4110
*Costar:* CV-M10
*Dalsa:* CA-D1, CA-D2
*DVC:* 0A, 8, 10
*EEV:* CAM17
*EG+G:* MC9128, MC9256
*Hitachi:* KP-M1
*Panasonic:* GP-MF502/552, GP-MF702D
*Pulnix:* TM-640, TM-845, TM-9700
Generic RS-170 models
Continuous-V RS-170 models
Generic CCIR models

***Line Scan Cameras***
*Dalsa:* CL-CX series, CT-C5, CL-G1
*EG+G Reticon:* LC1902, LC1911
*EG+G:* LD20XX series

***Color Cameras***
*Sony:* XC-003
*Panasonic:* GP-MF612

***High Resolution Cameras***
*Kodak Megaplus:* 1.4i, 1.6i, 4.2i, ES 1.0
*Hamamatsu:* C4880, C4742
*Dalsa:* CA-D4, CA-D9
*Texas Instruments:* MC-1134P
*EG+G:* MD4013
*Dage MTI:* Model 81

***TDI Cameras***
*Dalsa:* CL-E1, CL-F2, CT-E1, CT-F2
*EG+G Reticon:* LC4911/21, LC4922

***Infrared Cameras***
*Inframetrics:* Selectcam
*Cincinnati Electronics:* RST160
*Amber:* Radiance 1
*Flir Systems:* Prism DS

# Specifications

## Analog Scanner (AS)

***Digitization***

- 4:1 source multiplexer
- Programmable low-pass filter
  - Programmable seventh order bessel filter to tailor frequency response
  - Cutoff frequency ranges from 1 to 16 MHz
- Software-controlled offset and gain
- DC or AC coupling of input analog video signal
- 8-bit ADC digitizes input at pixel rates from 100 KHz to 26 MHz
  - Phase lock loop: 5 MHz to 26 MHz
- Input signal voltage: 0.5V to 2.0V nominal
- Terminating resistors 75 ohms ± 3%
- 256 levels of gain with a scale factor of 0.0 to 2.0
- 256 levels of offset with a range of ± 4.0V (referred to input)
- DC clamp can be enabled/disabled and programmed to any width
- ADC clock can come from three possible sources:
  - External clock from scanner or cameras at 100 KHz to 26 MHz
  - Horizontal or composite sync from camera can be phase-locked to generate the ADC clock at 5 MHz to 26 MHz rates
  - Arbitrary clock can be synthesized at 100 KHz to 26 MHz

***Timing***

- 1 to 4096 pixels (H&V timing)
- Programmable active window, sync, and period (H&V)
- Programmable H&V sync processing
- Sensor interface with differential or single-ended sync inputs:
  - Receive and/or transmit horizontal sync, vertical sync, composite sync, and pixel clock signals to or from sensors

## Acquire Digital (AD)

***Digital Inputs***

- Accepts either 24-bit single-ended or 12-bit differential digital inputs
- Differential-only version available for compatibility with PECL and LVDS cameras (see “Differential AD”)
- 24-bit single-ended data:
  - Input levels are TTL-compatible
  - Schmidt trigger receivers with hysteresis improve noise immunity
- All single-ended and differential inputs are terminated in 220 ohms to +5V and 330 ohms to ground.
- 12-bit differential data:
  - Input receivers are differential RS-422 types
  - Inputs have hysteresis for improved noise immunity
  - Performs similarly to standard RS-422
  - Functions well in long cable drive (to 20 meters) applications

***Timing Generators***

- Sensor clock can come from three sources:
  - External clock from scanner or cameras with 0 to 20 MHz rates
  - ADC clock at rates from 5 MHz to 20 MHz can be generated by phase-locked horizontal or composite sync from camera
  - Arbitrary clock can be synthesized at 102 KHz to 20 MHz rates
- Four available sync inputs are configurable for single-ended or differential, and for either active high or active low:
  - Clock from sensor
  - Horizontal sync from sensor
  - Vertical or composite sync from sensor
  - Auxiliary input from sensor (can be polled from or generate an interrupt to the VMEbus)
- Four sync outputs are differential with RS-422 type drivers for RS-422 and TTL compatibility:
  - Clock output to sensor
  - Horizontal sync to sensor
  - Vertical sync to sensor
  - Auxiliary output #1 to sensor
- Three general-purpose, programmable sync outputs are single-ended with 24 mA TTL drivers. Output polarity of single-ended signals is software selectable:
  - Horizontal auxiliary output #2 to sensor
  - Vertical auxiliary output #1 to sensor
  - Vertical auxiliary output #2 to sensor

***Timing***

- 1 to 4096 pixels (Horizontal and Vertical timing)
- Programmable active window, sync, and period (H&V)
- Programmable H&V sync processing
- Sensor interface with differential or single-ended inputs
  - Receive and/or transmit horizontal sync, vertical sync, composite sync, and pixel clock signals to or from sensors

## Differential AD

- Accepts 12-bit differential digital inputs only
- 12-bit differential data:
  - Input receivers are RS-422, compatible with PECL and LVDS (RS-644) driver technology
  - Inputs are terminated in 100 ohms

## Acquire Color (AC)

***Analog Signal Path***

- Input impedance: 75 Ohm ± 2% (all channels)
- Nominal 1.0V video input

***A/D Converter***

- Supports the following surface sizes:
  - 768x576 (PAL) – full resolution
  - 640x484 (NTSC) – full resolution
  - 512x576 (PAL) – digitally re-sampled
  - 512x484 (NTSC) – digitally re-sampled

***Timing***

- Line-locked clock generation
- Data rates:
  - NTSC: 12.27 MHz at 60 Hz
  - PAL: 14.75 MHz at 50 Hz
- 20 MHz RGB or YU/YV output to MaxVideo 250 and 200

***Timing Generator***

- Single 26.8 MHz crystal clock controls all timing functions
- 640 active samples per line (60 Hz)
- 768 active samples per line (50 Hz)

***VCR Features***

- Fast sync recovery of vertical blanking for VCR signals
- Works with VCRs in all VCR playback modes

## Additional Information

For more information about the products mentioned in this document, please refer to the following Datacube literature:

**ImageFlow Data Sheet**
**MaxVideo 250 Data Sheet**



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