KODAK *EktaPro* HG Imager, Model 2000

The KODAK EKTAPRO HG Imager, Model 2000 is the next generation in a family of cameras that combine high frame rates and excellent resolution digital imaging within a small, rugged, self-contained package. The HG Imager offers record rates from 30 to 2000 frames per second, continuous recording with variable pre/post trigger, and both live and playback video as color or monochrome RS-170 output. A rear control panel provides easy access to commonly used features such as exposure, frame rate and playback controls. A control panel lockout feature secures the imager setup for severe environments such as automotive crash sled, airborne and range applications.

SELF-CONTAINED, COMPACT DESIGN FOR ANY ENVIRONMENT

Designed as a small, lightweight, self-contained camera, the HG Imager does not require an accompanying processor. In any environment, digital images may be stored during download in a compact (Bayer) or 24-bit Color TIFF format onto a PCMCIA hard drive or solid state memory card for future detailed analysis using a notebook or desktop computer. In an airborne application, the HG Imager's one-button record and auto exposure features reduce the imaging process to a single TTL or contact closure. As a replacement for film cameras in harsh environments, the HG Imager's compact housing allows it to mount easily onto an impact sled, crash test vehicle or under the wing of an aircraft. In the laboratory, the adjustable X/Y coordinate display, in addition to record, playback, and download functions, make analysis and permanent storage of images a simple task. By attaching a video recorder to the rear of the camera, an operator can capture and store images to S-VHS tape.

NETWORKING AND COMMUNICATIONS

100Mbps Ethernet communication is a standard HG Imager feature, providing remote control communication and fast image transfer for multiple HG Imagers from a personal computer. PC-based control software for the HG Imager supports both 100BASE-T Ethernet and RS-485 communication networks for simultaneous management of multiple imagers. A Dynamic Link Library is available for sophisticated users who intend to develop their own control software. And finally, an RS-232 interface allows the HG Imager to be computer controlled through an extensive built-in ASCII command set that permits easy terminal control, and development of basic software routines to automate the imaging process.

- **High-Resolution Color Recording**
  Kodak's state-of-the-art sensor technology provides resolution at 512 x 384 pixels in 24-bit color. Also available is a model with a monochrome sensor which provides even greater resolving power and light sensitivity.

- **Large Square Pixels**
  Pixels are 16µm x 16µm, making the camera ideal for computer image analysis applications.

- **Rugged Design**
  Built to withstand punishing environments up to 100g's in any axis.

- **Unique Anti-Blooming Control**
  The camera can look directly into flood lamps and still capture the surrounding scene. This is unique for high-speed sensors.

- **Built-in Electronic Shutter**
  The camera's reliable electronic shutter provides sharp images and is essential in eliminating motion blur.

- **Variable Exposure**
  From 23 through 983 microseconds at 1,000 full frames per second, in 5 microseconds increments.

Front view

Rear view

The EKTAPRO HG Imager, Model 2000 can download images to PCMCIA type III storage media.

MOTION ANALYSIS SYSTEMS DIVISION

KODAK EKTAPRO HG Imager, Model 2000
SPECIFICATIONS

Resolution:	512 (H) x 384 (V) photo-sensitive pixels
Image:	24-bit color or 8-bit monochrome images
Blooming Protection:	Greater than 100x at 1 millisecond exp. 1000 frames per second (fps)
Exposure Rates:	Electronic shutter variable from 23 through 983μ at 1,000 full fps, in 5μ increments
Dynamic Range:	48 dB at 25°C ambient temperature
Record Rate:	NTSC = 2000, 1000, 500, 250, 125, 60, 30 fps and external PAL = 2000, 1000, 500, 250, 125, 50, 25 fps and external
Trigger Modes:	Variable from start to maximum available image capacity
Playback Rates:	NTSC = 1, 2, 4, 7, 15 and 30 fps PAL = 1, 2, 3, 6, 12 and 25 fps
Recording Times:	Up to 2 seconds storage at 1000 full fps; up to 2.73 seconds storage at 2000 fps; Longer record times at slower frame rates
Rear Panel Controls:	Download, Live-normal/Play forward, Live-low light/Play reverse, Frame Rate (up/down), Exposure Time (up/down), Ready, Record, Delete Recording and RS-485 Termination On/Off switch
X-Y Reticle:	Built in electronic crosshair for data reduction and calibrated measurements
Triggers:	TTL, closed contact; software driven one button record mode
Border Data:	Date/Time, Imager ID number, IP address, exposure rate, frame number, trigger status, temperature, reticle position, system status, session ID number, frame rate, baud rate
LED Indicators:	Standby, Ready, Data Secure, Fault
Hardwired Controls:	**Ready** - (input) changes imager mode from Standby to Ready to be Triggered **Trigger** - (input) changes the imager mode from Ready to Record **Ready Status** - (output) indicates the imager is in the Ready to record mode, waiting for Trigger **Fault** - (output) indicates trigger fault, PCMCIA fault, overtemp
Computer Interfaces:	**RS-485** - used for control and configuration of one or more imagers over serial line **RS-232** - used for control and configuration of single imager over serial line **Dedicated Ethernet** - 100 Base-T physical link using UDP/IP protocol. Used for HG Imager control and configuration, and for downloading images from one or more HG Imagers. Connection of non-HG devices to this link is not recommended
Image Capacity:	**Standard:** 1024 full frames at 1000 fps, 2730 frames at 2000 fps **Optional:** 2048 full frames at 1000 fps, 5461 frames at 2000 fps Memory module - PCMCIA type III interface for archiving digital images onto removable storage media
Imager Connectors:	**Main Interface:** Single Mil-C-38999 connector provides a conduit for all supported communication lines and power **RS-232:** DB9 provides serial communications for control via ASCII commands **BNC:** Allows NTSC or PAL, RS170 video output
Distribution Box Connectors:	**RS-485:** DB9 supports multiple imager control on a single communication line **RS-232:** DB9 provides serial communications for control via built-in ASCII commands **BNC Connection:** Ready, Exposure out, Sync In, Fault Status, NTSC or PAL Video, Trigger, and Ready Status **RJ45:** LAN - Supports direct connection from an Imager to an Ethernet HUB PC - Supports direct connection from an Imager to a PC NIC **Power:** +22 to 42 VDC Input **Imager:** Single Mil-C-38999 connector provides a conduit for all supported communication lines and power **Output:** Single Mil-C-38999 connector provides a conduit for all supported communication lines and for distribution to J-Box **IRIG:** Optional PC based IRIG-B time capture for annotation of image tag data with IRIG time
Lens Mount:	C-mount or Box Mount
Size:	4.3(W) x 5.5(H) x 12(L) inches
Weight:	15 lbs. (estimated)
Base Mounting:	Five 1/4" - 20 bolt mounts on the bottom
Power:	+22 to 42 VDC at 50W
Operating Case Temp:	-10°C to +50°C
Storage Case Temp:	-25°C to +65°C
Shock:	100g @ 10 milliseconds any axis, 1000 cycles 50g @ 100 milliseconds any axis, 1000 cycles
Emission Standards:	Meets all applicable international standards
Safety Standards:	Meets all applicable international standards
Software:	Control panel software for remote control of one or more imagers via Ethernet or RS-485; for use with personal computer using Windows NT 4.0™