

A STILL VIDEO SYSTEM (DRAFT COPY - 3/20/87)

E. Brooks, L. Goolsby, E. Kendrick, T. Nutting, F. Oleson, D. Pophal
Eastman Kodak Co.
Electronic Photography Division
Rochester, New York 14650

INTRODUCTION

A complete Still Video System has been developed that includes all the components necessary for capturing, displaying, printing and sending and receiving Still Video Images.

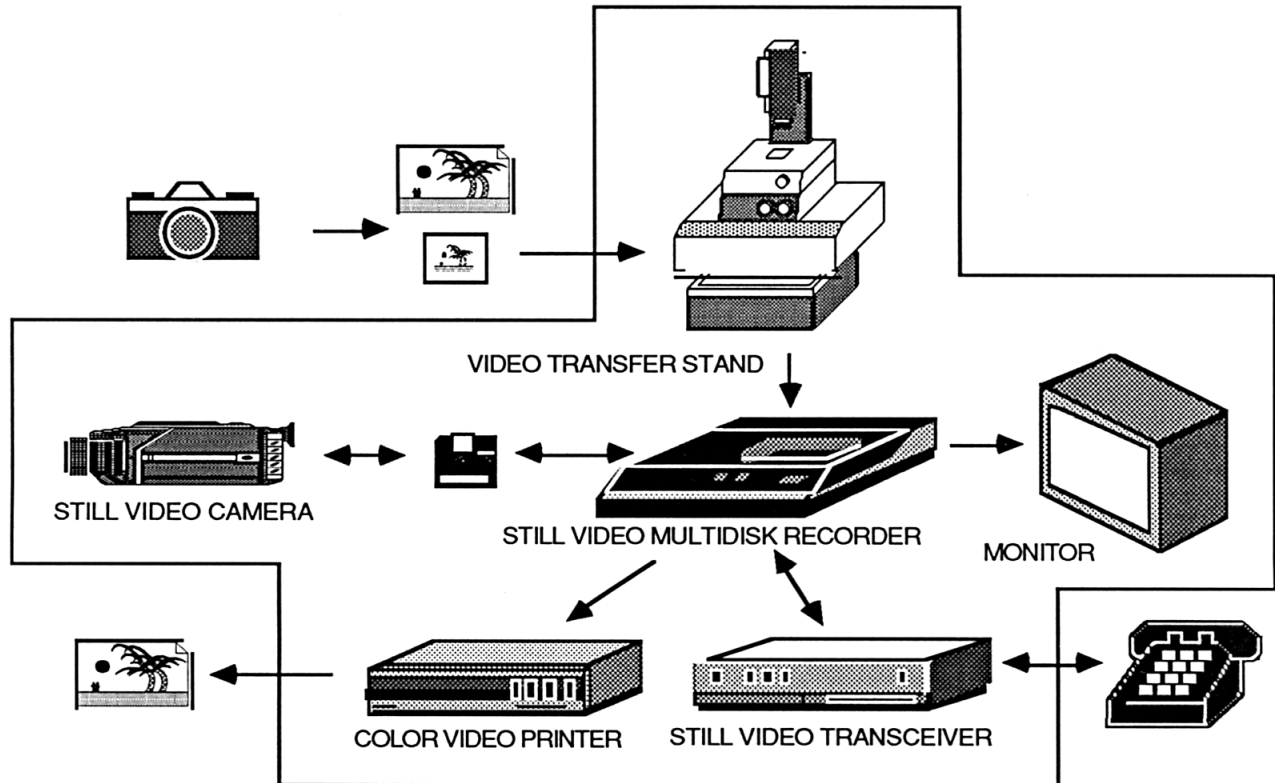


Figure 1 - The Still Video System

SYSTEM CONCEPT

The system consists of a Still Video Camera, a Multidisk Recorder (and player), a Printer, a Video Transfer Stand, a telephone line Transceiver and a TV monitor. The Camera and Recorder utilize the Still Video Floppy disk and conform to the specifications of the Electronic Still Camera Conference¹. The system interconnects utilize standard NTSC and analog RGB signal levels and the Recorder, Printer and Transceiver have digital communication ports for optional control by external computer. Overall system performance exceeds 300 lines of TV resolution.

STILL VIDEO CAMERA

A 280,000 element 2/3" format CCD imager is utilized for making single field or full frame still recordings. In the still frame mode, the imager has an effective ISO of 100 and a focal plane shutter is used to integrate both fields simultaneously to eliminate motion blur between the two fields. The shutter is capable of speeds as fast as 1/1000 second. In the still field mode, the vertical registers of the CCD act as an electronic shutter and the two fields are then summed to increase the effective ISO to 200.

While the picture is being composed, the electronic viewfinder requires that the imager operate in the continuous frame mode with an integration time of 1/30 sec. The Camera includes a provision for alleviating depth-of-field differences between the continuous frame mode and the still modes.

The dual thin-film recording head utilizes air pressure for head-media contact. This has several advantages over the rail type system including longer head life, less critical adjustments, good contact over the large area of the dual head, and no rail retraction mechanism.

STILL VIDEO MULTIDISK RECORDER

The Recorder plays back and records either single field or full frame images utilizing a tray that holds 30 disks. The tray has a built-in EEPROM to store user generated data such as date, disk name, image number and category information. Operation is through a menu driven system with on-screen displays or by an external computer through an RS-232 compatible serial port. Image access time is 0.1 second for adjacent tracks, 2.0 seconds across the disk, 3.0 seconds for adjacent disks and 4.0 seconds across the tray.

Single field recordings are played back with the second field interpolated from the first. When recording, the vertical sync signal is monitored so as to always record the odd field first. This insures that when duplicating disks, field recordings will always be the true field, not the interpolated field. The dual thin-film head used in the Camera is also utilized in the Recorder.

COLOR VIDEO PRINTER

The printer transfers dye through thermal sublimation from a donor web to a receiver sheet to produce a 3.5 X 4.7 inch print from NTSC, RGB or digital input. Prints are delivered in less than 1.5 minutes and the printer has a capacity of 100 prints before donor and receiver material must be replenished.

A 512 X 512 X 3 (RGB) framestore is utilized with a dynamic range of 8 bits per pixel for 256 levels of tone scale for each color. When using RGB input, horizontal print resolution at 50% MTF is 350 lines.

The desired print density determines the number of pulses sent to the 512 element thermal head and thermal feedback from the head determines the width of the pulses. The resultant print will have proper density regardless of head heat-up and cool-down phenomena.

STILL VIDEO TRANSCEIVER

The Transceiver transmits and receives still video color images over standard dial-up phone lines. Each color image is digitized to 512 X 512 resolution with 256 gray levels, and an image compressor/expander reduces average transmission time to less than 1 minute. A recognizable image appears in 10 seconds.

Image data is transmitted at 9600 BPS and is automatically adjusted to lower data rates on noisy phone lines. Error detection will result in 1 undetected error in 10^4 transmissions.

VIDEO TRANSFER STAND

The Transfer Stand provides an NTSC output and zoom and crop capability for slides and prints. Contrast adjustability is also provided for prints. Print sizes up to 9 X 12 inches can be accommodated.

SUMMARY

A still video system has been developed that utilizes several new technologies to provide improved image quality, access time, reliability, and convenience of use. This system has a variety of applications including computer graphics, law enforcement, education and training, medical diagnostics and news gathering.

REFERENCE

- 1) The Electronic Still Camera Conference, Specifications of Still Video Floppy Systems