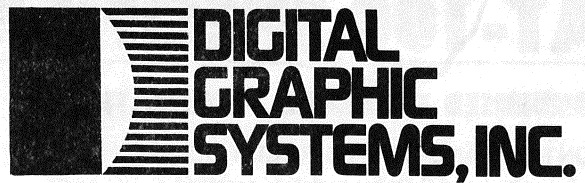


CAT-100



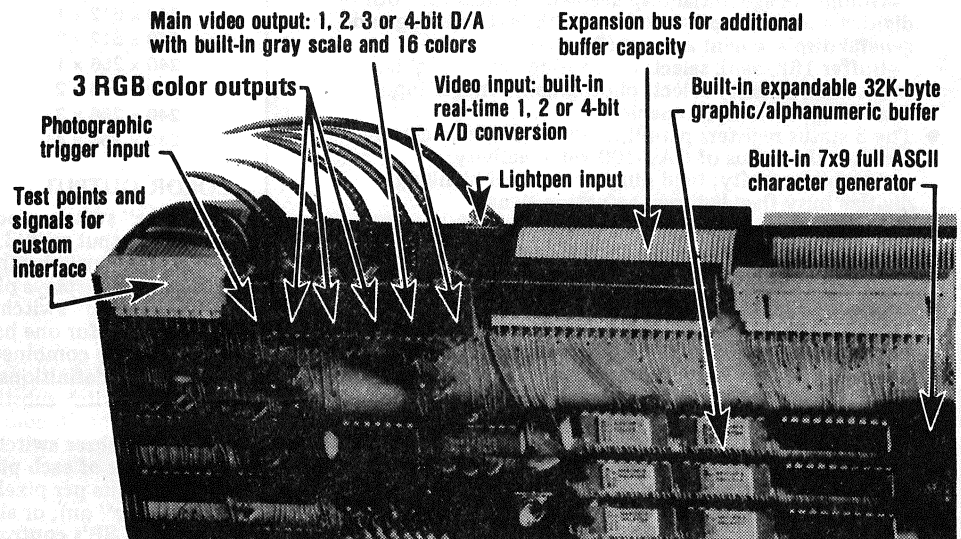
A COMPLETE COLOR IMAGING SYSTEM

ON TWO S-100

BOARDS

with

video frame grabber.



FUNCTIONAL CHARACTERISTICS

9618

The CAT-100 is a powerful, integrated, expandable, general-purpose digital video imaging system for S-100 bus microprocessors. It consists of two standard-size S-100 boards in its basic configuration. It offers three fundamental functions: a video frame digitizer, an image memory, and an output video generator.

The digitizer can capture a video frame in 1/60th of a second and store it in the on-board 32K-byte image memory. The image memory is accessible for image generation or processing in the address space of the S-100 bus through a window which can be selected or deselected by software. The video generator displays the digitized image in 16 shades of gray or 16 colors on standard black and white or color TV monitors, or high-resolution RGB monitors.

The CAT-100 provides a variety of synchronization choices; it can generate its own RS-170 video sync, extract sync from any external video source, or lock onto a separately supplied external sync signal. Two types of video A/D conversion circuits provide a choice of 1, 2 or 4 bits per pixel

at maximum video rate. The first circuit is a conventional converter yielding 16 gray levels, the other is a contouring circuit useful for reducing images to outlines. The software-selectable system parameters include a variety of image formats, video output controls, digitization commands, addressing modes, vertical image offset, photo trigger and lightpen controls. Fifteen formats using the entire buffer capacity are selectable for digitization as well as for display and offer resolutions ranging from 256 to 1280 pixels per TV line.

The text mode, with a high definition 7x9 character generator, can display up to 2,640 characters on a screen organized as 33 lines of 80 characters. A smooth scrolling feature allows the user to scan the entire text file at a variable speed while the characters remain perfectly legible. A lightpen can be connected directly to the CAT-100, and the interaction provides 18 bits of coordinates resolving one pixel in the 480x512 format. A photo trigger synchronizes the display of a single frame with the shutter of a photographic camera.

CAT-100 SPECIFICATIONS

CONDENSED TECHNICAL SPECIFICATIONS

CONTROL AND STATUS REGISTERS

- 5 control and 3 status registers accessed as I/O ports.
- Switch-selected I/O address boundaries.
- Can be located anywhere in I/O address space.
- The 5 control registers allow a large variety of functional modes to be selected by software:
 - General system timing: choice of 3 fundamental clock speeds; for each speed, choice of 2 shift clock ratios and 3 pixel clock ratios for graphics formatting; interlace enable; digitize/display command; graphics/text mode; text formatting and smooth vertical scrolling displacement.
 - Main video output mixer control: live video view switch; dot mode; gray scale/equal weight summation control; general video output polarity; 4 individual pixel bit masks.
 - Graphic buffer addressing: internal page select (6 bits) for 128K-byte total capacity; window select/deselect flag; video synchronization source select.
 - Graphic image initial displacement address for both the digitize and the display modes; rough text scrolling and general displacement address (12 bits).
 - Buffer 16K-bank select; contouring circuit enable; contouring polarity select; photographic trigger input enable; lightpen input enable.
- The 3 status registers permit S-100 software to closely monitor the status of CAT-100 video activity:
 - TV field activity; field number; vertical blanking; digitize busy flag; lightpen actuation signal.
 - Lightpen "seen" flag; lightpen X-Y coordinates (18 bits).

GRAPHIC MEMORY BUFFER

- On-board 32K-byte capacity in basic CAT-100 system.
- Organized in 2 banks of 16K bytes of dynamic memory.
- Expandable up to 256K of capacity in 32K increments on extension boards for better gray scale or color resolution.
- 2-port design for a totally snow-free and clean display:
 - internal port for fast video access;
 - external port for S-100 bus. Access time: 1 microsecond average, 25 microseconds maximum during 0.2% of the time.
- Convenient addressing scheme:
 - Fixed access window in S-100 memory address space.
 - Window size (2K/8K) and location are switch-selectable.
 - The software-selectable page of the CAT-100 buffer appears to the CPU as regular memory located in the window.
 - Allows large buffers to be addressed without consuming a large fraction of the S-100 address space.

VIDEO INPUT

- On-board 4-bit A/D converter yields 16 gray-scale levels.
- Full video-rate digitization: 1/60th of a second for a resolution of 240 x 256 x 4 or equivalent.
- Can be set to generate 1, 2 or 4 bits per pixel.
- Conversion speed: better than 76 nanoseconds for 4 bits.
- Accepts standard 1.4 volt composite B/W video; Z=75 ohms.
- Automatic composite sync extractor.
- Accepts EIA RS-170 or "random interlace" synchronization.
- No equalization requirements: will sync on a video tape or a video cassette recorder output.
- Also accepts/generates external sync (selectable by software).
- On-board proprietary 2-threshold slicing/contouring circuit as an alternative to the A/D converter.
- Maximum output rate: 26 Mbits/sec. for both the A/D converter and the contouring circuit.
- Accepts external digital data from higher performance converters or real-time video processing equipment.
- Direct view of live contoured image before digitization.
- Large number of input formats matching the output formats.

VIDEO OUTPUTS

- One main and 3 auxiliary standard composite video outputs.
- All 4 video outputs are 1.4 volt p-p; Z=75 ohms.
- Each output may display an independent digital image.
- The main output is driven by a 3-source video mixer which will show any combination of up to 3 simultaneous images: the live video input, the real-time contoured video input, and a digitized image or a text stored in the buffer.

GRAPHIC MODE

- On-board 4-bit D/A converter; 4 individual bit switches.
- Can be set to generate 2, 4, 8 or 16 levels of gray scale.
- Dot mode available for 256, 288 and 320 pixels per line.
- When dot mode is selected, the main output display is composed of discrete square dots and shows a pleasant homogeneous texture horizontally and vertically.
- Variety of output mapping formats, fully compatible with all the input formats.
- 3 aspect ratios: square, standard rectangular, compressed.
- For each aspect ratio, an image can be mapped into 3 interlaced formats and 7 non-interlaced formats.
- 30 software-selectable GRAPHIC FORMATS, listed in the form:

Lines/frame x Pixels/line x Bits/pixel		
SQUARE	RECTANGLE	CONDENSED*
480 x 512 x 1	454 x 576 x 1	408 x 640 x 1
480 x 256 x 1	454 x 288 x 1	408 x 320 x 1
480 x 256 x 2	454 x 288 x 2	408 x 320 x 2
240 x 1024 x 1	227 x 1152 x 1	204 x 1280 x 1
240 x 512 x 1	227 x 576 x 1	204 x 640 x 1
240 x 512 x 2	227 x 576 x 2	204 x 640 x 2
240 x 256 x 1	227 x 288 x 1	204 x 320 x 1
240 x 256 x 2	227 x 288 x 2	204 x 320 x 2
240 x 256 x 3	227 x 288 x 3	204 x 320 x 3
240 x 256 x 4	227 x 288 x 4	204 x 320 x 4

* OPTIONAL

COLOR OUTPUT

- "Color" switch selects B&W output when off, composite color output with 3.58MHz burst and subcarrier when on.
- "Palette" switch superimposes gray scale to colors when on, displays plain colors when off.
- "Saturation" switch decreases the amplitude of the subcarrier for one half of the displayed colors, and can be combined with "Palette" to offer 4 different definitions of the 16 available colors.
- "B/W" switch substitutes a dark gray and a light gray for 2 of the 16 colors by suppressing their subcarrier.
- The last three switches present 8 different ways of mapping the 4 bits of each pixel into 16 colors.
- With 4 bits per pixel, either the MSB controls the luminance ("Palette" on), or all 4 bits control the luminance ("Palette" off). 3 LSB's control the hue.

TEXT MODE

- A software-selectable alternative to the graphic mode.
- Makes efficient use of the buffer as a text file: 32,768 characters are stored, with up to 2,640 visible at one time.
- High quality full ASCII 7x9 character generator.
- Any character can be individually inverted by software.
- Instant scanning through the 32K-character text file by setting appropriate base address in control register.
- Smooth scrolling at raster line level permits variable scanning speed; text always remains perfectly legible.
- No wrap-around at end of buffer.
- 6 software-selectable TEXT FORMATS, listed in the form:

Text lines/frame x Characters/text line					
29 x 64	29 x 72	29 x 80	33 x 64	33 x 72	33 x 80

LIGHTPEN INPUT

- Enabled by software; interaction flagged in status.
- 18 bits of X-Y coordinates available in status.
- CAT-100 timing must be restarted by software within one millisecond after interaction occurs.
- Input specs: active-high TTL pulse > 100 nanoseconds.

PHOTOGRAPHIC TRIGGER INPUT

- Armed by software; screen blanks and waits for signal.
- Photo input designed to be grounded by closure of the "X" flash contacts of a photographic camera.
- A complete frame is then displayed and photographed. This technique avoids partial or multiple exposures and yields clean individual pictures or animated films.

POWER

- DC voltages unregulated per S-100 specs.
- +8V, 2.5A typical; +16V, 0.8A typical; -16V, 0.3A typical.

TEMPERATURE

+10°C to +40°C ambient, operating.