



US005179639A

United States Patent [19] Taaffe

[11] Patent Number: 5,179,639

[45] Date of Patent: Jan. 12, 1993

[54] COMPUTER DISPLAY APPARATUS FOR SIMULTANEOUS DISPLAY OF DATA OF DIFFERING RESOLUTION

[75] Inventor: James L. Taaffe, Arlington, Mass.

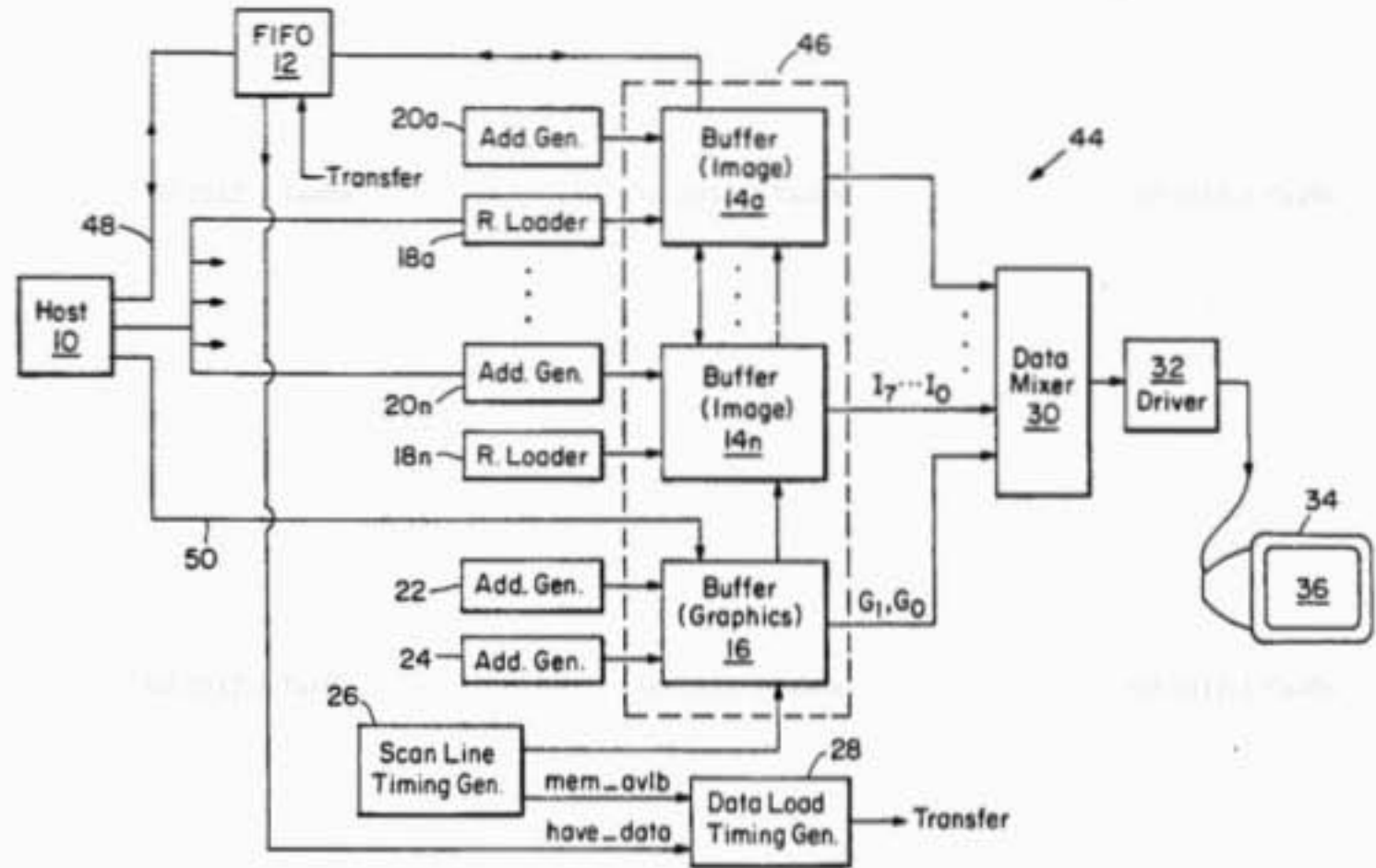
[73] Assignee: Massachusetts General Hospital, Boston, Mass.

[21] Appl. No.: 537,331

[22] Filed: Jun. 13, 1990

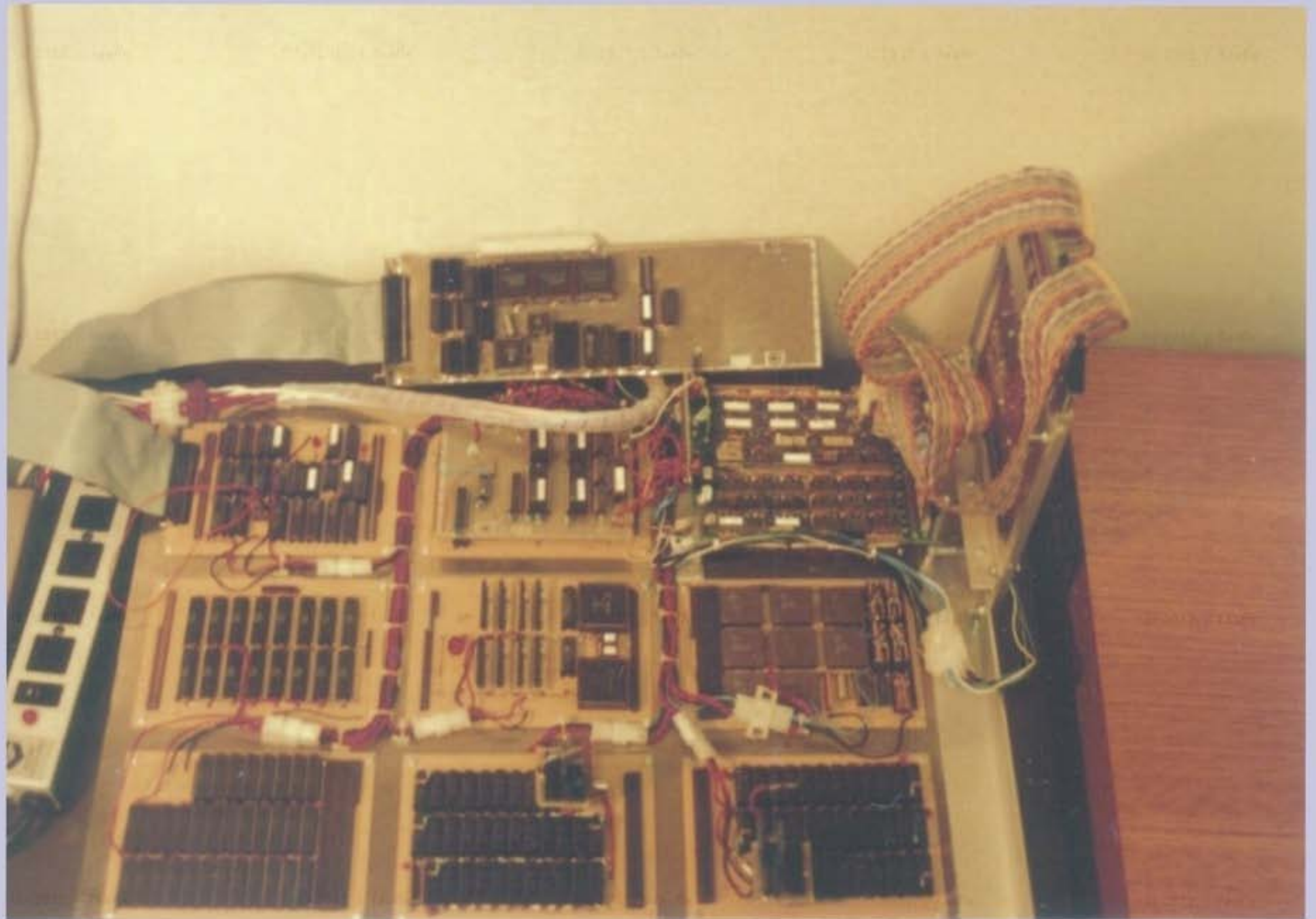
[57] ABSTRACT

A multiple memory display controller provides simultaneous display of overlaid image and graphic data in a computer display system. A video random access memory (RAM) in the display controller stores display data corresponding to graphics to be displayed on the computer display monitor. And a series of dynamic RAMs in the display controller stores display data corresponding to images to be displayed on the computer display monitor. A data mixer receives and mixes signals from the video RAM and one of the dynamic RAMs to form signals which are used to drive the display monitor. The signals provide graphics displayed at one resolution overlaid on images displayed at a different resolution on the monitor. A first-in first-out (FIFO) buffer and rectangle loader provide efficient loading of blocks of display data in the display controller memories.



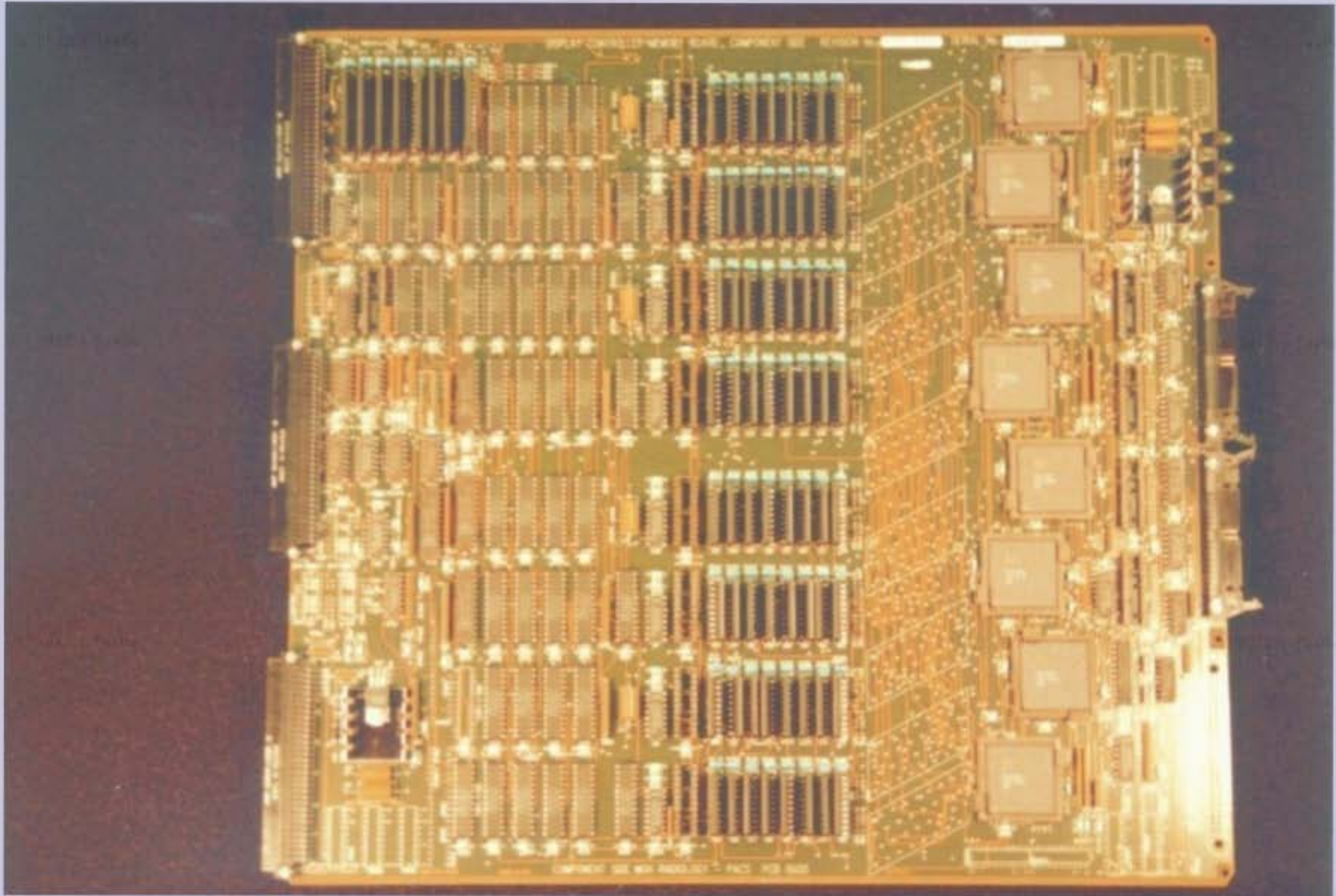
To meet the requirements for displaying a diagnostic quality medical image with fast overlapped graphics it was necessary to have three image buffers: 1) a 2-bit medium-resolution buffer comparable with the then current Mac-OS; 2) two 12-bit high-resolution 2.5K x 2.0K medical image buffer. Each lower resolution graphic pixel was replicated to cover multiple image pixels; mapped as: 00 black, 01 gray, 10 medical image, and 11-white. Double buffering for the medical image was used to allow for fast image updating.

The Initial Prototype of the Display-Controller



Prototype of the RSTAR high-resolution 2.5K X 2.0K diagnostic quality display controller. (2 of 9)

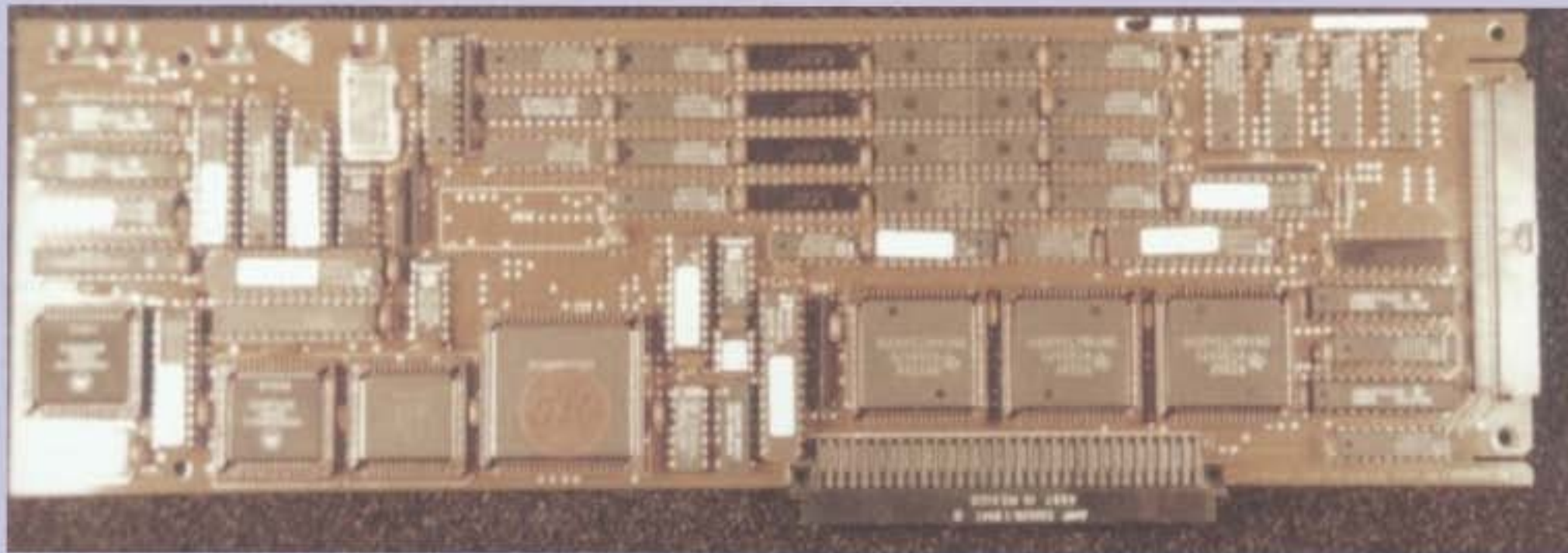
An Early Production of the RSTAR Display-Controller



Technology Used: Xilinx gate-arrays, ECL PALS, and a 500 MHz Gallium Arsenide Video DAC.

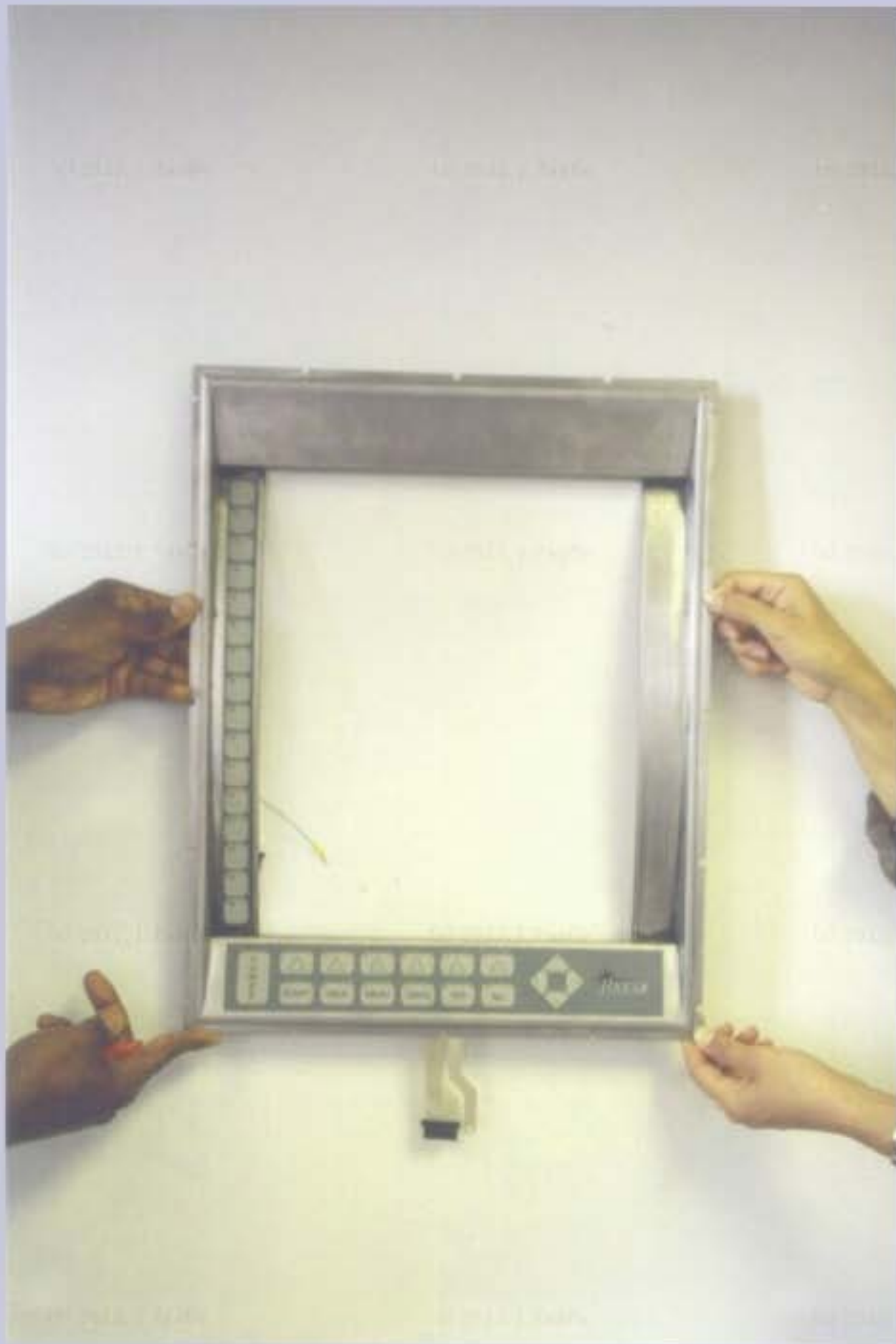
RSTAR Display Controller Workstation Adapter

Apple Macintosh /MIT-NuBus Bus Comparable
Apple OS Compatible Graphic Adapter
Drives Up To 4 Displays
CPU Unattended Dynamic-Memory-Access Transfers
w/ Bit-Blit and Window-and-Center Transform
w/ Big-Indian to Little-Indian and Byte/Swap Transform

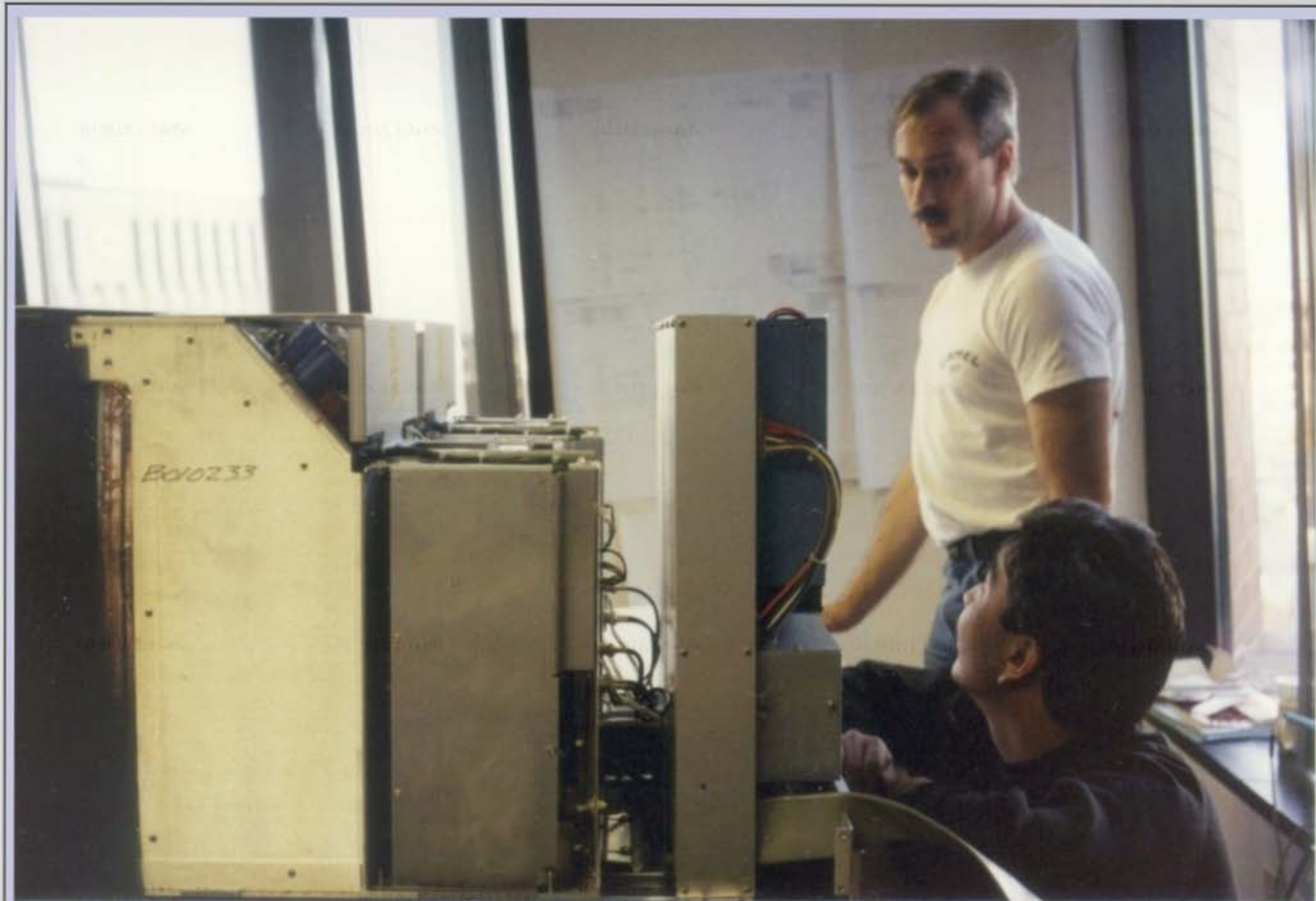




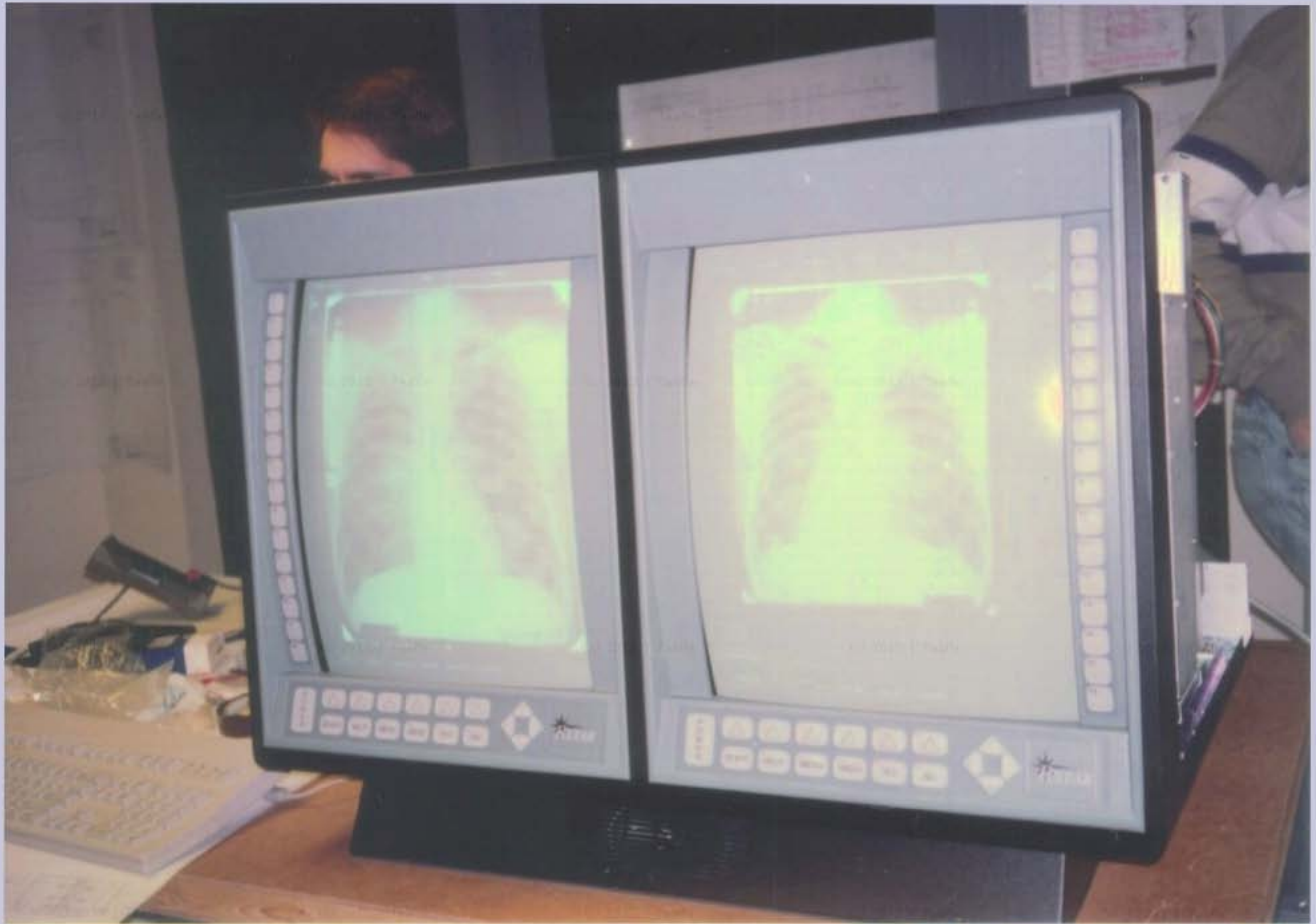
Bruce, Maria, and Buzz



Mark and Bruce perform final assembly.



Bruce and Tim, High-Speed and State Machine, sort out final items.



Two side-by-side RSTAR high-resolution 2.5 X 2K displays undergo testing. (8 of 9)



Final RSTAR high-resolution 2.5K X 2.0K work-stations on display at the 1992 RSNA. (9 of 9)