

[54] **PROGRAMMABLE SCAN/READ CIRCUITRY FOR CHARGE COUPLED DEVICE IMAGING DETECTORS**

[75] Inventors: **Phil M. Salomon, Tujunga; Kalman Smilowitz, Playa del Rey, both of Calif.**

[73] Assignee: **The United States of America as represented by the Administrator of the National Aeronautics and Space Administration, Washington, D.C.**

[21] Appl. No.: **276,749**

[22] Filed: **Jun. 24, 1981**

[51] Int. Cl.<sup>3</sup> ..... **H04N 3/15**

[52] U.S. Cl. .... **358/213; 358/125**

[58] Field of Search ..... **358/213, 125, 126**

[56] **References Cited**

**U.S. PATENT DOCUMENTS**

4,012,018	3/1977	Lorell et al. .	
4,251,834	2/1981	Hall .....	358/213
4,314,279	2/1982	Yoshida .....	358/213
4,322,752	3/1982	Bixby .....	358/213
4,343,021	8/1982	Frame .....	358/213
4,364,089	12/1982	Woolpson .....	358/126
4,382,267	5/1983	Angle .....	358/213

**OTHER PUBLICATIONS**

"Charge-Coupled Device Trackers For High Accuracy Guidance Applications", Salomon, SPIE, vol. 203 (1979), p. 130, originally presented Aug. 27, 1979.

"Image Signal Processing In Sub-Pixel Accuracy Star

Trackers", Salomon and Glavich, SPIE, vol. 252 (1981), p. 64, originally presented Jul. 28, 1980.

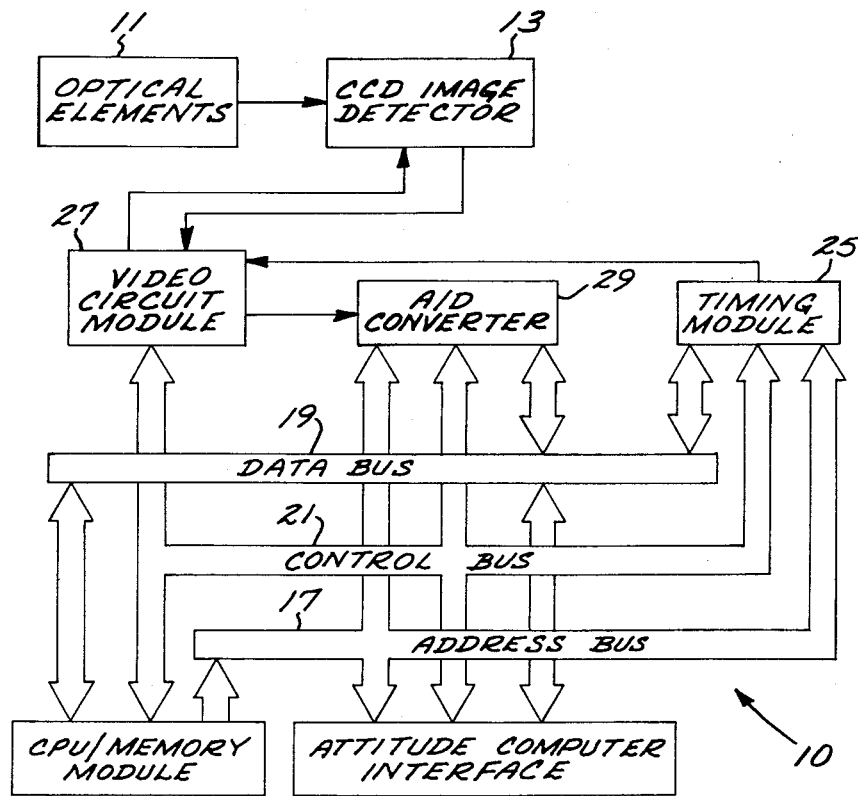
"Charge-Coupled Device Trackers For High Accuracy Guidance Applications", Salomon, Optical Engineering, Jan./Feb. 1981, vol. 20, No. 1, p. 135.

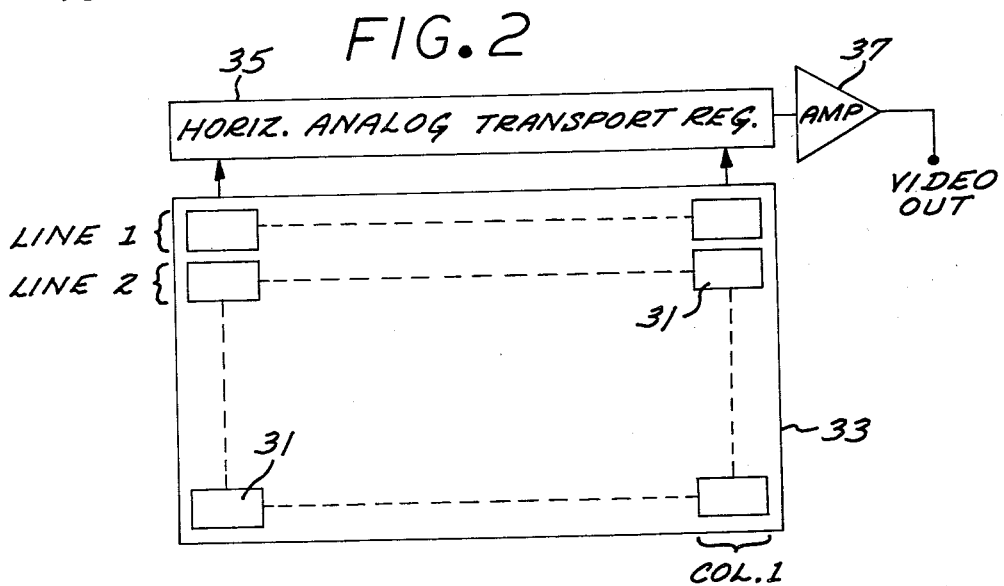
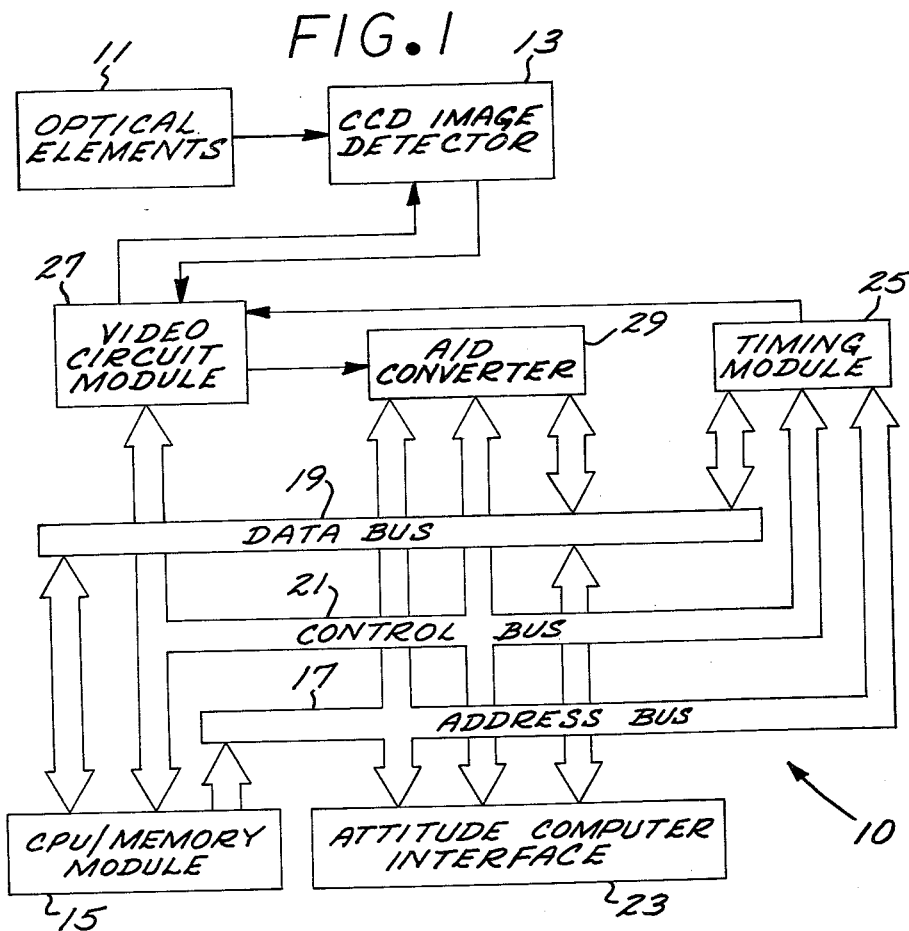
*Primary Examiner*—Michael A. Masinick  
*Attorney, Agent, or Firm*—Paul F. McCaul; Thomas H. Jones; John R. Manning

[57] **ABSTRACT**

A circuit for scanning and outputting the induced charges in a solid state charge coupled device (CCD) image detector (13) is disclosed in an image detection system (10) for use in a spacecraft attitude control system. The image detection system includes timing control circuitry (25) for selectively controlling the output of the CCD detector (13) so that video outputs are provided only with respect to induced charges corresponding to predetermined sensing element lines of the CCD detector (13). The system also includes an analog to digital converter (29) for converting selected video outputs from the CCD detector (13). The timing control circuit (25) and the analog to digital converter (29) are controlled by a programmed microprocessor (15) which defines the video outputs to be converted and further controls the timing control circuit (25) so that no video outputs are provided during the delay associated with analog to digital conversion.

**19 Claims, 6 Drawing Figures**





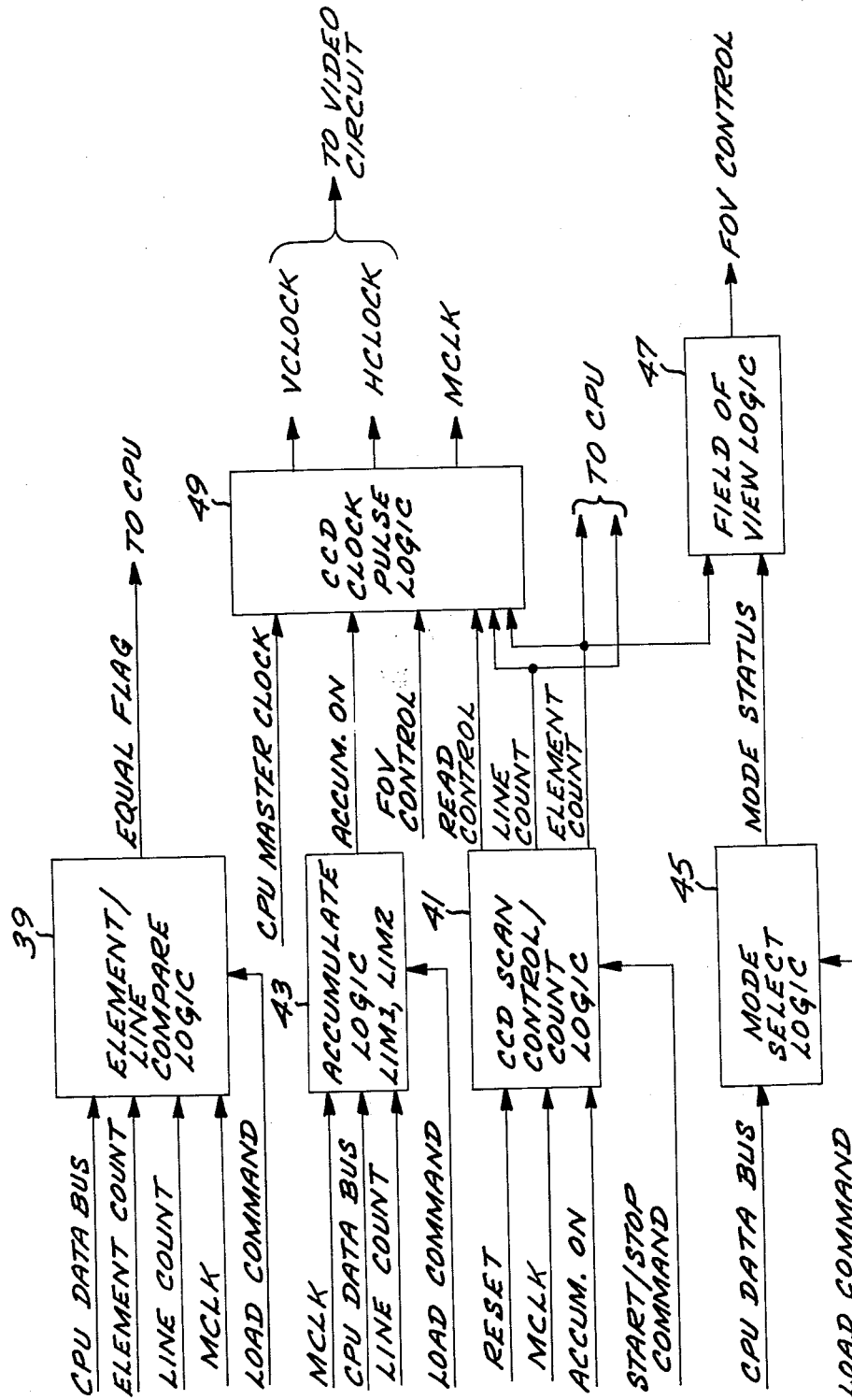


FIG. 3

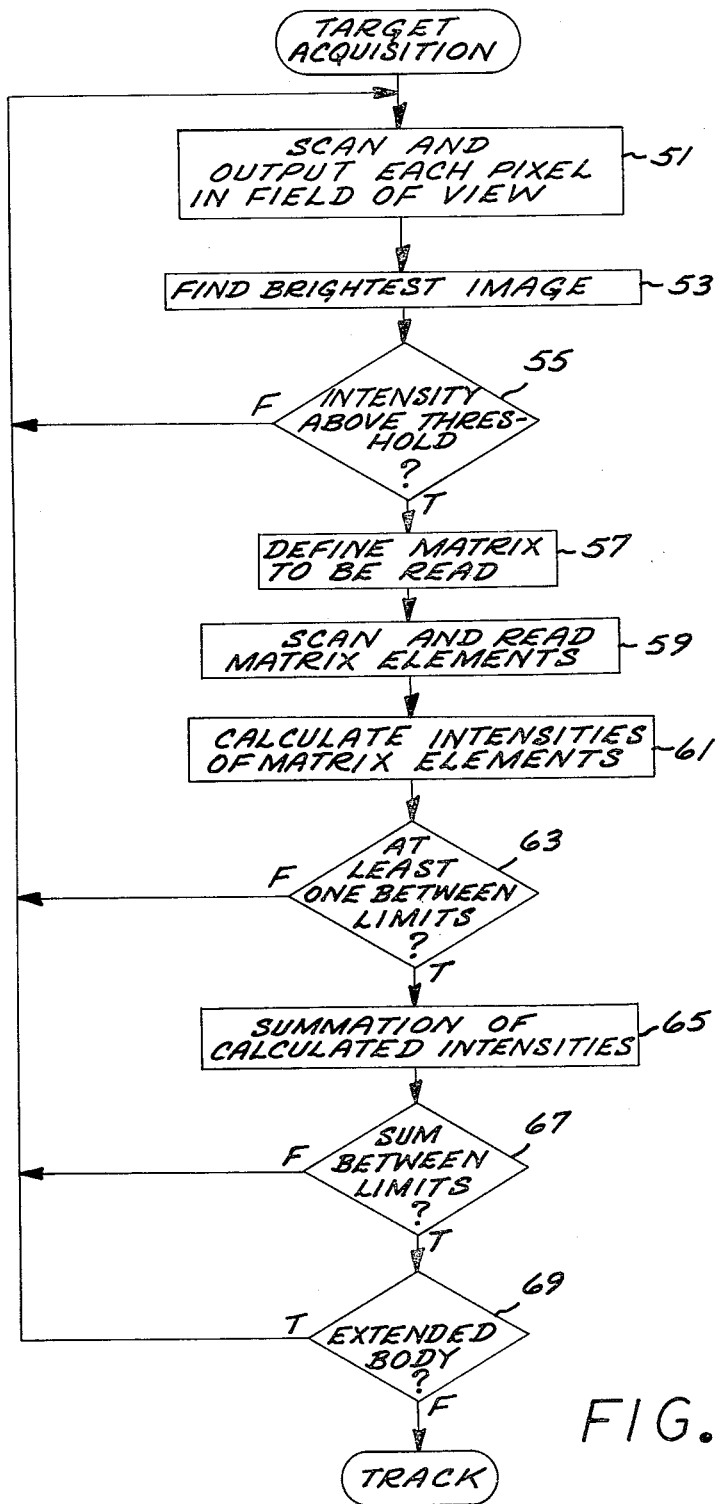


FIG. 4

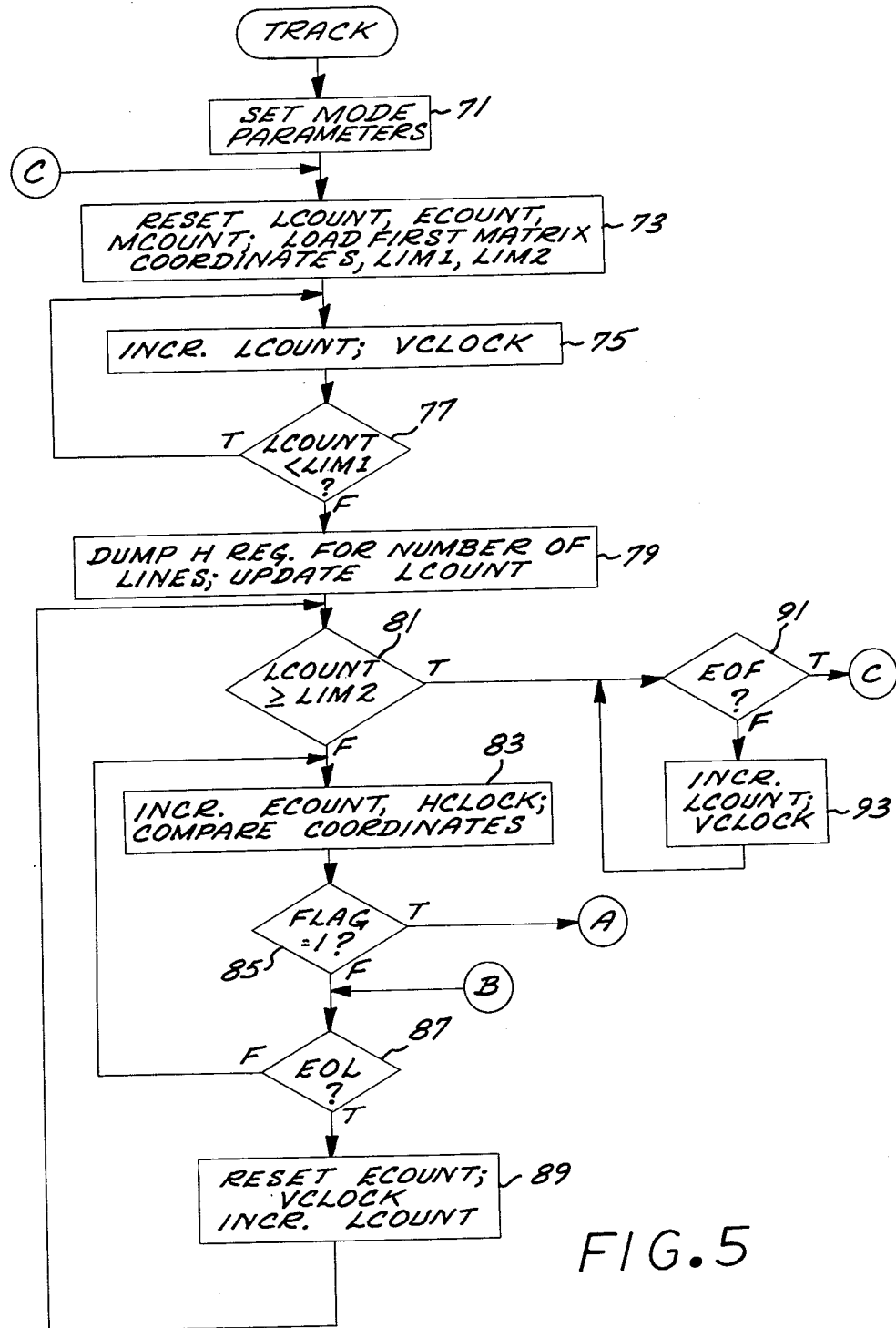


FIG. 5

# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.