



United States Patent [19]

[11] Patent Number: **5,283,559**

Kalendra et al.

[45] Date of Patent: **Feb. 1, 1994**

[54] **AUTOMATIC CALIBRATION OF A CAPACITIVE TOUCH SCREEN USED WITH A FIXED ELEMENT FLAT SCREEN DISPLAY PANEL**

4,737,773	4/1988	Kobayashi	340/707
4,745,565	5/1988	Garwin et al.	364/571
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4,929,935	5/1990	Rysavy et al.	340/712
5,008,657	4/1991	Hanson et al.	340/766

[75] Inventors: **Paul W. Kalendra; William J. Piazza,** both of Boca Raton, Fla.

OTHER PUBLICATIONS

[73] Assignee: **International Business Machines Corp.,** Armonk, N.Y.

IBM Technical Disclosure Bulletin, "Self-Calibration and Coordinate Conversion for a Touchpad or Touch Screen Computer Input Device", vol. 30, No. 4, Sep. 1987, pp. 1663-1666.

[21] Appl. No.: **947,688**

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Assistant Examiner—V. Chang
Attorney, Agent, or Firm—Romualdas Strimaitis

[22] Filed: **Sep. 21, 1992**

[51] Int. Cl.⁵ **G09G 5/00**

[52] U.S. Cl. **345/168; 345/156**

[58] Field of Search 340/706, 712; 178/18, 178/19, 20; 341/32, 33

[57] ABSTRACT

[56] References Cited

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4,305,135	12/1981	Dahl et al.	341/33
4,476,463	10/1984	Ng et al.	340/712
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4,710,758	12/1987	Mussler et al.	340/712
4,710,759	12/1987	Fitzgibbon	340/712

A touch screen display is automatically calibrated during periods of active use or extended periods of non-use. Calibration contacts are cemented or embedded to the surface of a touch sensitive panel, and electrically connected to a reference during calibration. The reference is either electrical ground or a resistive, capacitive, or inductive load.

19 Claims, 5 Drawing Sheets

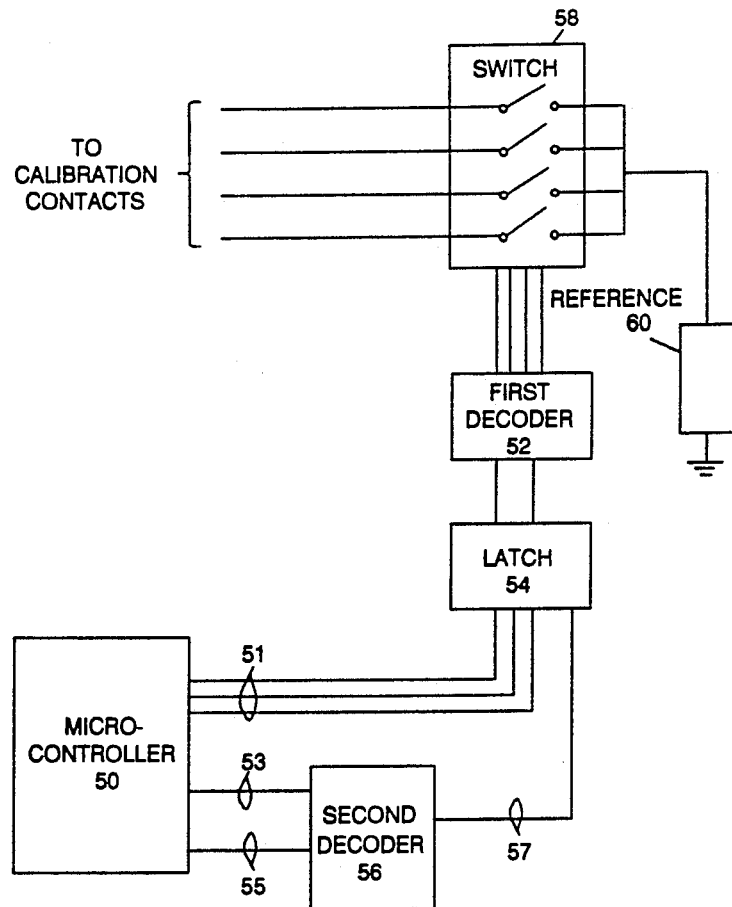


FIG. 1

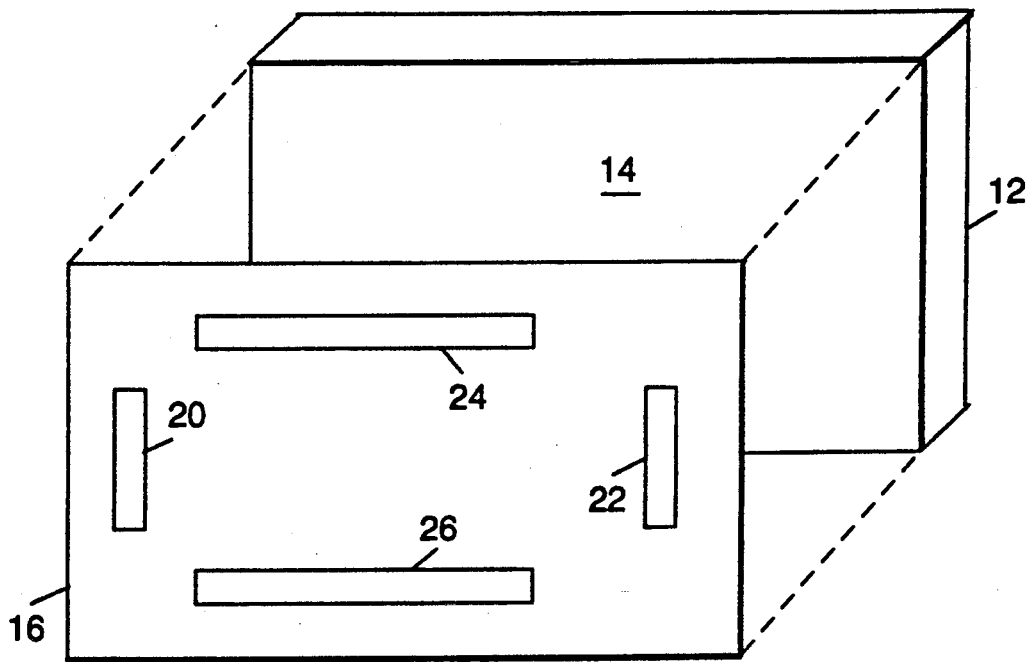


FIG. 2

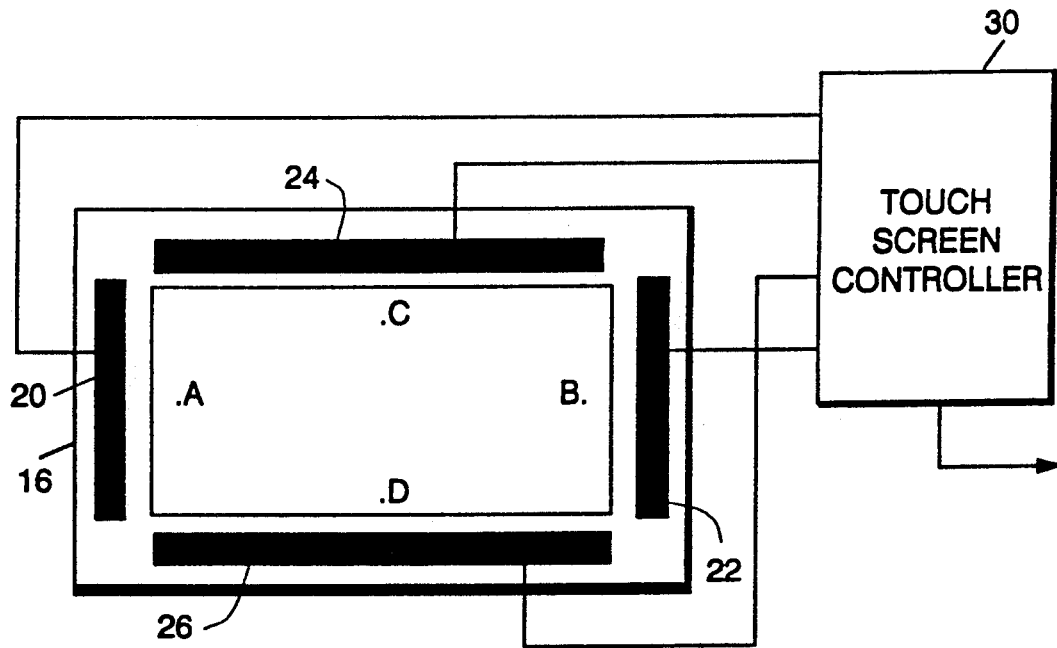


FIG. 3

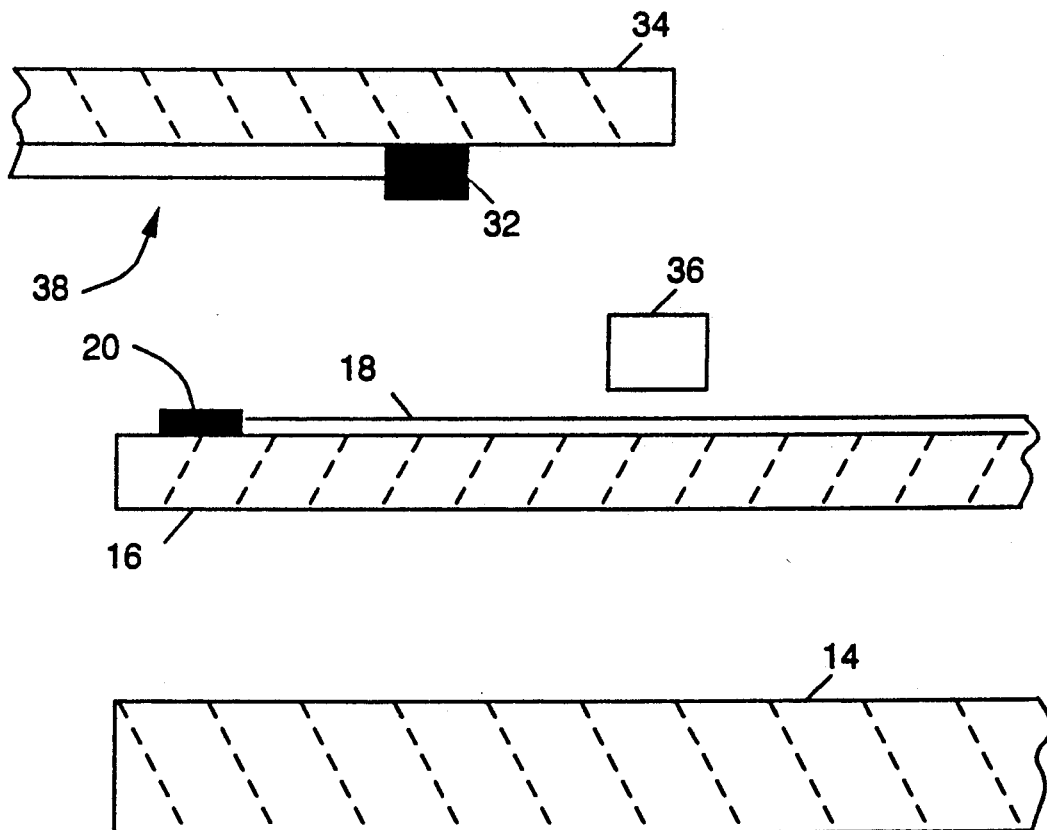
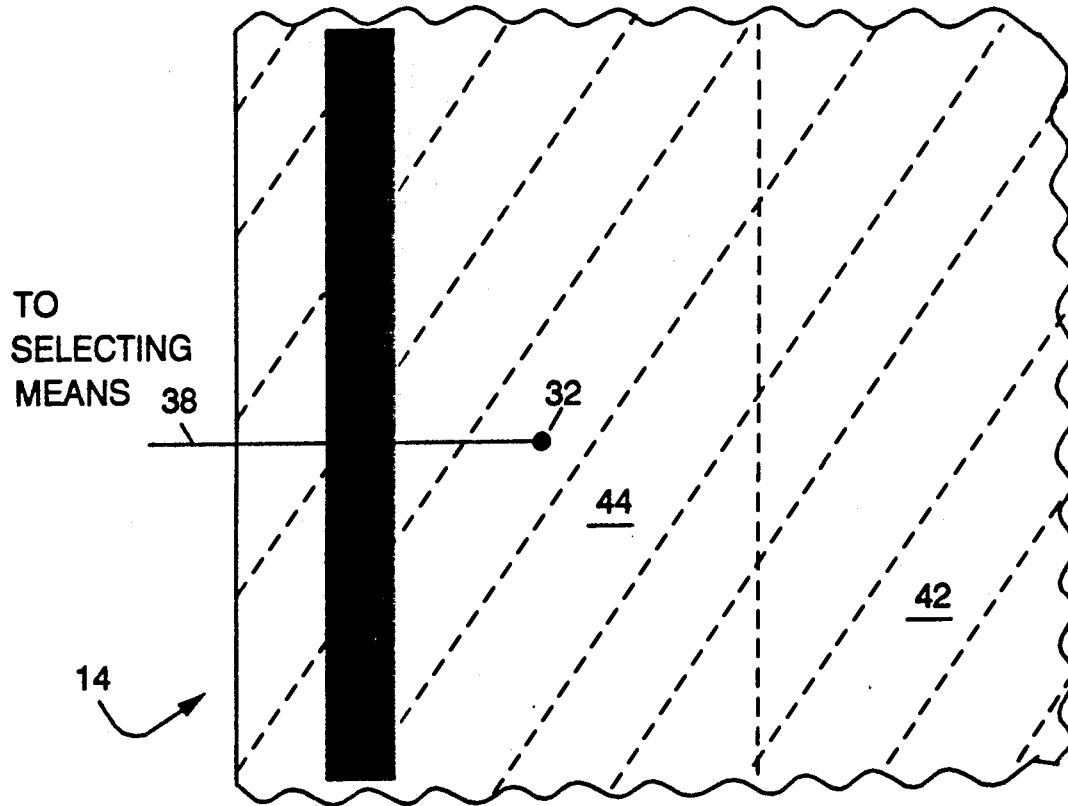


FIG. 4



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