United States Patent [19]

Fein et al.

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[54] **MEDICAL SENSOR WITH MODULATED ENCODING SCHEME**

[75] Inventors: **Michael E. Fein**, Mountain View; **David C. Jenkins**, Loomis; **Michael J. Bernstein**, San Ramon; **K. L. Venkatachalam**, Palo Alto; **Adnan I. Merchant**, Fremont; **Charles H. Bowden**, San Ramon, all of Calif.

[73] Assignee: **Nellcor Puritan Bennett Incorporated**, Pleasanton, Calif.

[*] Notice: This patent is subject to a terminal disclaimer.

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[22] Filed: **May 6, 1998**

Related U.S. Application Data

[60] Continuation of application No. 08/451,630, May 26, 1995, Pat. No. 5,779,630, which is a division of application No. 08/168,449, Dec. 17, 1993, Pat. No. 5,645,059.

[51] Int. Cl.^{7} A61B 5/00
[52] U.S. Cl. **600/310**; 600/322; 600/323
[58] Field of Search 600/310, 322–324, 600/475–480, 300; 356/41

[56] **References Cited**

U.S. PATENT DOCUMENTS

5,645,059 7/1997 Fein 600/323
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Primary Examiner—Robert L. Nasser
Attorney, Agent, or Firm—Townsend and Townsend and Crew LLP

[57] **ABSTRACT**

The present invention provides an encoding mechanism for a medical sensor which uses a modulated signal to provide the coded data to a remote analyzer. The modulated signal could be, for instance, a pulse width modulated signal or a frequency modulated signal. This signal is amplitude independent and thus provides a significant amount of noise immunity.
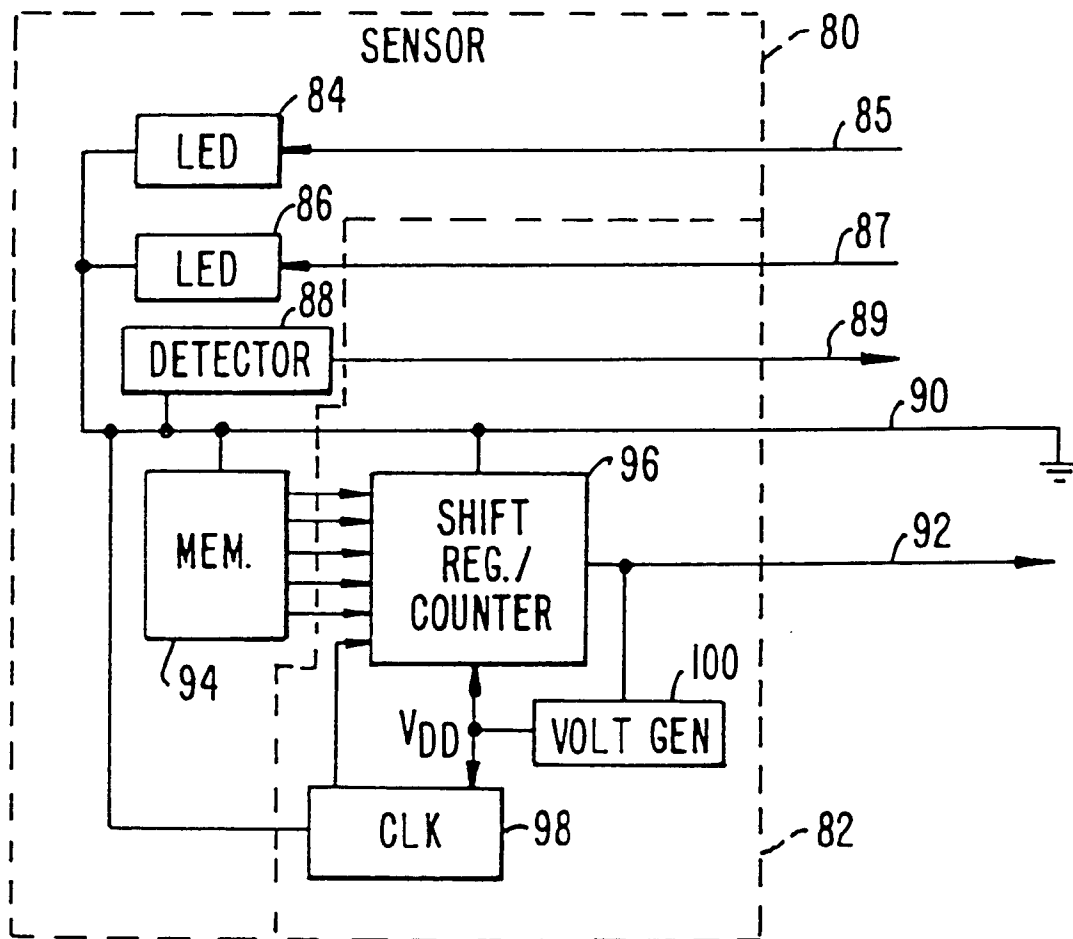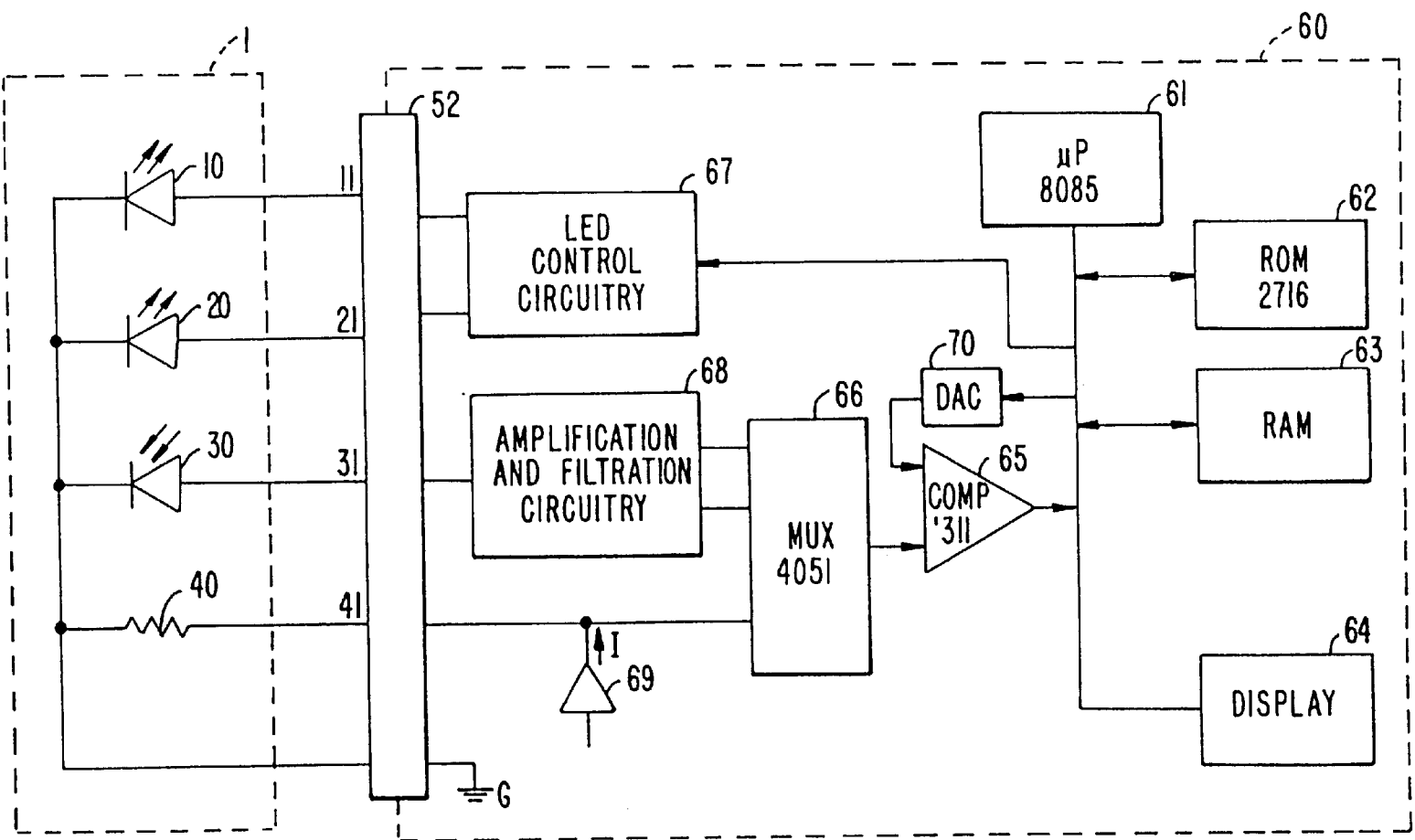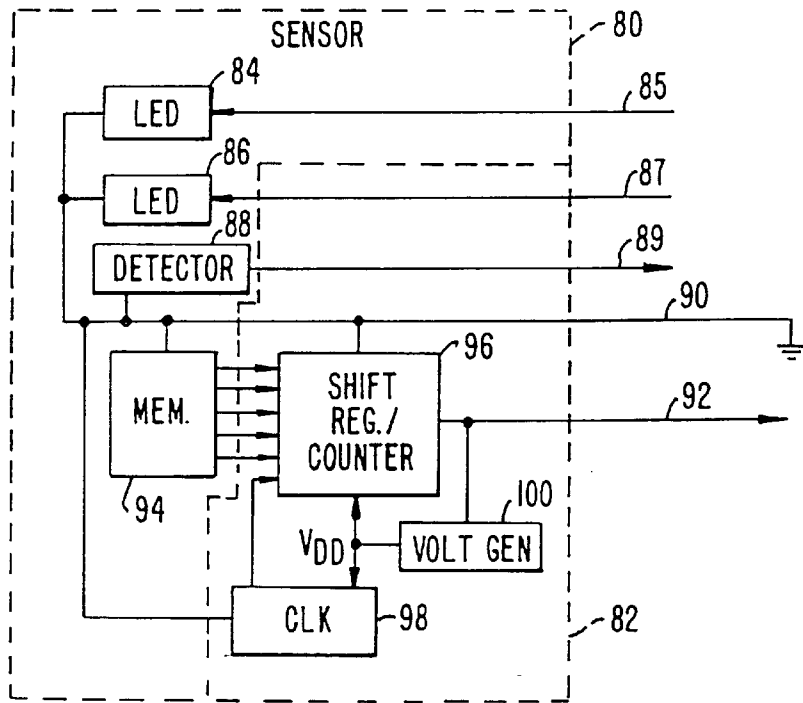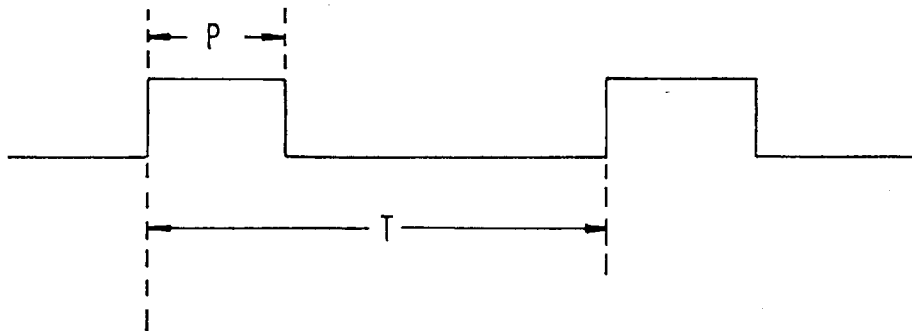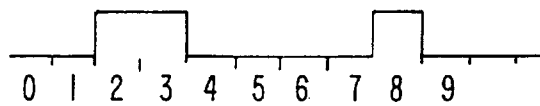
24 Claims, 5 Drawing Sheets

FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

50

52

FIG. 5.

140

118

DRIVER (119)
OUTPUT

I   FROM
OXIMETER

FIG. 7.

69

I

41

TO MULTIPLEXER 66

40

R_{cal}

FIG. 8A.

V_{REF}

Z_{STD}

V_{cal}

41

TO MULTIPLEXER 66

40

R_{cal}
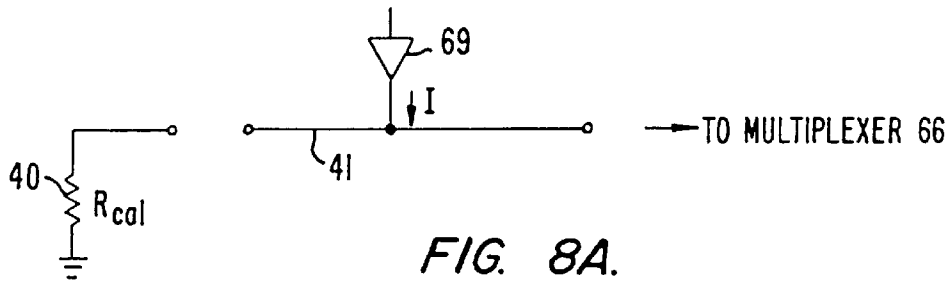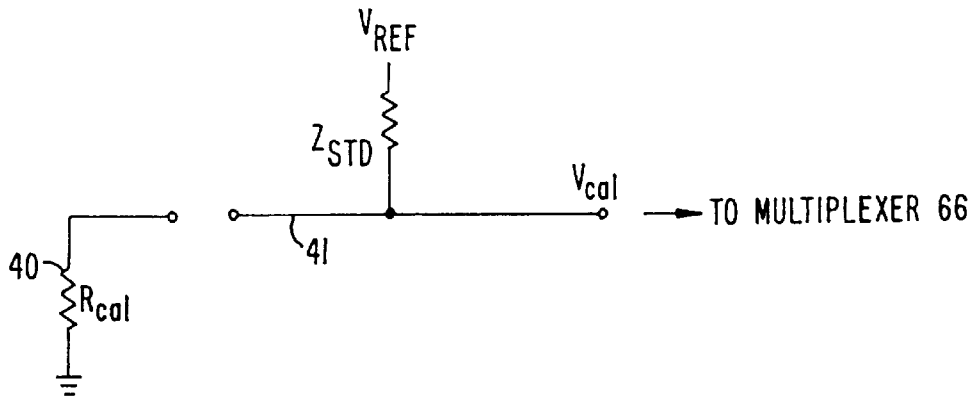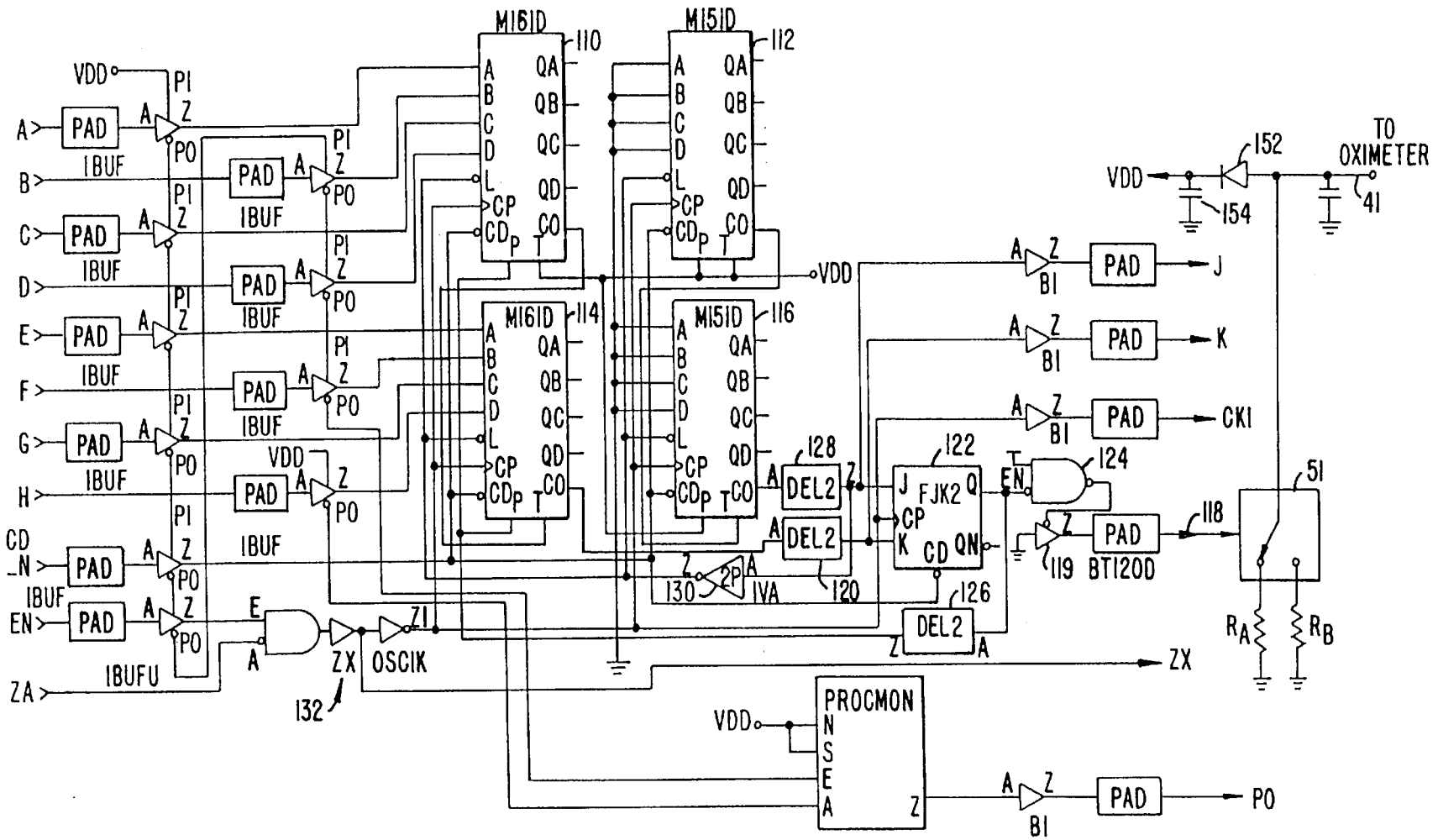
FIG. 8B.

FIG. 6.

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