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# United States Patent [19]

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Adams et al.

[45] Date of Patent: **Feb. 2, 1993**

[54] **MULTI-BEAM SONAR FISH DETECTION APPARATUS PROVIDING REAL-TIME THREE-DIMENSIONAL WIRE-FRAME DISPLAY REPRESENTATION**

Smarter", *Fishing Tackle Retailer Magazine*, Feb. 1985, pp. 57-61.

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### [57] ABSTRACT

[21] Appl. No.: **720,644**

A sonar depth sounder system is provided in which a plurality of elements are combined to form a sonar transducer capable of generating a plurality of narrow overlapping beams and receiving sonar echoes. The sonar return information is filtered, amplified through a log converter, digitized and then analyzed by a high-speed microprocessor. This analysis stage combines information obtained from each one of the plurality of sound beams generated by the transducers, determines correct target location and size, distinguishes fish from other targets such as thermoclines or structure based on heuristic algorithms and provides an output data set for display. Representations of three-dimensional submerged structures are presented in a variety of formats to the user, including utilizing a grid line display of the contour of the bottom surface and location lines from displayed fish above the surface to grid lines on the bottom surface display.

[22] Filed: **Jun. 25, 1991**

[51] Int. Cl.<sup>5</sup> ..... **G01S 15/96**

[52] U.S. Cl. .... **367/111; 367/88**

[58] Field of Search ..... **367/111, 88, 908**

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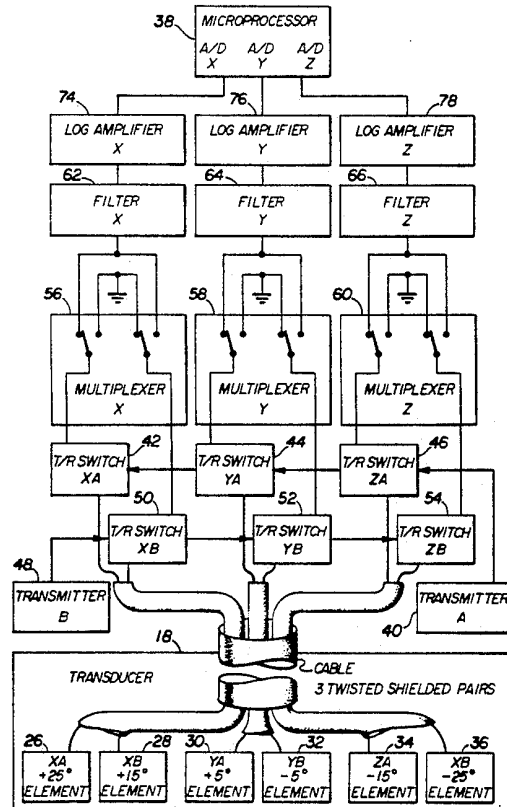
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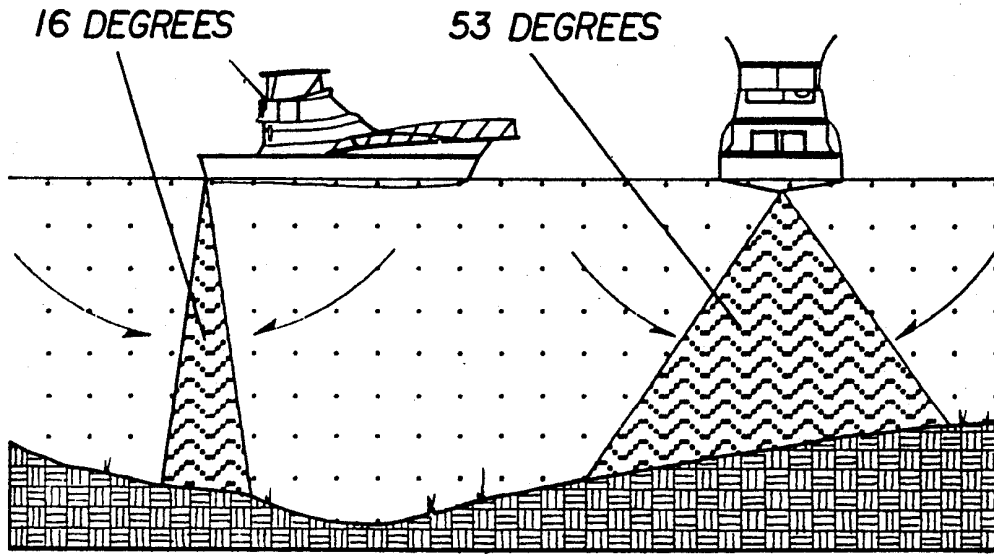
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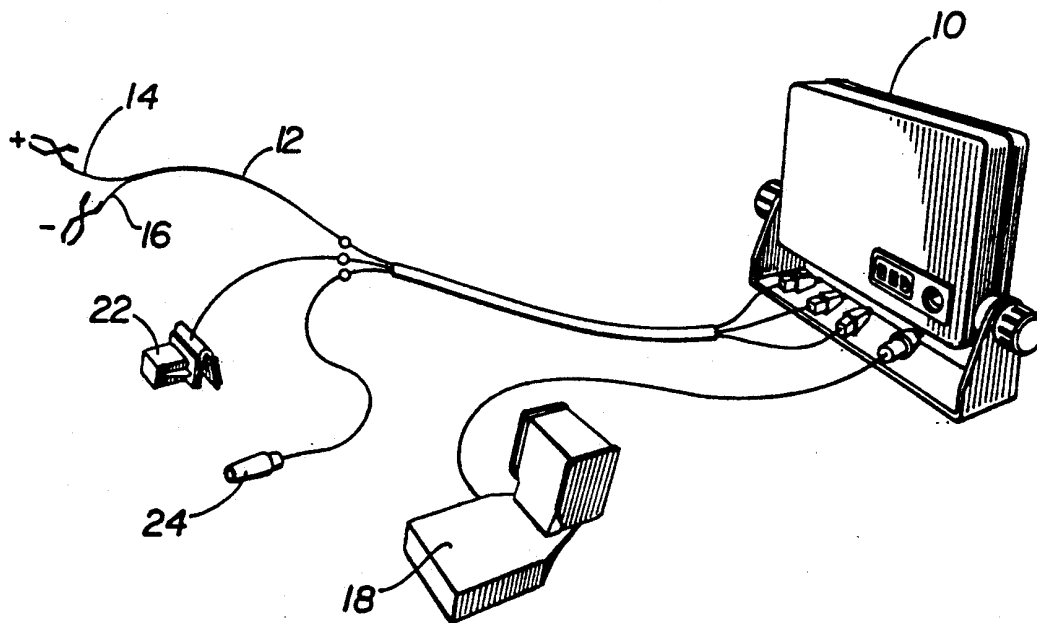
Bourne, "How the Microchip Made Fish-Finders

**7 Claims, 12 Drawing Sheets**

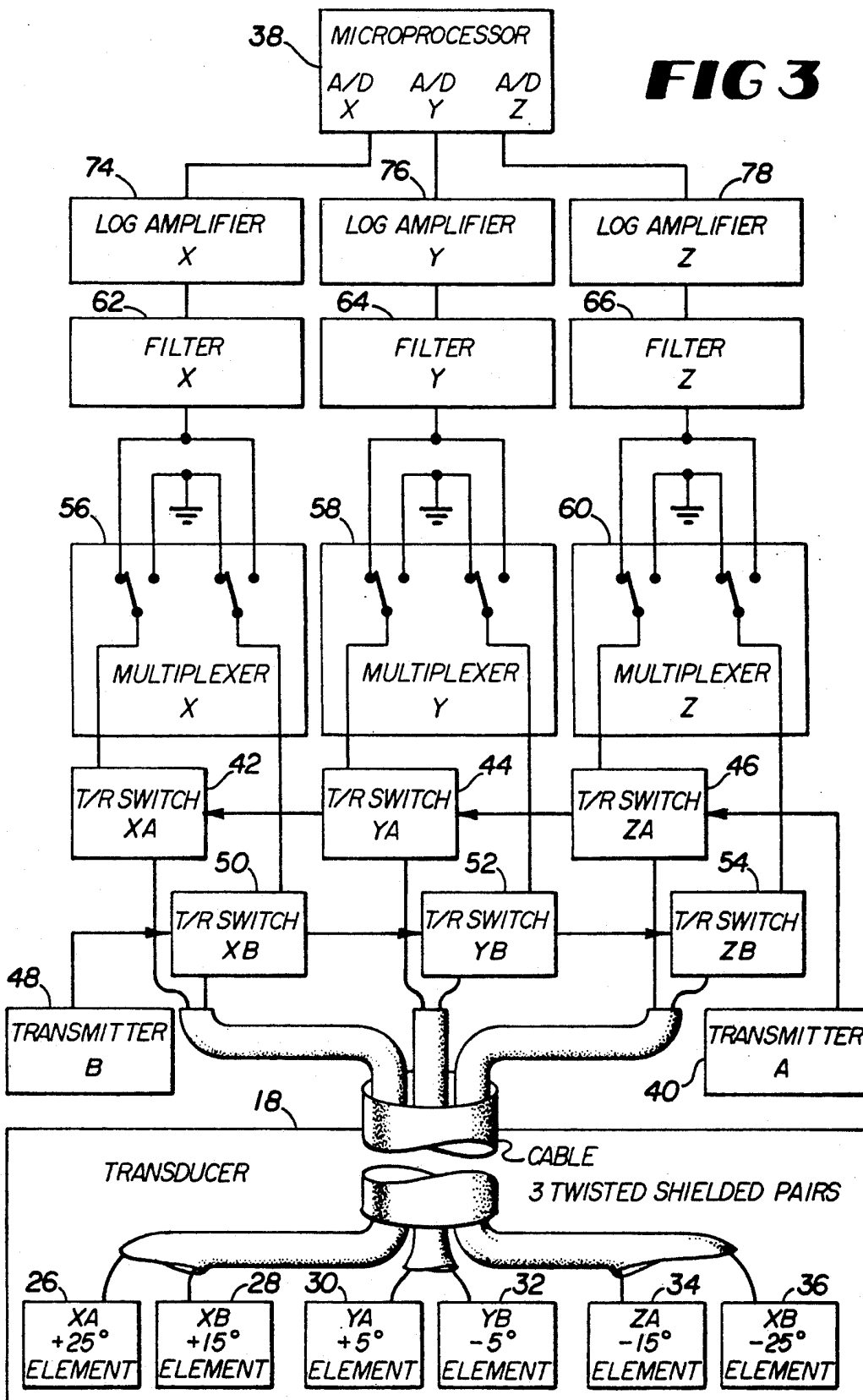


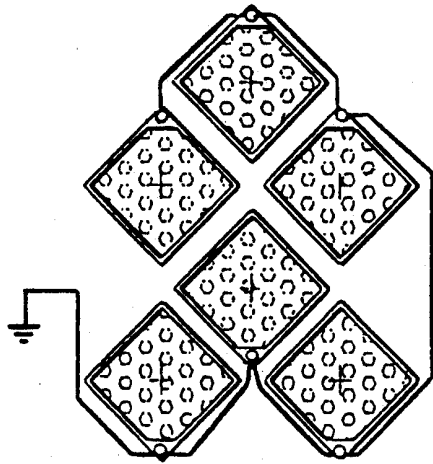


**FIG 1**

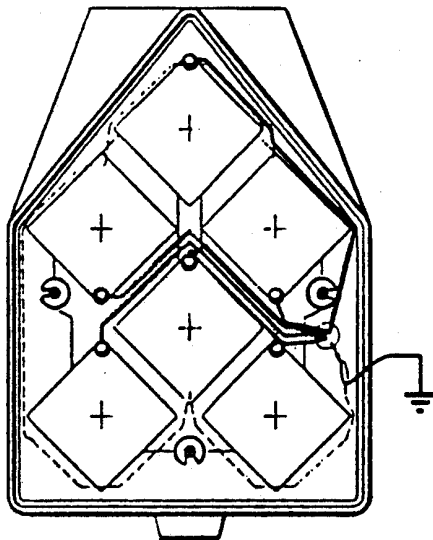


**FIG 2**

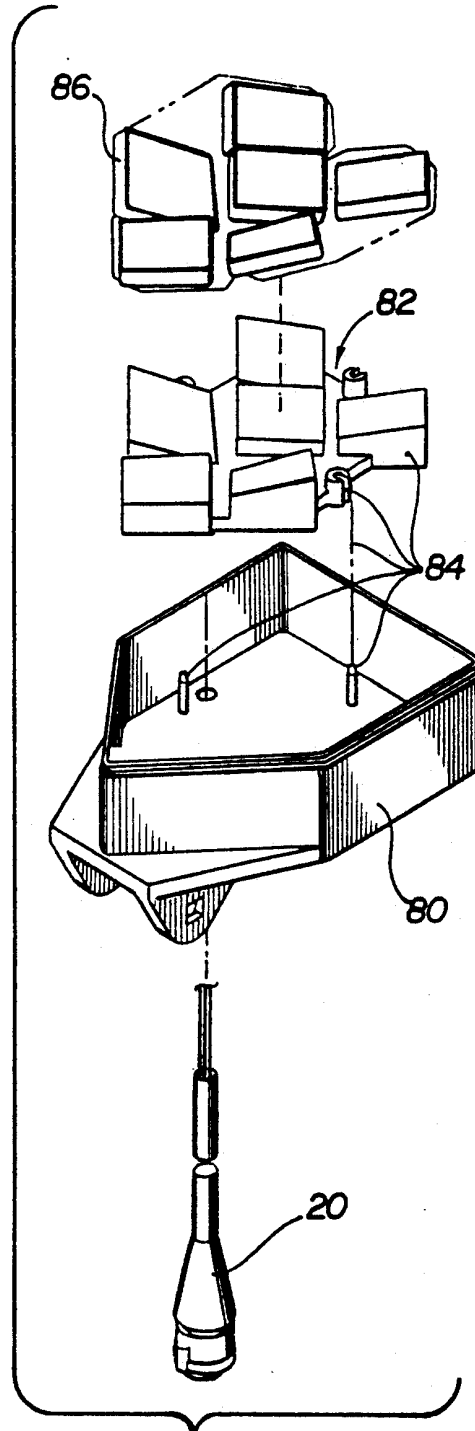




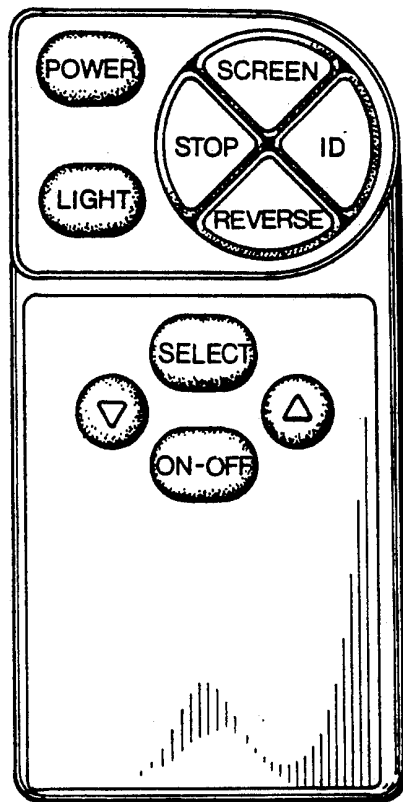
**FIG 4**



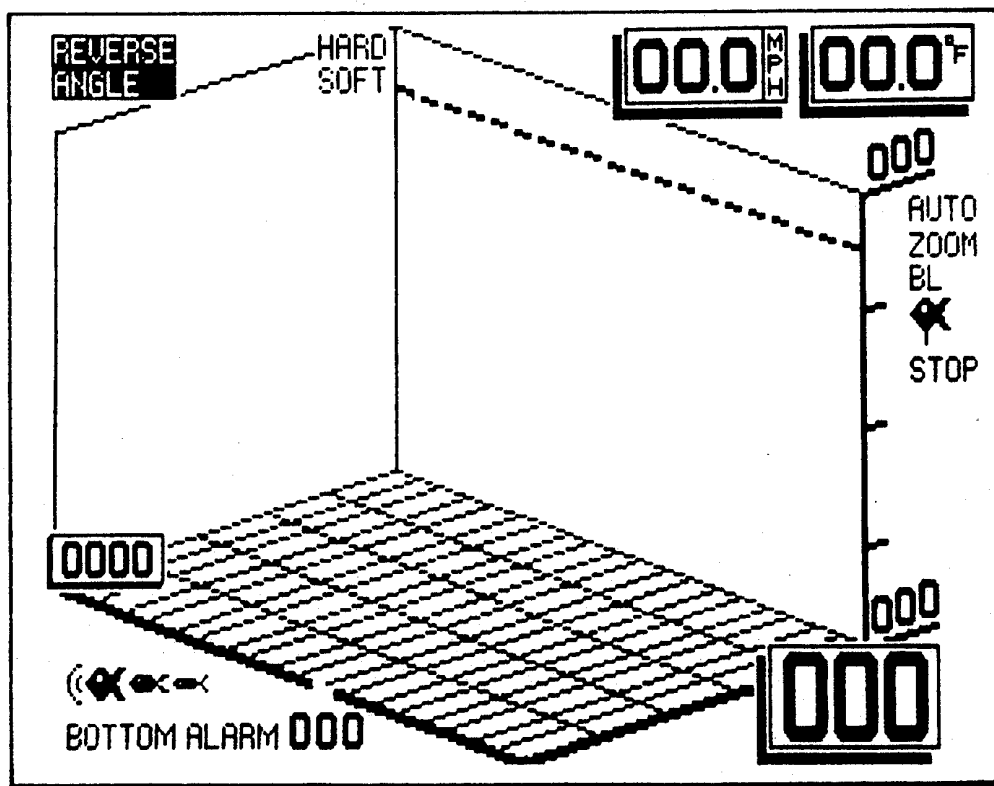
**FIG 5**



**FIG 6**



**FIG 7**



**FIG 8**

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