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(12) **United States Patent**
Bendov

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(54) **SMART AND ACTIVE ANTENNA ARRAY FOR PORTABLE AND MOBILE TELEVISION RECEPTION**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 627 days.

(21) Appl. No.: **10/893,844**

(22) Filed: **Jul. 19, 2004**

(65) **Prior Publication Data**

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Related U.S. Application Data

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(51) **Int. Cl.**
H04N 5/00 (2006.01)

(52) **U.S. Cl.** **348/836**

(58) **Field of Classification Search** 348/836, 348/725, 731; 342/372; 455/25, 32, 434

See application file for complete search history.

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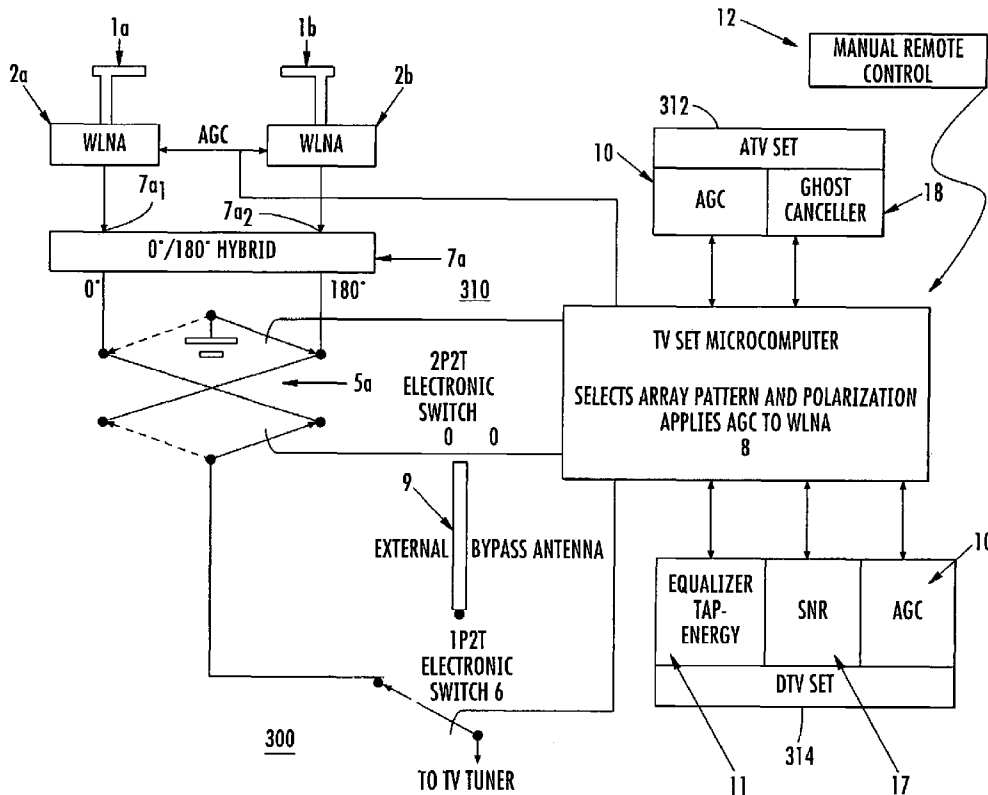
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Primary Examiner—Paulos M. Natnael

(57) **ABSTRACT**

A television receiving apparatus includes a tuner having an input port for image-representative signals, an input port for an external antenna, and an internal or associated external indoor antenna array including at least two electronically integrated antenna-WLNA elements. A processor includes a plurality of RF switches and at least one hybrid, for selectively generating a plurality of signals including sums and differences of signals from said elements. The sums and differences are compared with each other and with the external antenna signal to select the best signal, and that selected best signal is coupled to the input port of the tuner.

11 Claims, 9 Drawing Sheets



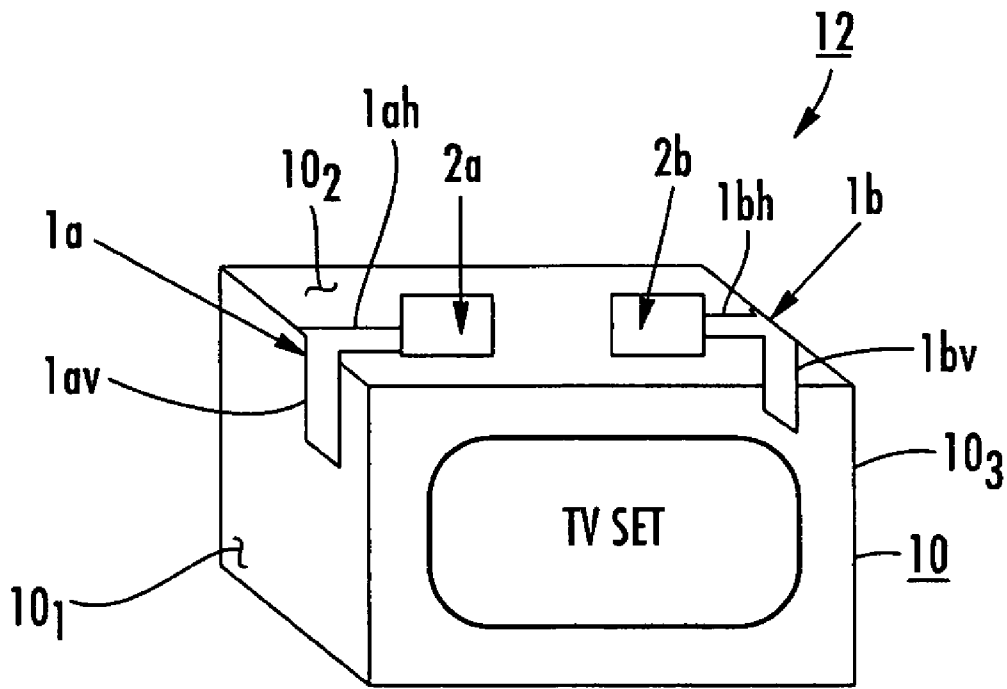


FIG. 1

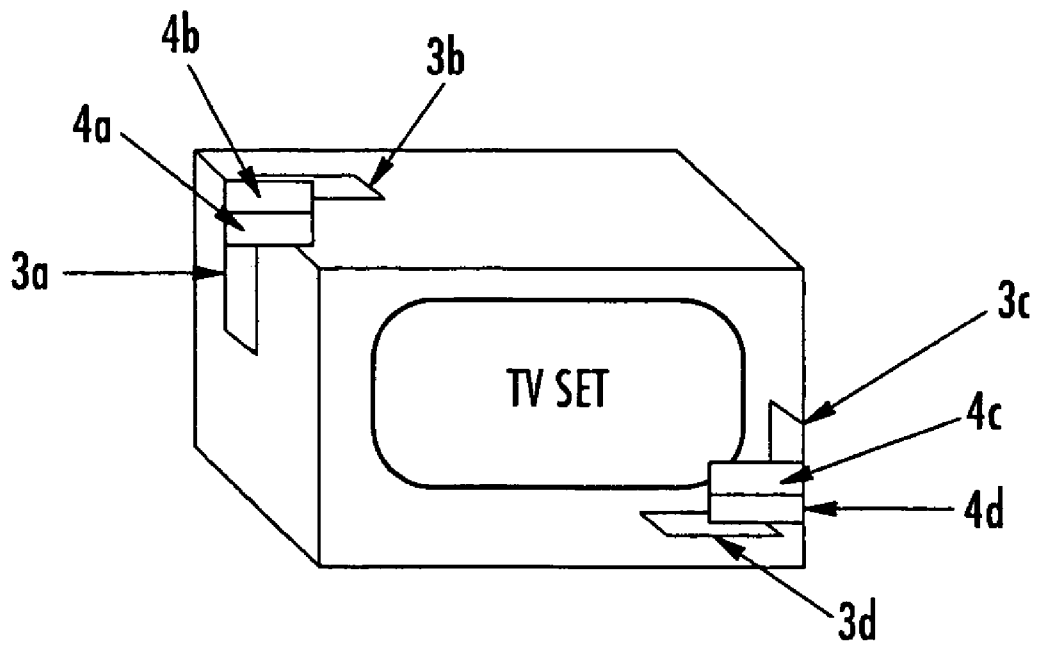


FIG. 2

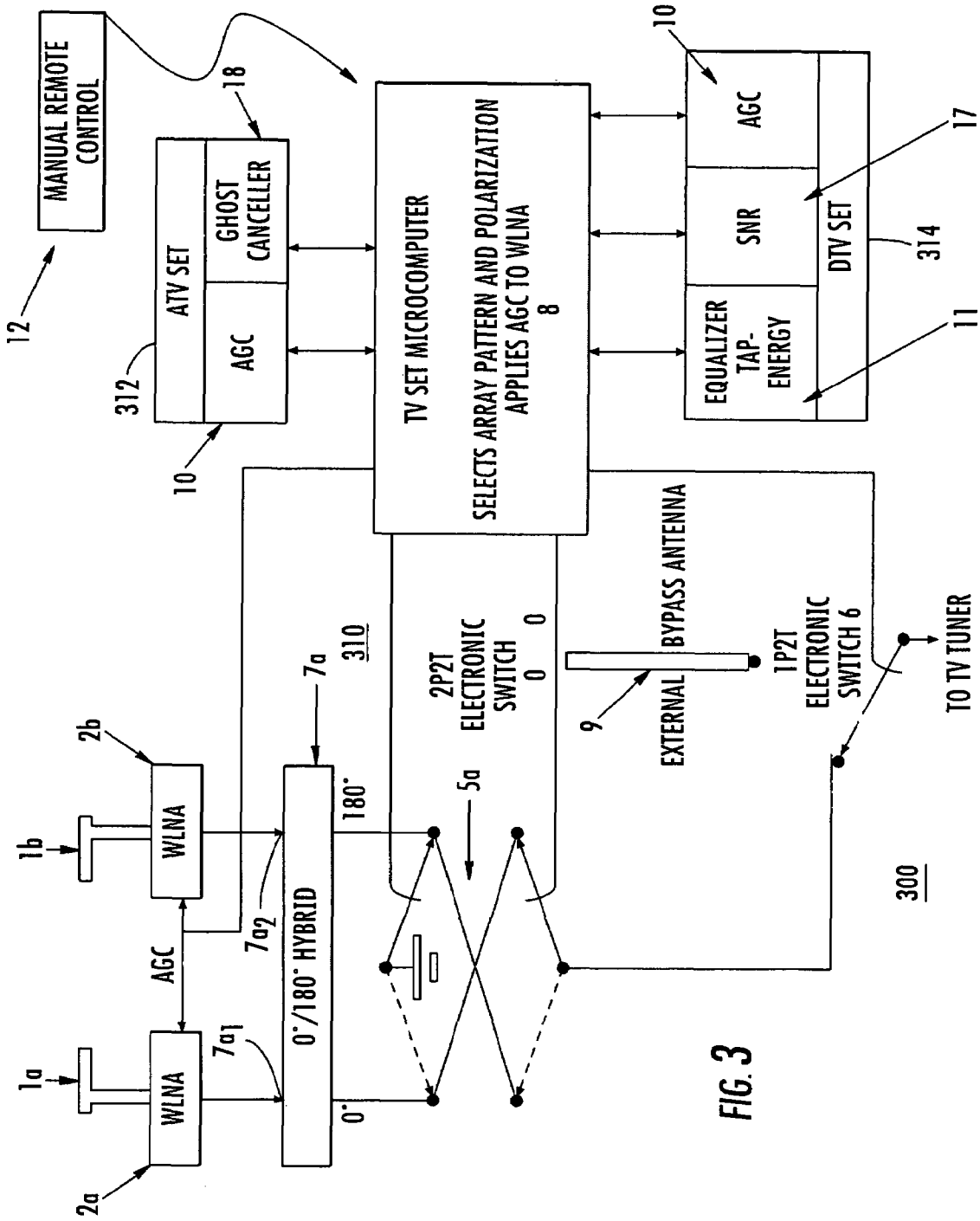


FIG. 3

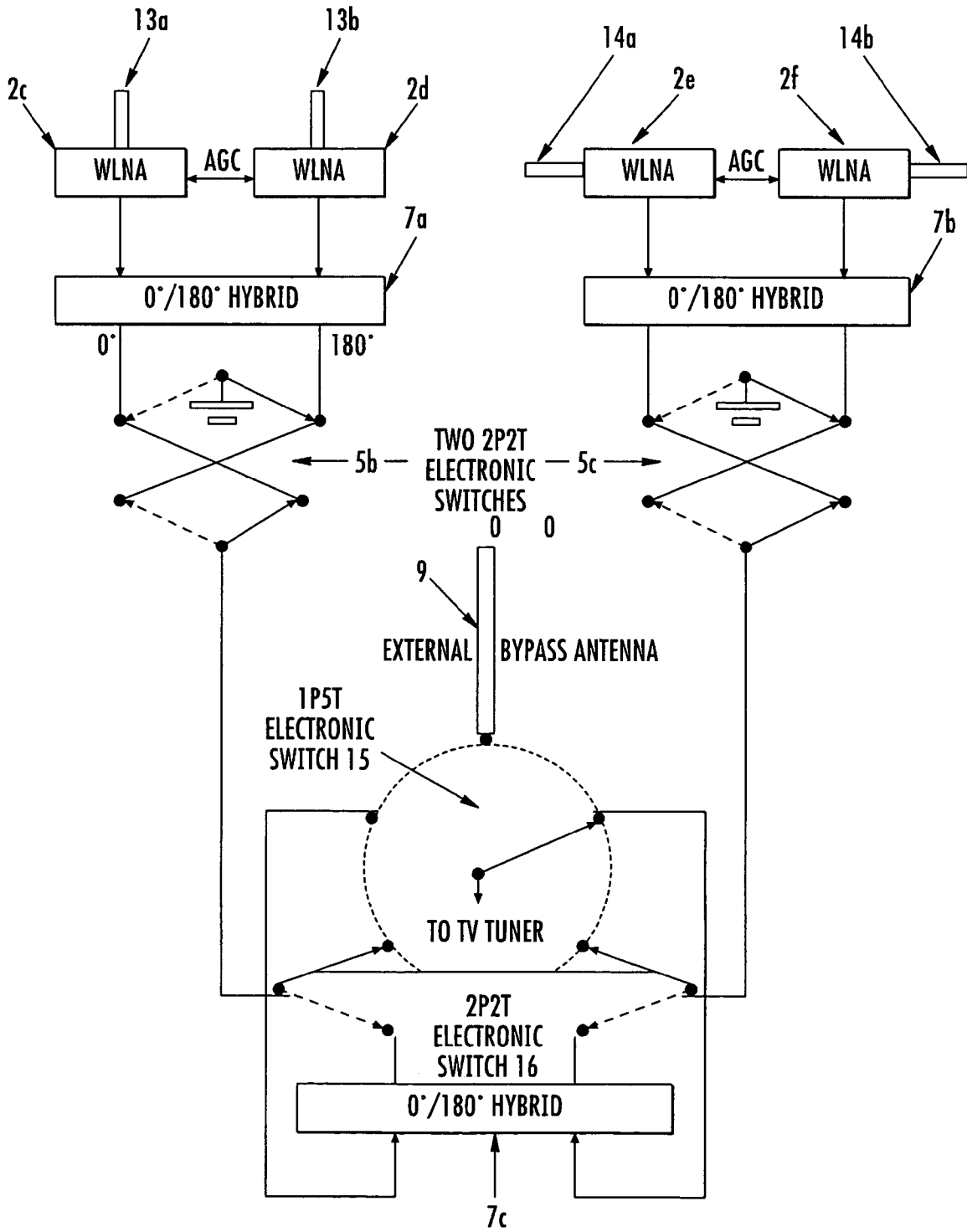
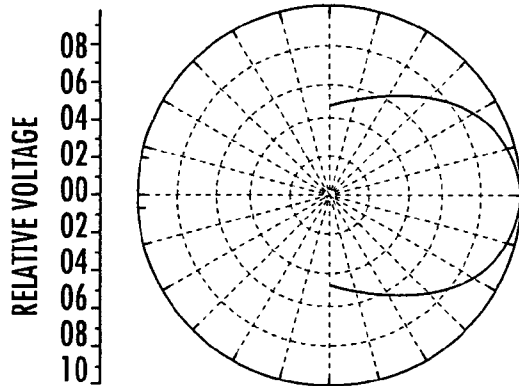
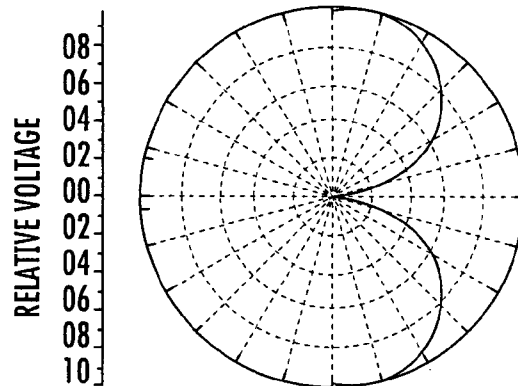


FIG. 4

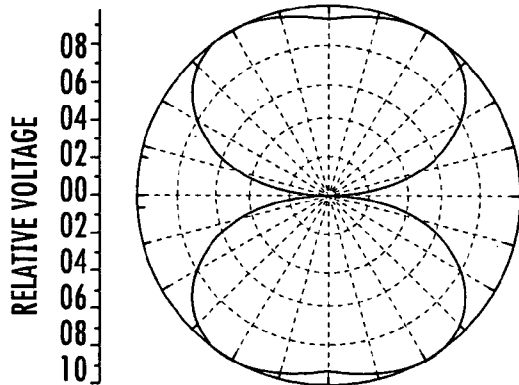
ELEVATION PATTERNS OF THE HORIZONTAL DIPOLES IN THE SUM (0°) MODE



ELEVATION PATTERNS OF THE HORIZONTAL DIPOLES IN THE DIFFERENCE (180°) MODE



AZIMUTH PATTERNS OF THE VERTICAL DIPOLES IN THE DIFFERENCE (180°) MODE



AZIMUTH PATTERNS OF THE VERTICAL DIPOLES IN THE SUM (0°) MODE

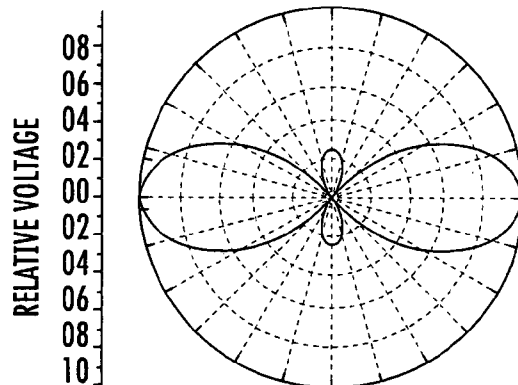
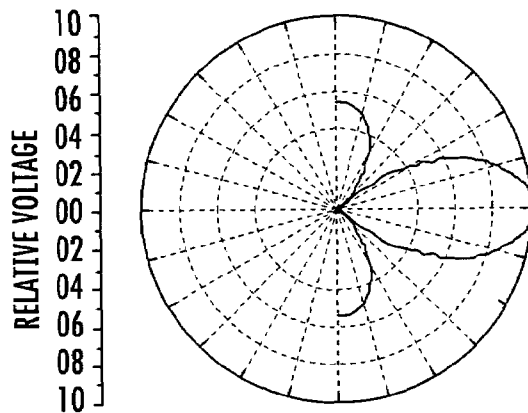
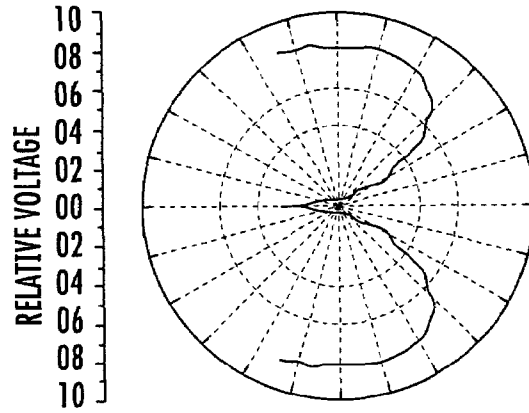


FIG. 5a

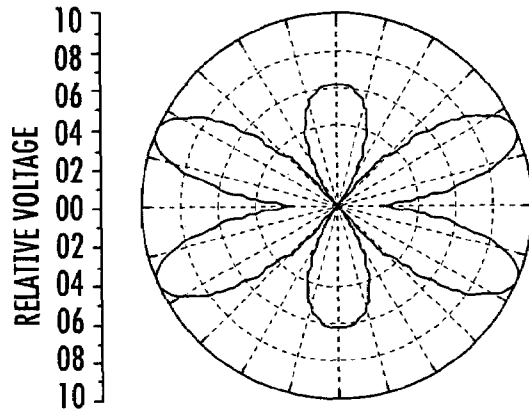
ELEVATION PATTERNS OF THE HORIZONTAL DIPOLES IN THE SUM (0°) MODE



ELEVATION PATTERNS OF THE HORIZONTAL DIPOLES IN THE DIFFERENCE (180°) MODE



AZIMUTH PATTERNS OF THE VERTICAL DIPOLES IN THE DIFFERENCE (180°) MODE



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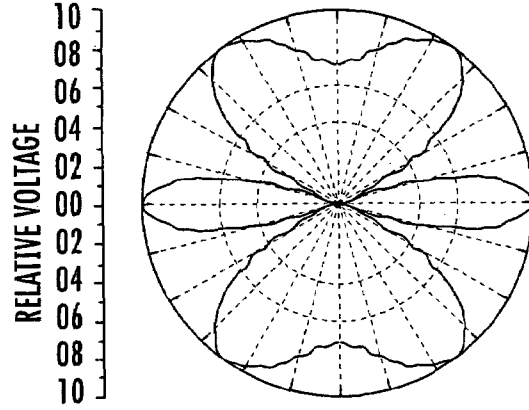
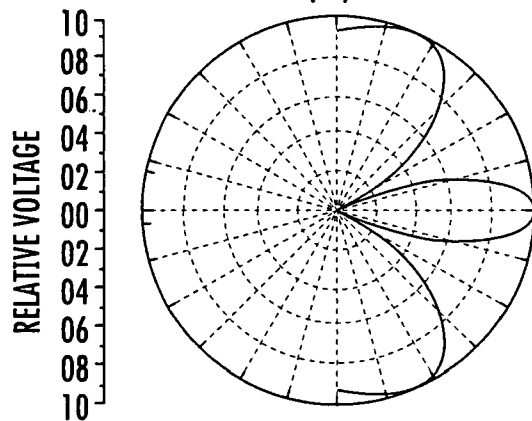
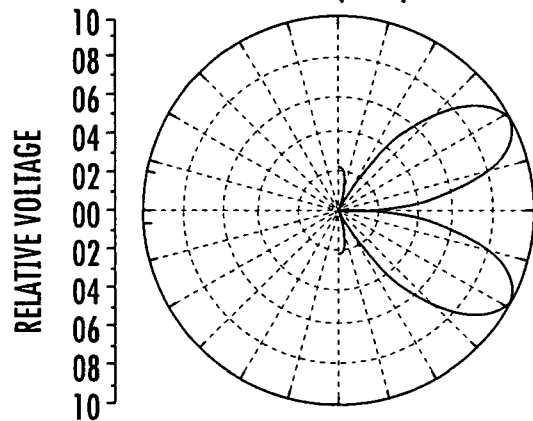


FIG. 5b

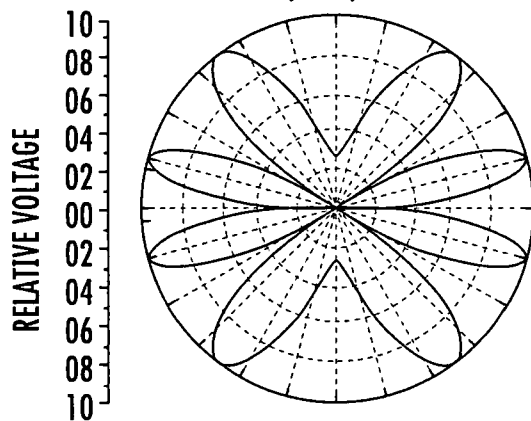
ELEVATION PATTERNS OF THE HORIZONTAL DIPOLES IN THE SUM (0°) MODE



ELEVATION PATTERNS OF THE HORIZONTAL DIPOLES IN THE DIFFERENCE (180°) MODE



AZIMUTH PATTERNS OF THE VERTICAL DIPOLES IN THE DIFFERENCE (180°) MODE



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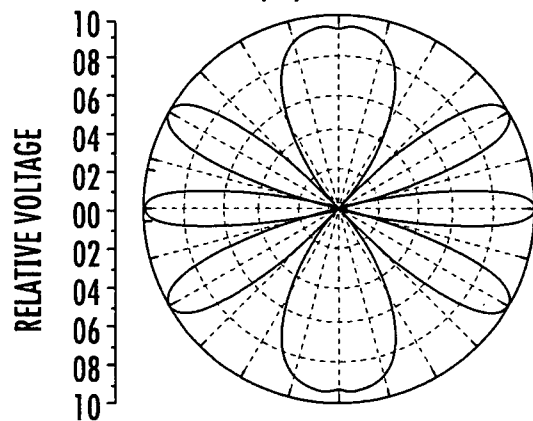
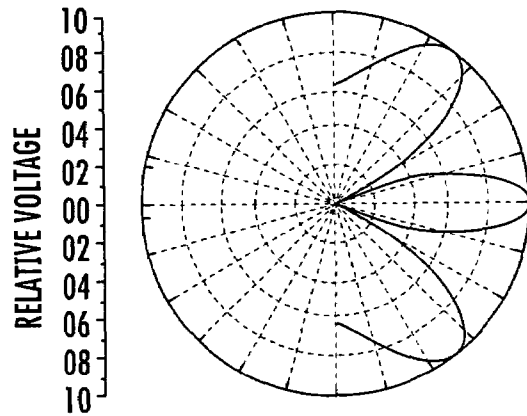
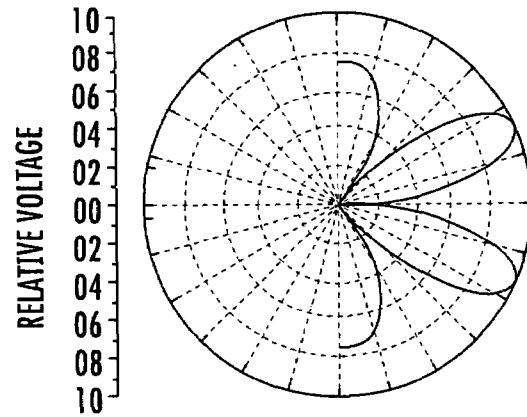


FIG. 5c

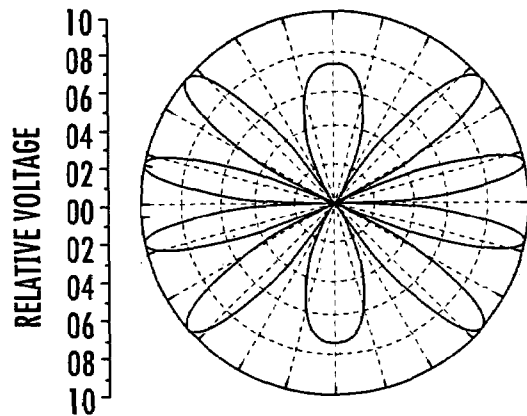
ELEVATION PATTERNS OF THE HORIZONTAL DIPOLES IN THE SUM (0°) MODE



ELEVATION PATTERNS OF THE HORIZONTAL DIPOLES IN THE DIFFERENCE (180°) MODE



AZIMUTH PATTERNS OF THE VERTICAL DIPOLES IN THE DIFFERENCE (180°) MODE



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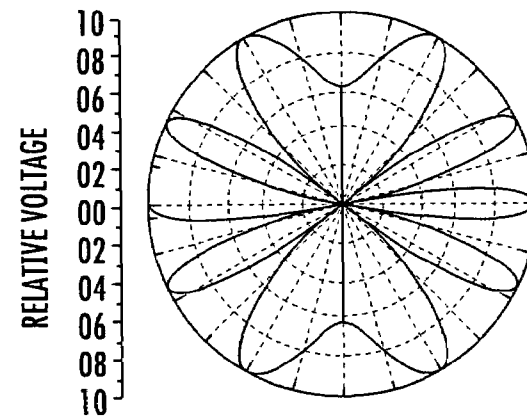


FIG. 5d

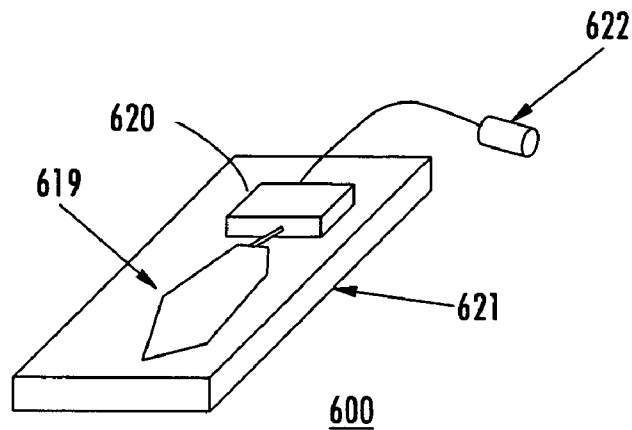


FIG. 6

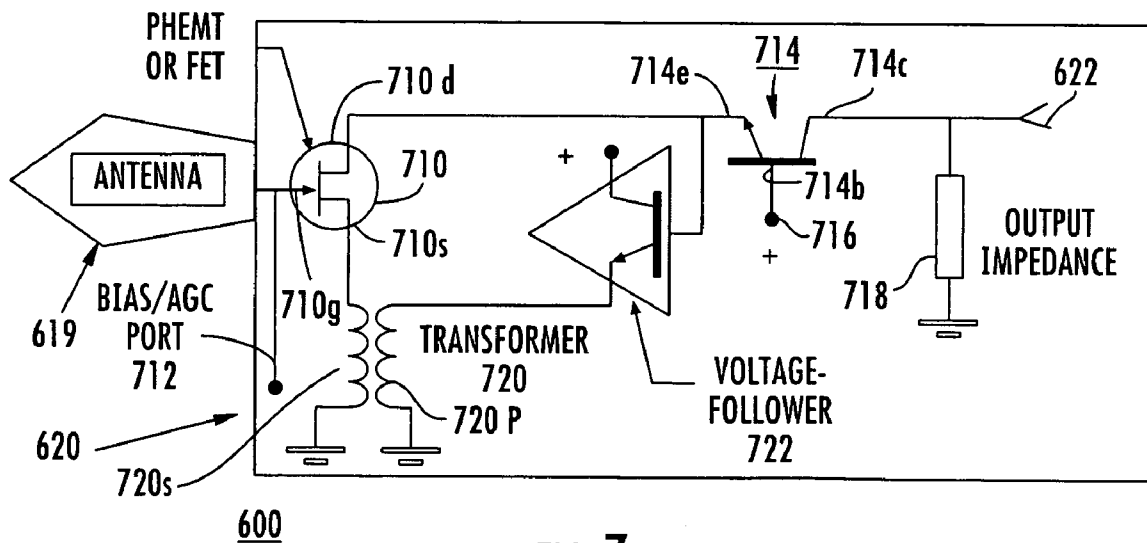


FIG. 7