



# AFTER OFFICE HOURS

## MULTICHANNEL AUTOMATIC NATALITY SENSOR WITH INSTANTANEOUS COMPUTER-INTEGRATOR AND AUDIOVISUAL RECORDER

*A New Instrument*

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**I**NTENSE RESEARCH AND DEVELOPMENT during recent years in such clinical obstetric problems as detecting pregnancy,

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The illustration at the top of the page is "The Medieval Doctor," a 15th-century German woodcut (The Bettmann Archive).

measuring fetal size and position, monitoring uterine contractions, documenting cervical dilatation, calculating descent, and pelvimetry, have resulted in the emergence of a new multipurpose instrument which can perform all of these functions with a high degree of reliability compared to present-day electronic methods.

As opposed to the ultrasonic Doppler detection of early fetal heart activity,<sup>27,34,48,52</sup> the new Multichannel Automatic Natality Sensor Instrument (abbreviated MANS instrument) utilizes a transvaginal duodigitalized module simultaneously with an externally applied detector analog. The instrument is programmed to detect and measure changes in the uterine size and consistency, believed by many<sup>5,41</sup> to be early reliable signs of pregnancy (Fig 1). Ultrasonics have also recently been utilized in the diagnosis of uterine contents,<sup>6,16,46,59</sup> for the detection of fetal position<sup>2,3,57</sup> and cranial dimensions.<sup>10,19,39</sup> The use of roentgen rays for this purpose has likewise been accepted clinically.<sup>1,4,9,15,30,36,40</sup> The MANS instrument uses an intermittent multilocation module involving multidigital sensors, working with a simultaneous isomer analog on the opposite side of the uterus. This program is modeled after Leopold's specifications,<sup>32,35,43</sup> and it can perform these functions with remarkable precision,<sup>24,58</sup> particularly when applied by British midwives (Fig 2).

Technics involving the transabdominal<sup>7,8,26</sup> or transcervical application of a pressure detector utilizing a closed balloon<sup>14,17,45</sup> or an open catheter<sup>11,37,53,60</sup> have also been utilized recently with great success in the monitoring and detection of uterine contractions. With relative simplicity, however, a MANS instrument utilizing an externalized duodigitalized module of the detector unit (described later), can obtain clinically useful data suitable for recording.

Preliminary attempts to record cervical dilatation and effacement with mechanized<sup>13,18,56</sup> and electronic<sup>20,21,55</sup> detecting devices



Fig 1. Multichannel Automatic Natality Sensor. (Only sensor terminal is shown; instantaneous computer-integrator and audiovisual recorder not shown.)

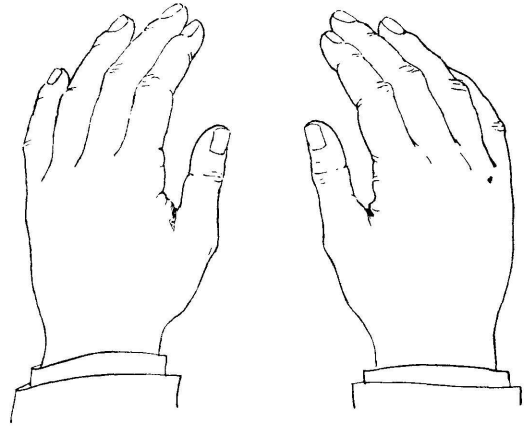


Fig 2. Multipurpose Isomer Analog of MANS Instrument seen in Fig 1. (MANS Instrument is shown at right for comparison.) Arranged for Leopold's maneuver.

have met with varying success. The MANS instrument in a sterilized uni- or duodigital module suitable for transrectal or transvaginal application can be programmed to perform up to existing clinical standards of reliability.<sup>38,51</sup> The same module can be programmed to record the descent of the presenting part with reliability superior to that of existing mechanical,<sup>12,22,50</sup> electronic,<sup>23,25</sup> roentgenologic<sup>29,31,44,47,49</sup> or laboratory methods. Pelvimetry, especially of the midpelvis and outlet, has been performed utilizing roentgen rays which achieved varying degrees of correlation<sup>28,33,35,42</sup> with clinical outcome; the MANS instrument module for the detection of cervical dilatation can also be programmed to obtain remarkably useful pelvimetric data.

The advantages of the instrument include: (1) its minimal maintenance, beyond occasional cleansing and terminal detector protector adjustment; (2) the availability of the instrument on a 24-hour basis (if the obstetric units can meet the rather demanding housing requirements for such a module); and (3) the reliable utilization of the instrument at the call of nurses and interns. The fully-developed model, which is strongly

recommended for a busy obstetric unit, also comes with an instantaneous data computer-integrator and audiovisual recorder. In addition, it features an isomer analog module (alluded to above, Fig 2) which can also be programmed for intermittent ink tracings of data on an ordinary hospital chart in a "language" often found to be comprehensible at once to some personnel.

The instrument comes in two fundamental models: the prototype MANS instrument has now been manufactured for many years and has predictable advantages and disadvantages. A recent, attractive innovation involving a Warm-Oriented adaptation of the MANS instrument (abbreviated WOMANS instrument) has been receiving approval on obstetric services in recent years (Fig 3). The advantages in natality sensitivity gained by utilizing this WOMANS instrument are balanced by the tendency of the instrument to circuit irritability and replications involving its own reproductive apparatus; therefore, the reliability of this attractive instrument is currently being questioned by some.

The instrument is not customarily purchased outright by obstetric services due to the prohibitive cost of development, but it is available at rental rates which increase with the amount of programming built into

## MULTICHANNEL AUTOMATIC NATALITY SENSOR

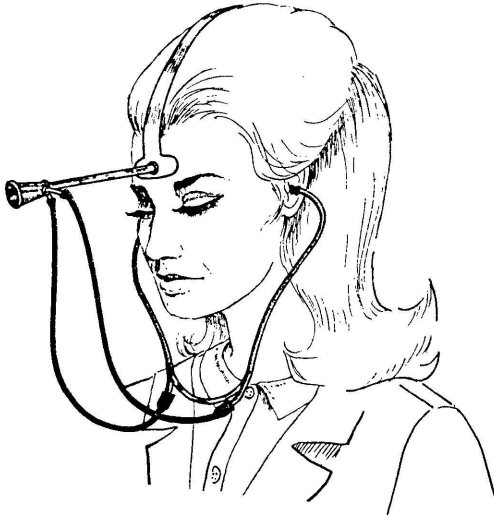


Fig 3. Warmth-Oriented Instrument. Instantaneous Computer-Integrator and Audiovisual Recorder Unit in a modern, attractive housing.

the instrument. The module requires four years of general medical programming which the manufacturers do not choose to reveal fully at this time, but which can be described as "multipurpose random trial and error." Each instrument is then highly individualized by the manufacturers to strike a compromise between the availability of the rare elements necessary for its production and the requirements specified by the obstetric service. The specifications of the service are then gradually programmed into the instruments through an extension of the manufacturer's "multipurpose random trial and error" method while the unit itself is housed in the obstetric service until the circuitry emerges

in an acceptably predictable pattern suitable to the service. Rental fees during the three-to-five year special programming period are usually paid directly by the hospital. After that, the cost of the fully-developed unit is generally passed on directly to the obstetric patients on a fee-for-service basis in compliance with Federal Medicare Guidelines. After a "shakedown" period of two years, the product is vigorously tested by the manufacturer and, if specifications are found compatible with the manufacturer's standards, the final product receives certification and is listed in appropriate catalogues—to the decided advantage of the obstetric service.

Although the annual rental fees are equal and often exceed the cost of multichannel recorders, ultrasonic devices or other electronic equipment, the manufacturers recommend that the obstetric services commit themselves to the full programming of MANS instrument in preference to the electronic competitors currently available, because of the instrument's long-term advantages of reliability, integrity and availability.

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### REFERENCES

(Note: We wish to apologize for the breakdown of the Computerized Information Retrieval System we have relied on to print out the references. A complete list will be available sometime in the future, sorted out and written by hand.)