

# NASA TECH BRIEF

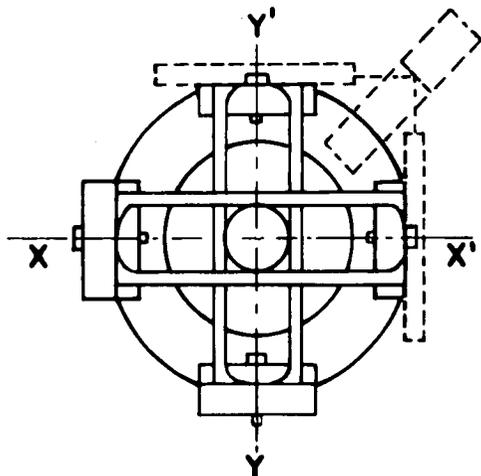
*Ames Research Center*



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## Reference Apparatus for Medical Ultrasonic Transducer

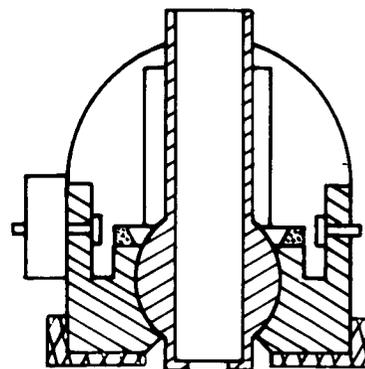
A miniature reference apparatus has been developed for use in conjunction with an ultrasonic transducer probe of the type often used by cardiologists to determine existence of heart disease and to follow its progress on an ultrasonoscope. Ordinarily, an ultrasonic transducer probe is held against the chest of a patient and then carefully moved around a perpendicular axis until there is found a position over the heart which provides interpretable signals on the screen of the ultrasonic cardiology oscilloscope. Considerable time and effort is spent in the task of locating the appropriate probe position and area over the heart, and every time the patient is reexamined, the trial and error technique must be resumed. The reference apparatus described below has been developed especially for use with patients who must be reexamined periodically over long intervals of time.



The reference apparatus holds the ultrasonic probe in position over the heart, but as the probe is moved (like a joy stick), two meters give an indication of the position of the probe. Thus, once the reference apparatus has been located properly, and its position on

the chest of the patient has been recorded on the skin by means of indelible fiducial marks and the appropriate meter readings have been noted, it is a simple matter at some later time to reposition the probe on the chest over the heart of the patient. The reference apparatus is first positioned in accordance with the indelible reference marks and finally adjusted so that the former meter readings are reproduced. In this way, signals from the exact same area of the heart can be reexamined.

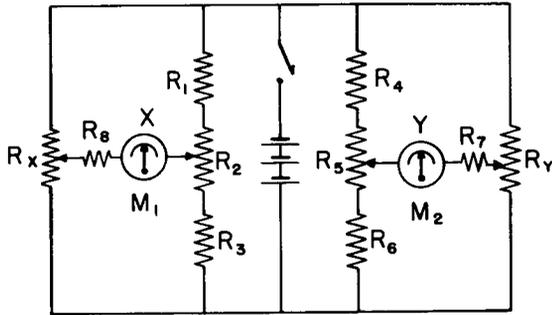
The primary component of the reference apparatus is an assembly about 5 cm in diameter into which the transducer is inserted at time of use. The assembly is connected to a meter box which contains the circuitry for indicating orientation of the transducer probe as X and Y coordinates (meter readings). Sub-assemblies in the apparatus are a probe holder, base plate, and X and Y yokes that are connected with potentiometers.



The ball-joint-type probe holder has an inner diameter equal to the outer diameter of commercially available ultrasonic transducers; at the ball end there is an inner ridge to prevent the transducer from passing completely through the holder. The probe holder

(continued overleaf)

is secured in the base-plate assembly by a ball-retainer cap, but is free to rotate about the seat. The base plate is covered externally by a rubber cap which is ridged or grooved to prevent sliding on the patient's chest; the ridged end of the probe holder extends slightly beyond the rubber cap.



At the ball end of the probe holder, the Y-yoke is pinned to a bearing block at one end, and is pinned to the center wiper of the Y potentiometer at the other end. Movements of the probe in the direction Y-Y' or Y'-Y will cause the Y-yoke to pivot about the pins; rotation of the pin at the potentiometer will move the center wiper and cause an unbalance in the Y-resistance network (R4, R5, R6, and M2) in the meter box. Resistor R7 is the sensitivity resistor which sets full-scale deflection on M2 for maximum displacement of the Y-yoke and R5 centers M2 when the probe holder is vertical or centered in the reference apparatus.

Displacement of the probe holder in X-X' or X'-X directions will be transmitted through the X-yoke located slightly below the Y-yoke and similarly indicated by the network R1, R2, R3, and M1; R8 is the sensitivity resistor and R2 centers the meter. Movements of the probe pivoting about the ball joint at an angular position are indicated on the X- and Y-meters as two digits, 01 through 10.

**Note:**

No additional documentation is available. Specific questions, however, may be directed to:  
 Technology Utilization Officer  
 Ames Research Center  
 Moffett Field, California 94035  
 Reference: B74-10197

**Patent status:**

Inquiries concerning rights for the commercial use of this invention should be addressed to:  
 NASA Patent Counsel  
 Mail Code 200-11A  
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