



INTERNATIONAL ATOMIC ENERGY AGENCY
UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION



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SMR.300/56

College on Medical Physics
(10 October - 4 November 1988)

Quality Assurance

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** These notes are intended for internal distribution only

QUALITY ASSURANCE

- THE PURPOSE IS TO ASSURE THAT THE EQUIPMENT IS OPERATING AT THE EXPECTED LEVEL OF PERFORMANCE.
- SOMETIMES IT MAKES POSSIBLE TO PREVENT FAILURES OF THE EQUIPMENT AND TO REDUCE DOWNTIME.

HOW TO DO Q.A. TESTS ?

- THE SAME TESTS MUST BE PERFORMED DURING EACH QUALITY CONTROL SESSION
- EACH TEST MUST BE DONE IN THE SAME MANNER (USING THE SAME TRANSDUCER AND WITH THE SAME EQUIPMENT ADJUSTMENTS)
- KEEP A LOG OF Q.A. TESTS, MALFUNCTIONS, AND PREVENTIVE MAINTENANCE CALLS
- A QUALITY CONTROL SESSION SHOULD BE PERFORMED AFTER ANY SERVICE CALL.

WHICH PARAMETERS ?

- DISTANCE CALIBRATION (HOR.-VERT.) NO VERT. AND NO DISTORSION OF THE IMAGE
- DIGITAL CALIPER LEVEL OF PRECISION OF THE SYSTEM OF DISTANCE MEASUREMENT
- MAXIMUM SENSITIVITY AND UNIFORMITY THE DEEPEST ECHO SIGNAL YOU MAY DETECT AND DISPLAY AT OPTIMUM SETTINGS; UNIFORMITY OF THE SIGNAL AND OF THE IMAGE IN DIFFERENT AREAS
- GRAY SCALE PHOTOGRAPHY HARD COPY FIDELITY
- SPATIAL RESOLUTION AXIAL AND LATERAL RES.
- CYST IMAGING CAPABILITIES DETECTION OF SOLID AND LIQUID CYSTS
- PHYSICAL ASPECT OF EQUIP. CABLES, FILTERS, TRANSDUCERS, CAMERAS, PROCESSOR

TEST OBJECTS

- TISSUE EQUIVALENT MATERIAL
IN ORDER TO TEST THE US EQUIP.
UNDER CLINICAL CONDITIONS

TYPICALLY ALL TISSUE MIMICKING PHANTOMS CONTAIN
A SOLUTION OF:

- AGAR (POLYSACCHARIDE GEL) (3%) ☉
- WATER
- PROPANOL
- GRAPHITE

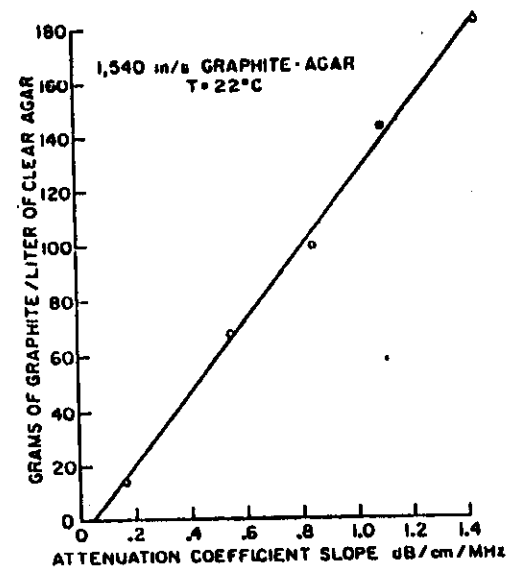


Fig. 2. This graph shows the approximately linear relation between the grams of graphite powder per liter of agar-water-propanol matrix material and the slope of the attenuation coefficient.

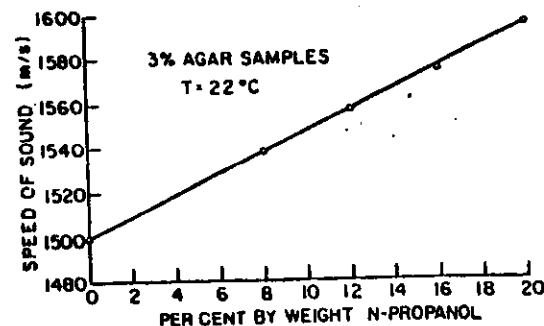
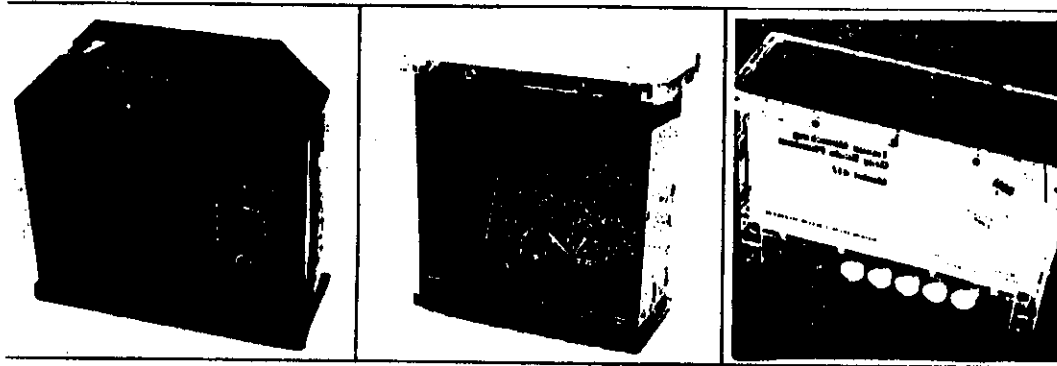


Fig. 4. Speed of sound vs. concentration of n-propanol at 22°C, showing a linear relation for sample D (TABLE I). Graphs for samples A through E are nearly identical.

© H.N. BURLAW and others: "A NEW ULTRASOUND
TISSUE-EQUIVALENT MATERIAL" in RADIOLOGY
vol. 134 n. 2 page 517-520; february 1980

COMMON CHARACTERISTICS OF TEST OBJECTS:

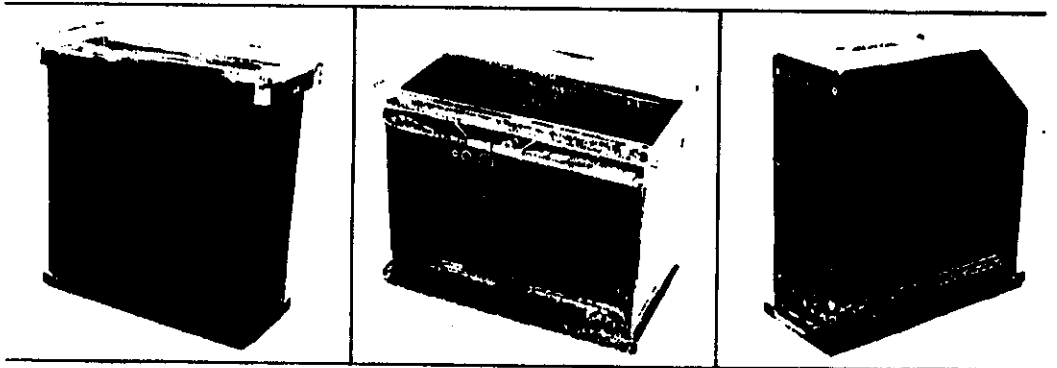
- A TISSUE EQUIVALENT MATRIX OF AGAR AND GRAPHITE
- REFLECTORS MADE WITH NYLON WIRES (0.2, 0.3mm)
- REFLECTORS ARRANGED IN DIFFERENT CONFIGURATIONS DEPENDING ON THE PARAMETER TO BE MEASURED
- INCLUSIONS OF GEL WITH DIFFERENT CHARACTERISTICS WITH RESPECT TO THE GEL OF THE MATRIX, IN ORDER TO SIMULATE LIQUID OR SOLID CYSTS.



TFC-AB leboM

AC1A leboM

TFA leboM



BDTA leboM

BATA leboM

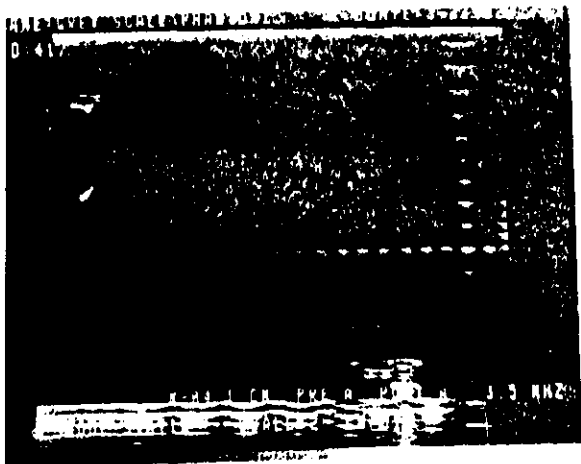
AS1A leboM



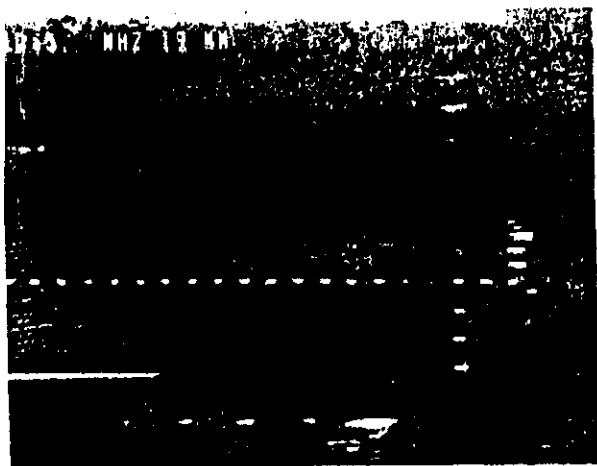
8



Fig. 2. Schematic of Gray Scale Ultrasound Phantom.

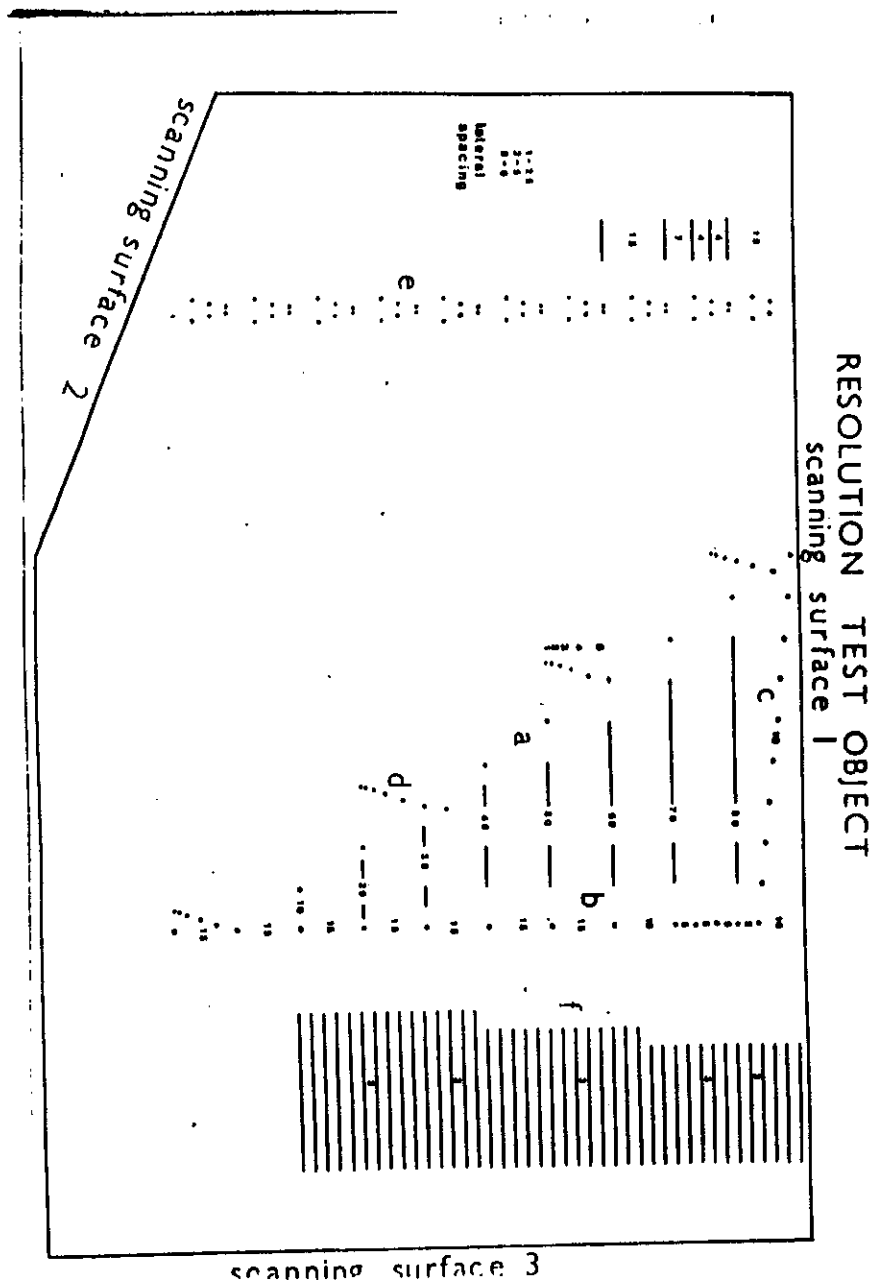


7A

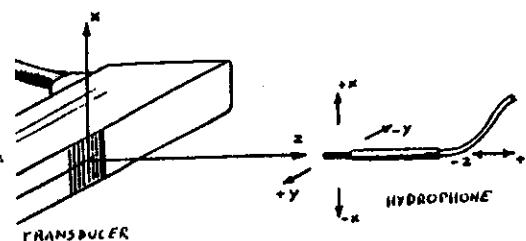
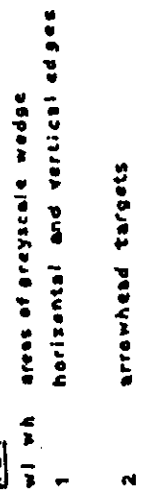


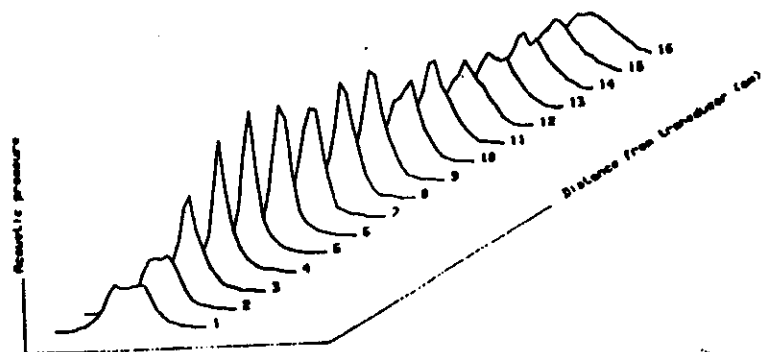
7B

3.5 MHz transducer (7A) and 5 MHz transducer (7B) showing line beam width pattern in the extended line target column.

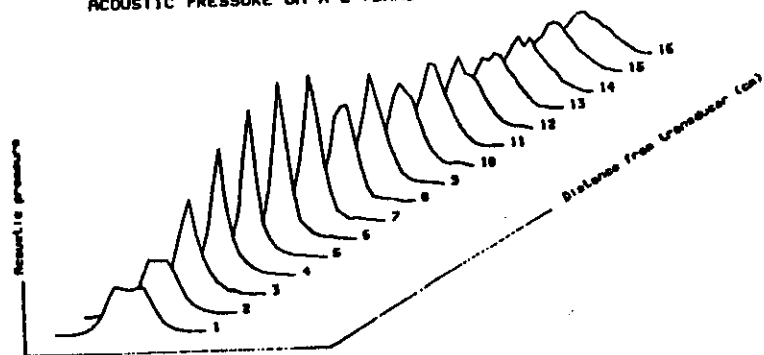


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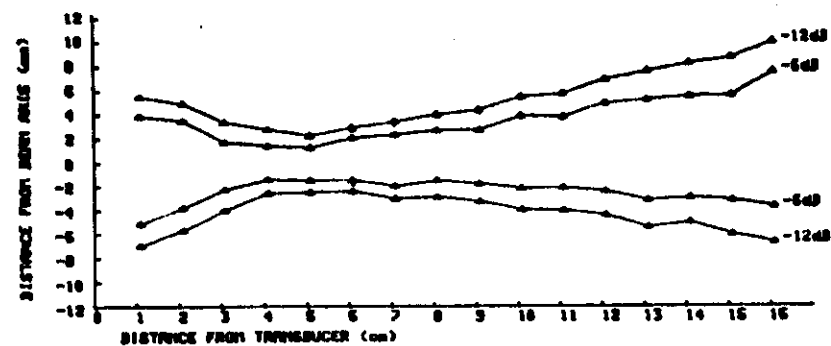




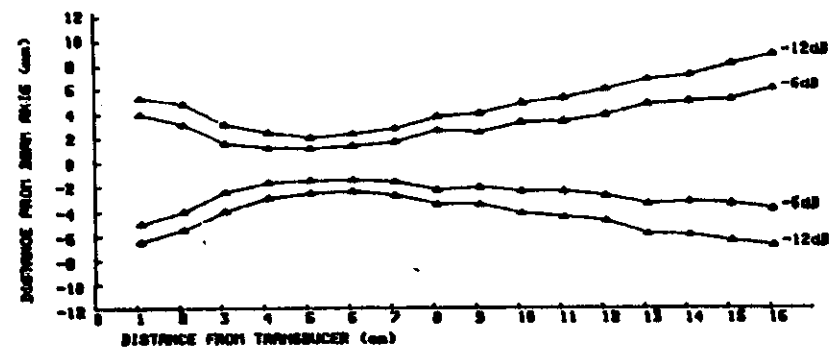
ACOUSTIC PRESSURE ON X-Z PLANE



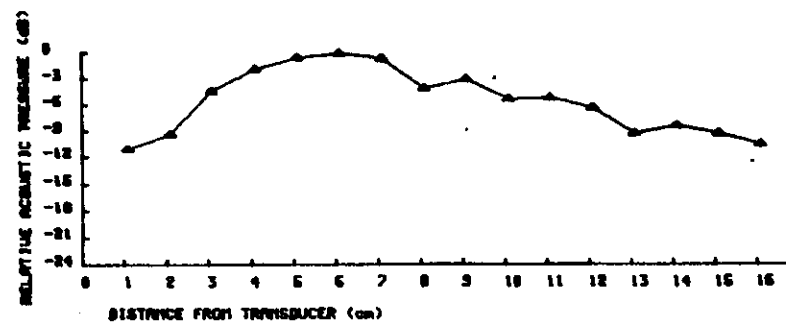
ACOUSTIC PRESSURE ON Y-Z PLANE



BEAM SHAPE ON ELEVATION PLANE (X-Z)

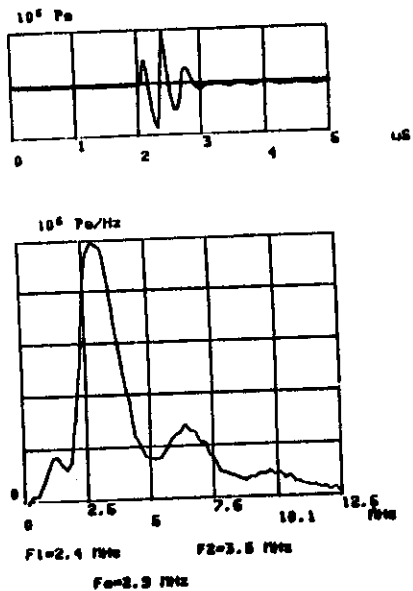


BEAM SHAPE ON SCAN PLANE (Y-Z)

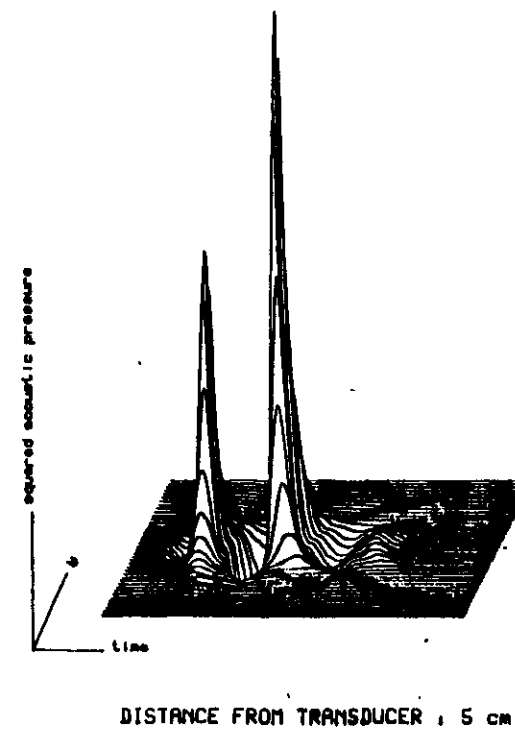


ACOUSTIC PRESSURE ON BEAM AXIS (Z)

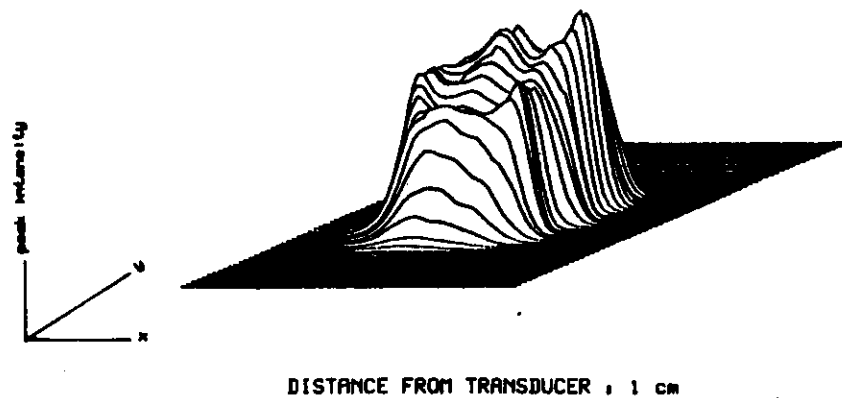
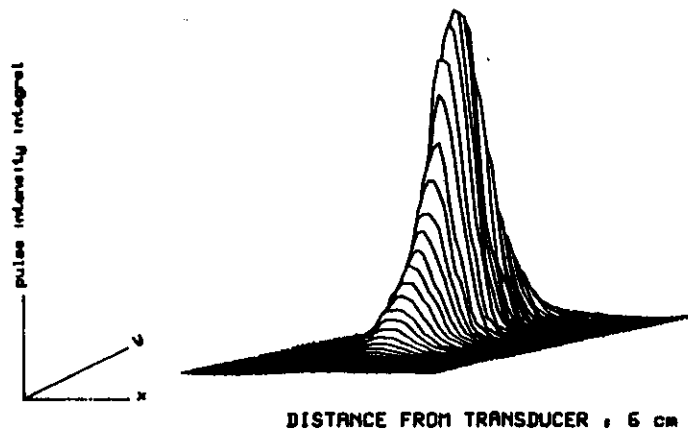
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Model: PK 300C
N. Series: ...
Date: 12/03/04



Fabbricante: RUSALDO
Modello: RU 940
N. Serie: ...
Data: 26/03/1984
L/N-fuoco F2-13cm



Fabbricante: A.T.L.
Modello: RK 300 C
N. Serie:
Data: 12/03/84



Fabbricante: PIRELLA
 Modello: RU 940
 N. Serie:
 Data: 01/10/04
 SONDA SECTOR

