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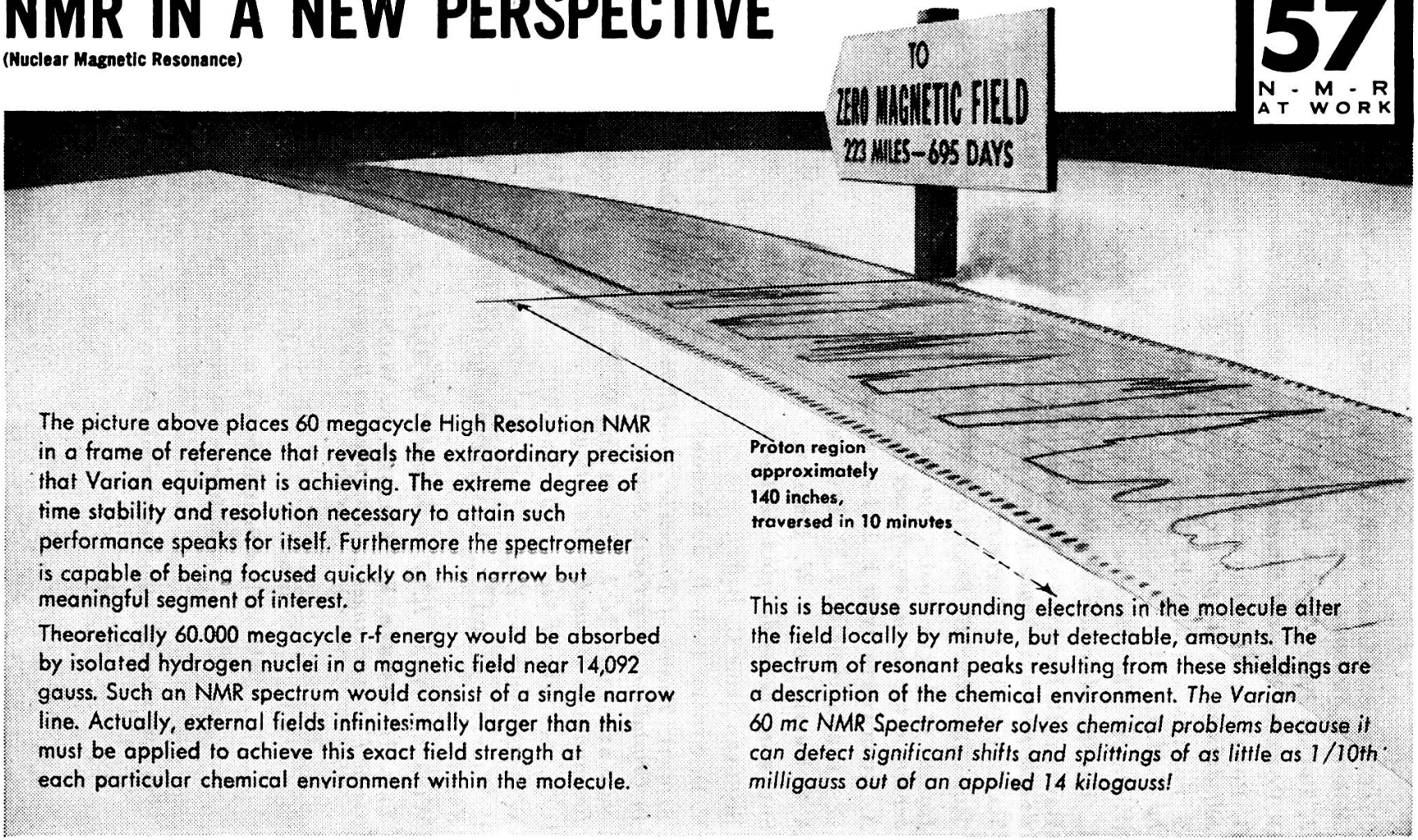
NMR IN A NEW PERSPECTIVE

(Nuclear Magnetic Resonance)

57
N - M - R
AT WORK



The picture above places 60 megacycle High Resolution NMR in a frame of reference that reveals the extraordinary precision that Varian equipment is achieving. The extreme degree of time stability and resolution necessary to attain such performance speaks for itself. Furthermore the spectrometer is capable of being focused quickly on this narrow but meaningful segment of interest.

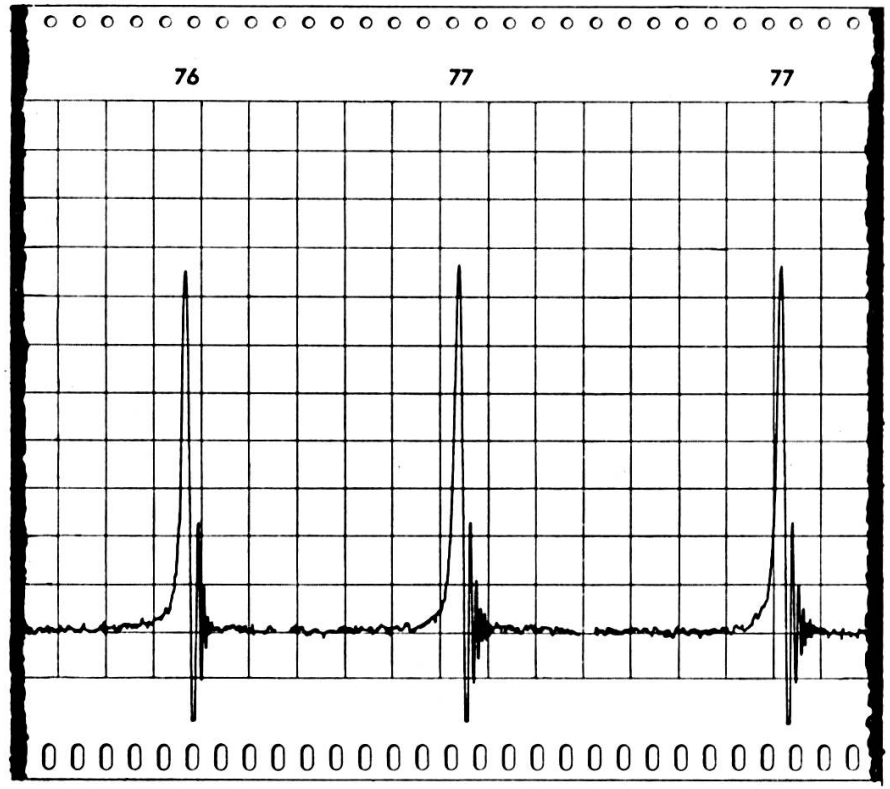
Theoretically 60.000 megacycle r-f energy would be absorbed by isolated hydrogen nuclei in a magnetic field near 14,092 gauss. Such an NMR spectrum would consist of a single narrow line. Actually, external fields infinitesimally larger than this must be applied to achieve this exact field strength at each particular chemical environment within the molecule.

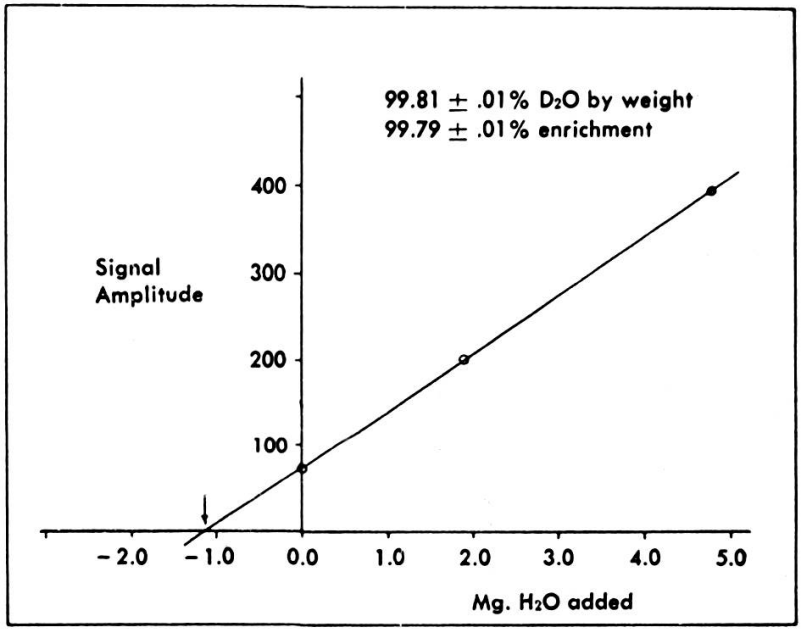
This is because surrounding electrons in the molecule alter the field locally by minute, but detectable, amounts. The spectrum of resonant peaks resulting from these shieldings are a description of the chemical environment. *The Varian 60 mc NMR Spectrometer solves chemical problems because it can detect significant shifts and splittings of as little as 1/10th milligauss out of an applied 14 kilogauss!*

57 of a series

QUANTITATIVE ANALYSIS OF RESIDUAL H_2O IN HIGH PURITY D_2O

INTERPRETATION: In No. 4 of this series a sample containing 3.4 percent H_2O was analyzed by comparison with standards of known concentration. The analysis has now been extended to the residual H_2O in high purity D_2O, utilizing the great sensitivity of the 60 mc Spectrometer. The traces at left below demonstrate the reproducibility of the signal amplitude at the residual proton level encountered with such samples. The analysis is performed by adding precisely known amounts (by weight) of H_2O to the sample and plotting the total signal amplitude against the added H_2O, as shown in the graph at the lower right. Extrapolation to zero signal gives the amount of H_2O initially present. The sample studied contained 1.15 mg. of residual H_2O in 593.7 mg. of D_2O. This gives the result of 99.81% D_2O by weight, or 99.79 atom-percent deuterium.





H_2O Remaining in High Purity D_2O by the Method of Adding Known Amounts of H_2O and extrapolating to Zero Signal Amplitude.

For other examples in this series and for current technical information on Varian NMR and EPR Spectrometers, write the Varian Associates Instrument Division.

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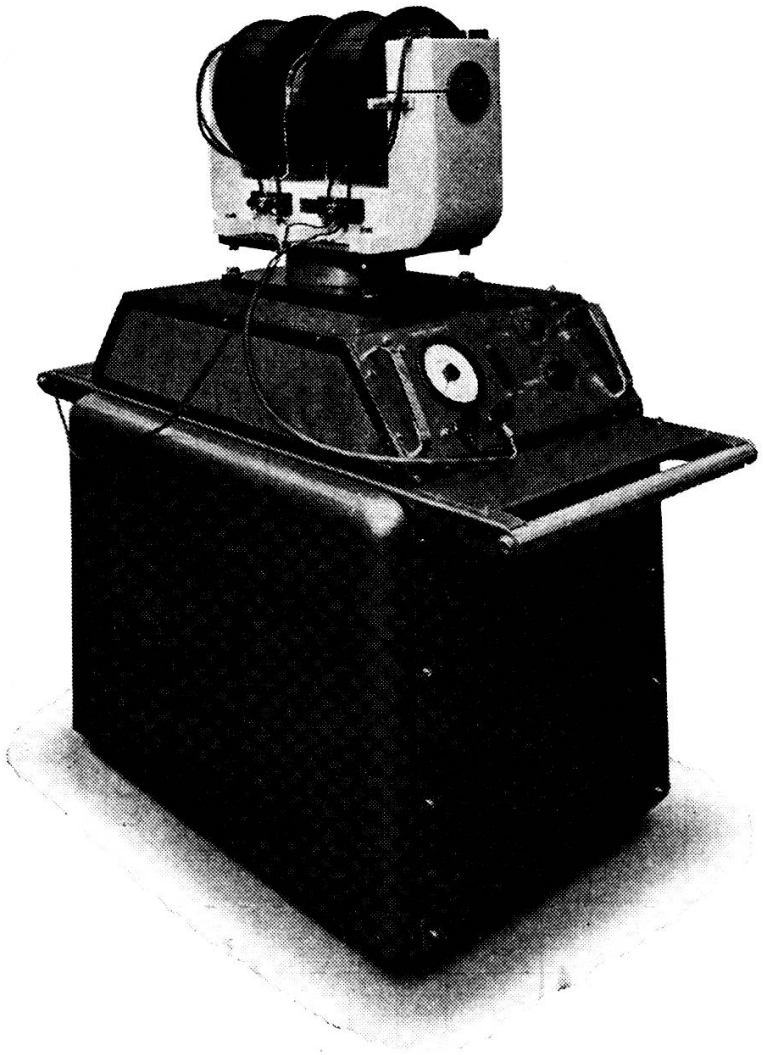
STABILITY



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For full particulars of the Type B power-supply unit and Newport electromagnets and instruments write to

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