Strip Chart showing stability and sensitivity of prototype 602B/X EMR. Sample: Varian 0.00033% pitch standard; effective cavity power, 7 milliwatts; 3 second integration time; noise equivalent to 5 x 10^{10} spins/gauss. Rm. temp. Signal to noise, 40:1; f = 9.49gc;

New EMR Spectrometers Advance Standards in Sensitivity and Resolution

Strand Labs announces that its new B-series of X-band electron magnetic resonance spectrometers set a new standard in EMR sensitivity and resolution. Using a new development in microwave detectors, these systems, with a high-resolution 6 kc magnetic field modulation, offer demonstrated noise figures of 15 db at 1 milliwatt sample cavity power level. This figure corresponds to a minimum detectable number of spins of 2×10^{11} spins/gauss of line width when the sample is observed at room temperature in a cavity with unloaded Q of 25,000 (which is standard in our X-band systems) and with an integration time of 3 seconds.

These proven systems in Model 601 and Model 602 configurations are available for use with microwave power at the cavity of up to 200 milliwatts. Note that these B-series systems may be compared in sensitivity with existing units by scaling the sensitivity, 2×10^{11} spins/gauss, inversely proportional to both the square root of the microwave power and the Q of the sample cavity. In these systems, however, the use of the full 200 milliwatts of power may not increase the sensitivity by another factor of 14, since saturation of the sample tends to limit the increase in sensitivity with power. It can only be said that, in many cases, a sensitivity of better than 5×10^{10} spins/gauss is achievable in these systems with more power.

This sensitivity increase corresponds approximately to a reduction by 15 db in noise figure of Strand Labs A-series systems. This is accomplished by using a new type of semiconductor diode selected for low 1/f noise and for match in our detector mounts. We consider the B-series the ultimate in EMR apparatus since, though conceivably a further 10 db noise figure may be possible with maser amplifiers, this further reduction in noise figure yields only a factor of 3.1 decrease in the minimum number of detectable spins. The high Q of our sample cavity gave the Strand Labs A-series EMRs an 11 db increase in sensitivity over systems with sample cavity Q of 7,000. Now, with a detector noise figure within a few db of that attainable at any signal frequency, 100 kc or 30 mc, and with our ultra-stabilized klystron sources, Strand Labs offers a B-series EMR system with highest resolution and unsurpassed noise figure. The high Q sample cavity yields a bonus sensitivity of up to 11 db.

For the K (23 - 25 gc), K_a (34 - 36 gc) and E (67 - 73 gc)-band EMR, Strand Labs expects similar increases in sensitivity, even though they are remarkably good at present. For example, the K and K_a units have been demonstrating sensitivities (based on molecular oxygen as a standard) of better than 5×10^{10} spins/gauss of line width.

If you have a requirement for an electron magnetic resonance spectrometer that demands the limit of what is currently achievable at X, K, K_a or E-band, or if you already own a Strand Labs EMR and would like to have it modernized or given a maintenance check-up, write the Technical Director at Strand Labs.

excited states, oxidation-reduction reactions, and paramagnetic metal ions in biological macromolecules.

Additional information can be obtained from R. G. Shulman, Bell Telephone Laboratories, Murray Hill, N. J.

Radio Meteorology

The Inter-Union Committee on Radio Meteorology (of the International Scientific Radio Union and the International Union of Geodesy and Geophysics), the American Meteorological Society, and the Central Radio Propagation Laboratory of the National Bureau of Standards are organizing a symposium on radio meteorology that will include all aspects of the topic. The meeting will be held September 14 to 18 at the Central Radio Propagation Laboratories in Boulder, and will emphasize the establishment of a broader community of interest among the various specialties involved in the interaction between radio waves and the troposphere.

The following topics are among those expected to be covered at the symposium: (1) relevant microwave propagation in or through the troposphere, notably scatter propagation, ducting, general bending, and attenuation by precipitation, clouds, vapors, and gases, (2) radar observations of precipitation, clouds, lightning, and dielectric inhomogeneities in the air, (3) radiations from lightning, excluding interactions of the radiations with the ionosphere and beyond unless relevant to other items, changes in the electric field of the thunderstorm, (4) microwave radiometry, closely related to the attenuation in the first item, (5) meteorological processes underlying the preceding phenomena, and (6) interactions such as those preceding but involving light waves, especially coherent or pulsed coherent light.

The earliest possible registration is requested since an early distribution of advance proceedings is planned. Additional information can be obtained from J. W. Herbstreit, Program Committee, 1964 World Conference on Radio Meteorology, Central Radio Propagation Laboratory, National Bureau of Standards, Boulder, Colo.