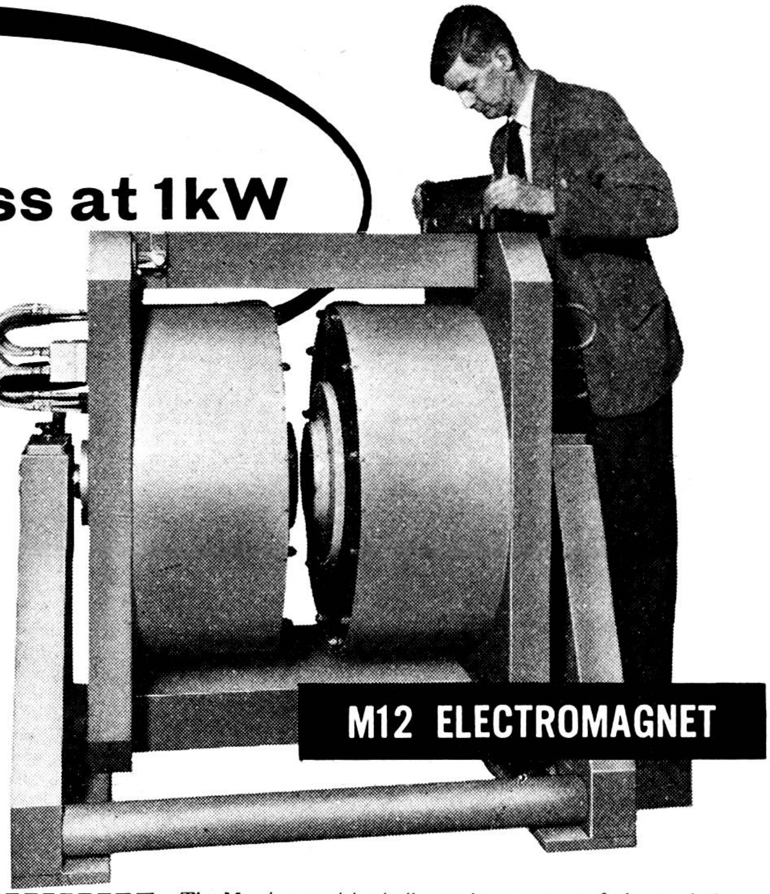
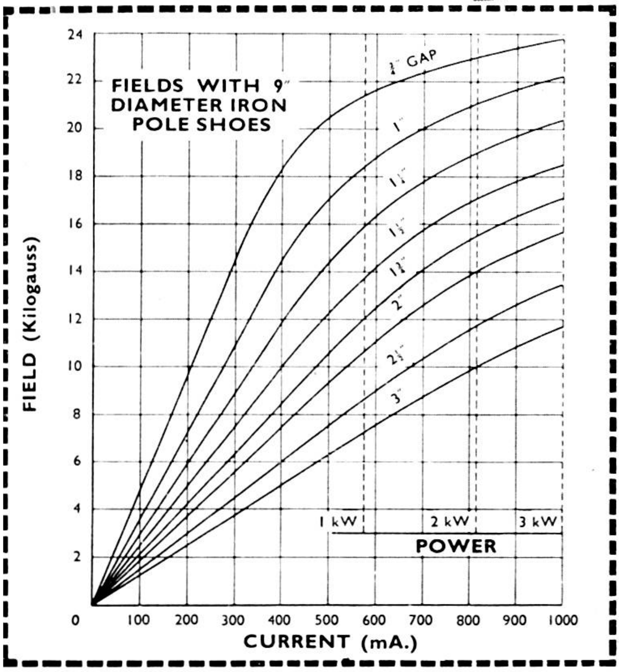
14,000 Gauss at 1kW





The **M12** is a precision built 12" electromagnet of advance design intended for the research worker who requires flexibility in gap geometry with outstanding homogeneity and stability over a wide range of fields. It is basically the same magnet as used in the RS2 high resolution nuclear magnetic resonance spectrometer, which demonstrates its capability. *Special features include:*

FLEXIBILITY IN GAP GEOMETRY — provided by the introduction of precision ground spacers into the yoke as shown in the illustration and choice from a series of interchangeable pole shoes. The standard range of gaps is from ¼" to 3" in ¼" steps and of pole face diameters from 3" to 17" in 2" steps.

FIELD HOMOGENEITY — Pole shoes are of ultrasonically tested high purity iron. Small grain size and minimum magnetic reluctance is ensured by special heat treatment processes. Gap parallelism is adjusted to better than 0".0002 before despatch. Finer adjustment in the plane of the yoke can be made on site by means of the unique tapered wedge system visible at the top left hand side of the yoke.

TEMPERATURE STABILITY — To minimise the effect of the inherent magnet temperature coefficient of about 12 ppm per °C, (i) the current coils are isolated from the yoke by totally enclosing them in water jackets and (ii) a large gap m.m.f. is provided at low power (e.g. 14,100 gauss is obtained with a 1½" x 9" gap at 1.1 kW)

POWER UNIT — This unit has a maximum output of 3 kW. Its stability is better than 1 in 10^6 and with the addition of a flux stabiliser, an overall short term stability of better than 1 in 10^8 is obtained. Current is continuously adjustable in the range 40 mA to 1·0A to within 0.1 μa The unit is water cooled.

PERFORMANCE — The curves show the field obtainable at different gap lengths with 9" diameter iron pole shoes.

ACCESSORIES — A wide range of accessories include a rotating base, modulation coils, shim coils and supplies, flux stabiliser and scan unit, thermal lagging for magnet yoke and a water recirculating system.

For further information please write giving details of your problem.

The AEI range of scientific equipment
includes apparatus for ELECTRON MICROSCOPY,
MASS SPECTROMETRY, RADIOGRAPHY, CRYSTALLOGRAPHY,
MATERIALS IRRADIATION, HIGH VACUUM ENGINEERING,
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Let us look into YOUR *problem.*

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N/R010

NO. 21 EPR AT WORK SERIES

HYPERFINE STRUCTURE IN ORGANIC FREE RADICALS BY EPR

(ELECTRON PARAMAGNETIC RESONANCE)

Interaction in organic free radicals of the unpaired electron with the magnetic moments of the protons frequently gives rise to well defined hyperfine structure. Often this structure permits identification of an unknown radical. One may also extract detailed information on electron wave functions from this observed hyperfine splitting.

EXAMPLE

Tetracene positive ion free radical.

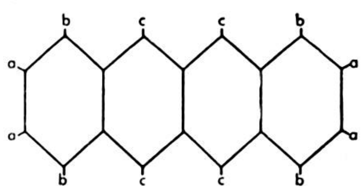

FIG. A TETRACENE

Tetracene, Figure A, when dissolved in concentrated H_2SO_4 forms a positive ion free radical, which has been investigated with EPR by Weissman and others[1]. We recently reëxamined this radical[2] using the high sensitivity Varian 100 kc EPR spectrometer. Figure B shows the total spectrum and Figure C, the seven central lines obtained with a slower scan of the DC magnetic field. The temperature was 65°C and the concentration, 10^{-4} molar.

The resonance saturates easily, and the V-4500-41A low-high power bridge was therefore necessary to permit observation at 30 db attenuation of the klystron power (0.20 mw at the sample). All lines are 60 milligauss peak-to-peak, and the line width is independent of temperature. When using 100 kc field modulation one expects resonance sidebands to occur at ± 30 milligauss from the line center, and it is felt that these sidebands determine the observed line width. Work of this type requires good magnetic field