

# AERIAL RADIATION

## *New Measurement Method: Use of Scale Models*

**A**MONG apparatus to be shown at the Physical Society's Exhibition at Imperial College, South Kensington, from April 6th to 10th will be an entirely new device designed to plot, by the use of scale-model aircraft, the radiation characteristics of aircraft aeriels. Made by Ferranti, the equipment is known as "a radiation-pattern recorder."

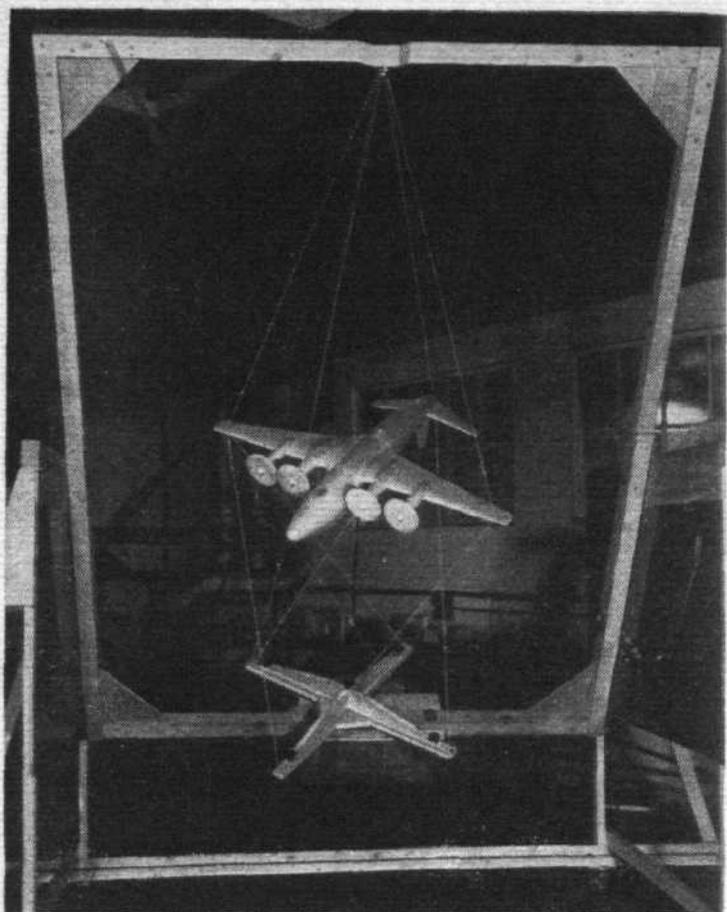
In an aircraft aerial the radiation pattern may be appreciably modified by the presence of the machine itself, especially when the aircraft size exceeds the wavelength. The shape and positioning of the principal components and asymmetry in the fore-and-aft direction all contribute in varying degrees to produce a distorted radiation diagram. Mathematical computation of aerial behaviour thus becomes very difficult. Qualitative forecasts can be made in most cases, but are usually of little value in determining optimum aerial siting for a particular application; only by resorting to actual measurement can any precise picture be obtained.

Experiments on full-scale aircraft, however, are difficult. Measurements made with the aircraft grounded are immediately ruled out, since stray reflections must be avoided and a truly three-dimensional family of radiation patterns is desired. On the other hand, flight tests may be expensive and inaccurate.

The solution to these difficulties, claim Ferranti, lies in the use of models in which both aircraft dimensions and operating wavelength are reduced by the same scaling factor. Experimental conditions can then be controlled with ease, and advantages are gained in compactness, accuracy and cost. By choosing a suitable suspension system, ideal free-space conditions can be simulated.

The radiation-pattern recorder was designed primarily for this purpose, though the apparatus is flexible and may be adapted if required to other problems. As initially developed, the equipment is intended to cater for the aircraft installation of L-band aeriels (30 cm) in connection with the Ferranti-developed D.M.E. By using a scaling factor of 24, the modelling wavelength falls in K-band (1.25 cm) and a typical passenger aircraft has a scaled wing-span of, say, 4 to 6 feet—a convenient size. The yoke suspending the model allows both principal plane (great circle) and small circle patterns to be taken. The model acts as a transmitter, but results thus obtained are, it is stated, equally valid whether the full-scale aerial is to be used as a transmitting or as a receiving element.

The receiver is of the superhet type with an intermediate frequency of 45 mc/s. The recorder can be used over a wide range of wavelengths by changing either the scaling factor or the receiver



*Method of suspending test-model inverted in a gimbal mounting.*

head, or both. Also, a stable high-gain receiver becomes permissible. Working range can be made large (up to 1,000 wavelengths at K-band) despite limited transmitter power. Thirdly, a piston attenuator can be introduced. This provides a high degree of accuracy and a power scale which is linear in db.

The recording equipment consists essentially of two separate servo-mechanisms. The first, the rotational system, produces motion of the plotting table in sympathy with the remotely controlled rotation of the aircraft model. The second, the translational system, determines the deflection of a pen according to the instantaneous value of the power radiated by the aerial under test. Plots may be taken either in Cartesian or polar co-ordinates, for a maximum variation in signal power of 40 db, and for a writing speed normally between 1.5 and 2 min per pattern.

This recorder was developed by Ferranti under M.o.S. contract.

## VERSATILE POWER-SAW

**A**N unusually compact and versatile transportable power hacksaw has recently been produced by the Tungum Sales Co., Ltd., Painswick Road, Cheltenham, Glos. Known as the "Beaver", it has a maximum work-section capacity of  $4\frac{1}{2}$  in for ferrous and non-ferrous metals of any cross-section. Power is supplied by a  $\frac{1}{4}$  h.p. single-phase A.C. 220/230-volt motor driving through a vee-belt, and the supply can be taken from any convenient socket.

The high-speed-steel blade, 12 in long, is relieved of load on the return stroke to save wear. A support-trestle for lengthy material is available at a small extra cost. Dimensions are 20 in x 18 in x 22 in high, and the weight is 92 lb.

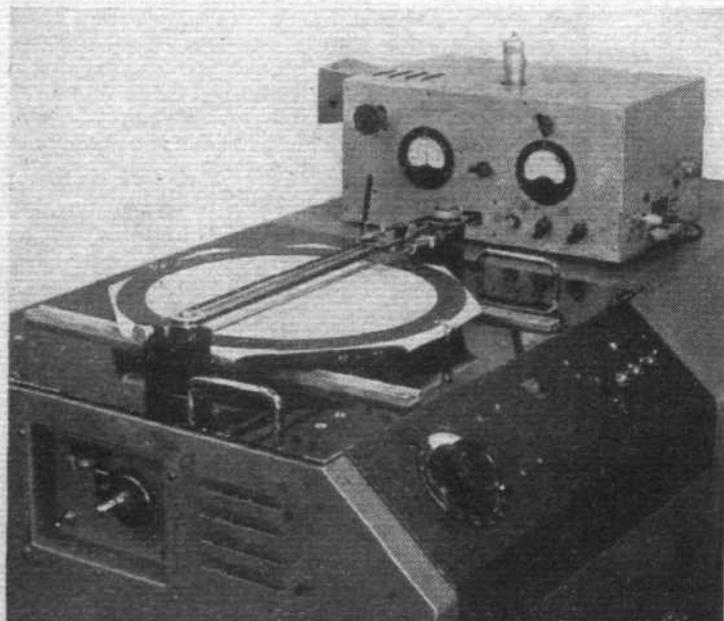
The makers emphasize that the "Beaver" has not been designed for high-speed production, but rather as an inexpensive tool that can conveniently be used in a variety of situations.

## FOR FACTORY EXTENSIONS

**O**RDERS under the expansion programme will mean, for many firms in the industry, a search for increased factory-space, and in this connection one of the products of the structural-steelwork division of Chamberlain Industries, Ltd., Staffa Road, London, E.10, is of topical interest.

It is a steel-framed building designed on the unit principle, so that a single section may be extended in length as and when required by the addition of the necessary number of stanchions, roof-trusses (at 10-ft intervals) and asbestos-sheet walling and roofing.

The roof-spans available are 36ft, 48ft and 60ft, and there is a choice of heights of 12ft, 14ft, 16ft and 18ft. With suitable doors such buildings would make useful hangars for small aircraft.



*Top of the recording unit, showing controls and plotting table.*