

Radar for Air Traffic Control

THE MARCONI COMPANY has applied considerable development effort to the application of radar to modern air traffic control. It has become increasingly obvious that automatic techniques are necessary to handle the density of high-speed air traffic that has built up and presents a problem which modern techniques can assist in solving.

A NEW APPROACH

One of the most urgent problems facing aviation today is the safe and economical control of both civil and military aircraft. Existing procedural methods of control are being increasingly overloaded by mounting speeds and growing numbers of aircraft. The problem is further aggravated by the mixture of jet and piston-engined aircraft on the airways.

The increasing pressure on the controller must be relieved if he is to continue to perform his function properly. Also, the common use of upper air space with the integration of civil and military control means inevitably that automatic data handling must be introduced into control systems.

For many years Marconi's have been engaged in the design and manufacture of radar displays and data handling equipment, primarily for military purposes, and have installed comprehensive control systems in many parts of the world. These advanced and complex schemes are made up of various separate units, many of which can be incorporated in civil air traffic control, or defence systems, to give varying degrees of automation (see page 383).

50 CM RADAR

The merits of the Marconi 50 cm radars are well known and over forty of these radars have been sold for civil air traffic control purposes throughout the world. One of the main reasons for the popularity of this equipment is that the 50 cm wavelength presents an ideal compromise between the need for high definition and long range in adverse weather conditions. Crystal control is used, giving fully coherent MTI. Marconi 50 cm radars give greater range using a relatively low transmitter power, and are unaffected by precipitation. At low elevations, excellent gap-free coverage is provided.

As a result of Marconi's policy of constant research and development, all Marconi 50 cm radars are now fitted with parametric receivers, which give an overall improvement in signal strength

resulting in increased slant range and better probability of paint for the same power output.

Blind-speed fading can in some cases become troublesome to controllers. To alleviate this a p.r.f stagger and discrimination unit has been introduced as an optional extra. This unit, besides eliminating blind speed fading, also reduces interference from other radars working on different p.r.fs.

The advantages of 50 cm radars in air traffic control applications can be summarized as follows:

- (a) That the required cover can be provided by a relatively low transmitter power, which in itself is a trend towards reliability.
- (b) 50-centimetre radar, at the performance levels discussed, suffers little from precipitation clutter and does not require the use of polarizers with a consequent loss of performance.
- (c) Good MTI facility is afforded which is fully coherent for stability and very simple for reliability.
- (d) Excellent cover is provided particularly at low angles of elevation.

In addition to the above, Marconi's philosophy behind the design and manufacture of the 50-centimetre radars is to provide flexibility on the operational side and simplicity on the technical side.

23 CM RADAR

When 50 cm radar does not provide a solution to a specific requirement a shorter wavelength may be preferable. In such cases Marconi's recommend 23 cm rather than 10 cm radar for air traffic control. Elimination of precipitation clutter is necessary at 23 cm, unlike 50 cm, and circular polarization is employed (see page 369).

Single, or back-to-back long-range and high-cover 23 cm systems are available similar to those used in military systems (see page 363). The size and form of the aerial varies according to the cover and beamwidth required.

SECONDARY RADAR

Secondary radar supplements, and in some instances can replace, Primary Radar by automatically and positively identifying aircraft, even under heavily congested traffic conditions. It also permits height information to be acquired from aircraft within its radar coverage.

The Marconi Company and the Compagnie Française Thomson-Houston have jointly designed and manufactured SECAR, a completely new and extremely versatile secondary surveillance radar system to meet all present and anticipated requirements for Secondary Radar (see page 354).

COMPLETE PROJECTS

A feature of the Marconi Company is its ability to undertake complete airport projects, including full data computation and display, communications and closed-circuit television. The Company has become renowned for the expert way in which it handles comprehensive schemes and welcomes enquiries on projects of all sizes.



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Two Marconi 50 cm Radars Type S264A, together with eighteen fixed-coil displays and associated equipment are installed at the Brussels National Airport, Belgium.



X1136

A prototype Distance-from-Threshold Indicator Type 3004 being used at London Airport (Heathrow)