

BUILDING BLOCK RADAR

—meets today's needs

The changing pattern of air traffic control over the past twenty years has demanded new forms of radar equipment. With the increase in air charter flights and air-freight, the volume of traffic has outstripped the rate of fitting airports with ground-based types of navigational aids.

Today the successful radar manufacturer must foresee market trends, and design his product well ahead of demand. The Marconi Company has therefore developed a 'building block' radar system, comprised of separate elements which can be applied to meet numerous requirements.

J. W. Sutherland, Manager, Radar Division, describes this revolutionary new Marconi system.

RADAR HAS developed rapidly since its birth in the mid-1930s, and ground radar has developed in two ways: for air defence, and for civil air traffic control.

Many large airports now are equipped with airways surveillance radar systems. Marconi's, supplying a substantial number of this equipment in Britain and elsewhere, have amassed considerable experience in air traffic control techniques.

Requirements in the military and civil fields are changing rapidly, and a completely new approach must be made. In civil aviation the recent rate of air traffic expansion (due particularly to the increase in charter flights and air-freight) has far outstripped the rate of fitting airports with radar and other types of ground-based navigational aids.

The successful radar manufacturer must be able to foresee market trends, and to design and develop equipment to satisfy them, well ahead of demand.

It is against this backdrop of experience that the Marconi S600 series of radar equipment has been formulated. Its fundamental aim is to provide a number of basic compatible radar elements from which it is possible to build up radar systems to meet practically every operational requirement. The system can be applied in the static military role for early warning, general air surveillance, control of fighters, control of guided weapons, coast watching or military air traffic control.

In the tactical military application, similar functions can be performed by equipment which can be



helicopter-lifted, carried by transport aircraft, or towed across country. Other versions can be fitted in warships. For civil air traffic control installations the S600 series can be used both for airways surveillance and terminal area applications.

In the S600 series, maximum performance has been achieved at minimum overall expenditure, an expression which covers not only the capital outlay for the equipment, but also the total cost of operating, maintaining and sustaining the service of the equipment throughout its life. Thus, high reliability, ease of maintenance, and operation with minimum numbers of men, all contribute to overall cost effectiveness.

Secondly, the intrinsic radar problem of 'clutter suppression' has been tackled in a new and fundamental way, and excellent results achieved. The received signal in a radar equipment not only, contains the 'echo' or 'return' from the wanted target,



A transmitter for the S600 series radar being tested in High Voltage Laboratory, Baddow

A new concept in radar—a complete station in transportable sections. This model shows a surveillance system including secondary radar, a height-finder and a data-handling cabin





This is the 1MW, S-band (10 cm.) transmitter/receiver S2010 for use with the S600 series radar in either static or mobile roles. Panels have been removed to show the modulator and R/F units. It is the prototype of one of four types of transmitters of different power and frequency supplied for the series, production modules of which are now being built. The L-band transmitter, S2011, is half the volume of the former transmitter capable of the job, and its weight has been very much reduced. Two types of the transmitters have new tuneable, vapour-cooled magnetrons, developed by English Electric—another Marconi first

but also reflected signals from fixed objects such as buildings, trees, mountains, waves and precipitation.

In the past, some measure of discrimination has been possible by examining the difference between the moving target and the fixed clutter—a technique known as 'moving target indication' (MTI). In the S600 series, MTI techniques have been embodied in the design of the transmitters from the outset;

all the phenomena which have degraded MTI performance in the past have been remedied. The result is clutter suppression of an order never previously achieved.

Thirdly, 'reliability' has been pursued through the whole design of all elements. Solid state devices, including microcircuitry, are used throughout the transmitter-receiver except for the output valves.

Finally 'flexibility' has been achieved by the building brick approach to the design. A very simple system can be formed from a small number of basic elements; by adding to this nucleus, more sophisticated facilities and higher performance can be achieved, ending with a comprehensive radar system with maximum capability.

A wide variety of aerials can be used with transmitters in the static and mobile/transportable role. For example, in static applications a number of

New TV test gear

M.I. HAS RECEIVED a £40,000 order from the G.P.O. for television transmission test equipment. The instruments, sixty-five Sine-Squared-Pulse and Bar Generators, TF2905/6, will be used for testing the transmission quality of communication links in conveying colour-television signals.

The TF2905/6 is part of a new and comprehensive range of television transmission measuring equipment, with units suitable for all colour and monochrome systems. The Company expects to capture a significant share of the rapidly growing, world-wide market for such equipment, worth several million pounds.

This equipment created a large amount of interest to technical visitors when it was shown at the first International Broadcasting Convention. It was also featured at a private exhibition held by M.I. in the Kensington Close Hotel, London.

These instruments, the widest range of fully compatible television transmission test gear, can be built up into composite test assemblies. New instruments in the range include: Sine-Squared-Pulse and Bar Generators for monochrome and colour; a test set for luminance/chrominance gain and delay inequality measurements on colour-television links; blanking and sync mixers enabling



The M.I. colour and monochrome television transmission test and other new equipment created considerable interest at the first International Broadcasting Convention. Discussing some of the equipment are (left to right) C. N. E. Woodley, Publicity Manager; John Akam, Technical Representative; and Joe Tripp, Senior Sales Engineer, Sanders Division

sweep or video test waveforms to be superimposed on studio blanking and sync pulses.

These are complemented by existing M.I. equipments, including the extremely successful television transmitter sideband analyser and the 20MHz sweep generator.

45-foot (14-metre) and 30-foot (9-metre) aperture aerials have been designed to operate at S-band and L-band, both singly or back-to-back. Aerials of 18-foot (5-metre) aperture are available at L-band and S-band for static or mobile and transportable requirements; the C-band transmitters are used with two sizes of height-finder aerial, which again can be used in either static or mobile transportable configurations.

Finally, at 50-centimetre wavelength, there are two aerials of 52-foot (16-metre) aperture for operation in air traffic control.

Associated with the data acquisition elements of the S600 series, display data handling and communications facilities are provided to complete the overall operational package.

High definition 12-inch (30-centimetre) and 16-inch (40-centimetre) radar displays are so

engineered that they can be built up into several different arrangements and provided with many operational facilities to suit particular needs. The whole system is adaptable in the numbers of displays fitted and the facilities available with each. The data-processing component of the system is based on the Marconi Myriad high-speed on-line computer, with storage capacity appropriate to the particular requirement.

To complete the display and data handling complex, flexible electronic data displays are used to assist the operators in their functions, and to provide a rapidly assimilable presentation of information to the operational staff.

The high performance, cost effectiveness, and complete flexibility of the Marconi S600 series make it attractive for almost every radar requirement. It has an enormous export sales potential.