

Marconi 10 and 23 cm-band Long-range Surveillance Radars ($2\frac{1}{4}$ MW)

Radar has now become the most important element in early warning and air traffic control systems. It is therefore vitally important that it should be both efficient and reliable.

The ideal standard is the supply of an unbroken sequence of precise and unambiguous information within the required radar cover. The solution to the radar problem, however, is of necessity a compromise and cannot always be embodied in a single equipment operating at one frequency.

Operational results will depend upon the choice of parameters, each of which places emphasis on different requirements.

The Marconi range of high-power search radars is both highly efficient and very flexible.

FEATURES

(a) Standard

Very high power; $2\frac{1}{4}$ megawatts from transmitters of advanced design.

Wide range of cover can be obtained by using back-to-back systems with two aerials on one mounting, thus avoiding

expensive synchronous turning gears.

Single-way systems can also be supplied.

Independent 10 cm and 23 cm-band transmitter/receivers are used. They are very similar in design, using many common units and thereby minimizing the necessary spares-holding.

An advanced, built-in automatic monitoring system provides continuous display of transmitter standing-wave ratio, peak power and receiver noise factor.

Logarithmic and linear receiver outputs are available, with pulse-length discrimination and signal processing.

(b) *Optional*
Unattended operation and full remote control.

Stand-by transmitter for each frequency so that the radar can be fully operational in spite of the carrying out of servicing routines on the two main transmitters. To this facility can be added that of local or remote control of switchover to main and stand-by transmitters.

Circular polarization can be provided. This

may be switched in or out by electrical actuators.

MTI, P.R.F.S tagger, Pulse Discrimination and Doppler cancellation facilities are available.

Equipment

Transmitter/receivers

The 10 cm and 23 cm-band transmitter/receivers (Type SR 1000, SR 1030, S 2011 and S 2012, see page 381 and 369) are rapidly becoming recognized throughout the world as leading design achievements.

These transmitters are completely self-contained air-cooled cabinet equipments of remarkable compactness. As well as containing the complete transmitter and receiver they incorporate a comprehensive automatic control and monitoring system which excludes the need for external test gear and enhances efficiency and speed of maintenance.

The magnetrons employed deliver outputs from 2 to $2\frac{1}{2}$ MW.

Aerial system

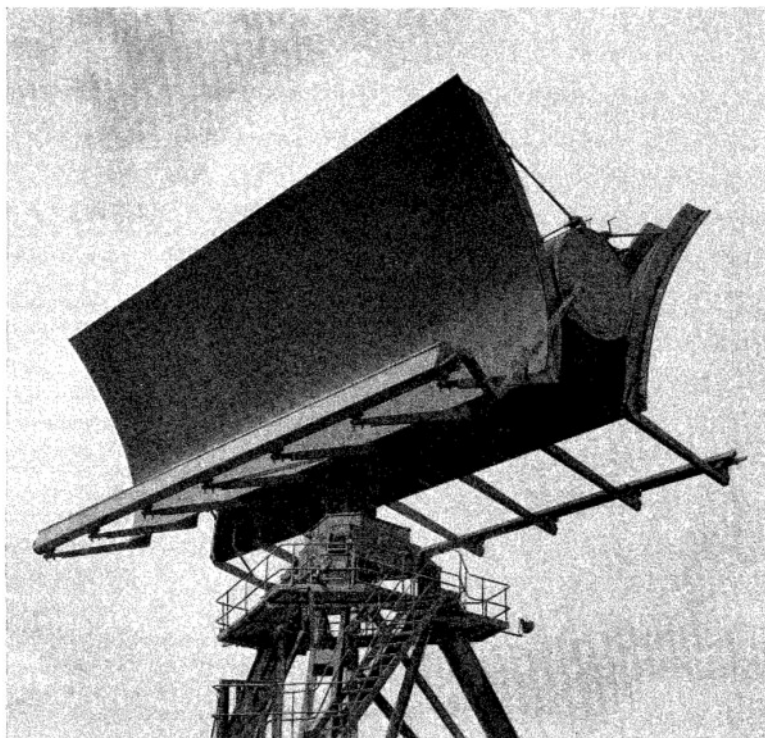
The use of a linear-fed aerial system has been decided upon as most suitable, after considerable experiment. The reflector structures, being straight in one plane, permit a high degree of precision in manufacture and easy checking of contours. They also lend themselves readily to adjustment in length for regulation of the cover requirement.

The reflector system is made up of sections 7 ft 6 in. (2.25 m) long. The sections are of extremely rigid, lightweight, honeycomb construction. This presents a considerable advantage in the event of damage, as the effect is confined to the immediate vicinity of the impact and is not spread throughout the structure. Moreover the damaged area can be easily patched *in situ*.

The reflectors may be of either the parabolic or cosecant-squared type, and the vertical aperture is 15 ft (4.5 m). The required number of sections are assembled together by bolting.

The support frame for the sections consists of a steel tube 7 ft (2.1 m) in diameter. This is also made of sections according to the required length.

Each section of the reflector is attached to and supported on the tubular frame by upper and lower fixings. These are arranged such that the lower fixing forms a pivot to permit tilt adjustment. The adjustment is effected by means of warwick screws, which form the upper supports. The warwick screws are mechanically linked to a single



9119

control, operated by motor drive. Control of this motor may be removed if desired.

The tubular support is attached centrally to a lattice steel mounting frame by means of which the aerial assembly is fitted to the pivot mount.

Thus an aerial reflector assembly of 30, 45 or 60 ft (9, 13.5 or 18 m) can be made. Existing installations can be modified to conform to new requirements.

The offset feed consists of an edge-slotted waveguide, carried in a flare to provide the correct illumination of the reflecting surface.

The feed is weather-protected by a glass-fibre cover and is rendered air-tight by means of a Neoprene/glass-fibre sheet, fitted under the glass-fibre cover.

The length of the feed varies, of course, according to the horizontal aperture size. The feed assembly is carried by boom arms extending from the reflector framework. On the same tubular mounting it is possible to assemble two reflectors back-to-back. Single systems can also be provided and it is a

comparatively simple operation to convert an existing single radar head into a back-to-back system.

The range

A wide variety of combinations is possible, but the following are the standard designs:

Radar Type No.	Aerial System	Wave-length
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Single-beam radars

S 255	45 ft Cosec ²	23 cm
S 319	60 ft Cosec ²	23 cm

Back-to-back radars

S 247/S 266	{ 45 ft Parabolic	10 cm
	{ 45 ft Cosec ²	23 cm
S 265	{ 45 ft Parabolic	10 cm
	{ 45 ft Cosec ²	10 cm
S 300	{ 45 ft Parabolic	23 cm
	{ 60 ft Cosec ²	23 cm
S 316	{ 60 ft Cosec ²	23 cm
	{ 45 ft Cosec ²	10 cm
S 320	{ 45 ft Parabolic	23 cm
	{ 45 ft Cosec ²	23 cm

DATA SUMMARY

Frequency range: 10 cm-band 2700–2900 MHz, 2900–3055 MHz. 23 cm-band 1295–1365 MHz.

Peak power output: 2 to 2½ MW.

Pulse: Standard pulse length 5 μs at p.r.f up to 300 p.p.s. Other combinations to special order.

Trigger: Positive pulse or internal generator.

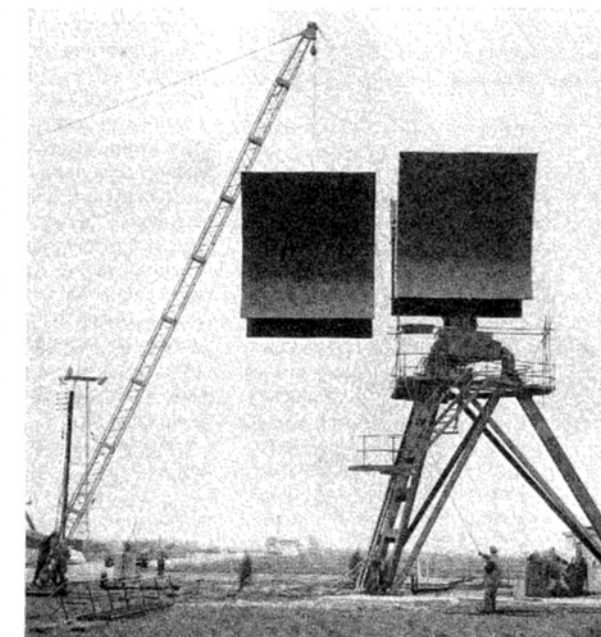
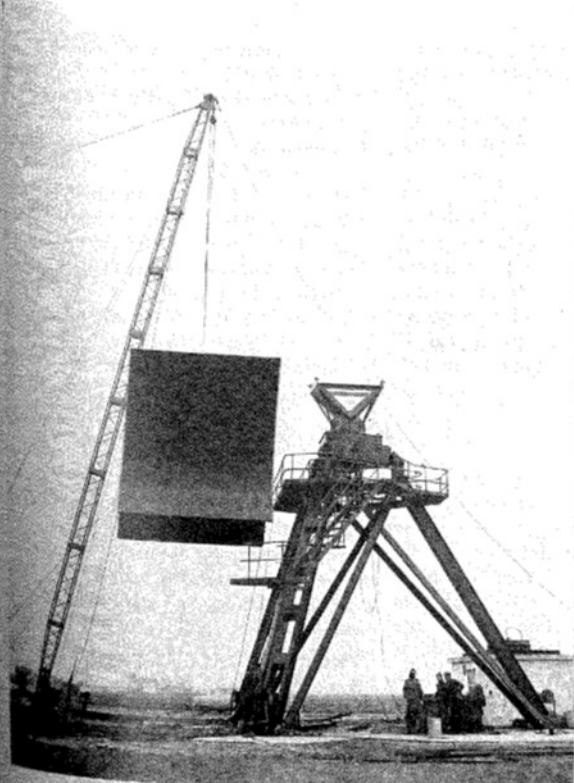
Receiver overall noise factor (max.): 10 cm-band and 23 cm-band 4.5 dB.

Receiver bandwidth: 0.4, 0.7 or 1 MHz.

Output: Logarithmic and linear outputs available, maximum video output 5 V from each.

Aerial system: Horizontal beamwidth (45 ft): 10 cm-band, 0.5°; 23 cm-band 1.1°. Side lobes: 22–25 dB down on main lobe. Max. angle cover of complete system: up to 45°.

Prefabricated construction greatly facilitates assembly, repair and maintenance



8430

8429

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