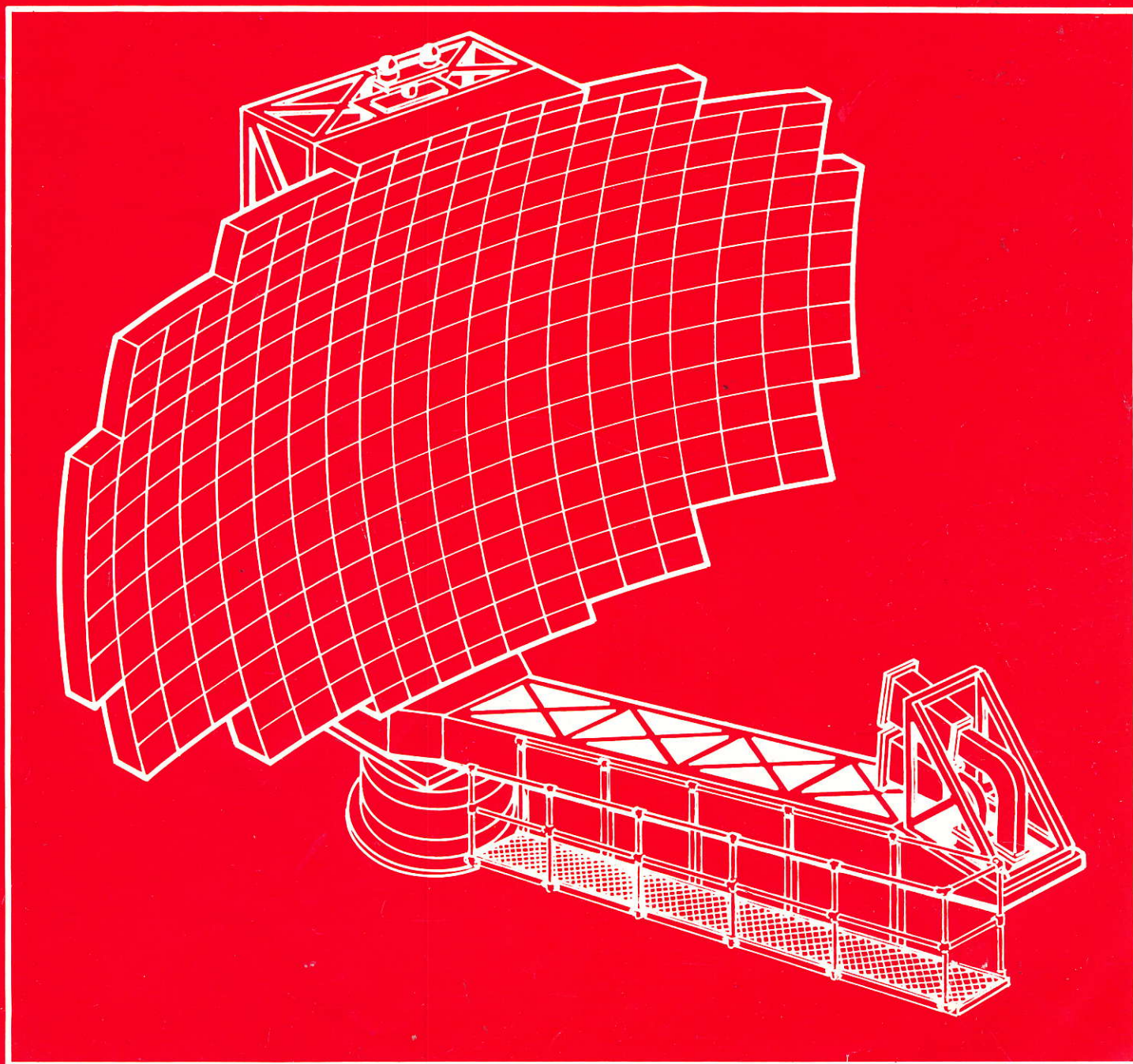


AIR TRAFFIC
CONTROL
SYSTEMS

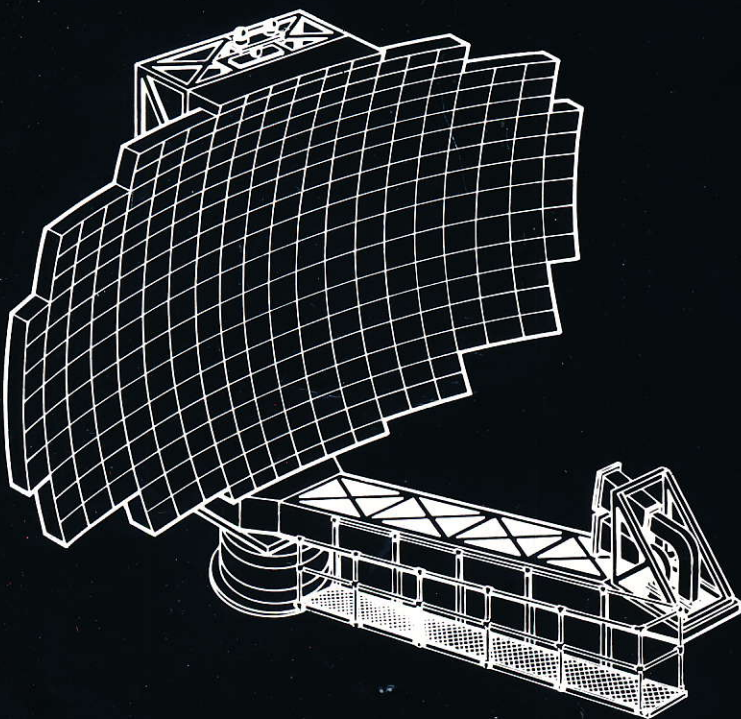
**Marconi
Radar**

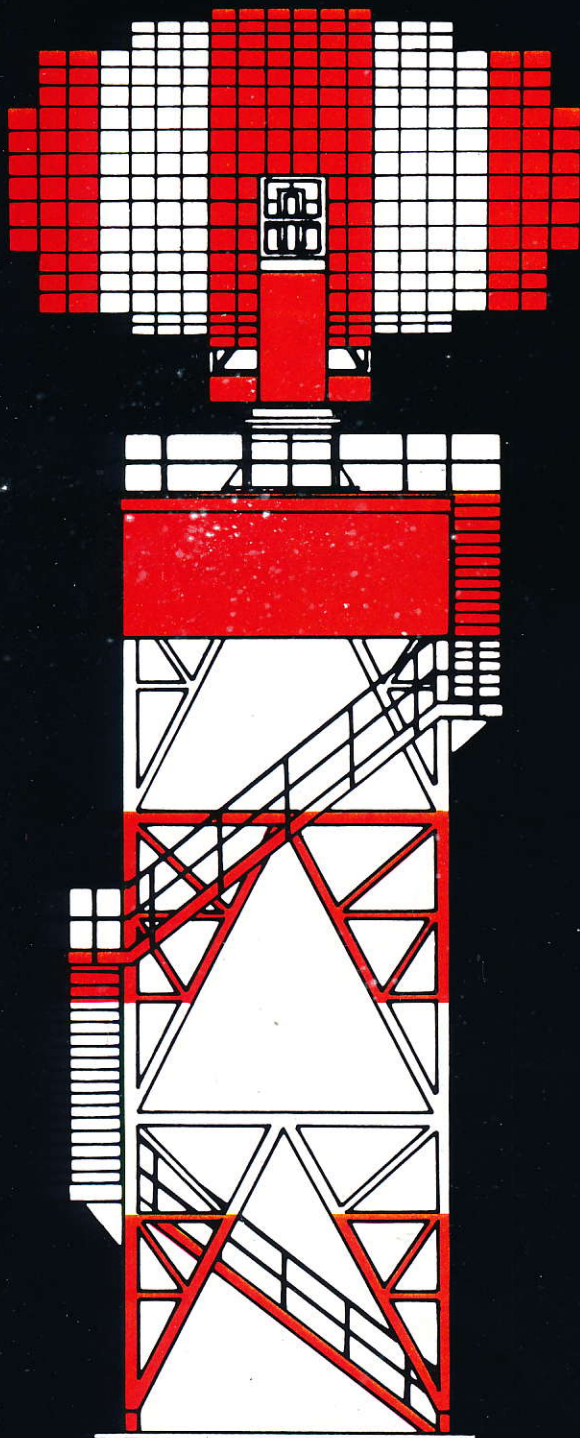
TAR S513



S513 23cm band Primary Surveillance Radar Systems

- Major advances in performance, reliability and economy.
- Single channel or dual-diversity systems.
- Dual-beam.
- High environmental tolerance.
- Reliable, two motor turning gear.
- Solid-state, low-voltage modulator.
- Excellent clutter performance.
- Adaptive signal processing.
- Maximum operational availability.
- Fail-soft design.
- Long M.T.B.F.
- Minimum routine maintenance.
- Simplified fault finding for improved M.T.T.R.
- Standard tower available.





S513 23cm band Primary Surveillance Radar

The Marconi Radar S513 23cm band radar system is designed to meet the approach/departure and terminal area control requirements of air traffic control authorities world-wide.

Employing a rugged dual-beam antenna, a stable and reliable transmitter-receiver and the advanced S7113 adaptive signal processor, the S513 system achieves the maximum availability of wanted signals in all types of competing clutter, both fixed and moving.

Antenna

The double curvature antenna is formed from perforated aluminium alloy sheets, mounted on a rigid back structure. Provision is made for the fitting of any type of SSR antenna currently visualized.

A dual corrugated horn feed produces main and auxiliary beams for the receive function, giving significant reduction of ground clutter returns. This composite horn system enables a change of gain to be provided in the region of 0 to 3 degrees of elevation, supplying a greatly improved target-to-angle and ground clutter ratio within the radius of 30 miles (48 kilometres) from the radar, the area in which clutter is the most troublesome. Circular polarization is fitted, for the reduction of weather clutter.

The main horn assembly is fitted with an orthogonal mode transition, separately used to detect weather returns. Subsequent processing derives weather contouring for displays. The use of circular polarization, with the facility for receiving cross polarized signals, ensures that the required target and weather information is available without operator intervention.

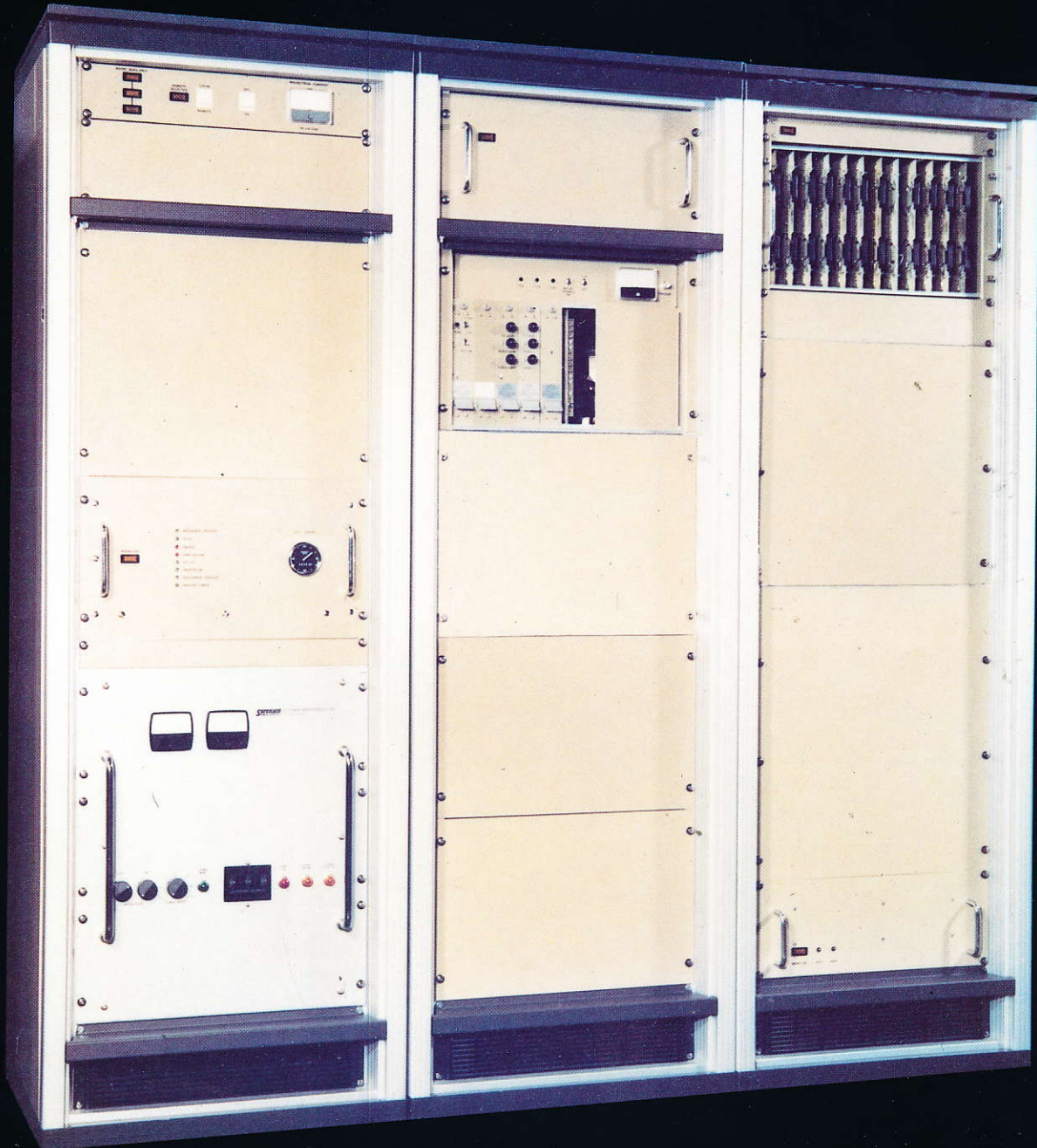
The antenna turning gear has a design life of 20 years and is fitted with dual drive motors.

Provision is made for single motor operation. All maintenance is carried out within the servicing enclosure.

Tower

The antenna tower, available in a range of standard heights, incorporates an enclosed servicing platform. The tower rigidity permits monopulse SSR accuracy to be maintained.

Transmitter-receiver Type S2027



Transmitter-receiver

The transmitter-receiver is a high technology design, with reliability enhanced by the low electric stress within the transmitter. The all-solid-state modulator uses twelve individually fused modules in parallel. 'Fail-soft' operation contributes to the high figure of mean-time-between-failure achieved by the unit.

Particular attention has been given to the output tube reliability and in this respect a predicted life of over 15,000 hours results from state of the art design. Overall system stability is maintained at a high level permitting an MTI improvement factor of 48 dB.

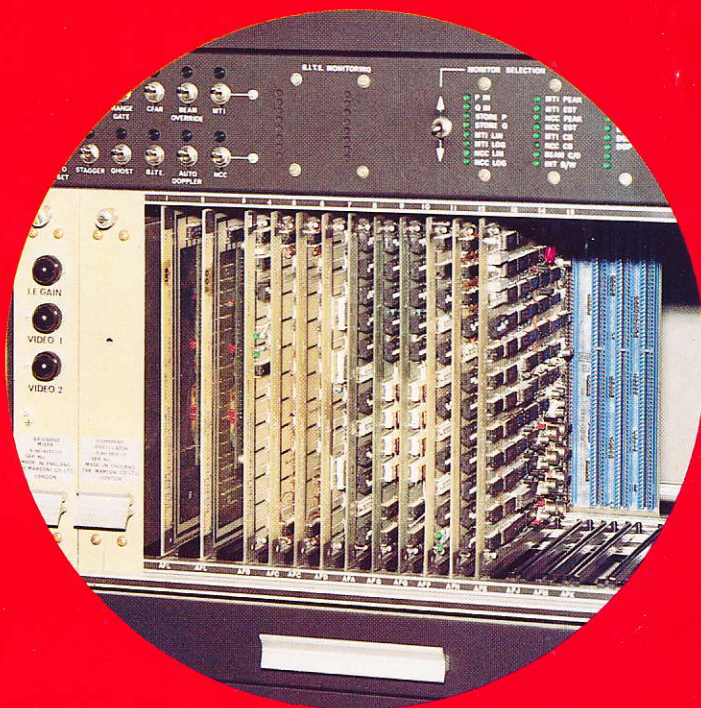
Remote control

Where required, remote control is achieved by using a telemetry system to multiplex signals on to common cables between the radar head and a remote control and monitor panel.

Signal processing

Features

- Parallel processing
- Four pulse static clutter canceller
- Time varied weighting
- Four pulse adaptive moving clutter canceller
- Tangential target detection channel
- Temporal CFAR thresholding on all outputs
- Range azimuth beam encoding map
- De-stagger
- Trigger generation
- IF or baseband inputs
- Internal off-line monitoring (on-line, IEEE bus)
- Test signals available on receiver system
- Weather processing
- Automatic switching between antenna beams
- Pulse repetition frequency discrimination
- Video combining circuits
- Sliding window range correlator



S7113 Signal processor.

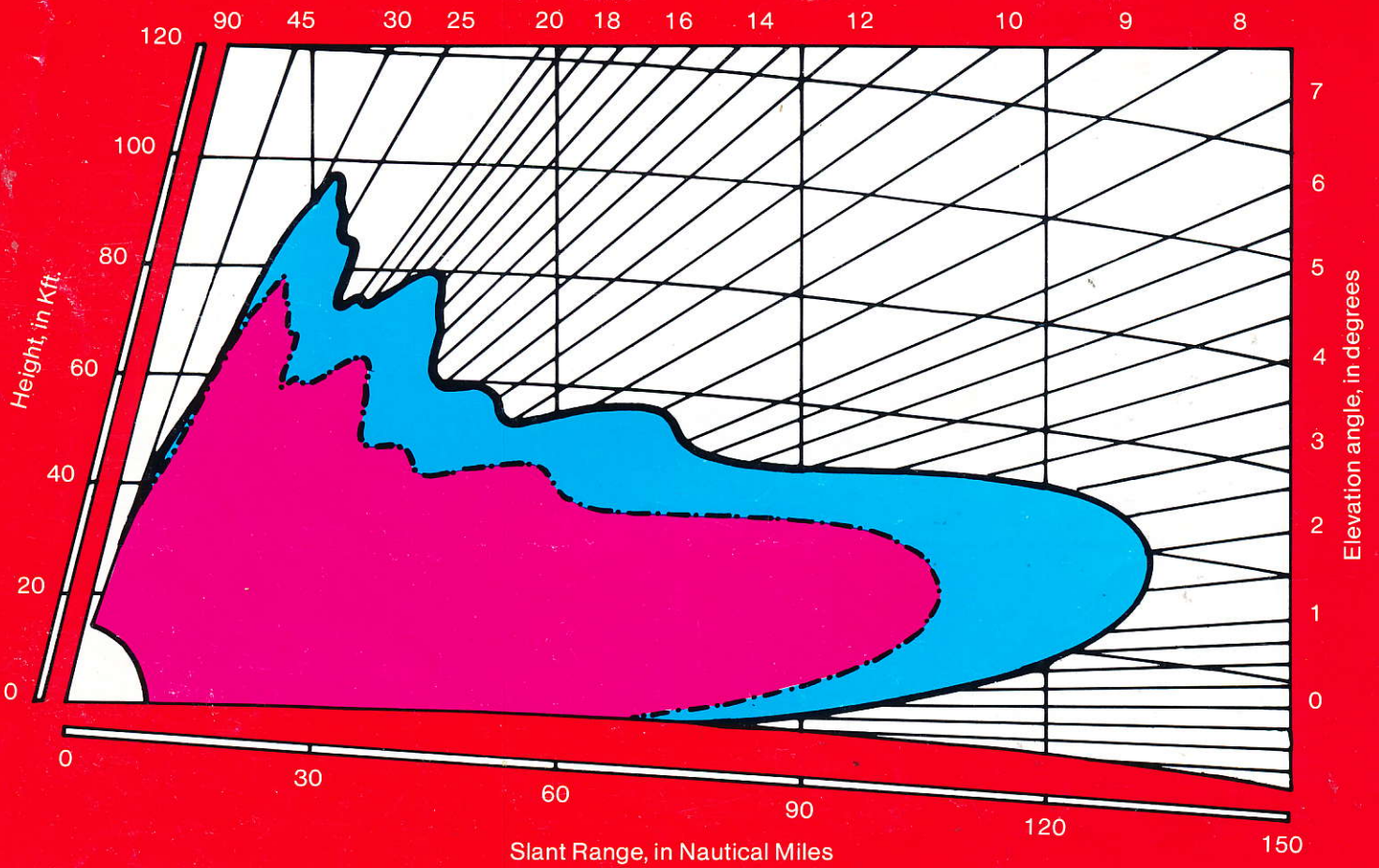
The adaptive signal processing is designed to ensure that track quality for wanted targets is maintained under all radar clutter conditions. The processing technique also has significant advantages in respect of reduced complexity.

Multi-staggered p.r.f.'s ensure a first blind speed well in excess of current aircraft speeds. Optimum target detection is attained by a combination of coherent and non-coherent techniques. Temporal integration and threshold techniques are applied to all outputs in each processing channel, resulting in very low false alarm rates and noise free signals.

The signal processor comprises four discrete channels. The first is an MTI processor consisting of a four pulse canceller with time-varied weighting. The second processes non-doppler conscious signals (non-coherent) allowing targets to be detected down to zero velocity

where super-clutter visibility exists. The third channel provides sub-clutter visibility over both fixed and moving clutter. The fourth channel comprises the weather processor, included to provide indication of the presence of weather precipitation. In this case a special filter is used to reduce losses at near zero radial velocities and the detected weather video path includes a de-stagger facility before its amplitude is sensed. Two preset adjustable thresholds are provided for low and high precipitation intensity indication.

In the S513 system, the signal processor dynamically controls the beamswitch, normally selecting the main beam in areas where the clutter dynamic range does not exceed the signal processor's input signal requirements. Excessive clutter dynamic range automatically selects the auxiliary beam input, thereby improving the target to clutter ratio.



— 5m² target
 - - - 2m² target
 80% probability

Specification

Frequency band	1250 to 1365 MHz (tuneable)
Transmitter	Peak power 850kW. Pulse length 1.5μ nominal. PRF 650p.p.s.
Receiver Noise Factor	2.5 dB.
Antenna	Rotation speed 12 r.p.m. Gain 33.5 dB. (Main beam) 31.0 dB. (Auxiliary beam) Horizontal beamwidth 1.7°

This document gives only a general description of the product(s) and shall not form part of any contract. From time to time changes may be made in the product(s) or in the conditions of supply.

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