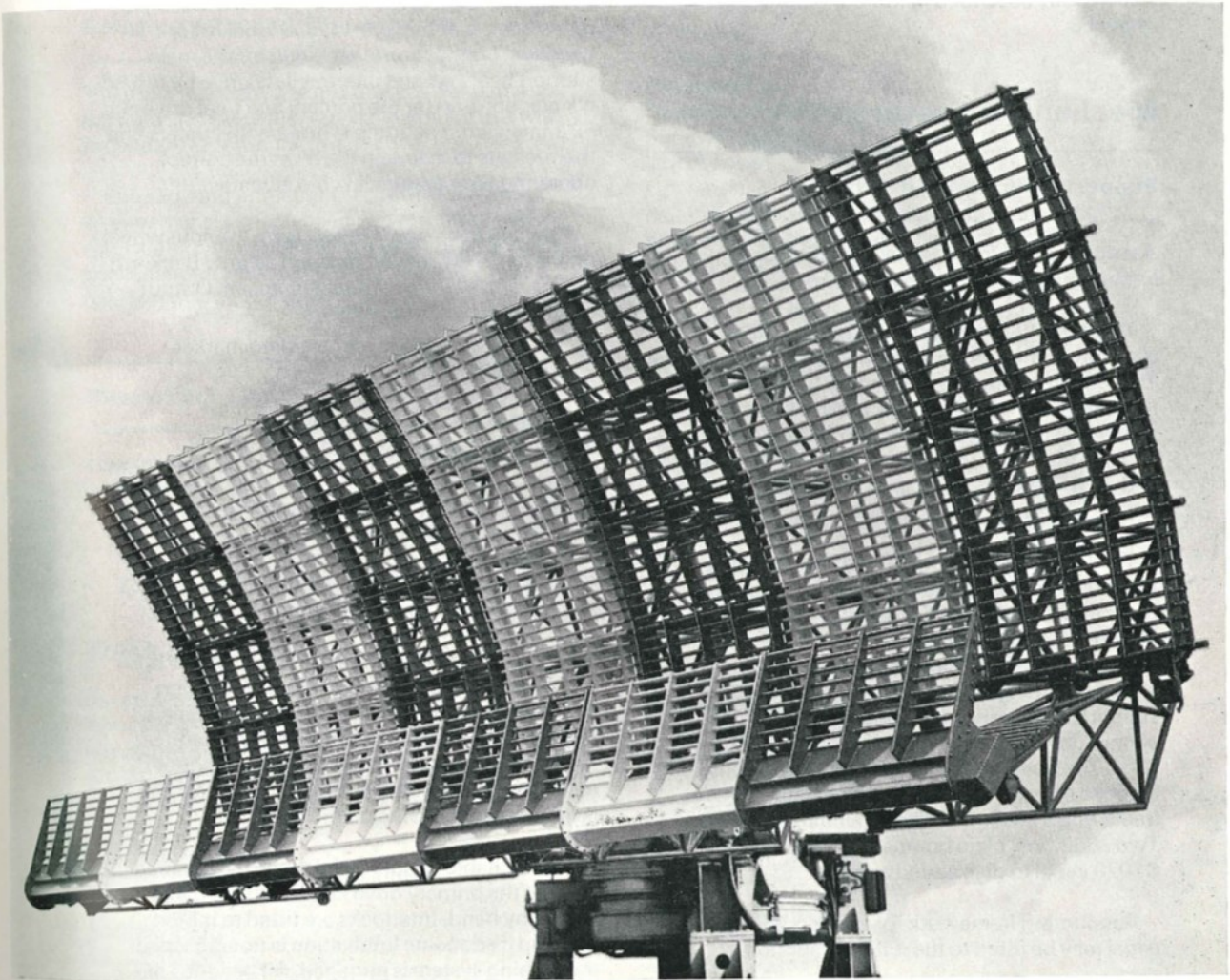


Marconi Radar Data Sheet A10

50cm Band Surveillance Aerials

Type S1050—Reflector size 52.5 feet by 13 feet
Type S1055—Reflector size 52.5 feet by 14 feet
Type S1070—Reflector size 67.5 feet by 13 feet



Frequency band 580 to 610MHz

High turning rates

Different versions for different
ATC applications

The Marconi Surveillance Aerials Type S1050, S1055 and S1070 operate at a wavelength of 50cm and cover the ATC requirements for terminal area and en route surveillance in Radar Systems Type S650 and S670. They comprise a single curvature reflector, fed by an off-set linear feed, mounted on a dual-speed turning gear with data takeoff. The S1050 and S1070 are parabolic in profile while the S1055 reflector is shaped to give high cover. The aerials are used with the Marconi 500kW 50cm Band Transmitter/Receiver Type S2020 which is fully described in Marconi Radar Data Sheet B5. Turning Control is by Aerial Alternating Current Controller Type S6014, fully described in Marconi Radar Data Sheet E3.

Mechanical Features

Support Structure and Reflector

A mounting platform carries the reflector framework and feed support booms.

The mounting platform consists of a steel structure having three arms spaced at 120 degrees. The reflector framework is carried by hinge pins, mounted on two of the arms, and an adjustable screw foot mounted on the third. This provides variable tilt, shown on a scale, between -1 degree and +10 degrees (+1 degree and +12 degrees for the S1055).

The reflector is built up from seven sections (nine on the S1070), each consisting of rows of horizontal circular-section aluminium tubes 38mm (1½in) diameter spaced at 102mm (4in) intervals. These are carried on four sheet aluminium flanges riveted to brackets on the support framework, also constructed from aluminium tube. Each section is 2.3m (7ft 6in) wide. The outer and two intermediate sections carry the feed support booms, which are lattice frameworks constructed from aluminium tubes. Two additional plain booms are fitted on the S1070 aerial to give added support.

A mounting framework for a secondary radar aerial may be fitted to the reflector support.

Reflector sizes are given in the Data Summary section of this Data Sheet.

Turning Gear

The full-fit turning gear is capable of driving the 16m (52ft 6in) aerial at the maximum rotation rate of 15 rev/min in a sustained wind speed of 63 km/hr (34 knots) in typical conditions.

The pedestal is fabricated from welded mild steel and carries the drive motors and gear-boxes, the main support bearing, the data gear-box and an optional inching drive.

One or two single or dual speed 20/40 hp a.c. motors are used depending on the load

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requirements. Two 40 hp motors are required for the S1070 which has a rotation rate of 7.5 rev/min only.

Each motor drives through a primary drive, using a single worm reduction, an intermediate drive using a single reduction gear, and a final drive, using a spur pinion meshing with a spur wheel on the aerial drive tube. On the S1050 and S1055 alternative ratios are used in the primary drive, to provide rotation rates of 5 and 10 rev/min or 7.5 and 15 rev/min for either a 50 or 60Hz power supply.

The main support assembly for the aerial drive tube consists of two pre-loaded taper roller bearings. Lubrication is provided for the main support bearings and intermediate drive by forced oil injection and for the primary and final drives by oil immersion. The sump is fitted with heaters and thermostats to maintain the oil at the correct operating temperature, in cold climates.

The data gear-box is driven from the spur wheel on the aerial drive tube, through an anti-backlash pinion. The bearings are sealed for life. Output shafts are provided as follows:

- 1) 1 : 1 for auto-align and heading marker contacts
- 2) 1 : 1 for 3-inch mag slip or sine/cosine potentiometer
- 3) 30 : 1 for Selsyn type 1813 or 1406.

Note:
Outputs 1) and 2) are of high accuracy, suitable for a digital encoder.

As options, a 10 : 1 shaft may replace the 30 : 1 shaft and three extra 1 : 1 shafts may be fitted.

The optional inching drive consists of a 1 hp a.c. motor driving through a single reduction gear-box to the main drive wheel, providing a rotation rate of approximately 0.3 rev/min. A mechanical clutch allows the inching drive to be disengaged during normal operation and is interlocked with the main drive.

A detachable handle fitted to the high-speed shaft of the primary drive enables the aerial to be turned by hand. Interlocks are fitted to inhibit start-up if adequate lubrication is not present or the inching system is engaged. All bearings are sealed against oil leakage and ingress of dust and moisture. Corrosion-resistant finishes are used throughout the equipment.

Electrical Features

Feed

The feed is built up from seven sections of aluminium waveguide (nine sections for the S1070), edge-slotted in the narrow face and set in a flare constructed from aluminium tubes to ensure correct illumination of the reflector.

To obtain good sidelobe performance, flanges are fitted between the slots to prevent aberrations

due to the joints between sections, and vertically polarized radiation is absorbed by loaded dipoles located in the flare aperture.

The waveguide radiator is fed by an air-spaced coaxial feeder and terminated by an open radiating load.

A fibreglass window covers the slotted face and open end to provide weather protection. Dry air is blown through the complete feed and waveguide assembly.

Rotating Joint and Slip-ring Unit

The triple rotating joint has one coaxial path for the feed and two other coaxial paths for use with a secondary radar aerial.

The slip-ring unit, together with either four screened or six unscreened ways, is fitted below the rotating joint, providing a path for a secondary surveillance aerial switching pulse and connections for the obstruction lights.

Obstruction Lights

Twin obstruction lights are fitted to the top of the reflector.

Data Summary

Frequency band:

580–610MHz.

Horizontal beamwidth:

S1050 and S1055:

2.1° at half-power points

S1070: 1.7°.

Side-lobe level:

–24dB with respect to main lobe.

Gain:

S1050: 31dB

S1055: 30dB

S1070: 32dB.

Polarization:

horizontal.

Tilt:

S1050 and S1070: –1° to +10°

S1055: +1° to +12°.

Turning Gear

Motors:

S1050 and S1055:

1) One or two 20/40 hp dual speed.

2) One or two 40 hp single speed.

S1070: Two 40 hp single speed.

Rotation rates:

Operational S1050 and S1055:

1) 5 and 10 rev/min.

2) 7.5 and 15 rev/min.

Operational S1070: 7.5 rev/min.

Inching: 0.3 rev/min.

Data takeoff:

- 1) 1 : 1 for auto-align and heading marker contacts.
- 2) 1 : 1 for 3in mag slip or sine/cosine potentiometer.
- 3) 30 : 1 for Selsyn type 1813 or 1406.

} Standard

- 1) 10 : 1 replacement for 30 : 1.
- 2) 1 : 1 –3 extra.

} To order

Environment

Temperature:

Operational: –30° to +50°C.

Survival: –40° to +65°C.

Relative humidity:

100% below 30°C.

53% at 40°C.

32% at 50°C.

Pressure:

Operational: 750mb.

Survival: 420mb.

Wind speed:

Operational:

dependent on speed of rotation and number of drive motors fitted. Typical figures for 380V operation at 30°C are:

| Motors | Aerial Speed rev/min. | Sustained Wind Speed (knots) |
|--------|--------------------------|---------------------------------|
|--------|--------------------------|---------------------------------|

S1050 and S1055

| | | |
|---|----|----|
| 1 | 10 | 33 |
|---|----|----|

| | | |
|---|---|----|
| 1 | 5 | 65 |
|---|---|----|

| | | |
|---|----|----|
| 2 | 10 | 63 |
|---|----|----|

S1070

| | | |
|---|-----|----|
| 2 | 7.5 | 54 |
|---|-----|----|

Survival: 227km/h (120 knots) with iced reflector.

Ice coating:

Operational: 4.8kg/m² (1lb/ft²).

Survival: 19.2kg/m² (4lb/ft²).

Dimensions

Reflector height:

S1050: 3.97m (13ft)

S1055: 4.32m (14ft)

S1070: 3.97m (13ft)

Reflector width:

S1050: 16m (52ft 6in)

S1055: 16m (52ft 6in)

S1070: 20.57m (67ft 6in)

Overall height:

(from base of pedestal)

S1050: 5.78m (19ft)

S1055: 6.1m (20ft)

S1070: 5.78m (19ft)

Overall width:

(including feed assembly)

S1050: 16.46m (54ft)

S1055: 16.4m (54ft)

S1070: 21.1m (69ft)

Overall depth:

(including feed assembly)

S1050: 4.42m (14ft 6in)

S1055: 4.42m (14ft 6in)

S1070: 4.42m (14ft 6in)

Weight:

(including turning gear):

S1050 and S1055:

11500kg (25300lb).

S1070:

12000kg (26600lb).

The information given herein is subject to confirmation at the time of ordering.

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