

Marconi S 600 Series Signal Processing Type S 7005

The S 600 series employ a number of highly sophisticated signal processing techniques all of which are built in solid state. Integrated circuits are used in places to provide high stability, high reliability and high performance. The suppression of clutter using this signal processing equipment is superior to any previous radar system of comparable cost to the S 600. The basic receiver includes a logarithmic amplifier and a Pulse Length Discriminator. This effectively removes clutter from the display and allows targets in the clutter which are larger than the clutter to be seen. In addition the following signal processing facilities can be provided, double cancellation M.T.I, p.r.f stagger and discrimination, and a further section has been developed to give Doppler compensation.

Construction

The equipment consists of a basic light-weight framework, made from P.V.C clad aluminium sheet, mounted on a strong supporting plinth. Housed in the plinth are a

cooling fan, the power distribution controls, interlocks, and a 24 volt relay power supply. The electronic components are housed in three 'vertical drawers', individual drawers containing (a) The M.T.I (b) The P.R.F.D, and (c) The P.R.F.S. Each drawer is mounted on pull-out runners, and contains its own power supplies. Housed in the top of the rack are the control switches, indicator lights, and the quartz delay cells. Provision is made for housing a total of five cells (2 for M.T.I, 2 for P.R.F.D and 1 for P.R.F's). For P.R.F's above 400 pps only one cell each is needed for the M.T.I and P.R.F.D channels.

The Moving Target Indicator

This equipment ensures excellent clutter suppression by employing two separate cancellation circuits. Signals received by the equipment are stored until the next set of signals are obtained. A comparison is made between the two and any which have not altered in phase are removed. In the past, considerable problems have been experienced with M.T.I systems which required constant readjustment of the internal oscillator in order to compensate for a variety of modulation effects within the equipment. A very stable transmitter, a special trigger system and a new quartz delay cell are employed in the S 600 equipment which eliminates the need for constant adjustment and makes possible an extremely high level of cancellation.

Pulse Repetition Frequency Stagger

Conventional M.T.I systems suffer from 'blind speeds' by which aircraft moving at certain velocities are eliminated from the radar display in the same way as static clutter, and a number of targets may be lost due to this problem. In the S 600 Series equipment the pulse repetition frequency of the radar signal is staggered giving simultaneous operation on two or more pulse repetition frequencies which can be chosen to raise the blind speeds above Mach 2.

Pulse Discrimination

This equipment rejects any signals received from other radars operating on adjacent radio frequencies by accepting only signals of the correct pulse length and repetition frequency.

Additional facilities

Additional facilities giving more specialized

signal processing have been developed by The Marconi Company. One of these techniques is called doppler cancellation which allows slowly moving localized clutter to be eliminated.

DATA SUMMARY

M.T.I: Double cancellation.

Static clutter suppression: Greater than 40 dB.

M.T.I video-normal video gate: Controlled by range and/or clutter. Alternatively by external video signal.

Staggered P.R.F:

Double or triple stagger

Stagger Ratio: Can be chosen to suit operational requirements.

Typical Stagger characteristics

P.R.F: 300 p.p.s.

Triple Stagger ratio: 4:5:6.

Max. intermediate loss: 3.0 dB.

P.R.F.D: In normal and M.T.I video circuits preceding video gate.

Signal Inputs

Intermediate frequency: 45 MHz.

Signal Outputs

Primary radar transmitter trigger: Positive 15 V 2 μ s.

Sec. radar pre trigger: Positive 15 V 2 μ s.

Display trigger: Positive 15 V 2 μ s (3 outputs).

Video Log/PLD: Positive 5 V signal 1 V shoulder noise (3 outputs).

Video MTI gated: Positive 5 V signal 1 V shoulder noise (3 outputs).

Power Supplies

220-240 V \pm 10% single phase 50 Hz or 380-415 V 3 phase.

Power Consumption: 300 VA

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