Air Defence Systems

Marconi
Radar Systems

MACE SYSTEMS

MACE in Air Defence

A display and data handling system designed to meet the needs of modern air defence.

Features

- ★ Integrated or Autonomous Operations
- ★ Sector Operations
- ★ Control and Reporting
- ★ Surface to Air Missile Control
- ★ Flexible Deployment
- ★ Mobile or Static
- ★ Fast and efficient mmi
- ★ High quality presentations

MACE offers a complete air defence capability, built up using a network of stations operating with a high degree of integration. These stations can operate as Sector Operations Centres, Control and Reporting Centres and SAM control centres using a common set of display and data handling equipment. The specific role of a station and the configuration of the network can be varied to give a high degree of flexibility.

The MACE display and data handling equipment uses the latest technology. Computing is provided by powerful bus-orientated multiple processors operating in the well-established LOCUS environment, which has been proven in numerous military and civil systems in the UK and abroad. The displays are the new ASTRID S3022 and S3023 cursively written ppis, supplemented by TV touch tabulars for tote and man-machine interaction.

Operational Availability

High operational availability is one of the most important features of a defence system. MACE has been configured to achieve fault tolerant performance. Parallel processing and the separation of raw and extracted data up to the point of display are just two ways in which the impact of faults can be minimised.

Automatic fault monitoring and reporting systems aid maintenance staff, and test functions can be called up for any element of the system. Repairs can be carried out while still maintaining an operational capability.

The Air Defence Applications Packages

The features of the three major roles provided by MACE are as follows:

Sector Operations Centre Role

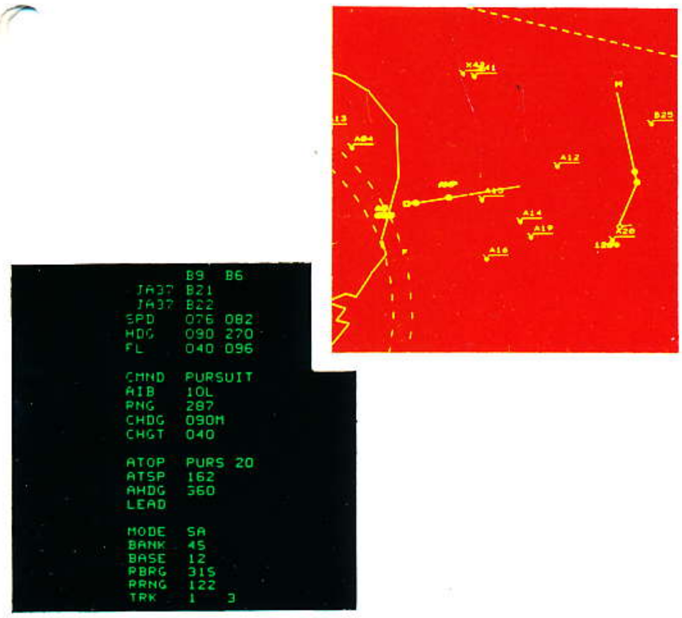
- ★ Management of up to five CRCs
- ★ Management of up to six SCCs
- ★ Computer assisted track correlation
- ★ Automatic track crosstell
- ★ Automatic tote data exchange
- ★ Coordination with other sectors

Control and Reporting Centre Role

- ★ Automatic track initiation and following
- ★ Automatic IFF
- ★ Computer-assisted interceptions and recoveries
- ★ Automatic data exchange with the network
- ★ Manual supervision of all automated functions
- ★ Simulation

SAM Control Centre Role

- ★ Coordination of up to 10 missile sites
- ★ Automatic SAM assignment
- ★ Automatic tracking in the autonomous role
- ★ Manual supervision of all automated functions.



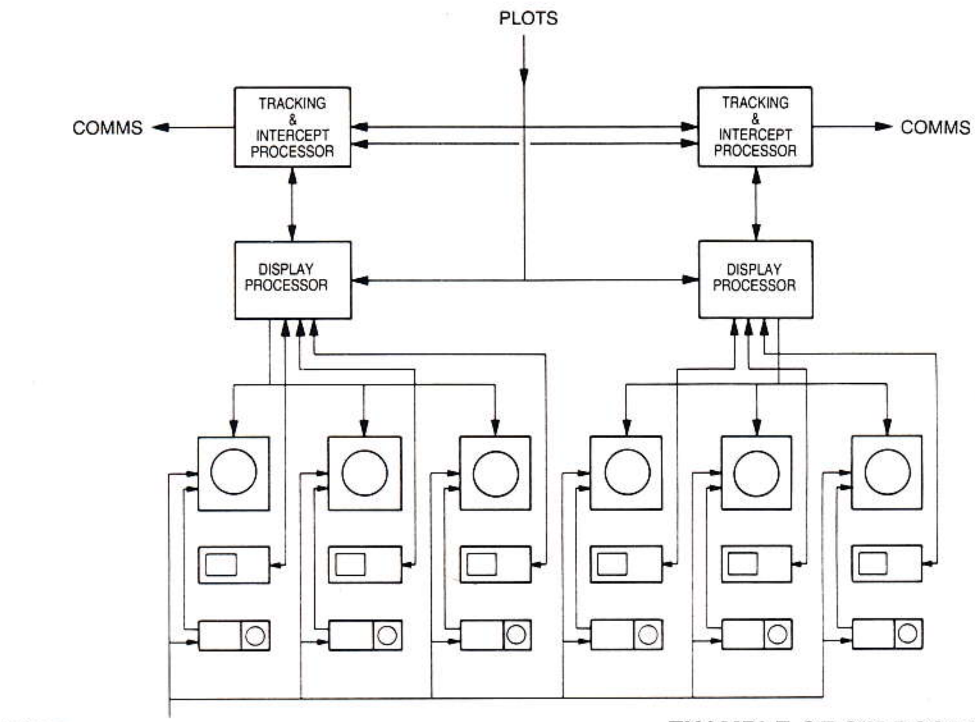
The Sector Operations Centre provides integration of all activities within a sector and coordination with other sectors. It forms the hub of a network of stations receiving data from them, and in turn transmitting data to them.

Track information is received from CRCs and other SOCs and correlated to form a sector-wide RAP. This may then be crosstold tod the ADOC and SAM control centres, and filtered as appropriate to other users. Resources, status and engagement data is received, and appropriate selections made for automatic transmission round the network.

The Control and Reporting Centre uses data from a main sensor such as Martello to generate a local RAP. This may be augmented by data from "gap fillers" or from other stations in the network. System data can be accessed and updated at a series of terminals interfaced to the MACE CRC. This data immediately becomes available to the controllers and to the network. Tactical and fighter performance data held by the system enables interception calculations to be made, and control information passed to the interceptors by voice or data link.

Local simulation enables local operator training. Simulated track behaviour is determined by aircraft performance data held by the system.

The SAM Control Centre can operate autonomously, building a local RAP in the same way as a CRC, but alternatively it can receive all its track data from the network. Stored performance data enables the system to identify all possible targets for each site. Optimum targets are determined and assigned to specific sites. Transmissions to these sites include target range and elevation data, and a command dialogue ensures the appropriate level of control by the SAM control centre.

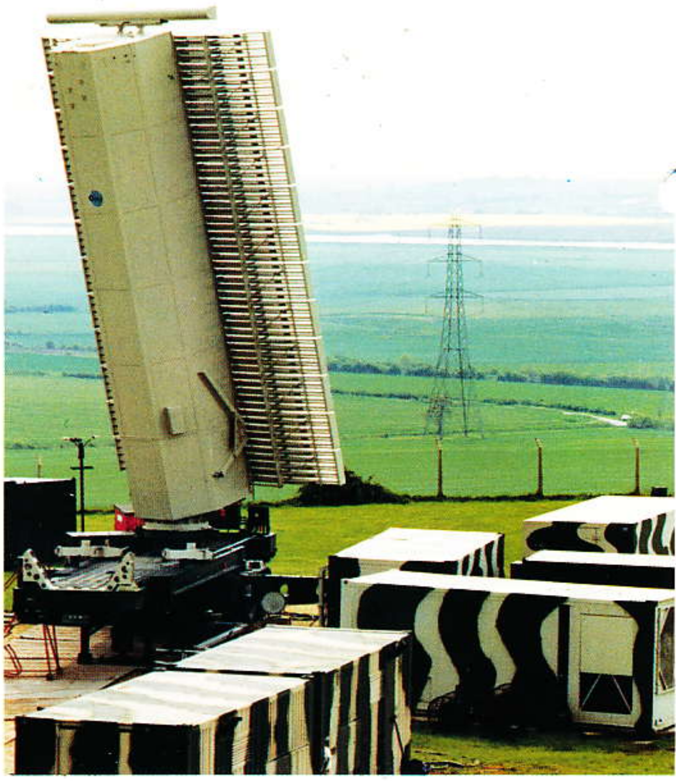


EXAMPLE OF SIX POSITION CONFIGURATION

Centre Configuration

The standard six-position MACE configuration has been engineered into a 40ft ISO container to give a fully transportable system. Equipment and operational areas are separate, as with the static installation, to give an optimum working environment for the operations staff. Either all six displays can be used for tracking and interception, or the two groups of three can operate autonomously, for example to provide both the Control and Reporting Centre and SAM control functions within one container. More complex and powerful configurations can be assembled when necessary.

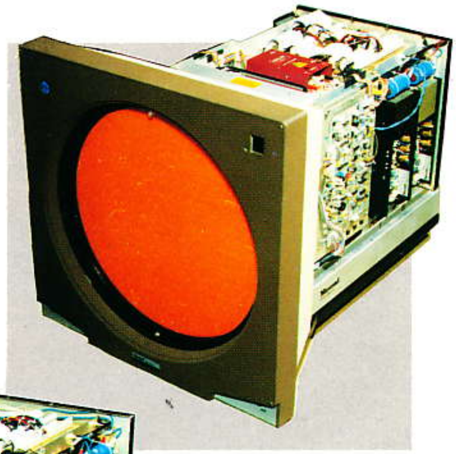
Each console houses a ppi display, a tabular display and touch mask, keys, rolling ball and communications fit.



A typical Transportable Sector Operations Centre on a Test Site.

Brief Technical Description

The PPI Display Unit, accepts both raw radar signals direct from the radar sensor, and computer generated data from the processors. The raw radar is retimed and displayed under the autonomous control of the display. Computer generated data is received over a high speed serial link and stored within the display. Playout is managed by microprocessor, which interleaves the raw and synthetic data to give a high synthetic data load without loss of raw radar information. A communications port allows operator input data to be returned to the data handling system.



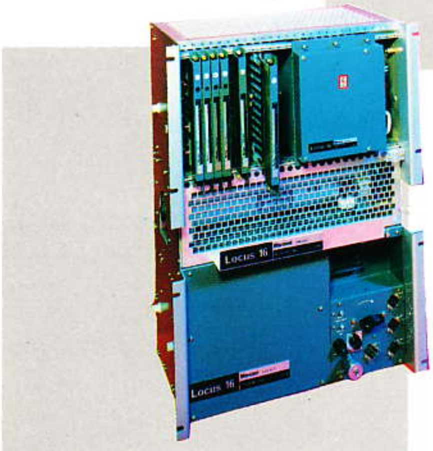
Two sizes of display unit are available, either 560mm (22 inches) or 400mm (16 inches) in tube diameter.

The Touch Tabular Display performs a dual role. The main screen area is used to present totes and readouts called up for display from the system database. The lower part of the screen is used as a touch-sensitive keyboard, a powerful and efficient method of man-machine communication. The screen is divided into 32 touch areas, which are labelled by the computer. As each touch is made, the computer generates a new set of labels, leading the operator through a tree structured matrix of prevalidated selections. Menu-driven systems of this type cut down error rates to negligible levels, and are quick and easy to learn.

The display uses TV raster scan techniques, giving crisp, clear presentation with adjustable brilliance to match that of the ppi and the ambient lighting conditions. Touch detection is by interruption of orthogonal infrared light beams across the face of the display.

The Computing System is provided by advanced modular distributed processors. Each module is designed for a particular function, and a number of modules are placed together in a processor bin. Modules range from store boards and interface boards to powerful processor boards, containing the latest LSI packages for maximum power and economy in space.

Many of the modules contain intelligence. Distributing intelligence avoids a bus bottleneck, simplifies the applications software and facilitates fault location.



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