 compile and then distribute the air-sea picture on which Britain’s forces must act, yet provide a system which can survive the loss of one or more of its nodes.

Radar are the front line of UKADGE, although there are other, passive sensors which can track a target by its electromagnetic emissions. These, too, are being updated. Radar reporting posts provide air defence cover from the Faeroes in the extreme north to Cornwall in the south, and from Ireland to East Anglia. Each will receive a powerful, transportable, threedimensional air-defence radar.

The RAF will have three different types of new-generation 3D radar operating in two different wavebands. The General Electric GE592 23cm (L or D band) radars are already in place. The next to enter service will be Marconi Martello 23cm radars. The other radars all operate at 10cm (S or E/F band) and are AR320s developed jointly by Plessey Radar and ITT-Gilfillan.

All of these radars are characterised by their ability to measure target range, bearing, and height, the latter by means of a pencil beam electronically steered in elevation or, in the case of Martello, by means of a beam-forming network in the receiver. Both the GE592 and Martello are solid-state radars, with a stack of transistors amplifiers behind the planar-array antenna providing “fail-safe” capability by replacing the traditional single, large travelling-wave-tube transmitter.

By providing overlapping L-band and S-band coverage, the RAF hopes to complicate the enemy’s jamming task, while transportability should reduce the vulnerability of the radars themselves. Each radar will be deployed in a convoy of about 15 vehicles to a presurveyed but unmarked site indistinguishable from the surrounding countryside. The radar head will be located remotely from its associated reporting post, and will be protected by decoys intended to confuse anti-radar missiles. An on-site target simulator will be used to exercise the radar in peacetime.

The RP, a collection of trailers, will be manned, with an electronic counter-measures officer on site to help the radar overcome jamming. Radar plots (target positions) and strobes (jammer bearings) will be injected into the UKADGE network via a narrow-band datalink.

Associated with four of the RPs are semi-hardened command and reporting centres with local tracking and fighter control capabilities which to back-up the CRCs. The hardened command and reporting centres normally responsible for tracking and interceptor control are the nerve centres of Britain’s air defences, and interface with Nato’s Nadge and France’s Strida II air defence systems for target data exchange, with Royal Navy ships assigned to air defence, and with NATO E-3s and, eventually, RAF Nimrod AEW.3s providing low-altitude cover. There are links with Shape operations centre in Belgium and with the UK Civil Aviation Authority’s London air traffic control centre at West Drayton.

There has been little automation of air picture compilation and distribution in recent years. Linesman, the system improved UKADGE will replace, was introduced in the early 1970s and improved the dissemination of radar information, and was updated to provide an automated means of distributing a recognised air picture among SOCs in UKADGE, Nadge, and Strida.

With Linesman, however, the air picture available to the fighter controller can be several minutes old. UKADGE will provide a real-time picture of the UK air defence region, essential if long-range cruise-type missiles are to be identified and intercepted.

The task of building-up an air picture begins with the receipt of radar plots and jamming/strobes. At a CRC the plots are combined with those of other radars for multi-radar target tracking. These active tracks are then combined with passive tracks derived from jamming strobes.

Tracks from airborne early warning and interceptor aircraft are also introduced along with those from other CRCs, and track-to-track correlation is performed to produce the local air picture. Then the recognition process begins, an automatic interpretation of the West Drayton air traffic control centre ensuring instant access to each currently filed civil flight plans. Other SOC/CRCs supply track identities which help build the local recognised air picture. With the threat revealed, the fighter controllers can now marshal and direct their forces.

Sea tracks are introduced into the system to produce the final recognised air-sea picture. The mutual exchange of information between elements ensures that all centres share the same constantly updated picture of the UK air defence region and even if an element is lost, the big picture will remain intact.

Each SOC/CRC has its heart five minicomputers, two for input/output processing, one for active (radar) tracking and one for passive (jammer) tracking, plus one for general housekeeping. Any one computer can fail without affecting system capability.

The data handling system services several universal display consoles, each with its own processing capability. The console is dominated by a 22in-diameter, four-colour display used for surveillance.