In the 1980s the demands for a small but highly efficient air defence network are as great as those in 1940. Although radars see further and fighters fly faster, the limiting factor is still the human reaction time of the fighter controllers, and their ability to respond quickly enough in the deployment of the forces available to them.

The plotting tables of 1940 have long since given way to a recognised air-sea picture displayed on CRT screens. Otherwise, the present-day operations rooms that are the nerve centres of Britain’s air defences have changed remarkably little since the Second World War.

What has changed is the threat. This now comes from all-weather aircraft armed with long-range missiles and protected by sophisticated electronic countermeasures (ECM). Fixed radars with their powerful electromagnetic emissions have become vulnerable to antiradiation missiles, of particular concern when the radars are located close to the nerve centres of the defence network.

By the mid-1970s the UK realised that any new system which would provide air defence cover into the 21st century would need to combine a centralised command structure with a decentralised sensor network that was secure, survivable, and capable of sustaining damage and still operating.

Two technological developments have made it possible to fulfil these apparently conflicting requirements; a new generation of transportable ground radars, and new telecommunications technology. The first enables sensors to be remotely deployed at will almost anywhere in the UK. The second provides a nationwide network of lines and exchanges that splits amoeba-like and routes both voice and data along any path so long as some physical connection remains.

At the same time, it was realised, a new generation of data handling system would be required for the SOCs and CRCs to accept data from outlying radar posts—some of which would require limited fallback command and control capability—and to assemble an overall air defence picture that would be continuously and mutually communicated between centres to guard against the loss of any element.

The massive computing load this represents, and the constraint on physical size imposed by building costs, dictated the use of compact minicomputers with the power and performance of mainframes. To keep both initial and running costs to a minimum, proven off-the-shelf equipment was to be used.

Initial Improved UKADGE project definition conducted by Plessey in the mid-1970s on behalf of the UK Ministry of Defence showed that this initial concept was feasible, and that at least one design approach was practical. RAF Air Staff Requirement 885 for an improved UK air defence ground environment to replace its existing Linesman system was ready for competitive Nato bidding by mid-1979.

In September 1980 the £150 million fixed-price contract for the heart of Britain’s new air defence was awarded to UKADGE Systems Limited (UKSL), a consortium of Hughes Aircraft, Marconi, and Plessey, each with a one-third share. Hughes took responsibility for the data handling system, which will use commercial Digital Equipment VAX 11/780 minicomputers, and for the large-screen wall displays. Marconi Radar agreed to supply the display and voice communication system, including software and the universal console incorporating a display and the associated graphics generator supplied by Plessey. Plessey also assumed responsibility for the digital data node switching system.

The digital data and voice telecommunications network that would eventually link the entire system together became Uniter, to be developed by GEC under a separate contract. Based on the company’s System X for British Telecom, Uniter will ultimately be a “packet-switched” network. The message to be sent is divided into packets, each individually addressed, then dispatched along any available route, not necessarily direct. On receipt, the packets are reassembled in the correct order to reconstruct the original message. Packet switching overcomes the problems inherent in circuit switching by automatically rerouting around busy or broken lines. Uniter is the glue that holds Improved UKADGE together, providing a cat’s cradle of secure interconnections between the national ADOC and its standby, the regional SOCs and their CRCs and CRPs, air bases, and surface-to-air missile sites. The aim is to