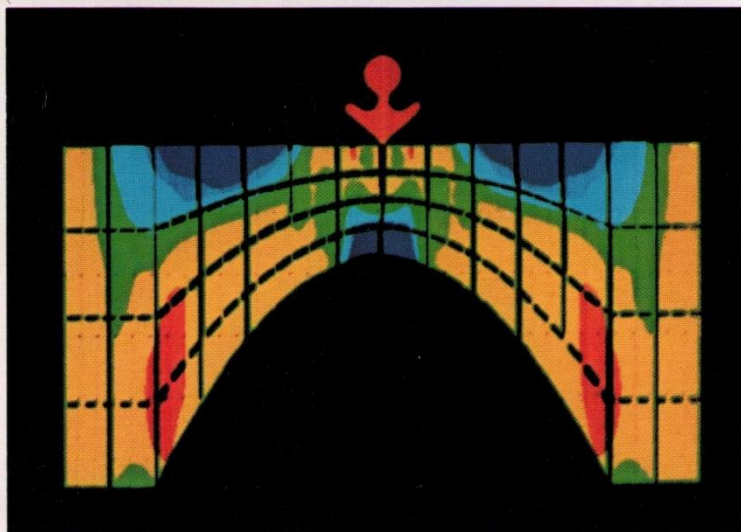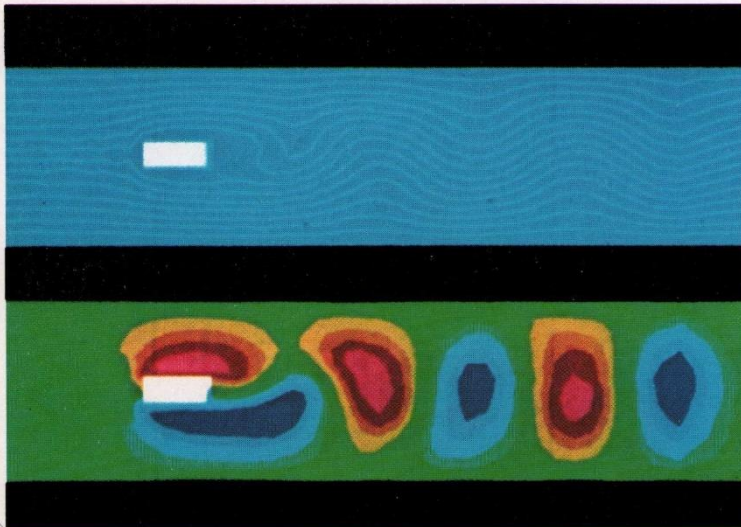# SRC INTERACTIVE COMPUTING FACILITY

An intimate dialogue between a computer and a designer or research worker can effectively supplement both his reasoning power and his memory. Such dialogue constitutes "interactive computing". The Science Research Council has taken a major initiative in this field by setting up a service managed centrally, yet with machines largely distributed among the research community they serve. This initiative covers applications programs as well as hardware, systems, networking and graphics software.

The Science Research Council is responsible for funding selected research and development projects at Universities and Polytechnics whose cost is too high to be borne by their normal funds. The provision of a good interactive computing service is seen by SRC as a key element in promoting creative research in many of these projects, particularly those in engineering departments at Universities and Polytechnics whose results may be crucial in aiding British industry over the coming decade. The SRC has therefore set up a national Interactive Computing Facility (ICF) and authorised major expenditure on developing the facility throughout the UK during the next 5 years. The computing power for this new service will initially be based on two medium-power mainframes and a set of about 15 multi-user minicomputers to be located at individual Universities and Polytechnics, linked by an extensive communications network and connected to substantial batch processing facilities. This should provide for the needs of a community of about 1200 individual research users. Responsibility for management, development, and implementation of the ICF rests with the Rutherford Laboratory, which already provides one of Europe's most powerful batch-processing computer services for the benefit of SRC supported research groups.

The increasing complexity of modern technology demands extensive facilities for modelling and simulation, often involving heuristic factors which defy the traditional analytic approach. There is, therefore, an increasing need to "interact" with the program, ie, the designer himself becomes a major component in the computation. Hence the need for powerful interactive facilities with a fast response. To achieve this, the ICF is installing its multi-user minicomputers at widely spread sites throughout the UK. Each mini can give computing "on demand" to about ten users simultaneously, and is linked to a communications network. Access is provided through a number of advanced terminals which can be loaned to research groups, as and when their projects demand, from a large pool maintained by the ICF. An important goal is to avoid duplication of programming effort at different Universities: economies should be achieved here because the network is designed to allow a set of user programs to be mounted and maintained at a certain "host" computer, and then run on that computer by users who may be connected to any of the other nodes. Many jobs must be set up using interactive graphics, then passed to a large batch-processor for heavy calculations, then returned for interactive examination of the results; so good links with batch processors are also vital. The development of communication and systems programs to support this kind of "networking" requires work in the forefront of present day computer science, carried out to the highest standards in order to provide a totally reliable service as programs enter production use. Much of this work involves close collaboration with computer manufacturers and with industry.

Work in progress at Chilton to assess the comparative performance of two minicomputers for interactive use. On the left is a GEC 4070; background centre is a Prime 400. Local terminals (foreground) include a thermal printer, alphanumeric VDU and storage-screen devices.

A refreshed display terminal of the type shown in the top right photograph must be used whenever a large part of the picture is subject to frequent change.

Equally demanding is work on advanced interactive graphics software, and on common "applications packages", or programs concerned with a certain technique which provide the jumping-off point for research in a number of different areas (for example, finite element analysis of field problems underlies research in areas such as civil engineering, structural design, and magnet technology). The SRC views the development of such packages in conjunction with the University groups who are leaders in a given technique, as one of the most important functions of the ICF. "Special Interest Groups" of engineering research workers have been formed in many important fields to advise on the correct specification for these packages, but their widespread acceptance and use by other research workers in Universities and in industry will depend crucially on the quality of their implementation.

The heart of the ICF distributed computing system has already been established. Following plans defined by the Networks Unit for a unified network to serve future University and Research Councils needs, ICF processors will progressively become more tightly linked, using X25 protocols and higher-level protocols currently under development. Building upon this, the ICF is greatly strengthening its team to implement the applications packages, which will be responsible for producing some of Britain's most advanced computer-aided engineering design and production programs over the next few years.

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