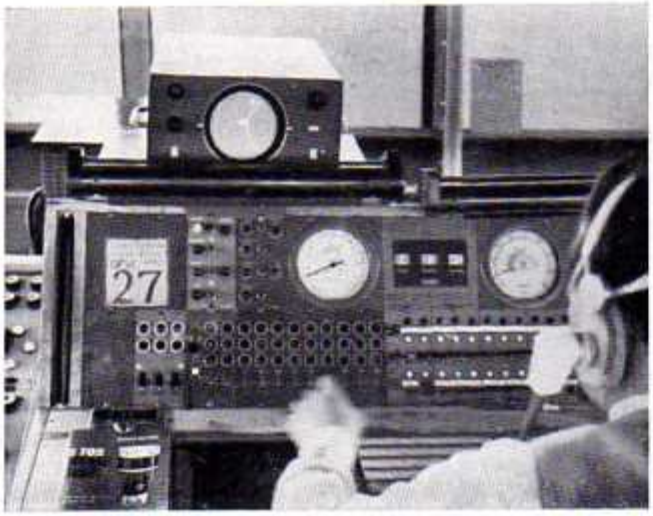

Fig. 4

cations. An experimental version of this tube showing long range radar is pictured in Fig. 5.

Radar/television Scan-Conversion

The other main contender for bright displays it the T.V. scan-conversion system.

There are three methods of achieving scan-conversion. These are:

1) a conventional radar display viewed by a T.V. camera.
2) electronic conversion, using the bombardment induced conductivity tube.
3) electronic conversion, using electron beam modulating techniques.

The first system is still an active possibility. In a previous paper read to the C.I.T. [2] the operation and use of the storage vidicon and the bombardment induced condutivity tube was fully discussed. Since then, experimental storage orthicons have been made, but there has been insufficient interest to stimulate much work in this field. An electronic storage tube of type [3] has recently been developed by the Cathodeon Company of Great Britain. This tube combines the principles of the 3" image orthicon with a storage mesh, and has considerable advantages over previously availab'e tubes. The C.990 Beam Modulation Storage Tube is double ended, and the target consists of a metal mesh coated on one side with an insulator. A charge pattern can be set up on the insulating layer by scanning it with a high velocity beam from the writing gun, releasing secondary emission electrons. The reading beam scans the target from the opposite side through a coplanar ion trap mesh and is arranged to approach the storage target at near zero velocity. The action of the positive charge pattern is to allow a variable fraction of the beam current to pass through the storage mesh. The remaining beam electrons are repelled from the target and return to the electron multiplier and provide the output signal.

This tube provides high resolution, excellent afterglow characteristics and a very uniform background. A short experiment was recently carried out, using live radar video and a photograph of this is shown in Fig. 6. Only 405 line T.V. scanning was available, and local interference was present, but the results were promising.

However, in view of the limited brightness available from a conventional T.V. display, and the implications of modern trends in data handling systems, the scan-conversion approach needs careful consideration before it can be assured a firm future. It could well be that the most attractive property of the scan conversion tube is its applications to bandwidth compression.

Conclusions.

The main features of air traffic control as it is now emerging are the association of data handling computers with radar and procedural systems, and the emphasis on scan-conversion in the U.S.A.

Once data is available from a computer, scan-conversion is effectively achieved, and the fast readout rate of a computer provides bright synthetic and tabular displays. It is true that the raw acquisition display is still at a low rate, and at low light output level, but there appears to be little operational objection to this, as long as the performance of the fluoride display is better than existing bright displays. However, much of the data read out from a computer is only at high speed in order to reduce flicker, and not because it changes very rapidly. Consequently a good storage display device with selective erasure (such as the Hughes Multi-Mode Tonotron) could help to reduce the load on the computer. Also, there are

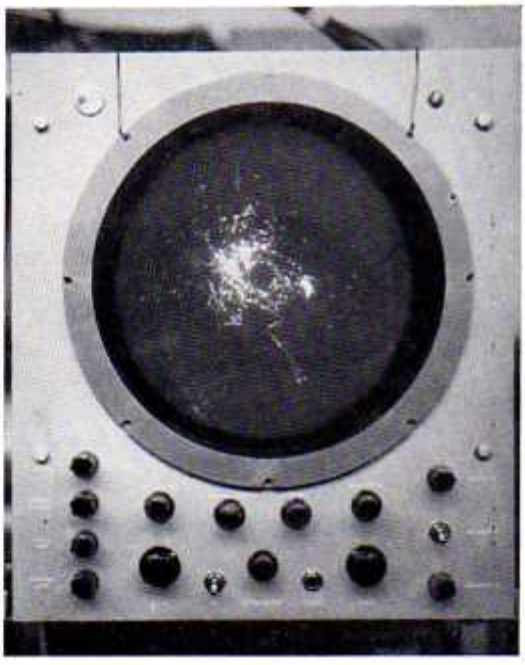

Fig. 5