CHAPTER 3

THE INTEGRATED FLIGHT INSTRUMENT SYSTEM

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Introduction

1. Improvements in aircraft performance have led to a number of developments in the concept and design of the flight instruments used by the pilot to manoeuvre the aircraft so that it follows the desired flight path. The function of these instruments is to provide attitude and velocity information efficiently and unambiguously.

2. Autopilots, radar, and weapons systems also require attitude and velocity inputs, and in the past each system was designed with its own sensing element. This led to much duplication of such items as gyroscopes.

3. The Integrated Flight Instrument System (IFIS) is essentially a display system which derives its information from central sensors, which also provide the required inputs for other aircraft systems.

Description

4. The IFIS is provided with information by the following sensors:

a. The MRG 2 twin gyro platform (*see* Part 2, Sect 2).

b. The Air Data Computer (*see* Part 1, Sect 3).

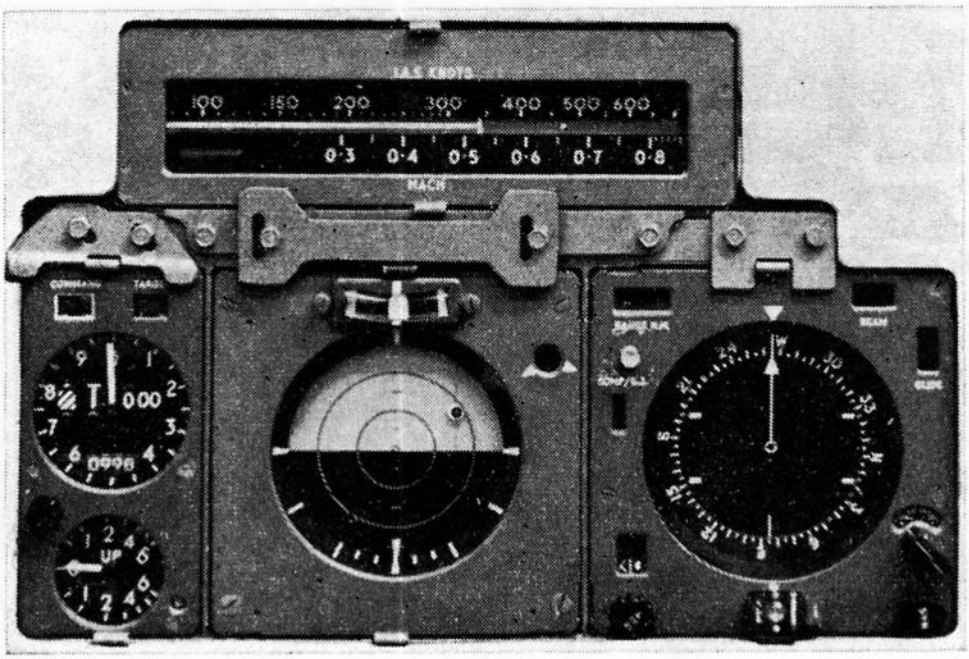

Fig 1 The IFIS Display

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c. The TACAN, ILS and UHF equipments, through coupling units.

5. The IFIS display is shown in Fig 1, and consists of the following sub-units:

a. The speed display.

b. The height and rate of climb display.

c. The F4C attitude indicator.

d. The navigation display.

6. The operation of the speed, height and rate of climb displays is described in Part 1, Sect 3 in the chapter dealing with the Air Data Computer, and is therefore not repeated here.

The F4C Attitude Indicator

7. The F4C attitude indicator provides a continuous display of aircraft attitude in the pitch and roll axes relative to the horizon. The display is driven by roll and pitch servomotors controlled by the relevant outputs of the MRG 2, and consists of a roller blind which is divided into two sectors representing the earth and the sky. The centre spot on the indicator represents the aircraft, and concentric rings are calibrated in 20° increments of pitch. Roll angles are calibrated about the lower edge of the dial in 30° divisions, with 10° sub-divisions in the first 30°. A rotatable needle indicates the roll angle against the roll scale. The roller blind gives full freedom of display in both roll and pitch. Above the indicator there is a ball in tube slip indicator. A flight director bead, which is actuated by the flight control system, appears on the face of the indicator.

The Navigation Display

8. The navigation display gives a continuous indication of heading derived from the MRG 2. The gyro output can be slaved to a fluxvalve monitoring signal, or initially aligned with magnetic heading and used as a direction indicator. The heading display can be combined with any one of three functions:

a. ILS

b. Violet Picture

c. TACAN.

9. **ILS Function.** When the mode selector switch is set to ILS, glide path and localizer beam displays are shown. The glide path is represented by a horizontal bar which moves vertically up and down relative to the centre spot on the instrument to

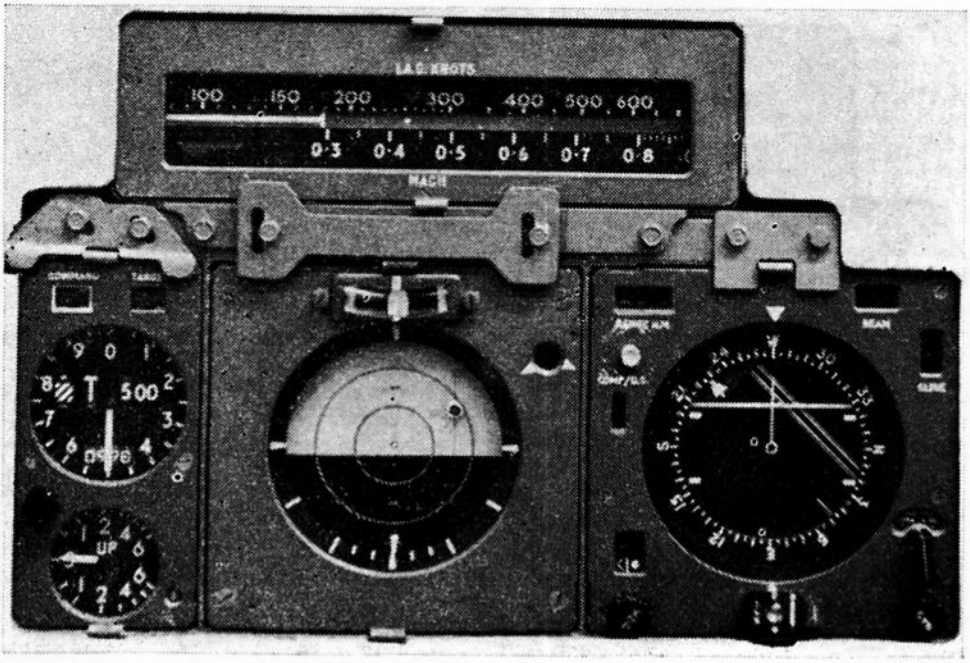

Fig 2 ILS Display—Homing to the Centre Line

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indicate the position of the glide path in relation to the aircraft in elevation. The localizer beam is represented by a pair of parallel lines which can rotate as well as move laterally. The lines indicate the orientation of the glide path relative to aircraft heading, and the lateral displacement of the aircraft from the beam centre line. A QDM marker can be set on the face of the instrument by pulling out and rotating the set heading knob. Fig 2 shows the aircraft approaching the ILS localizer on a heading of 270°. Runway QDM is 226° and the desired heading arrow is also set to 226°. The aircraft is still below the glide path. Fig 3 shows the aircraft heading down the localizer centre line on the glide path. Beam and glide path amber lights are covered by shutters if the individual systems are serviceable. A blue light at the base of the display is actuated by the inner and outer ILS markers.

10. **TACAN Function.** The TACAN display appears when the mode selector switch is set to TACAN and the appropriate channel has been selected on the TACAN equipment. The display is shown in Fig 4, and consists of a series of concentric arcs calibrated in increments of 20 miles range from the beacon. In the TACAN mode range also appears in the range window. A line bisecting the range arcs indicates the magnetic bearing of the beacon when read against the compass card.

11. **Violet Picture.** UHF homing signals are displayed by the ILS localizer indicator bars when ILS mode is selected with the ILS/Violet Picture selector set to Violet Picture, provided that the appropriate UHF frequency is selected.

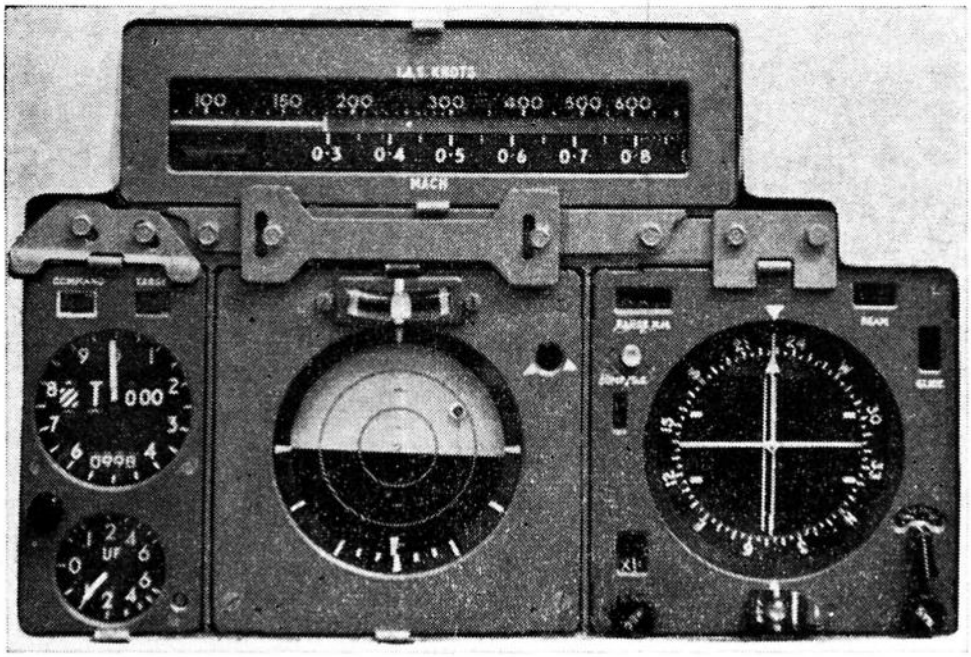

Fig 3 ILS Display—Final Approach

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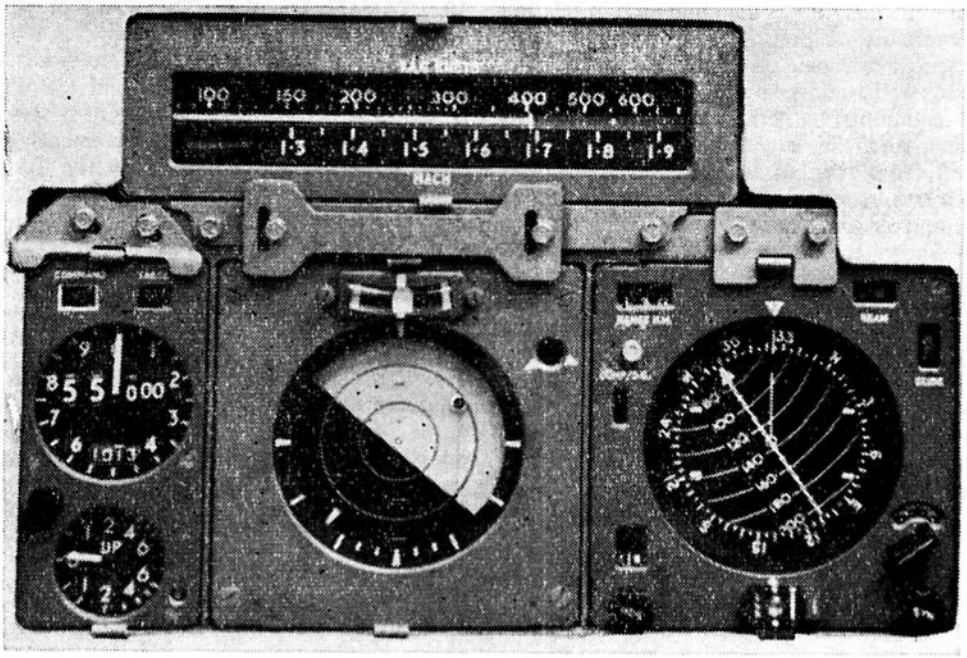

Fig 4 TACAN Display

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