PART 2 : FLIGHT, ENGINE, AND ANCILLARY INSTRUMENTS

INTRODUCTION

1. During flight in limited visibility, the three senses which a pilot normally uses to give him his attitude in space, relative to the earth, are either ineffective or misleading.

2. The first sense, that of vision, is unable to define the vertical in limited visibility, when the horizon or other reference can no longer be seen.

3. The second sense, that of the inner ear, forms a liquid level, capable of detecting the direction of gravity. Any acceleration, however, such as centrifugal force during a turn, causes an apparent change in the direction of gravity, so that a pendulous device, such as the liquid level, is unable to detect the true vertical. Furthermore, when a pilot recovers from a turn during limited visibility, the surging movement in the liquid level of the inner ear gives the impression that he is continuing the turn, and results in corrective action being taken to recover from the apparent turn. This leads to a turning movement in the opposite direction.

4. The third sense, the deep muscle sense, acts on the nerves owing to the effect of the weight of the human body when it is in different attitudes. This forms an indication of the attitude of the body ; but centrifugal and other acceleration forces cause this sense also to be misleading.

5. During flight in limited visibility, therefore, since the pilot's natural senses are limited in reliability, a standard flight panel is provided to enable him to assess the aircraft attitude accurately, and the importance of relying on the instrument indications and *not on physical sensation* is strongly emphasized.

6. The standard flight panel comprises the following six basic instruments, and an I.L.S. marker beacon lamp :—

(*a*) An airspeed indicator.

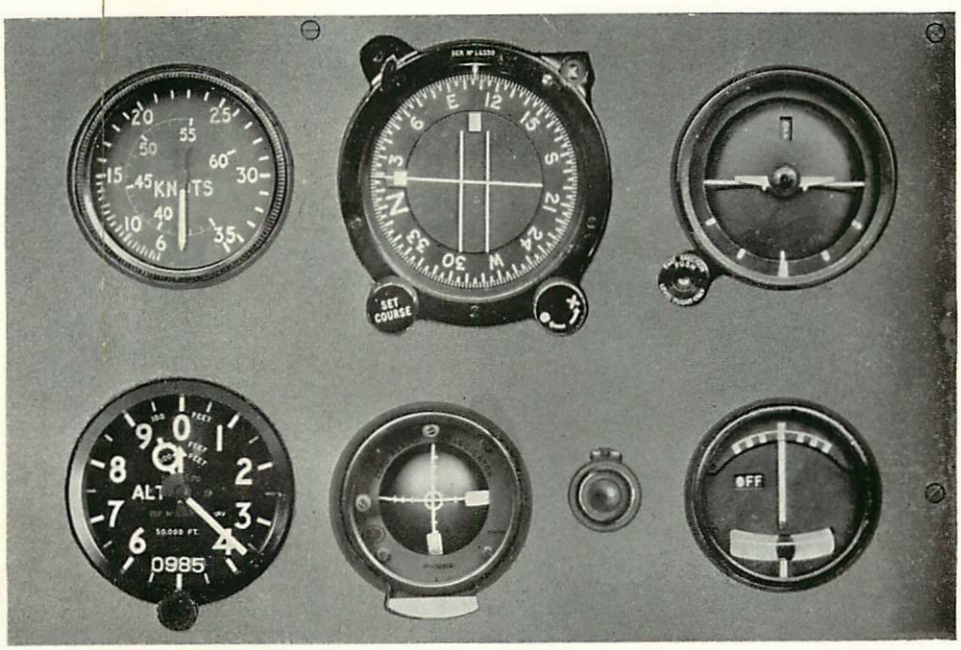
(*b*) A G.4 compass.

(*c*) An artificial horizon.

(*d*) An altimeter.

(*e*) A zero reader flight director.

(*f*) A turn and slip indicator.



The Standard Flight Panel.

7. It should be noted that in aircraft fitted with the zero reader flight director, this instrument takes precedence over the I.L.S. (Instrument Landing System) meter for the bottom centre position among the basic six, and has the I.L.S. meter fitted below it. When automatic approach is fitted, however, the zero reader flight director is not required, and the I.L.S. meter goes up into its place. In the case of aircraft without I.L.S., the rate of climb and descent indicator is fitted at the bottom centre of the standard flight panel in place of the zero reader flight director.

8. Since the mechanism of the flight instruments is delicate, the flight panel must be isolated in order to minimize shocks and dampen engine vibrations. It is, therefore, mounted on a sorbo rubber suspension, which ensures that vibration of the instruments is restricted to low amplitude.