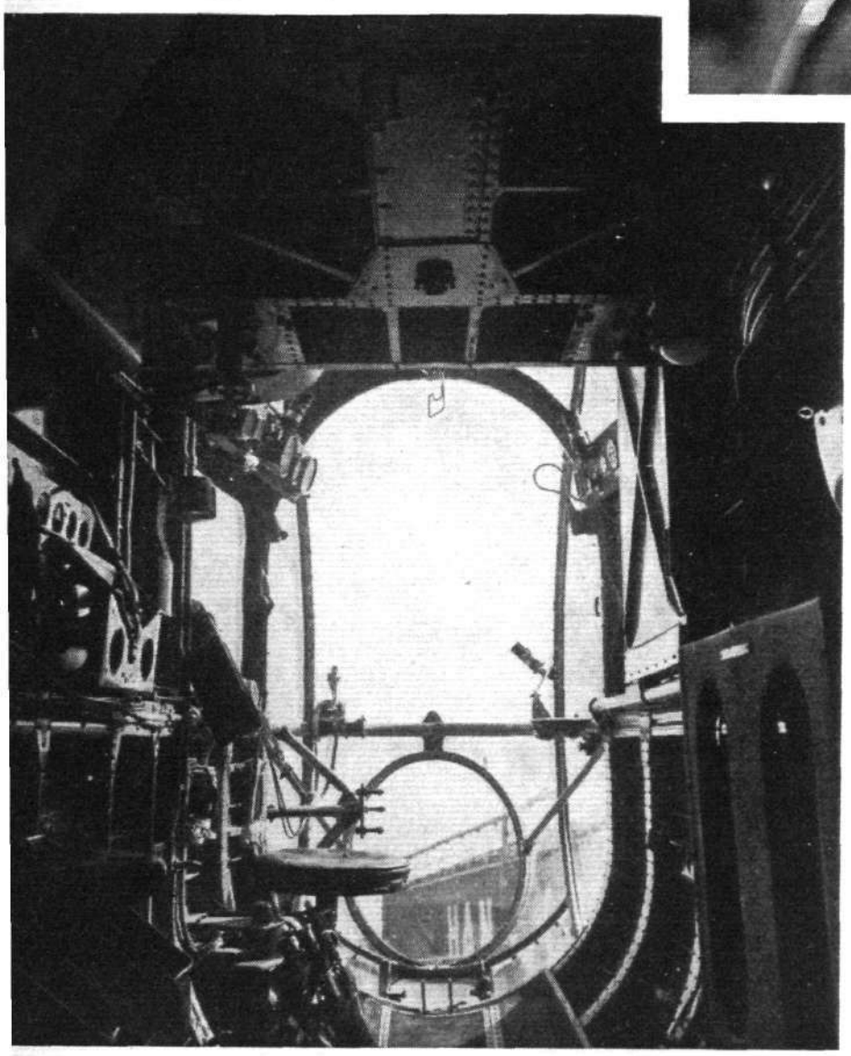
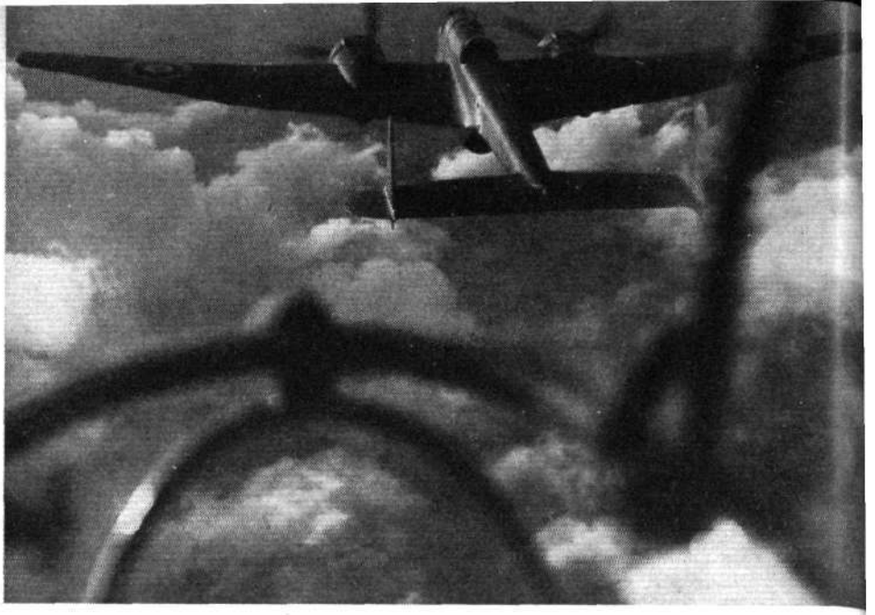
station, and can be operated from the same seat; an automatic pilot; and an automatic camera, which is fitted immediately below the wireless set. Each member of the crew is provided with an exit to enable him to use his parachute.

The machine is fitted with the latest type of blind-flying and fog-landing equipment.

As at present in production, the Hampden is fitted with two Bristol Pegasus XVIII engines. The Pegasus XVIII is rated at 815 h.p. at 4,750ft., using medium supercharge, and





The compartment of the front lower gunner and bomber, in the nose of the fuselage (left) and, above, the unimpeded view obtained from it.

750 h.p. at 14,750ft. using full supercharge. The take-off output is 965 h.p., and the maximum power for all-out level flight (five minutes) is 1,000 h.p. at 3,000ft., or 885 h.p. at 15,500ft. Alternative engines of the Pegasus series (e.g., Pegasus XXV or XXVI) could equally well be installed. In any case, the engines would be fitted with the standard Bristol long-chord cowling embodying a leading-edge exhaust collector with single outlet and adjustable cooling gills on the trailing edge.

The Hampden could, alternatively, be equipped with in line engines of liquid- or air-cooled type, notably the Rolls-Royce Merlin X (1,030 h.p. max. at 16,250ft. with two-speed supercharger in high gear) or the Napier Dagger VIII (1,000 h.p. max. at 8,750ft.). With the latter engines the machine is, in fact, built under the name Hereford by Short and Harland, of Belfast.

With Pegasus XVIII engines the Hampden is normally fitted with three-bladed De Havilland constant-speed airscrews.

If one were looking for proof of the contention that, provided the size of the initial order is sufficiently large, the rate of production can be greatly speeded-up by careful study of production problems during the design stage, such proof is furnished by the Hampden. The following notes, and a considerable proportion of the illustrations, are therefore devoted to the production aspect.

Assembly has always been the bottle-neck of production, whether it be the assembly of the innumerable "bits and pieces" of which a modern aircraft structure is composed, or whether it be the installation of the almost incredible range of equipment and "services" necessary for the proper functioning of a military aeroplane. That this must necessarily be so is obvious when one stops to consider that the manufacture of small parts and components can be speeded-up to any desired extent by multiplying the number of machines and operators; but when the various "bits and pieces" meet on the aircraft only a limited number of men can get to work on assembling them without getting in one another's way. So with the installation of equipment. Once the shell of a fuselage, for example, is completed, the number of men who can be accommodated inside for the purpose of mounting and connecting-up the instruments, armament, hydraulic and electric services, and so forth, in short, attend to "the plumbing," is obviously limited.

"Split" Construction

Realising this, the Handley Page Company decided, when the Hampden was being planned, to attack the problem in a different and more logical way. The aerodynamic design, as one may term it, once decided upon, the drawing office and the works got together, and, after a good many discussions, one may suppose, evolved the scheme on which the Hampden was ultimately produced. For its working this scheme is so completely dependent upon the closest co-operation between structural design and production that in the following notes the two must be dealt with concurrently.

The foundation of the scheme was actually laid in connection with the previous Handley Page bomber type, the Harrow. When the initial order for Harrows was received it was, however, not of a size to justify very extensive jigging and tooling. Consequently, the scheme could not be carried to its logical conclusion, and a sort of half-way measure had to be adopted.

In the Hampden, however, the initial order was sufficiently large to justify much greater expenditure on jigs and tools, and consequently the principle could be carried almost to its logical conclusion. Not quite, because even the Hampden order was not sufficiently large to extend the desirable production methods down to the last small detail. However, the fundamental principle is there and can be applied to any type, so long as the size of order makes it financially possible.

An article on the flight-testing of Hampdens appeared in "Flight" of December 29, 1938.
