**Drover flying trials showed need for minor adjustments only. The structural design is based largely on the Dove.**

# Some Drover Impressions

**VIVIGANI examines the design and construction features of this interesting Australian three-engined light transport. Success of the structural design is apparent from the payload increase of 200 lbs. over the estimated payload of 1200 lbs. and performance is sound.**

THE De Havilland Drover, now a fait accompli, has aroused much interest in the aviation sphere, not only in this country, but also in England and America, and the reaction has been quite voluntary since the DH organisation has deliberately not sought advance publicity of any kind. This policy, which is very rare in the aeroplane business, is also very refreshing, for one gets a little tired of the terrific build-up which pending types, both British and American, have been receiving when all too frequently the particular type is either a failure or, for reasons of cost, etc., never progresses beyond the design or the prototype stage. I don't think it adds to the prestige of a manufacturer to do this sort of thing and that is why the DH policy is to be commended.

Decentralised design is apparently a policy of the DH enterprise, for the Canadian branch has already designed the Beaver for the local market. The Drover is the first aeroplane which the Australian company has designed and built as a totally new type. Other manufacture has been concentrated on established designs, although their experience in this field has been extensive and includes mass production of the Mosquito. This point is worth remembering, for it has contributed largely to the quality of the Drover.

It is generally understood that the Drover has been conceived as the Dragon replacement, although it will, if sold in quantity, have a far greater potential field than ever commanded by the Dragon. It appears to have had somewhat of a freighter philosophy behind it, but in this country at least it is likely to have its greatest future as an economic passenger feeder.

Before giving some details of the aeroplane itself it is interesting to review another basic philosophy behind the design—the decision to employ the three-engined fitment.

This decision, which must have been a difficult one to make, is one which reflects great credit upon the design team, for they have boldly entered a most contentious field; one which was considered, four or five years ago, to be outmoded, and one which, in the light of existing and proposed Civil Aviation requirements, may yet prove to be the only economic answer in the smaller feeder-freighter category. The lead in this field has been set by John Northrop, and he could prove to be a world beater once again, for it was he who designed the DC-3 for Donald Douglas.

## Engine-Out Considerations

With growing emphasis being placed on the engine-out performance of commercial aircraft, the designers of the twins are being set an increasingly difficult problem, while the step from the twin to the four-engined fitment introduces extra problems of wing strength, drag, instrumentation and a host of others. The three-engined fitment, however, can be made without the same weight penalty in the wing and with little extra drag; it also gives much better potential engine-out performance than the twin. The latter type cannot avoid the fact that an engine failure leaves it with a maximum of only 50 per cent. power available and with a severe asymmetrical problem at the critical higher powers. This means higher safety speeds and trouble straight away with the Civil authorities.

Although it has been stated that the Drover is based on the Dove for much of its design, it bears very little actual resemblance to the Dove, except around the cockpit from the front. The conventional tail wheel probably contributes to the difference, together with the three-engined fitment.

First impressions of the Drover are that it is bigger than one would have expected. It stands well off the ground at the nose and the centre engine cannot be serviced in comfort from the ground. It has the same span as the Dove and obviously there is much similarity here.

These two points are not criticisms, but merely impressions. The span has allowed a wing loading of exactly 20 pounds per sq. ft., which gives it a great start as a performer at the lower end of the speed range, while the aspect ratio (greater than anticipated) would allow better speed figures.

It is not necessary to give the leading particulars, but a few comments on the general construction methods will be of interest.

The Drover is of all-metal stressed skin construction and with practically only one exception is made of the British DTD 546D specification aluminium alloy. The exception concerns the spar caps, which are of the 75S material, among the strongest of the non-ferrous alloys in its heat-treated state known as 75ST.

The skin on the wings and on the fuselage is, with the exception of some sheets on the underside of the mainplanes, of 24 SWG thickness, and it is here that the very excellent workmanship which has been put into the construction is most apparent. The thin 24 gauge skin is not easy to work, especially on a prototype when jigs are being used for the first time. In addition, the entire fuselage is built in one jig, which makes the construction much more difficult, by reason of the relative inaccessibility of various jobs, when compared with the normal production procedure of construction in sections. This standard of workmanship has resulted from the now extensive experience gained by the DH organisation. Much of it has been in wooden construction, but metal work remains a part of all aircraft.

While on the general construction of the Drover, one other innovation is of interest. This is the proposed use of metal-to-metal glue of the skin joints, and other than highly stressed metal joints. This method is not used on the prototype, but is projected for the production models. We do not know very much of this type of construction, and will be very interested to see how it will stand up to the bush conditions for which the aeroplane is being designed. DH's have valuable experience in this "Radux" jointing technique, as it is used in the Dove.

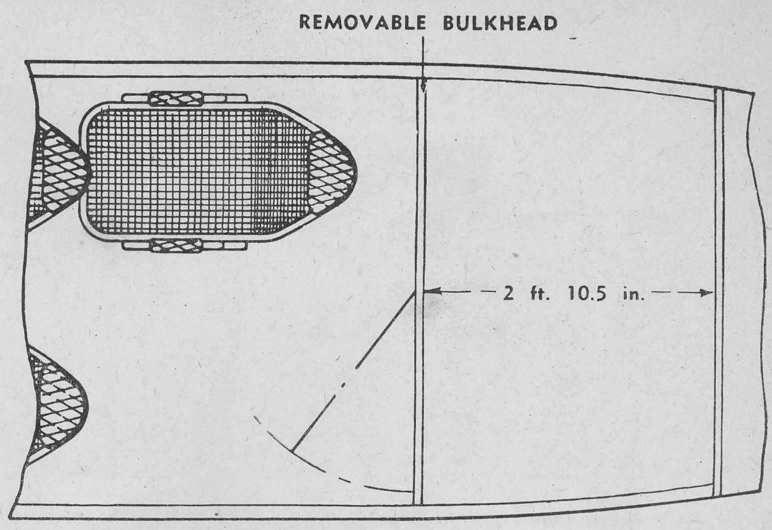
## Construction Aids Repairs

It would probably behave in service much the same as the chain welding methods which are used on similar occasions and which can be seen on cowls, wheel well doors, fillets, etc., of most post-war American commercial aircraft. Ease of repair is the most important factor involved. This must be weighed against simplicity of construction, for with a comparatively slow aeroplane the drag of the rivet head is not great. However, it is assumed that DH's have their eye on this point, for to be a success the Drover should have no repair problems in the field.

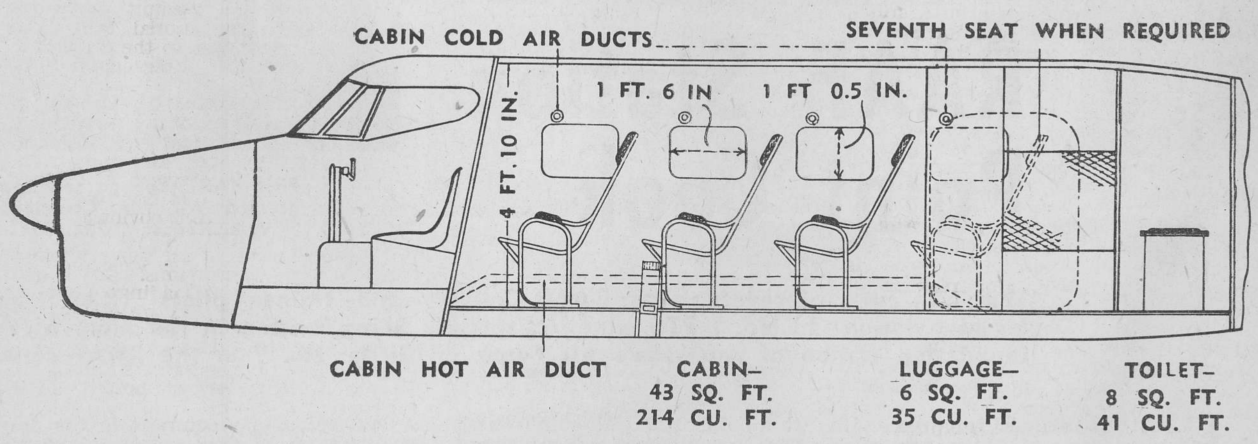
The cabin is very free of any excrescences, and in the full freighter version would have a free length of some twenty feet. Although the fuselage is of circular section for ease of construction and to give increased space over the Dragon, it is possible that a worthwhile refinement here would have been the pear-shaped fuselage section which gives maximum fuselage width at floor level. This is quite an important point, and the Northrop designers of the Pioneer altered this prototype in this manner to give their production models this pear-shaped configuration.

The dove-like cabin windows are an asset for passenger work, when the Drover can be used with up to nine customers. Few passenger aeroplanes these days have adequate visibility for the passenger. For a person making his first trip the cabin visibility is by far the most important aspect of the trip.

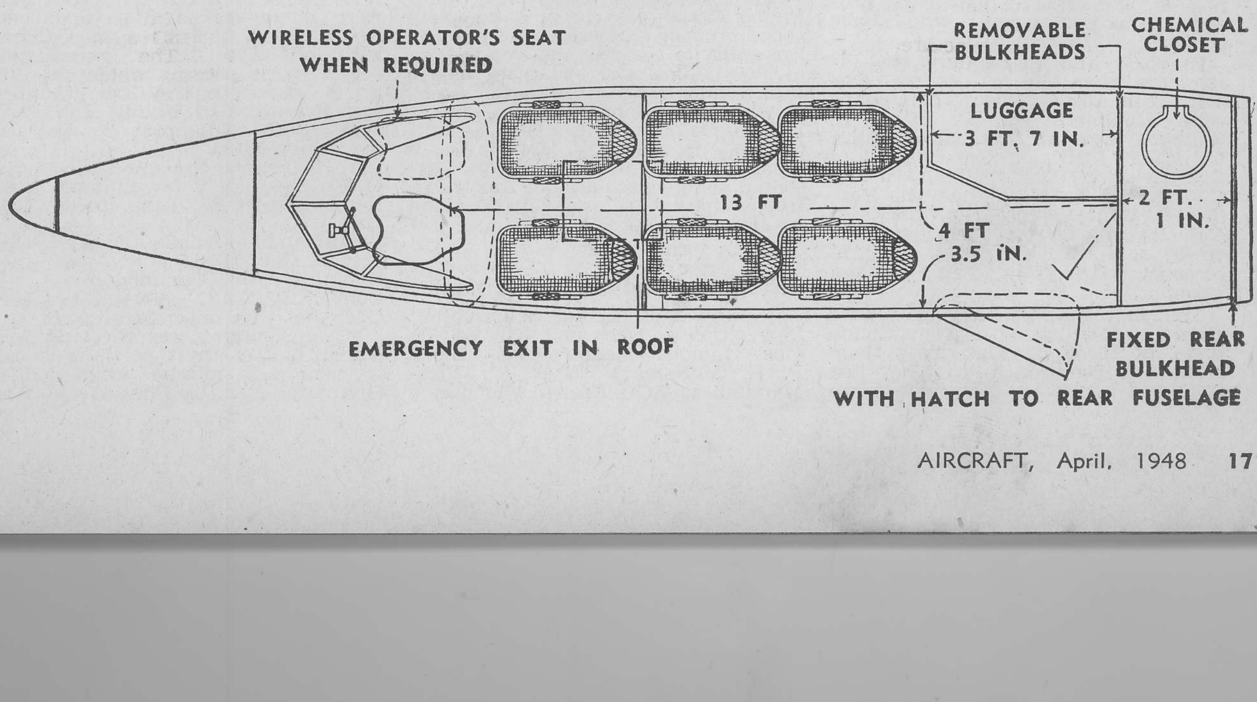
*(Continued on Page 46)*




**Seventh seat in position, toilet removed. Luggage 11 sq. ft—56 cu. ft.**




**Cabin plan of the standard version 6-7 seat Drover. Fuel tank capacity is 90 gallons in two 45 gallon tanks.**



## DROVER IMPRESSIONS

*Continued from page 17*

Little improvement can be made on the Dove method of offering an interior where the easily removable bulkheads make for extreme versatility. The presentation of a cabin interior for an aeroplane like the Drover should be as simple as possible. Alternative customer choice interiors invariably cause extra cost and, at times, much heart burning.

The present cockpit layout is in the throes of prototype instrumentation, with the attendant test equipment, and so it is too early to assess this aspect at this stage. The DH cockpit has always been noted for its simplicity, and the Drover is no exception.

The use of a wireless-operating hostess is an innovation by Airlines (WA) Ltd., which may well be copied by others, for with nine passengers and a pilot the next member must be a cabin attendant. Radio fitment has to be made and will need some thought to have it all accessible to the pilot if the single-seater cockpit is to be adopted. A small point in connection with the cabin is that a larger door would be a big advantage. There must be a number of pilots who would only fit through the present door with great contortions.

The engines are the now famous little Gipsy Majors, the mark being the Series 10, developing 145 HP, and fitted with manual VP airscrews. The engines are very neatly fared, with the outboard fitments reminiscent of the outboard nacelles in the Lancastrian. The outboard Merlins in the Lanc. are as neat a fitment as could be made and the Drover outboards are real miniatures. These power eggs are interchangeable except for some engine driven components. At present only one generator is fitted, but an extra one may be introduced later. This would be desirable for the operation of the electrical services.

With the exception of official test crews, DCA restrictions on prototype flying preclude flight in the Drover for the time being. However, the DH people are anxious to let people assess the aeroplane in the air, which shows that they are pleased with it.

The empty weight is actually less than calculated, and the top speed will probably be in excess of the 150 mph original calculation, although, as the DH people rightly point out, top speed has very little to do with commercial flying.

Apart from some very minor trouble with the control surface operation the aeroplane has performed excellently in the air, despite the fact that the electric controls for the VP system are not yet fitted and the aeroplane has to be flown as a fixed pitch combination.

The cruising speed of 135 mph, which has been established in flight, is an excellent figure for a fixed undercarriage machine and is quite satisfactory for its projected use. The aircraft is very kind in the air and has no vices. Perhaps its most important performance feature is the short take-off and landing runs, the latter being abetted by the generous flap area.

It is a sturdy and business-like aeroplane, with the simple and trouble-free shock rubber undercarriage, and has an excellent future. The price, it is hoped, will be in a reasonable bracket, and it will be interesting to see how it is offered. If a speedy step can be made from prototype to production at a reasonable figure the Drover should have little difficulty in finding green pastures. END.

## AMERICAN BLUEPRINT

*Continued from page 13*

- Planes be ordered for delivery over a five-year period whenever possible.

"We believe that military purchases of aircraft of 30 to 40 million pounds weight annually, in addition to demands for commercial and private planes, would provide a sound basis for expansion in an emergency," states the Commission.

In one of the most vigorously worded chapters in the report the Commission urges the essentiality of intensive research and development in aeronautics.

It points out that, during the Second World War, America concentrated on the development of existing types of aircraft for production, and practically abandoned fundamental research.

"By VJ Day our reserve of research information was largely exhausted," it states.

Pointing out that Britain and France are making sacrifices to provide for research, it urges that increased appropriations be made to expand research activities—and that greater secrecy be maintained about advances.

To achieve desired results it is recommended that:—

- The possibility of employing atomic energy for aircraft propulsion be followed up;
- More research effort be put into the development of systems for making blind landings with aircraft;
- Each aeronautical research agency should be allocated a lump sum annually, the appropriation to be based on estimated requirements;
- Salary limits should be lifted to attract top-calibre scientists; and education in aeronautical sciences be given high priority.

The United States is dangerously short of equipment for research in the trans-sonic and supersonic speed range, says the Commission, but the most serious lack in the research and development field is personnel.

It reveals that in the fiscal year of 1948 the US Government is spending about 312 million dollars for aeronautical research and development, but says it is evident that the total amount of money going into various aeronautical research channels is considerably greater. END.

**[The Civil Aviation section of this report will be dealt with in the May issue.**