19th August, 1937.

The Secretary,
Commonwealth Aircraft Corporation Pty. Ltd.,
422 Little Collins Street,
MELBOURNE. Vic.

Dear Sir,

Tail Plane - Gannet
Broken Spar

In connection with the matter of the broken Tail Plane spar of the Gannet operated by Intercity Airways, Mr. H.A. Wills representing Civil Aviation Board has reported that under examination at M.S.B. Maribyrnong, it was found that the spar which C.A.B. forwarded there for examination has been proved to be cracked at every rib attachment.

Mr. Wills said that the opinion stated at M.S.B. is that the cracks are due to the alteration of the structure of the metal at, or near the welds and the consequent early fatigue due to the vibration or fluctuating loads upon this member.

He also stated that he thought that the trouble may be overcome by securing the ribs by clips, without welding.

As all spars that have been fitted have had the ribs welded to them the damage has already been done if welding is the cause. Therefore, it appears to be necessary to replace all spars in existing Gannet tailplanes.

It has been reported by Mr. Wills that the R.A.A.F. Gannet which is, or was operating in Central Australia also has been found to have broken spars. No information in regard to the other Gannet in the possession of the R.A.A.F. has come to hand.

The steel in these spars is made to the T45 Specification and therefore has a fairly high carbon content, approx. .3%. This appears to be a disadvantage in the member we refer to. It is thought that the substitution of a lower carbon steel, even if a slightly heavier gauge has to be employed should be investigated. This suggestion has been put to Mr. Wills who appears to regard it with favour.

The spars under consideration are of 2"D x 20g. This relatively large diam and light gauge may on investigation prove to be a disadvantage.

No action has yet been taken by this Branch, to modify any Gannet Tail Plane in consequence of these failures. The Tail Plane for Gannet No. 8 was just in the process of being covered when information was received that the R.A.A.F. machine was found to have the fault, and C.A.B. intimated that it would be necessary to alter the method of rib attachment.

When the matter was subsequently discussed with Mr. Wills it was pointed out that even if welding were omitted from the rib attachments the spars were welded at both ends, and although no cracks had been reported to have been detected in close proximity to these welds it is possible that they may occur, if the remainder of the spars remain intact as a result of a change over to the clip attachment.

Whereas the rear spar is transverse to the fuselage, the front spars, port and starboard, stretch from a short transverse tube about 6" in length at the front attachment to their point of attachment about 9" from the outer extremities of the Tail Plane. The Tail Plane braces upper of rod, and the lower of tube, are attached at the intersection of the front and the rear spar. It has been reported that two spars have broken in the Codock Tail Plane. The original was of 1½D. Mild Steel. A 1¾" Diam. tube of the same specification was substituted; this also broke. A 2" Diam. tube of now unknown specification was then fitted: this appears to be standing up but not many hours have been flown on this spar.

The following appear to be the points to be investigated:-

1. Will clipping instead of welding the ribs be of any advantage, if the ends of the spars are welded.

2. Are the ribs which are not braced sufficiently stable.

3. Would Mild Steel T26 with welded ribs be more suitable.

4. Should the tube be replaced by a built up rivetted beam of HT Steel - taking the relative section moduli of tube and the I section beam into consideration.

5. Would a pin jointed structure be more suitable.

The cause of the failure appears to be due to fatigue, but it has not yet been estgblished what is the cause of the fatigue. It appears to be certain that fatigue had been hastened by welding, but this it seems can be regarded only as a contributary cause.

Under certain conditions of flying, very definite shakings of the Tail unit were noticeable. It is most noticeable when one engine is running at higher revs. and the other "ticking over". Although Mr. Clarke, who tested Gannet No. 7 showed that the shaking could be eliminated Mr. Hall, who subsequently flew the machine, stated that whilst it was reduced in No. 7 it was not entirely eliminated, and he did not consider the condition in which it could be eliminated in this machine as being normal flying.

It is possible that mechanical vibration and not aerodynamic buffetting is the cause, particularly as the engines are mounted metal to metal without rubber cushions.

We now await advice as to what would be an acceptable modification to overcome this fault. As the delivery of No. 7 and the completion of No. 8 are liable to be held up your assistance in this matter is requested please.

Yours faithfully,