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CP-100 MARK 5

STRICTLY CONFIDENTIAL

As you know, we have had several discussions on the subject of the Mark 5 wing strength within the various divisions of the Company, and the thoughts of the principals have been aired pretty effectively. For what they are worth, my own feelings on this subject are as follows.

First, dealing with the facts; - with regard to the aircraft which were found with buckled wings at St. Hubert, and the case of the fatal accident at London on Air Force Day, it is now generally agreed that these aircraft were operating outside the limit load factors corresponding to their speed and altitude at the time of wing failure.

From a purely legal point of view, then, there is no reason to believe that the aircraft strength does not comply with the model specification, and the Air Force have not approached the Company officially to ask them to do anything about the strength of the aircraft. They appear to have accepted the fact that the pilots who were flying these aircraft were trying to put on a good demonstration and, in fact, exceeded the limits for which we had cleared the aircraft.

The fatal accident occurred on an aircraft which had just taken off and was assumed to be at around full fuel weight, and the preliminary evidence from the moving pictures are that he was travelling faster than the 400 knots originally estimated. He was also flying close to the jet wake of the first demonstration aircraft, which could have imposed additional gust loads on the aircraft.

I understand from Fred Plumb that the Air Force feel that an education program is required for the pilots flying the

Mark 5, and that the Air Force, at Senior Officer level, feel that this is the answer. I also understand, however, that the pilots themselves, in the squadrons equipped with Mark 5's, are now quite disturbed and have openly stated that they are afraid of the aircraft.

Dealing now with the methods of taking care of this situation, there are basically three ways of relieving the situation:-

1. We could restrict the flying of the aircraft at low altitude to, say, 300 to 350 knots, and possibly put a 'g' limitation on the aircraft which would take care of possible gusts. This, I believe, is not a particularly good solution, since it not only puts a black mark against the aircraft by these limitations, but it would also allow a pilot to break the aircraft if he exceeded the limitations. I would be particularly worried about handling the Belgian situation in this way.
2. We could strengthen up the wing at the point of failure, i.e., between Ribs 6 and 8, and retrofit this strengthening scheme on all Mark 5's, including the Belgian aircraft. There are three problems involved in this, as I see it :-
 - (a) A fairly large scale modification program would have to be set up which could delay the delivery of aircraft to both our own Air Force and the Belgians, and we would have a Mod Center operation on our hands in the Plant.
 - (b) Even if the strengthening was carried out in this manner, this would take care only of the failure in the outer wing and the next point of failure would be at the root of the wing, since the whole philosophy of the basic Mark 5 aircraft was to take advantage of the root strength of the aircraft by adding tip span and area, so that the whole wing was approximately of the same strength from root to tip. (We do know now, however, that in certain stressing cases, the strength of the tip is approximately 8% under the strength at the root.)

The overall strength of the Mark 5, due to the extra span, was reduced from 7.33 'g' limit to 6.1 'g' limit in the half fuel case, and from approximately 6 'g' limit to 5.3 'g' limit in the case of full fuel. There is, therefore, the distinct possibility that the wing would still fail, when subjected to excessive 'g', somewhere between the root and the tip if these strength modifications were carried out between Ribs 6 and 8.

- (c) This repair scheme would have to be incorporated in the Belgian aircraft now, to get delivery on schedule, and it is difficult to see how we could press for this modification without R.C.A.F. approval, and, in any case, there is likely to be a feeling that Avro consider the wing to be under the strength previously estimated.

NOTE: If a sufficiently simple repair scheme could be found to make the modification a relatively easy retrofit, this problem would, of course, be considerably alleviated. Bob Lindley is looking into this.

3. The third method, and the one which I believe is the most sensible approach, is to take off the tips of aircraft which are to be used for demonstration within our own Air Force, or put a strong recommendation to them that they only do high speed, high 'g', low level flying with Mark 4 aircraft, and restrict the Mark 5 aircraft to the high altitude type of flying for which it was designed and released.

For the Belgians, the aircraft will be, in any case, delivered with the short wing and wing tip tanks installed, and we could make up a fairing which completes the wing tip once the tanks are removed, and inform the Belgians we strongly recommend that, for the first few months of their flying, when they will undoubtedly be doing demonstration work and low level flying, they leave the tips in the Stores and install them later when the aircraft passes from the 'toy' stage to actual operation. We would have to also give them tailplane tips, which could be added at the same time

as the wing tips, when they went to full Mark 5 configuration. This would require some minor engineering and manufacturing, since the present tail tips are not removable.

I believe that the advantages of this scheme are as follows:

- (a) We need not restrict the clipped wing version in any way.
- (b) We do not believe they would break up this version in demonstration flying.
- (c) Any other course of action which puts a speed restriction on the aircraft will always present the problem that should the pilots ignore these restrictions, as they have done in the past in Canada, and will undoubtedly do, for my money, in Belgium, then we will have CF-100's splattered all over Europe, and I would rather face the problem of explaining the situation to the Belgians now than have this happen later.

To cut a long story short, give them an aircraft that they cannot break until they are ready for high altitude squadron operation and then, and only then, put on the restrictions to high altitude flying only.

From a political point of view, we obviously have quite a bit of selling to do, even taking the latter course, since our Air Force will obviously have to go along with this philosophy and, in fact, suggest to the Belgians that they, the R.C.A.F., support this view. Messrs Lindley and Lindow are quietly going to discuss this with A.D.C., and then with C/C Footitt and W/C Prahm on Wednesday of next week. I believe that probably around Friday of next week we should have a Divisional get-together to make a definite decision on this matter.

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