

- 11th December, 1953.
- MR. HARVEY E. SMITH - GENERAL WORKS MANAGER
- MR. J. C. FLOYD - CHIEF ENGINEER
- SUGGESTED POLICY on C-105

Confidential

I was very pleased to get your memo on the method which you feel we should follow on the designing and building of the C-105, since there is no doubt that we must all settle something on this as soon as possible. I had submitted a dummy brochure to Mr. Saye to get his approval on the format of the "Bible" which we wish to establish on the 105, and in this was included a brief section on suggested Company policy. I am attaching herewith my own copy of this section for your perusal. Could you please return it, since, at the moment, this is the only copy we possess. I will have a copy run off for you if you wish. I do not suggest that we follow this plan to the letter, and as I pointed out, it is just my own opinion on the best way to handle the job; however, during our discussions, of course, this may change.

I want to say from the outset that I am very sympathetic with the problems involved from your point of view, since, for better or worse, I was also on the receiving end of these problems for a very brief period, (but certainly long enough to understand some of the difficulties encountered in building an airplane). (When I joined Works I had no idea of the difficulties involved)

I also found out, at that time, the fundamental differences in the characters of the two jobs: Design and Manufacturing. On the Manufacturing side one is dealing with the efficient sequencing and handling of generally known quantities and hardware that can be seen and touched. On the Design side, one is dealing mostly with unknown quantities which embrace a number of almost intangible problems, and one is always gambling. The bigger the gaps in the knowledge, the greater the gamble. The Chief Engineer's job is to see that the gambles taken are big enough to keep the Company ahead of the game on a technically competitive basis, but not too great to risk the collapse of operations should the unknowns produce too many major difficulties.

From certain smatches of conversation from time to time, I have sensed the existence of a feeling (although I may be completely wrong), that I have been tagged with a "do it like Britain" complex, and that I am suggesting building a prototype aircraft mainly on the basis that "this is the way they do it in the U.K." This is certainly not the case, and while I do feel that the technical superiority, generally, of the British designs, - e.g. the "Vulcan" - is based on their emphasis on development, I fully realize that to be competitive with companies on this side of the Atlantic, we must get a product into production which is technically sound as fast as we possibly can and take the reasonable gambles implied in doing this.

to: Mr. H. R. Smith

I certainly share your philosophy that we should do what is good for Canada, and, of course, this is one of my main reasons for remaining in Canada.

I think that it may be a good idea to go through the points in your memo one at a time, so that we can see where the differences lie in our philosophies. In the attached sheets I have taken your points one-by-one, and commented on them by numbered paragraph.

I have suggested to Mr. Snye that he peruse our respective suggestions, and then hold a meeting, if necessary, of all people who are concerned with the 105, and base our program on the best possible integrated program on which we all agree, since I feel that this is the most important decision that this Company will make, probably at any time, - since it will set the pattern for our future operations.

- 1 - 1. I agree that we should not strive to obtain a contract based on two prototypes only, and then sort out the development program, - deciding then, when these have been successfully sorted out, to go ahead with a production airplane based on a developed prototype. The only reason I suggest having a prototype aircraft at all is to build engineering flying test specimens as fast as is humanly possible, so that we can prove the product and make any changes in pre-production or production before it is too late. The prototype would not be for the purpose of sorting out drawing errors or establishing construction methods, since these should all be sorted out well ahead of any hardware being manufactured.
- 1 - 2. I agree here with your philosophy to go right ahead with production, including the layout work, using individual part prints and drawing up Specifications, etc. However, I do not feel that it is reasonable at that stage to make hard tools for the first aircraft, which is implied in 1 - 2(b).
- 2 - 1. I can have no possible doubt about your sincere desire to suggest what is best from the over-all Company point of view, and I feel I do not need to reassure you that such is the purpose of my own suggestions.
- 2 - 2. I would respectfully suggest that a comparison of the Engineering type of work done on dams, power plants, bridges, automobiles, etc. could have no bearing whatsoever on the decisions we make in the case of a front-line combat aircraft. The factors used in designing most of these products have hardly changed over the centuries, and bear no resemblance to the relatively colossal unknowns inherent in advanced aircraft design.

to: Mr. H. R. Smith

3.

2 - 3. Here, I would agree that on the CP-100 you have had a pretty rough time, due to the production schedule and the timing which you inherited, and also due in some measure to the quality of the design information which, in turn, was due in some measure to the pressure under which many of our designers had to work to clear up the technical problems involved in bringing the aircraft up to operational standard, - and I know of no one who could have done a more efficient job than you did in sorting out these problems, in Production. However, I cannot agree that the greatest difficulties encountered by the Company were solely due to the drawings not being properly drawn or checked. Probably our biggest single problem on the airplane, and one which almost put us out of business, was the inadequacy of the strength of the centre-section and other major components, which was a purely technical problem, and was in no way due to somebody drawing the thing badly. The same applies to our present and most urgent problem - i.e. the whole canopy story - which is a problem concerned with pressure, airloads, laws of Nature, etc. which one cannot draw on a piece of paper.

The same also applies to our next biggest problem which is the clearance of the Century rocket pods, since no one had the foggiest idea, until these pods were flown, that they were going to fail by airload fatigue, etc.

The biggest problem that Convair have at the moment is the complete re-design of the fuselage of the F-102, due to interference effects between the wing and the fuselage intersection, and this is apparently putting their schedule back somewhat. This happened to them, even with a research aircraft being built ahead of the prototypes and despite the best efforts of their 3300 engineers to sort out these problems in the wind tunnels and on the research aircraft before flight.

This, in no way, detracts from your very good point that detail and assembly drawings should be checked in detail before issue, and there will be no excuse for us on the 105 for turning out design information which is either not adequate or which produces parts which do not fit together. However, I am trying to point out, having said this, that we are still left with a great deal of unknowns which can only be sorted out by suitable development work either on rig tests or aircraft allocated for engineering development.

to: Mr. H. R. Smith

- 3 - 1. I agree completely with your philosophy with regard to this section, except that I feel that an enormous gamble will be taken on 3 - 1(e), if tooling and interchangeability gauging is frozen too early, unless a considerable number of changes can be tolerated later.
- 3 - 2. I agree with this section, except, again, for the manufacturing of hard tools at this stage.
- 3 - 3. I agree with this section.
- 3 - 4. I agree with this section on the basis of the pre-production aircraft, but assuming that Engineering are allowed to make their prototype or development aircraft ahead of this as quickly as possible.
- 3 - 5. I believe that this is a matter for real discussion between our two groups, and I would rather discuss this than comment on it here.
- 3 - 6. I believe that the comments in 2 - 3 cover this section.
- 3 - 7. I agree with you entirely.
- 3 - 8. I think you must be under a misapprehension here, since it was certainly not our inability to build the Jetliner which crucified this airplane, and, in fact, it was designed almost absolutely on the philosophy that 5, at least, per month, could have been made from the original tooling, and it did, in fact, completely meet the Specification. Politics and indecision on the parts of the Government, the Company, and the criminal handling of the Certification problems by the Department of Transport due to ignorance, and reticence to take a gamble, were the deciding factors in digging the grave for this aircraft.

To sum up, then, I believe that we must certainly follow the path that we are designing for production, and must also ensure that you and your people are brought in as early as possible on the project, and that the best possible relationships are established between the two Departments. I do, however, feel that Engineering must be allowed to build a flying shell and, if possible, four such development airplanes as fast as is humanly possible and completely under our own control in Experimental, as tools of Engineering for developing and proving the product.

This, however, should, in no way, retard the decision to go into production as fast as possible and take whatever reasonable gambles are necessary to get a first-class product into production in the fastest possible time.

JCF/1b

*cc: Mr. W. D. Smyke
Mr. R. L. Liddy*

J. C. Floyd,
Chief Engineer-Aircraft Division.