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Mngr.....	Eng. Supt.....
Sec.....	A/F. Mngr.....
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27 NOV 1961	
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MISSION AUSTRALIENNE
S.N.E.C.M.A.
70, bld Kellermann

PARIS 13e
France

COMMONWEALTH AIRCRAFT CORPORATION PTY.LTD.
BOX 779 H P.O.
Elizabeth St.

MELBOURNE
Australia

Attention : the MANAGER

Subject : Test cell silencing systems

Dear Sir,

In your letter M I26, information was requested relative to our views on the silencing problem. Attached herewith is a copy of Mr. MELBOURNE's report which cover the present status of the investigations relative to test cell silencing. This will serve to show the trend of the present thoughts on the subject, but firm recommendations will not be possible until the exploratory work is complete.

Yours Faithfully,

CIRCULATION / COPIES *27 11/61*

E.F. MNGR ✓	FCT. ADM. SUPT.
DSGN. ENGR ✓	MC. SHOP. SUPT.
DEV. ENGR ✓	PRODUCN. SUPT.
SERV. ENGR	ASSMLY. SUPT.
QUAL. ENGR	FOUNDRY. SUPT.
PROD. ENGR	METCAL. SUPT.
MATL. ENGR	PROCESS SUPT.
CH. TL. DSGR	TOOL. PROD. SUPT.
CH. INSP. E. F.	TOOL. ROOM. SUPT.
A/F MANAGER	SUPT. INSPECTION

WJM/SG

C. Bellward
C. BELLWARD

WJM

REVIEW OF TEST CELL SILENCING SYSTEMSI SUMMARY

The investigations regarding the modifications required to adapt the C.A.C. test cell silencing system for ATAR engines with afterburner are by no means complete. This review will serve to show the trend of the "thinking" but firm recommendations will not be possible until the exploratory work is complete. The general ideas at this stage may be summarised as follows :

- 1) The noise level tolerated by S.N.E.C.M.A. at Villaroche would not be acceptable in the built up area at C.A.C.
- 2) Provision of a "BERTIN" gas mixing device in front of the detuner.
- 3) Provision of an additional section at the rear of the C.A.C. detuner.
- 4) Provision of supplementary air intake duct in the C.A.C. test cell.
- 5) Streamlining of exhaust cooling air entry to reduce buffeting and vibration.

II NOISE LEVEL TEST AT VILLAROCHE

A special test was arranged by S.N.E.C.M.A. at Villaroche to permit some appreciation of the problem. An ATAR engine using afterburners was under test and it was found that the noise level about 50 yards in front of the air intake was in the range of 105 to 110 decibels. This noise level would be quite unacceptable in the built up area at Fisherman's Bend.

In addition, the vibration on the rear and side walls of the test cell was quite severe. However, there was no evidence that the buffeting and vibration had caused any structural damage to the building.

The vibration was felt some hundreds of yards distant and the windows rattled in the engine preparation shop.

III SILENCING OF S.N.E.C.M.A. Test Cell

S.N.E.C.M.A. do not use a conventional type silencing unit but are content to exhaust the gases into a large mixing chamber where large quantities of cooling air are introduced. The mixing chamber is, in fact, an extension of the concrete walls of the test house building and the gases are deflected upwards at the rear. The walls of the chamber are lined with asbestos mattresses containing compressed sound absorbing material enclosed by perforated steel sheet. This method of soundproofing does not appear to be as effective as the two types of detuner in use at C.A.C. and cannot be used as a basis for determining our requirements.

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4 SILENCING OF FRENCH AIR MINISTRY TEST CELLS.

The French Air Ministry cells at Saclay were inspected but the principal ATAR cell was under repair. The basic design of the exhaust gas exit conditions are in some respects similar to SNECMA but use is made of water injection in the exhaust tube and resonant chambers in the walls of the mixing chamber. However, it is understood the noise level is still a source of worry. These cells suffer from the fact that they are built in old fortifications and the exhaust gases have their exit at low level.

The use of water injection has been considered on previous occasions at C.A.C. but this is not recommended for the C.A.C. installation.

5. SILENCING OF ARMAGNAC FLYING TEST BED

The Armagnac flying test bed used by S.N.E.C.M.A. at Villaroche is equipped with a portable detuner during engine run up tests. A visit was arranged during 9 K engine tests and the portable unit was very effective during engine runs without afterburner. A further visit was arranged during afterburner tests but, unfortunately, the starting equipment developed a defect and the test was abandoned. This detuner is manufactured by the "SOCIETE BERTIN & Cie" and is based on the principle of hot gas mixing in the main core of the jet flame. This is achieved by the use of hollow stainless steel tubes which induce a flow of cooling air from the outside of the detuner. A second ejector effect is obtained when air is introduced to the periphery of the gas stream through perforated plate. BERTIN & Cie are interested in providing a study for an attachment to be fitted to the front of our detuner for manufacture, either in France or under license in Australia.

BERTIN have had an acoustics Engineer in attendance during the 9 K tests in the Armagnac and will doubtless be able to supply us with results of their noise level tests in due course.

Negotiations are still proceeding with the BERTIN organisation.

One problem associated with this type of unit is the necessity to provide adjustment of the front portion of the detuner for engine calibration purposes. According to the SNECMA test bed design authority, the detuner gap should not be less than 5' and the Villaroche production test supt has indicated that 6' is in fact required. However, both the testing and control authorities at Villaroche have made a recommendation, in writing, for adjustment to be provided over a range from 1.6 feet to 8.2. feet. This is completely unrealistic.

6. SILENCING OF SULZER TEST BED (SWITZERLAND)

Test bed silencing has been discussed with Mr. SCHMID of SULZER and he says that his Company is purchasing a conventional type detuner from Ets. A. BOET of North France. He says that the Swiss considered submissions from BOET of France, CULLUMS of England and a Swedish firm. The BOET detuner was chosen because it was the cheapest offered.

We are endeavouring to obtain further information relative to the BOET detuner.

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