

UNITED STATES GOVERNMENT

Memorandum

SATURN HISTORY DOCUMENT
University of Alabama Research Institute
History of Science & Technology Group

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TO : AA- Dr. Seamans Date ----- Doc. No. ----- DATE: February 4, 1963

FROM : M - Mr. Holmes

SUBJECT: F-1 Engine Combustion Instability Problems

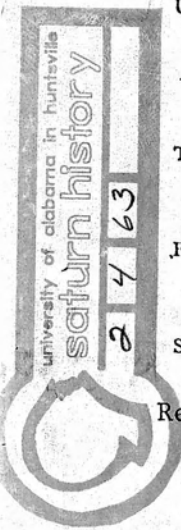
- Reference:
1. memo to Mr. Rosen from Mr. Holmes dated 1/26/63
 2. letter to Dr. von Braun from Mr. Holmes dated 1/26/63
 3. note from Dr. Seamans to Mr. Holmes dated 1/23/63 transmitting the following:
 - a. memo to Dr. Seamans from Mr. Dixon dated 1/18/63
 - b. memo to Dr. Seamans from J. C. Evvard dated 12/27/63
 - c. Lewis memo to Dr. J. C. Evvard from Dr. R. J. Priem dated 12/12/63

Attached for your information are the minutes of a meeting held in my office on January 31, 1963 to discuss our most recent accomplishments and our plans for the future in solving the F-1 engine combustion instability development problem.

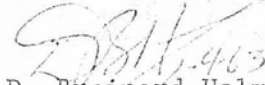
Mr. Paul Castenholz of Rocketdyne gave a very excellent presentation and the charts used by him have been included as a part of the minutes. In response to my direct questions it appeared that all present at the meeting believed that everything possible is being done to solve this difficult and serious problem. It might further be noted that all those present stated their optimism that a proper solution will be found.

Since the representation at the meeting seemed to cover all major areas involved, including Lewis, apparently any lack of coordination as expressed in the December 31st letter to you from Dr. Evvard have been overcome in the intervening time.

You have copies of my letters to Dr. Wernher von Braun and to Mr. Milton Rosen asking them to give their specific and personal attention to following this problem. Further, I have instructed all of our NASA personnel cognizant of this area to leave no stone unturned in applying the resources of brain-power and funds to achieve an early solution. I am informed that there are presently no impediments to the program in the form of lack of authorization for the application of the proper manpower, sufficient overtime and sufficient funds. I have requested that any bottlenecks arising in this development be brought to my personal attention immediately. Included in this request are bottlenecks associated with not only development, manpower and funding but also facilities. I have further requested that Mr. Milton Rosen establish channels for urgent action messages and procedures for all government and contractor participation in the F-1 combustion instability development work.



I plan to personally keep you informed of all significant factors in this development on a current basis. We will, of course, furnish you with a monthly status report from Mr. Tischler's office as you requested.



D. Brainerd Holmes
Director of Manned Space Flight

Attachment

cc: Dr. von Braun
Mr. Rosen

MEMORANDUM FOR RECORD

Subject: Meeting on F-1 Engine Combustion Instability at NASA Headquarters on January 31, 1963

Attendees:

ONMF

D. Brainerd Holmes, Director of Manned Space Flight
Joseph P. Shea, Deputy Director (for Systems)
Milton Rosen, Director, Launch Vehicles and Propulsion
A. O. Tischler, Assistant Director, Propulsion
Charles H. King, Jr., Chief, Liquid Booster Engines

MSFC

Hermann K. Weidner, Deputy Director, Propulsion and Vehicle Engineering Division
Saverio Norea, F-1 Project Manager, Propulsion and Vehicle Engineering Division
Jerry Thomson, Propulsion and Mechanics Branch, Propulsion and Vehicle Engineering Division

Rocketdyne

Paul D. Castenholz, Assistant Chief Engineer, Propulsion Analysis
Joseph P. McNamara, Vice President and General Manager of the Liquid Rocket Division
Dave Aldrich, F-1 Program Manager

Lewis

Richard J. Pricm, Head, Rocket Combustion Section, Chemistry and Energy Conversion Division

Rocketdyne, MSFC and ONMF representatives met with Mr. D. Brainerd Holmes on January 31, 1963 to present the present status of F-1 combustion stability work.

Mr. Paul Castenholz of Rocketdyne discussed present efforts by Rocketdyne and MSFC to cope with the problems. Mr. Castenholz is one of five engineers at Rocketdyne who have been given complete authority to set up and run a development program within the F-1 engine development program. This authority gives their activity precedence over other F-1 development activities. Mr. Castenholz reported that 142 engineers are employed full time on this single task. This is in contrast with 60 people planned when the group was first formed.

The presentation included a survey of the seven cases of instability, an explanation of the phenomena observed, and a lay-out of design modifications now in work. These design modifications, some of which are now being tested, will continue in test through September.

Mr. Holmes indicated his concern about the F-1 stability problems, said that no limit on resources should prevent full effort and authorized MSFC to apply all necessary overtime. All F-1 work, including facilities approvals, is to be handled on an urgent basis. Procedure to be established.

Dr. Joseph Shea suggested an active feed-back system to counteract the oscillatory tendency.

Dr. Frien of LeRC stated that, since his December memo on the F-1 stability approach, Rocketdyne has in fact implemented his suggestions.

Rocketdyne has asked for help in analyzing data now being obtained. MSFC has supplied ten analysts to work full time over the next several months. In addition, Mr. Jerry Thomson, chairman of the Ad-Hoc Instability Panel, will be in residence at Rocketdyne for the next few months at least. It was requested that other members of the Ad-Hoc group also work closer to Rocketdyne.

Mr. Hermann Weidner of MSFC displayed a "fall-back" engine delivery schedule which will permit substantial completion of Rocketdyne-proposed injector evaluation tests and still permit vehicle ground tests to be accomplished without schedule slippage. This will be discussed further with vehicle representatives.

The writer proposed that an active and sustained research activity in the rocket combustion field be sponsored by OART. Memo is being prepared.

A. O. Tischler

Attachment