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Seventh  
Progress Report  
on

Fire Detection in Aircraft Engine Nacelles

by

C. S. McCamy and Wm. F. Hooser

Covering period 25 October 1953 to 25 January 1954

for

Headquarters  
Wright Air Development Center  
Wright-Patterson Air Force Base  
Dayton, Ohio  
Project No. 52-660A45

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# Fire Detection in Aircraft Engine nacelles

by

C. S. McCamy and Wm. F. Roeser

## 1. Summary

During the past quarter measurements were made of the rate at which energy was radiated in various parts of the spectrum from high velocity jet flames. Measurements were also made of the rate of increase in the radiation as the rate of combustion increased from the instant of ignition. Some measurements were made of the relative amounts of energy received from flames with and without a heated background.

## 2. Measurements on High Velocity Jet Flames

A series of measurements have been made on high velocity flames produced by a ram-jet type burner in which the fuel and air could be premixed and preheated. Gasoline was the fuel used. For one series of flames, both the fuel and air were premixed and preheated and the fuel-air ratio was varied over wide limits. For another series, only the air was preheated and the fuel was injected into the air stream just ahead of the flame holder. The maximum velocity of the burning gas ranged from 670 to 2570 feet per second. Measurements were made of the rate of energy radiated in selected wavelength bands and the flicker frequency distribution.

## 3. Hot Background Studies

A series of measurements have been made of the relative amounts of energy received from flames with and without a heated background. A black body radiator was used as the background source and its temperature was varied from 70° to 1000°F.

## 4. Rate of Increase of Emission

The rate of increase of energy emitted by gasoline and hydraulic fluid flames was measured under different conditions.

The results of these experiments are being analyzed and summarized for inclusion in the final report.

## 5. Financial Condition

Expenditures and commitments on this project:

April 25, 1952 through Sept. 30, 1953	\$28,632.36
Oct. 1, 1953 through Dec. 31, 1953	<u>9,001.60</u> ✓
Total through December 31, 1953	<u>\$37,633.96</u>



REPORT OF THE NATIONAL BUREAU OF STANDARDS

1. SUMMARY

During the past year the Bureau has been engaged in a study of the various methods of measuring the rate of flow of water in open channels. The results of this study are presented in this report. The methods investigated are the velocity method, the float method, the weir method, and the current meter method. The velocity method is the most accurate and reliable, but it is also the most expensive. The float method is the simplest and least expensive, but it is also the least accurate. The weir method is a good compromise between accuracy and cost. The current meter method is a good method for measuring the flow of water in small channels.

2. DESCRIPTION OF METHODS

The velocity method consists in measuring the velocity of the water at various points in the channel and then averaging these velocities to obtain the mean velocity. This method is the most accurate and reliable, but it is also the most expensive. The float method consists in measuring the time required for a float to travel a known distance in the channel. This method is the simplest and least expensive, but it is also the least accurate. The weir method consists in measuring the height of the water above a weir and then using a formula to calculate the flow rate. This method is a good compromise between accuracy and cost. The current meter method consists in measuring the flow rate of the water by means of a current meter. This method is a good method for measuring the flow of water in small channels.

3. RESULTS OF INVESTIGATION

The results of the investigation are presented in this report. The velocity method is the most accurate and reliable, but it is also the most expensive. The float method is the simplest and least expensive, but it is also the least accurate. The weir method is a good compromise between accuracy and cost. The current meter method is a good method for measuring the flow of water in small channels.

4. CONCLUSIONS

The rate of flow of water in open channels can be measured by various methods. The velocity method is the most accurate and reliable, but it is also the most expensive. The float method is the simplest and least expensive, but it is also the least accurate. The weir method is a good compromise between accuracy and cost. The current meter method is a good method for measuring the flow of water in small channels.

5. REFERENCES

1. National Bureau of Standards, Report of the National Bureau of Standards, 1923.

2. National Bureau of Standards, Report of the National Bureau of Standards, 1923.

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