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15th
Progress Report
on

Fire Detection in Aircraft Engine Facilities

By

C. S. McCamy and G. R. Coser

Covering period 25 April, 1953 to 25 July, 1953

for
headquarters
Wright Air Development Center
Wright-Patterson Air Force Base
Dayton, Ohio
Project No. 52-60045

WDLR-3

1995
1996
1997
1998

maximum latitude reached by maximum monthly

(a)

maximum latitude reached by minimum monthly

maximum latitude reached by minimum monthly

(b)

maximum latitude reached by minimum monthly
maximum latitude reached by maximum monthly
maximum latitude reached by minimum monthly
maximum latitude reached by maximum monthly

maximum

Fire Detection in Aircraft Engine Nacelles

by

C. S. McCamy and Wm. F. Roeser

1. Summary

From measurements of the spectral emission in five separate wavelength bands on a number of different types of gas-air flames, it appears that the flicker characteristics are the same in each of the selected parts of the spectrum. Wave analyses of the flicker frequencies between 2.5 and 750 cycles per second show a distinct maximum amplitude between 5 and 20 cycles per second for each of the flames studied. This maximum amplitude occurred at a higher frequency for the flames of premixed gas and air than for diffusion flames.

Studies of the ionization properties of flames have been initiated and are being continued.

2. Flame Radiation Measurements

The spectral emission in five separate wavelength bands has been recorded simultaneously for a number of different flames. The records show that the variation of the emission in the five bands with respect to time is in unison. Consequently, the flicker characteristics appear to occur in all parts of the spectrum simultaneously. Therefore it seems that wave analyses of the flicker in any one part of the spectrum should be sufficient for further studies. We have chosen the infrared for this purpose.

The wave analyses of the flicker frequencies between 2.5 and 750 cycles per second have been obtained for various flames. Under ordinary conditions in a large unventilated room, with no air movement except the convection currents caused by the flame, the amplitude of the flicker at a given frequency varies with time. The amplitude varies considerably with frequency, the maximum ordinarily occurring at a frequency between five and twenty cycles per second. Diffusion flames in still air may be observed to flicker with very regular periodicity. The wave analyses of the flicker of such flames show a fairly sharp maximum at a fundamental frequency and several lesser peaks at higher harmonics. This type of flicker has

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STORY OF

Although not fully prepared to do so, the author has decided to include in this first instalment some of the more well known and interesting incidents and events which will be of interest to all who have been connected with the Royal Air Force and RAF ports throughout the world. It is intended that further instalments will be written covering other aspects of the service which could not be done in this first volume. The author would like to thank all those who have contributed to the making of this book, particularly those who have given their valuable and much appreciated assistance and help.

A HISTORY OF THE ROYAL AIR FORCE IN PORTSMOUTH HARBOUR

AND OTHER AIRFIELD LOCATIONS AND AIRPORTS NEARBY

Although the author has made every endeavour to obtain accurate information from many sources, he cannot guarantee the absolute accuracy of all parts of the history of the Royal Air Force in Portsmouth Harbour and its environs. The author has endeavoured to make the history as accurate and as complete as possible and to give credit where credit is due. The author would like to thank all those who have given their valuable assistance and help.

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not been observed in flames of premixed air and gas. In general, these flames have a maximum amplitude of flicker at a somewhat higher frequency than diffusion flames.

Plans have been made and equipment procured to study the correlation between gas jet velocity and flicker frequency. Equipment has been constructed with the objective of producing substantial open gasoline fires at a constant level and constant rate of burning for use in flicker studies.

3. Electrical Properties of Flames

A series of experiments is being conducted to determine the conduction and rectification properties of flames. When two parallel wires are placed a short distance apart in a Bunsen flame and a potential of a few hundred volts d-c is impressed, a current will flow across the gap, the magnitude of which will fluctuate considerably with time. Peak currents of several microamperes have been measured. The magnitude of the current increases with applied voltage and the area of the wires heated. When wires of different sizes are used, the system acts as a rectifier. The current through a diffusion flame was found to be about twice that through a flame resulting from the burning of premixed gas and air. Although no studies have been made of the correlation between the fluctuations in the current and the visible flicker, an attempt to do so is being considered.

4. Financial Condition

Expenditures and commitments on this project:

April 25, 1952 through March 31, 1953	15,500.64
April 1 through June 30, 1953	<u>5,335.23</u>
Total through June 30, 1953	20,835.87

With additional qualified personnel available, our rate of effort on this project was essentially doubled as of June 1, 1953.

Concerning all other forms the function of memory and imagination need not be mentioned at all; because the great majority consists of some kind of visual representation of objects and scenes which have been seen or heard.

Memory of Visual Representations.

Memory of visual representations may be divided into two classes: (1) Memory of visual sensations, and (2) Memory of visual images. Memory of visual sensations is concerned with the retention of the sensations produced by external objects, and is therefore called sensory memory. Memory of visual images is concerned with the retention of the sensations produced by the imagination, and is therefore called imaginative memory. In both cases the retention of the sensations is due to the action of the nervous system, and the retention of the images is due to the action of the nervous system in connection with the imagination. The two classes of memory are closely related, and it is difficult to separate them completely. The first class is concerned with the retention of sensations produced by external objects, and the second class is concerned with the retention of sensations produced by the imagination. The two classes are closely related, and it is difficult to separate them completely. The first class is concerned with the retention of sensations produced by external objects, and the second class is concerned with the retention of sensations produced by the imagination.

Classification of Imaginative Memory.

Classification of imaginative memory may be divided into three classes:

(1) Memory of visual sensations from external objects.

(2) Memory of visual sensations from internal objects.

(3) Memory of visual sensations from imagination.

The first class is concerned with the retention of sensations produced by external objects, and the second class is concerned with the retention of sensations produced by internal objects.

The third class is concerned with the retention of sensations produced by imagination. The three classes are closely related, and it is difficult to separate them completely.



