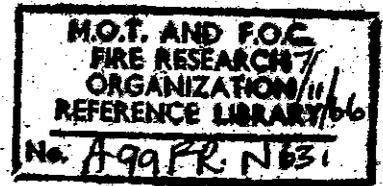


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Fire Research Note
No. 631



INCENDIARISM STATISTICS

by

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SUMMARY

Deliberately started fires probably account for a larger proportion of the United Kingdom fire loss than published statistics suggest. Methods of improving the collection and interpretation of these statistics are put forward.

Several lines of research into factors associated with the occurrence of incendiarism are outlined.

This report has not been published and should be considered as confidential advance information. No reference should be made to it in any publication without the written consent of the Director of Fire Research.

MINISTRY OF TECHNOLOGY AND FIRE OFFICES' COMMITTEE
JOINT FIRE RESEARCH ORGANIZATION

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INTRODUCTION

In the sense that the consequences of the action causing the fire are unforeseen, most of the fires that become a matter of public concern are accidental. Some fires are not accidental, and are started for financial gain, emotional satisfaction, or other reasons. This report brings together some of the statistical information which exists with a view to understanding more about this class of fire.

VARIETIES OF INCENDIARISM

Fires are started deliberately for a variety of reasons; as a weapon in wartime, for religious or political reasons, to avenge personal grievances, by mentally disordered persons and for financial gain.

Where children are responsible, society regards a misadventure as a crime after a certain age is reached. It is difficult to distinguish between a fire started for a sensible purpose (e.g. burning unwanted material) and a practical joke. As it happens, where difficulties in definition arise the financial loss in the fire is usually small.

FIRE BRIGADE STATISTICS

Published figures

Reports of fires (other than chimney fires) attended by local authority fire brigades in the U.K. are analysed by the Joint Fire Research Organization. The "supposed cause" is recorded on each report, and the information is coded, sorted and published¹⁾. Table 1 shows the relative numbers of fires due to incendiarism and other causes.

Table 1

Fires due to incendiarism in 1964.

Supposed causes	Fires in buildings	Fires not in buildings
Incendiarism ("malicious ignition")	1 212 (1.5%)	436 (0.4%)
Unknown	9 262 (11.3%)	13 508 (11.5%)
Accidental	71 270 (87.2%)	103 356 (88.1%)
TOTAL	81 744 (100%)	117 300 (100%)

Fires of incendiary and unknown origin tend to be larger than those of accidental origin, so the fraction of the total fire loss due to incendiarism is certainly greater, and perhaps very much greater, than the above figures suggest.

There is evidence also that an appreciable number of fires that are counted as accidental and unknown may be of incendiary origin.

Unrecorded Incendiary Fires

Fire brigades often record the causes of fires, but it is certain that to avoid complications suspected incendiary is understated. The method of analysis of reports used by the J.F.R.O. tends to increase the understatement, by concentrating on the mechanism of ignition rather than the motive of the igniter. From the circumstances of the fire this may quite obviously be deliberate.

From looking at the way in which the causes of fires in one particular location - G.P.O. letter boxes - have been counted by the J.F.R.O., it is possible to deduce that quite a few incendiary fires appear in the published statistics as accidental.

A 1-in-4 sample of reports for 1963 showed 184 fires in G.P.O. letter boxes (i.e. that were attended by fire brigades). Common sense suggests that not many of these were accidental, but the causes were actually coded as follows:-

Table 2

"Supposed causes" of fires in G.P.O. letter boxes, U.K. 1964

49	Explosives, fireworks
32	Matches, children with
24	Taper, lighted paper, sticks
23	Matches (except children with)
18	Smoking materials
6	Naked light - no further information given
4	Malicious ignition
9	Miscellaneous
19	Unknown
<hr/>	
184	
552	Estimated number of reports not coded
<hr/>	
736	Estimated number of fires

The very small number that were officially attributed to "malicious ignition" will be noted.

It is sometimes suggested that when a fire is deliberately started by children in a situation where comparatively little damage is done, e.g. on waste ground, a fire brigade report will give the cause "children playing with matches", whereas a similar fire in a building would be put down to incendiary. Children in the younger age groups may be unaware of the consequences of starting a fire, and it would then seem to be correct to count it as accidental, but a child of 15 might have a strong element of malicious intent.

Undetected Incendiary Fires

At first sight it seems impossible to estimate how many incendiary fires are put down to accidental or unknown causes. Some indirect methods exist and are now described.

When a person is convicted of arson (or a similar offence), other previous offences may be "taken into consideration". It is possible to see what the causes of these fires were originally put down to by fire brigades.

The originally "supposed causes" for fires due to two pyromaniacs^{20,21} were:-

Table 3

"Supposed causes" of fires due to two pyromaniacs

"Supposed cause"	Case 1	Case 2	Case 1 and 2 together
Accidental	3	12	15
Unknown	2	9	11
Intentional	4	3	7
No record	0	5	5
	—	—	—
TOTAL	9	29	38

Out of 33 fires due to incendiaryism, only 7 would have been counted as such in the published statistics. An examination of other cases would yield further information about the probability of recognition of a single offence.

Presumably this would increase for a long series of offences, as a pattern became discernible and the offender became more confident.

An entirely different approach is to compare the allocation of "supposed causes" for fires of different sizes. The proportion of incendiary fires seems to increase with the size of the fire, as does the proportion of fires of unknown origin.

Since May 1962 10 fires have occurred with individual direct losses of over £1 M; 3 were known to be due to incendiaryism and 6 were of unknown origin.

Table 4

"Supposed causes" reported by fire brigades
for 10 very large fires

Date	Location	Direct loss (£ M)	"Supposed cause"
4. 5.62.	Birmingham	2.5	Unknown
22.10.63.	Hirwaun	1.7	Unknown
15. 6.64.	Coventry	2.9	Unknown
5.12.64.	London	5.0	Unknown
10.12.64.	Newcastle	1.4	Unknown
10. 9.65.	Glasgow	1.3	Incendiarism
28. 9.65.	Shepshed	1.0	Smoking materials
15.11.65.	Newcastle	1.0	Incendiarism
17.11.65.	Mansfield	1.9	Unknown
16. 2.66.	Neatishead	1.2	Incendiarism

A J.F.R.O. investigation (to be published) of fires requiring 5 or more jets for their extinction shows that about 5 per cent were attributed to incendiarism, compared with 1.5 per cent of all fires in buildings, and that over half of these large fires were of unknown origin.

It seems therefore that incendiary fires grow to be large more often than accidental fires - this would be expected - underlining the fact that fire losses due to incendiarism are larger than would be supposed by examining the causes numerically.

POLICE STATISTICS

Published figures

Reports of crimes and court proceedings are prepared by the police, and analysed by the Home Office (for England and Wales)^{10,11}.

Under English law, the offence committed by an incendiarist is usually "arson" (classification No.56). There is also a less serious offence, "setting fire to crops plantations etc." (classification No.57/1), for which prosecutions are fewer. Several other offences could be committed by means of a fire in certain circumstances, including most varieties of malicious damage, murder and attempted suicide.

Tables derived from Home Office statistics appear as Appendices I, II and III. To obtain a complete picture for the U.K., similar statistics would be required for Scotland and Northern Ireland. It will be seen that most recorded offenders are male and under 17. When it is remembered that very young offenders are unlikely even to receive an official caution, the low average age is the more remarkable.

It is not obvious how likely an offence by a young child is to be recorded as a "known crime". The practice may not be consistent between police forces. Any inconsistencies in reporting would affect the validity of geographical comparisons, unless suitable adjustments were made.

Unpublished figures

When a person is charged with stealing something, the charge sheet gives an estimate of the value of the item stolen, and in the same way, for an arson charge the damage done in a fire is recorded. Although no convenient method exists for collecting it centrally, it is generally possible to obtain a copy of an individual charge sheet.

OTHER STATISTICAL SOURCES

Insurance

Insurance companies suffer from fires due to incendiaries, whether the fires are started for fraudulent profit on over-insured property or for other reasons.

The last known large-scale fraud scheme in the U.K. operated between 1927 and 1933⁵. In the past, high proportions of national fire losses, both in the U.K. and abroad, have been attributed to such fires^{2,14,15}. No consistent information is published on the extent to which claims are believed to result from incendiary fires.

Medical

It might be possible to reduce the tendency to incendiaryism by studying the effect of environment on personality, and considering the distinguishing characteristics of pyromaniacs.

People with a dislike of their environment may also be likely to start fires carelessly, through what might be termed subconscious incendiaryism. In such a situation, even fire prevention publicity may suggest both the idea of starting a fire and the best way to do so.

Other countries

The U.S.A. and Canada (in particular) seem more concerned with incendiaryism than does the U.K., and doubtless a great deal of statistical information is available. As an example, no U.K. statistics appear to exist for the motives of arson offenders, but the Ontario Fire Marshal⁷ gives the following breakdown:-

Table 5

Motives of Arson Offenders, Ontario, 1965

Motive	Adult	Juvenile
Mischief	14	59
Spite	27	-
Mental	9	8
Financial gain	4	-
Prank	-	3
Halloween Prank	2	1
Vandalism	1	1
Fraud	1	-
Cover up theft	1	-
Revenge	1	-
	<u>60</u>	<u>72</u>

INCIDENCE OF INCENDIARISM

Time

Some idea of when incendiaryists are most active can be obtained by analysis of fire brigade reports of fires that were counted as "malicious ignition" by the J.F.R.O.

The time of discovery of a sample of these fires is illustrated in Figures 1 and 2. The times of origin would naturally be somewhat earlier.

It will be seen that most of these fires happen at night, particularly between 2000 and 0200. The weekend (Saturday, Sunday and early Monday morning) shows rather more activity than midweek. On the other hand there is no great seasonal variation, even around November 5th or at school holiday periods.

Periodicity

A person presumably feels the urge to start a fire more strongly at certain times than others. To check whether there is any sign of a natural cycle, a series of 29 fires started by one person¹⁸ was analysed.

The grouping of intervals between successive and non-successive incidents is illustrated as a histogram in Figure 3. (By grouping the intervals in the way shown, the weekly cycle does not appear).

There is evidence of periods of about 30, 60, ... days. Although this is the experience of only one person, it is worth looking for an explanation of cycles of around this length.

One possibility would be that there exists a basic physiological cycle of around this length; or something connected with the calendar month might affect the potential incendiaryist.

The apparent period of rotation of the sun relative to the earth is about 27 days⁶, so sunspots affect the electrical properties of the atmosphere with this period. Ionisation is associated with state of mind³, so there might be some connection here. (There is also a large amplitude cycle in solar activity with a period of about 22 $\frac{1}{3}$ years, which might conceivably be related to fire statistics)⁶.

The lunar cycle has a slightly variable period of about 29.53 days. Animal life is affected by the moon in many ways, and folk lore associates it with a wide range of human activities also. In the mind of the general public, pyromania is associated with the full moon; such folk lore associations are often found to have some justification, a point which is receiving further attention⁴.

Weather

Investigations have been made into the effects of many meteorological conditions on various illnesses and on state of mind^{16,17,18}.

Changes in pressure, vapour pressure, temperature and atmospheric electricity might be expected to have some effect on fire incidence, since these have the greatest biological effects.

It has been shown that there is a significant correlation between vapour pressure and the likelihood of a fire starting, but not of its spreading^{8,9}. It could be that it is the psychological effect on the person responsible that is important, since most of the physical quantities favouring ignition also favour spread.

In Peru, the incidence of epileptic convulsions - epilepsy is sometimes associated with incendiarism - has been found to depend on whether the sufferer originated from the coastal regions or the mountains¹⁷.

Locations

Places of worship attract incendiarists, particularly when associated with racialism.

Fires in letter boxes show an upward trend of 11.8 per cent per annum.

Table 6

Fires in G.P.O. letter boxes attended by
fire brigades - U.K.

1962	682
1963	736
1964	846

Schools are set on fire, particularly by pupils and former pupils.

Haystacks and barns are easily ignited, secluded and produce a spectacular blaze. Understandably these are given coverage in press and radio serials.

Regional tendencies

A measure of incendiarism can be obtained by dividing the number of arson incidents reported by the police in a given area¹¹ by the population of that area.

When this is done for the larger administrative areas of England and Wales, the incidence appears to be non-uniform.

For example, in 1964 the average was 30.7 known offences per million population over the whole of England and Wales, but for Co. Durham it was 112.

There could be differences in the likelihood that an offence would be recognised and recorded that would account for such variations. Average figures for several years would be more appropriate for a fuller investigation, since the numbers in a single area in one year are small, and local waves lasting a year or so could be stimulated by publicity given to previous offences.

One series of incendiary fires occurred in a town where the factory of a large firm of fire protection engineers is situated²⁰. It is not known whether there was any direct connection between the offender and the factory, but in any case he can hardly have been unaware of its existence.

Effect of Publicity

Publicity given to acts of vandalism may put the idea of committing similar acts into the mind of a susceptible person.

An apparent example was an increase in railway incidents around the date of the Elm Park derailment (29.3.65). Two films depicting railway sabotage were also showing around this time, which might have helped the effect.

Table 7

Incidents of vandalism on British Railways notified to police

1964	1082
1965	1249 (15.1% increase)

Spectacular fires receive quite extensive coverage, both in the press and on television, and one wonders whether (even when they are accidental) this may not have the wrong effect on incendiary-minded persons. The cause of fires is not usually mentioned when reported as news items, but if arson receives a mention it might reinforce the effect.

So far as is known, no voluntary "playing-down" on the part of editors has been suggested, as happens with certain other types of crime. It has been known, however, for a local paper to co-operate with a fire brigade in regard to a similar problem, that of malicious false alarms. In this case reduction in publicity had a beneficial effect.

If quantities such as the column -inch-readership for newsworthy fires were compared with fire statistics covering the periods some effects might be revealed.

DISCUSSION

Magnitude of problem

Everything suggests that there is a tendency for incendiarism to be under-recorded, and that published statistics are quite seriously misleading.

Improvement in recording of causes

A simple opinion scale for recording supposed causes would improve the statistics about the intentions of the persons, known or unknown, responsible for the occurrence of fires. It is important to avoid confusion between legal definitions and statistics designed to illustrate apparent intentions.

Table 9

Suggested Opinion Scale

1. Almost certain that this fire was accidental.
2. Probable that this fire was accidental, but no real reason why it might not have been deliberate.
3. No real reason why this fire might not have been either accidental or deliberate.
4. Probable that this fire was deliberate, but no real reason why it might not have been accidental.
5. Almost certain that this fire was deliberate.

Reasons for regional variations

Comparison of the regional distribution of incendiarism might reveal associations. Crime, mental health and climate would be possibilities. Specialist regional atlases would suggest further ideas.

Statistics from other countries would extend the range of factors with which incendiarism could be associated. Some figures from the U.S.A.¹², of which the exact basis is not known, seem to show that incendiarism is about as prevalent there as in the U.K.

Fire prevention economics

The economics of incendiarism warrant a close study; the expenditure on detention, medical treatment, welfare work, research, etc. might be compared with the loss, which after all is a loss to society and not a redistribution of wealth as in theft, however reprehensible that may be.

CONCLUSIONS

While incendiarism has always existed as a problem, little is known except that it is probably very much underestimated.

It is easy to see approaches that might be made but these would require greater resources than are at present available.

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- (21) WEST RIDING OF YORKSHIRE (COUNTY COUNCIL OF THE) FIRE SERVICE DEPARTMENT. Letter to Under Secretary of State, Home Office (Fire Service Department), dated 14th April 1960 (ref.O3/2/2), lists a series of 29 offences of arson committed by one person in the Morley district in 1955-7 and 1959-60. (Referred to as Case 2 in this report).

The work described in this paper forms part of the programme of the Joint Fire Research Organisation of the Ministry of Technology and the Fire Offices' Committee; the paper is published by permission of the Director of Fire Research.

The author wishes to thank the Home Office Research Unit for supplying the criminal statistics quoted, and Dr. R. I. C. Bradford for drawing attention to the biometeorological aspects of the subject.

APPENDIX I

Arson: Table showing the number of offences known to the police during various years, and the number of offences cleared up during those years (irrespective of the year in which they were committed)

	<u>Known</u>	<u>Cleared up</u>	
1951	513	331	(64.5%)
1956	641	388	(60.5%)
1961	1 115	640	(57.4%)
1964	1 442	-	

APPENDIX II

Arson and setting fire to crops, plantations etc: Table showing the number of persons found guilty at courts in England and Wales during 1964: (Persons cautioned by the police as an alternative to taking proceedings in court are not included)

	Arson	Setting fire to crops etc.
Aged under 14	M 108 } F 2 } 110	1 } 1 } 2
Aged 14 and under 17	M 120 } F 2 } 122	9 } - } 9
Aged 17 and under 21	M 88 } F 2 } 90	7 } - } 7
Aged 21 and over	M 110 } F 11 } 121	5 } - } 5
All ages	M 426 } F 17 } 443	22 } 1 } 23

APPENDIX III

Arson: Table showing the number of persons cautioned by the police in England and Wales during 1964. These statistics refer to cautions, whether oral or written, which were given by, or on the instructions of, a senior police officer as an alternative to taking proceedings in court.

Aged under 14	M 35) F 1)	36
Aged 14 and under 17	M 4) F 2)	6
Aged 17 and under 21	M 2) F -)	2
Aged 21 and over	M 2) F 1)	3
All ages	M 43) F 4)	47

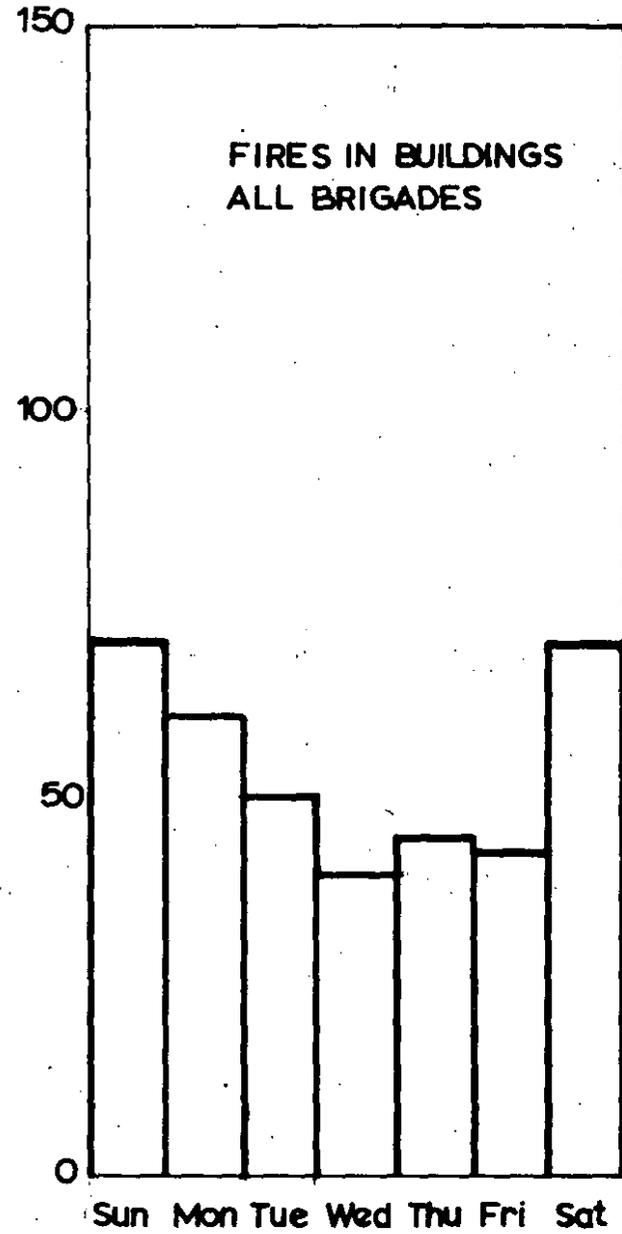
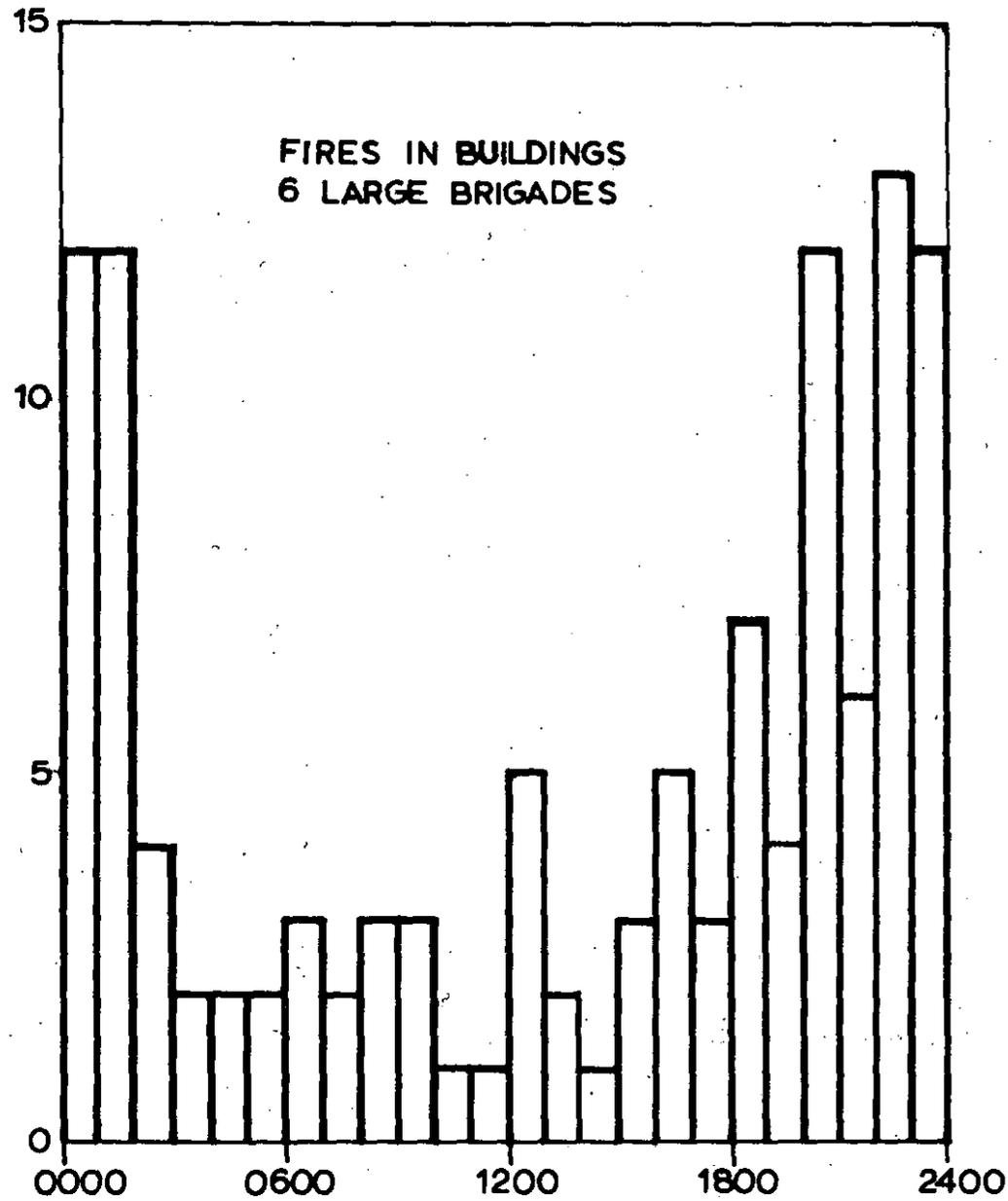


FIG.1. TIME AND DAY OF DISCOVERY OF FIRES ATTRIBUTED TO "MALICIOUS IGNITION." U.K.1963.

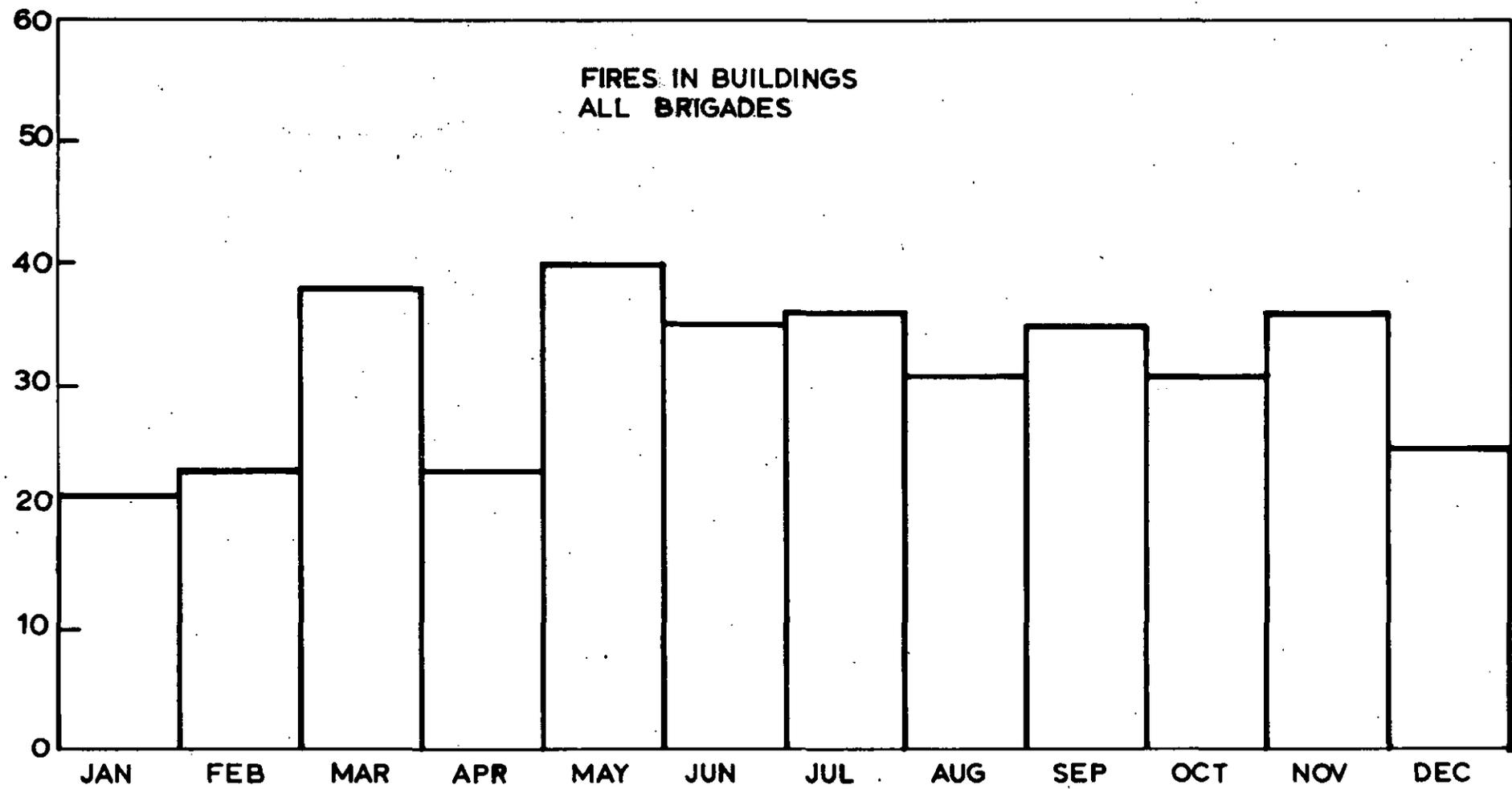


FIG.2. MONTH OF DISCOVERY OF FIRES ATTRIBUTED TO "MALICIOUS IGNITION." U.K.1963.

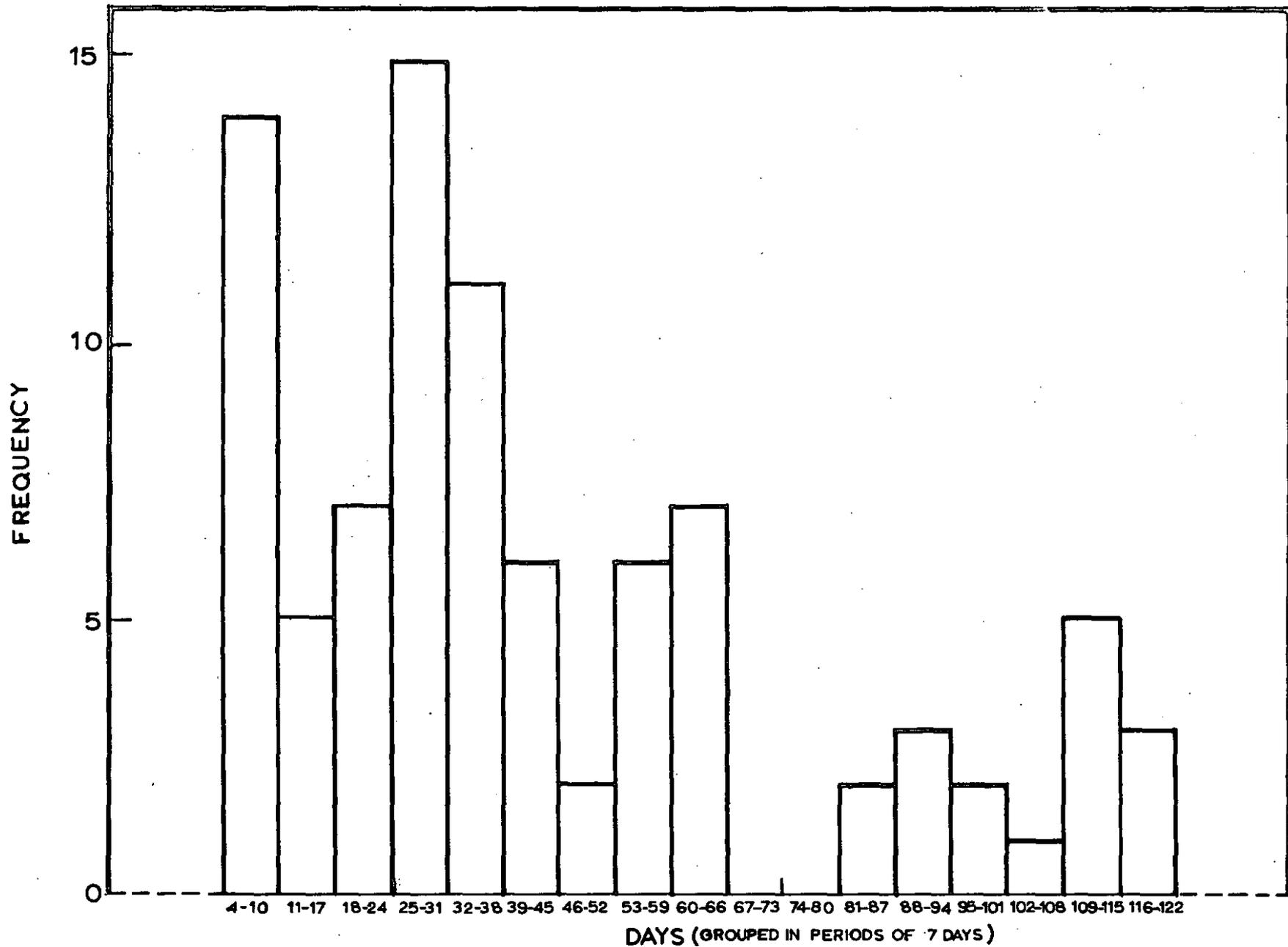


FIG.3. INTERVALS BETWEEN FIRES STARTED BY ONE INCENDIARIST (29 FIRES)
SHORT AND LONG INTERVALS NOT SHOWN.

