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A REVIEW OF THE INCIDENCE OF FIRES ATTENDED BY FIRE SERVICES IN THE UNITED KINGDOM 1947-52

by

D.W. Millar and J.F. Fry

Summary

To find the factors causing variations in fire incidence and to observe general trends in the overall fire picture, a study has been made of annual fire statistics for the period 1947-52.

An increase in the frequency of fires in industrial premises during the period was linked with an increase in industrial activity. The incidence of fire in a number of industries has been considered in relation to the net value of the output and to the number of employees in the industry. It appears that the highest incidence of fire in industrial premises occurred in the wood and cork manufacturing industries, and to a lesser extent in the chemical and allied industries. In particular industries there were some outstanding causes of fire, for example, electric irons accounted for about 12 per cent of the fires in the manufacture of clothing, while mechanical heat and sparks were responsible for almost 40 per cent of the fires in the manufacture of textiles.

The rate of incidence of attendance at fires in dwellings in Scotland remained approximately constant during the period at 20 per 10 000 dwellings at risk per year. In England and Wales, the rate of incidence was 12 per 10 000 dwellings in 1947 and increased to 16 per 10 000 dwellings in 1952. The difference in rates of incidence between Scotland, and England and Wales may be associated with the density of population. The apparent increase in the rate of incidence in England and Wales is considered to be partly due to an increasing tendency to call fire brigades at the first sign of an outbreak.

The rate of incidence in departmental stores appears to be similar to that which would be expected in groups of retail shops with similar numbers of employees. The highest rate of incidence among retail establishments is in meat, fish and poultry shops and the difference between this trade and other retail trades appears to be due mainly to fires caused by faults in electric refrigerators.

In agricultural occupancies and in forestry, the frequency of fires attended varies from year to year and appears to be largely dependent on climatic conditions.

The frequency of attendances at fires in oil and petrol driven road vehicles increased from about 4,000 in 1947 to about 6 000 in 1952. It appears that there were about 1·2 to 1·4 attendances each year for each thousand licences. The most frequent causes of these fires were faults in electric

wiring and heat, sparks or friction caused by engines.

The incidence of fatal casualties in fires attended by Fire Brigades was fairly constant during the six year period at an average of 1.3 fatalities per 100 fires attended in buildings. Non-fatal casualties increased from 6.4 per 100 fires in 1947 to 8.6 per 100 fires in 1952 but this apparent increase may have been due to changes in reporting procedure or to an increasing tendency to call for Fire Brigade assistance.

There appears to have been a growing tendency for Fire Brigades to use small equipment such as first-aid hose reels and chemical extinguishers. The proportion of fires extinguished before the arrival of the Fire Brigade has shown a tendency to increase and this is a further indication of an increasing tendency to call for Fire Brigade assistance in the early stages of a fire.

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I - INTRODUCTION

Statistical information relating to fires attended by the Fire Services in the United Kingdom has been compiled annually for the Home Office since 1946. A punched card system has been used for storing and sorting the data and one or more cards, depending on the extent to which the original fire spread, were code-punched for every report received from the National Fire Service in 1947, and from the National Fire Service and from the Fire Brigades in 1948. In the other years a sampling system was used in which every Fire Brigade was represented in proportion to the number of fires it attended. The fixed proportion of the reports sent in by each Fire Brigade were selected for code-punching, by the use of published tables of random numbers so that every report sent in had an equal chance of being selected, and the reports selected were distributed throughout the year in such a way as to reflect the variation of fire incidence with time. The proportion of reports used in 1946, 1949 and 1952 was 1 in 4 and that in 1950 and 1951 was 1 in 2. The results of such sample analyses give the numbers of fires attended by each Fire Brigade, and the total numbers attended in England and Wales, Scotland and Northern Ireland very accurately. When the data are classified in other ways, for example according to the occupancy (that is the place in which the fire occurred) or according to the cause of the fire, there will in general be an error introduced by the sampling procedure, but, by normal statistical methods, it is possible to estimate the limits of such errors. The larger the observed number of fires the smaller is the relative importance of possible sampling errors.

II - THE CAUSES OF VARIATION IN THE NUMBERS OF FIRES ATTENDED

The numbers of fires falling into the classes shown in the tables are affected by a variety of influences. For convenience these may be considered as "errors", which tend to provide misleading information, and "factors", which cause a true change in the statistical picture of fires. Possible errors are:-

1. Mistakes in coding

While there are always cases of doubt in any system of this kind, every care is taken to ensure consistent and accurate coding and the code-punching of the reported information is independently verified. It is thought that coding errors have little influence on the figures.

2. Mistakes in tabulation

There may be errors of tabulation and recording, but the system is largely self-checking and the effect of these errors also is believed to be negligible.

3. Possible sampling errors

The importance of possible sampling errors diminishes as the observed number of fires increases, so that, although differences between small numbers of fires should not be regarded as significant, the errors on larger groupings are small.

4. Inaccurate reporting

The only likely source of error not within the control of the Organization is incorrect reporting, but it is known that a considerable effort is made by reporting officers to ensure that reports are as accurate as it is possible to make them. In support of this it can be said that there have been cases where the Fire Brigade information has been independently confirmed. For example an investigation was carried out by the British Electrical Industries Research Association, in collaboration with the British Electricity Authority and the Joint Fire Research Organization, into the incidence of fires caused by faulty

electrical installations in houses. The broad conclusions of the Fire Brigade officers as to the original causes of these fires were confirmed by expert investigation in over 80 per cent of the fires. It is thought that, while there may be variations in the standards of reporting from one Fire Brigade to another, the amount of inaccuracy is not likely to have a serious effect upon conclusions drawn from the figures.

The factors believed to influence the statistics are:-

1. A current tendency on the part of the general public to call the Fire Brigades to smaller fires than in, say 1946 or 1947, so that there are more attendances at fires, but not necessarily more outbreaks.

2. Changes in fire risk; for example, there is a considerable variation in grassland fires due very largely to a variation in flammability connected with climatic conditions.

3. Changes in the quantity of material at risk, for example, increasing numbers of oil and petrol driven road vehicles; or changes in levels of activity, for example, increases in industrial output which have been accompanied by increases in the numbers of fires.

4. Fire prevention measures and fire-safety propaganda which may have the effect of decreasing fire incidence.

5. Chance fluctuations. This factor can best be illustrated by considering fires in a particular hazard, for example fires in private houses and flats. The current level is about 21 000 fires per year in approximately 13 000 000 dwellings. Numerous factors determine in which houses and flats the 21 000 fires will occur and to predict which of the individual houses will have fires is impossible. Yet there is considerable regularity in the numbers of fires, both in total and in the various classes of dwellings. Even in a particular class of dwellings, say one particular type of post-war temporary dwelling, there is still a considerable degree of regularity in the observed numbers of fires due to various causes.

An observed number of fires in a particular category is the result of a set of many determining circumstances, of varying importance: In general there will be only a few major determining circumstances, within which will operate a large number of minor causes. The numbers in any category will certainly vary over a period of years and if this is due to variation in the minor causes, the fire-risk of the category under discussion is considered to be constant, though subject to chance fluctuations. If any of the major determining circumstances should alter, the fire-risk is altered. The resulting variation in fire incidence is important whatever the cause of the change in fire-risk, but it will be appreciated that measures to combat fires depend on a knowledge of the determining factors. The purpose of this note is to review the statistical information available and so far as is possible in the present state of knowledge, to determine the major circumstances (and their variations) which underlie the observed fire incidence.

The phenomenon of multiple events, individually unpredictable but showing a regularity in mass, is well known. The figures of fire incidence follow this law of statistical regularity and this provides some evidence that the figures in general reflect the broad trend of fire incidence and are not grossly affected by inaccuracy.

III - THE GENERAL OUTLINE OF FIRE INCIDENCE

1. THE CAUSES OF FIRES

There are many variants of each of the causes to which a fire may be attributed; a full description of every incident is impossible and the best that can be done is to specify the element or elements common to a number of fires. A striking feature of the distribution of reported causes in any given occupancy is their variety. In some types of occupancy there may be a

particular, outstanding cause, but usually there are many different causes each accounting for only a small proportion of the total number of fires. Some method of summarizing the causes is essential and the classification used in Tables 1 (a), (b) and (c) has been applied to various types of occupancy; conclusions are given in the appropriate sections of this note. From the figures given in Table 1 it appears that the main difference between the fire picture in England and Wales and that in Scotland lies in the fires due to faults of construction or the failure of permanent equipment in buildings, that is those due to such things as faulty flues or ignition of timber under hearths. The proportion of these fires in Scotland is 5 per cent higher than in England and Wales, a difference of the order of 250 fires a year.

The causes of fire in buildings in the United Kingdom have been examined for variation in respect to time. Those listed below show a statistically-significant, increasing trend and the relationship with time may be represented with reasonable accuracy by a straight line.

(a) Chimney fires not confined to chimney

(b) Electric cooker

(c) Electric refrigerator

(d) Television

(e) Wireless

(f) Other electrical apparatus (excluding wire and cable)

(g) Gas cooker

(h) Miscellaneous gas apparatus (other than burners, cookers, fires)

(i) Matches

(j) Mechanical heat or sparks

(k) Oil apparatus other than oil lamp or stove or oil engine

(l) Oxyacetylene cutting and welding apparatus

(m) Slow combustion stoves igniting materials other than structural woodwork

(n) Taper, lighted paper or sticks

(o) Unknown source of ignition

The increases in fires due to causes b, c, d, e and f (i.e. those associated with the use of electricity) are undoubtedly largely due to the increasing use of electricity for many purposes. The increase in fires due to gas cookers probably reflects an increase in the number of cookers at risk.

Fires caused by braziers and coal or coke furnaces show a significant, decreasing trend.

2. FIRES IN BUILDINGS

The numbers of fires occurring both in buildings and in places other than buildings are shown in Table 2 for the three main administrative areas, England and Wales, Scotland, and Northern Ireland.

To obtain a standard of comparison between different areas for any particular year, or between years for a particular area, it would be most satisfactory to calculate rates of incidence in terms of the numbers of buildings at risk. Unfortunately it is not possible to do this for most categories of buildings since the numbers at risk are known for only a few of the categories, e.g., post-war houses. To overcome this difficulty comparisons may be made in terms of numbers of fires per head of population; a method which appears justifiable if it is assumed that the number of buildings in a given area is

dependent on the needs of the population and that these needs are satisfied to about the same extent throughout the United Kingdom.

The levels of fire incidence in relation to population, calculated from the total numbers of fires attended in buildings, show differences between England and Wales, Scotland, and Northern Ireland, but there appears to be a general increase with time in all three areas.

When the numbers of fires per head of population in England and Wales are compared with those in Scotland it is found that, in each year, the values for Scotland are higher than those for England and Wales and this is largely due to a higher relative frequency in private houses and flats. For other types of buildings, except commercial premises, the rates for the two areas are much the same in any one year.

Because of possible sampling errors, chance fluctuations and systematic errors in the figures of population general conclusions from the figures quoted can be only tentative, but it is clear that the fire incidence in private houses and flats is higher in Scotland than in England and Wales. In commercial premises also there is a consistent difference between the numbers of fires per head of population in England and Wales, and Scotland, but it is not certain that this represents a real difference in fire incidence. For other categories of buildings, the fires per head of population appear to be about equal in the two areas.

The variations of fire incidence in respect to time have been examined separately for England and Wales, and Scotland.

In England and Wales fires in industrial premises, professional establishments, public institutions, educational establishments and dwellings show a significant upward trend which may be represented with reasonable accuracy by a straight line. It should be noted that, since the period covered by the data is only 6 years, it is unlikely that any relationship could be established between fire incidence and time other than a linear one.

In Scotland the trend of fire incidence with time is significant only for industrial premises, which show an increase, and for service establishments which show a decrease.

3. FIRES OCCURRING ELSEWHERE THAN IN BUILDINGS

The incidence of fires occurring elsewhere than in buildings is shown in Table 2 from which it can be seen that there is considerable variation both within and between geographical areas. There are variations in the agricultural hazards which are thought to be due to climatic conditions, and an increase in fires in transport hazards which is probably due to an increase in the numbers at risk. Variations in the outdoor storage hazard are probably due to a combination of both these circumstances.

In England and Wales between 40 and 70 per cent of all outdoor fires occur in agricultural hazards; between 10 and 20 per cent in transport and communication, and about 15 per cent in outdoor storage hazards. In Scotland the corresponding proportions are 40 to 50 per cent for the agricultural hazards; about 25 per cent for transport and communications and between 15 and 25 per cent for the outdoor storage hazards; while in Northern Ireland 50 to 65 per cent of the fires occur in agricultural hazards, 20 per cent in transport and communications and 10 to 20 per cent in outdoor storage.

IV - DETAILED DISCUSSION OF FIRE INCIDENCE

1. FIRES IN AGRICULTURAL BUILDINGS

The item "agricultural buildings" includes any building, other than the farmhouse itself, which is concerned with farming, stock rearing, market gardening, fruit or poultry farming or allotment gardening, but excludes buildings in private gardens. The numbers of fires are shown graphically in Fig. 1. In England and Wales about 20 per cent of the fires occur in Dutch barns compared with about 5 to 10 per cent in Scotland. The causes of fire are very varied. Approximately 16 per cent of the fires are attributed to

incubators or brooders, and this is the largest of the known causes, while the causes of 18 per cent of the fires are reported as unknown. About 20 per cent are attributed to matches and smoking materials and 12 per cent to oil lamps, stoves, blowlamps, engines and tractors, while slow combustion stoves account for about 6 per cent of the fires, and spontaneous combustion is reported in 5 per cent. The variation in incidence shown in Fig. 1 shows some agreement between England and Wales and Scotland, and possibly some association with the variation in weather conditions.

It is not easy to decide what methods are likely to be effective in reducing the fire incidence, but possibly attention should be paid to the source of ignition reported as "incubator" or "brooder". The multiplicity of causes and possible association of incidence with weather conditions, suggest that both constructional faults and human carelessness provide sources of ignition, and that the materials first ignited tend to vary in their susceptibility to ignition according to the humidity of the atmosphere.

2. FIRES IN INDUSTRIAL PREMISES

The term "industrial premises" is used to describe all buildings in which some product is manufactured, and also includes mining and quarrying premises. The numbers of fires are given in Table 3 grouped according to the Orders of the Standard Industrial Classification. This classification differs from that normally used by the Organization so that the figures in Table 3 do not correspond to the numbers of fires in industrial premises shown elsewhere in the Tables. The fire incidence is shown graphically in Fig. 2.

There was a 23 per cent increase in incidence between 1947 and 1953 in England and Wales and a 22 per cent increase in Scotland, though in neither case was the increase at a steady rate. Industrial production increased over the period by about 24 per cent, and it is of interest to compare fire incidence with some measure of production since an increase in production means an increase in either mechanical or human activity or both. A comparison of incidence in the United Kingdom with the Index of Industrial Production has been made in Fig. 3. Both quantities show an upward trend, though the index, increasing at a rate of 6 to 7 per cent each year up to 1951, shows the more rapid rise. The decrease in production in 1952 is not reflected in the numbers of fires. There is not a very close relationship between the level of fire incidence and the level of industrial activity as measured by the index. Indeed such a relationship would not be expected particularly at the level of individual industries. However, the idea that the increase in fire incidence may have resulted from the increase in general activity associated with the rise in production is probably correct within limits, but informative only in suggesting the probable future trend in fire incidence in these premises.

The left-hand column of Table 3 gives the Index of Industrial Production weights, a series of numbers proportional to the net output of each group of industries. The net output of an industry is the value added to the products of that industry by the process carried on and is essentially the gross value of the products less the cost of the materials used in producing them. To some extent the net output of an industry may be used as a measure of the activity of that industry, and figures proportional to the net output as an indication of the relative amount of activity contributed by that industry to the total industrial activity of the whole country. This type of comparison cannot be taken too far, but it provides a not unreasonable standard of comparison of fire incidence between industries. On this basis Table 3 shows that in metal manufacture, the treatment of non-metalliferous mining products, the manufacture of general metal goods (Order VIII), the manufacture of precision instruments and jewellery, the manufacture of food, drink, and tobacco, the manufacture of paper and the printing industry, and in building and contracting the incidence of fire is approximately what would be expected from the contribution of each industrial group to the national economy. The fire incidence in the manufacture of chemicals and allied trades and in the wood and cork industry is very much higher than would be expected, while the incidence in the manufacture of textiles and clothing, in the miscellaneous manufacturing industries and possibly in the manufacture of leather and leather goods is slightly higher than the expected value. The fire incidence in mining and quarrying appears to be decidedly lower and the incidence in the engineering, shipbuilding and electrical goods industry, and in the manufacture

of vehicles slightly lower than the expectation. Differences in the proportional numbers have been judged subjectively, since it is felt that the approximation in the basic assumptions outweighs considerations of statistical significance. It should be remembered that the proportional numbers are not mutually independent and an increase in one implies a decrease in others.

It is well to consider other measures of relative fire incidence in industrial groups before discussing further the suggestions made in the preceding paragraphs. Fire incidence is related to the numbers of establishments and to the estimated employment in the establishments in Table 4. The data are grouped in the same way as in Table 3 and the figures of establishments and numbers employed come from the 1948, 1949 and 1950 Census of Production reports. The rate calculated as "fires per 1 000 establishments", is a measure of relative incidence on the assumption that all establishments are the same size. This may be seriously misleading and the other rate calculated, "fires per 10 000 employed per year", is better in some respects although it suffers from the defect that all employees are assumed to be equally likely to cause fires. When considering sources of ignition due to personal carelessness, such as the careless disposal of smoking materials, this may be approximately true, and the resulting incidence of fire may depend largely upon the presence of materials that can be readily ignited. There is, however, great variation in the amount of power and mechanical equipment needed by, or available to, the individual employee, not only between industries, but also between different concerns within one industry. This variation will affect fire incidence and is therefore of interest, but it will bias comparisons of incidence based on the rate "fires per 10 000 employed" in favour of the industries with a low degree of mechanization. The net output per person employed, which is shown in column (h) of the table, throws some further light on this point.

Inspection of the rates in column (f) of Table 4 confirms the conclusions that the incidence of fire is decidedly low in mining and quarrying and high in the manufacture of chemicals and allied trades, and in the wood and cork manufacturing industry. An incidence of 4-7 fires per 10 000 employed per year is the modal (that is the most frequently occurring) rate, and a fire incidence more or less equal to this is common to the following industries:- (a) the treatment of non-metalliferous mining products other than coal, (b) metal goods not elsewhere specified (Order VIII), (c) precision instruments and jewellery, (d) metal manufacture, (e) textiles, (f) clothing, (g) paper and printing, and (h) food, drink and tobacco. The fire incidence in engineering, shipbuilding and the manufacture of electrical goods, the manufacture of vehicles, and building and contracting appears to be low compared with the modal rate, while that in the manufacture of leather goods and the miscellaneous manufacturing industries is on the high side. Differences in rates have been judged subjectively since sampling and chance variations in the numbers of fires will not affect the rates very much and there is reasonable consistency within industries over the three years. The classification into industries of high, standard, and low incidence agrees fairly well with that obtained in the previous section except that the manufacture of textiles and clothing are judged to have a high incidence on the basis of net output and a standard incidence on the basis of "fires per 10 000 employed per year".

When the causes of fires in industrial premises are considered it is found that there are some outstanding causes in certain industries. One example is that of fires reported to be caused by electric irons in the clothing industry which average 42 a year, an average proportion of 12 per cent of all the fires in this industry. Similarly fires reported as being caused by children playing with matches in the building and contracting industry average 69 a year, a proportion of nearly 11 per cent of all fires in the industry which compares unfavourably with the 2 to 5 per cent in other industrial groups. Fires caused by mechanical heat and sparks are far more serious in textile manufacture than in any other industry. There is an average of 185 fires reported a year, nearly 40 per cent of the incidence in the industry, which compares unfavourably with a range of between 1 per cent reported in building and contracting to 7 per cent in the chemical group of industries. Hot metal is the reported source of ignition of 111 fires per year in the group of industries manufacturing metals, machines, implements, and conveyances, an average proportion of 8 per cent compared with under 2 per cent of all fires in other industrial groups.

Fires reported as due to blowlamps are relatively more important in building and contracting than the other industrial groups; those reported as being caused by oxyacetylene cutting and welding apparatus are relatively more important in mining and quarrying, and the engineering group of industries, and, to a lesser extent, in the manufacture of bricks and pottery, the chemical group of industries, and the building and contracting industry. Fires caused by rubbish burning are reported an average of 33 times a year, corresponding to a proportion of nearly 7 per cent of all fires in the woodworking industries. Fires in which the reported source of ignition was a slow combustion stove constituted 15 per cent of the total in premises concerned with mining, quarrying and the treatment of mine and quarry products; 13 per cent of the total in building and contracting; 10 per cent in the woodworking group and about 5 per cent in other industries.

The causes of fire in the different industrial groups have been compared as differences in proportions to allow for the differences in the sizes of industries. The differences shown by the comparisons made in the preceding paragraphs are all statistically significant. The total number of fires per year in most of the industrial groups is at least 300, so quite small differences in proportions may be statistically significant though this does not necessarily mean that the differences are of great practical importance. It should be noted that the percentages of fires due to various causes within a group are not independent since an increase in the proportion due to one cause will reduce the proportions due to other causes, but, when there are many categories and small proportions in each this is unlikely to have a serious effect.

The sources of ignition of fires in industrial premises caused by equipment essential to human needs, such as heating and lighting equipment, would be expected to be distributed roughly in proportion to the size of the industrial group in which case differences in incidence of these fires would probably reflect differences in the presence of readily flammable materials. There appear to be roughly two levels of incidence. In building, mining and quarrying, the manufacture of clothing, woodwork, paper, and the miscellaneous manufacturing industries about 14 per cent of the fires are in this category while the proportion in the other industrial groups is only about 7 per cent. It may be surprising to find the mining, quarrying, and treatment of mine and quarry products in the high incidence group and the manufacture of textiles and textile goods in the low incidence group but this is probably due to differences in the types and distribution of the equipment in the industries. For example there are probably many open fires and slow combustion stoves in huts and small buildings connected with quarries, while textile manufacture will be mainly in centrally heated factories.

The incidence of fires caused by faults of construction or the failure of permanent equipment in buildings varies from 6 per cent in the bricks, pottery and glass industry and in the chemical industry, to 13 per cent in the clothing industry, the manufacture of food, drink, and tobacco, paper-making, and building and contracting. The incidence in mining and quarrying and the treatment of mine and quarry products, and in the engineering group also appears to be high.

The variations between industrial groups in the numbers of fires reported as due to an unknown cause are interesting. The proportions in all industrial groups except the manufacture of bricks, pottery and glass and the chemical industry are between 11 and 17 per cent while the proportions in these two industries are 21 and 22 per cent respectively.

The more noticeable causes of fire in industrial premises which show upward trends are miscellaneous electrical apparatus, miscellaneous gas apparatus, mechanical heat and sparks, hot metal, oxyacetylene cutting and welding apparatus, slow combustion stoves and those reported as unknown. The causes which show some downward trends are fires in grates, coal or coke furnaces, and the careless disposal of smoking materials.

3. FIRES IN PREMISES CONCERNED WITH TRANSPORT AND COMMUNICATIONS

All fires in buildings concerned with rail, road, water or air transport and methods of communication such as telephones are grouped under the heading of "premises concerned with transport and communications". Vehicles are not

necessarily involved in these fires. From Fig. 4 it can be seen that though there are fluctuations in the numbers of fires both in England and Wales, and in Scotland, there is no marked trend. In England and Wales about 30 per cent of the fires took place in private garages and a further 30 per cent in other garages for petrol and oil driven vehicles. Altogether something over 70 per cent of the fires occurred in buildings concerned with road transport, and a little under 20 per cent in buildings concerned with rail transport, mainly buildings other than stations. In Scotland fires in buildings concerned with rail transport (mainly other than stations) account for something over 30 per cent of the total fires in transport and communications.

Fires caused by faults in electric wire and cable average 18 per cent of the total in England and Wales but only 12 per cent in Scotland. The only other fairly frequent individual cause of fire is that reported as smoking materials, an average of 11 per cent of the fires in England and Wales and 9 per cent of those in Scotland.

4. FIRES IN COMMERCIAL PREMISES

The term "commercial premises" is used to describe only commercial premises concerned with the actual handling of goods and does not include purely office buildings. Some 80 per cent of the fires in this occupancy, both in England and Wales and in Scotland, are in retail shops and about 10 per cent in wholesale premises, while the proportion of fires in departmental stores is between 3 and 5 per cent. There are few fires in warehouses but it has been shown elsewhere(1) that these fires cause the highest financial loss per fire.

A Census of Distribution has recently been taken by the Board of Trade and a preliminary report enumerates about 90 per cent of the total number of retail establishments by their trades. An attempt has been made to use these figures for the purpose of calculating rates of incidence of fire. Definition in this field is difficult, as is comparison between the classification used in the Census and that used for the Organization's statistics. Where the comparisions seem reasonable the numbers of fires per 1 000 establishments per year and the numbers per 10 000 persons employed per year have been calculated using the establishment and employment figures given in the Census which apply to June 1950, and the average yearly incidence of fire between 1949 and 1952. Variations in total employment in the distributive trades amount to about 2 per cent over the 4 year period, so that changes in the numbers of establishments and the numbers employed in the individual retail trades are unlikely to have a serious effect upon the conclusions drawn. The numbers of fires and rates, where these have been calculated, are given in Table 5. The different types of retail trade have been divided into five groups according to rates of incidence of fire measured by the two criteria referred to above. In group (2) there is an average of 3-4 fires per 1 000 establishments per year and 7-9 fires per 10 000 employees per year; the average number of employees per establishment is 4-5. If the rates of incidence in this group are regarded as representing the standard fire incidence in retail shops, then comparisons of fire incidence in other groups is possible. For example the incidence in department and variety stores, group (1), is high judged by the average rate of 96 fires per 1 000 establishments per year, but appears to be more reasonable when judged by the average rate of 7·6 fires per 10 000 employees per year. The actual occurrences of fires in these stores is therefore not exceptional compared with other retail shops when the size of the stores is taken into account. In group (3) the average numbers of fires per 1 000 establishments per year are comparable with those in group (2), but the numbers of fires per 10 000 employees per year are about twice as high. As may be seen from the table, the average numbers of employees per establishment in group (3) are about half those in group (2), which suggests that the fire incidence in group (3) is very similar to the standard incidence of group (2), but that the measurement of the incidence is affected by the differences in average employment per establishment. In group (4) are collected the trades in which the fire incidence appears to be high, and in group (5) those in which the incidence appears to be low, judged by both of the rates calculated. In one or two trades the numbers of fires per year and the numbers of establishments are both small and no great significance can be attached to the rates of incidence, but in most cases they are large enough for differences in the rates to be regarded as significant differences in levels of fire incidence.

Some retailers, grain and forage merchants in particular, conduct both wholesale and retail trade. The larger establishments of this kind were not counted in the retail section of the Census and the high rates of incidence may be, to some extent, due to this method of selection.

The highest rate of incidence is that in meat, fish and poultry shops. This is largely due to the frequency of refrigerator fires and is, presumably, linked with the fact that these shops use refrigerators to a greater extent than others. In England and Wales 60 per cent of all fires in these shops were reported to be caused by refrigerators, nearly all of them due to electrical faults. Fires caused by electric refrigerators were the largest individual cause reported in all fires in commercial buildings. There was an average of 600 fires per year, or some 20 per cent of all the fires in these premises, of which 340 per year were in retail butchers, fishmongers and poulterers. There were fires due to this cause in other retail establishments such as confectioners, greengrocers, grocery and provision shops, dairies, and a few in wholesale establishments. There were very few fires reported due to gas refrigerators. The next-most important reported cause in commercial premises was the careless disposal of smoking materials. Some 14 per cent of the fires were due to this cause compared with about 6-7 per cent in houses and flats. The total numbers of fires are illustrated in Fig. 5.

5. OFFICES, GOVERNMENT AND OTHER

All fires attended in office buildings appear in this category but fires in offices forming part of a works, or part of a shop, unless they are in separate buildings, are generally classified under the occupancy appropriate to the works or shop. The table below shows how the offices are classified.

Table 6

FIRES IN OFFICES

Reports of fires attended by the Fire Services in the United Kingdom 1947-52

	Year											
	1947		1948		1949		1950		1951		1952	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Government depts....	95	19	85	18	164	24	148	21	130	24	144	20
Local authority offices	81	16	79	17	228	33	276	38	178	32	176	25
Other offices	329	65	296	64	300	43	294	41	244	44	384	55
	505	100	460	100	692	100	718	100	552	100	704	100

About 20 per cent of the total fires attended in offices are attributed to smoking materials, the proportion in dwellings being only 6-7 per cent. Fewer fires in offices are attributed to fires in grates, about 9 per cent, the proportion in dwellings being about 20 per cent. Some 5 per cent of the fires in offices are attributed to slow combustion stoves.

6. PROFESSIONAL ESTABLISHMENTS (OTHER THAN OFFICES) PUBLIC INSTITUTIONS, EDUCATIONAL ESTABLISHMENTS

The premises in this category are schools, hospitals, homes and institutions, churches and miscellaneous public or professional services such as laboratories, courts of justice, prisons, libraries, art galleries. The numbers of fires in the different items are shown in Fig. 6 from which it may be seen that the incidence of fire in educational establishments and hospitals and homes shows a marked upward trend in England and Wales though not in Scotland.

It is difficult to estimate the number of educational establishments at risk. The numbers of primary and secondary schools aided by grants from the Ministry of Education show no marked increase between 1947 and 1952; major further education establishments increased from 680 to 750, while evening institutes, which usually occupy buildings used for other purposes during the

day, increased in number from 5 100 to 10 800. On the other hand, the child population on the registers of schools aided or recognised by the Ministry of Education, that is the major proportion of the child population at school, increased from 5 300 000 in 1947 to 6 400 000 in 1952 and 95 per cent of these children attend grant-aided schools. There has been an increase of the order of 30 per cent in the number of students at establishments for further education and an increase of about 50 per cent in the students at evening institutes. There is of course great variation in the time spent at the establishment, the full time students being only a small proportion of the total.

The numbers of fires have increased fairly steadily, except in 1949, the overall increase from 1947-52 being about 70 per cent. This suggests that there is a greater increase in fires attended by Fire Brigades in educational establishments, than would be expected by the increase in educational activity since 1947. It is known, however(2) that many of the fires do not cause serious damage, and many may be little more than routine attendances resulting from a rule that the Fire Brigade should be called to any fire in a school, however small.

In Scotland the increase in the number of pupils attending schools under the management of education authorities, or grant-aided, is 10 per cent. The numbers of fires are small, there is considerable variation from year to year and no appreciable trend can be seen.

There are no readily available figures of changes in the numbers of beds being used in hospitals or homes, but in England and Wales the increase in the incidence of fires may, as in schools, be partly due to an increase in activity. The fires in places of worship and in the other occupancies included as "professional establishments" are evidently subject to a variety of influences both in England and Wales and Scotland.

The commoner causes of fire in professional establishments, schools, etc. are:- faults in electric wire and cable, about 6 per cent of the fires; fires in grates, about 7 per cent; slow combustion stoves, some 8 per cent; oil lamps and stoves, about 8 per cent; children playing with matches, about 5 per cent, and smoking materials, about 10 per cent. The fires caused by faults of construction or the failure of equipment in buildings amount to about 13 per cent as against 20 per cent in dwellings.

6. FIRES IN PRIVATE RESIDENTIAL HOUSES AND FLATS

Houses and flats may be conveniently divided into those built before 1939, the vast majority being of the ill-defined construction described as "traditional", and those built since 1945. The fire incidence in dwellings built since the war has been examined in a seriesof analyses and summarised in a note covering the period 1946-52(3). The numbers of fires in all houses and flats are shown graphically in Figs. 7 and 8. It has already been noted that the incidence of fire in dwellings is higher in Scotland than in England and Wales. Little direct information on the numbers of houses and flats in England and Wales or Scotland is available, but since the definition of a dwelling used in the Census of Population(4) taken in 1951 is, except for caravans and houseboats, broadly comparable with the term houses and flats, estimates of the total numbers are possible, using the information given in the Housing returns. Such estimates are given in Table 7. They may be in error to the extent that no account is taken of demolitions. It can be seen that each year the estimated rate of incidence of fire in England and Wales is consistently lower than that in Scotland by 4 to 6 fires per 10 000 dwellings at risk per year. There is an upward trend in the rates of incidence in England and Wales but not in Scotland, though the incidence in Scotland varies significantly from year to year. In both areas the estimated number of persons per dwelling has decreased steadily from 1947 and Scotland now appears to have very much the same density of population per dwelling as England and Wales, although, as may be seen from census data of persons per room given in Table 8, Scotland has a consistently higher average number of people per room in both urban and rural districts, than England and Wales. It is well known that Scotland suffers more from overcrowding and according to Bowley(5), this is because of the prevalence of two and three-roomed houses compared with the four and five roomed houses more usual in other parts of Britain. It is possible that the high rate of incidence

in Scotland is connected with the overcrowding; the differences are of the same order of magnitude. The average number of persons per room in Scotland is about 25 per cent higher than in England and Wales, and except for 1947 the differences in the rates of incidence are between 30 and 45 per cent.

Causes of fire contributing to the higher rate in Scotland are "chimney fires not confined to the chimney", the rate for which was about three times as high in Scotland as in England and Wales in 1951 and 1952, and "fire in grate igniting furniture and timber under hearth", the rates in Scotland being about twice those in England and Wales. The rates for chimney fires not confined to the chimney have recently increased considerably in both areas, but the rate in Scotland is believed always to have been higher than that in England and Wales. Other fires for which the incidence in Scotland is generally higher than that in England and Wales are those caused by faults in electric wire and cable, those caused by fires in grates igniting materials other than bedding and clothing, and those attributed to the careless handling or disposal of hot ashes and smoking materials, candles, tapers, matches (including children playing with matches). Fires caused by fires in grates igniting bedding, clothing and linen have a lower rate in Scotland than in England and Wales.

The causes of about 4 per cent of the fires in dwellings are reported as unknown. The rate of incidence of fires caused by heating, cooking and lighting equipment is higher in Scotland than in England and Wales by about 3 fires per 10 000 dwellings at risk per year, and that of fires due to faults of construction by about 2 fires per 10 000 dwellings at risk per year. Fires due directly to personal carelessness are significantly higher in Scotland, by about 0.6 fires per 10 000 dwellings at risk per year.

8. FIRES IN CLUBS, HOTELS, RESTAURANTS, PUBLIC HOUSES

This category includes residential hazards other than private houses such as hostels, boarding houses and holiday camps, and the catering industry. It can be seen from Fig. 9, that the numbers of fires in England and Wales were fairly constant in the last four years of the period but showed some increase from the level of incidence in 1947 and 1948.

The biggest individual source of ignition is "fish frying range", the hot fat of which often becomes ignited. Most of the 700 fires a year in this group are in fish and chip shops. About 280 fires a year are caused by careless handling of smoking materials and matches, and by children playing with matches, and about 100 fires a year by electric refrigerators.

9. FIRES IN OUTDOOR AGRICULTURAL HAZARDS

Fires in agricultural hazards are numerous, and while individual fires, especially in forests, or agricultural machinery, can cause serious damage, the majority are on grass land, heath land or railway embankments and are important only because of the potential spread, and the demands made upon the Fire Brigades in extinguishing them. In Table 9 is shown the estimated usage of land in the United Kingdom. The area of Scotland is roughly half that of England and Wales, but crops and grass land occupy only 23 per cent of the Scottish area while they cover about 65 per cent of England and Wales and about the same proportion of Northern Ireland. About 60 per cent of the area of Scotland comprises rough grazings and this compares with 14 per cent in England and Wales and 20 per cent in Northern Ireland. Although the difference in the "amount of risk" probably accounts for some of the very large difference in incidence in these hazards between England and Wales, and Scotland and Northern Ireland, such differences are judged to be small compared with those caused by differences in weather conditions. It has been shown elsewhere[6] that the incidence of fires caused by sparks from locomotives is closely associated with relative humidity and the relation is illustrated in Fig. 10. It is reasonable to assume that relative humidity is the main meteorological condition determining fire incidence, since, above a certain level of humidity no ordinary source of ignition is likely to start a fire, and below a certain level fires are very easily started. The relationship is not simple and small differences at certain critical levels of relative humidity are likely to have a considerable effect on fire incidence. There is the further point that the moisture content of grass, bracken, crops, or trees may be largely independent of atmospheric humidity when the vegetation is young; the fact that fires in grassland and railway embankments occur both early and late in the year suggests

that dead vegetation, the moisture content of which is highly dependent on atmospheric conditions, is usually the material first ignited in these fires. It can be seen from Fig.10 that the relative humidity is closely connected with the amount of rainfall and sunshine which therefore necessarily bear some relationship to fire incidence. Countrywide measurements of relative humidity are not available; but rainfall and average sunshine are shown in Fig.11 and fire incidence in agricultural hazards in Fig.12. In England and Wales the expected relationship between the incidence of fire and weather conditions is roughly borne out, remembering that averages for the whole country are considered. The variations and relative levels of both incidence and weather conditions in Scotland and Northern Ireland do not show such good agreement, but there is some indication that the detailed relationship illustrated in Fig.10 applies to fires in more general agricultural hazards and to wider areas than that covered by the investigation dealing with sparks from locomotives which was confined to the Home Counties.

Fires in standing or stooked crops are not numerous except in conditions of low atmospheric humidity, but there are rather more fires in ricks and stacks. The lower moisture content of stacked crops compared with standing crops makes the material more readily ignitable. The sources of ignition reported in all fires involving crops in England and Wales are sparks from locomotives, between 7 and 24 per cent of the total number of fires; matches, children playing with matches and smoking materials, over 20 per cent; rubbish burning, about 10 per cent; spontaneous combustion, between 10 and 25 per cent; and unknown causes, about 20 per cent. In Scotland fewer fires are attributed to sparks from locomotives and spontaneous combustion, and more to matches and children playing with matches.

The numbers of fires in agricultural machinery are small but show a fairly steady increase from 1947 to 1952. This no doubt reflects the increase in the numbers of nearly all types of agricultural machinery in use which has taken place in these years. About 40 per cent of the fires are caused by oil or petrol tractors, and it is thought that the majority of these are caused by sparks from exhaust pipes. There is a risk from exhaust sparks to agricultural hazards other than machinery, including standing crops and ricks, and it is probably one that could be fairly easily eliminated.

The cause of some 90 per cent of the fires on railway embankments is sparks from locomotives both in England and Wales and in Scotland. The same cause is reported for about 12 per cent of the fires in grassland and heathland. The other causes reported in this hazard are smoking materials, to the extent of about 13 per cent in Scotland and 24 per cent in England and Wales; matches and children playing with matches, to the extent of 30 per cent of the fires attended both in England and Wales and in Scotland; and rubbish burning or intentional burning to the extent of about 15 per cent in both areas.

The fires attended by Fire Brigades in woods, forests and plantations represent only part of the total incidence in this hazard since the Fire Brigades attend only a small proportion of the fires which occur in or near forests owned by the Forestry Commission. The Commission has recently published a booklet describing the fire experience in its own forests and plantations(7). Because of differences in definitions direct comparison of the statistics is not possible, but fires caused by railways constitute a much higher proportion of fires in Forestry Commission property than in the fires attended by Fire Brigades. This cause is reported in about 10 per cent of outdoor fires attended by the Fire Brigades. The Fire Brigades report smoking materials, matches and children playing with matches as the cause in about 40 per cent of the fires and intentional burning or rubbish burning in about 15 per cent of the fires.

10. FIRES IN TRANSPORT

The great majority of the fires in transport are in oil or petrol driven road vehicles, and, as shown in Fig.13, these show a steady increase, relatively the same in England and Wales, Scotland, and Northern Ireland, from 1947. Table 10 overleaf relates the number of fires to the number of current licences in Great Britain. The reasonably stable figure of fires per 1 000 licences, though only a rough measure, is enough to show that the fire risk in petrol or oil driven vehicles is probably fairly constant and that the increase in fire

Table 10

FIRES IN OIL AND PETROL DRIVEN ROAD VEHICLES

Reports of fires attended by Fire Brigades in Great Britain 1947-52

Year	Number of fires	Total licences current	Number of fires per 1 000 licences
		Thousands	
1947	3 998	3 317	1.2
1948	3 447	3 482	1.0
1949	4 564	3 322	1.4
1950	5 126	4 093	1.3
1951	5 482	4 318	1.3
1952	6 160	4 517	1.4

incidence is due to the increasing number of vehicles. The major reported causes of fire are faults in electric wire and cable, an average of 34 per cent of the total number in England and Wales, and 38 per cent in Scotland, and fires caused by engines, 35 per cent in England and Wales, and 31 per cent in Scotland. About 6 per cent of the fires in both areas are attributed to mechanical heat and sparks. The proportions due to the various causes are consistent from year to year in each of the areas. There is no reason to expect differences in incidence between the two areas which suggests that such differences as appear in the figures are the result of differences in reporting and chance fluctuations.

As might be expected, the major cause of fires in railway rolling stock is sparks from locomotives. This accounts for about 40 per cent of the fires.

Fires in ships in port were examined in 1949[8]. The report said that 40 per cent of the fires were due to welding and cutting apparatus and that this cause, together with smoking materials (including matches), faults in electric wire and cable and heat from stoves and their flues accounted for about 70 per cent of the fires. Information on any change that may have occurred in the causes of fires of this type is not readily available. The Working Party set up by the Ministry of Transport, for which the report[8] was prepared, made a series of recommendations in their report. The evidence obtained from courts of enquiry on recent large fires in ships in port indicates that there is scope for further application of these recommendations.

11. FIRES IN OUTDOOR HAZARDS

Most of the fires in outdoor hazards are in refuse dumps, and are therefore of little economic importance though they constitute a nuisance to Fire Brigades. Fires in stacks of timber, and in outdoor stores of rubber, cotton, oils and grease or other chemicals may, however, cause serious damage. The more frequent causes of fire include sparks from locomotives, children playing with matches, oxyacetylene cutting and welding apparatus, rubbish burning (especially in timber yards) and smoking materials. These causes suggest that a little care would be sufficient to prevent many of the fires, which often result in severe losses, as in the West Hartlepool timber yard fire which was believed to be due to a spark from a locomotive.

V. METHODS OF EXTINCTION

Information on the methods used to extinguish fires is presented in Table 11 and in Figs.14 and 15. All the fires included were attended by the Fire Services, but not all were extinguished by them.

The proportions of fires extinguished before the arrival of the Fire Services shows a tendency to increase, more or less steadily, both in buildings and elsewhere. The commonest method used in the fires extinguished before the arrival of the Brigade is water from buckets, but the numbers of fires extinguished by this method remained sensibly constant over the four years 1949-52 and the increase was largely due to the use of chemical extinguishers, removal,

and smothering and to an increase in the number of fires which burnt out before the Brigade arrived. Part of the increase in the use of chemical extinguishers may be the result of advertising and other propaganda, but the other three methods are less likely to be influenced by such considerations.

The number of fires in buildings which burnt themselves out increased significantly from 1 per cent to almost 2 per cent of all fires attended in buildings; among them there will have been some "late calls", but the proportion of these is not readily available. The total number of "late calls" received each year is about 3 000. The increase in the number of fires which burn out before the Brigade arrives probably reflects a tendency to call for Fire Brigade assistance more readily than in the past so that more small fires are attended. The numbers of fires extinguished by chemical extinguishers, removal and smothering may also be indicative of this tendency since the rates of change of the numbers with respect to time are, very roughly, equal.

The figures of fires extinguished by various methods in occupancies other than buildings, both before the arrival of the Fire Brigade and by the Fire Brigade, reflect not only the variation in the numbers of these fires but also differences in method dictated by the kind of equipment at hand. Fires extinguished by smothering, the use of sand and earth, the use of water in buckets, and the use of chemical extinguishers constitute a fairly high proportion of those extinguished before the arrival of the Brigades, and a much lower proportion of those dealt with by the Brigades.

An interesting feature of the extinction of fires both in buildings and in other occupancies is the increasing use by the Brigades of hose reel jets in preferenceto the use of heavier jets from pumps and hydrants. The numbers are illustrated in Fig. 15 and it can be seen that the use of hose reel jets has increased very considerably and the use of the heavier jets has decreased though not in the same proportion. Hose reel jets are currently being used to extinguished fires which, in earlier practice, would have been tackled with heavier jets, but in addition to this they are being used for other fires. Fire Brigade policy is inclined to the use of smaller jets in order to cause as little water damage as possible, and it is probable that the figures are partially a reflection of the effectiveness of this policy.

VI. CASUALTIES IN FIRES

Table 12 gives some idea of the extent of injury and mortality in fires attended by the Fire Services. The Fire Services are called to only a proportion of the incidents where injury or death is caused by burns or scalds; it is probable they attend most major conflagrations in which there are casualties, and it is known that they attend some incidents in which people are injured but there is no fire in the accepted sense of the word. The extent of injury in the recorded non-fatal casualties can vary from the very minor to the very grave. Table 13 below shows the numbers of civilian casualties in terms of the fires in buildings; this is a somewhat arbitrary choice, but most of the casualties occur in buildings and it is thought to be more appropriate than dividing by the total numbers of fires attended.

Table 13

CASUALTIES IN FIRES ATTENDED BY THE FIRE SERVICES

Reports of fires attended in the United Kingdom 1947-52

Year	Number of fatal civilian[x] casualties per 100 fires in buildings	Number of non-fatal civilian[x] casualties per 100 fires in buildings
1947	1.33	6.42
1948	1.46	6.85
1949	1.19	7.94
1950	1.26	8.37
1951	1.46	9.41
1952	1.36	8.57

x Non Fire Service

There is no evidence of any steady increase or decrease in the fatal casualty rate per 100 fires; there is an upward trend in the non-fatal casualty rate and this is reflected in the increasing proportion of non-fatal casualties reported to be due to burns and scalds.

There is an average of 3 Fire Service personnel killed each year. The numbers of non-fatal casualties fluctuate from year to year but show no marked upward or downward trend; nor do the numbers in the various categories of injury show any particular variation. It is perhaps worth noting that nearly half the Fire Service injuries are bruises, cuts and abrasions while 70 per cent of the civilian non-fatal injuries are burns and scalds.

VII. CONCLUSIONS

In analysing the figures of fires attended by the Fire Brigades in the United Kingdom fires in buildings have been considered separately from those in occupancies other than buildings. This is necessary because there is evidence that in agricultural hazards, the largest item in the fires occurring out of doors, the incidence of fire is dependent on climatic conditions. There is also probably some dependence on climate of the incidence of fires in refuse dumps, another large item. This influence of climatic conditions, affecting the flammability of substances ignited, is not established as a general factor concerned with fires in buildings and no attempt has so far been made to examine this possibility; in any case the effect, if any, is generally likely to be small. It is suggested that climatic conditions may have some bearing on fires in agricultural buildings.

There are differences between England and Wales, Scotland, and Northern Ireland in the area and usage of land so that variations of incidence in fires occurring elsewhere than in buildings are to be expected. The level of incidence of fires in buildings is also different in England and Wales from that in Scotland, largely because of differences in the incidence of fires in dwellings, and is lower in Northern Ireland than in either of the other areas. When the buildings in Northern Ireland are grouped according to type of occupancy, the resulting numbers in each group are small and may be affected considerably by sampling fluctuations. The conclusion, necessarily tentative, is that while the incidence of fire in agricultural buildings may be a shade higher in Northern Ireland, the incidence in industrial premises and houses is considerably lower, and in other buildings somewhat lower than that in England and Wales. In this analysis it has been assumed that there is no great difference in the distribution of buildings in various occupancies in relation to population in the three areas.

The variations of incidence in time are of interest. There is an upward trend, though not a steady one, in the total numbers of fires in buildings both in England and Wales and in Scotland. The figures for the total numbers in 1953 have just become available; in both countries they show a slight decrease of about 6 per cent on the 1952 level, and are at the same level as 1949-51 but higher than that in 1947-1948. The most important occupancy in which there has been a steady increase in time in England and Wales is private residential houses and flats, and this is followed by industrial premises. The only other occupancy in which it has been possible to establish a significant linear trend in time is the group covering educational establishments, public institutions and miscellaneous professional establishments; there was no evidence of a significant upward trend in the fires in other occupancies. There is evidence though, of somewhat higher levels of incidence in 1951 and 1952 than in 1947 and 1948 in some of the occupancies. The only significant trends in fire incidence in Scotland were an increasing one in industrial premises, and a decreasing one in Service establishments. There is evidence of an overall upward trend in the remaining occupancies, though not of a significant trend in any individual occupancy.

Fires attended in industrial establishments in the United Kingdom increased from 1947 to 1952 by about 23 per cent; the Index of Industrial Production shows an increase of the same amount and the two quantities appear to have increased at about the same relative rate. At the level of individual industries the correspondence is not so good; in all industries the yearly production increased and in the majority of industries fire incidence also increased.

The fire incidence in the chemical industry and in the manufacture of wood and cork appears to be high compared with other industries both on the basis of

net output and on that of fires per 10 000 employees per year, while the incidence in the engineering, shipbuilding and electrical goods group, and in mining and quarrying are lower than the "standard" industrial incidence. Some causes of fire have been found to be exceptionally high in specific industries; the most startling is the proportion of 40 per cent of all fires in the textile group being caused by mechanical heat and sparks. Fires caused by the careless handling or disposal of smoking materials and matches, children playing with matches and incendiarism vary in proportion from an average of about 11 per cent in the chemical industry to about 30 per cent in building and contracting.

There is a fairly large group of retail shops with average rates of incidence of 3-4 fires per 1 000 establishments per year, and 7-9 fires per 10 000 employees per year; in these there is a consistent average of 4-5 employees per establishment. The occurrence of fires in departmental stores is not exceptional considering their size, at an average rate of 7.6 fires, per 10 000 employees per year. Meat, fish, and poultry shops have a very high rate of fire incidence of 15 fires per 1 000 establishments per year, or 45 fires per 10 000 employees, the average number of fires being 660 per year. Some 60 per cent of the fires in these shops are reported to be caused by electrical faults in refrigerators.

The differences between England and Wales, and Scotland in the incidence of fires in private houses and flats are estimated to be between 8 fires per 10 000 dwellings at risk per year in 1947 and about 4 fires per 10 000 dwellings at risk per year in 1952. The rate of incidence in Scotland varies about an average of 20 fires per 10 000 dwellings while that in England and Wales rises fairly steadily from a rate of 12 in 1947 to a rate of 16 in 1952. A possible reason for this difference is the known fact that Scotland suffers from overcrowding to a greater extent than England and Wales. The difference in incidence shows itself in the fires due to chimney fires not confined to the chimney, those due to open fires in grates igniting timber under hearth, and furniture, and to a lesser extent, those due to smoking materials and similar causes. These causes suggest that structural deficiencies may be partly responsible for the higher incidence in dwellings in Scotland. The individual causes of fires show some variation, for example fires in chimneys not confined to the chimneys have risen very sharply in the last two years in England and Wales. There has been an increase in Scotland also but the relative level there appears always to have been higher than that in England and Wales.

Part of the increase in the rates of incidence of fires in dwellings in England and Wales may be due to a tendency in recent years to call the Fire Brigades to smaller fires. The increase in incidence is largely among fires associated with causes essential to human needs such as heating, lighting and cooking equipment; and this lends some support to this suggestion. The same tendency would presumably apply to Scotland also but might be counter-balanced by a decrease in the actual number of outbreaks so that the rate of incidence appears to remain almost constant. If the housing programme in Scotland is more than keeping pace with population growth then there should be a tendency to relieve overcrowding which may have some effect on fire incidence.

From the examination of the methods of extinction of fire it again appears possible that Fire Brigades are in attendance at smaller fires.

There is no evidence of an increase in the number of fatal casualties in relation to the number of fires, but there is evidence that there are now rather more non-fatal casualties per fire than in the past. The term non-fatal casualty covers a very wide variety of injuries, and minor injuries may now be more widely reported than in the past.

The classification of causes of fire used in this analysis was adopted in an attempt to measure the size of various broad groups of like causes. Fires due to heating, lighting and cooking apparatus constitute between 44 and 50 per cent of the fires in dwellings but between 5 and 20 per cent of the fires in industry. Since the number of these fires in dwellings is about 7 000 a year more detailed examination might be rewarding. The fires due to careless handling of smoking materials, matches and so on amount to about 16 per cent of fires in dwellings and to between 12 and 30 per cent of those in industry, so propaganda against such carelessness and mishandling would, if

it were effective at all, apply over a considerable field. The proportions of fires in industrial premises due to faults of construction of buildings or the failure of permanent equipment of buildings vary from 6 to 12 per cent (compared with a figure of about 20 per cent in houses). The information provided in the review not only suggests that a considerable proportion of fires are caused by factors which are common to all buildings, it also locates particular fields where further detailed investigation should prove rewarding.

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Table 5

FIRES IN RETAIL ESTABLISHMENTS ATTENDED BY FIRE SERVICES IN GREAT BRITAIN, 1949-52

Type of retail trade	Average number of fires per year 1949-52	Fires related to establishments		Fires related to employment		Average persons employed per establishment
		Number of retail establishments (June 1950)	Average number of fires per year per 1 000 establishments	Number of persons engaged (June 1950)	Average number of fires per 10 000 persons engaged	
	(1)	(2)	(3)	(4)	(5)	(6)
(1)						
Department and variety stores	138.0	1 442	95.7	181 802	7.6	126.1
(2)						
Books, newspapers, stationery	49.5	10 839	4.6	58 098	8.5	5.4
Boots and shoes	42.5	14 101(a)	3.0	55 139(a)	7.7	3.9
Confectionery, excluding bakeries	102.5	23 868	4.3	124 512	8.2	5.2
New and second-hand clothing	231.0	74 945	3.1	329 286	7.0	4.4
Drugs and druggists sundries	73.5	16 733	4.4	82 232	8.9	4.9
Grocery and provisions	396.0	129 345	3.7	478 398	8.3	3.7
Jewellery, watches, clocks	19.5	5 490	3.6	21 385	9.1	3.9
(3)						
Domestic glass and pottery	11.0	3 060	3.6	6 061	18.1	2.0
Wines and spirits	36.5	7 608	4.8	19 129	19.1	2.5
Fruit, vegetables, flowers	161.0	42 180(b)	3.8	112 412(b)	14.3	2.7
(4)						
Building materials	43.0	5 323	8.1	20 044	21.5	4.6
Coal, coke, solid fuel	92.5	13 305	7.0	57 320	16.1	4.3
Furniture	102.0	16 086(c)	6.3	90 453(c)	11.3	5.6
Grain and forage (d)	20.0	1 509	13.3	4 764	42.0	3.2
Meat, fish, poultry	659.5	44 469	14.8	146 504	45.0	3.3
Milk and dairy products	69.5	8 759	7.9	72 984	9.5	8.5
(5)						
Newspapers, tobacco, confectionery	64.0	50 445	1.3	186 073	3.4	3.7
Saddlery and leather goods	1.0	2 444	0.4	6 092	1.6	2.5
Tobacco	16.0	10 284	1.6	23 190	6.9	2.3

(a) Establishments where boot and shoe repairing as well as retailing is carried on, are included in columns (2) and (4) but excluded from columns(1), (3) and (5)

(b) Greengrocers with fish shops are included in columns (2) and (4)

(c) Art galleries, picture shops and shops selling musical instruments are included in columns (2) and (4) but excluded from columns(1), (3) and (5)

(d) Only partly represented in the census of retail establishments.

Source - Census of Distribution reports.

Table 4

FIRES IN INDUSTRIAL PREMISES ATTENDED BY FIRE SERVICES IN GREAT BRITAIN 1948-50

Industrial group	S.I.C. Order	Year	Number of establishments +	Number of fires	Number of fires per 1 000 establishments per year	Estimated employment +	Fires per 10 000 employed per year	People employed per establishment	Net output per person employed *
		(a)	(b)	(c)	(d)	(e) (000's)	(f)	(g)	(h) £
Mining and quarrying	II	1948	3 537	111	31.4	833.6	1.3	236	488
		1949	3 895	104	26.7	834.8	1.2	214	510
		1950	3 494	104	29.8	805.3	1.3	230	532
Treatment of non-metalliferous mining products other than coal	III	1948	5 539	163	29.4	294.1	5.5	53	545
		1949	5 745	220	38.3	303.5	7.2	53	547
		1950	5 650	162	28.7	308.5	5.3	55	578
Chemicals and allied trades	IV	1948	4 061	346	85.2	349.7	9.9	86	766
		1949	4 291	376	87.6	358.6	10.5	84	752
		1950	...	580	...	...	...	...	862
Metal manufacture	V	1948	2 648	319	120.5	529.9	6.0	200	608
		1949	2 696	420	155.8	535.4	7.8	199	653
		1950	2 606	436	167.3	540.3	8.1	207	713
Engineering, shipbuilding and electrical goods	VI	1948	13 952	592	42.4	1 629.0	3.6	117	522
		1949	14 335	720	50.2	1 664.0	4.3	116	535
		1950	...	594	...	...	...	...	563
Vehicles	VII	1948	7 402	227	30.7	727.7	3.1	98	505
		1949	7 288	192	26.3	750.1	2.6	103	522
		1950	6 926	226	32.6	763.7	3.0	110	558
Metal goods not elsewhere specified	VIII	1948	11 182	267	23.9	438.1	6.1	39	529
		1949	11 209	284	25.3	433.8	6.5	39	524
		1950	10 582	278	26.3	443.0	6.3	42	555
Precision instruments, jewellery, etc.	IX	1948	3 604	80	22.2	119.4	6.7	33	520
		1949	3 478	135	39.1	124.6	10.9	36	543
		1950	3 105	88	28.3	127.7	6.9	41	567
Textiles	X	1948	9 506	461	48.5	845.5	5.5	89	515
		1949	9 703	496	51.1	954.2	5.2	98	516
		1950	9 506	546	57.4	996.6	5.5	105	601
Leather, leather goods and fur	XI	1948	2 973	85	28.6	67.8	12.5	23	738
		1949	2 889	68	23.5	66.8	10.2	23	648
		1950	2 663	66	24.8	67.9	9.7	25	738
Clothing	XII	1948	15 004	301	20.1	531.5	5.7	35	402
		1949	17 431	324	18.6	586.4	5.5	34	394
		1950	...	294	...	...	...	...	403
Food, drink, tobacco	XIII	1948	28 785	517	18.0	696.9	7.4	24	754
		1949	32 076	612	19.1	738.7	8.3	23	734
		1950	...	580	...	...	...	...	817
Manufacture of wood and cork	XIV	1948	13 909	516	37.1	270.1	19.1	19	511
		1949	13 809	612	44.3	285.5	21.4	21	487
		1950	12 761	644	50.5	288.0	22.4	23	509
Paper and printing	XV	1948	8 285	190	22.9	432.5	4.4	52	634
		1949	9 125	252	27.6	455.6	5.5	50	608
		1950	8 813	138	15.7	477.3	2.9	54	677
Other manufacturing industries	XVI	1948	3 173	230	72.5	211.8	10.9	67	561
		1949	3 157	180	57.0	209.9	8.6	66	562
		1950	2 970	182	61.3	214.8	8.5	72	606
Building and contracting	XVII	1948	110 554	660	6.0	1 644.8	4.0	15	401
		1949	128 623	618	4.8	1 722.7	3.6	13	418
		1950	...	842	...	...	...	...	...

+ Source - Census of Production reports

* For firms employing more than ten people.

FR.159. T.H.

Table 3

FIRES IN INDUSTRIAL PREMISES ATTENDED BY FIRE SERVICES IN THE UNITED KINGDOM, 1947-52

Relation of fire incidence to net annual output

Standard Industrial Classification Order		Index of Industrial Production Weights (proportional to net output of each group of industries)	Year											
			1947		1948		1949		1950		1951		1952	
			Number of fires	Proportionate number	Number of fires	Proportionate number	Number of fires	Proportionate number	Number of fires	Proportionate number	Number of fires	Proportionate number	Number of fires	Proportionate number
II	Mining and quarrying	77	107	20	111	21	108	18	104	17	102	17	112	17
III	Treatment of non-metalliferous mining products other than coal	29	163	31	164	31	220	38	162	27	170	28	184	29
IV	Chemicals and allied trades	47	350	67	347	65	380	64	384	64	426	69	424	66
V	Metal manufacture	59	312	59	320	60	420	72	436	72	414	67	548	85
VI	Engineering, shipbuilding and electrical goods	160	641	122	595	111	724	122	598	99	674	109	728	113
VII	Vehicles	79	225	43	227	42	192	32	230	38	270	44	236	37
VIII	Metal goods not elsewhere specified	44	239	46	267	50	284	48	282	47	284	46	388	60
IX	Precision instruments, jewellery, etc.	10	80	15	80	15	136	23	90	15	100	16	88	14
X	Textiles	83	465	89	478	89	512	86	574	95	728	118	568	88
XI	Leather, leather goods and fur	8	71	14	85	16	68	12	66	12	62	10	120	19
XII	Clothing	42	306	58	306	57	328	55	302	50	298	48	312	48
XIII	Food, drink and tobacco	98	470	90	527	98	628	106	594	98	598	97	596	92
XIV	Wood and cork	25	569	108	530	99	612	103	662	110	550	89	568	88
XV	Paper and printing	48	208	40	190	35	252	43	232	39	240	39	260	40
XVI	Other manufacturing industries	23	236	45	233	43	180	30	188	31	206	33	156	24
XVII	Building and contracting	125	578	110	668	125	622	105	858	143	786	127	884	137
		957	5 020	957	5 128	957	5 666	957	5 762	957	5 908	957	6 172	957

Table 2

THE INCIDENCE OF FIRES ATTENDED BY FIRE SERVICES IN THE UNITED KINGDOM, 1947-52

Area	YEAR											
	1947		1948		1949		1950		1951		1952	
	No. of fires attended	Fires per 1 000 of population (a)	No. of fires attended	Fires per 1 000 of population (a)	No. of fires attended	Fires per 1 000 of population (a)	No. of fires attended	Fires per 1 000 of population (a)	No. of fires attended	Fires per 1 000 of population (a)	No. of fires attended	Fires per 1 000 of population (a)
England and Wales												
In buildings	31 970	0.74	32 001	0.74	36 924	0.85	37 540	0.86	36 454	0.83	40 384	0.92
Not in buildings	34 512	0.80	25 470	0.59	55 952	1.28	25 776	0.59	27 746	0.63	42 032	0.96
Total	66 482	1.54	57 471	1.33	92 876	2.13	63 316	1.44	64 200	1.46	82 416	1.88
Scotland												
In buildings	4 772	0.94	4 632	0.90	5 208	1.01	5 526	1.07	5 246	1.03	5 604	1.10
Not in buildings	1 595	0.31	1 752	0.34	2 672	0.52	2 046	0.40	1 926	0.38	2 596	0.51
Total	6 367	1.23	6 384	1.24	7 880	1.53	7 572	1.46	7 172	1.41	8 200	1.61
Northern Ireland												
In buildings	536	0.40	613	0.45	660	0.49	678	0.50	694	0.51	708	0.51
Not in buildings	168	0.13	310	0.23	412	0.30	308	0.22	430	0.31	444	0.32
Total	704	0.53	923	0.68	1 072	0.79	986	0.71	1 124	0.82	1 152	0.84
United Kingdom												
In buildings	37 278	0.75	37 246	0.75	42 792	0.85	43 744	0.87	42 394	0.84	46 696	0.93
Not in buildings	36 275	0.73	27 532	0.55	59 036	1.18	28 130	0.56	30 102	0.60	45 072	0.89
Total	73 553	1.49	64 778	1.30	101 828	2.03	71 874	1.43	72 496	1.44	91 768	1.82

(a) Source - Registrars General. The population figures for 1947-50 and 1952 are estimates.

Table 1 (c)

CAUSES OF FIRES ATTENDED BY FIRE SERVICES IN NORTHERN IRELAND, 1947-52

Supposed cause of fires	Number of Fires in Buildings						Number of Fires not in Buildings					
	1947	1948	1949	1950	1951	1952	1947	1948	1949	1950	1951	1952
Aircraft, crashed	-	-	-	-	-	-	1	1	-	4	-	-
Ashes, soot	8	15	8	8	8	-	3	3	-	4	4	4
Brazier	1	1	-	6	2	-	-	-	-	2	-	-
Candle	6	4	4	6	6	-	-	-	-	2	-	-
Chimney fire, not confined to chimney	6	6	12	16	36	28	-	-	-	-	-	-
Chimney, sparks from (outside building)	30	49	28	16	20	24	3	4	4	-	-	4
Electric cooker	1	-	-	2	-	-	-	-	-	-	-	-
fire, heater, radiator	11	6	20	18	8	4	-	-	-	-	-	-
iron	6	2	-	2	4	4	-	-	-	-	-	-
motor	4	4	-	8	2	-	-	-	-	-	-	-
refrigerator	5	7	8	4	6	12	-	-	-	-	-	-
wire and cable	42	37	40	62	38	32	18	33	40	42	64	72
wireless	3	3	4	6	6	4	-	-	-	-	-	-
other apparatus	8	10	4	8	12	8	3	2	-	4	2	4
Explosives, fireworks	4	1	4	-	4	-	1	-	-	2	2	4
Fire in grate igniting bedding, clothing, linen	4	7	8	10	8	12	-	-	-	-	-	-
furniture and furnishings	11	12	16	4	14	12	-	-	-	-	-	-
structural timber under hearth	30	23	40	44	24	28	-	-	-	-	-	-
other materials	74	70	68	142	130	108	-	-	-	-	-	-
Fish frying range (all fuels)	6	14	12	8	18	12	-	-	-	-	-	-
Flue	9	23	20	10	6	16	-	-	-	-	-	-
Furnace (coal or coke)	3	4	-	4	-	-	-	-	-	-	-	-
Gas (coal) burner, jet, ring	3	5	8	2	2	-	1	-	-	2	-	-
cooker	5	6	4	2	6	4	-	-	-	-	-	-
fire, heater, radiator	1	-	-	2	-	-	-	-	-	-	-	-
other apparatus	-	2	-	4	4	-	-	-	4	-	-	-
Incendiarism	2	1	-	-	-	-	5	1	-	-	-	-
Incubator, brooder (all fuels)	12	28	16	24	8	8	-	-	-	-	-	-
Intentional burning of grassland, gorse etc.	-	-	-	-	-	-	1	4	-	10	2	4
Lightning	1	-	-	-	-	-	-	-	4	-	-	-
Lime	-	-	-	-	2	4	-	-	-	-	-	-
Locomotives, sparks from	-	1	8	2	2	-	4	15	56	22	26	28
Matches	5	6	4	6	18	16	5	3	4	-	10	4
Matches, children playing with	9	10	16	20	12	20	5	7	16	4	30	32
Mechanical heat or sparks	8	10	8	6	14	8	2	3	4	4	-	-
Metal, hot	2	1	4	4	2	4	-	1	-	-	2	4
Oil, blowlamp	4	1	4	6	2	-	-	1	-	-	-	-
engine (including petrol)	2	5	-	6	8	4	9	8	8	22	20	28
lamp, stove	22	27	16	14	8	12	-	-	8	-	4	-
tractor	2	2	4	6	2	4	1	1	4	2	6	8
other apparatus	-	2	-	4	-	4	1	1	-	-	-	-
Oxyacetylene cutting and welding apparatus	5	1	4	4	4	4	2	2	-	2	34	-
Rubbish burning	8	3	24	4	6	12	12	32	56	18	-	12
Slow combustion stove igniting structural woodwork	7	4	4	-	4	-	-	-	-	-	-	-
other materials	11	18	16	4	20	12	3	7	-	2	8	12
Smoking materials	63	66	68	70	62	56	17	32	56	60	60	40
Spontaneous combustion in rubbish	-	-	-	-	-	-	1	3	-	-	-	-
in other materials	6	4	-	-	-	-	1	4	-	2	4	-
Steam roller, engine, traction engine	-	2	-	-	-	-	-	-	-	-	-	-
Sun's rays	2	-	-	-	-	-	2	2	-	-	-	-
Taper, lighted paper or sticks	3	2	4	12	16	8	-	-	8	2	4	-
Taper, lighted paper or sticks, children playing with	2	3	-	-	2	-	-	-	4	-	2	-
Miscellaneous and undefined	27	28	48	24	22	8	3	16	16	10	2	12
Unknown source of ignition	52	77	104	68	116	216	64	124	120	86	144	172
Total fires	536	613	660	678	694	708	168	310	412	308	430	444

Note: Each figure in this table may be subject to a sampling error.

Table 1 (b)

CAUSES OF FIRES ATTENDED BY FIRE SERVICES IN SCOTLAND, 1947-52

Supposed cause of fires	Number of Fires in Buildings						Number of Fires not in Buildings					
	1947	1948	1949	1950	1951	1952	1947	1948	1949	1950	1951	1952
Aircraft, crashed	-	-	-	-	-	-	-	4	-	2	2	-
Ashes, soot	161	204	304	352	200	212	113	87	112	76	64	60
Brazier	19	10	8	14	10	20	8	5	20	4	14	16
Candle	46	32	32	34	34	16	3	1	4	-	-	-
Chimney fire, not confined to chimney	169	136	148	288	336	588	-	-	-	-	-	-
Chimney, sparks from (outside building)	84	73	88	82	40	48	13	13	12	6	16	12
Electric cooker	32	23	32	52	50	52	-	-	-	-	-	-
fire, heater, radiator	109	73	64	98	90	76	-	1	4	-	2	-
iron	41	42	48	46	36	64	-	-	-	-	-	-
motor	30	32	24	10	46	24	5	18	12	6	6	8
refrigerator	49	72	100	86	98	136	-	-	-	-	-	-
television	-	-	-	-	-	-	-	-	-	-	-	-
wire and cable	292	279	368	230	304	244	127	132	236	156	188	244
wireless	26	28	28	44	34	40	-	-	-	-	2	-
other apparatus	45	53	56	70	78	84	16	11	20	30	36	28
Explosives, fireworks	5	4	4	10	8	12	8	7	16	6	4	28
Fire in grate igniting bedding, clothing, linen	68	67	56	94	90	56	-	-	-	-	-	-
furniture and furnishings	143	131	168	156	148	216	-	-	-	-	-	-
structural timber under hearth	565	421	488	566	378	412	-	-	-	-	-	-
other materials	669	649	500	564	614	480	-	-	-	-	-	-
Fish frying range (all fuels)	35	61	56	68	66	28	1	-	-	4	4	8
Flue	71	79	60	78	68	76	6	5	8	2	4	-
Furnace (coal or coke)	31	17	20	4	6	8	7	2	-	-	-	-
Gas (coal) burner, jet, ring	82	75	72	106	58	56	3	7	4	14	30	20
cooker	97	102	128	186	140	188	-	-	-	-	-	-
fire, heater, radiator	19	12	24	20	22	-	-	-	-	-	-	-
other apparatus	39	56	56	62	54	84	2	-	12	14	-	8
Incendiarism	9	7	4	8	12	-	2	3	-	6	2	-
Incubator, brooder (all fuels)	26	43	56	50	44	40	1	-	-	-	-	4
Intentional burning of grassland, gorse, etc.	-	3	-	-	2	-	25	58	36	28	30	24
Lightning	8	5	4	2	2	-	1	8	4	2	2	16
Lime	3	3	8	-	4	-	9	10	-	2	4	4
Locomotives, sparks from	37	23	60	46	42	60	168	208	500	326	268	272
Matches	44	48	80	90	92	128	24	23	28	100	46	92
Matches, children playing with	163	193	212	166	206	160	190	236	360	268	318	420
Mechanical heat or sparks	34	36	24	44	40	36	25	15	24	38	22	24
Metal, hot	6	19	48	32	28	24	7	17	8	8	2	4
Oil, blowlamp	73	65	96	82	82	72	4	3	4	-	-	4
engine (including petrol)	29	18	20	20	8	20	81	82	96	122	104	136
lamp, stove	78	71	92	80	68	88	2	10	8	18	14	16
tractor	15	9	16	4	20	24	11	10	48	24	28	52
other apparatus	18	10	4	20	8	4	2	1	8	2	2	4
Oxyacetylene cutting and welding apparatus	25	27	32	40	48	36	27	31	44	44	34	44
Rubbish burning	26	22	44	36	38	36	206	170	312	144	158	176
Slow combustion stove igniting structural woodwork	42	36	40	32	52	56	2	1	-	-	-	-
other materials	89	79	76	84	94	120	23	33	12	16	20	48
Smoking materials	444	411	492	472	514	444	202	137	192	144	146	176
Spontaneous combustion in rubbish	-	-	-	-	-	-	6	4	4	-	-	-
in other materials	15	15	8	12	14	12	15	11	24	14	16	12
Static electricity	-	3	4	-	-	-	-	-	-	-	-	4
Steam roller, engine, traction engine	-	3	-	-	2	-	3	3	-	-	-	-
Sun's rays	6	4	4	2	6	12	8	7	28	12	2	4
Taper, lighted paper or sticks	24	14	24	36	46	60	-	3	-	12	4	12
Taper, lighted paper or sticks, children playing with	38	37	60	50	70	64	10	17	12	18	24	36
Miscellaneous and undefined	307	342	424	364	324	332	81	140	208	142	96	276
Unknown source of ignition	286	355	344	434	372	556	148	218	252	236	212	304
Total fires	4 772	4 632	5 208	5 526	5 246	5 604	1 595	1 752	2 672	2 046	1 926	2 596

Note. Each figure in this Table may be subject to a sampling error

Table 1(a)

CAUSES OF FIRES ATTENDED BY FIRE SERVICES IN ENGLAND AND WALES, 1947-52

Supposed cause of fires	Number of Fires in Buildings						Number of fires not in Buildings					
	1947	1948	1949	1950	1951	1952	1947	1948	1949	1950	1951	1952
Aircraft, crashed	-	-	-	-	-	-	32	52	60	46	78	104
Ashes, soot	789	817	1 244	1 164	856	660	737	564	824	934	682	912
Brazier	130	95	88	88	88	56	137	99	132	126	142	136
Candle	387	276	324	358	304	340	16	9	12	18	8	8
Chimney fire, not confined to chimney	177	93	96	364	820	1 940	-	-	-	-	-	4
Chimney, sparks from (outside building)	430	557	496	444	310	412	55	59	108	60	42	48
Electric oooker	361	421	712	686	734	752	-	-	-	-	-	8
fire, heater, radiator	1 075	814	816	976	1 082	1 068	-	1	-	4	12	12
iron	337	312	388	324	324	304	-	-	-	-	-	-
motor	349	244	156	246	262	300	45	34	8	20	22	24
refrigerator	503	710	1 000	1 042	916	976	-	-	4	-	-	4
television	12	30	52	96	134	156	-	-	-	-	-	-
wire and cable	2 264	2 037	2 272	1 958	2 352	2 452	1 735	1 531	2 076	2 264	2 470	2 824
wireless	202	304	360	304	374	384	-	-	-	8	4	-
other apparatus	487	477	676	828	858	832	148	171	196	328	312	328
Explosives, fireworks	94	60	124	246	170	220	172	126	168	258	306	460
Fire in grate igniting bedding, clothing, linen	852	838	876	1 088	998	976	-	-	-	-	-	-
furniture and furnishings	710	660	676	786	636	920	-	-	-	-	-	-
structural timber under hearth	2 320	2 181	2 420	2 602	1 554	2 152	-	-	-	-	-	-
other materials	2 294	2 565	2 680	3 390	2 872	3 300	-	-	-	-	-	-
Fish frying range (all fuels)	529	680	888	920	956	836	2	-	44	16	32	28
Flue	540	813	664	642	774	864	15	23	12	22	44	76
Furnace (coal or coke)	117	109	112	38	58	68	18	12	8	2	2	8
Gas (coal) burner, jet, ring	571	501	716	630	598	584	68	106	144	174	244	192
cooker	483	499	804	848	892	980	2	-	-	-	-	-
fire, heater, radiator	210	176	180	262	246	232	-	-	-	-	-	-
other apparatus	256	292	364	370	422	388	22	39	80	92	38	112
Incendiarism	70	77	120	76	8	8	46	44	60	48	12	-
Incubator, brooder (all fuels)	197	498	440	490	540	448	2	2	4	6	6	-
Intentional burning of grassland, gorse etc.	14	17	20	4	14	4	322	291	512	150	262	360
Lightning	59	90	100	62	74	196	43	41	64	28	34	84
Line	17	15	8	24	16	8	42	36	8	38	32	40
Looomotives, sparks from	197	185	292	160	164	212	4 298	3 216	11 516	3 166	4 488	7 312
Matches	390	405	444	516	536	708	312	254	576	376	350	636
Matches, children playing with	2 108	2 131	2 452	2 056	1 910	1 988	5 755	5 293	9 484	4 768	4 964	8 060
Mechanical heat or sparks	294	329	392	434	482	480	321	256	316	344	426	300
Metal, hot	140	160	260	284	234	240	40	71	56	84	88	32
Oil, blowlamp	811	746	772	830	836	728	36	22	48	42	36	72
engine (including petrol)	226	164	208	244	204	180	1 446	1 054	1 536	1 700	1 868	1 996
lamp, stove	734	653	760	710	830	780	96	104	140	126	116	188
tractor	39	66	104	70	66	72	180	94	328	220	204	356
other apparatus	108	82	116	146	152	172	41	44	96	100	72	132
Oxyacetylene cutting and welding apparatus	202	258	332	334	322	360	244	203	272	250	230	220
Rubbish burning	577	424	640	486	476	528	4 426	2 470	6 728	2 362	2 272	3 864
Slow combustion stove igniting structural woodwork	388	332	372	484	322	440	2	1	-	2	-	-
other materials	699	709	708	904	828	1 032	143	144	104	114	222	344
Smoking materials	3 793	3 626	3 776	3 068	3 178	3 376	7 181	4 101	9 656	2 594	2 712	4 588
Spontaneous combustion in rubbish	5	46	-	4	4	-	285	183	412	186	94	104
in other materials	280	172	356	212	334	204	593	438	868	440	612	632
Static electricity	22	16	20	22	32	8	8	7	-	2	-	-
Steam roller, engine, traction engine	10	9	8	2	2	-	35	17	48	4	4	4
Sun's rays	109	70	100	66	50	48	436	142	504	80	84	192
Taper, lighted paper or sticks	144	117	168	194	204	264	22	23	48	52	38	52
Taper, lighted paper or sticks, children playing with	74	90	92	50	60	32	35	38	16	14	18	20
Miscellaneous and undefined	1 265	1 295	1 620	1 574	1 752	1 704	597	593	1 372	672	886	1 276
Unknown source of ignition	2 519	2 658	3 060	3 334	3 234	4 012	4 321	3 462	7 304	3 436	3 178	5 880
Total fires	31 970	32 001	36 924	37 540	36 454	40 384	34 512	25 470	55 952	25 776	27 746	42 032

Note. Each figure in this table may be subject to a sampling error.

Table 7

FIRES ATTENDED BY FIRE SERVICES IN RESIDENTIAL HOUSES AND FLATS, 1947-1952

a) England and Wales

Year	Estimated number of dwellings at mid-year Thousands	Number of fires attended during year	Estimated number of fires per 10 000 dwellings at risk per year	Estimated home population at mid-year Thousands	Estimated number of persons per dwelling at mid-year
1947	11 098	13 805	12.4	43 050	3·88
1948	11 356	14 013	12·3	43 296	3·81
1949	11 576	16 132	13·9	43 595	3·77
1950	11 759	17 770	15·1	43 830	3·73
1951	11 934	16 960	14.2	43 745	3·67
1952	12 125	19 348	16·0	43 940	3·62

b) Scotland

1947	1 277	2 615	20.5	5 085	3·98
1948	1 309	2 388	18·2	5 144	3·93
1949	1 329	2 644	19·9	5 159	3·88
1950	1 355	2 922	21·6	5 174	3·82
1951	1 378	2 736	19.9	5 096	3·70
1952	1 403	2 856	20·4	5 114	3·65

Table 8

LIVING ACCOMMODATION IN GREAT BRITAIN

Numbers of Persons per room in England, Wales and Scotland
June 1951

Region	Persons per room	
	All dwellings	Shared dwellings
England		
Northern (A)*	0.86	1·12
(B)*	0.85	1·20
(C)*	0.78	1.02
East and West Ridings (A)	0.75	1.03
(B)	0.75	1.09
(C)	0.74	1.07
North Western (A)	0.74	1.00
(B)	0.73	1·00
(C)	0·71	0·98
North Midland (A)	0·71	1.00
(B)	0.70	0·99
(C)	0.70	0·97
Midland (A)	0·79	1·14
(B)	0·73	0.88
(C)	0·74	0·93
Eastern (A)	0·70	0.82
(B)	0·69	0·81
(C)	0·67	0·78
London and South Eastern (A)	0·68	0·75
(B)	0·66	0·79
(C)	0·66	0·79
Southern (A)	0·71	0·85
(B)	0·67	0·81
(C)	0.70	0·77
South Western (A)	0.73	0.81
(B)	0·65	0·78
(C)	0·68	0·81
All England (A)	0·74	0·90
(B)	0·71	0·88
(C)	0.70	0.87
Scotland (A)	1·01	1·30
(B)	0.96	1·38
(C)	0·95	1·40
Wales (A)	0.74	0·93
(B)	0·71	0·97
(C)	0·72	1·01

Source. - Census 1951 Great Britain - One per cent sample Tables

* (A) Urban areas with 50 000 or more population
(B) Other urban areas
(C) Rural or landward areas.

Table 9

ESTIMATED USAGE OF LAND IN THE UNITED KINGDOM 1952

	England and Wales		Scotland		Northern Ireland		United Kingdom
	Acres	% of area	Acres	% of area	Acres	% of area	Acres
	10^3x		10^3x		10^3x		10^3x
Crops and fallow	10 116	27	1 743	9	507	14	12 367
Temporary grassland	3 676	10	1 479	8	582	17	5 737
Arable land	13 792	37	3 222	17	1 089	31	18 104
Permanent grassland	10 700	29	1 169	6	1 190	34	13 059
Total crops and grass	24 492	66	4 391	23	2 279	65	31 163
Rough grazings	5 369	14	10 980	56	697	20	17 046
Forest area	2 418	6	1 375	7	62	2	3 855
Other (including built-up)	5 060	14	2 717	14	451	13	8 227
Total	37 339	100	19 463	100	3 489	100	60 291

Source - Agricultural Departments.

Table 11

METHOD OF EXTINCTION OF FIRES ATTENDED BY FIRE SERVICES IN THE UNITED KINGDOM, 1947-52

Method of extinction	Fires in buildings						Fires other than those in buildings					
	1947	1948	1949	1950	1951	1952	1947	1948	1949	1950	1951	1952
Extinguished before the arrival of the Fire Brigade												
1. Burned out	360	461	576	702	702	892	593	609	1 132	750	828	1 020
2. Removal	621	626	892	948	1 106	1 144	161	220	244	304	338	364
3. Automatic sprinkler system	36	31	36	42	36	12	-	-	-	-	-	-
4. Beating	126	153	172	194	180	240	559	508	1 056	462	484	896
5. Smothering	472	444	640	712	868	804	218	176	256	244	364	360
6. Sand, earth, etc.	106	145	136	180	152	156	168	165	148	240	232	288
7. Water from buckets	2 959	2 962	3 260	3 144	3 240	3 168	587	461	800	662	664	848
8. Water from stirrup or hand pumps	131	94	68	44	44	56	32	15	20	-	10	-
9. Chemicals and chemical extinguishers	632	727	960	1 004	1 114	1 276	658	565	860	868	942	1 116
10. Two or more methods 4-9	235	293	312	350	406	364	172	153	236	252	250	272
11. Water from garden hose, etc.	99	121	160	150	172	164	49	37	100	74	56	92
12. Hose reel jets (using water in tank only)	36	41	52	60	36	32	26	31	148	36	56	96
13. Hose reel jets (using more water than that in tank)	5	4	-	-	6	-	5	1	12	4	4	4
14. Jets from inside hose reel or inside hydrant	26	24	20	38	64	72	-	-	-	-	6	12
15. Hose reel jets and jets from hose reel	-	-	4	-	-	-	-	-	-	-	-	-
16. Jets from pumps and hydrants	114	120	128	108	112	88	160	171	220	136	142	184
17. Other and undefined methods	198	203	304	436	422	452	84	69	148	212	264	332
18. Total	6 156	6 449	7 720	8 112	8 660	8 920	3 472	3 181	5 380	4 244	4 640	5 884
Extinguished by the Fire Brigade												
19. Removal	2 618	2 660	3 256	3 336	3 514	3 872	377	332	560	636	648	676
20. Beating	48	39	60	58	60	52	4 001	3 781	7 800	2 696	3 634	6 348
21. Smothering	140	182	272	264	236	256	37	34	56	56	28	92
22. Sand, earth, etc.	26	41	32	32	46	48	107	105	124	92	134	136
23. Water from buckets	2 578	2 476	2 584	2 756	2 556	2 912	578	453	812	486	478	636
24. Water from stirrup or hand pumps	5 060	4 678	4 892	5 222	4 184	4 868	348	300	480	202	224	316
25. Chemicals and chemical extinguishers	1 392	1 424	1 888	1 968	2 050	2 156	1 139	905	1 240	1 454	1 656	1 724
26. Two or more methods 20-25	230	227	280	422	314	232	592	495	1 204	348	314	504
27. Hose reel jets (using water in tank only)	9 193	9 419	10 928	11 808	11 958	13 964	8 597	7 078	17 420	8 722	10 272	17 132
28. Hose reel jets (using more water than that in tank)	2 384	2 465	2 724	2 740	2 400	2 656	1 485	1 082	2 800	1 182	1 238	1 916
29. Jets from inside hose reel or inside hydrant	48	67	64	84	100	92	-	-	-	-	2	20
30. Hose reel jets and jets from hose reel	-	4	16	18	26	12	-	-	-	-	4	-
31. Jets from pumps and hydrants	7 167	6 849	7 736	6 462	5 858	6 140	15 401	9 660	20 960	7 888	6 708	9 468
32. Other and undefined methods	238	266	340	462	426	516	141	126	200	124	128	220
33. Total	31 122	30 797	35 072	35 632	33 728	37 776	32 893	24 351	53 656	23 886	25 468	39 188
34. Total fires	37 278	37 246	42 792	43 744	42 388	46 696	36 275	27 532	59 036	28 130	30 108	45 072

Note: Each figure in this table may be subject to a sampling error.

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Table 12

NATURE OF INJURIES OF CASUALTIES IN FIRES ATTENDED BY FIRE SERVICES IN THE UNITED KINGDOM, 1947-52

Nature of injury	Number of Persons											
	N.F.S. and Fire Brigade						Other casualties					
	1947	1948	1949	1950	1951	1952	1947	1948	1949	1950	1951	1952
Fatal casualties												
Burns and scalds	1	-	1	-	-	-	313	254	292	344	382	371
Overcome by gas or smoke	-	-	1	1	-	-	52	54	43	81	77	77
Other and undefined injuries	2	1	1	3	3	-	130	236	176	128	159	188
Total	3	1	3	4	3	-	495	544	511	553	618	636
Non-fatal casualties												
Burns and scalds	338	309	375	262	263	302	1 623	1 779	2 433	2 641	2 813	2 940
Bruises, cuts, abrasions	708	638	686	621	610	685	271	284	366	353	414	406
Dislocations, sprains, fractures	129	83	102	73	107	109	47	36	47	48	40	47
Overcome by gas or smoke	35	64	80	73	45	67	57	67	88	116	139	110
More than one of the above injuries	49	40	38	37	24	37	70	61	76	94	97	99
Shock	7	6	12	4	9	2	182	189	261	262	345	313
Other and undefined injuries	229	197	221	165	224	228	145	134	126	148	143	89
Total	1 495	1 337	1 514	1 235	1 282	1 430	2 395	2 550	3 397	3 662	3 991	4 004
Total number of casualties	1 498	1 338	1 517	1 239	1 285	1 430	2 890	3 094	3 908	4 215	4 609	4 640

Note. These figures are a complete enumeration of the information on all reports received; there is no sampling error in any year.

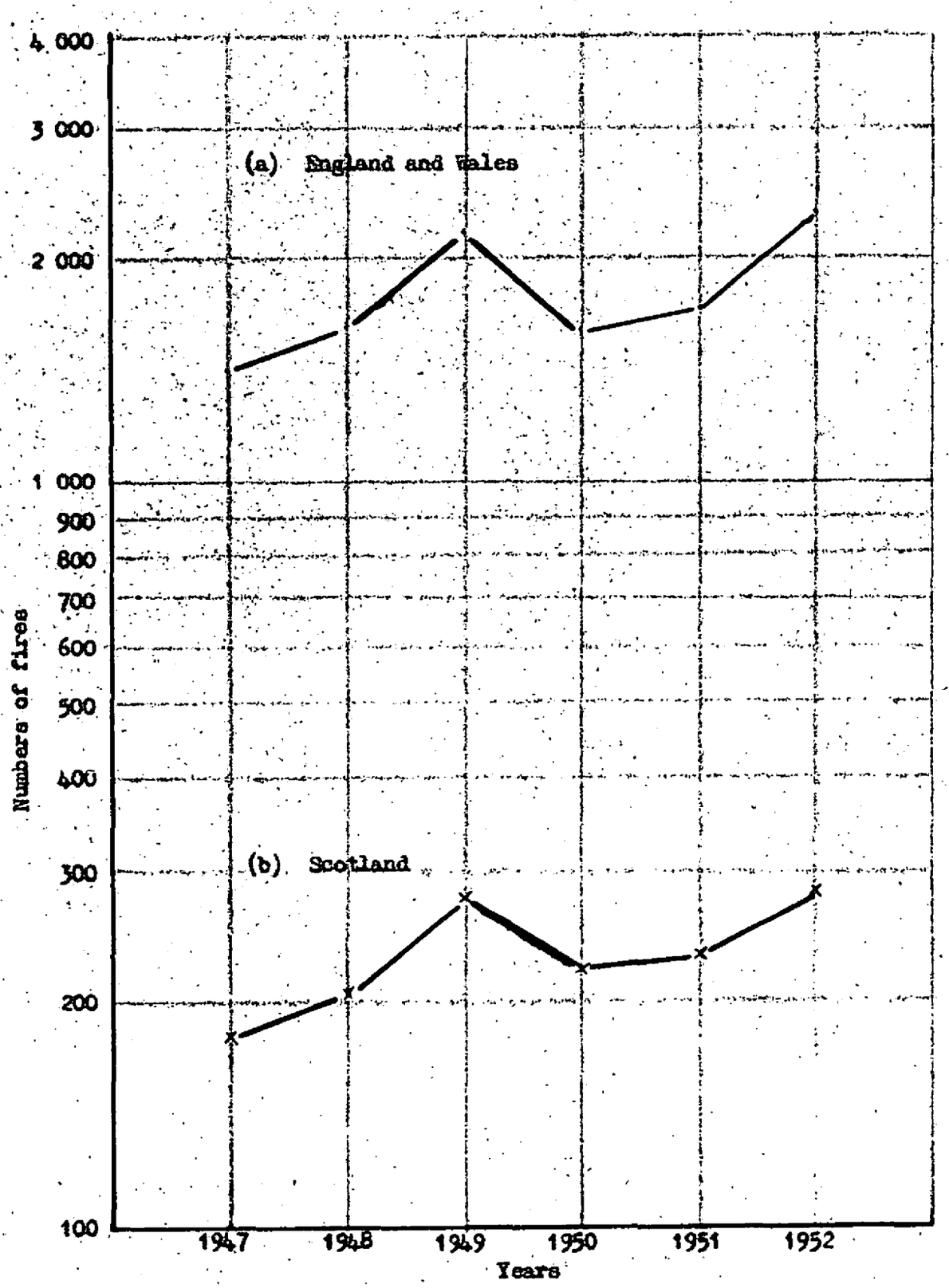


FIG. 1. FIRES IN AGRICULTURAL BUILDINGS ATTENDED BY FIRE SERVICES IN GREAT BRITAIN 1947-52

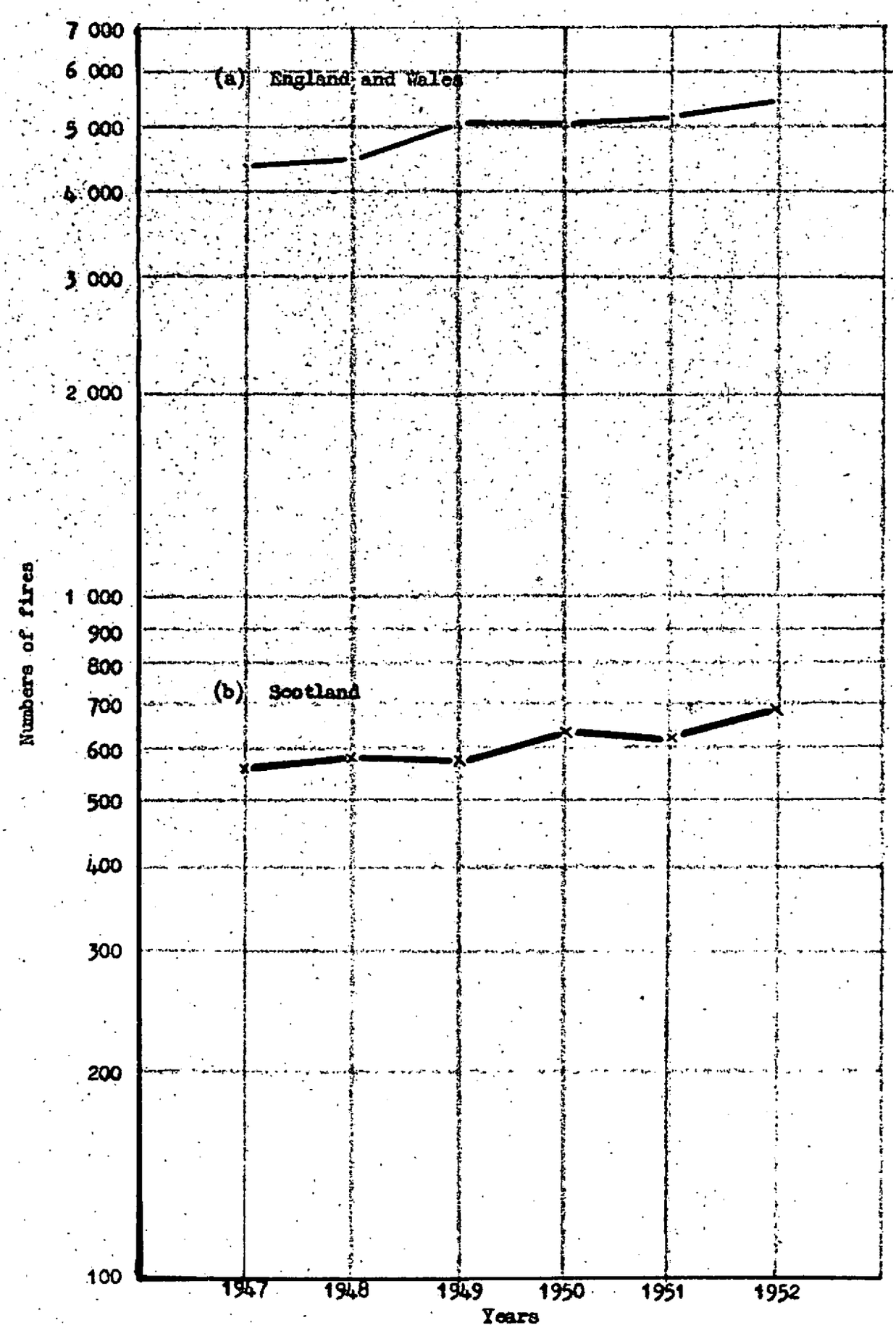
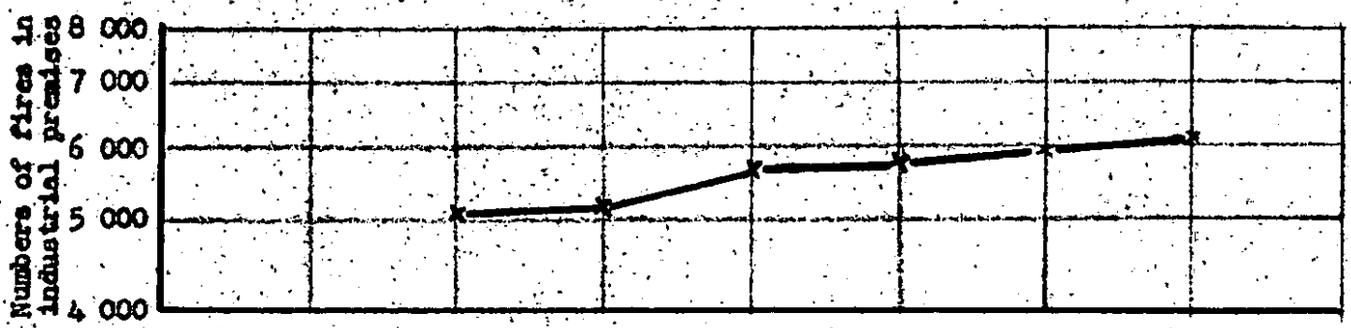
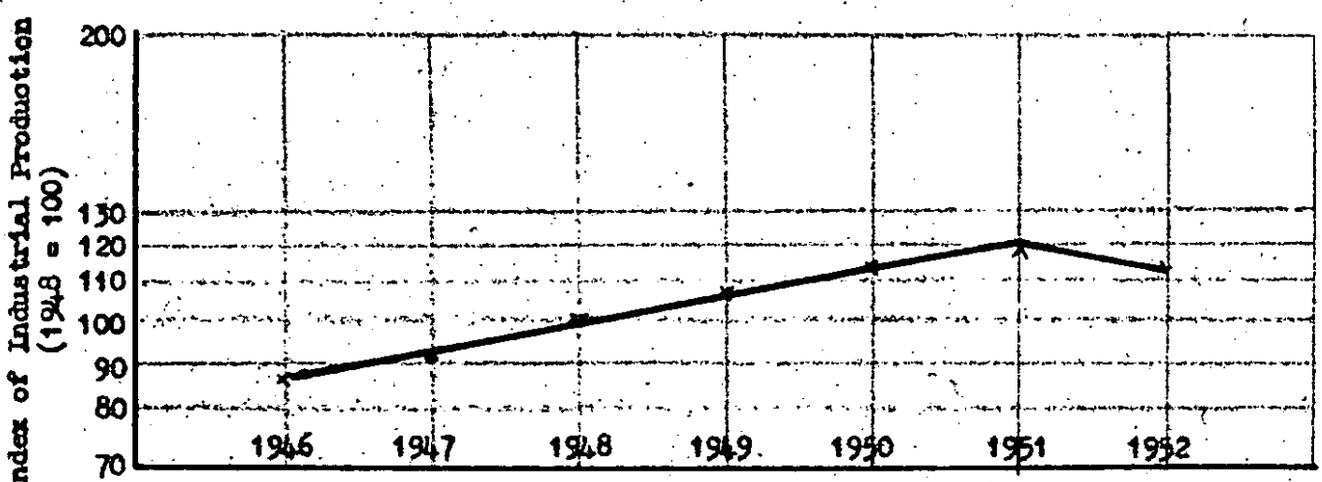


FIG. 2. FIRES IN INDUSTRIAL PREMISES ATTENDED BY FIRE SERVICES IN GREAT BRITAIN 1947-52



(a) Attendances by Fire Services in the United Kingdom 1947-52



(b) Index of Industrial Production

FIG. 3. FIRES IN INDUSTRIAL PREMISES COMPARED WITH THE INDEX OF INDUSTRIAL PRODUCTION

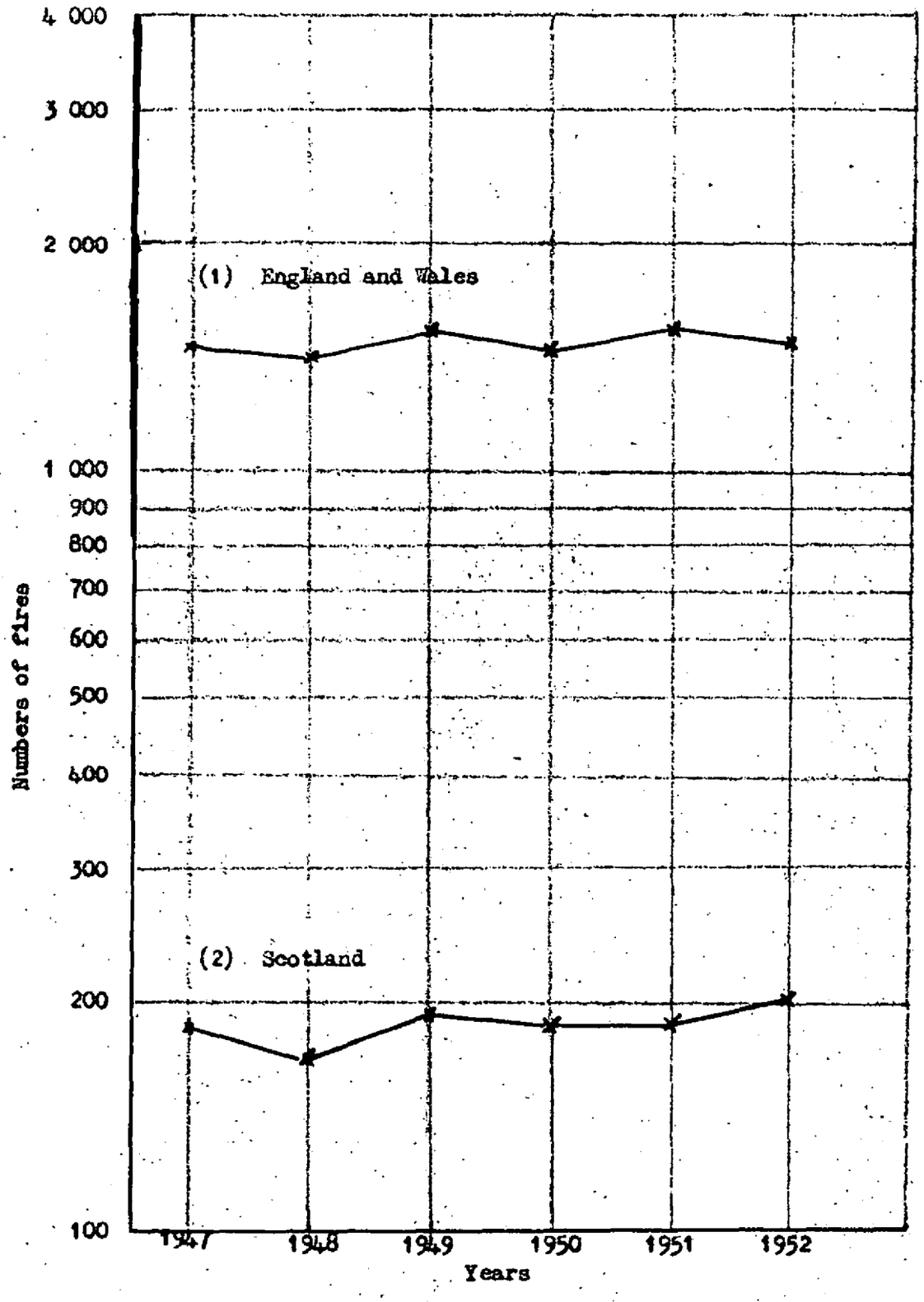


FIG. 4. FIRES IN PREMISES CONCERNED WITH TRANSPORT AND COMMUNICATION ATTENDED BY FIRE SERVICES IN GREAT BRITAIN 1947-52

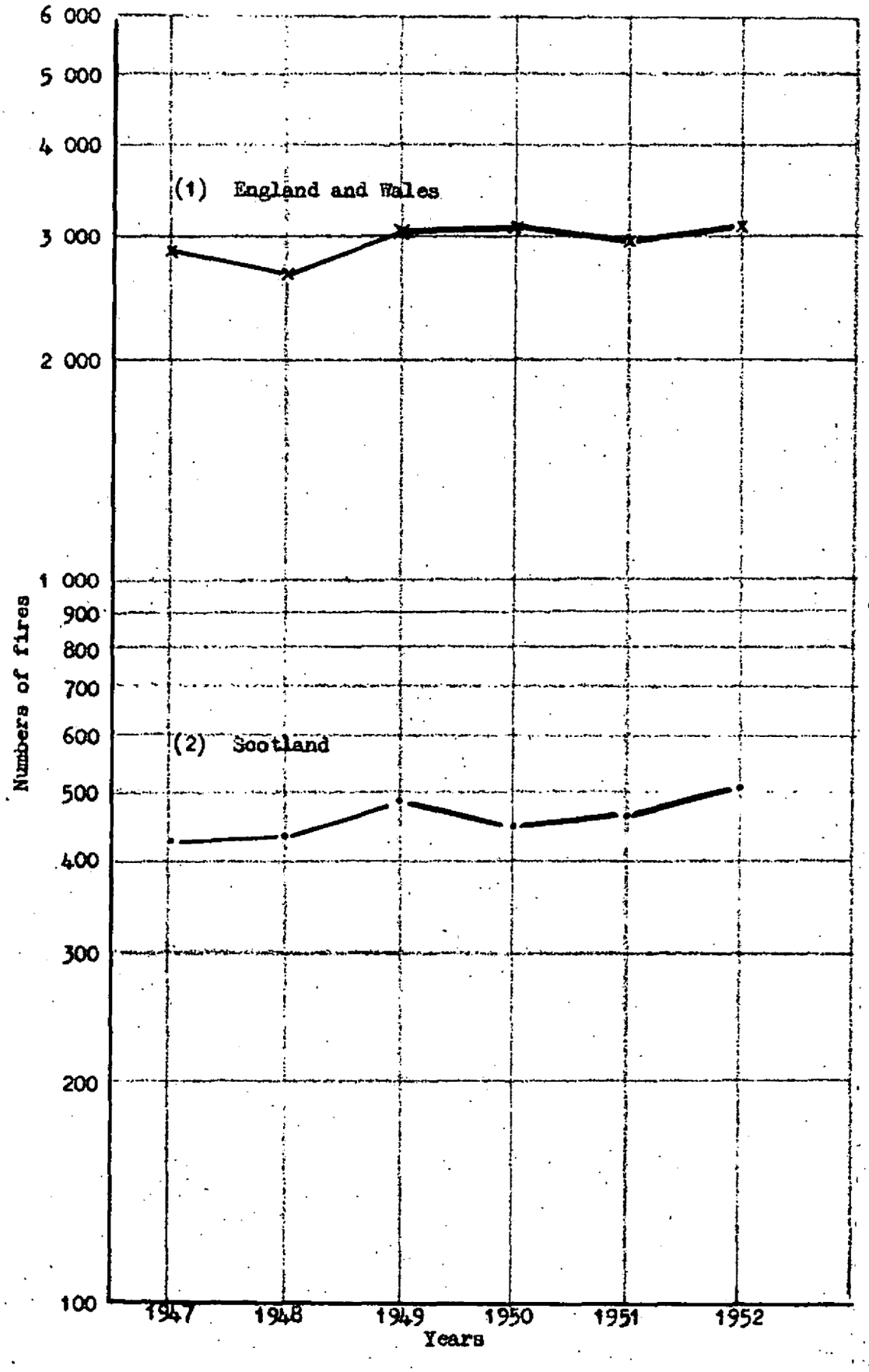


FIG. 5. FIRES IN COMMERCIAL PREMISES (SHOPS AND WAREHOUSES) ATTENDED BY FIRE SERVICES IN GREAT BRITAIN 1947-52

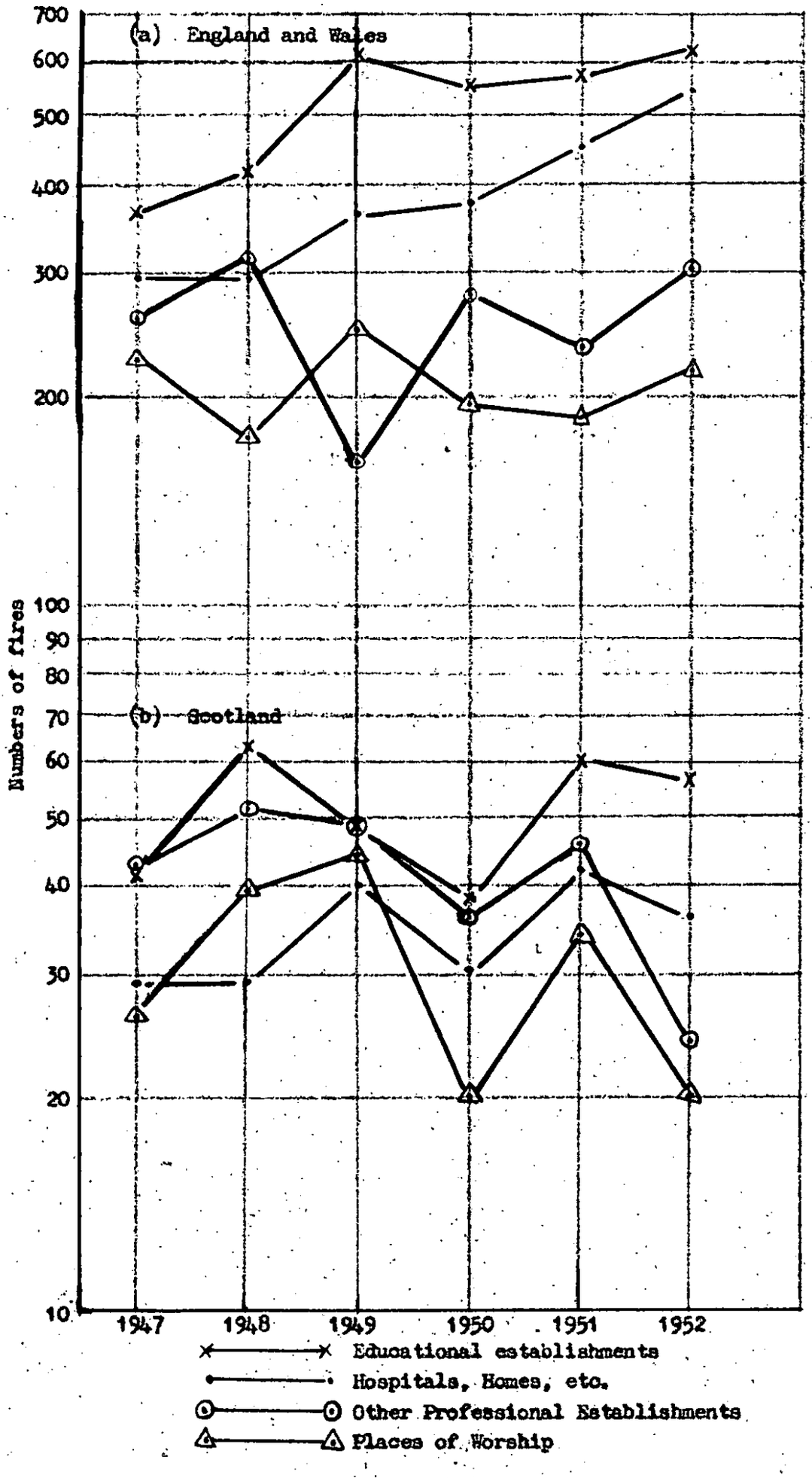


FIG. 6. FIRES IN PROFESSIONAL ESTABLISHMENTS AND PUBLIC INSTITUTIONS ATTENDED BY FIRE SERVICES IN GREAT BRITAIN 1947-52

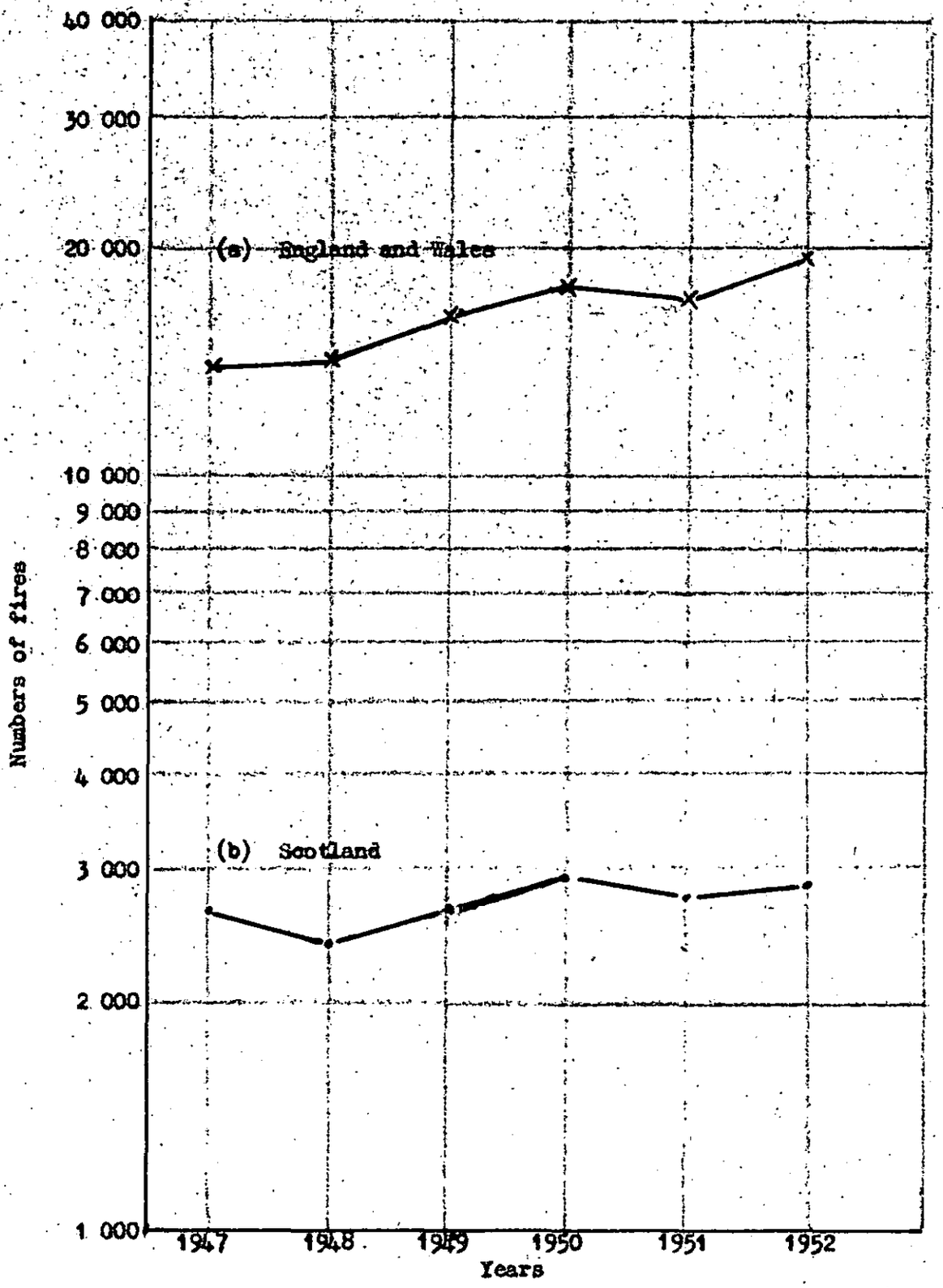


FIG. 7. FIRES IN RESIDENTIAL HOUSES AND FLATS ATTENDED BY FIRE SERVICES IN GREAT BRITAIN 1947-52

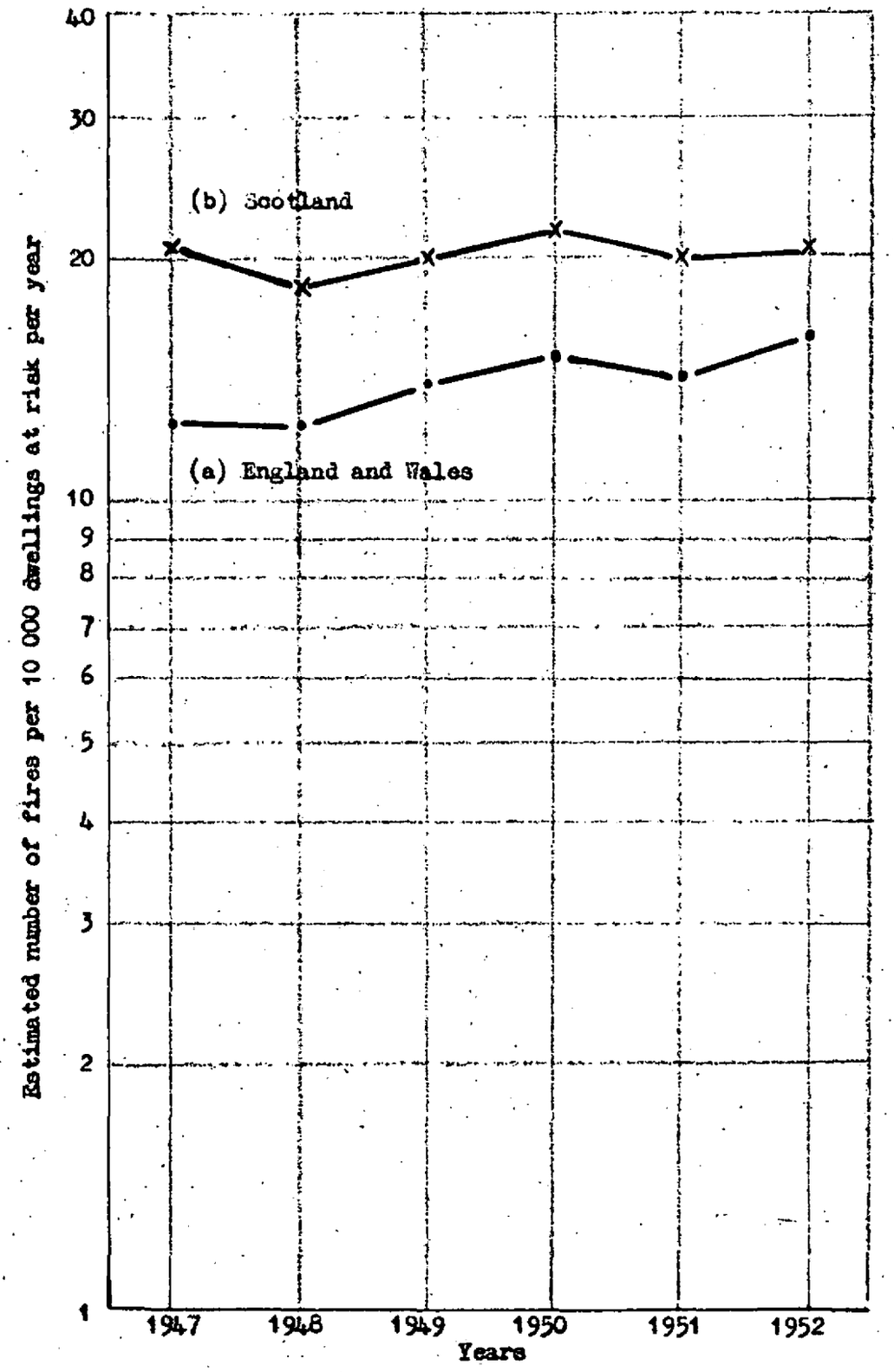


FIG. 8. FIRES IN RESIDENTIAL HOUSES AND FLATS. RATES OF INCIDENCE OF FIRES ATTENDED BY FIRE SERVICES IN GREAT BRITAIN 1947-52

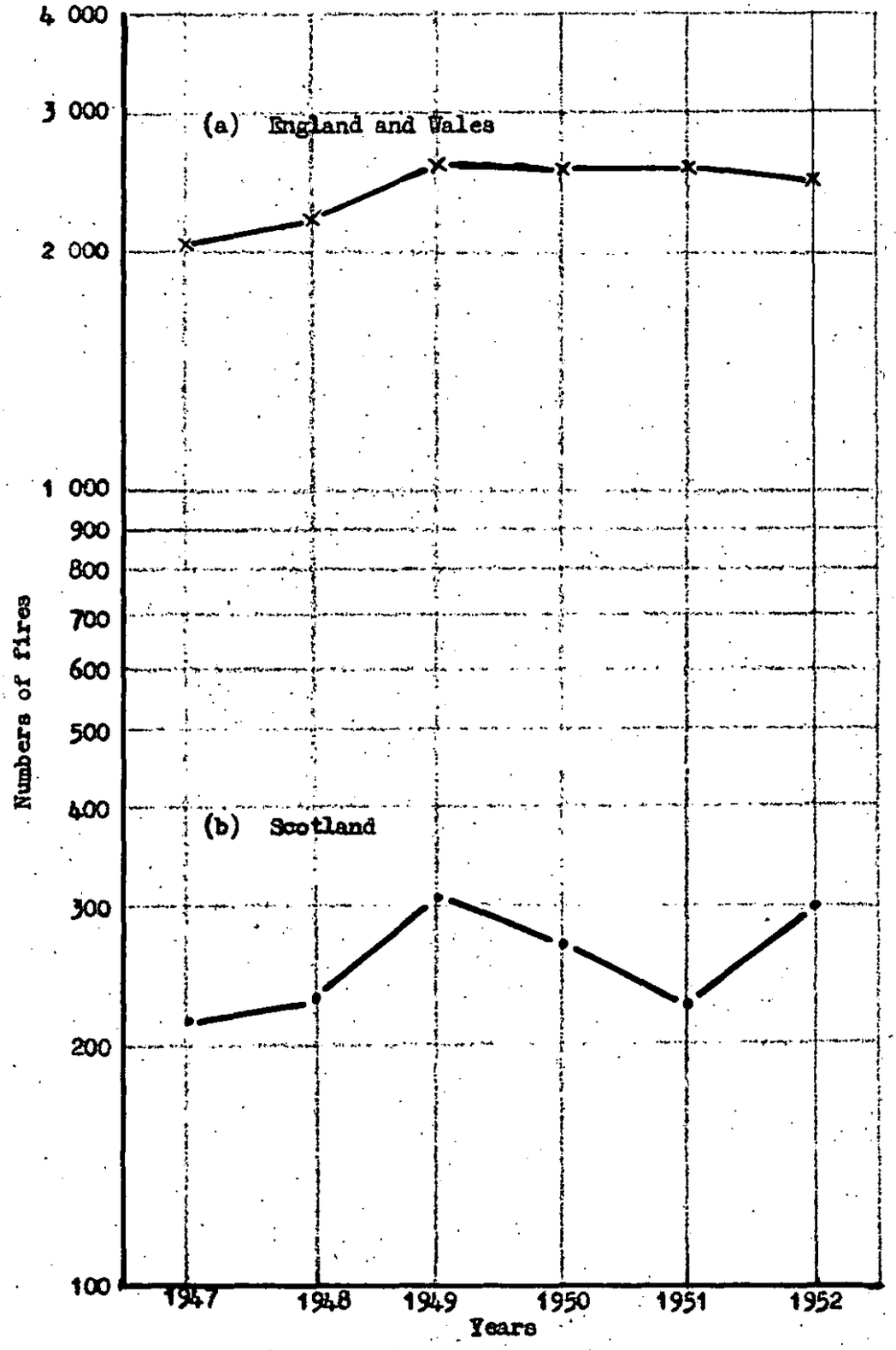


FIG. 9. FIRES IN CLUBS, HOTELS, RESTAURANTS, PUBLIC HOUSES, HOSTELS, BOARDING HOUSES AND HOLIDAY CAMPS ATTENDED BY FIRE SERVICES IN GREAT BRITAIN 1947-52

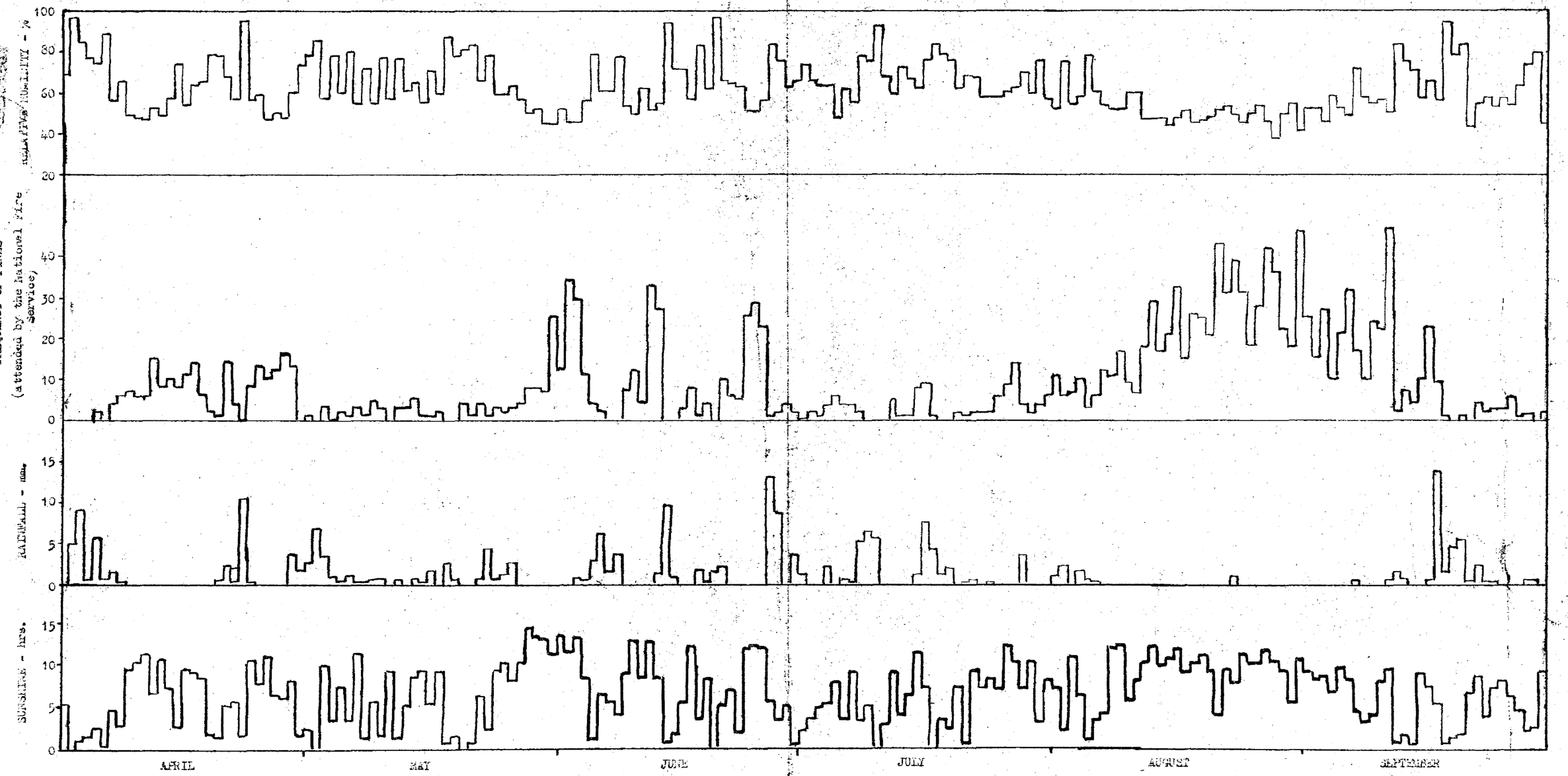
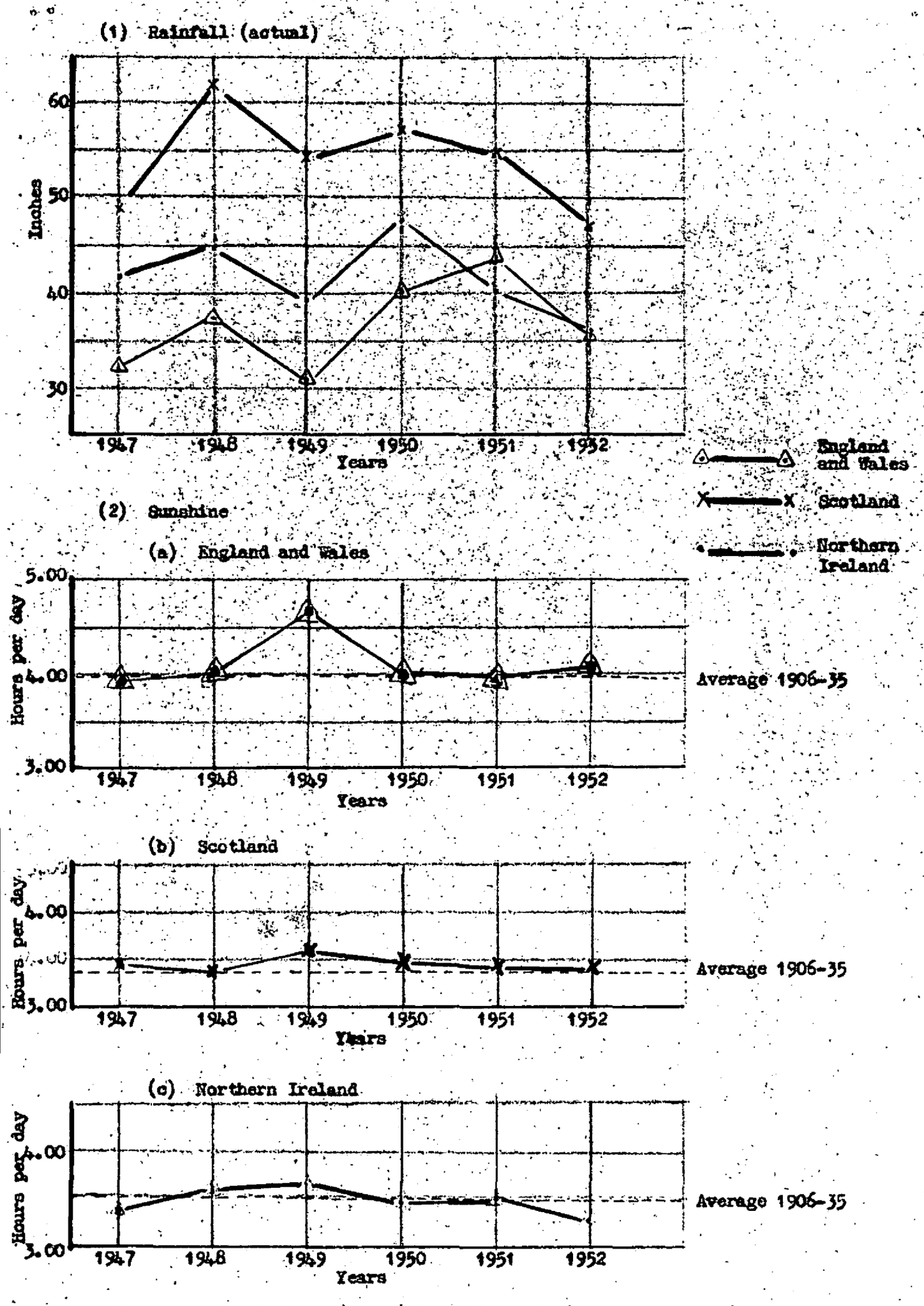


FIG. 10. DAILY RELATIVE HUMIDITY, FREQUENCY OF FIRES CAUSED BY SPARKS FROM LOCOMOTIVES(1), RAINFALL AND SUNSHINE IN LONDON AREA, 1947

Source of meteorological data - Air Ministry (Meteorological Service)

(1) Reports of fires attended by the N.F.S. in the area.



Source - Air Ministry (Meteorological Service)

FIG.11. WEATHER CONDITIONS IN THE UNITED KINGDOM 1947-52

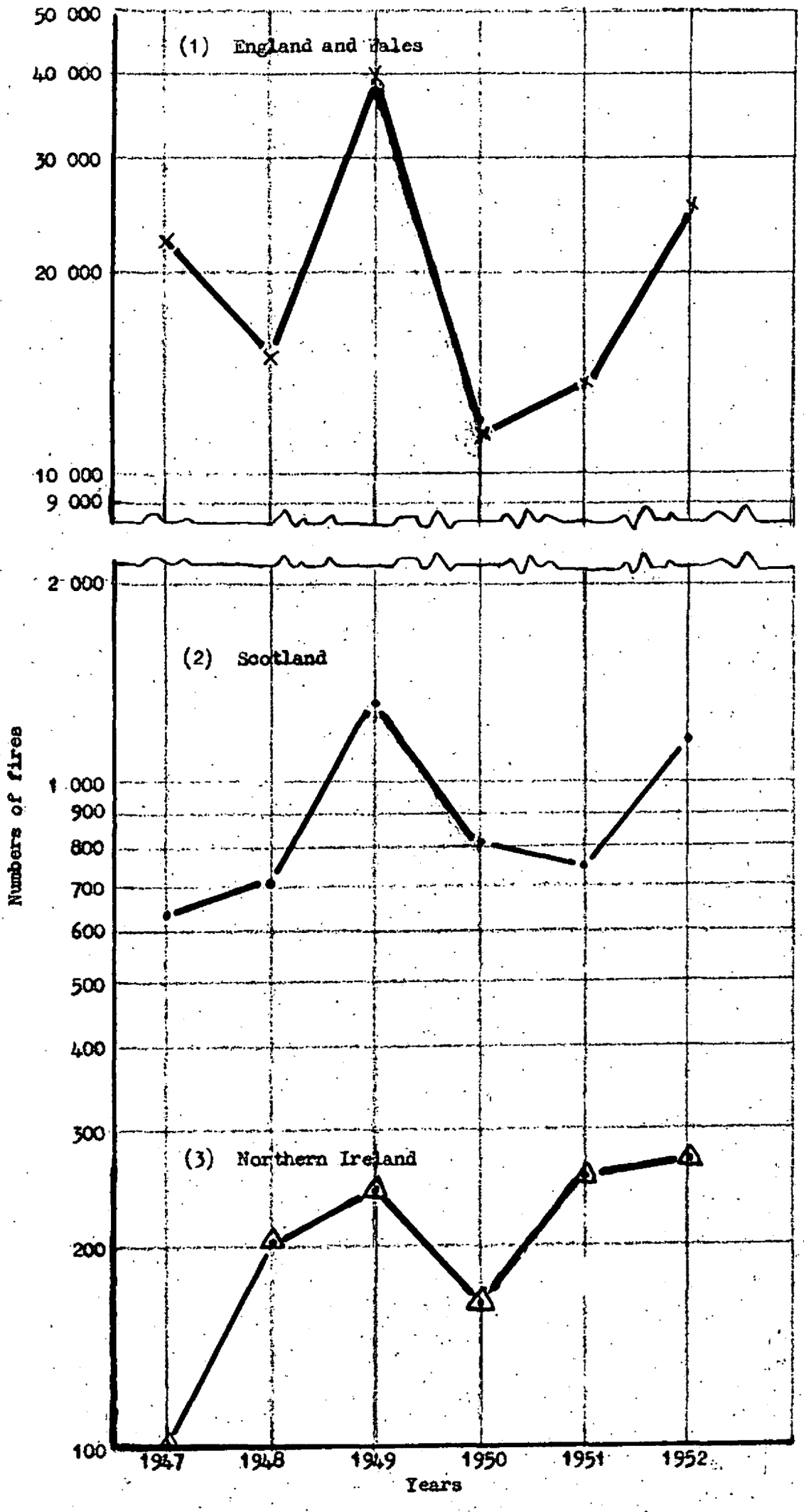


FIG. 12. FIRES IN HAZARDS CONNECTED WITH AGRICULTURE, FORESTRY AND GRASSLANDS ATTENDED BY FIRE SERVICES IN GREAT BRITAIN 1947-52

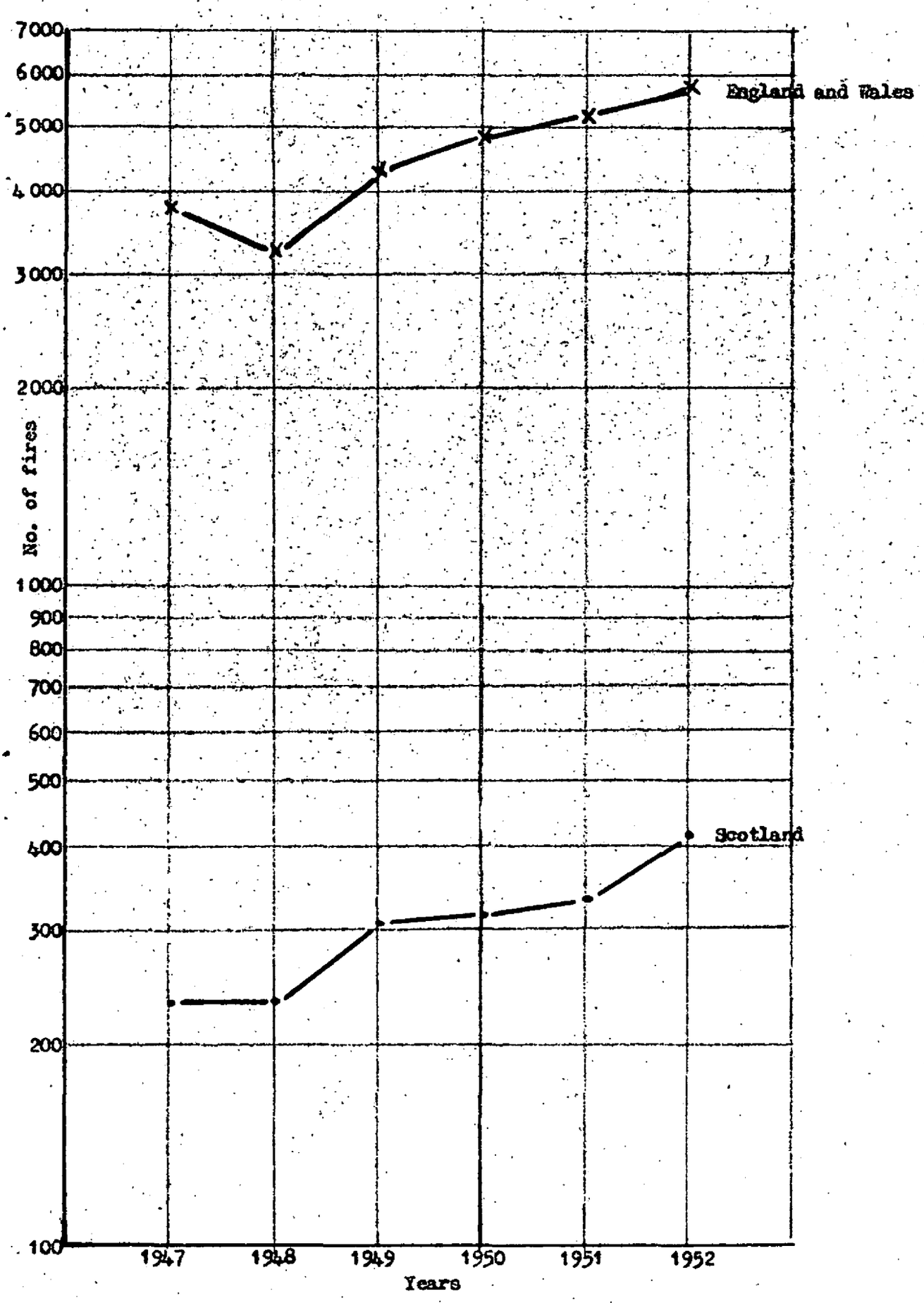


FIG. 13. FIRES IN OIL OR PETROL DRIVEN ROAD VEHICLES ATTENDED BY FIRE SERVICES IN GREAT BRITAIN 1947-52

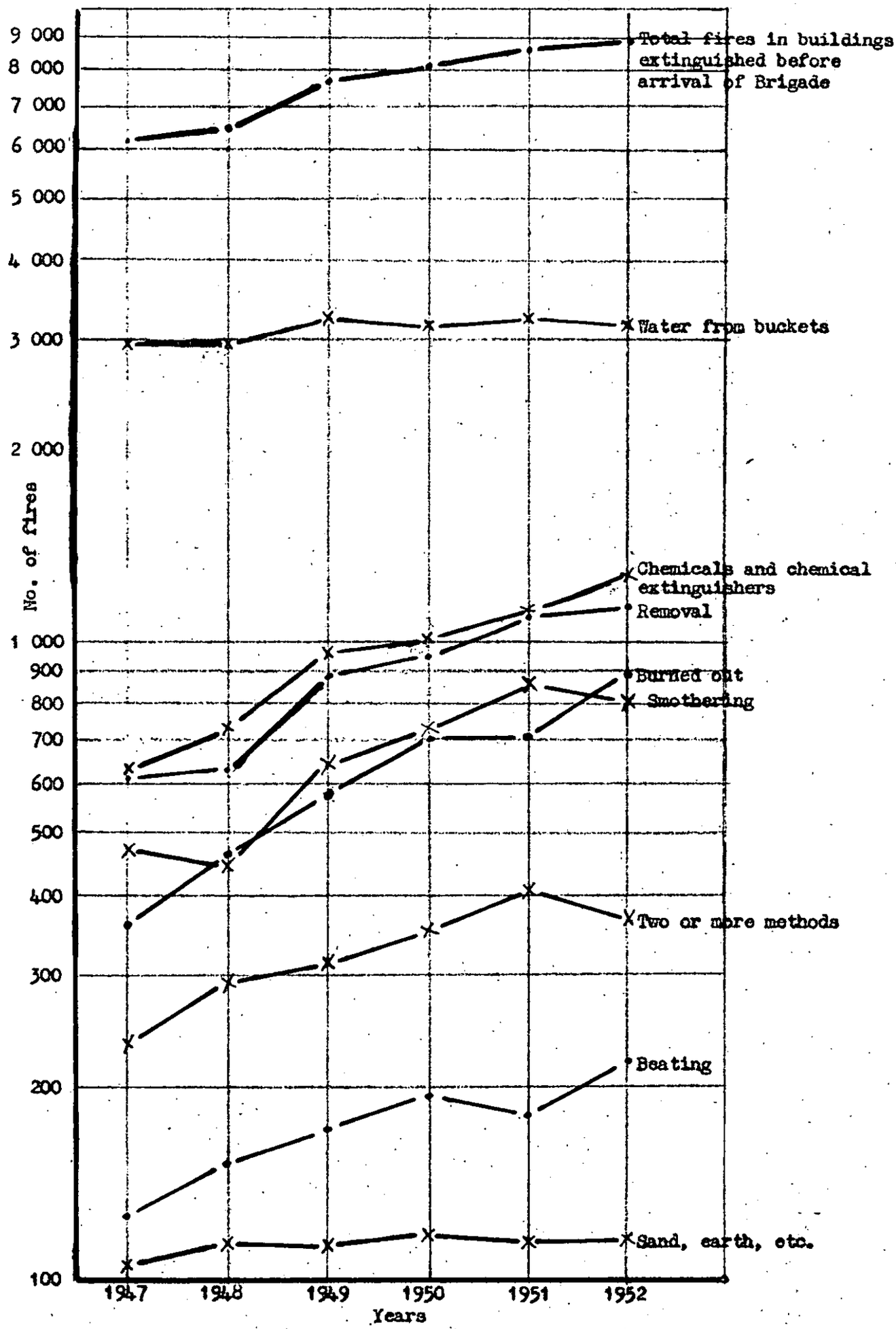


FIG. 14. FIRES IN BUILDINGS ATTENDED BUT NOT EXTINGUISHED BY FIRE SERVICES IN THE UNITED KINGDOM 1947-52

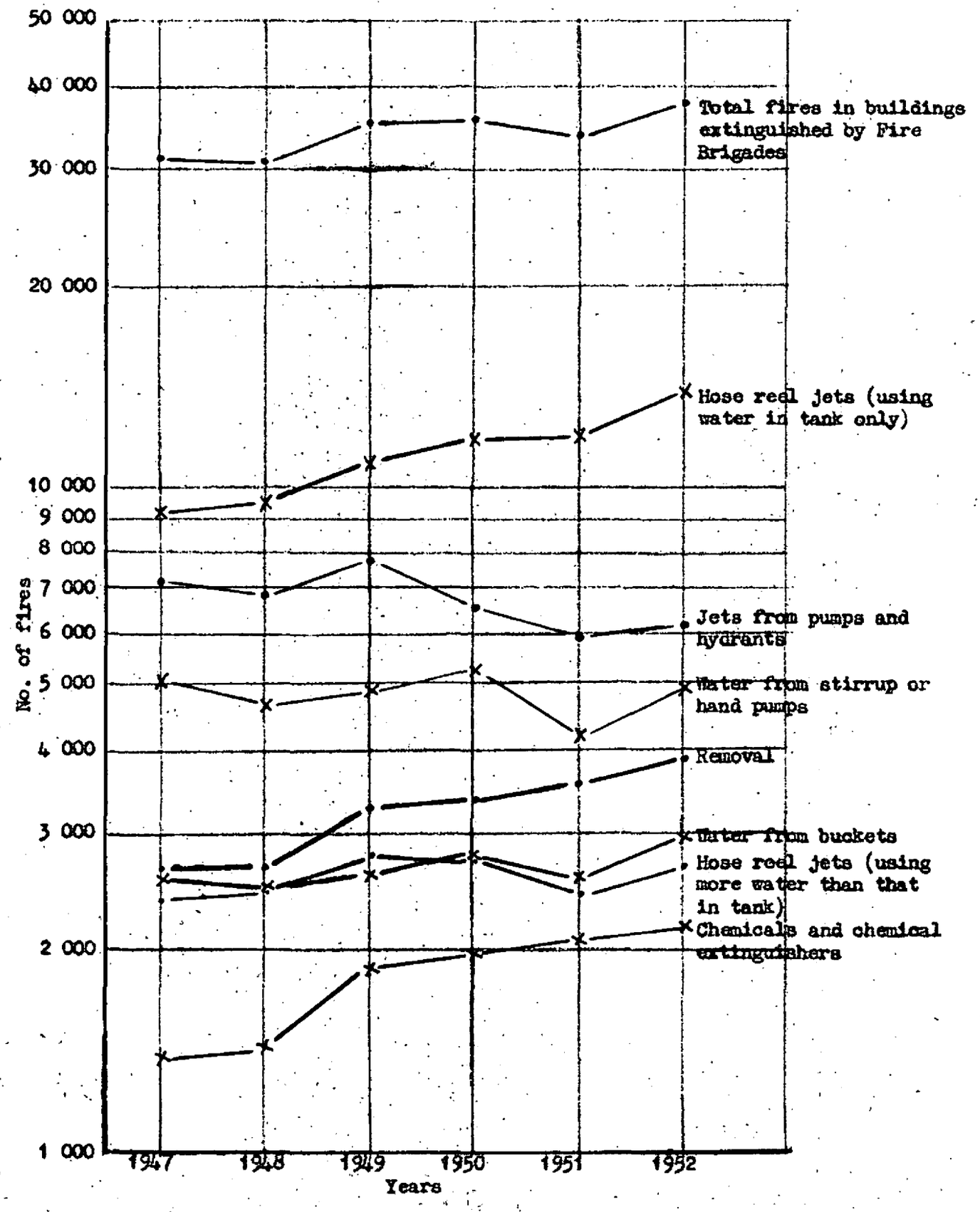


FIG.15. FIRES IN BUILDINGS ATTENDED AND EXTINGUISHED BY THE FIRE SERVICES IN THE UNITED KINGDOM 1947-52