Fire Research Note

No 716

ESTIMATED FIRE FREQUENCIES IN BUILDINGS BASED ON EXPECTED FUEL USAGE

by

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June 1968

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F.R. Note No.716.
June 1968.

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SUMMARY

The number of fires in buildings attended by fire brigades in the United Kingdom has increased from 50 492 in 1955 to 88 162 in 1966.

An attempt has been made to forecast the fire frequencies in buildings up to 1975 based on expected fuel usage.

Electrical appliances are likely to account for an increasing proportion of fires, whereas fires in oil and gas appliances are likely to account for smaller proportions, although the expected sales of gas and oil are likely to continue to increase. The use of solid fuel will probably continue to decrease.

Assuming that the current trends do not change, the annual incidence of fires in buildings can be expected to rise to about 143 000 by 1975.

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

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INTRODUCTION

The number of fires attended by fire brigades in buildings in the United Kingdom in 1955 was 50 492; by 1966 this figure had risen to 88 162[1]. There is no sign of a halt to this increasing trend, in fact, if anything, since 1958 the increase has been more rapid than previously. An attempt has been made to forecast the future trend. This forecast is based on the estimated usage of various types of fuels[2] as estimated by the Ministry of Power.

METHOD

In Fig.1a, the numbers of fires attributed to electric appliances in buildings is plotted against the quantity of electricity sold as recorded in the Annual Abstract of Statistics[3] for each year during the period 1955-1966. Extrapolating the curve, a straight line in this instance, by using the Ministry of Power estimates, an estimate of the expected number of fires in 1970 and 1975 is obtained. A further graph, Fig.1b, shows the annual fire frequencies due to electric appliances between 1955 and 1966 and the estimates up to 1975. If electricity is sold at the expected rate, one can expect the number of fires in electric appliances to be about 35 500, about four times the number recorded in 1955 and about 25 per cent of the estimated total of fires in buildings in 1975.

A similar analysis was done for fires in gas appliances. A four-fold rise in gas sales is expected in the period 1966-1975, an increasing proportion of this being natural gas. However, if the curve in Fig.2a is assumed to continue as a straight line when extrapolated, the number of fires in gas appliances would not be expected to rise by the same factor as the predicted sales of gas (see Fig.2b).

The analysis for solid fuel reveals, as one might expect, a decrease in the use of solid fuel over the period under review. In this analysis only domestic usage of coal and coke has been considered, since the majority of fires attributed to solid fuel appliances are in fact associated with this type of usage, despite the extensive use of coal in power stations, gasworks, coke ovens, etc. There were 9 588 fires started by solid fuel appliances in 1955; by 1975 it is expected that there will be less than 2 000 fires per year (see Figs 3a and 3b).

After an upward trend in fires due to oil appliances particularly in 1958 and 1959 it seems as though this trend has been halted. With the increased use of oil for central heating the number of fires due to oil appliances is unlikely to rise abnormally, except, perhaps, in a severe winter (see Figs 4a and 4b).

To complete the picture, one must also consider fires in some of the less common fuels. Liquefied petroleum gas sales have increased considerably over the last few years and the fires attributed to liquefied petroleum gas appliances have also increased, though not so quickly. No information is available on

expected sales, so it has been assumed that the current trend will continue. Fires in oxy-acetylene appliances, chiefly welding and cutting equipment, have been increasing during the period under review, and there is no reason to suppose that this trend will alter. Estimates have also been made of the expected trends in numbers of fires attributed to appliances of "other and unspecified fuels" and for causes such as malicious ignition (known to be rising sharply), children with fire, etc. and unknown causes, and it seems that, unless the pattern of fuel usage alters or there is a change in fire prevention activities, the annual incidence of fires in buildings in the United Kingdom will have risen to about 143 000 in 1975.

Table 1 shows the estimates for fires due to various fuels in the years 1968, 1970, 1972 and 1975 - Table 2 shows these figures as indices based on 1966.

Table 1

Fire frequency forecasts based on expected fuel usage*

Fuel	Actual frequencies				Forecast frequencies			
	1955	1960	1965	1966	1968	1970	1972	1975
Electricity	8 924	12 140	18 243	19 202	22 600	25 500	29 200	35 500
Gas	3 324	3 672	4 578	5 085	5 900	7 100	7 900	9 400
Solid fuel	9 588	6 408	5 030	4 438	3 500	2 900	2 500	1 800
Oil	3 408	5 240	5 312	5 317	5 600	5 600	5 700	5 700
Liquefied petroleum gas	68	208	546	748	900	1 000	1 100	1 300
Acetylene	344	544	861	913	1 100	1 300	1 500	1 700
Other and unspecified fuels	900	1 160	2 073	2 297	2 800	3 200	3 600	4 400
All other causes (e.g. children with fire) and unknown	23 936	33 088	46 524	50 162	58 700	65 700	72 700	83 200
TOTAL	50 492	62 460	83 167	88 162	101 100	112 300	124 200	143 000

*The estimates of fuel usage are J.F.R.O. estimates based on data contained in "Fuel Policy"[2]

Table 2

Indices of expected numbers of fires according to fuel usage (1966=100)

Fuel	Indices (1966=100)				
	1966	1968	1970	1972	1975
Electricity	100	117.7	132.8	152.1	184.9
Gas	100	116.0	139.6	155.4	184.9
Solid fuel	100	78.9	65.3	56.3	40.6
Oil	100	105.3	105.3	107.2	107.2
Liquefied petroleum gas	100	120.3	133.7	147.1	173.8
Acetylene	100	120.5	142.4	164.3	186.2
Other and unspecified fuels	100	121.9	139.3	156.7	191.6
All other causes (e.g. children with fire) and unknown	100	117.0	131.0	144.9	165.9
TOTAL	100	114.7	127.4	140.9	162.2

DISCUSSION AND CONCLUSIONS

The number of fires attended by fire brigades have been increasing steadily during the years 1955-1966 and, from a study of present trends it appears likely that by 1975 the total number of fires in buildings will be about 143 000.

The use of solid fuel is decreasing, but the use of other fuels, such as gas, electricity and oil is increasing. The expected increase in gas sales is fourfold between 1966 and 1975, the fires due to gas appliances, however, are expected to increase by less than 50 per cent. Similarly, with liquefied petroleum gas, the expected increase in fires is also likely to be lower than the expected increase in sales of that fuel.

The increased use of oil is very largely in central heating, so despite increased sales of kerosine burning oil, the numbers of fires are not expected to increase significantly, unless a severe winter, as in 1962-1963, brings about an exceptional increase in the use of portable oil space heating appliances.

With electricity, the outlook is not so good. If trends continue as they are, fires associated with the use of electricity will outnumber the total fires for gas, oil, solid fuel and liquefied petroleum gas combined by 1975. Electric cookers and electric blankets accounted for most of the increase in electrical fires during the period 1955-1966.

It seems that a way to help halt the increasing trend in fires in buildings would be to make more use of gas and oil for central heating and more use of gas for cooking.

REFERENCES

1. United Kingdom Fire Statistics 1966. Ministry of Technology and Fire Offices' Committee Joint Fire Research Organization, H.M.S.O. London, 1968.

2. Fuel Policy. Ministry of Power, Command Paper 3438. H.M.S.O., London, 1967.

3. Annual Abstract of Statistics, No.104, 1967. Central Statistical Office, H.M.S.O., London, 1967.

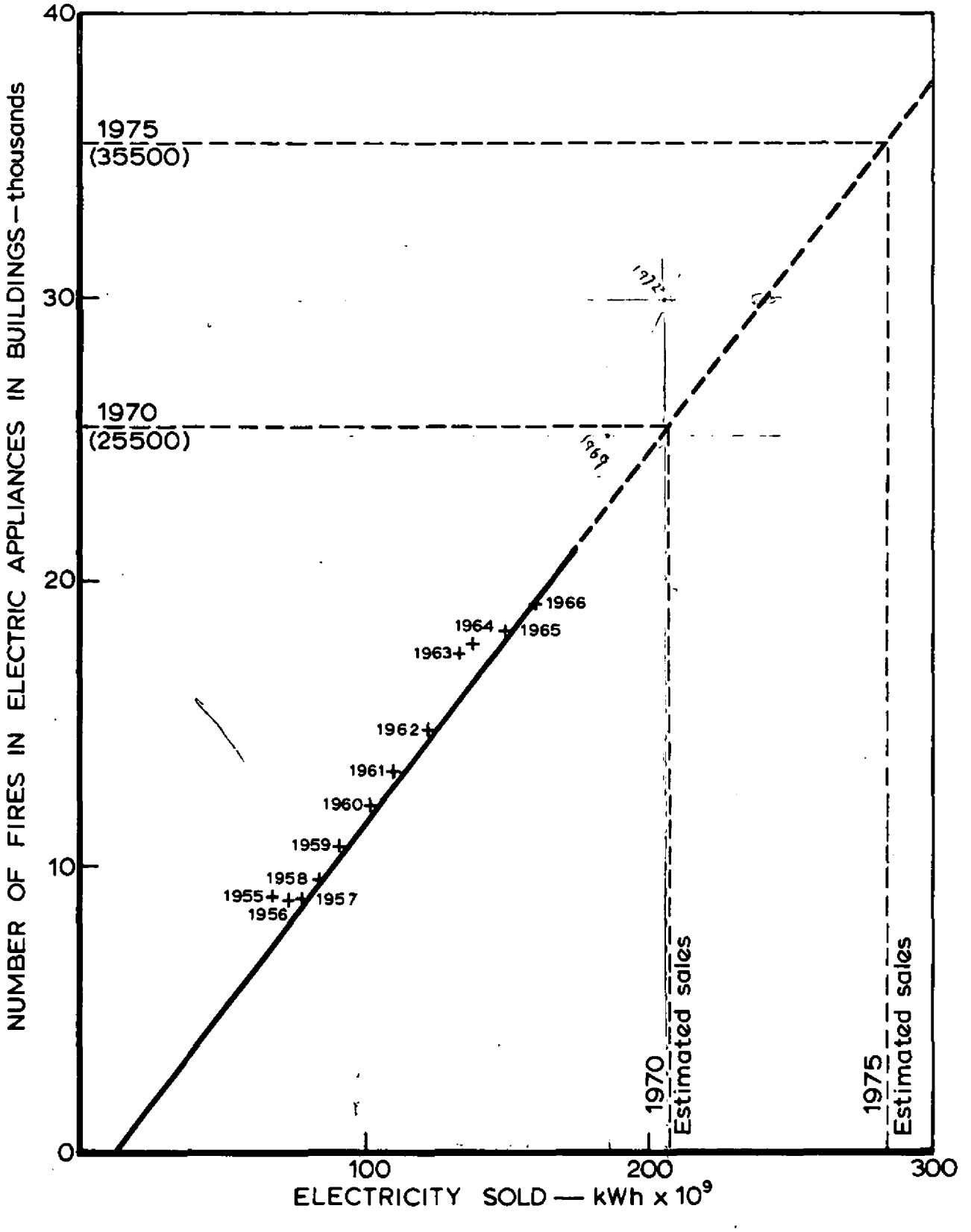

FIG. 1A. FIRES DUE TO ELECTRICITY

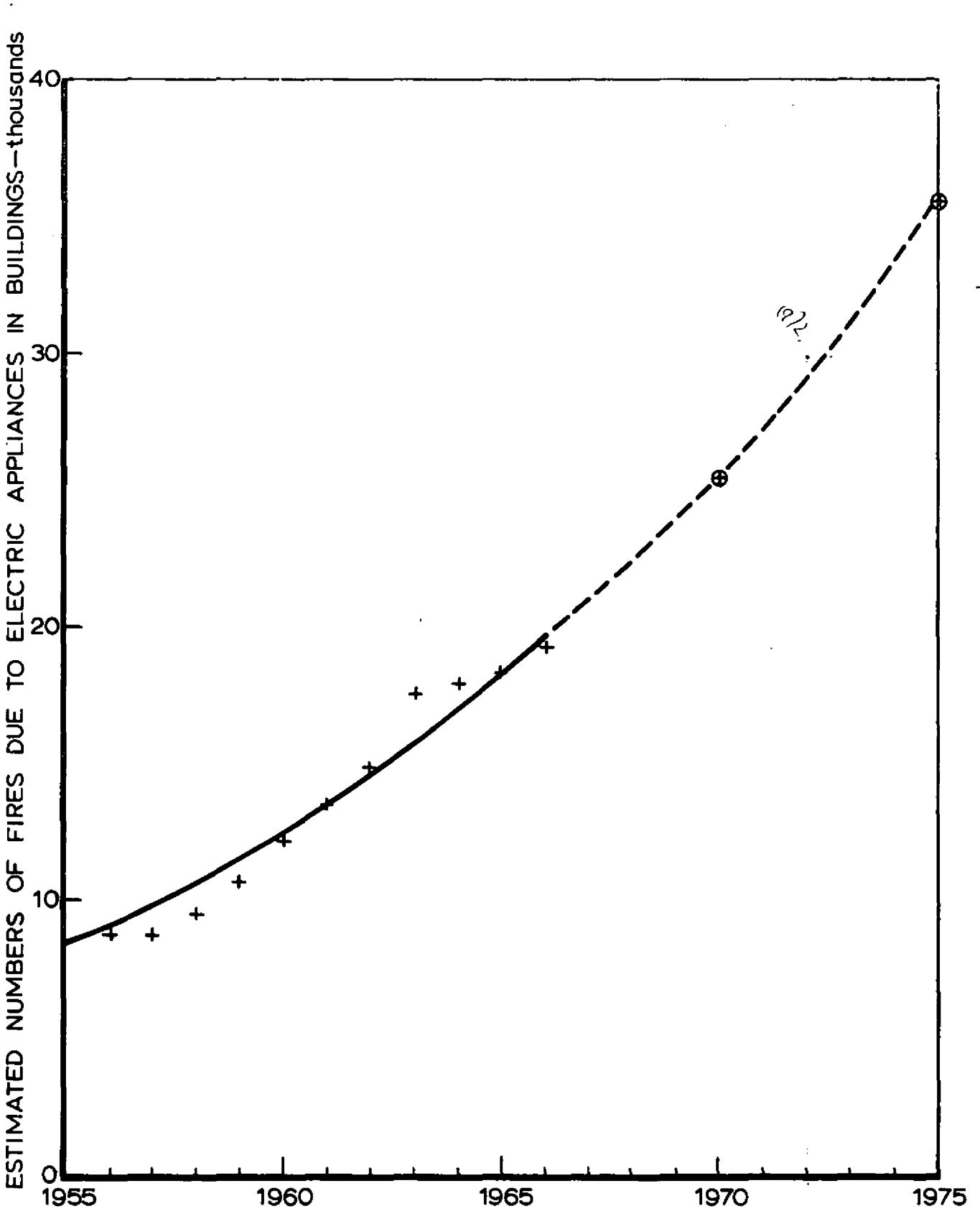

FIG. 1B. ESTIMATED FIRES DUE TO ELECTRICITY

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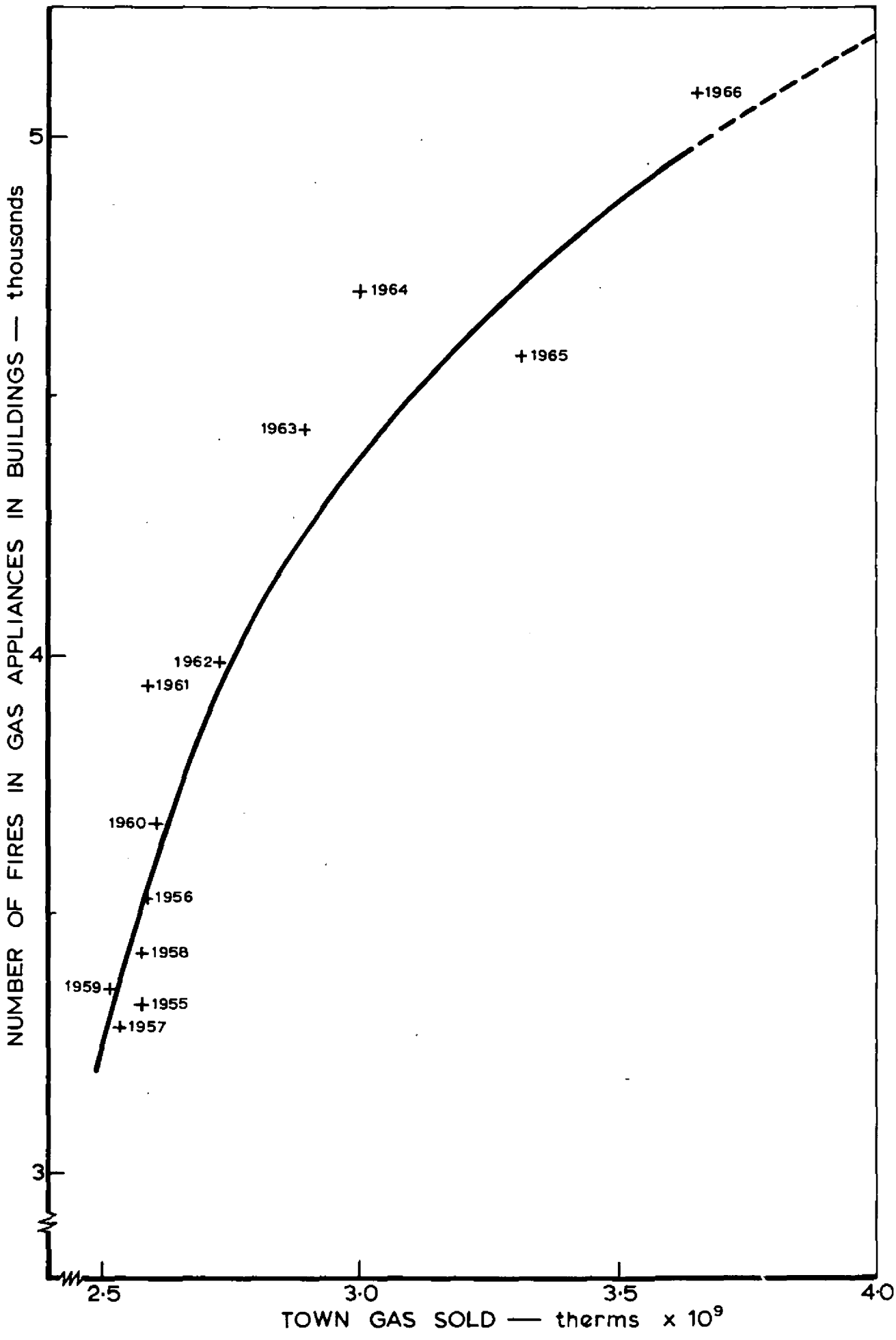

FIG. 2A. FIRES DUE TO GAS

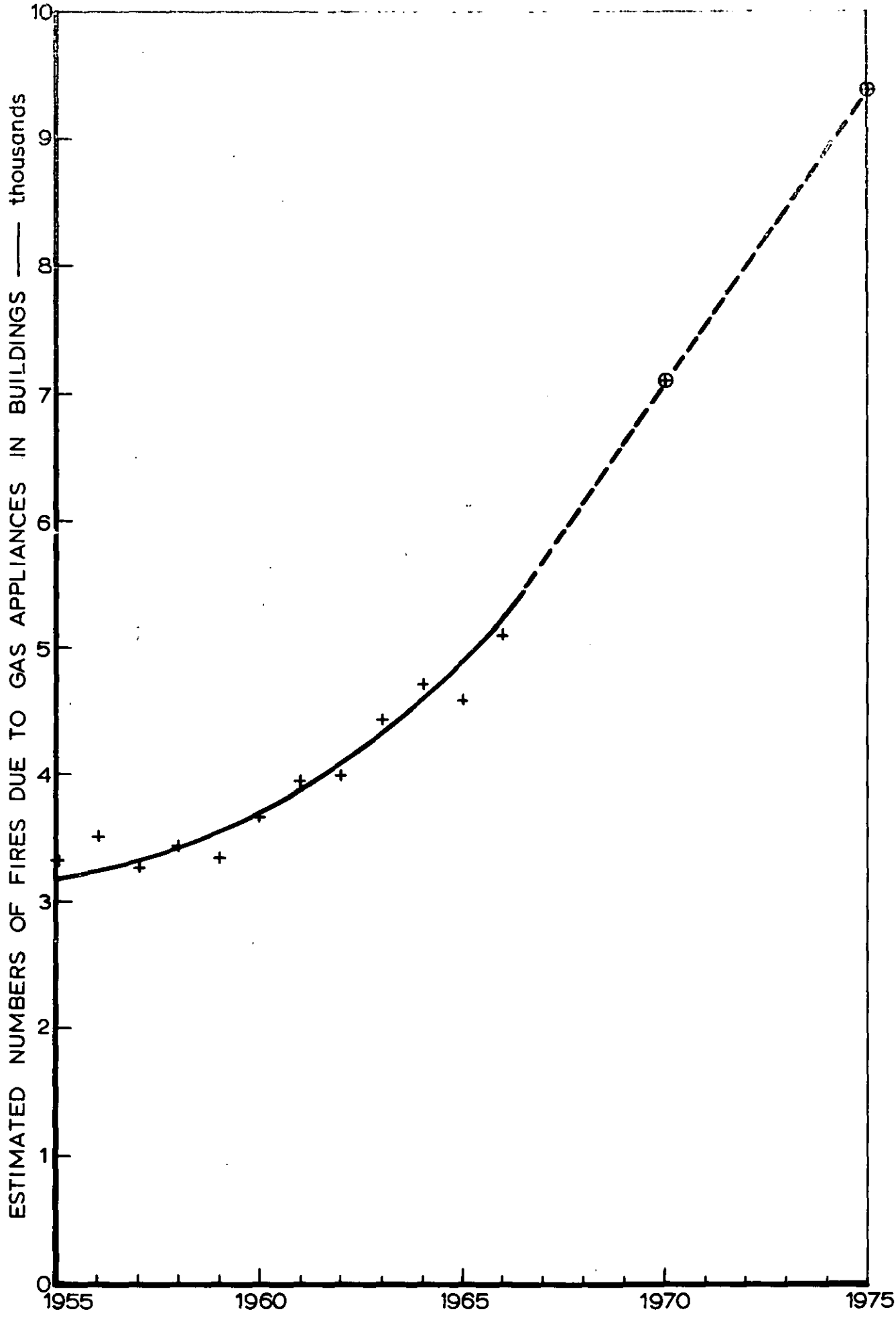

FIG. 2B. ESTIMATED FIRES DUE TO GAS

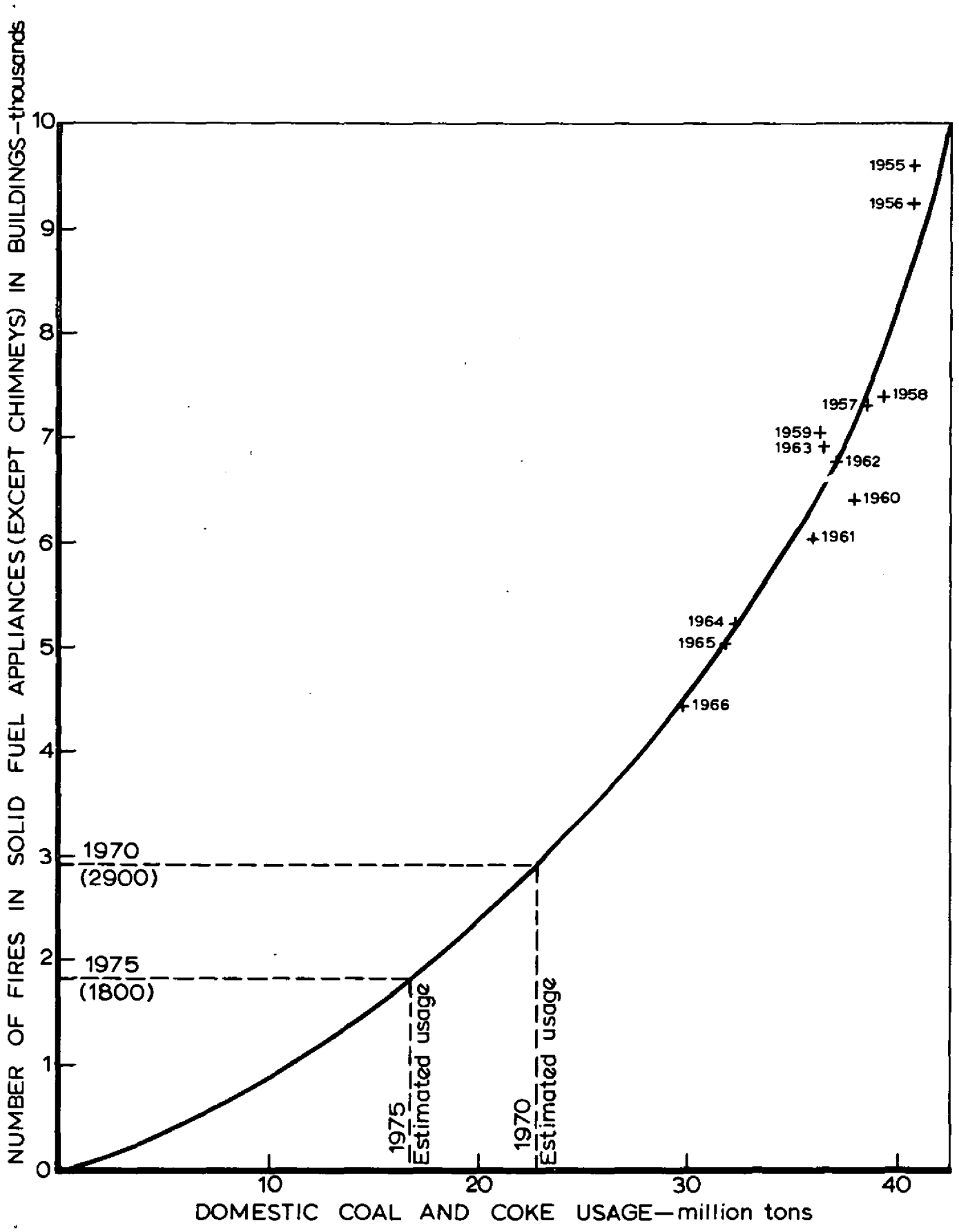

FIG. 3A. FIRES DUE TO SOLID FUEL

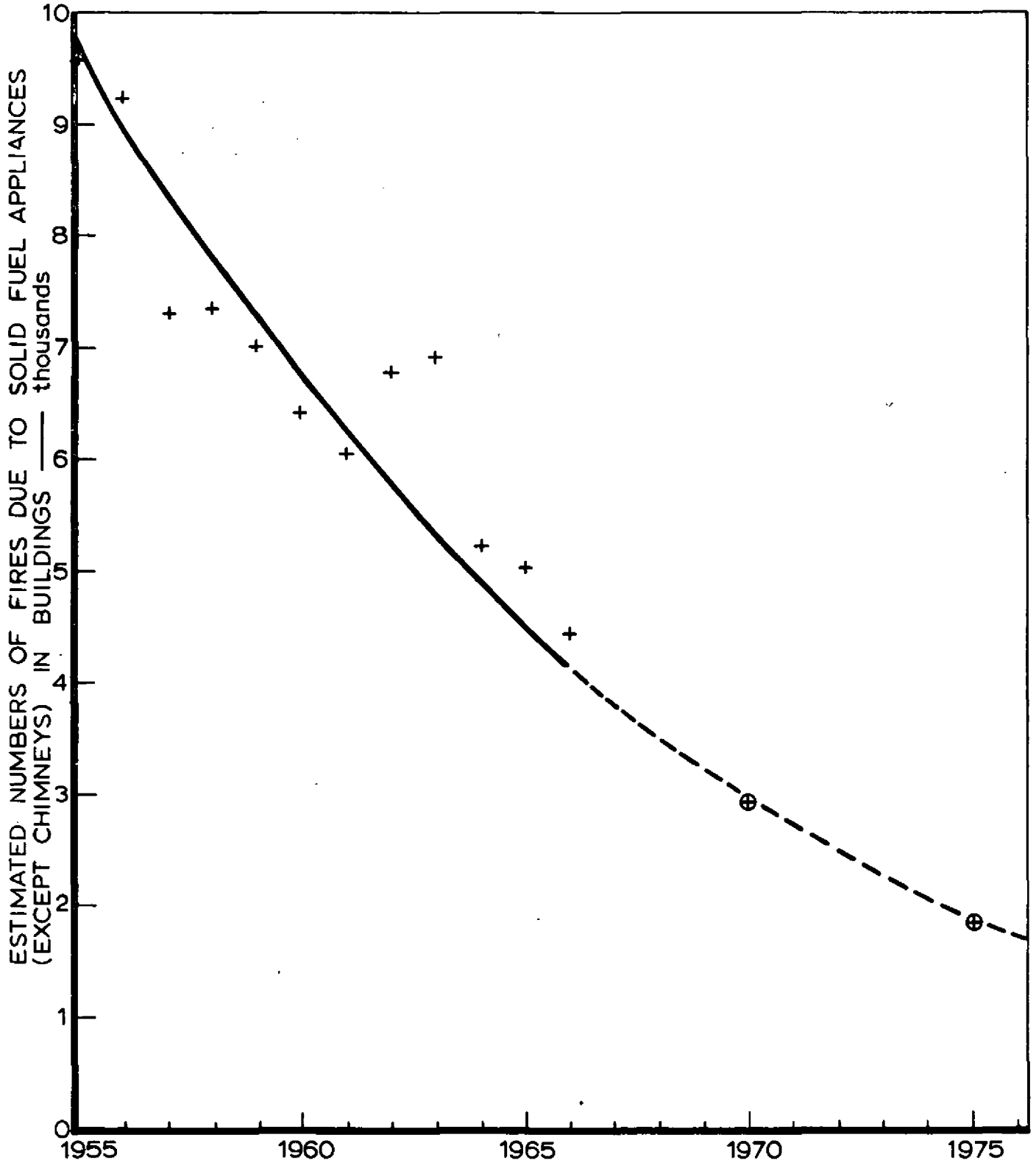

FIG. 3B. ESTIMATED FIRES DUE TO SOLID FUEL

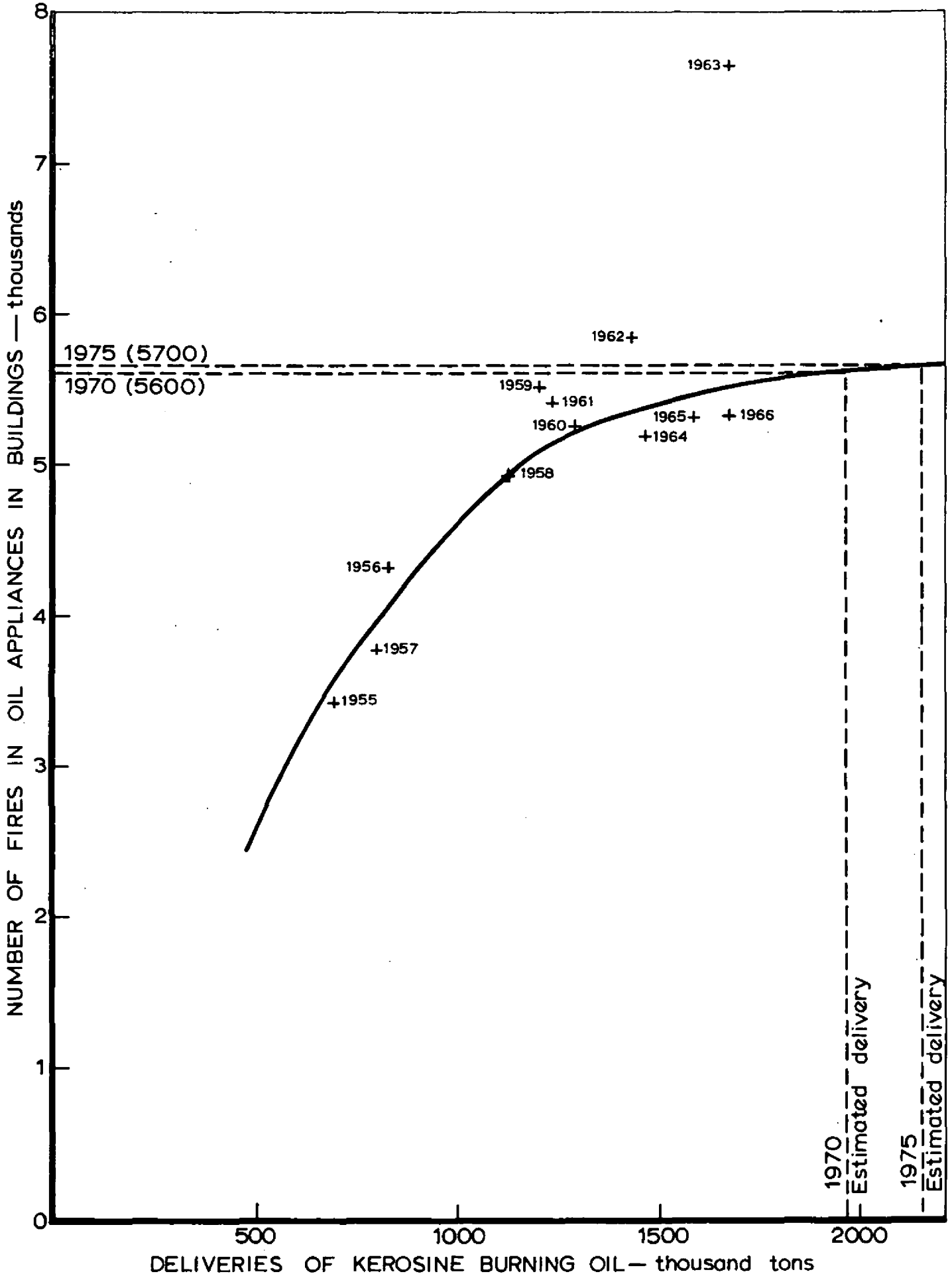

FIG. 4A. FIRES DUE TO OIL

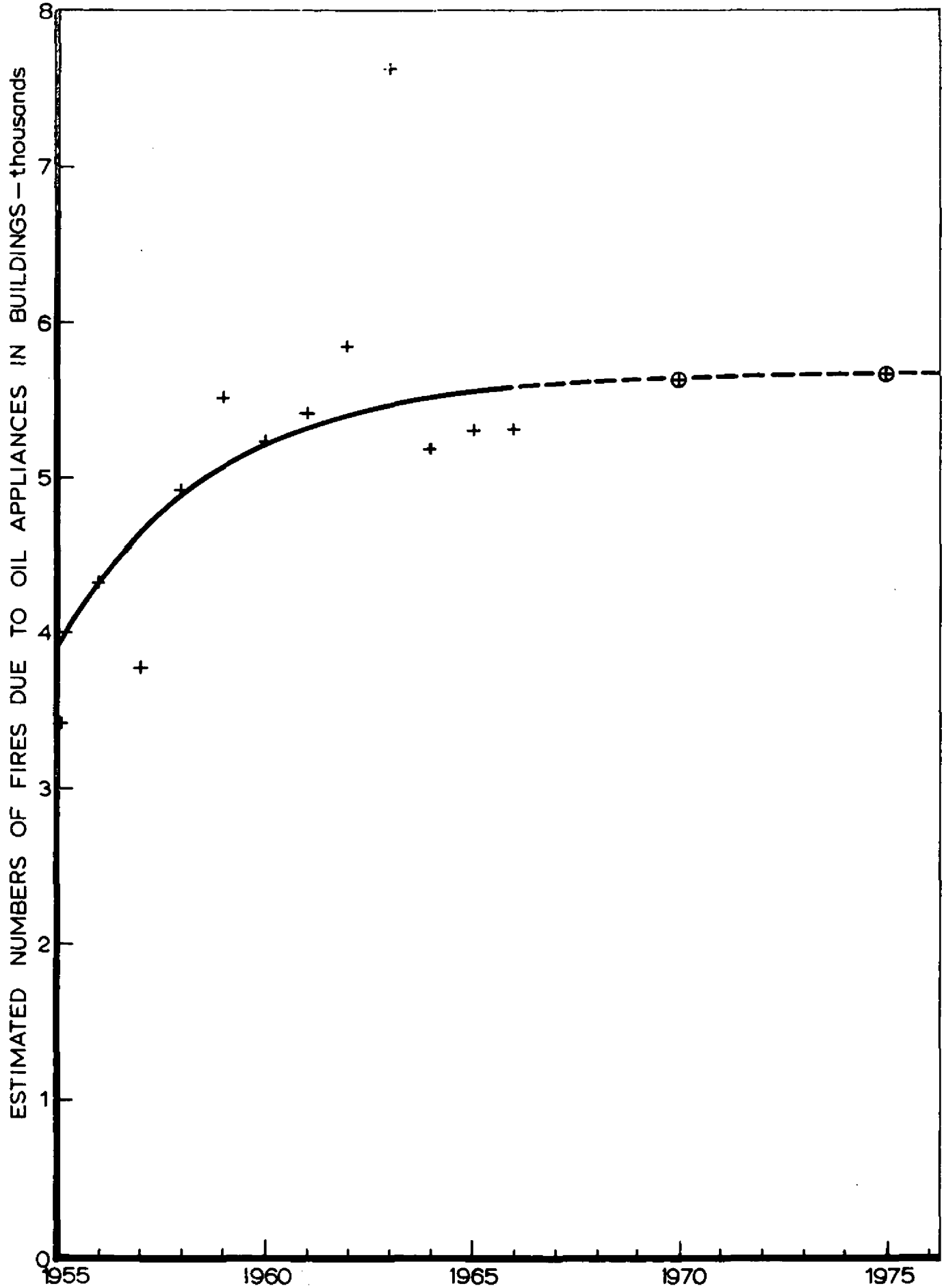

FIG. 4B. ESTIMATED FIRES DUE TO OIL