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FUEL RESEARCH INSTITUTE OF SOUTH AFRICA.

TECHNICAL MEMORANDUM NO. 4 OF 1968

OPERATION OF A FAN-ASSISTED FANTOM FIRE
ON ANTHRACITE AND BITUMINOUS COAL.

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BY:

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OPERATION OF A FAN-ASSITED FANTOM FIRE
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The Fantom fire was tested at the request of Messrs. Field Aircraft Services Africa, Limited, the importers of the appliance.

During the experiment, the fire was installed in a 16" standard fireback (c.f. B.S.No.1251) which forms part of a testing unit according to B.S.No. 3142:1959. The Fantom fire is equipped with an electrically driven blower which delivers air under the grate of the appliance. The fan can operate at two speeds (normal and boost) and fans of two different capacities are available.

In all tests 0.75 kg. firewood and 9 kg. fuel were placed on the grate; the deepening bar, supplied with the unit, was installed.

The following characteristics were recorded:

(a) Total radiant heat output over a hemisphere, e.g. the heat normally radiated into the room.

(b) Heat output in the direction specified in B.S.3142.

This parameter is used to characterise the speed at which the heat output builds up after kindling, (by recording the time when an output of 200 B.Th.U/ft², hour is attained.)

(c) Density of the smoke generated (for bituminous coal only).

The fuels were Natal Ammonium anthracite and Waterpan bituminous coal, both of large nut size. The fireplace was tested under natural draught and at both speeds of each fan.

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The results are presented in Table I and Figures 1 to 4.

TABLE I.
Performance of Fantom Fire.

Fuel	Natural Draught	Fan				
		Normal		High Capacity		
		Normal	Boost	Normal	Boost	
Anthracite	69	49	30	47.5	39	a
Bit.coal	{ 63	41	33	48.5	26	a
	{ 55	27	23	33	22	b

- a. Time required to attain a heat output of 200 B.Th.U/ft²,
hour (minutes)
- b. Time elapsed until disappearance of smoke (minutes)

From these data it is evident that the fan accelerates the ignition process appreciably and that with a fuel of low reactivity, like anthracite, a higher heat output is obtained than can be achieved on natural draught.

Though the smoke density is not reduced when operating the fan, the period of smoke emission is reduced.

The performance with the high capacity fan does not differ significantly from that of the normal unit. The fans were operated for the entire duration of the test, and no adverse effects, due to the high temperatures to which the fans were exposed, were noticed in these trials.

Some further particulars of the fans are given in Table II.

TABLE II .../

TABLE II.
Particulars of Fan.

Fan Type	Setting	Pressure Static	mm. H ₂ O Vol.Head	Approx. Speed, r.p.m.
Normal	Run	1.9	0.7	2200
"	Boost	2.2	0.9	2400
High Capa- city	Run	2.9	1.3	2500
"	" Boost	3.4	2.0	2900

Notes: Static Pressure measured with outlet port closed (no delivery).

Velocity head measured in centre of outlet port, free intake and discharge.

Air temperature 24^oC, air pressure 650 mm Hg.

The fan velocity is approximate only as the speed drops when applying the tachometer.

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Chief Research Officer.

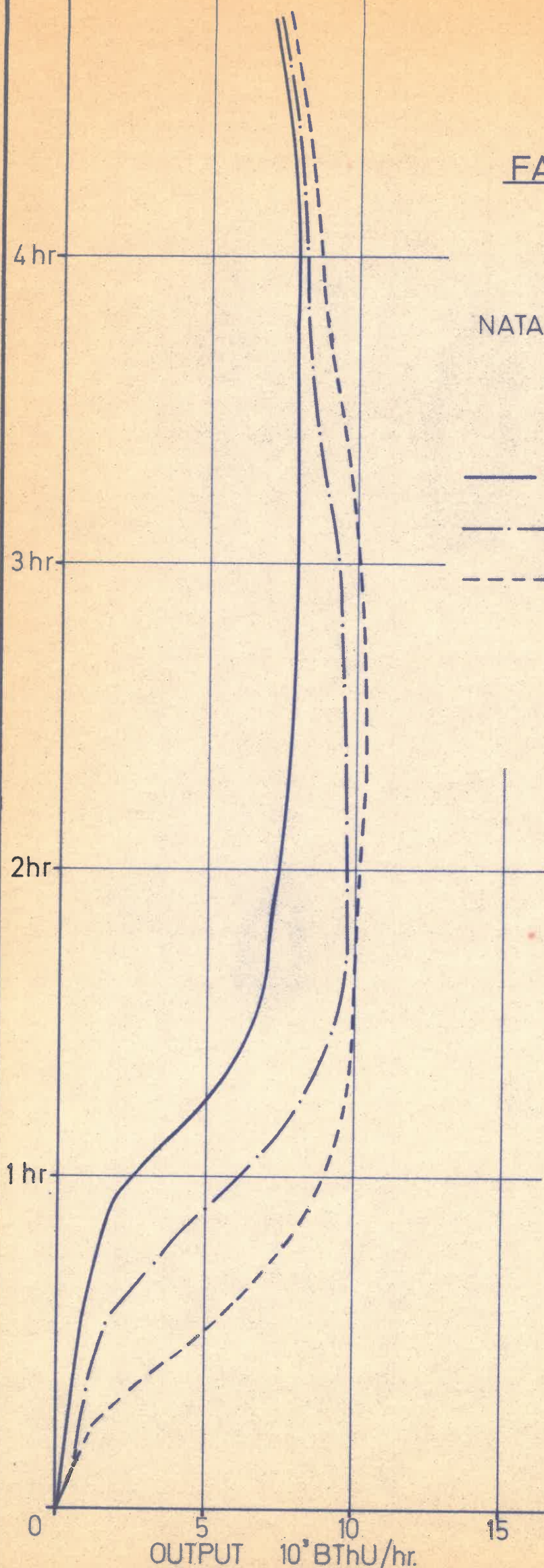
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FIG. 1.

FANTOM FORCED
DRAUGHT
OPEN FIRE.

NATAL AMM. ANTHRACITE.
NORMAL FAN.



- NATURAL DRAUGHT.
- · - FAN POSITION I.
- - - FAN POSITION II.

FIG.2.

FANTOM FORCED
DRAUGHT
OPEN FIRE.

WATERPAN COAL.
NORMAL FAN.

- NATURAL DRAUGHT.
- - - FAN POSITION I.
- · - FAN POSITION II.

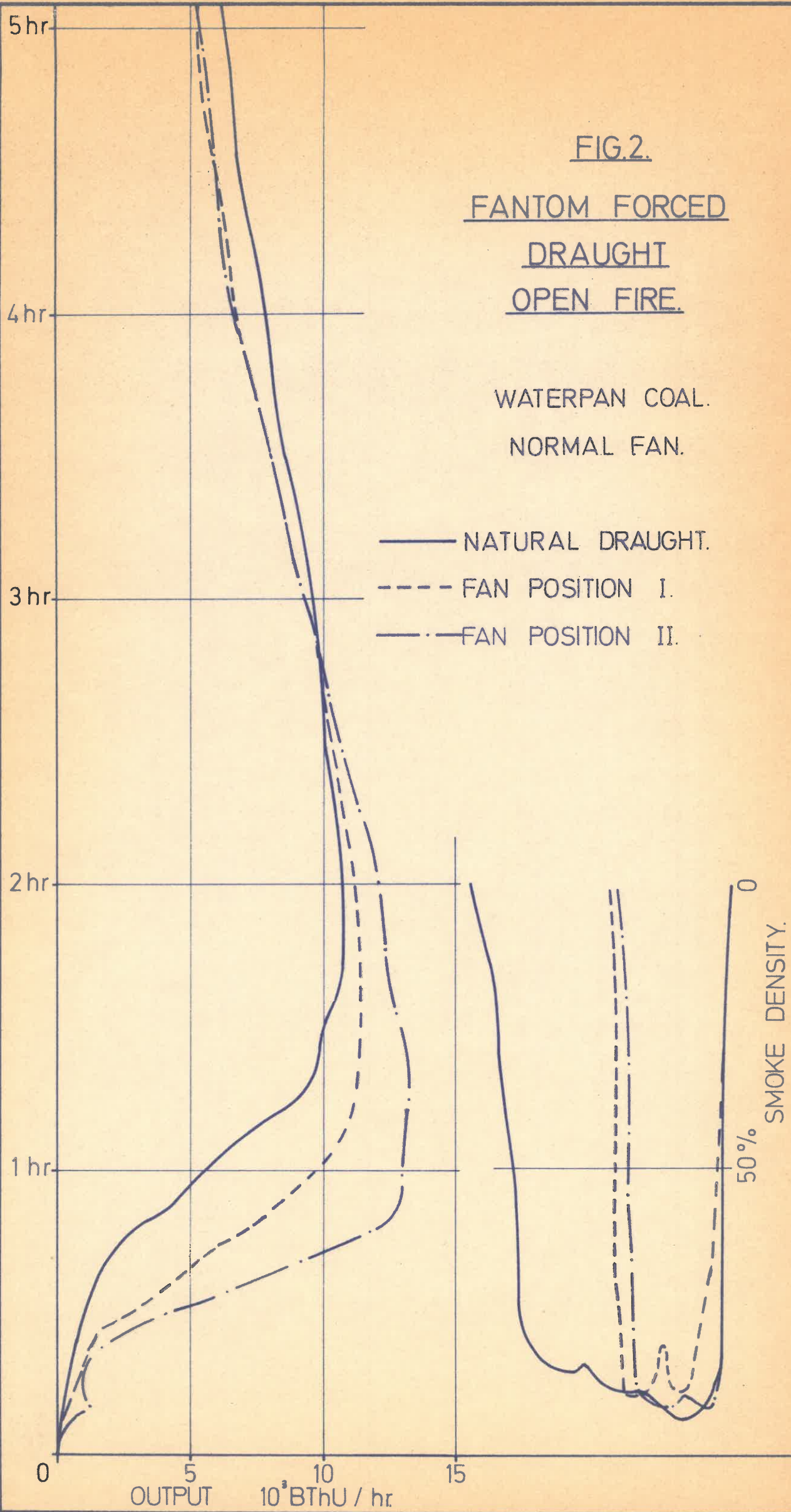


FIG. 3.

FANTOM FORCED
DRAUGHT
OPEN FIRE.

NA. ANTHRACITE.
LARGE CAPACITY
FAN.

— FAN POSITION I.
- - - BOOSTER FAN II.

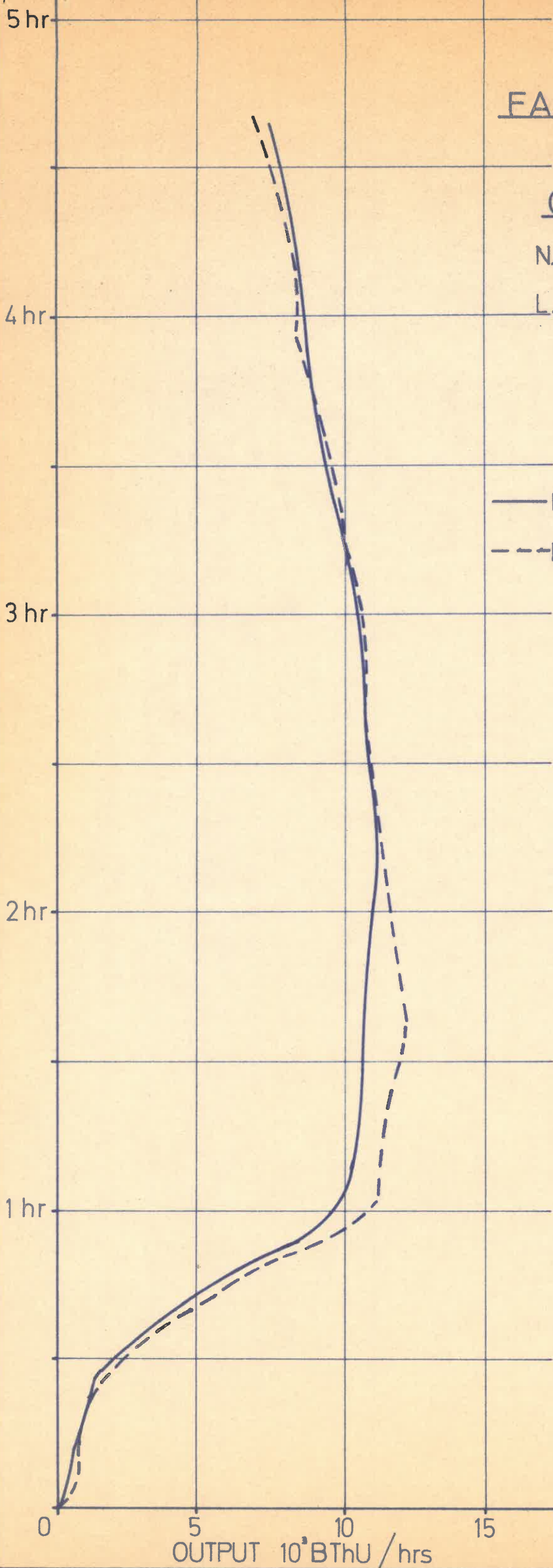


FIG.4
FANTOM FORCED
DRAUGHT
OPEN FIRE.

WATERPAN COAL.
 LARGE CAPACITY
 FAN.

--- FAN POSITION I
 — FAN POSITION II

