AN ANALYSIS OF THE REHEAT CYCLE FOR STEAM.

THESIS, SUBMITTED FOR THE DEGREE OF M.Sc. (ENGINEERING.)

BY

A.E. JENSEN. B.Sc. (ENG.) [S.A.], B.Sc. (ENG.) [LONDON.]
A.M.I. MECH. E.

1929

An Analysis

of

The Reheat Cycle for Steam.

1929

Thesis

Submitted for the Degree of

M. Sc. (Engineering)

By

A. E Jensen: B Sc. (Eng.)--- S A.
B. Sc. (Eng.)--- London.
A. M. I. Mech. E.

An Analysis

of

The Reheat Cycle for Steam.

1929

Thesis

Submitted for the degree of

M. Sc. (Engineering.)

By

A. E. Jensen: B. Sc. (Eng.)--- S.A.
B. Sc. (Eng.)--- London.
A. M. I. Mech. E.

AN ANALYSIS OF THE REHEAT CYCLE FOR STEAM

Some text-books on heat engines make the sweeping statement that efficiency is appreciably improved by reheating the steam after it has flowed partially through the engine in the usual manner, and then having the vapour returned to the prime mover, but with a high superheat, to complete its work.

The statement is made to apply whether the reheater is incorporated within the main boiler walls, whether it is a separate unit having its own furnace or whether the reheater uses high pressure and high temperature steam to supply the reheat.

As far as the author is aware no attempt has been made to fully substantiate such a statement, hence the following analysis has been made to gain further information regarding the possible gains with respect to the Rankine cycle.

The use of a reheater involves the installation of plant whose cost will be a fair proportion of the total cost of the plant, hence it is essential to reheat under conditions of maximum possible gain in order to cover the extra cost of plant.

In practice only one reheater has been used up to the present date, that is, expansion of the steam is split up into two stages with reheating between the two stages. Hence the author has considered the question of reheating at one point only of the steam flow through the prime mover.

- No -

No information is available as regards the best point of the expansion to be selected for reheating and the possible gain to be derived, hence this thesis is devoted to the determination of the point at which reheating should take place in order to obtain the maximum efficiency of the theoretical cycle and the possible gain which can be obtained.

The Rankine cycle is considered with reheating performed at intermediate points of the expansion, expansion in the second stage being taken right down to exhaust or back pressure. In all cases reheating is considered at constant pressure.

SUPERHEATED STEAM

The pressure-Volume diagram and the temperature - entropy diagrams for a single reheat are given in figures 1, 2, 3 and 4 (see attached blue prints).

In all cases the steam is reheated up to the same temperature as that of the steam initially led to the prime mover.

PRESSURE-VOLUME DIAGRAM (Fig. 1)

The steam is allowed to expand initially from "c" to "d" as in the Rankine cycle. At "d" the steam is led to the reheater where it is heated at constant pressure (P_3), the volume increasing from Vd to Ve. The steam is then led back to the prime mover and allowed to expand from "e" to "f". At the end of the first expansion the steam may be either just dry saturated, slightly superheated or slightly wet according to the amount of expansion allowed in the first stage.

- The -

The three conditions will be considered by means of the temperature-entropy diagram.

STEAM JUST DRY SATURATED AT END OF FIRST EXPANSION (Fig.2)

Fig. 2 "a" is the feed-water state point and "c" is the state point of the superheated steam as initially led to the prime mover. "cd" represents the first stage expansion. "de" represents reheating up to the initial temperature at constant pressure. "ef" represents the second stage expansion down to back pressure with temperature T_2.

Work done in the reheat cycle is proportional to the area "m b c^1c d m" in the first stage and to the area "a m d e f a" in the second stage. Total work done is proportional to the area "a b c^1c d e f a".

Work done = m b c^1c d + a m d e f

$$= \left\{(T_1-T_3)\left(1+\frac{L_1}{T_1}\right)+K_{p_1}(T_s-T_1)-T_3\left(\log_e\frac{T_1}{T_3}+K_{p_1}\log_e\frac{T_s}{T_1}\right)\right\}$$

$$+\left\{(T_3-T_2)\left(1+\frac{L_3}{T_3}\right)+K_{p_2}(T_s-T_3)-T_2\left(\log_e\frac{T_3}{T_2}+K_{p_2}\log_e\frac{T_s}{T_3}\right)\right\} \quad \text{--(1)}$$

Heat Supplied = m b c^1c d + k am d e f h

$$= \left\{(T_1-T_3)\left(1+\frac{L_1}{T_1}\right)+K_{p_1}(T_s-T_1)-T_3\left(\log_e\frac{T_1}{T_3}+K_{p_1}\log_e\frac{T_s}{T_1}\right)\right\}$$

$$+\left\{L_3+T_3-T_2+K_{p_2}(T_s-T_3)\right\} \quad \text{- - - - - - - - - - - - - - - -(2)}$$

Cycle Efficiency $= \dfrac{(1)}{(2)}$

$$= \frac{\left\{(T_1-T_3)\left(1+\frac{L_1}{T_1}\right)+K_{p_1}(T_s-T_1)-T_3\left(\log_e\frac{T_1}{T_3}+K_{p_1}\log_e\frac{T_s}{T_1}\right)\right\}+\left\{(T_3-T_2)\left(1+\frac{L_3}{T_3}\right)+K_{p_2}(T_s-T_3)-T_2\left(\log_e\frac{T_3}{T_2}+K_{p_2}\log_e\frac{T_s}{T_3}\right)\right\}}{\left\{(T_1-T_3)\left(1+\frac{L_1}{T_1}\right)+K_{p_1}(T_s-T_1)-T_3\left(\log_e\frac{T_1}{T_3}+K_{p_1}\log_e\frac{T_s}{T_1}\right)\right\}+\left\{L_3+T_3-T_2+K_{p_2}(T_s-T_3)\right\}} \quad \text{--(3)}$$

Alternately. Work done = a b c c^1d g + g d e f

$$= \left\{(T_1-T_2)\left(1+\frac{L_1}{T_1}\right)+K_{p_1}(T_s-T_1)-T_2\left(\log_e\frac{T_1}{T_2}+K_{p_1}\log_e\frac{T_s}{T_1}\right)\right\}$$

$$+\left\{K_{p_2}(T_s-T_3)-T_2K_{p_2}\log_e\frac{T_s}{T_3}\right\} \quad \text{- - - - - - - - - - - - -(4)}$$

Heat supplied = k a b c^1c d g j + j d e h

$$= \left\{L_1+T_1-T_2+K_{p_1}(T_s-T_1)\right\}+\left\{K_{p_2}(T_s-T_3)\right\} \quad \text{- - - - - - -(5)}$$

Cycle Efficiency

$$= \frac{\left\{(T_1-T_2)\left(1+\frac{L_1}{T_1}\right)+K_{p_1}(T_s-T_1)-T_2\left(\log_e\frac{T_1}{T_2}+K_{p_1}\log_e\frac{T_s}{T_1}\right)\right\}+\left\{K_{p_2}(T_s-T_3)-T_2K_{p_2}\log_e\frac{T_s}{T_3}\right\}}{\left\{L_1+T_1-T_2+K_{p_1}(T_s-T_1)\right\}+\left\{K_{p_2}(T_s-T_3)\right\}} \quad \text{-(6)}$$

<u>Steam still superheated at end of first expansion</u> (Fig.3)

"cd" represents the first stage expansion, the steam being at a superheat temperature T_s^1 when led to the reheater. Reheating takes place from "d" to "e".

<u>Work done</u> = a b c^1 c d g + g d e f

$$= \left\{(T_1-T_2)\left(1+\frac{L_1}{T_1}\right)+K_{p_1}(T_s-T_1)-T_2\left(\log_e\frac{T_1}{T_2}+K_{p_1}\log_e\frac{T_s}{T_1}\right)\right\}$$
$$+\left\{K_{p_3}(T_s-T_s^1)-T_2K_{p_3}\log_e\frac{T_s}{T_s^1}\right\} \text{------------}(7)$$

<u>Heat Supplied</u> = k a b c^1 c d j + j d e h

$$= \left\{L_1+T_1-T_2+K_{p_1}(T_s-T_1)\right\}+\left\{K_{p_3}(T_s-T_s^1)\right\} \text{--}(8)$$

<u>Cycle Efficiency</u> =

$$\frac{\left\{(T_1-T_2)\left(1+\frac{L_1}{T_1}\right)+K_{p_1}(T_s-T_1)-T_2\left(\log_e\frac{T_1}{T_2}+K_{p_1}\log_e\frac{T_s}{T_1}\right)\right\}+\left\{K_{p_3}(T_s-T_s^1)-T_2K_{p_3}\log_e\frac{T_s}{T_s^1}\right\}}{\left\{L_1+T_1-T_2+K_{p_1}(T_s-T_1)\right\}+\left\{K_{p_3}(T_s-T_s^1)\right\}} \text{---}(9)$$

<u>Steam Wet at the end of first expansion</u> (Fig. 4)

"cd" represents expansion in the first stage, the steam having a dryness fraction $\frac{md}{me^1}$ when led to the reheater. "de^1" is the first reheat effect when the steam is made dry saturated, the steam is then superheated from "e^1" to "e" with temperature T_s.

<u>Work done</u> = m b c^1 c d + a m e^1 e f

$$= \left\{(T_1-T_3)\left(1+\frac{L_1}{T_1}\right)+K_{p_1}(T_s-T_1)-T_3\left(\log_e\frac{T_1}{T_3}+K_{p_1}\log_e\frac{T_s}{T_1}\right)\right\}$$
$$+\left\{(T_3-T_2)\left(1+\frac{L_3}{T_3}\right)+K_{p_4}(T_s-T_3)-T_2\left(\log_e\frac{T_3}{T_2}+K_{p_4}\log_e\frac{T_s}{T_3}\right)\right\} \text{----}(10)$$

<u>Heat Supplied</u> = m b c^1 c d + k a m e^1 e f h

$$= \left\{(T_1-T_3)\left(1+\frac{L_1}{T_1}\right)+K_{p_1}(T_s-T_1)-T_3\left(\log_e\frac{T_1}{T_3}+K_{p_1}\log_e\frac{T_s}{T_1}\right)\right\} + \left\{L_3+T_3-T_2+K_{p_4}(T_s-T_3)\right\} \quad \text{----------(11)}$$

$$\underline{\text{Cycle Efficiency}} = \frac{\left\{(T_1-T_3)\left(1+\frac{L_1}{T_1}\right)+K_{p_1}(T_s-T_1)-T_3\left(\log_e\frac{T_1}{T_3}+K_{p_1}\text{Log}_e\frac{T_s}{T_1}\right)\right\} + \left\{(T_3-T_2)\left(1+\frac{L_3}{T_3}\right)+K_{p_4}(T_s-T_3)-T_2\left(\log_e\frac{T_3}{T_2}+K_{p_4}\log_e\frac{T_s}{T_3}\right)\right\}}{\left\{(T_1-T_3)\left(1+\frac{L_1}{T_1}\right)+K_{p_1}(T_s-T_1)-T_3\left(\log_e\frac{T_1}{T_3}+K_{p_1}\log_e\frac{T_s}{T_1}\right)\right\} + \left\{L_3+T_3-T_2+K_{p_4}(T_s-T_3)\right\}} \quad \text{--(12)}$$

In the equations given, T_3 will have different values. K_{p_1} K_{p_2} K_{p_3} and K_{p_4} will have different values since they refer to different ranges of pressure and superheating.

The Rankine cycle efficiency for the same limiting temperatures T_s, T_1 and T_2 is :-

$$\frac{\left\{(T_1-T_2)\left(1+\frac{L_1}{T_1}\right)+K_{p_1}(T_s-T_1)-T_2\left(\log_e\frac{T_1}{T_2}+K_{p_1}\log_e\frac{T_s}{T_1}\right)\right\}}{\left\{L_1+T_1-T_2+K_{p_1}(T_s-T_1)\right\}} \quad \text{------(13)}$$

It is impossible to directly determine the conditions amongst the given cases for a maximum cycle efficiency because several variables are involved.

The method adopted is that of determing the cycle efficiency for various values of P_3 with corresponding saturation temperature T_3 and plotting the efficiency against the pressure P_3. The pressure at which reheating should take place for maximum efficiency can then be obtained from the curves as well as the maximum efficiency of the cycle.

Determining the efficiency for various values of T_3 with consequent varying values of K_{p_1} K_{p_2} K_{p_3} and K_{p_4} from equations (3) or (6)/(9) and (12) would be extremely laborious, hence efficiencies have been determined from the total-heat entropy chart for steam (see Fig. 5).

"cd" represents adiabatic heat drop from P_1 to P_3 (saturation temperature T_3). "de" represents reheating at constant pressure P_3 to bring the temperature back to the initial steam temperature T_s. "ef" represents the second stage adiabatic heat drop from P_3 (reheated) to back pressure P_2.

Total heat drop = Work done = c d + e f

Heat supplied = Total heat at "c" + reheat supplied from "d" to "e" − sensible heat in water at T_2.

(Total heat at "c" − sensible heat in water at T_2) = Heat supplied on Rankine Cycle.

Therefore, Heat supplied = Heat supplied on Rankine cycle + heat supplied during reheating.

Therefore, Cycle efficiency = $\dfrac{\text{heat drop "cd"} + \text{heat drop "ef"}}{\text{Heat supplied on Rankine cycle} + \text{heat supplied by reheater}}$ (14)

The cycles considered in the foregoing are called Cycles A.

In some cases it may be possible to perform the reheating by means of waste heat, in such cases the cycle will be called Cycles B. Both cycles are fully considered in this thesis.

Cycle B efficiency = $\dfrac{\text{heat drop "cd"} + \text{heat drop "ef"}}{\text{Heat supplied on Rankine cycle}}$ ------(15)

Cycle B will always have a higher efficiency than Cycle A or the Rankine cycle because additional heat is converted into work without debiting the reheat supplied against the cycle.

Efficiencies have been determined for the following cases :- Steam at 500 lbs. per sq. ins. abs. with initial temperatures of 750, 700, 650, 600, 550 and 500°F; in each case reheating to the initial steam temperature has been assumed.

Steam at 400 lbs. per sq. ins. abs., 350 lbs. per sq. ins. abs., 300 lbs. per sq. ins. abs., 250 lbs., per sq. ins. abs and 200 lbs. per sq. ins. abs. each with the temperatures 750, 700, 650, 600, 550 and 500°F.

The back or exhaust pressure has been taken at 1 lb. per sq. ins. abs. in all cases.

The results are shown in tables Nos. 1 to 36.

Table Nos. 1 to 6 refer to steam at 500 lbs. per sq. ins. abs.
Table Nos. 7 to 12 refer to steam at 400 lbs. per sq.ins abs.
Table Nos. 13 to 18 refer to steam at 350 lbs. per sq. ins.abs.
Table Nos. 19 to 24 refer to steam at 300 lbs. per sq. ins.abs.
Table Nos. 25 to 30 refer to steam at 250 lbs. per sq. ins.abs.
Table Nos. 31 to 36 refer to steam at 200 lbs. per sq. ins.abs.

The cycle efficiency curves are shown in Plates Nos. 1_A to 6_B

Plate No.	Initial steam Pressure lbs. per sq.ins.abs.	Initial Steam Temperatures °F	Back Pressure lbs.per sq.ins.abs.	Working Cycle
1A	500	500 to 750	1	A
1B	500	do.	1	B
2A	400	do.	1	A
2B	400	do.	1	B
3A	350	do.	1	A
3B	350	do.	1	B
4A	300	do.	1	A
4B	300	do.	1	B
5A	250	do.	1	A
5B	250	do.	1	B

Plate No.	Initial Steam Pressure lbs. per sq.ins.abs.	Initial Steam Temperatures °F	Back Pressure lbs.per sq. ins. abs.	Working Cycle
6A	200	500 to 750	1	A
6B	200	do.	1	B

The efficiency of the Rankine cycle is shown for each initial temperature by means of dotted lines on plates referring to Cycle A.

Efficiency curves for Cycle A lie partially above and partially below the Rankine efficiency line. Hence for Cycle A, it is important to choose the reheat point carefully if the greatest gain is desired.

Tables 1 to 36 also give the percentage gain over the Rankine cycle. If it is assured that the ratio of actual thermal efficiency of plant to theoretical cycle efficiency is not affected by the adoption of reheating then the gains shown will represent the percentage saving in fuel used.

When the Rankine cycle is followed the steam contains a fair amount of moisture at the lower stages of expansion, but when a reheat cycle is adopted the amount of moisture at the lower stages is reduced, the reduction being inversely proportional to the pressure at which reheating takes place, or, proportional to the amount of expansion in the first stage.

In practice the efficiency ratio of a prime mover increases slightly as the quality of the steam is higher at the end of expansion, this is particularly the case in the steam turbine. Hence, in practice, it may be expected that the gains will be slightly higher than the theoretical values.

Plates 1A to 6B have been used to obtain the maximum cycle efficiencies, reheat pressure for maximum efficiency and percentage gains over the Rankine cycle. The results are tabulated in Table No. 37.

Relation between Maximum Efficiency (Cycle A) and Initial Steam Temperature (Reheating to initial temperature)

Table No. 37 has been used in plotting the maximum efficiency against the initial steam temperature. The result is shown in Plate No. 7A. The relationship in the case of each pressure follows the straight line law of the form :-

Maximum Cycle efficiency = a constant + a constant (steam temperature - 500)

The actual equations for the limiting conditions considered in this investigation are :-

For 500 lbs.per sq.ins.abs., Max.efficiency = .3431 + .000108 (t-500)

" 400 " " " " " Max.efficiency = .3341 + .0001084 (t - 500)

" 350 " " " " " Max.efficiency = .3285 + .000108 (t - 500)

" 300 " " " " " Max.efficiency = .3212 + .000113 (t - 500)

" 250 " " " " " Max. efficiency = .3144 + .0001136 (t - 500)

" 200 " " " " " Max.efficiency = .3050 + .000115 (t - 500)

Where t = initial steam temperature (reheating up to initial temperature).

The lines are almost parallel and if the average value of the coefficient of "t" is used no great error will be involved. The average value is .0001107 and the greatest error occurs with 200 lbs. per sq. ins. abs. and 750°F, the error being .00108 in efficiency which represents an error of only .324%

The constants, for the equations given, when plotted against pressure gives a curve which has the following equation:-

$$\text{Constant} = .305 + .0002\ (P-200) - .1154 \times 10^{-10} (P)^{3.33}$$

Hence if the average coefficient of the temperature is used the following general equation can be used to determine the maximum possible efficiency for any pressure from 200 to 500 lbs. per sq. ins. abs. and for any temperature from 500 to 750°F :-

$$\text{Max. efficiency} = .305 + .0002\,(P-200) - .2154 \times 10^{-10}(P)^{3.33} + .0001107\,(t - 500)$$

Where P = abs. steam pressure

t = steam temperature (initial and after reheating).

Cycle B. The curves are similar to those for Cycle A and are shown in Plate No. 7B.

The equations to the lines are :-

For 500 lbs.per sq.ins.abs.,	Max.efficiency =	.4002 + .000168 (t - 500)
" 400 " " " " "	Max.efficiency =	.3884 + .000171 (t - 500)
" 350 " " " " "	Max.efficiency =	.3805 + .000176 (t - 500)
" 300 " " " " "	Max.efficiency =	.3720 + .000172 (t - 500)
" 250 " " " " "	Max.efficiency =	[illegible]20 + .000178 (t - 500)
" 200 " " " " "	Max.efficiency =	.3507 + .000168 (t - 500)

Again, the lines are almost parallel. The mean value of the coefficient of "t" is .000172 which gives the greatest error in the case of 250 lbs. per sq. ins. abs., the error being only .0015 which is an error of only .369% .

A similar treatment for the equations for maximum efficiency gives the fo[illegible]neral formula for Cycle B :-

$$\text{Max.Efficiency} = .3507 + .000251(P-200) - .316 \times 10^{-13}(P)^{4.42} + .000172\,(t-500)$$

In order to dispense with the use of formulae and variable constants, the curves shown in Plates 8A and 8B have been constructed from those in Plates 7A and 7B respectively. Maximum efficiency is plotted against initial steam pressure for various temperatures in steps of 10°F. Plate 8A refers to Cycle A and Plate 8B refers to Cycle B. These plates enable the greatest possible cycle efficiency being read off directly for any initial steam pressure from 200 to 500 lbs. per sq. ins. abs. with any initial temperature from 500 to 750°F, reheating taking place up to the initial steam temperature.

Plate 9A gives the pressure at which reheating must take place to give maximum efficiency on Cycle A. The curves are irregular but the general trend is that reheating should take place at progressively lower pressures as the initial steam temperature is higher and higher. At pressures of 500, 350 and 300 lbs. per sq. ins. abs. there is a wide choice at the lower temperatures, this is due to the efficiency curves being flat as seen in Plates Nos. 1A, 3A and 4A.

Plate 9B. The curves are similar to those of 9A but refer to Cycle B. In this case the general trend is that reheating should take place at progressively higher pressures as the initial steam temperature is higher and higher.

Plates 8A, 8B, 9A and 9B represent a summary of this investigation and can be used to solve any given case within the limits considered, that is, any pressure from 200 to 500 lbs. per sq. ins. abs. with any temperature from 500 to 750°F.

The following conclusions are drawn from the various tables and curves obtained :-

Cycle A

(1) Reheating must take place after a moderate amount of expansion has taken place in the first stage if maximum gain is desired. The resulting advantage of reheating the

steam when still at a moderately high pressure is that the reheater need not be of exceptionally large volumetric capacity.

(2) Percentage gain over the Rankine cycle for a given pressure increases with increase of steam temperature and temperature of reheating.

(3) As the degree of initial superheat decreases the permissible amount of expansion in the first stage decreases in order to obtain maximum efficiency.

(4) Reheating is of doubtful commercial advantage unless a high degree of superheat is employed with reheating up to the initial steam temperature. This involves the use of a reheater incorporated with a boiler or the use of a separately fired reheater. Hence extra capital and running costs must be carefully considered in connection with the saving in fuel resulting from the higher thermal efficiency of the prime mover.

(5) Reheating with live boiler steam will raise the reheat temperature only up to the saturation temperature of the live steam. Hence, from par. (2), the thermal efficiency will be lower than in the case of reheating to initial steam temperature. Therefore reheating with live boiler steam is of doubtful advantage except that a simpler and cheaper apparatus can be installed near the prime mover instead of in the boiler house.

(6) The gain is of such a small order that reheating can only be justified in the case of power plants of large output.

<u>Cycle B</u>

(1) The maximum gains are very large and approximately constant for a given steam and equal reheat temperature

- 13. -

for any initial pressure from 200 to 500 lbs. per sq. ins. abs. Thus for a temperature of 750°F the maximum gain varies from 23.2% to 23.63% for pressures varying from 200 to 500 lbs. per sq. ins. abs. respectively.

(2) The maximum gain increases with increase of initial and equal reheat temperature.

(3) Reheating must take place when the steam has expanded in the first stage almost down to atmospheric pressure in order to obtain maximum gain. The resulting disadvantage is that the reheater must have a large volumetric capacity if the steam velocity has to be kept within reasonable limits.

T A B L E   N U M B E R.

Initial Steam pressure = 500 lbs. per sq. ins. abs.
Final steam pressure = 1 lbs per sq. ins. abs.

Initial steam temperature = 750°F
Temperature to which steam is reheated = 750°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (re-heated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat + 1310	Efficiency.		Per cent. gain over the Rankine Cycle.		REMARKS.
							Cycle efficiency A	Cycle efficiency B.	Cycle A	Cycle B	
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
500	1	400	27	456	28	1338	.361	.3695	.98	3.36	
		350	43	448	45	1355	.3625	.375	1.26	4.90	
		300	60	441	65	1375	.364	.383	1.82	7.14	
		250	80	432	87	1397	.3665	.392	2.52	9.67	
		200	103	420	112	1423	.3675	.400	2.80	11.90	
		150	131	405	143	1453	.369	.4095	3.22	14.6	
		100	158	382	185	1495	.368	.420	2.94	17.5	
		80	186	370	205	1515	.368	.4255	2.94	19.1	
		60	210	354	230	1540	.3655	.431	2.10	20.6	
		40	243	329	265	1575	.364	.437	1.82	22.3	
		30	264	312	286	1596	.361	.440	.98	23.1	
		21	289	290	311	1621	.357	.442	-.14	23.7	
		15	313	256	335	1645	.352	.442	-1.54	23.7	
		9	345	226	367	1677	.341	.436	-4.62	22.3	

RANKINE EFFICIENCY = .3575

TABLE NUMBER 2

Initial Steam pressure = 500 lbs. per sq.ins.abs.
Final steam pressure = ...1.lbs per sq.ins. abs.

Initial steam temperature = 700°F
Temperature to which steam is reheated = 700°F

P_1	P_2	P_3	Heat Drop P_1 to P_3 B.Th.U	Heat Drop P_3(reheated) to P_2 B.Th.U	Heat Supplied during reheating. B.Th.U	Total Heat Supplied = Reheat + 1285 B.Th.U	Efficiency. Cycle efficiency A	Cycle efficiency B.	Per cent. gain over the Rankine Cycle. Cycle A	Cycle B	REMARKS.
500	1	400	25	442	26	1311	.357	.365	.85	2.55	
		350	40	433	45	1328	.358	.370	1.13	4.52	
		300	57	429	63	1348	.360	.379	1.69	7.07	
		250	77	420	86	1371	.3625	.387	2.40	9.32	
		200	99	407	109	1394	.3625	.393	2.40	11.00	
		150	125	392	134	1419	.364	.401	2.825	13.30	
		100	160	370	177	1452	.365	.4125	3.11	16.50	
		80	180	357	199	1484	.362	.4175	2.265	17.90	
		60	202	340	222	1507	.360	.4225	1.69	19.40	
		40	234	315	256	1541	.356	.427	.565	20.60	
		30	254	300	278	1563	.355	.432	.283	22,07	
		21	279	279	304	1589	.351	.4345	-.85	22.75	
		15	301	254	325	1610	.345	.432	-3.55	22.00	
		9	335	217	359	1644	.336	.430	-5.09	21.50	

RANKINE EFFICIENCY = .354

TABLE NUMBER 3

Initial Steam pressure = 500 lbs. per sq.ins.abs.
Final steam pressure = ...1..lbs per sq.ins. abs.

Initial steam temperature = 650° F
Temperature to which steam is reheated = 650° F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat + 1259	Efficiency.		Per cent. gain over the Rankine Cycle.		REMARKS.
							Cycle efficiency A	Cycle efficiency B.	Cycle A	Cycle B	
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
500	1	400	24	430	26	1285	.353	.3605	.57	2.70	
		350	38	423	42	1301	.354	.367	.855	4.56	
		300	54	414	60	1319	.355	.3725	1.14	6.12	
		250	72	408	82	1341	.3575	.382	1.65	8.83	
		200	94	395	94	1355	.360	.389	2.57	10.85	
		150	119	380	134	1393	.359	.396	2.28	12.80	
		100	154	359	174	1433	.359	.408	2.28	16.30	
		80	172	346	193	1452	.357	.411	1.71	17.10	
		60	193	329	215	1474	.355	.415	1.14	18.20	
		40	224	304	249	1508	.350	.420	-.285	19.70	
		30	244	287	270	1529	.348	.423	-.855	20.50	
		21	269	265	295	1554	.345	.425	-1.71	21.10	
		15	291	245	317	1576	.340	.426	-3.14	21.40	
		9	323	207	350	1609	.3295	.422	-6.12	20.25	
		6	347	176	373	1632	.321	.416	-8.55	18.50	

RANKINE EFFICIENCY = .351

TABLE NUMBER 4

Initial Steam pressure = .500 lbs. per [illegible]
Final steam pressure = ...1.lbs per [illegible]

Initial steam temperature = 600°F
Temperature to which steam is reheated = 600°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat + 1233	Efficiency.		Per cent. gain over the Rankine Cycle.		REMARKS.
							Cycle efficiency A	Cycle efficiency B.	Cycle A	Cycle B	
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
500	1	400	23	413	25	1258	.350	.358	0	2.29	
		350	36	411	41	1274	.350	.363	0	3.43	
		300	51	403	58	1291	.351	.368	.285	5.15	
		250	7C	394	81	1314	.353	.376	.857	7.42	
		200	88	383	101	1334	.353	.382	.857	9.15	
		150	113	368	130	1363	.353	.390	.857	11.40	
		100	146	345	167	1400	.350	.399	0	14.00	
		80	165	334	187	1420	.351	.405	.285	15.70	
		60	186	317	211	1444	.348	.408	-.57	16.60	
		40	215	292	241	1474	.344	.410	-1.72	17.15	
		30	235	275	262	1495	.341	.413	-2.575	18.00	
		21	259	254	288	1521	.339	.416	-3.15	18.85	
		15	281	233	311	1544	.328	.417	-6.39	19.2	
		9	313	199	342	1575	.325	.415	-7.15	18.6	
		6	336	175	365	1598	.320	.4145	-8.57	18.4	

RANKINE EFFICIENCY = .350

TABLE NUMBER.

Initial Steam pressure = ..500 lbs. per sq.ins.abs.
Final steam pressure = ...1 lbs per sq.ins. abs.

Initial steam temperature = 550°F
Temperature to which steam is reheated = 550°F

P_1	P_2	P_3	Heat Drop P_1 to P_3 B.Th.U	Heat Drop P_3(re-heated) to P_2 B.Th.U	Heat Supplied during reheating. B.Th.U	Total Heat Supplied = Reheat + 1205 B.Th.U	Efficiency. Cycle efficiency A	Efficiency. Cycle efficiency B.	Per cent. gain over the Rankine Cycle. Cycle A	Per cent. gain over the Rankine Cycle. Cycle B	REMARKS.
500	1	400	20	408	25	1230	.348	.355	.87	2.90	
		350	34	399	41	1246	.3475	.360	.725	4.35	
		300	48	392	58	1263	.348	.365	.87	5.8	
		250	63	382	76	1281	.347	.370	.58	7.25	
		200	83	371	99	1304	.348	.377	.87	9.38	
		150	106	355	126	1331	.347	.3835	.58	11.17	
		100	139	335	164	1369	.3455	.394	.145	14.20	
		80	155	322	182	1387	.343	.396	-.58	14.80	
		60	176	306	204	1409	.342	.400	-.87	15.95	
		40	205	282	236	1441	.338	.404	-.203	17.10	
		30	225	265	257	1462	.335	.407	-2.90	18.00	
		21	249	242	281	1486	.330	.408	-4.35	18.30	
		15	270	222	303	1508	.3255	.409	-5.65	18.55	
		9	300	191	335	1540	.319	.408	-7.55	18.30	
		6	323	161	358	1563	.3095	.402	-10.30	16.50	
		4	346	129	379	1584	.300	.395	-14.05	14.50	

RANKINE EFFICIENCY = .345

TABLE NUMBER 6

Initial Steam pressure = .500 lbs. per sq.ins.abs.
Final steam pressure = ...1.lbs per sq.ins. abs.

Initial steam temperature = 500°F
Temperature to which steam is reheated = 500°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3(re-heated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat + 1175	Efficiency.		Per cent. gain over the Rankine Cycle.		REMARKS.
							Cycle efficiency A	Cycle efficiency B.	Cycle A	Cycle B	
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
500	1	400	21	394	26	1201	.3455	.354	.436	2.91	
		350	33	388	43	1218	.3455	.360	.436	4.65	
		300	45	382	59	1234	.3455	.364	.436	5.80	
		250	62	372	79	1254	.3455	.370	.436	7.40	
		200	79	359	99	1274	.344	.374	0	8.70	
		150	103	345	128	1303	.3435	.3825	-.145	11.20	
		100	134	323	164	1339	.341	.390	-.87	13.35	
		80	150	311	181	1356	.340	.394	-1.16	14.50	
		60	170	295	204	1379	.337	.396	-2.04	15.10	
		40	198	271	234	1409	.3325	.400	-3.35	16.30	
		30	218	255	256	1421	.332	.404	-3.49	17.45	
		21	241	233	281	1456	.326	.4045	-5.23	17.60	
		15	261	212	301	1476	.321	.404	-6.69	17.45	
		9	291	180	331	1506	.313	.402	-9.00	16.90	
		6	314	154	355	1530	.3055	.3995	-11.20	16.15	
		4	335	123	375	1550	.2955	.391	-14.10	13.65	

RANKINE EFFICIENCY = .344

TABLE NUMBER. 7

Initial Steam pressure = ..400.. lbs. per sq.ins.abs.
Final steam pressure = ...1..lbs per sq.ins. abs.

Initial steam temperature = 750°F
Temperature to which steam is reheated = 750°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3(re-heated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat + 1312	Efficiency.		Per cent. gain over the Rankine Cycle.		REMARKS.
							Cycle efficiency A	Cycle efficiency B.	Cycle A	Cycle B	
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
400	1	350	17	448	17	1329	.350	.355	.143	1.57	
		300	35	441	38	1350	.353	.364	1.00	4.15	
		250	56	432	61	1373	.35[illegible]	.373	1.57	6.72	
		200	80	420	88	1400	.357	.382	2.15	9.30	
		150	111	405	121	1432	.360	.394	3.00	12.7	
		100	150	382	165	1477	.3605	.407	3.15	16.45	
		80	170	370	185	1497	.361	.413	3.29	18.2	
		60	194	354	212	1524	.359	.419	2.72	19.9	
		40	227	329	247	1559	.355	.424	1.57	21.35	
		30	248	312	268	1580	.3545	.428	1.43	22.5	
		21	275	290	295	1607	.352	.432	.715	23.6	
		15	298	266	318	1630	.347	.431	-.715	23.35	
		9	331	226	351	1663	.335	.425	-[illegible]	21.6	

RANKINE EFFICIENCY = .3495

TABLE NUMBER 8

Initial Steam pressure = 400 lbs. per sq.ins.abs.
Final steam pressure = ...1..lbs per sq.ins. abs.

Initial steam temperature = 700°F
Temperature to which steam is reheated = 700°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (re-heated) to P_2	Heat Supplied during reheat-ing.	Total Heat Supplied = Reheat + 1287	Efficiency.		Per cent. gain over the Rankine Cycle.		REMARKS.
							Cycle efficiency A	Cycle efficiency B.	Cycle A	Cycle B	
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
400	1	350	16	436	17	1304	.346	.350	.875	2.04	
		300	33	429	37	1324	.348	.359	1.46	4.66	
		250	53	420	60	1347	.3505	.367	2.19	7.00	
		200	77	407	85	1372	.353	.375	2.915	9.32	
		150	106	392	118	1405	.354	.386	3.21	12.53	
		100	142	370	157	1444	.354	.398	3.21	16.03	
		80	162	357	179	1466	.354	.4025	3.21	17.35	
		60	185	340	203	1490	.3525	.408	2.77	18.95	
		40	217	315	237	1524	.352	.413	2.63	20.40	
		30	238	300	260	1547	.348	.417	1.46	21.60	
		21	264	279	287	1574	.345	.422	.583	23.00	
		15	285	254	309	1596	.338	.418	-1.46	21.90	
		9	321	217	343	1630	.330	.417	-3.79	21.60	

RANKINE EFFICIENCY = .343

T A B L E   N U M B E R. 9

Initial Steam pressure = 400 lbs. per sq.ins.abs. Initial steam temperature = 650°F
Final steam pressure = 1 lbs per sq.ins. abs. Temperature to which steam is reheated = 650°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (re-heated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat + 1261	Efficiency.		Per cent. gain over the Rankine Cycle.		REMARKS.
							Cycle efficiency A	Cycle efficiency B.	Cycle A	Cycle B	
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
400	1	350	14	425	16	1277	.344	.348	.35	2.05	
		300	31	414	35	1296	.344	.353	.88	3.52	
		250	51	408	59	1320	.348	.364	2.05	6.78	
		200	72	395	82	1343	.3475	.370	1.91	8.52	
		150	100	380	113	1374	.349	.38[illegible]	2.35	11.75	
		100	135	358	153	1414	.349	.392	2.35	14.95	
		80	155	346	174	1435	.349	.398	2.35	16.70	
		60	176	329	196	1457	.347	.401	1.76	17.60	
		40	208	304	231	1492	.344	.406	.88	19.10	
		30	229	287	253	1514	.340	.409	-.294	19.95	
		21	254	265	278	1539	.337	.411	-1.17	20.55	
		15	276	245	300	1561	.334	.414	-2.05	21.45	
		9	310	207	335	1596	.324	.410	-4.99	20.25	
		6	334	176	358	1619	.315	.405	-7.63	18.80	

RANKINE EFFICIENCY

TABLE NUMBER. 10

Initial Steam pressure = 400 lbs. per sq.ins. abs.
Final steam pressure = ...1..lbs per sq.ins. abs.

Initial steam temperature = 600°F
Temperature to which steam is reheated = 600°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat + 1236	Efficiency.		Per cent. gain over the Rankine Cycle.		REMARKS.
							Cycle efficiency A	Cycle efficiency B.	Cycle A	Cycle B	
			B.Thu	B.Th.U	B.Th.U	B.Th.U					
400	1	350	14	411	16	1252	.340	.345	.295	1.77	
		300	31	403	35	1271	.3415	.351	.738	3.54	
		250	49	[illegible]	57	1293	.3425	.359	1.034	5.90	
		200	70	383	80	1316	.344	.367	1.475	8.26	
		150	95	368	109	1345	.3445	.375	1.625	10.63	
		100	130	345	148	1384	.343	.388	1.16	13.77	
		80	148	334	167	1403	.343	.390	1.18	15.05	
		60	170	317	192	1428	.3405	.395	.443	16.70	
		40	201	292	224	1460	.3375	.400	-.443	18.00	
		30	220	275	244	1480	.3345	.401	-1.33	18.30	
		21	245	254	271	1507	.330	.404	-2.66	19.20	
		15	267	233	294	1530	.327	.405	-3.54	19.50	
		9	300	199	326	1562	.3195	.404	-5.75	19.20	
		6	323	175	340	1576	.316	.4055	-6.79	19.00	

RANKINE EFFICIENCY = .339

TABLE NUMBER. 10

Initial Steam pressure = 400 lbs. per sq.ins.abs. Initial steam temperature = 600°F
Final steam pressure = ...1..lbs per sq.ins. abs. Temperature to which steam is reheated = 600°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3(re-heated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat + 1236	Efficiency.		Per cent. gain over the Rankine Cycle.		REMARKS.
							Cycle efficiency A	Cycle efficiency B.	Cycle A	Cycle B	
			B.Thu	B.Th.U	B.Th.U	B.Th.U					
400	1	350	14	411	16	1252	.340	.345	.295	1.77	
		300	31	403	35	1271	.3415	.351	.736	3.54	
		250	49	394	57	1293	.3425	.359	1.034	5.90	
		200	70	383	80	1316	.344	.367	1.475	8.26	
		150	95	368	109	1345	.3445	.375	1.625	10.63	
		100	130	345	148	1384	.343	.388	1.18	13.77	
		80	148	334	167	1403	.343	.390	1.18	15.05	
		60	170	317	192	1428	.3405	.395	.443	16.70	
		40	201	292	224	1460	.3375	.400	-.443	18.00	
		30	220	275	244	1480	.3345	.401	-1.35	18.30	
		21	245	254	271	1507	.330	.404	-2.66	19.20	
		15	267	233	294	1530	.327	.405	-3.54	10.50	
		9	300	199	326	1562	.3195	.404	-5.75	19.20	
		6	323	175	340	1575	.316	.4035	-6.79	19.00	

RANKINE EFFICIENCY = .339

TABLE NUMBER. 11

Initial Steam pressure = 400 lbs. per sq.ins.abs.
Final steam pressure = ...1.lbs per sq.ins. abs.

Initial steam temperature = 580°F
Temperature to which steam is reheated = 560°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat + 1210	Efficiency.		Per cent. gain over the Rankine Cycle.		REMARKS.
							Cycle efficiency A	Cycle efficiency B.	Cycle A	Cycle B	
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
400	1	350	13	399	15	1225	.336	.341	.149	1.64	
		300	26	392	33	1243	.336	.3455	.149	2.98	
		250	46	382	54	1264	.338	.354	.746	5.52	
		200	65	371	76	1286	.339	.361	1.044	7.60	
		150	90	355	105	1316	.339	.3685	1.044	9.85	
		100	123	355	143	1355	.339	.379	1.044	13.00	
		80	140	322	162	1372	.3375	.3825	.597	14.00	
		60	162	306	185	1395	.335	.387	-.149	15.36	
		40	191	282	217	1427	.331	.391	-1.34	16.55	
		30	211	265	238	1448	.329	.394	-1.94	17.48	
		21	235	242	262	1472	.325	.395	-3.13	17.75	
		15	258	222	286	1496	.321	.397	-4.33	18.35	
		9	289	191	319	1529	.314	.397	-6.42	18.35	
		6	313	161	343	1553	.3055	.392	-8.95	16.85	
		4	335	129	363	1573	.295	.384	-12.10	14.50	

RANKINE EFFICIENCY = .3355

TABLE NUMBER 18

Initial Steam pressure = 400 lbs. per sq.ins.abs.
Final steam pressure = 1 lbs per sq.ins. abs.

Initial steam temperature = 500°F
Temperature to which steam is reheated = 500°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat + 1181	Efficiency.		Per cent. gain over the Rankine Cycle.		REMARKS.
							Cycle efficiency A	Cycle efficiency B.	Cycle A	Cycle B	
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
400	1	350	12	388	16	1197	.335	.339	.299	1.497	
		300	26	382	34	1215	.3355	.3455	.449	3.44	
		250	43	372	54	1235	.336	.352	.598	5.38	
		200	61	359	75	1256	.335	.356	.299	6.58	
		150	85	345	104	1285	.334	.3645	0	9.12	
		100	117	323	141	1322	.330	.373	-1.197	11.70	
		80	134	311	159	1340	.331	.3775	-.898	13.03	
		60	155	295	183	1364	.3295	.381	-1.348	14.10	
		40	184	271	214	1395	.326	.385	-2.395	15.30	
		30	202	255	234	1415	.323	.387	-3.29	15.90	
		21	226	233	260	1441	.319	.389	-4.49	16.50	
		15	248	212	282	1463	.314	.390	-5.99	16.76	
		9	279	180	313	1494	.307	.389	-8.08	16.50	
		6	301	154	336	1517	.300	.385	-10.20	15.30	
		4	324	123	358	1539	.290	.3785	-13.15	13.30	

RANKINE EFFICIENCY = .334

TABLE NUMBER. 13

Initial Steam pressure = ...350 lbs. per sq.ins.abs.
Final steam pressure = ...1.lbs per sq.ins. abs.

Initial steam temperature = 750°F
Temperature to which steam is reheated = 750°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat + 1313	Efficiency.		Per cent. gain over the Rankine Cycle.		REMARKS.
							Cycle efficiency A	Cycle efficiency B.	Cycle A	Cycle B	
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
350	1	300	20	441	22	1335	.345	.352	.878	2.925	
		250	41	432	45	1358	.3485	.360	1.90	5.27	
		200	66	420	73	1386	.3485	.3706	1.90	8.74	
		150	98	405	107	1420	.355	.384	3.80	12.3	
		100	138	382	152	1465	.355	.397	3.80	16.1	
		80	156	370	172	1485	.355	.4025	3.80	17.7	
		60	182	354	199	1512	.3545	.409	3.65	19.6	
		40	217	329	236	1549	.352	.416	2.925	21.65	
		30	236	312	257	1570	.350	.420	2.34	22.8	
		21	265	290	285	1598	.3475	.424	1.61	24.0	
		15	290	266	309	1622	.3485	.424	.146	24.0	
		9	323	226	342	1655	.331	.418	-3.22	22.2	

RANKINE EFFICIENCY = .342

TABLE NUMBER 14

Initial Steam pressure = 350.. lbs. per sq.ins.abs. Initial steam temperature = 700°F
Final steam pressure = ...1.lbs per sq.ins. abs. Temperature to which steam is reheated = 700°F

P_1	P_2	P_3	Heat Drop P_1 to P_3 B.Th.U	Heat Drop P_3 (re-heated) to P_2 B.Th.U	Heat Supplied during reheating. B.Th.U	Total Heat Supplied = Reheat + 1288 B.Th.U	Efficiency. Cycle efficiency A	Efficiency. Cycle efficiency B.	Per cent. gain over the Rankine Cycle. Cycle A	Per cent. gain over the Rankine Cycle. Cycle B	REMARKS.
350	1	300	18	429	21	1309	.341	.347	.59	2.36	
		250	38	420	44	1332	.344	.355	1.48	4.72	
		200	62	407	69	1357	.3455	.364	1.92	7.38	
		150	92	392	103	1391	.345	.375	2.66	10.6	
		100	131	370	145	1433	.350	.389	3.25	14.75	
		80	151	357	167	1455	.350	.396	3.25	16.8	
		60	174	340	191	1479	.348	.399	2.65	17.7	
		40	207	316	226	1514	.345	.405	1.77	19.5	
		20	229	300	250	1538	.344	.410	1.48	20.96	
		21	255	279	277	1565	.342	.415	.885	22.4	
		15	276	254	299	1587	.335	.413	-1.18	21.85	
		9	312	217	333	1621	.326	.410	-3.84	20.96	

RANKINE EFFICIENCY = .339

TABLE NUMBER 15

Initial Steam pressure = 350 lbs. per sq.ins.abs.
Final steam pressure = 1 lbs per sq.ins. abs.

Initial steam temperature = 650°F
Temperature to which steam is reheated = 650°F

P_1	P_2	P_3	Heat Drop P_1 to P_3 B.Th.U	Heat Drop P_3 (reheated) to P_2 B.Th.U	Heat Supplied during reheating. B.Th.U	Total Heat Supplied = Reheat + 1263 B.Th.U	Efficiency. Cycle efficiency A	Efficiency. Cycle efficiency B.	Per cent. gain over the Rankine Cycle. Cycle A	Per cent. gain over the Rankine Cycle. Cycle B	REMARKS.
350	1	300	18	414	20	1283	.3365	.3425	.448	2.24	
		250	37	408	43	1306	.340	.353	1.494	5.35	
		200	60	395	66	1331	.342	.360	2.095	7.46	
		150	89	380	100	1363	.3445	.3715	2.845	10.9	
		100	125	359	141	1404	.3445	.384	2.845	14.65	
		80	145	346	162	1425	.344	.390	2.655	16.4	
		60	168	329	186	1449	.343	.3945	2.39	17.8	
		40	200	304	221	1484	.340	.400	1.496	19.4	
		30	221	287	243	1506	.338	.403	.896	20.3	
		21	246	265	268	1531	.3345	.405	-.149	20.95	
		15	269	245	291	1554	.3315	.4075	-1.05	21.65	
		9	302	207	325	1588	.320	.403	-4.48	20.3	
		6	327	176	349	1612	.3125	.399	-6.72	19.15	

RANKINE EFFICIENCY = .335

TABLE NUMBER. 18

Initial Steam pressure = 350.. lbs. per sq.ins.abs. Initial steam temperature; = 500°F

Final Steam pressure = ...1. lbs. per sq.ins.abs. Temperature to which steam is reheated = 600°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat. + 1238	Efficiency. Cycle efficiency A	Efficiency. Cycle efficiency B	Per cent. gain over the Rankine Cycle. Cycle A	Per cent. gain over the Rankine Cycle. Cycle B	REMARKS.
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
350	1	300	17	403	20	1258	.333	.340	0	2.10	
		250	36	394	42	1280	.336	.348	.90	4.50	
		200	57	383	65	1303	.337	.356	1.20	6.90	
		150	85	368	97	1335	.339	.366	1.80	9.90	
		100	119	345	135	1373	.339	.375	1.80	12.6	
		80	138	334	155	1393	.339	.382	1.80	14.7	
		60	160	317	180	1418	.337	.385	1.20	15.6	
		40	192	292	213	1451	.333	.391	0	17.4	
		30	211	275	233	1471	.330	.394	-.90	18.3	
		21	236	254	260	1498	.327	.396	-1.80	18.9	
		15	258	233	283	1521	.323	.397	-3.00	19.2	
		9	291	199	315	1553	.316	.396	-5.10	18.9	

RANKINE EFFICIENCY = .333

TABLE NUMBER. 17

Initial Steam pressure - ..350.. lbs. per sq.ins.abs.
Final Steam pressure = ...1.. lbs. per sq.ins.abs.

Initial steam temperature = 550°F
Temperature to which steam is reheated = 550°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Heat t. + 1212	Efficiency. Cycle efficiency A	Efficiency. Cycle efficiency B	Per cent. gain over the Rankine Cycle. Cycle A	Per cent. gain over the Rankine Cycle. Cycle B	REMARKS.
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
350	1	300	15	392	18	1230	.331	.3335	.303	1.67	
		250	33	382	39	1251	.332	.343	.607	3.94	
		200	54	371	63	1275	.333	.351	.91	6.38	
		150	79	355	92	1304	.333	.3585	.91	8.64	
		100	11[illegible]	335	130	1342	.333	.370	.91	12.13	
		80	130	322	150	1362	.332	.373	.607	13.04	
		60	152	306	173	1385	.331	.378	.303	14.54	
		40	182	282	206	1418	.3275	.383	-.758	16.1	
		30	202	265	227	1439	.3245	.385	-1.67	16.7	
		21	227	242	252	1464	.320	.387	-3.03	17.3	
		15	250	222	276	1488	.317	.390	-3.94	18.2	
		9	281	191	309	1521	.310	.390	-6.07	18.2	
		6	305	161	333	1545	.302	.385	-8.50	16.7	
		4	327	129	353	1565	.291	.3765	-11.8	14.1	

RANKINE EFFICIENCY = .330

TABLE NUMBER. 16

Initial Steam pressure = 350 lbs. per sq.ins.abs.
Final Steam pressure = 1 lbs. per sq.ins.abs.

Initial steam temperature = $500^{\circ}F$
Temperature to which steam is reheated = $500^{\circ}F$

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat.+ 1165	Efficiency. Cycle efficiency A	Cycle efficiency B	Per cent. gain over the Rankine Cycle. Cycle A	Cycle B	REMARKS.
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
350	1	300	15	282	19	1204	.3295	.335	.458	2.14	
		250	33	372	40	1225	.330	.342	.61	4.27	
		200	51	359	61	1246	.3295	.346	.458	5.49	
		150	75	345	90	1275	.3295	.3545	.458	8.08	
		100	108	323	128	1313	.329	.364	.305	11.0	
		80	126	311	147	1332	.329	.369	.305	12.3	
		60	147	295	171	1356	.326	.373	-.61	13.7	
		40	176	271	202	1387	.322	.377	-1.83	14.95	
		30	195	255	223	1408	.3195	.380	-2.595	15.86	
		21	220	233	250	1435	.3155	.3825	-3.81	16.6	
		15	241	212	271	1456	.311	.3825	-5.18	16.C	
		9	272	180	302	1487	.304	.382	-7.32	16.5	
		6	295	154	326	1511	.297	.379	-9.45	15.55	
		4	318	123	348	1533	.288	.3725	-12.2	13.6	

RANKINE EFFICIENCY = .328

TABLE NUMBER. 19

Initial Steam pressure – .300. lbs. per sq.ins.abs.
Final Steam pressure = ...1. lbs. per sq.ins.abs.

Initial steam temperature; = 750°F
Temperature to which steam is reheated = 750°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat + 1316	Efficiency. Cycle efficiency A	Cycle efficiency B	Per cent. gain over the Rankine Cycle. Cycle A	Cycle B	REMARKS.
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
300	1	250	22	432	24	1339	.339	.3455	1.045	2.99	
		200	48	420	53	1368	.342	.356	1.94	6.11	
		150	82	405	88	1403	.346	.370	3.13	10.3	
		100	123	382	135	1450	.348	.385	3.73	14.6	
		80	145	370	157	1472	.350	.3925	4.33	17.0	
		60	170	354	185	1500	.349	.400	4.03	19.25	
		40	206	339	223	1538	.3475	.4075	3.58	21.5	
		30	228	312	245	1560	.3465	.412	3.29	22.8	
		21	255	290	272	1587	.343	.415	2.24	23.75	
		15	280	266	297	1612	.339	.4155	1.[illegible]45	23.[illegible]	
		9	314	226	331	1646	.329	.412	-1.96	22.8	

RANKINE EFFICIENCY = .3355

TABLE NUMBER. 80

Initial Steam pressure = 300.. lbs. per sq.ins.abs.
Final Steam pressure = ..1.. lbs. per sq.ins.abs.

Initial steam temperature = 700°F
Temperature to which steam is reheated = 700°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (re-heated) to P_2	Heat Supplied during reheating.	Total Heat Supplied – Reheat. + 1291	Efficiency.		Per cent. gain over the Rankine Cycle.		REMARKS.
							Cycle efficiency A	Cycle efficiency B	Cycle A	Cycle B	
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
300	1	250	21	420	24	1315	.336	.3425	.90	2.85	
		200	46	407	50	1341	.338	.3515	1.50	5.55	
		150	79	392	87	1378	.3415	.3655	2.55	9.75	
		100	119	370	130	1421	.344	.380	3.30	14.1	
		80	139	357	152	1443	.343	.385	3.00	15.6	
		60	163	340	177	1468	.3425	.391	2.85	17.4	
		40	197	315	213	1504	.340	.3975	2.10	19.35	
		30	219	300	237	1528	.3395	.403	1.95	21.0	
		21	246	279	265	1556	.338	.4075	1.50	22.45	
		15	270	254	288	1579	.332	.407	-.30	22.25	
		9	303	217	321	1612	.333	.404	-3.00	21.3	

RANKINE EFFICIENCY = .333

TABLE NUMBER. 21

Initial Steam pressure = 300 lbs. per sq.ins.abs.
Final Steam pressure = 1 lbs. per sq.ins.abs.

Initial steam temperature;= 650°F
Temperature to which steam is reheated = 650°

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied + Reheat.+ .265	Efficiency.		Per cent. gain over the Rankine Cycle.		REMARKS.
							Cycle efficiency A	Cycle efficiency B	Cycle A	Cycle B	
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
300	1	250	19	408	23	1288	.331	.3375	1.22	3.21	
		200	44	395	50	1315	.331	.347	1.22	6.11	
		150	73	380	82	1347	.335	.358	2.45	9.50	
		100	111	359	125	1390	.336	.3715	2.75	13.6	
		80	131	346	146	1411	.3385	.377	2.905	15.3	
		60	155	329	171	1436	.337	.382	3.06	16.8	
		40	187	304	206	1471	.334	.388	2.145	18.7	
		30	209	287	229	1494	.332	.392	1.53	19.9	
		21	235	265	255	1520	.330	.395	.917	20.8	
		15	258	246	278	1543	.326	.398	-.305	21.7	
		9	292	207	313	1578	.316	.394	-3.36	20.5	
		6	317	176	337	1602	.3075	.390	-5.96	19.3	

RANKINE EFFICIENCY = .327

TABLE NUMBER. 22

Initial Steam pressure - 300 lbs. per sq.ins.abs.
Final Steam pressure = 1 lbs. per sq.ins.abs.

Initial steam temperature;= $600^{o}F$
Temperature to which steam is reheated = $600^{o}F$

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat.+ 1241	Efficiency.		Per cent. gain over the Rankine Cycle.		REMARKS.
							Cycle efficiency A	Cycle efficiency B	Cycle A	Cycle B	
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
300	1	250	19	394	22	1263	.3625	.333	.462	2.465	
		200	42	383	47	1288	.330	.3425	1.54	5.39	
		150	71	368	80	1321	.332	.354	2.15	8.92	
		100	106	345	119	1360	.332	.364	2.15	12.0	
		80	126	334	140	1381	.331	.371	1.85	14.15	
		60	148	317	165	1406	.3305	.375	1.69	15.4	
		40	181	292	199	1440	.3285	.381	1.08	17.2	
		30	201	275	220	1461	.3255	.384	.154	18.2	
		21	226	254	247	1488	.3225	.387	-.77	19.1	
		15	249	233	271	1512	.319	.3885	-1.85	19.5	
		9	283	199	304	1545	.312	.3885	-4.0	19.5	
		6	307	175	328	1569	.307	.3885	-5.54	19.5	

RANKINE EFFICIENCY = .325

TABLE NUMBER. 23

Initial Steam pressure = 300 lbs. per sq.ins.abs.
Final Steam pressure = 1 lbs. per sq.ins.abs.

Initial steam temperature;= 550°F
Temperature to which steam is reheated = 550°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat.+ 1215	Efficiency.		Per cent. gain over the Rankine Cycle.		REMARKS.
							Cycle efficiency A	Cycle efficiency B	Cycle A	Cycle B	
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
300	1	250	23	382	26	1241	.326	.334	.93	3.40	
		200	40	371	46	1261	.326	.339	.93	4.95	
		150	66	355	76	1291	.326	.347	.93	7.43	
		100	100	335	115	1330	.327	.3585	1.24	11.0	
		80	119	322	136	1351	.327	.3635	1.24	12.54	
		60	141	306	159	1374	.3255	.368	.775	14.93	
		40	173	282	194	1409	.323	.375	0	16.1	
		30	193	265	215	1430	.320	.377	-.93	16.7	
		21	217	242	239	1454	.316	.3775	-2.17	16.9	
		15	240	222	263	1478	.3125	.380	-3.25	17.65	
		9	272	191	297	1512	.306	.381	-5.27	18.0	
		6	297	161	322	1537	.298	.377	-7.75	16.7	
		4	320	129	343	1558	.289	.370	-10 .53	14.55	

RANKINE EFFICIENCY = .323

TABLE NUMBER. 24

Initial Steam pressure = 300.. lbs. per sq.ins.abs.
Final Steam pressure = ..1.. lbs. per sq.ins.abs.

Initial steam temperature;= 500°F
Temperature to which steam is reheated =500°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied - Reheat. + 1189	Efficiency. Cycle efficiency A	Cycle efficiency B	Per cent. gain over the Rankine Cycle. Cycle A	Cycle B	REMARKS.
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
300	1	250	19	372	22	1211	.3235	.3295	.466	2.34	
		200	38	359	44	1233	.323	.334	.311	3.73	
		150	63	345	74	1263	.323	.3435	.311	6.69	
		100	97	333	113	1302	[illegible]	~~.345~~ .354	.311	9.95	
		80	114	311	131	1320	[illegible]	.3575	0	11.05	
		60	135	295	155	1344	.320	.362	-.62	12.45	
		40	165	271	187	1376	.3175	.367	-1.40	14.0	
		30	185	255	209	1398	.315	.370	-2.18	14.9	
		21	209	233	235	1424	.310	.372	-3.73	15.53	
		15	233	212	259	1448	.307	.375	-4.66	16.5	
		9	264	180	290	1479	.300	.374	-6.84	16.2	
		6	288	154	315	1504	.294	.372	-8.70	15.53	
		4	310	123	336	1525	.284	.365	-11.8	13.36	

RANKINE EFFICIENCY = .322

TABLE NUMBER. 25

Initial Steam pressure = 250. lbs. per sq.ins.abs.
Final Steam pressure = 1. lbs. per sq.ins.abs.

Initial steam temperature;= 750°F
Temperature to which steam is reheated = 750°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat.+ 1317	Efficiency. Cycle efficiency A	Cycle efficiency B	Per cent. gain over the Rankine Cycle. Cycle A	Cycle B	REMARKS.
			B.Thu	B.Th.U	B.Th.U	B.Th.U					
250	1	200	27	420	30	1347	.332	.340	1.22	3.66	
		150	62	406	67	1384	.337	.355	2.75	5.18	
		100	106	382	116	1433	.341	.371	3.96	13.1	
		80	129	370	139	1456	.343	.379	4.57	15.55	
		60	156	354	169	1486	.343	.3675	4.57	18.15	
		40	192	329	207	1524	.342	.396	4.27	20.75	
		30	215	312	230	1547	.340	.400	3.66	22.0	
		21	242	290	257	1574	.3385	.405	3.20	23.5	
		15	266	266	283	1600	.334	.406	1.53	23.8	
		9	302	226	317	1634	.3235	.401	-1.66	22.25	

RANKINE EFFICIENCY = .328

TABLE NUMBER 26

Initial Steam pressure = 250.. lbs. per sq.ins.abs.
Final Steam pressure = ..1.. lbs. per sq.ins.abs.

Initial steam temperature = 700°F
Temperature to which steam is reheated = 700°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied - Reheat. + 1204	Efficiency.		Per cent. gain over the Rankine Cycle.		REMARKS.
							Cycle efficiency A	Cycle efficiency B	Cycle A	Cycle B	
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
250	1	200	27	407	28	1322	.328	.336	.924	3.075	
		150	60	392	65	1359	.3325	.350	2.21	7.70	
		100	102	370	110	1404	.336	.365	3. 39	12.3	
		80	124	357	134	1428	.3365	.3725	3.54	14.6	
		60	149	340	160	1454	.336	.3765	3.39	16.5	
		40	185	313	198	1492	.335	.387	3.075	19.1	
		30	207	300	222	1516	.334	.392	2.77	20.6	
		21	234	279	250	1544	.333	.398	2.46	22.5	
		15	258	254	273	1567	.327	.397	.615	22.15	
		9	293	217	308	1602	.318	.395	-2.15	21.5	

RANKINE EFFICIENCY = .325

T A B L E N U M B E R. 27

Initial Steam pressure = 250 lbs. per sq.ins.abs. Initial steam temperature = 650°F

Final Steam pressure = 1 lbs. per sq.ins.abs. Temperature to which steam is reheated = 650°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied + Reheat. 1269	Efficiency.		Per cent. gain over the Rankine Cycle.		REMARKS.
							Cycle efficiency A	Cycle efficiency B	Cycle A	Cycle B	
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
250	1	200	25	395	27	1296	.3245	.331	1.09	3.11	
		150	57	380	62	1331	.3285	.3445	2.34	7.32	
		100	97	359	107	1376	.3315	.360	3.27	12.15	
		80	118	346	129	1398	.3315	.365	3.27	13.7	
		60	141	329	153	1422	.3305	.370	2.96	15.3	
		40	176	304	191	1460	.329	.376	2.495	17.75	
		30	198	287	214	1483	.327	.382	1.87	19.0	
		21	224	265	240	1509	.324	.385	.935	19.95	
		15	248	245	264	1533	.321	.388	0	20.9	
		9	282	207	299	1568	.311	.385	-3.11	19.95	
		6	309	176	325	1594	.3045	.382	-5.14	19.0	

RANKINE EFFICIENCY = .321

T A B L E N U M B E R. 25

Initial Steam pressure = .250. lbs. per sq.ins.abs.
Final Steam pressure = ...1. lbs. per sq.ins.abs.

Initial steam temperature = 600°F
Temperature to which steam is reheated 600°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = reheat. + 1244	Efficiency		Per cent. gain over the Rankine Cycle.		REMARKS.
							Cycle efficiency A	Cycle efficiency B	Cycle A	Cycle B	
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
250	1	200	24	383	26	1270	.321	.326	1.26	3.47	
		150	54	348	60	1304	.3235	.340	2.05	7.25	
		100	92	345	102	1346	.326	.352	2.525	11.05	
		80	111	334	122	1366	.3255	.359	2.68	13.25	
		60	135	317	149	1393	.325	.364	2.525	14.8	
		40	167	292	182	1426	.3215	.370	1.42	16.7	
		30	189	275	205	1449	.320	.374	.946	18.0	
		21	215	254	233	1477	.317	.3775	0	19.1	
		15	239	233	258	1502	.314	.380	-.946	19.9	
		9	272	199	290	1534	.308	.379	-2.84	19.56	
		6	296	175	314	1558	.302	.375	-4.73	19.55	

(RANKINE EFFICIENCY) = .317

TABLE NUMBER 49

Initial Steam pressure = 250 lbs. per sq.ins.abs.
Final Steam pressure = 1 lbs. per sq.ins.abs.

Initial steam temperature = 550° F
Temperature to which steam is reheated = 550° F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat. + 1218	Efficiency.		Per cent. gain over the Rankine Cycle.		REMARKS.
							Cycle efficiency A	Cycle efficiency B	Cycle A	Cycle B	
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
250	1	200	22	371	25	1243	.316	.323	.635	2.88	
		150	50	355	57	1275	.317	.3325	.955	5.89	
		100	85	335	97	1315	.319	.345	1.59	9.86	
		80	105	322	119	1337	.320	.350	1.91	11.45	
		60	128	306	143	1361	.319	.356	1.59	13.35	
		40	159	282	177	1395	.316	.3625	.635	15.4	
		30	181	265	200	1418	.315	.366	.318	16.5	
		21	205	242	224	1442	.310	.367	-1.27	16.85	
		15	228	222	248	1466	.307	.370	-2.23	17.8	
		9	261	191	283	1501	.301	.371	-4.14	18.1	
		6	286	161	308	1526	.293	.367	-6.69	16.85	
		4	309	129	329	1547	.283	.360	-9.86	14.65	

RANKINE EFFICIENCY = .314

TABLE NUMBER. 30

Initial Steam pressure = 250 lbs. per sq.ins.abs.
Final Steam pressure = 1 lbs. per sq.ins.abs.

Initial steam temperature = 500°F
Temperature to which steam is reheated = 500°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat.+ 1192	Efficiency. Cycle efficiency A	Cycle efficiency B	Per cent. gain over the Rankine Cycle. Cycle A	Cycle B	REMARKS.
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
250	1	200	21	359	24	1216	.313	.319	.645	2.57	
		150	47	345	55	1247	.314	.329	.964	5.78	
		100	81	323	94	1286	.314	.339	.964	9.00	
		80	100	311	114	1306	.3145	.345	1.125	10.94	
		60	121	295	138	1330	.313	.349	.643	12.2	
		40	153	271	172	1364	.3105	.355	-.161	14.15	
		30	172	255	193	1385	.308	.358	-.964	15.1	
		21	197	233	220	1412	.305	.361	-1.93	16.1	
		15	220	212	245	1435	.3005	.3625	-3.37	16.55	
		9	251	180	274	1466	.294	.362	-5.46	16.4	
		6	276	154	300	1492	.289	.361	-7.08	16.1	
		4	300	123	323	1515	.279	.355	-10.3	14.15	
				RANKINE	EFFICIENCY	= .311					

TABLE NUMBER. 31

Initial Steam pressure – 200.. lbs. per sq.ins.abs.
Final Steam pressure = ..1.. lbs. per sq.ins.abs.

Initial steam temperature;= 750°F
Temperature to which steam is reheated = 750°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied – Reheat.+ 1330	Efficiency. Cycle efficiency A	Efficiency. Cycle efficiency B	Per cent. gain over the Rankine Cycle. Cycle A	Per cent. gain over the Rankine Cycle. Cycle B	REMARKS.
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
200	1	150	28	405	30	1250	.3208	.328	.47	2.83	
		100	83	362	90	1410	.330	.3525	3.45	10.5	
		80	107	370	114	1434	.333	.362	4.40	13.5	
		60	135	354	145	1466	.333	.370	4.4[illegible]	16.0	
		40	174	329	186	1506	.334	.382	4.70	19.5	
		30	199	312	211	1531	.334	.388	4.70	21.7	
		21	227	290	239	1559	.331	.391	3.77	22.6	
		15	253	268	265	1585	.3275	.393	3.67	23.3	
		9	388	226	300	1620	.3175	.390	-.47	22.3	

RANKINE EFFICIENCY = .319

TABLE NUMBER. 32

Initial Steam pressure = 200.. lbs. per sq.ins.abs.
Final Steam pressure = . 1.. lbs. per sq.ins.abs.

Initial steam temperature = 700 °F
Temperature to which steam is reheated = 700 °F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (re-heated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat. + 1295	Efficiency. Cycle efficiency A	Efficiency. Cycle efficiency B	Per cent. gain over the Rankine Cycle. Cycle A	Per cent. gain over the Rankine Cycle. Cycle B	REMARKS.
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
200	1	150	34	392	33	1335	.320	.329	1.91	4.78	
		100	80	370	87	1382	.326	.3475	3.82	10.7	
		80	102	357	111	1406	.327	.355	[illegible].14	13.1	
		60	130	340	140	[illegible]35	.3275	.363	4.30	15.6	
		40	165	315	177	1472	.326	.371	3.82	16.2	
		30	190	300	204	1499	.326	.379	3.82	20.7	
		21	216	279	251	1526	.[illegible]45	.3825	3.35	21.8	
		15	243	254	257	1552	.3205	.383	2.07	22.0	
		9	277	217	291	1566	.312	.382	-.638	21.7	

RANKINE EFFICIENCY = .314

TABLE NUMBER. 33

Initial Steam pressure = 200.. lbs. per sq.ins.abs.
Final Steam pressure = ...1.. lbs. per sq.ins.abs.

Initial steam temperature;= 650°F
Temperature to which steam is reheated 650°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied + Reheat.+ 1271	Efficiency. Cycle efficiency A	Efficiency. Cycle efficiency B	Per cent. gain over the Rankine Cycle. Cycle A	Per cent. gain over the Rankine Cycle. Cycle B	REMARKS.
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
200	1	150	33	360	36	1307	.315	.325	1.29	4.5	
		100	76	359	84	1355	.321	.3425	3.22	10.15	
		80	98	346	107	1378	.3225	.349	3.70	12.2	
		60	122	329	133	1404	.322	.355	3.54	14.15	
		40	159	304	172	1443	.321	.363	3.22	17.4	
		30	181	287	195	1466	.320	.368	2.90	18.3	
		21	208	265	222	1493	.317	.3725	1.93	19.8	
		15	233	245	247	1518	.315	.376	1.29	20.9	
		9	267	207	282	1553	.305	.373	-1.93	19.95	
		6	293	176	307	1578	.2975	.369	-4.34	18.7	

RANKINE EFFICIENCY = .311

T A B L E   N U M B E R 34

Initial Steam pressure = ..200. lbs. per sq.ins.abs.
Final Steam pressure = ...1. lbs. per sq.ins.abs.

Initial steam temperature;= 600°F
Temperature to which steam is reheated =600°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied - Reheat.+ 1246	Efficiency. Cycle efficiency A	Cycle efficiency B	Per cent. gain over the Rankine Cycle. Cycle A	Cycle B	REMARKS.
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
200	1	150	31	368	35	1281	.311	.320	1.30	4.23	
		100	73	345	81	1327	.315	.335	2.60	9.12	
		80	93	334	102	1348	.316	.343	2.93	11.7	
		60	116	317	128	1374	.315	.348	2.60	13.35	
		40	151	292	164	1410	.314	.356	2.28	15.95	
		30	173	275	187	1433	.3125	.360	1.79	17.3	
		21	200	254	216	1462	.310	.365	.976	18.9	
		15	224	233	241	1487	.3075	.3675	.163	19.7	
		9	257	199	273	1519	.300	.367	-2.28	19.55	

RANKINE EFFICIENCY = .307

TABLE NUMBER. 35

Initial Steam pressure = 200. lbs. per sq.ins.abs.
Final Steam pressure = ...1. lbs. per sq.ins.abs.

Initial steam temperature; = 550°F
Temperature to which steam is reheated = 550°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat. + 1221	Efficiency. Cycle efficiency A	Cycle efficiency B	Per cent. gain over the Rankine Cycle. Cycle A	Cycle B	REMARKS.
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
200	1	150	29	35r	33	1254	.306	.315	.99	3.96	
		100	67	335	76	1297	.310	.330	2.31	8.90	
		80	87	322	98	1319	.310	.335	2.31	10.55	
		60	111	306	123	1344	.3105	.342	2.475	12.9	
		40	144	282	159	1380	.309	.3495	1.98	15.35	
		30	165	265	181	1402	.306	.353	.99	16.5	
		21	190	242	206	1427	.302	.355	-.33	17.15	
		15	215	222	232	1453	.301	.358	-.66	18.15	
		9	248	191	267	1488	.295	.360	-2.64	18.8	
		6	273	151	292	1513	.2875	.355	-5.11	17.15	
		4	298	128	315	1536	.278	.350	-8.25	15.5	

RANKINE EFFICIENCY = .303

TABLE NUMBER. 56

Initial Steam pressure = 200. lbs. per sq.ins.abs.
Final Steam pressure = 1. lbs. per sq.ins.abs.

Initial steam temperature = 500°F
Temperature to which steam is reheated = 500°F

P_1	P_2	P_3	Heat Drop P_1 to P_3	Heat Drop P_3 (reheated) to P_2	Heat Supplied during reheating.	Total Heat Supplied = Reheat. + 1195	Efficiency. Cycle efficiency A	Cycle efficiency B	Per cent. gain over the Rankine Cycle. Cycle A	Cycle B	REMARKS.
			B.Th.U	B.Th.U	B.Th.U	B.Th.U					
200	1	150	28	245	33	1228	.304	.312	.997	3.65	
		100	63	323	73	1268	.305	.324	1.33	7.65	
		80	84	311	95	1290	.306	.330	1.66	9.63	
		60	105	295	119	1314	.305	.335	1.33	11.3	
		40	137	271	153	1348	.302	.341	.332	13.3	
		30	158	255	176	1371	.301	.345	0	14.6	
		21	183	233	203	1398	.2975	.3485	-1.16	15.8	
		15	205	212	225	1420	.2945	.3495	-2.16	16.1	
		9	239	180	259	1454	.288	.3505	-4.32	16.45	
		6	265	154	284	1479	.285	.3495	-6.3	16.1	
		4	287	123	307	1502	.273	.343	-9.3	13.95	

RANKINE EFFICIENCY = .301

TABLE No. 37

Deductions from Cycle Efficiency Curves

Initial Steam Pressure (abs)	Temperature of steam and Temperature of reheat	Rankine Efficiency	Cycle A Maximum Efficiency	Cycle A Pressure for Reheating	Cycle B Maximum efficiency	Cycle B Pressure for Reheating	Percentage Max. gain over Rankine Cycle: Cycle A	Percentage Max. gain over Rankine Cycle: Cycle B
500	750	.3575	.369	132.5	.442	17.5	3.22	23.63
	700	.354	.365	135	.434	17.5	3.11	22.60
	650	.351	.360	170	.426	15	2.56	21.37
	600	.350	.354	190	.4167	15	1.14	19.06
	550	.345	.3475	170 to 400	.4067	15	.725	18.46
	500	.344	.3455	250 to 400	.4045	20	.436	17.549
400	750	.3495	.361	95	.4315	17.5	3.29	23.46
	700	.343	.3543	120	.4218	17.5	3.29	22.97
	650	.341	.3497	115	.414	15	2.55	21.41
	600	.339	.3447	150	.405	15	1.66	19.47
	550	.3355	.3397	150	.397	12.5	1.25	18.33
	500	.334	.336	255	.390	15	.598	16.76
350	750	.342	.355	100	.424	17.5	3.80	23.98
	700	.339	.350	90	.415	20	3.24	22.42
	650	.335	.345	125	.4075	15	2.98	21.64
	600	.333	.3394	122.5	.397	15	1.92	19.22
	550	.330	.3334	125	.389	12.5	1.03	17.88
	500	.326	.3296	115 to 300	.3823	15	.488	16.55
300	750	.3355	.3495	75	.4153	17.5	4.17	23.76
	700	.335	.3438	95	.4072	17.5	3.24	22.28
	650	.327	.338	90	.398	13	3.36	21.71
	600	.325	.3323	120	.3883	12.5	2.25	19.48
	550	.323	.327	92.5	.3808	10	1.24	17.89
	500	.322	.323	100 to 250	.3746	12	.311	16.34

TABLE No. 37 (Contd.)

Initial Steam Pressure (abs)	Temperature of Steam and Temperature of Reheat	Rankine Efficiency	Cycle A		Cycle B		Percentage Max. over Rankine Cycle	
			Maximum Efficiency	Pressure for Reheating	Maximum Efficiency	Pressure for Reheating	Cycle A	Cycle B
250	750	.328	.343	65	.4058	15	4.57	23.72
	700	.325	.3365	80	.3978	15	3.54	22.40
	650	.321	.3315	90	.388	15	3.27	20.87
	600	.317	.3255	90	.3798	13	2.68	19.81
	550	.314	.320	85	.3708	11	1.91	18.09
	500	.311	.3146	110	.362	13	1.16	16.40
200	750	.319	.334	40	.393	15	4.70	23.20
	700	.314	.3275	60	.383	15	4.30	21.97
	650	.311	.3222	70	.376	15	3.60	20.90
	600	.307	.316	80	.3675	15	2.95	19.71
	550	.303	.3108	75	.360	10	2.57	18.81
	500	.301	.306	80	.3504	9	1.66	16.41

FIG. 1.

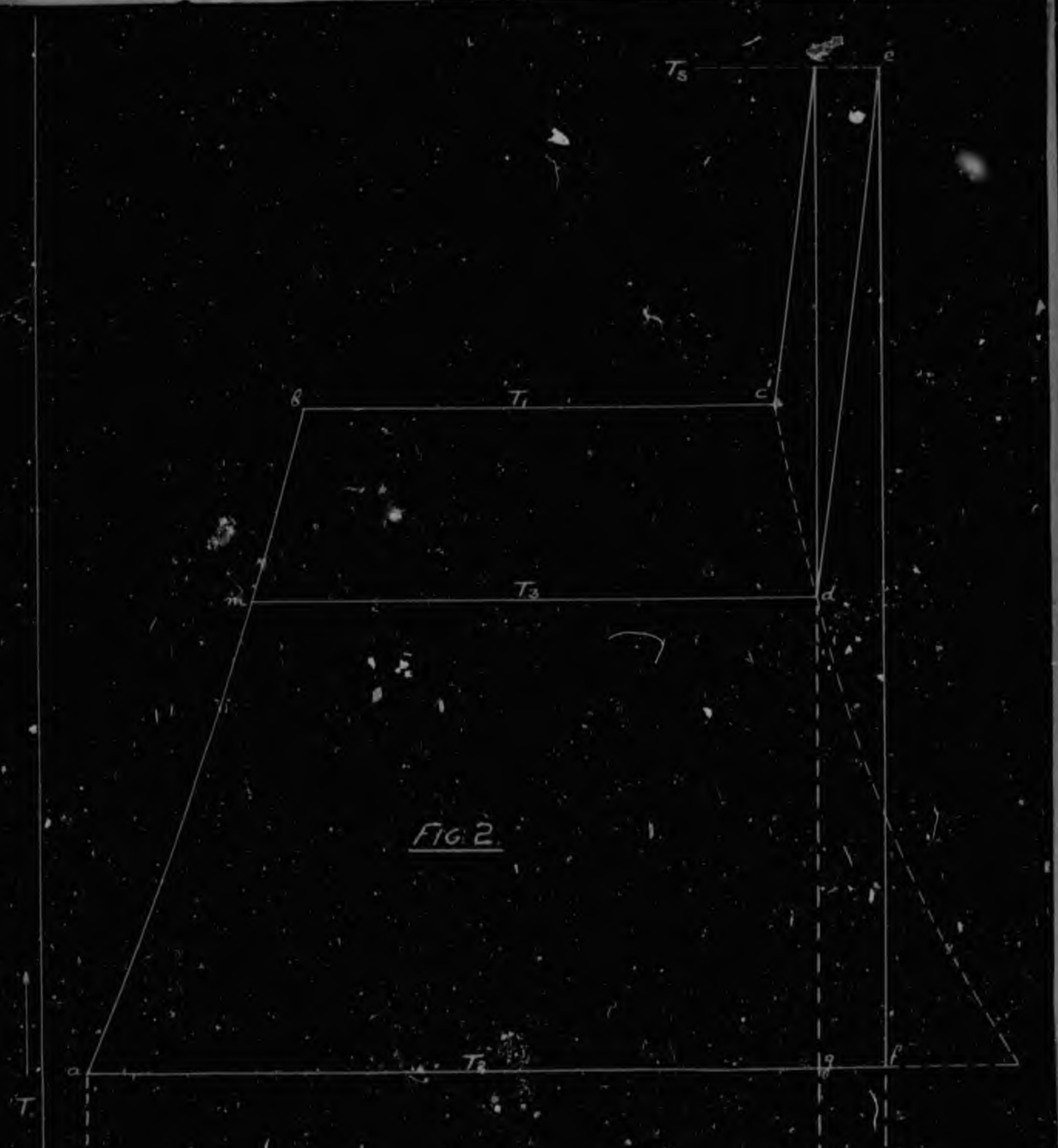


FIG. 2.

FIG 3.

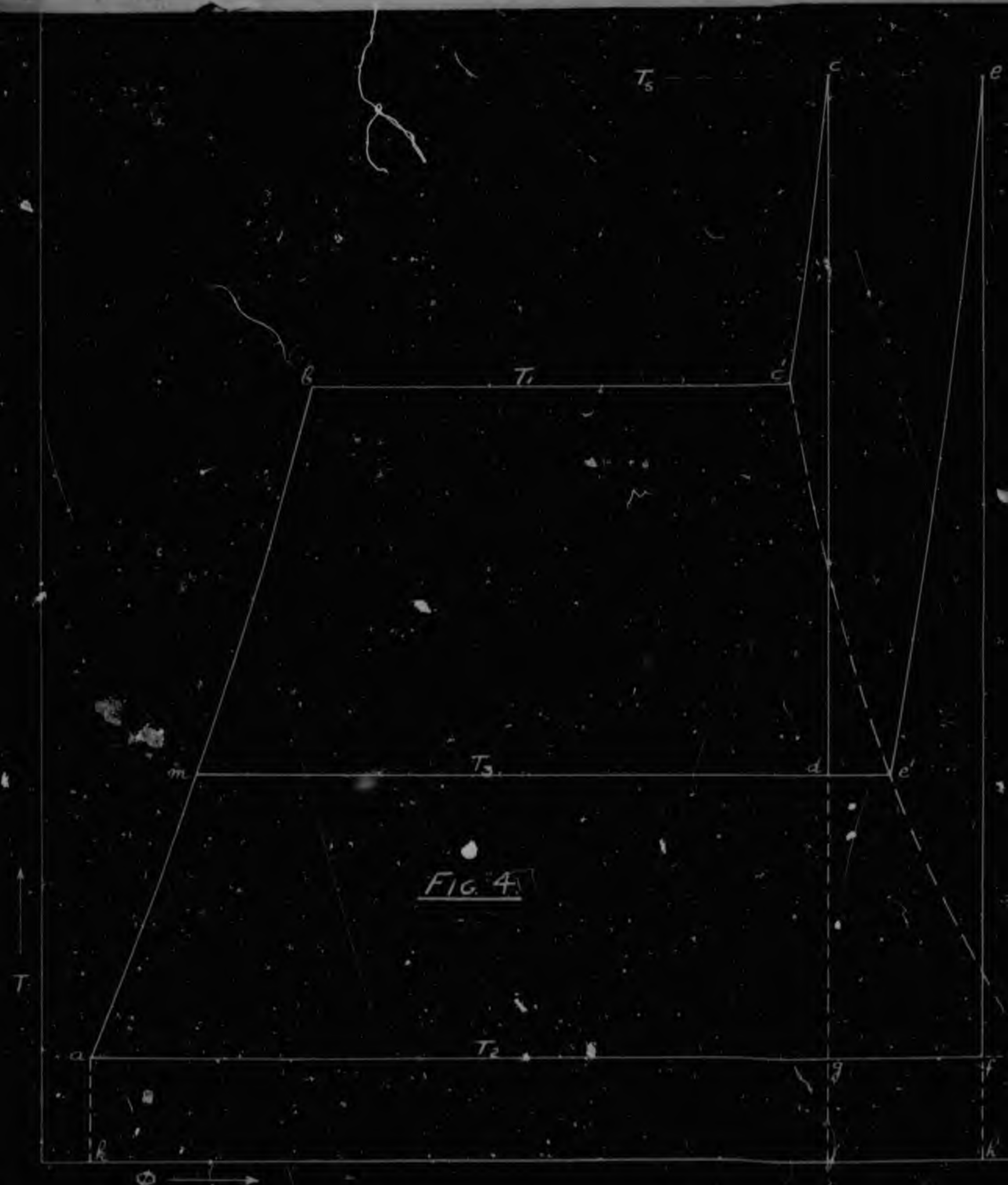


FIG. 4.

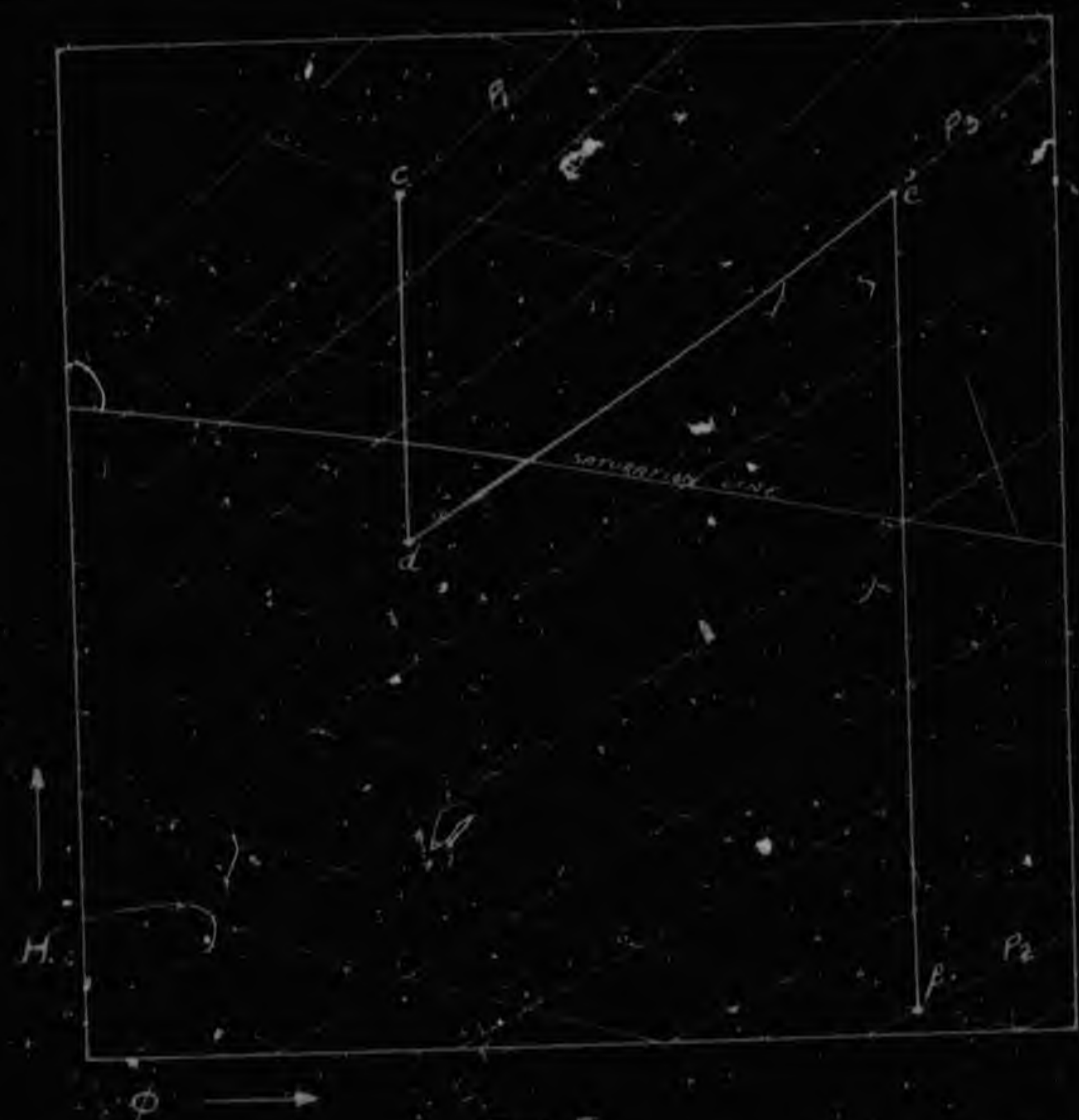


FIG 5.

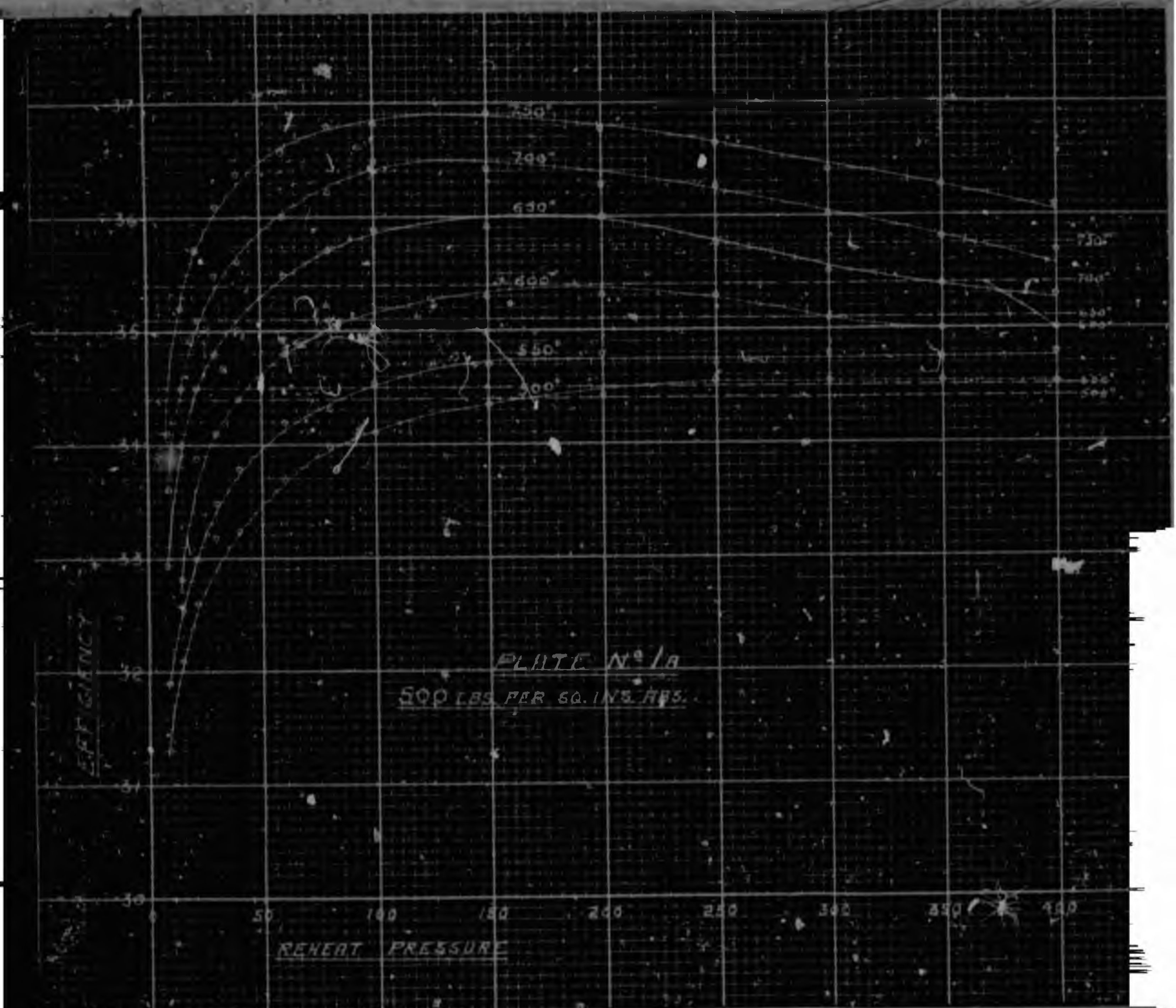
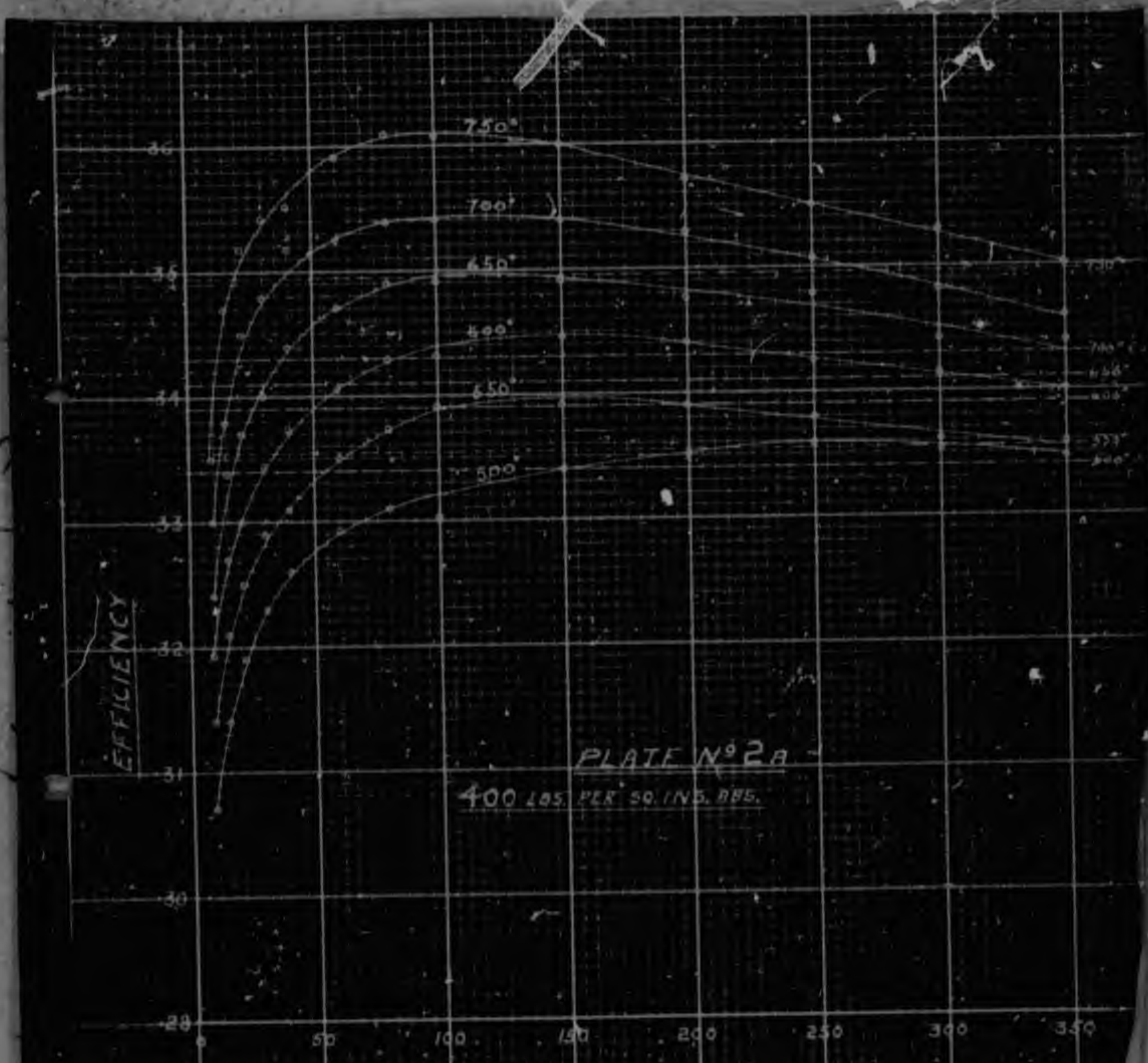


PLATE Nº 18
500 LBS. PER SQ. INS. ABS.
EFFICIENCY
REHEAT PRESSURE
750°
700°
650°
600°
550°
500°
30
31
32
33
34
35
36
37
0
50
100
150
200
250
300
350
400


PLATE N° 1a
500 LBS PER SQ. INS. ABS.
750°
700°
650°
600°
550°
500°
EFFICIENCY
·44
·43
·42
·41
·40
·39
·38
·37
·36
·35
0
50
100
150
200
250
300
350
REHEAT PRESSURE


750°
700°
650°
600°
550°
500°
750°
700°
650°
600°
550°
500°
36
35
34
33
32
31
30
28
0
50
100
150
200
250
300
350
EFFICIENCY
REHEAT PRESSURE
PLATE Nº 2 A
400 LBS. PER SQ. INS. ABS.

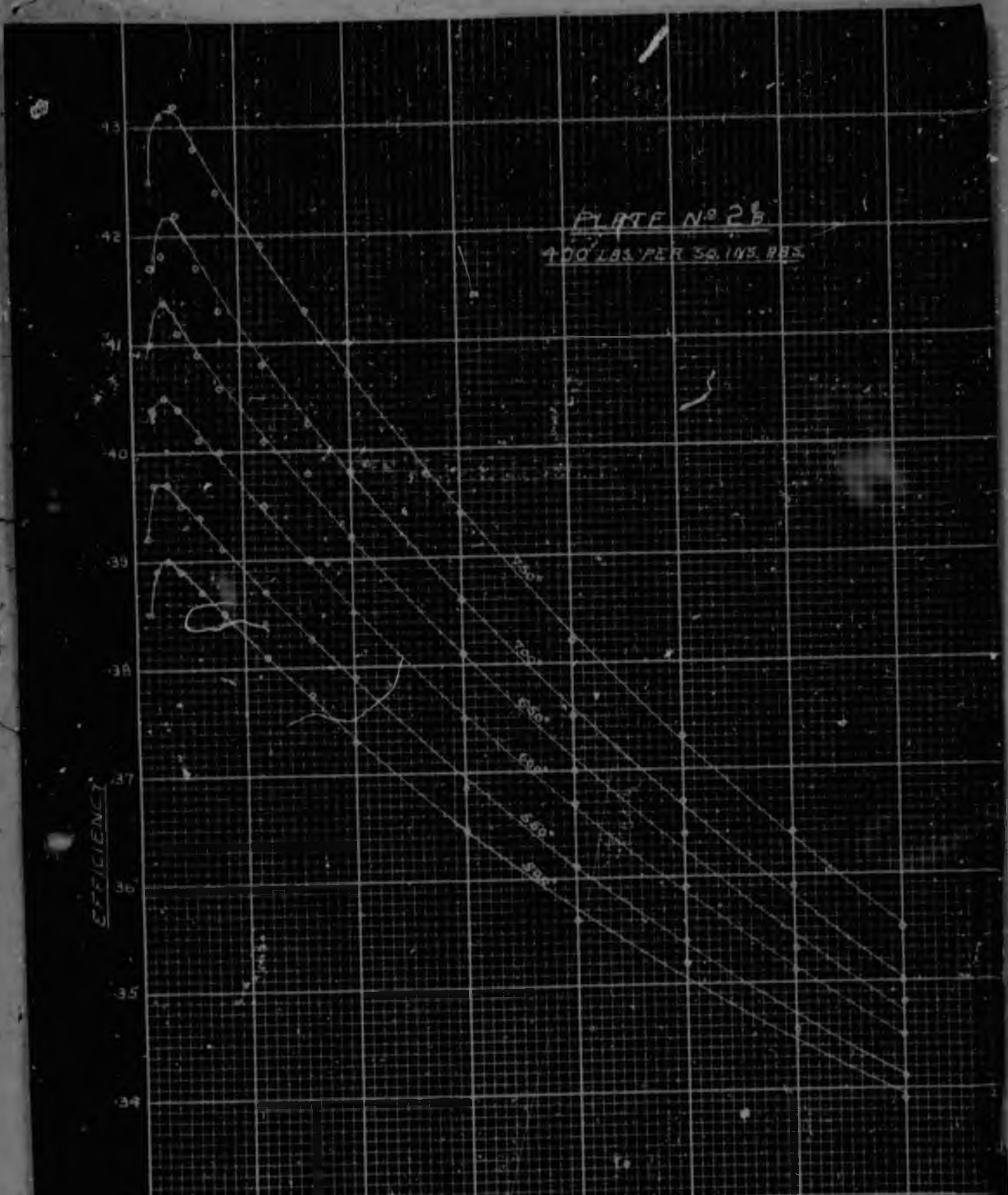
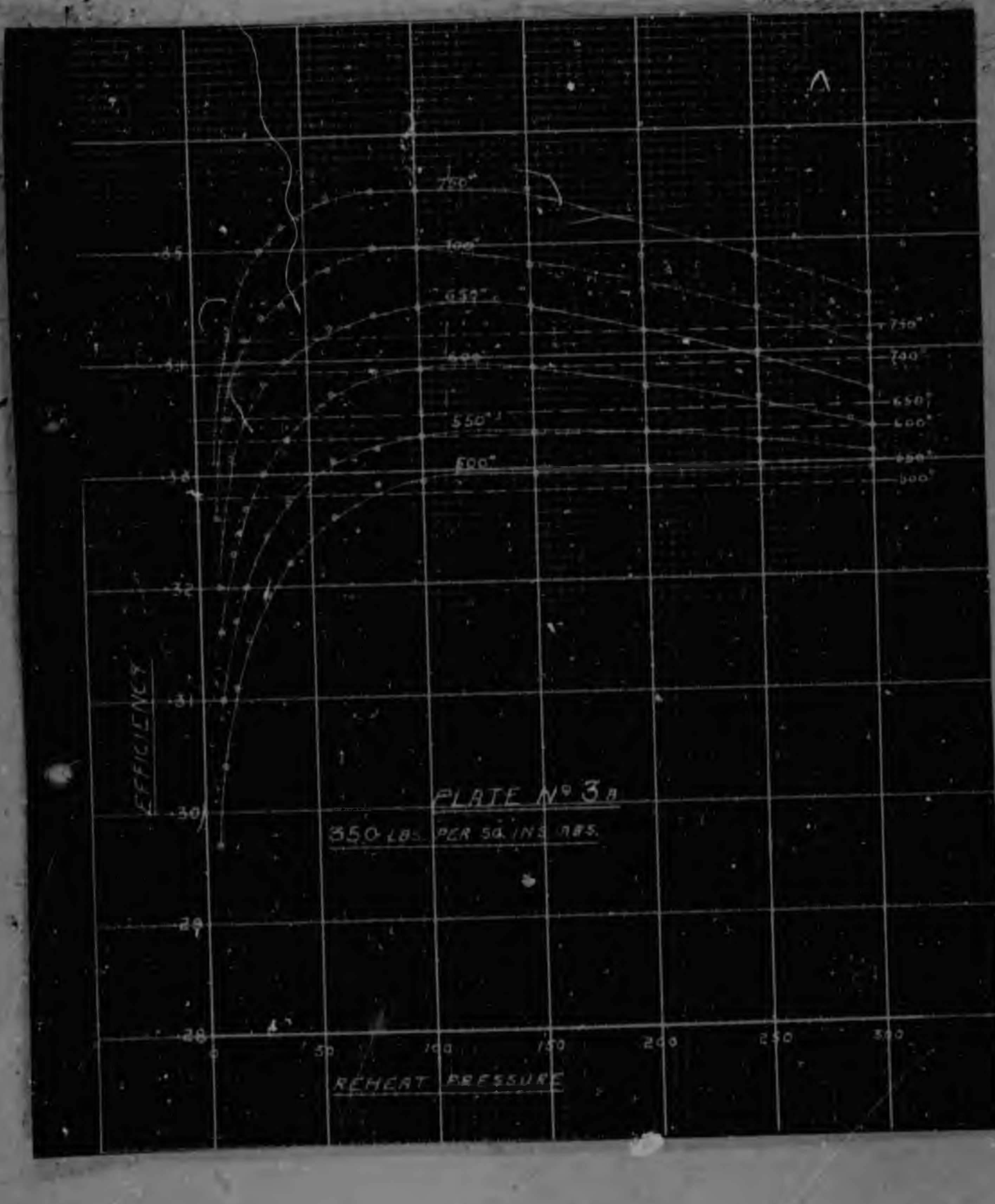


PLATE Nº 2B
400 LBS. PER SQ. INS. ABS.
·43
·42
·41
·40
·39
·38
·37
·36
·35
·34
·33
EFFICIENCY
750°
700°
650°
600°
550°
500°
50
100
150
200
250
300
350
REHEAT PRESSURE



750°
700°
650°
600°
550°
500°
.35
.34
.33
.32
.31
.30
.29
.28
0
50
100
150
200
250
300
EFFICIENCY
REHEAT PRESSURE
PLATE Nº 3A
350 LBS. PER SQ. INS. ABS.

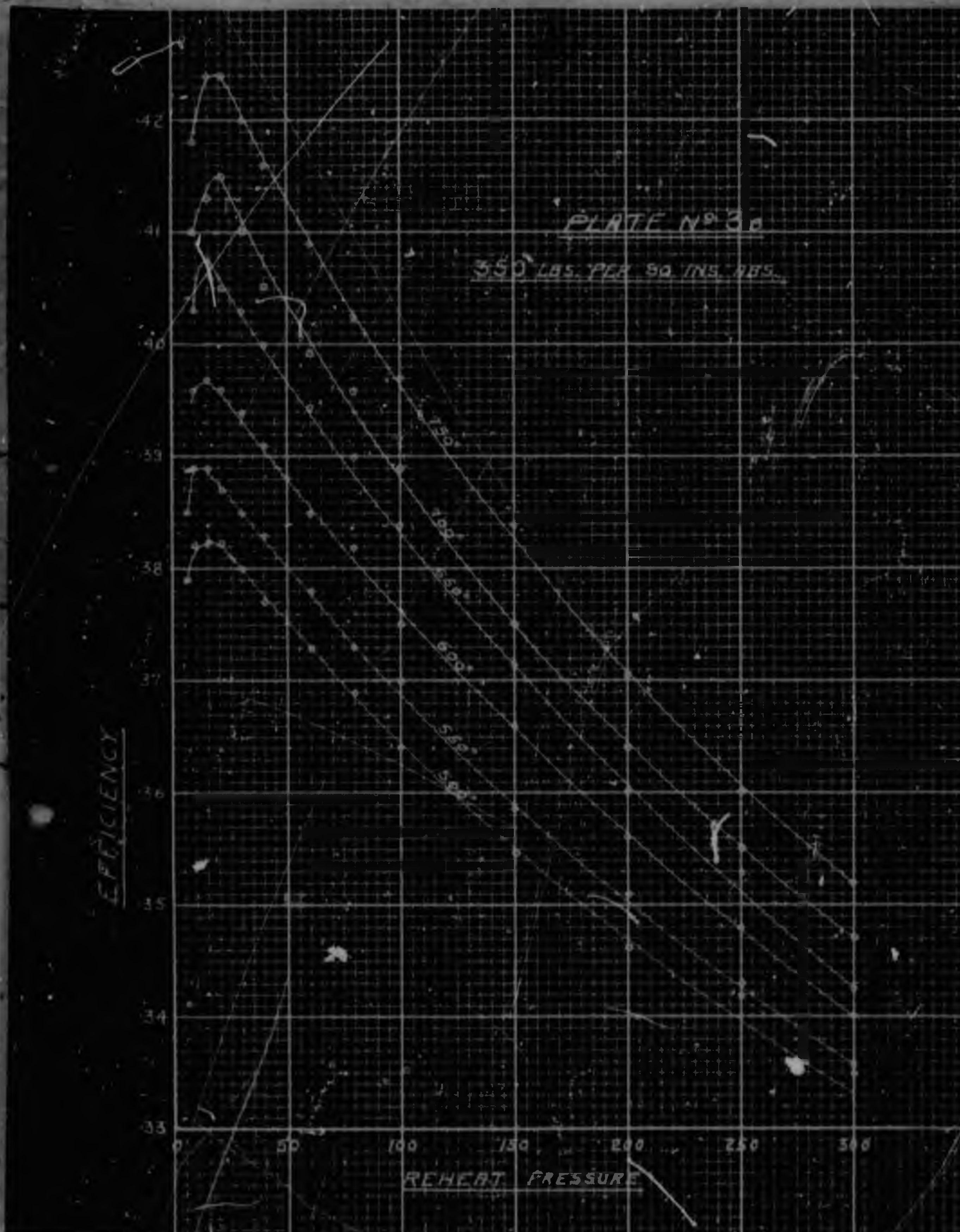


PLATE No 3a
350 LBS. PER SQ INS. ABS.
EFFICIENCY
42
41
40
39
38
37
36
35
34
33
0
50
100
150
200
250
300
REHEAT PRESSURE
750°
700°
650°
600°
550°
500°

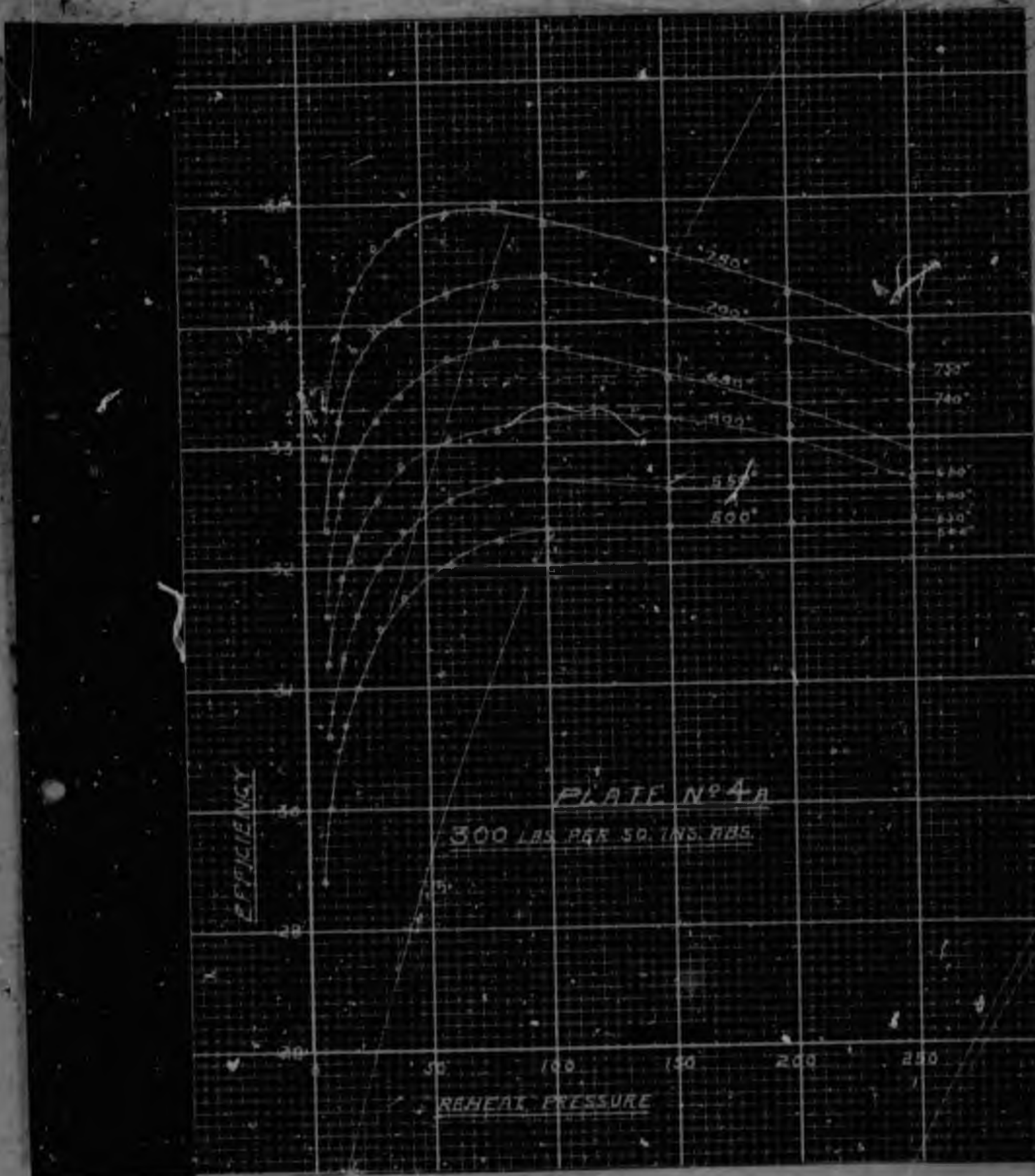


PLATE Nº 4 B
300 LBS PER SQ. INS. ABS.
EFFICIENCY
REHEAT PRESSURE
50
100
150
200
250
750°
700°
650°
600°
550°
500°

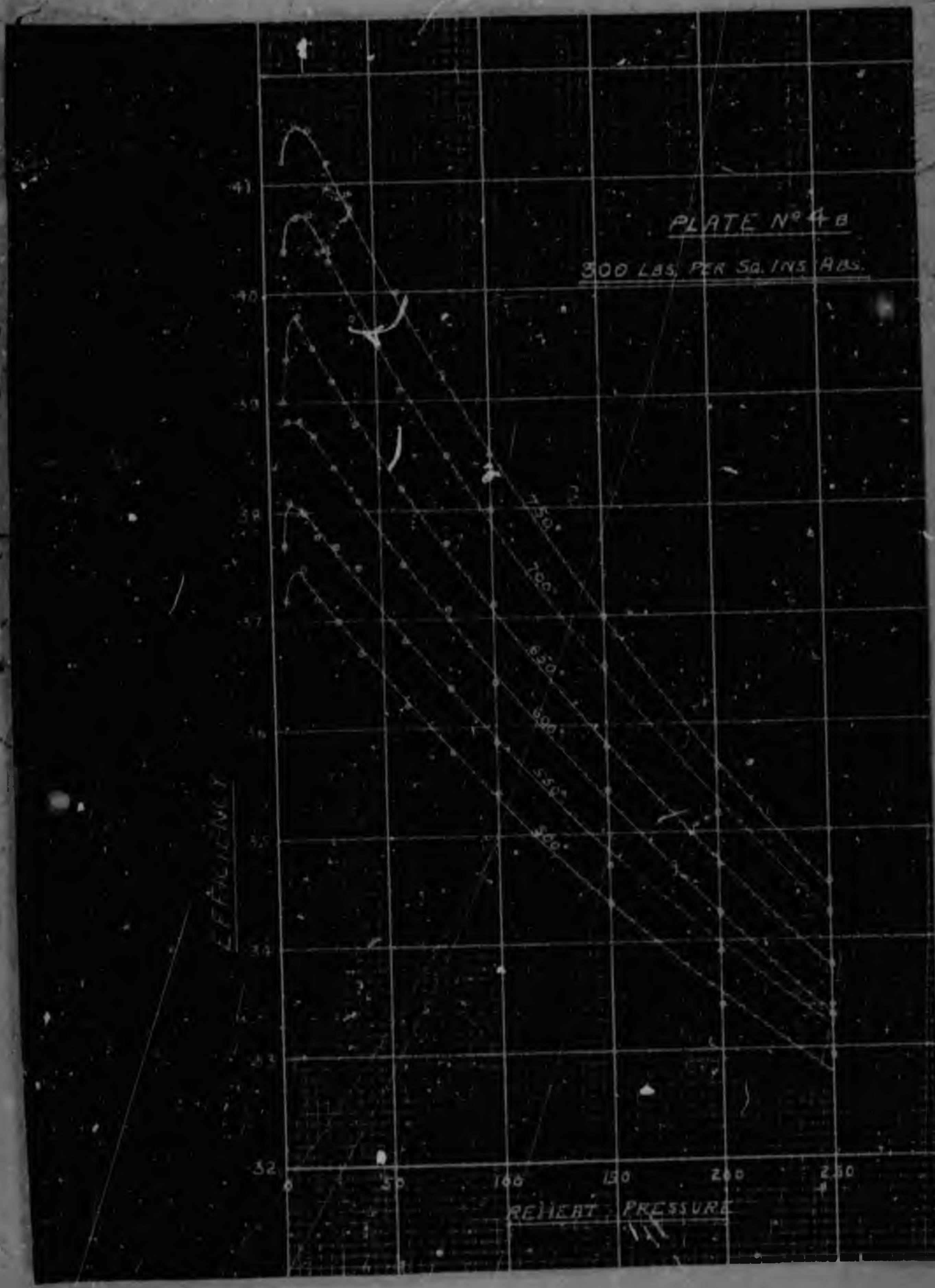
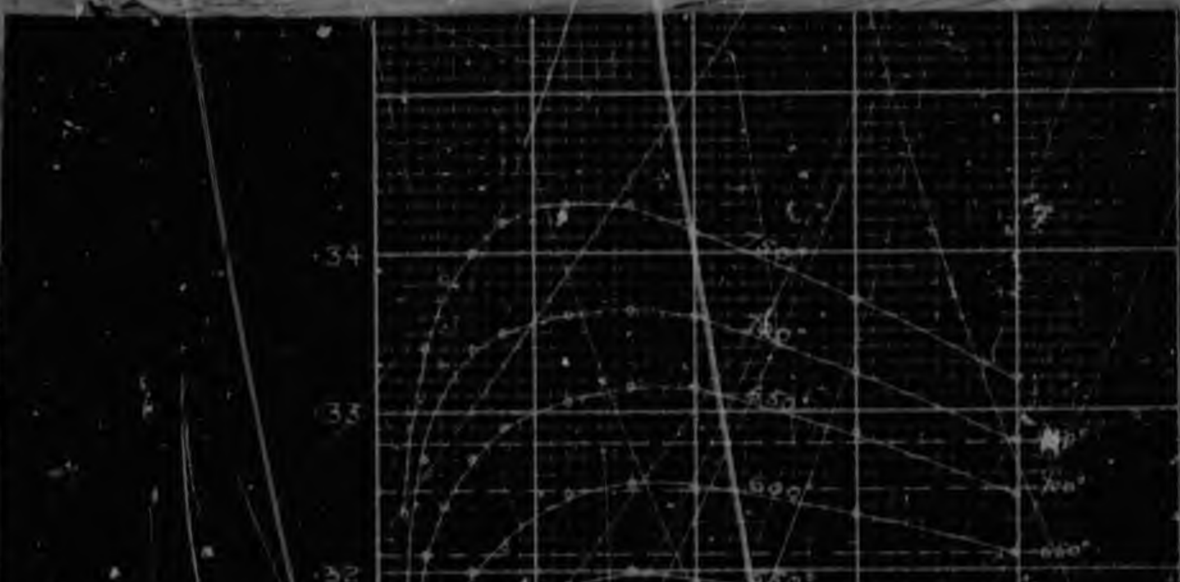


PLATE Nº 4B
300 LBS. PER SQ. INS. ABS.
EFFICIENCY
REHEAT PRESSURE
750°
700°
650°
600°
550°
500°
.41
.40
.39
.38
.37
.36
.35
.34
.33
.32
0
50
100
150
200
250



EFFICIENCY
.34
.33
.32
.31
.30
.29
.28
0
50
100
150
200
REHEAT PRESSURE
PLATE Nº 5A
250 LBS. PER SQ. INS. ABS.

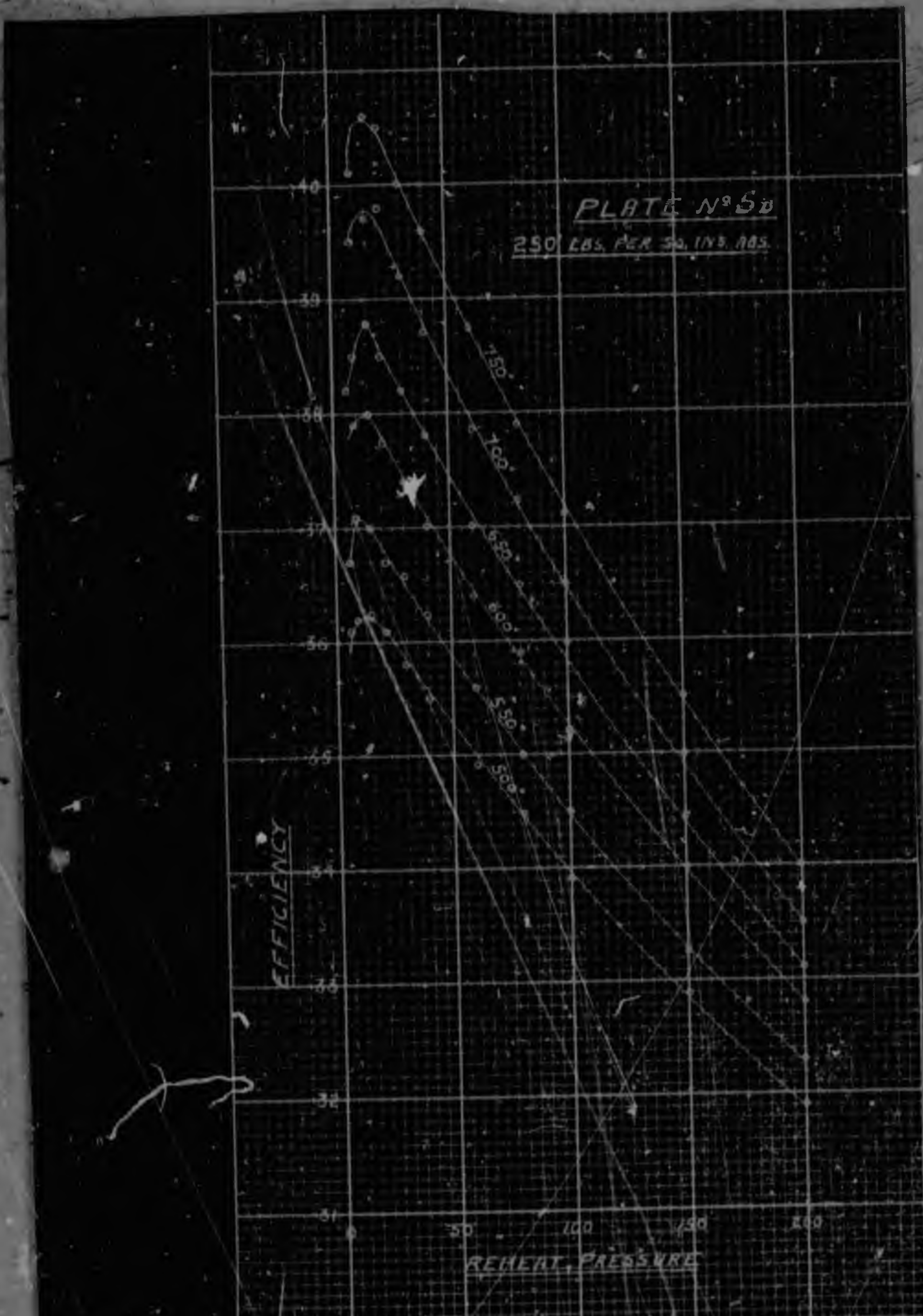
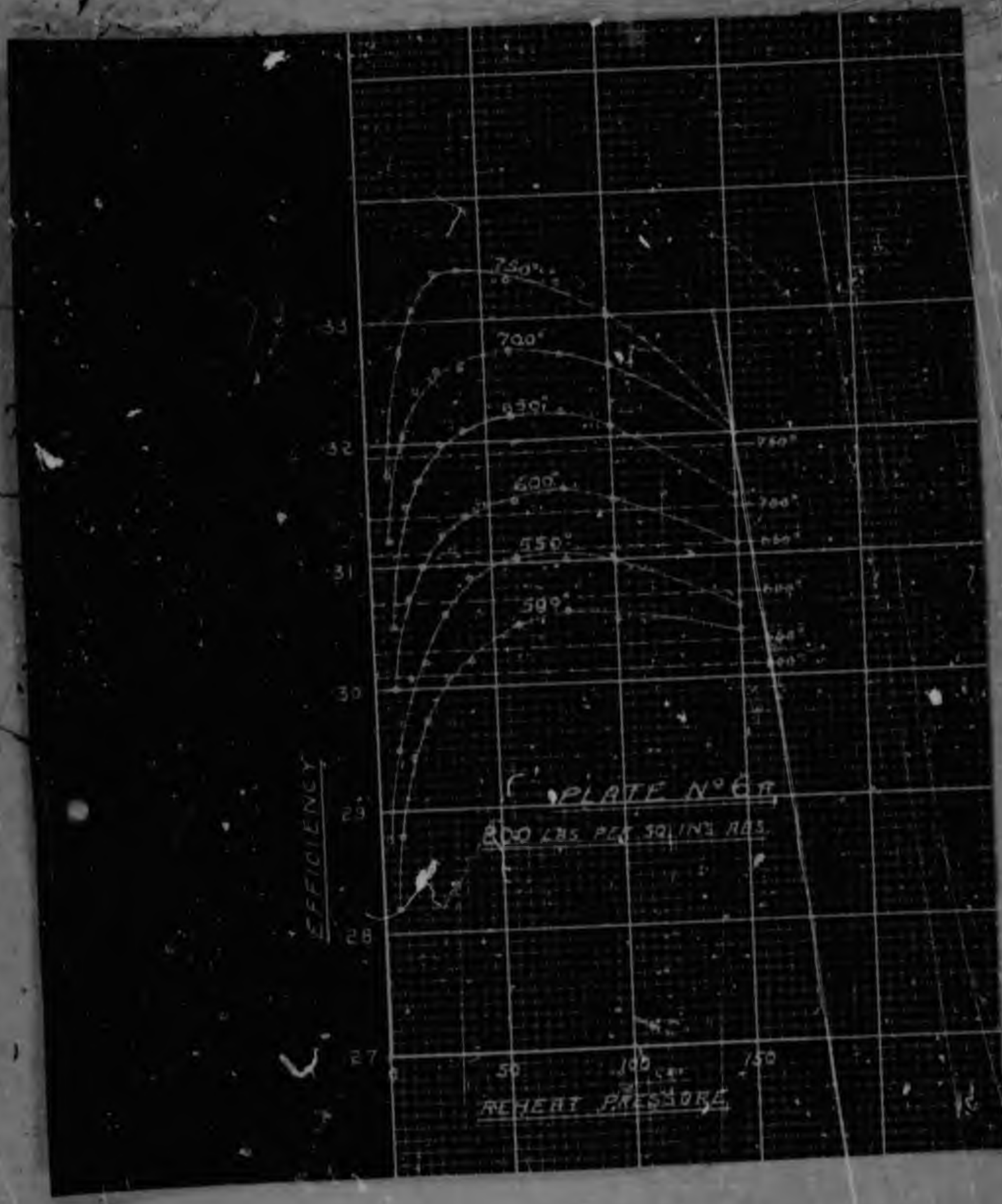


PLATE Nº 5b
250 LBS. PER SQ. INS. ABS.
EFFICIENCY
REHEAT PRESSURE
750
700
650
600
550
500



EFFICIENCY
REHEAT PRESSURE
PLATE N° 6A
800 LBS PER SQ. IN. ABS.
750°
700°
650°
600°
550°
500°
.33
.32
.31
.30
.29
.28
.27
0
50
100
150

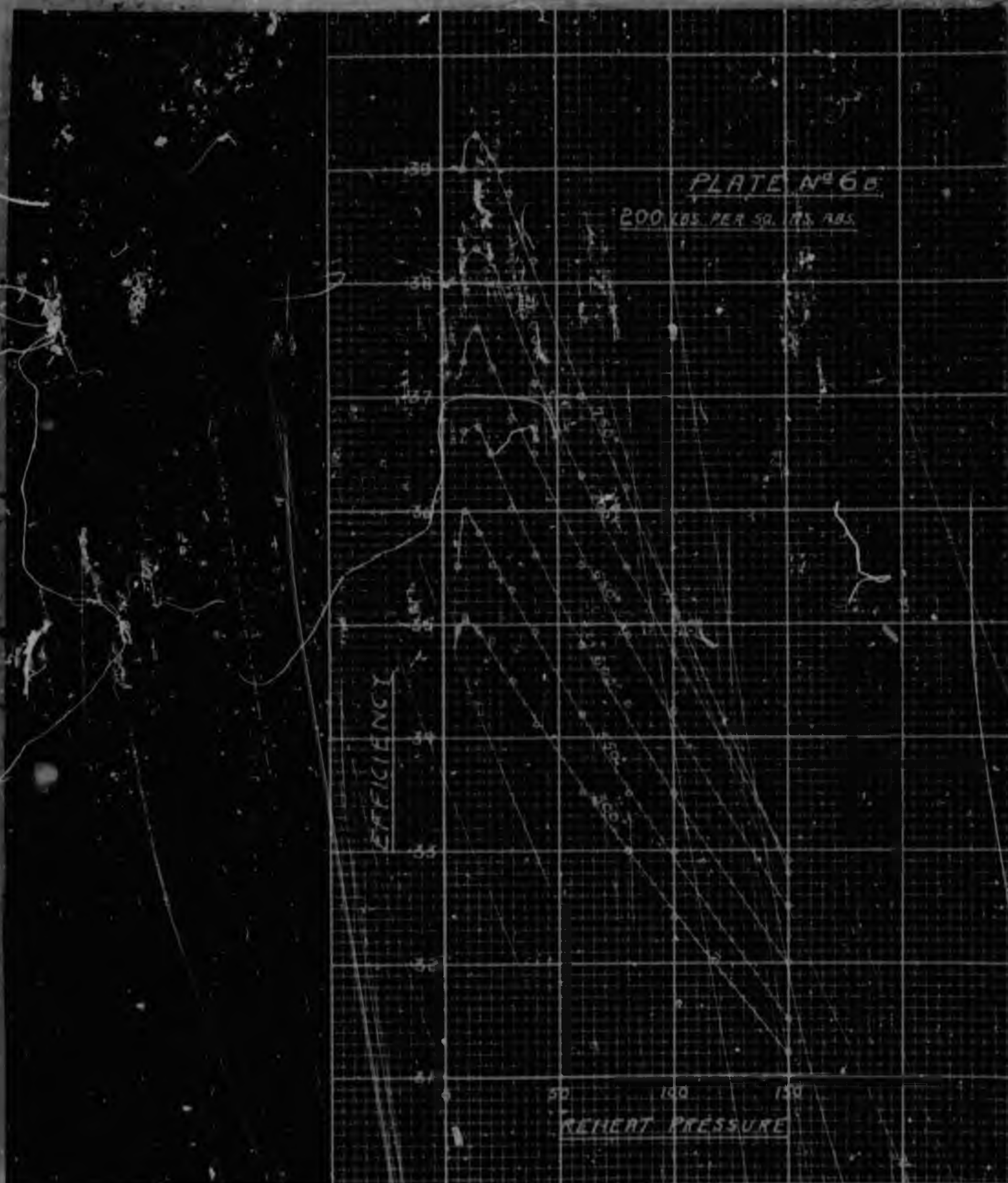
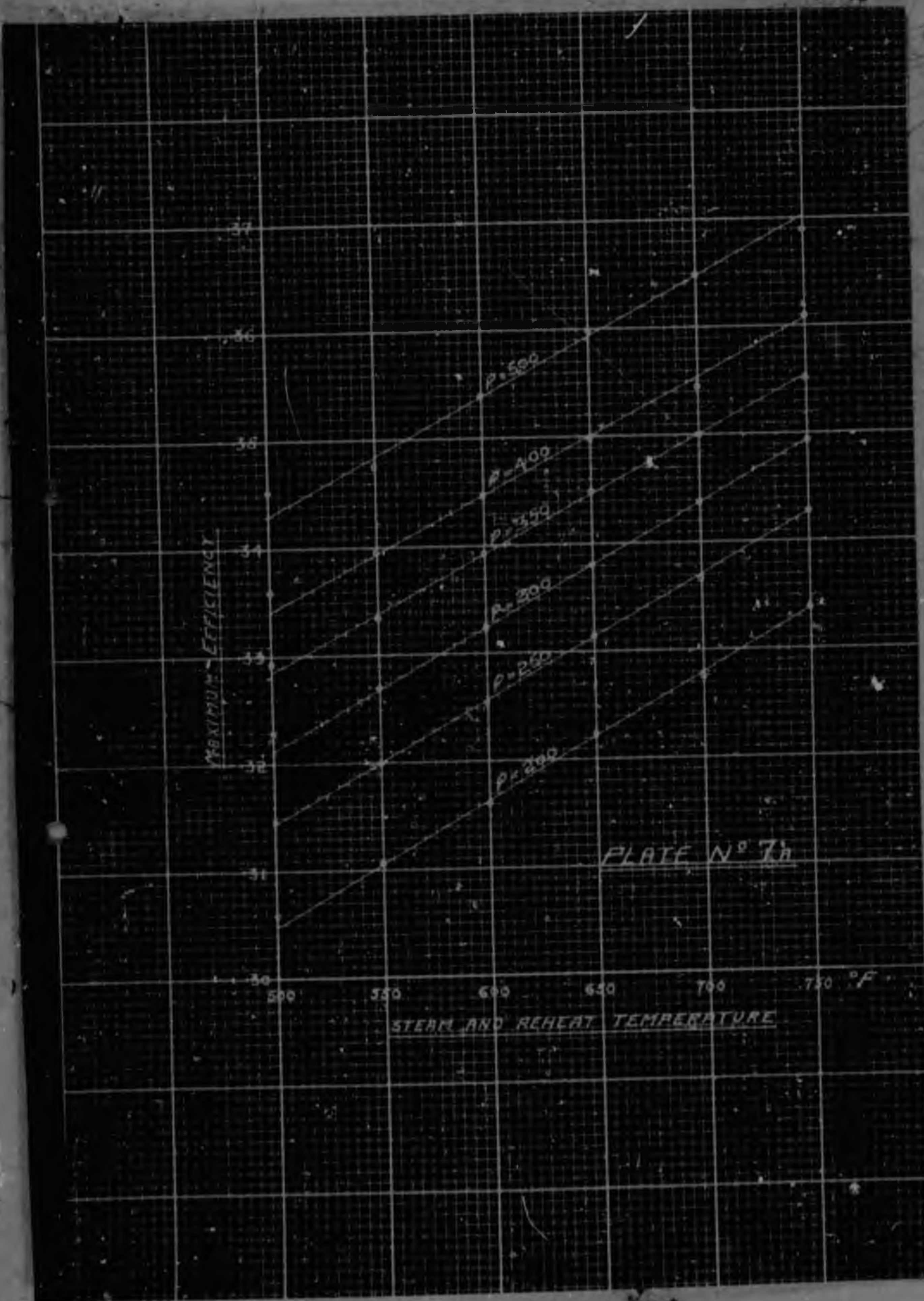
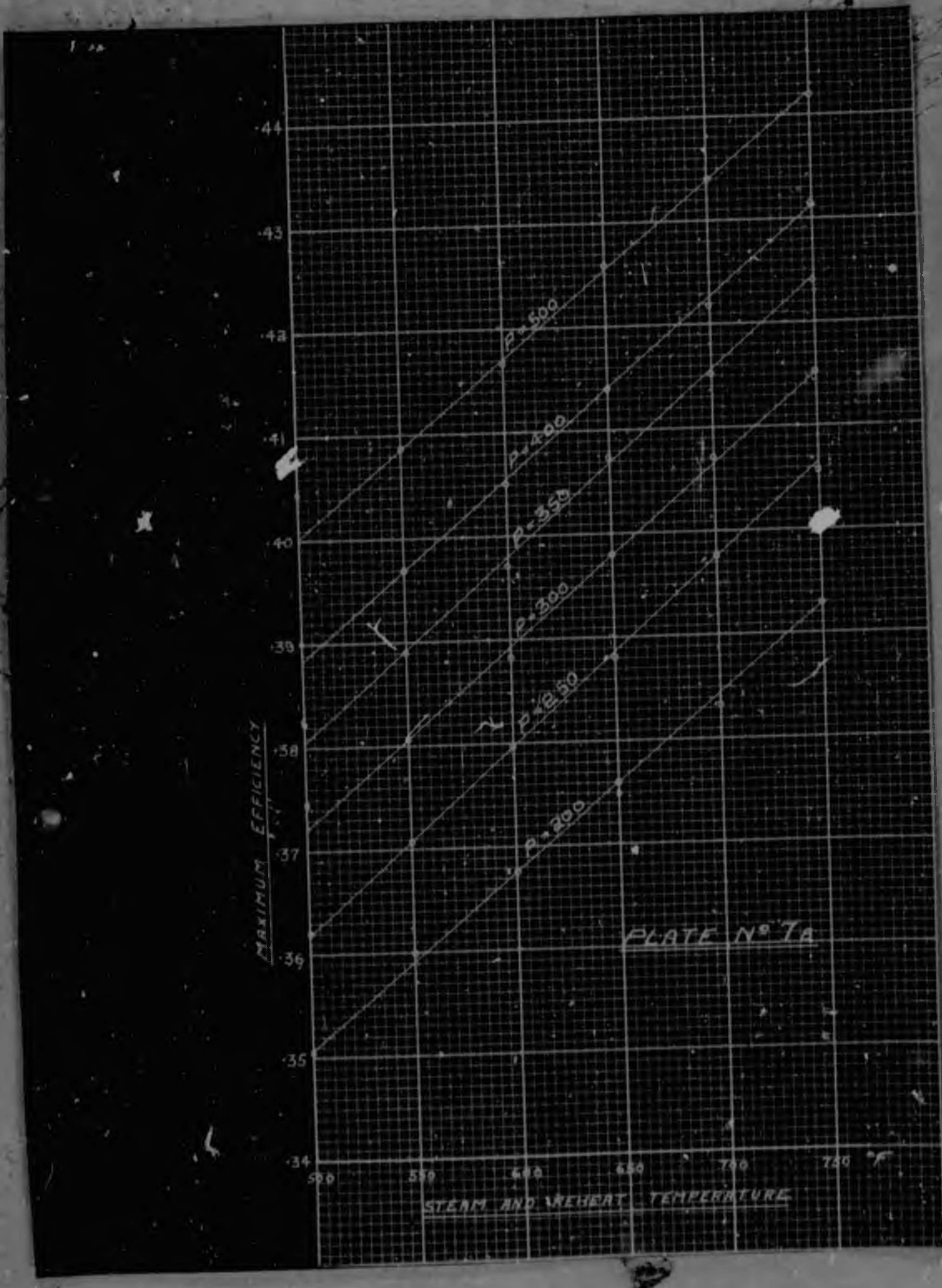


PLATE No 6B
200 LBS. PER SQ. INS. ABS.
EFFICIENCY
REHEAT PRESSURE
39
38
37
36
35
34
33
32
31
50
100
150


MAXIMUM EFFICIENCY
.37
.36
.35
.34
.33
.32
.31
.30
P=500
P=400
P=350
P=300
P=250
P=200
500
550
600
650
700
750 °F
STEAM AND REHEAT TEMPERATURE
PLATE N° 7h



·44
·43
·42
·41
·40
·39
·38
·37
·36
·35
·34
500
550
600
650
700
750 °F
MAXIMUM EFFICIENCY
STEAM AND REHEAT TEMPERATURE
P=500
P=400
P=350
P=300
P=250
P=200
PLATE No 7A

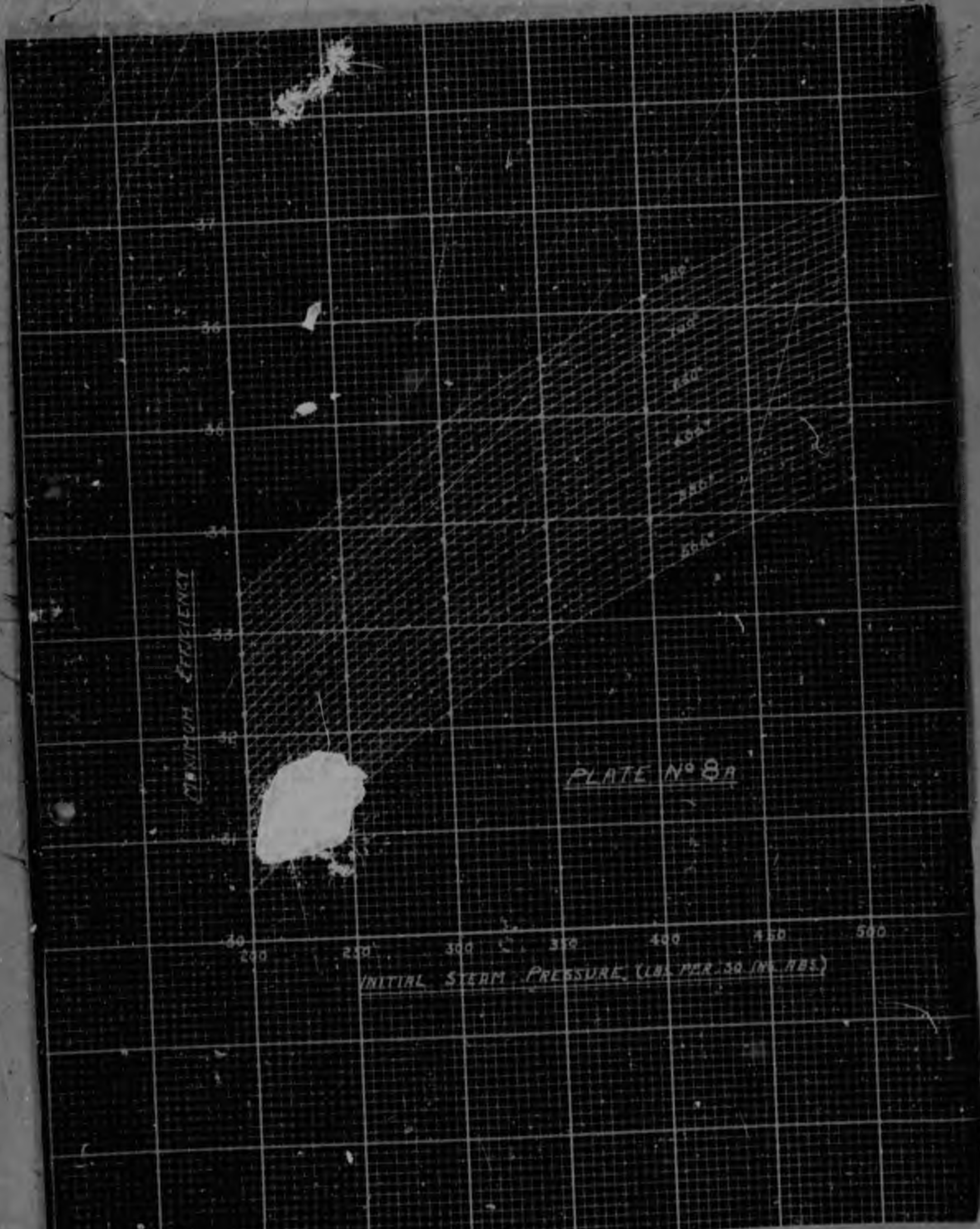
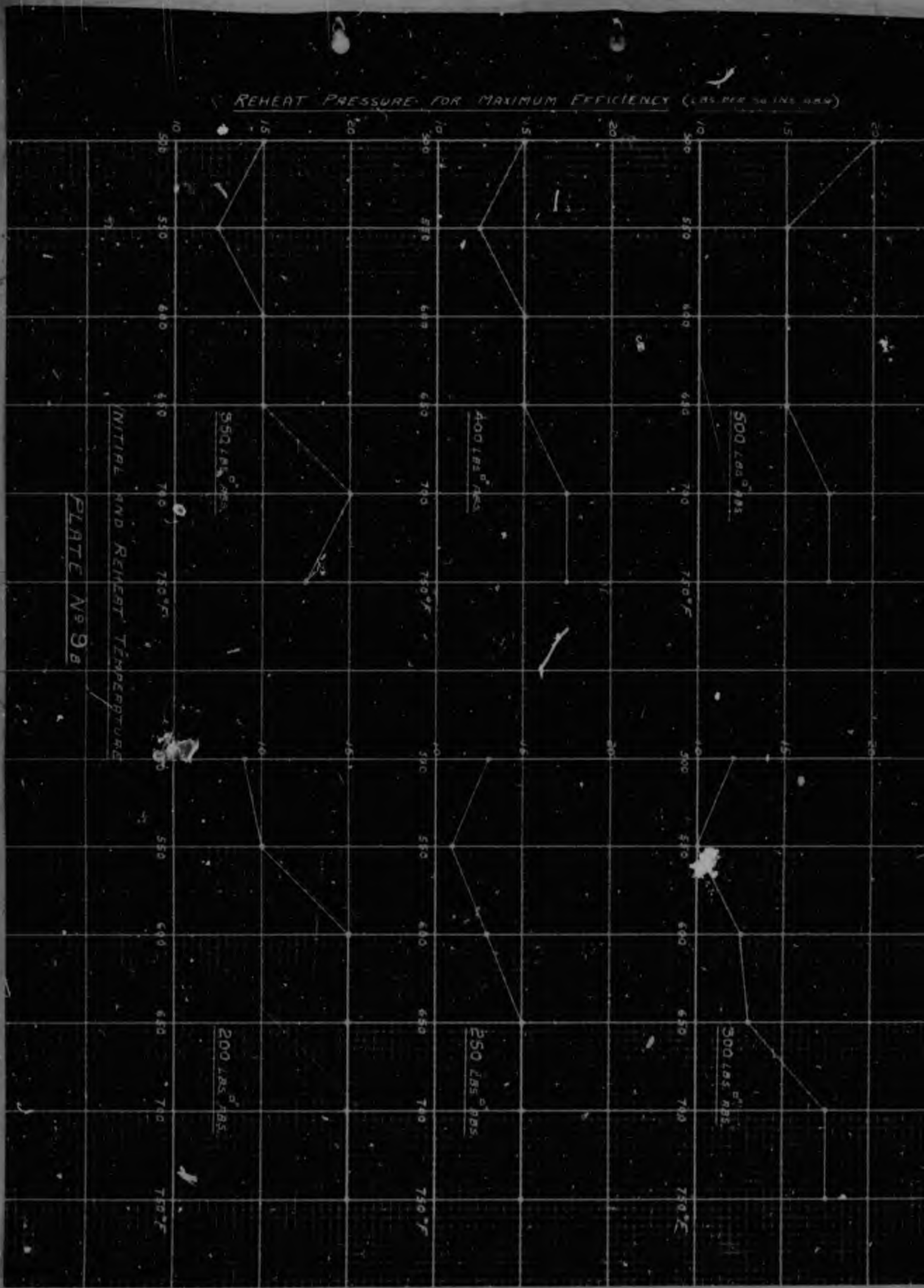

MAXIMUM EFFICIENCY
37
36
35
34
33
32
31
30
200
250
300
350
400
450
500
INITIAL STEAM PRESSURE (LBS PER SQ INS ABS)
PLATE Nº 8A

PLATE No 8B
MAXIMUM EFFICIENCY
INITIAL STEAM PRESSURE (LBS PER SQ. INS. ABS.)
·44
·43
·42
·41
·40
·39
·38
·37
·36
·35
·34
200
250
300
350
400
450
500
750°
700°
650°
600°
550°
500°

500 LBS. ABS.
400 LBS. ABS.
350 LBS. ABS.
300 LBS. ABS.
250 LBS. ABS.
200 LBS. ABS.
REHEAT PRESSURE FOR MAXIMUM EFFICIENCY (LBS. PER SQ. INS. ABS.)
300
200
100
0
550
600
650
700
750 °F
INITIAL AND REHEAT TEMPERATURE



REHEAT PRESSURE FOR MAXIMUM EFFICIENCY (LBS. PER SQ. INS. ABS.)
PLATE Nº 9B
INITIAL AND REHEAT TEMPERATURE
350 LBS. ABS.
400 LBS. ABS.
500 LBS. ABS.
200 LBS. ABS.
250 LBS. ABS.
300 LBS. ABS.
500
550
600
650
700
750°F
10
15
20