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1/16/2006
HR 70-14

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CENTRAL INTELLIGENCE AGENCY
WASHINGTON 25, D. C.

MEMORANDUM FOR: The Acting Director of Central Intelligence

SUBJECT : Combat with Enemy Nuclear Artillery, Free Rockets, and Guided Missiles in Offensive and Defensive Operations of an Army (Conclusion and Bibliography)

1. Enclosed is a verbatim translation of the conclusion, appendix, and bibliography of a seven-chapter TOP SECRET Soviet publication entitled "Combat with Enemy Nuclear Artillery, Free Rockets, and Guided Missiles in Offensive and Defensive Operations of an Army". It was issued by Scientific-Research Artillery Institute No. 1 in Leningrad in October 1960.

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Richard Helms
Deputy Director (Plans)

Enclosure

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COUNTRY : USSR

SUBJECT : Combat with Enemy Nuclear Artillery, Free Rockets, and Guided Missiles in Offensive and Defensive Operations of an Army (Conclusion and Bibliography)

DATE OF INFO : October 1960

APPRAISAL OF CONTENT : Documentary

SOURCE : A reliable source (B)

Following is a verbatim translation of the Conclusion and Bibliography of a TOP SECRET Soviet publication titled "Combat with Enemy Nuclear Artillery, Free Rockets, and Guided Missiles in Offensive and Defensive Operations of an Army". This document contains seven chapters and was published on 15 October 1960 by Scientific-Research Artillery Institute No. 1 in Leningrad. Each chapter will be disseminated as it becomes available and is translated.

In some cases, there are imperfections in the original text which leave doubt as to the accuracy of translation. Question marks are inserted in brackets following uncertain words or phrases. As in other IRONBARK reports, transliterated Cyrillic letters are underlined in translation, while Greek and Roman letters are given as in the original.

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Conclusion

The armed forces of our potential enemies have at their disposal various types of nuclear attack weapons. The bulk of these weapons consists at present of tactical and operational-tactical weapons. In view of this, combat with the enemy's tactical and operational-tactical nuclear attack weapons becomes a matter of exceptional importance.

Combat with the enemy's tactical, and to some extent with his operational-tactical, nuclear attack weapons, cannot be organized on the scale of a front alone. For carrying on this combat a front must concentrate in its hands control of all types and means of intelligence and all weapons for inflicting damage on the enemy, which are deployed in a comparatively narrow zone stretching for hundreds of kilometers. Naturally, it is impossible to centralize control at the front level of all the forces and weapons brought in to combat all the enemy's nuclear attack weapons, without exception. Consequently, the front cannot be the sole organizer of this combat.

The organization of combat with the enemy's nuclear attack weapons should be carried out at two echelons or levels: in the front and in the army. The best version of dividing the tasks in organizing this combat is for the front to organize in detail combat with the enemy's operational-tactical nuclear attack weapons, with the forces and weapons directly subordinate to it (taking into account the capabilities of the operational-tactical missiles of the armies), and to restrict itself to giving general directions only regarding combat with the enemy's tactical nuclear attack weapons, while the army organizes in detail combat with the enemy's tactical nuclear weapons, taking into consideration the tasks which it has been given by the front for combat with the enemy's operational-tactical nuclear attack weapons.

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In accordance with this, the army must have at its disposal the necessary intelligence forces and means to ensure fulfilment of the tasks with which it is faced.

It is necessary to note that the intelligence means now in existence can fulfil the requirements for combat with the enemy's nuclear weapons to a certain extent.

However, for this it is necessary to create an efficient system of control of these forces and means, and, in the first place, to take all measures to reduce the time spent on target designation in the case of such important and mobile targets as nuclear attack weapons on firing or launching positions.

Bearing in mind the improvement and strengthening of the antiair defense troops of our probable enemies and the develcpment of new, more perfected and mobile nuclear attack weapons, it is essential to pay the most serious attention to the most rapid development of new pilotless means of reconnaissance, which would be capable of fully replacing the existing means of aerial artillery reconnaissance and of getting accurate information very quickly regarding the enemy's nuclear weapons.

The investigations carried out in this study show that combat with the enemy's tactical nuclear attack weapons is one of the main tasks for our tactical missiles and gun artillery. In this connection it is necessary to note that the views held hitherto regarding the limited capabilities of gun artillery in combat with the enemy's nuclear weapons are not in accordance with the facts. Gun artillery is capable of combatting the enemy's nuclear attack weapons successfully. Moreover, for carrying on this combat, i.e., for neutralization and destruction of these weapons, it is not necessary, as was thought before,

to expend an enormous quantity of ammunition and to concentrate a large quantity of artillery. From the information given in this study, it is evident that in the conditions that have been laid down, fire for destruction of the enemy's nuclear attack weapons requires a comparatively small expenditure of ammunition and the employment, as a rule, of two or three batteries, i.e., not more than one battalion of artillery. This circumstance changes the significance and role of gun artillery considerably, and shows that at the present time gun artillery remains one of the main fire weapons of an army.

The short time that nuclear attack weapons remain on their firing (launching) positions poses exceptionally exacting requirements in the speed of carrying out a strike against them or in the preparation of fire for destroying these weapons. Timely opening of fire or delivery of strikes at the targets is the most important condition for successful combat with the enemy's nuclear attack weapons.

Under modern conditions, the destruction or neutralization of the enemy's nuclear weapons must not be postponed to a specific time, as, for instance, the neutralization of enemy batteries was postponed during the Second World War until the time of the artillery preparation for the assault. If the enemy battery (platoon, gun or launcher) is not destroyed immediately on the position it occupies, it will remain whole and undamaged, as it will most certainly not stay on one and the same position, especially after firing a nuclear projectile.

Under modern conditions, there should also be no delay in delivering a strike at a target or in opening fire to destroy it. Delay in opening fire or making a strike at the target will have the consequence that the target will escape destruction.

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Thus, reduction of the time taken for opening fire at targets of opportunity is one of the chief, if not the most important, requirement, both for organizing combat with the enemy's nuclear attack weapons, and for those weapons and that armament which will be employed in this combat.

In accordance with this, in developing new models of weapons and in perfecting the combat employment of those weapon models which are or can be used to destroy the enemy's nuclear weapons, it is essential to make every effort to ensure that their preparation for firing (launching) should require considerably less time than that required for the preparation for firing (launching) of the enemy's comparable weapons. Or, in other words, the weapons employed for combat with nuclear weapons must be better as regards their basic tactical-technical characteristics than the enemy's similar weapons.

There is no doubt that the solution of these and certain other questions mentioned in this report will ensure favorable conditions for successful combat with the enemy's nuclear attack weapons.

The recommendations made in this study regarding the organization and conduct of combat with the enemy's nuclear attack weapons should be tested at tactical and operational-tactical exercises of the troops.

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Guards Lieutenant-Colonel .....(KURBATOV)

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Lieutenant-Colonel .....(FILIPPOV)

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Appendix

Graphs for the determination of R_p and P dependent on d when the elliptical error of fire has the characteristics $\underline{V}_p$ and $\underline{E}$

For drawing up the graphs we calculated the coefficients η taking into account the probability of a hit in a circle with a radius R_p, dependent on the characteristics of the elliptical error of fire ($\underline{V}_p$ and $\underline{E}$) and of the displacement d of the center of dispersion in relation to the center of the circle.

The values of the coefficients η were determined by using the equation:

$$\eta = \frac{K r + d}{\underline{V}_p} = K \frac{r}{\underline{V}_p} + \frac{d}{\underline{V}_p} \qquad (1)$$

To determine η it is necessary:

- to take the values P, $\underline{E}$, and $\frac{d}{\underline{V}_p}$, when $\underline{V}_p = 1$;
- by means of P and $\underline{E}$ to find the value of the circular error r (in $\underline{V}_p$), equivalent to the probability of the elliptical error;
- to express $\frac{d}{\underline{V}_p}$ in terms of r and, making use of the graphs $K = f(P, d, r)$, for the given values of P, to determine the values of the coefficients K;
- to substitute the corresponding values arrived at in the formula (1) and to calculate $\eta = f(P, d, E)$.

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In calculating the coefficients η use was made of the graphs $K = f(P, d, r)$ and the values $\frac{r}{V_p} = (P, E)$ given in the study (15).

It should be noted that in calculating coefficient η, use can also be made of the data in Table 3B, given in the study (18).

The procedure for calculating the coefficient η is given in the form of an example.

Example:

Calculate the value of coefficient η for $d = 1\,V_p$, $P = 80\%$ and $E = 0.5$.

Solution:
1. for $P = 80\%$ and $E = 0.5$ $r = f(P, E) = 0.782 V_p$;
2. we express $d = 1V_p$ and r as $\frac{d}{r} = \frac{1}{0.782} = 1.29$;
3. for $d = 1.29$ and $P = 80\%$ $K = f(P, d, r) = 1.9$;
4. using formula (1) we find $\eta = 1.9 \times 0.782 + 1 = 2.485$.

The values of the coefficient η for the various d, P, and E, which have been calculated in a similar way, are given in the table.

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Table

Values of coefficient $\Pi = f(P, d, E)$

[illegible]	E	Values of Π when [illegible]									
		[illegible]	20	[illegible]	40	[illegible]	60	70	80	90	96
1	2	3	4	[illegible]	6	7	8	9	10	11	12
Column 1 not legible	0·1	0·35	0·41	[illegible]	[illegible]	1·02	1·25	1·54	1·90	2·44	3·00
	0·2	0·39	0·42	[illegible]	0·84	1·05	1·29	1·57	1·92	2·46	3·07
	0·3	0·41	0·50	0·74	0·91	1·11	1·34	1·61	1·96	2·46	3·09
	0·4	0·42	0·[illegible]	[illegible]	1·03	1·19	1·41	1·67	2·01	2·52	3·12
	0·5	0·46	0·71	[illegible]	1·09	1·29	1·61	1·74	2·08	2·[illegible]	3·16
	0·6	0·52	0·77	[illegible]	1·18	1·37	1·65	1·86	2·17	2·69	3·22
	0·7	0·57	0·83	1·06	1·28	1·47	1·70	1·96	2·28	2·76	3·32
	0·8	0·61	0·89	1·12	1·34	1·57	1·81	2·07	2·40	2·89	3·44
	0·9	0·64	0·94	1·19	1·42	1·66	1·90	2·18	2·53	3·03	3·59
	1·0	0·68	0·99	1·25	1·50	1·75	2·01	2·30	2·66	3·16	3·77

0·1	0·25	0·47	0·67	0·88	1·09	1·36	1·63	2·02	2·59	3·23
0·2	0·33	0·54	0·72	0·93	1·14	1·38	1·65	2·04	2·60	3·26
0·3	0·38	0·61	0·79	0·99	1·20	1·43	1·69	2·07	2·62	3·27
0·4	0·43	0·71	0·87	1·08	1·27	1·49	1·74	2·12	2·66	3·31
0·5	0·50	0·77	0·90	1·17	1·37	1·59	1·82	2·18	2·72	3·35
0·6	0·54	0·82	1·01	1·26	1·46	1·67	1·91	2·27	2·79	3·41
0·7	0·58	0·90	1·03	1·32	1·56	1·76	2·01	2·36	2·90	3·46
0·8	0·61	0·96	1·16	1·40	1·63	1·85	2·11	2·48	3·02	3·61
0·9	0·65	0·99	1·22	1·47	1·72	1·95	2·22	2·60	3·15	3·76
1·0	0·70	1·03	1·30	1·55	1·82	2·00	2·33	2·73	3·32	3·95
0·1	0·56	0·73	0·93	1·13	1·36	1·64	1·94	2·33	2·89	3·55
0·2	0·49	0·75	0·94	1·16	1·40	1·66	1·96	2·35	2·90	3·56
0·3	0·50	0·79	0·99	1·20	1·44	1·70	1·99	2·37	2·93	3·57
0·4	0·52	0·81	1·05	1·28	1·50	1·76	2·06	2·42	2·97	3·61
0·5	0·54	0·86	1·12	1·34	1·57	1·84	2·12	2·49	3·02	3·65
0·6	0·56	0·91	1·17	1·41	1·63	1·92	2·19	2·57	3·08	3·70
0·7	0·59	0·96	1·24	0·47/1·48	1·74	2·00	2·29	2·65	3·18	3·79
0·8	0·61	1·00	1·29	1·54	1·81	2·08	2·38	2·77	3·30	3·89
0·9	0·63	1·06	1·33	1·60	1·87	2·17	2·47	2·87	3·42	4·02
1·0	0·71	1·10	1·40	1·67	1·95	2·25	2·57	3·00	3·56	4·15

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= 2·0	0·1	1·45	1·59	1·75	1·94	2·19	2·46	2·77	3·15	3·73	4·39
	0·2	1·25	1·53	1·73	1·97	2·21	2·47	2·78	3·17	3·74	4·40
	0·3	1·17	1·50	1·75	1·99	2·24	2·50	2·80	3·19	3·70	4·42
	0·4	1·10	1·48	1·77	2·03	2·27	2·54	2·84	3·23	3·79	4·45
	0·5	1·05	1·47	1·78	2·05	2·32	2·59	2·89	3·28	3·82	4·49
	0·6	1·00	1·47	1·80	2·09	2·37	2·65	2·96	3·35	3·89	4·54
	0·7	0·98	1·47	1·82	2·12	2·41	2·71	3·02	3·43	3·98	4·62
	0·8	0·96	1·48	1·84	2·15	2·46	2·77	3·10	3·52	4·09	4·72
	0·9	0·95	1·49	1·86	2·18	2·51	2·84	3·18	3·62	4·20	4·85
	1·0	0·94	1·50	1·88	2·22	2·56	2·90	3·26	3·72	4·32	5·01
d= 3·0	0·1	2·43	2·55	2·69	2·89	3·11	3·38	3·69	4·07	4·65	5·32
	0·2	2·20	2·39	2·67	2·89	3·12	3·39	3·70	4·09	4·66	5·32
	0·3	2·06	2·42	2·65	2·90	3·14	3·42	3·72	4·11	4·68	5·33
	0·4	1·96	2·36	2·63	2·91	3·16	3·45	3·76	4·15	4·71	5·36
	0·5	1·89	2·32	2·62	2·93	3·20	3·49	3·81	4·20	4·75	5·40
	0·6	1·84	2·28	2·62	2·95	3·24	3·54	3·87	4·26	4·81	5·45
	0·7	1·78	2·26	2·63	2·97	3·27	3·59	3·93	4·33	4·89	5·53
	0·8	1·73	2·24	2·64	2·99	3·31	3·64	3·99	4·41	4·99	5·63
	0·9	1·68	2·22	2·65	3·01	3·36	3·69	4·06	4·50	5·09	5·75
	1·0	1·65	2·21	2·63	3·04	3·40	3·75	4·14	4·60	5·21	5·90

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3.[?]-0	0-1	4·43	4·53	4·67	4·84	5·07	5·34	5·62	6·00	6·57	7·23
	0·2	4·16	4·43	4·68[?]	4·83	5·07	5·26[?]	5·63	6·01	6·58	7·24
	0·3	4·00	4·35	4·59	4·82	5·08	5·36[?]	5·65	6·00[?]	6·60	7·26
	0·4	3·89	4·29	4·55	4·82	5·10	5·39[?]	5·68[?]	6·06	6·64[?]	7·28
	0·5	3·76	4·23[?]	4·51	4·82[?]	5·11	5·42	5·72	6·11	6·67	7·32[?]
	0·6	3·67	4·19	4·48	4·81	5·12	5·43[?]	5·77	6·16	6·72	7·36[?]
	0·7	3·58	4·14	4·45[?]	4·91[?]	5·14	5·45[?]	5·82[?]	6·22	6·80	7·42
	0·8	3·50[?]	4·00	4·45	4·52[?]	5·15	5·50[?]	5·87[?]	6·30[?]	6·89[?]	7·55[?]
	0·9	3·44[?]	4·04	4·42	4·83[?]	5·18	5·56[?]	5·94	6·38[?]	6·99	7·65[?]
	1·0	3·37[?]	3·99[?]	4·41[?]	4·58[?]	5·20	5·60[?]	6·00	6·44[?]	7·18[?]	7·79
	0·1	9·41	9·51	9·67	9·84	10·06	10·31	10·61	10·97	11·54	12·[??]
	0·2	9·14	9·41	9·63	9·83	10·06	10·32	10·61	10·98	11·55	12·[??]
	0·3	9·00	9·32	9·59	9·82	10·06	10·33	10·63	10·99	11·56	12·[??]
	0·4	8·83	9·22	9·54	9·80	10·07	10·35	10·65	11·02	11·59	12·2[?]
	0·5	8·70	9·15	9·49	9·78	10·07	10·38	10·69	11·06	11·62	12·2[?]
	0·6	8·58	9·08	9·45	9·76	10·08	10·40	10·73	11·10	11·67	12·3[?]
	0·7	8·49	9·02	9·41	9·75	10·08	10·42	10·77	11·16	11·74	12·3[?]
	0·8	8·38	8·96	9·37	9·73	10·09	10·45	10·81	11·22	11·82	12·4[?]
	0·9	8·29	8·91	9·34	9·72	10·10	10·48	10·86	11·28	11·91	12·5[?]
	1·0	8·19	8·85	9·30	9·70	10·10	10·50	10·90	11·35	12·00	12·[?]

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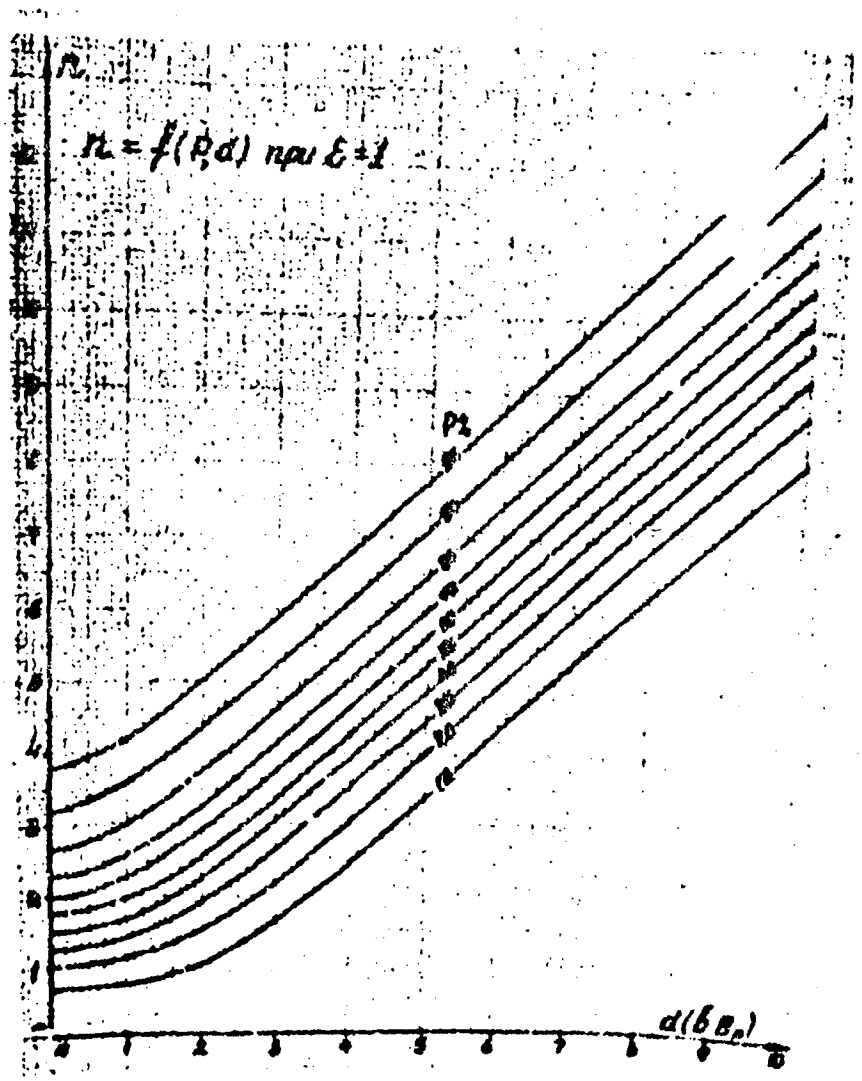
Below are given graphs for $R = f(P, d, E)$, drawn up on the basis of the data in the table, for $\overline{E} = 1; 0.9; 0.8; 0.7; 0.6; 0.5; 0.4; 0.3; 0.2; 0.1$, i. e. for the whole range of variations of E that is possible in practice.


n
n = f(P,d) при ε=1
P₂
d(δ B₀)

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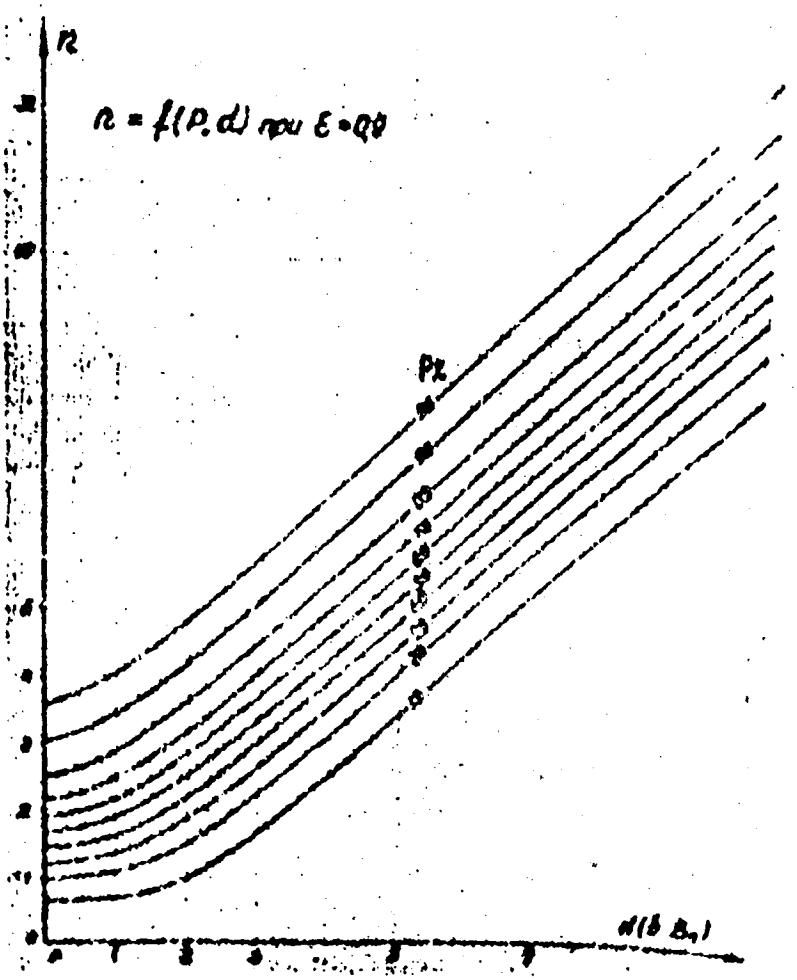

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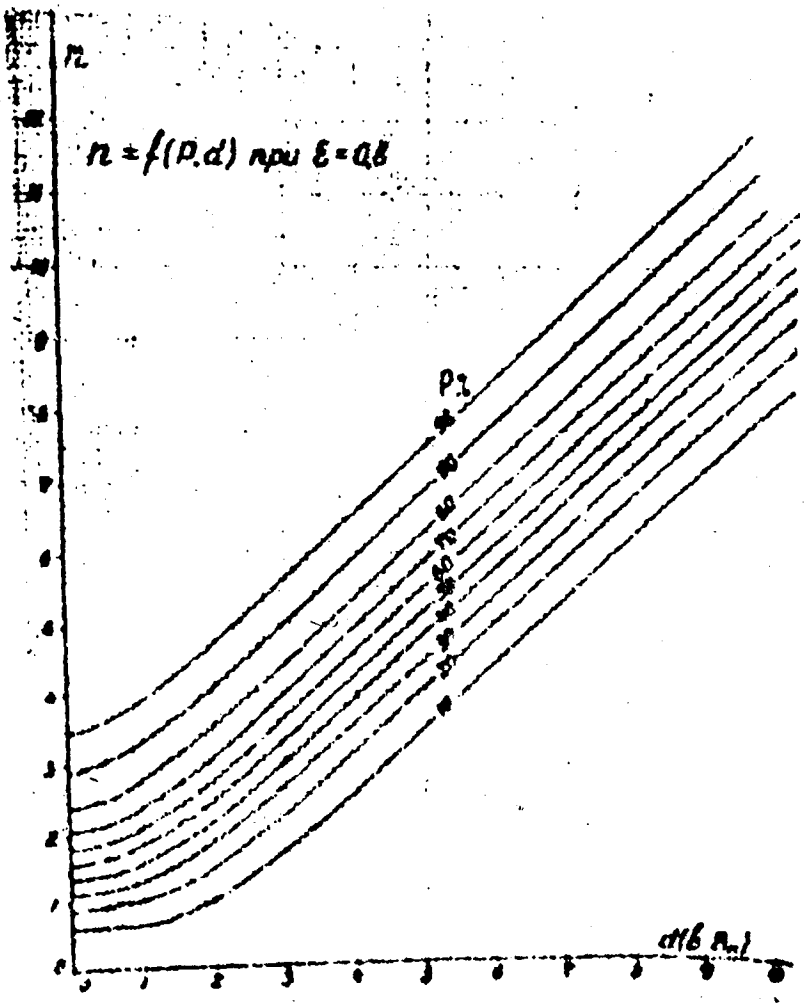
n
n = f(P,d) при ε = 0,6
P,%
d(б Вт)

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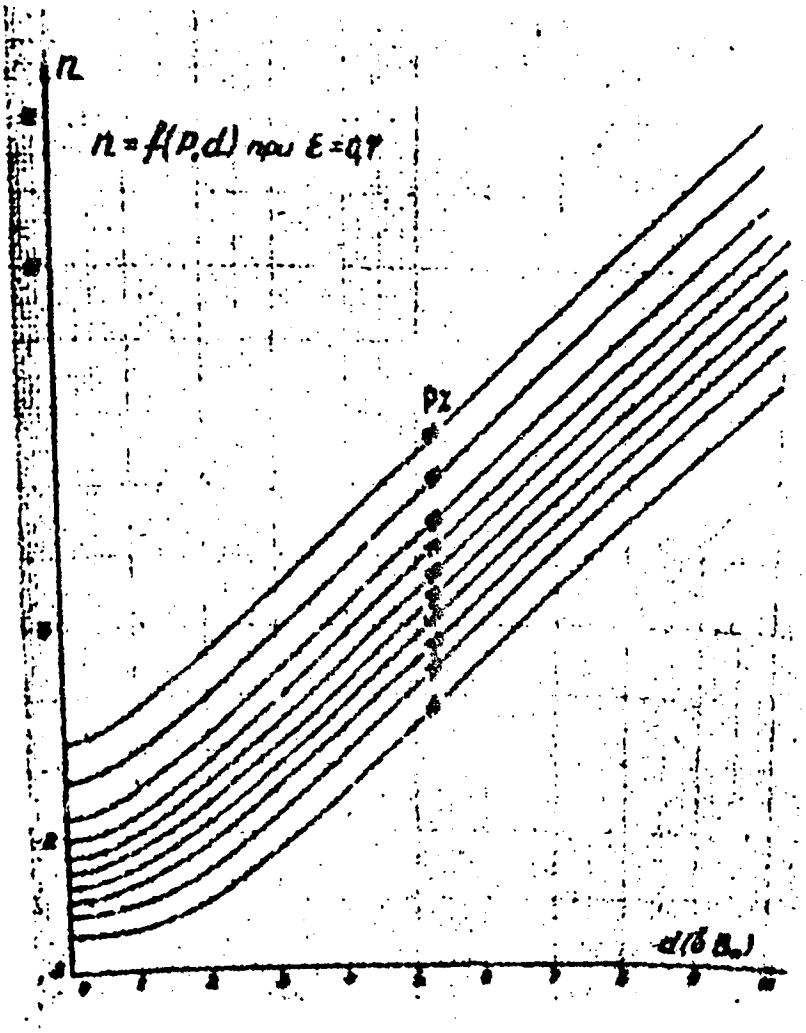

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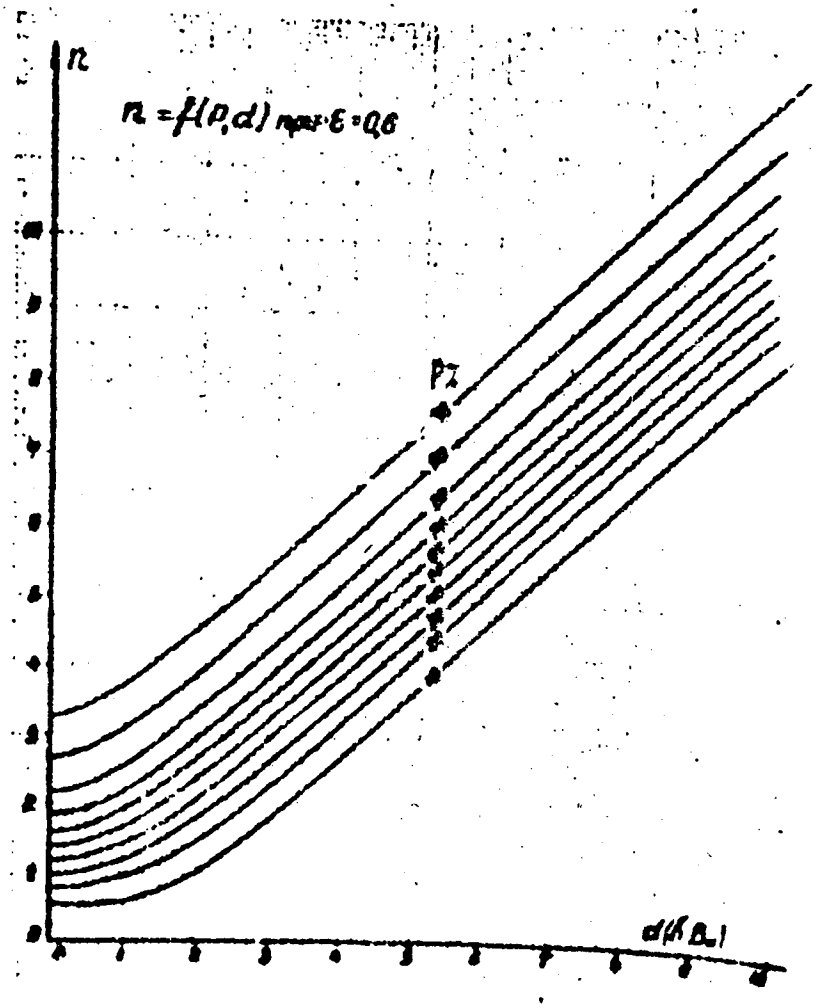

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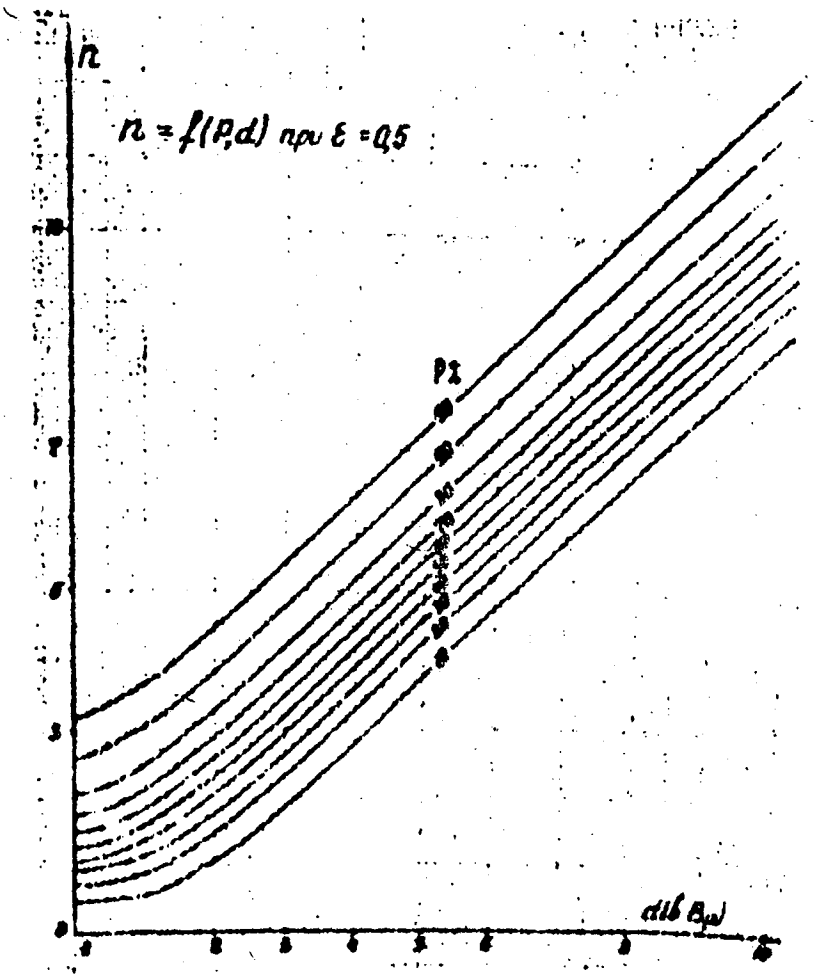

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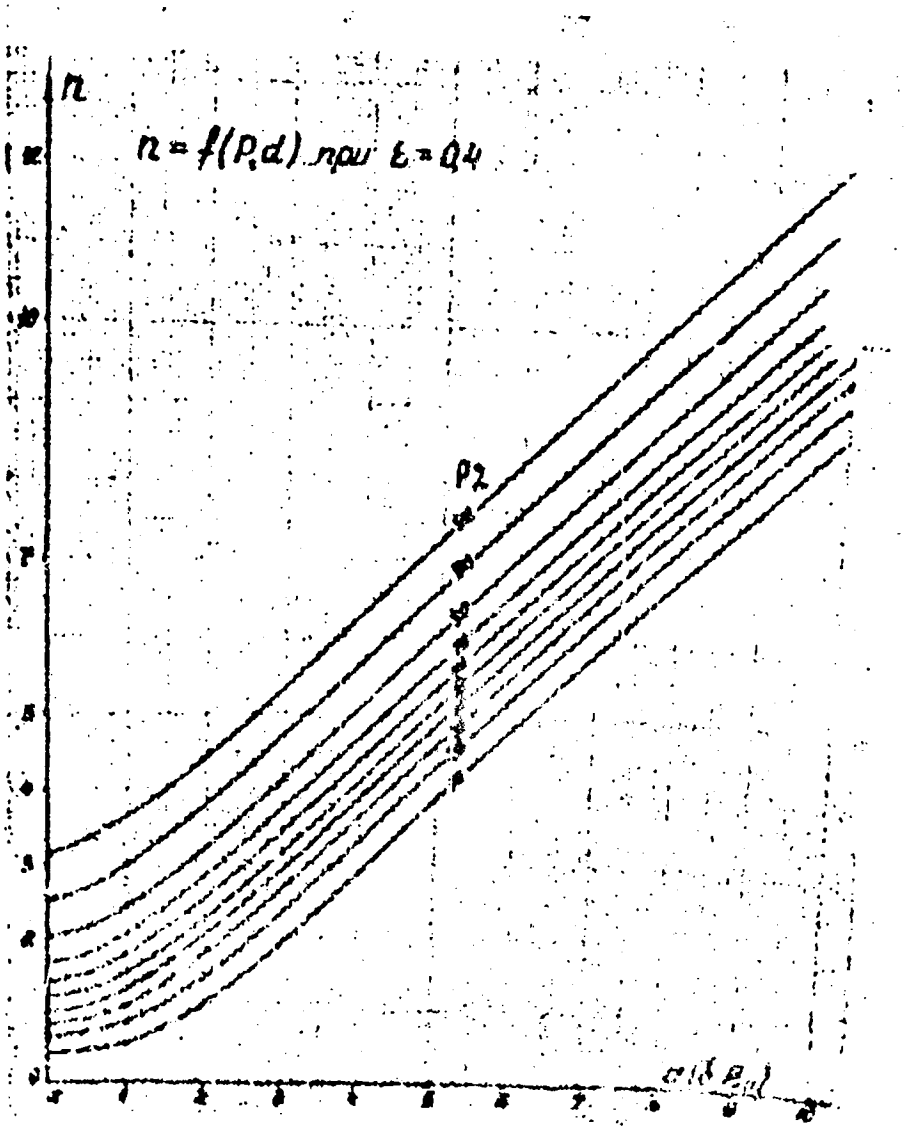

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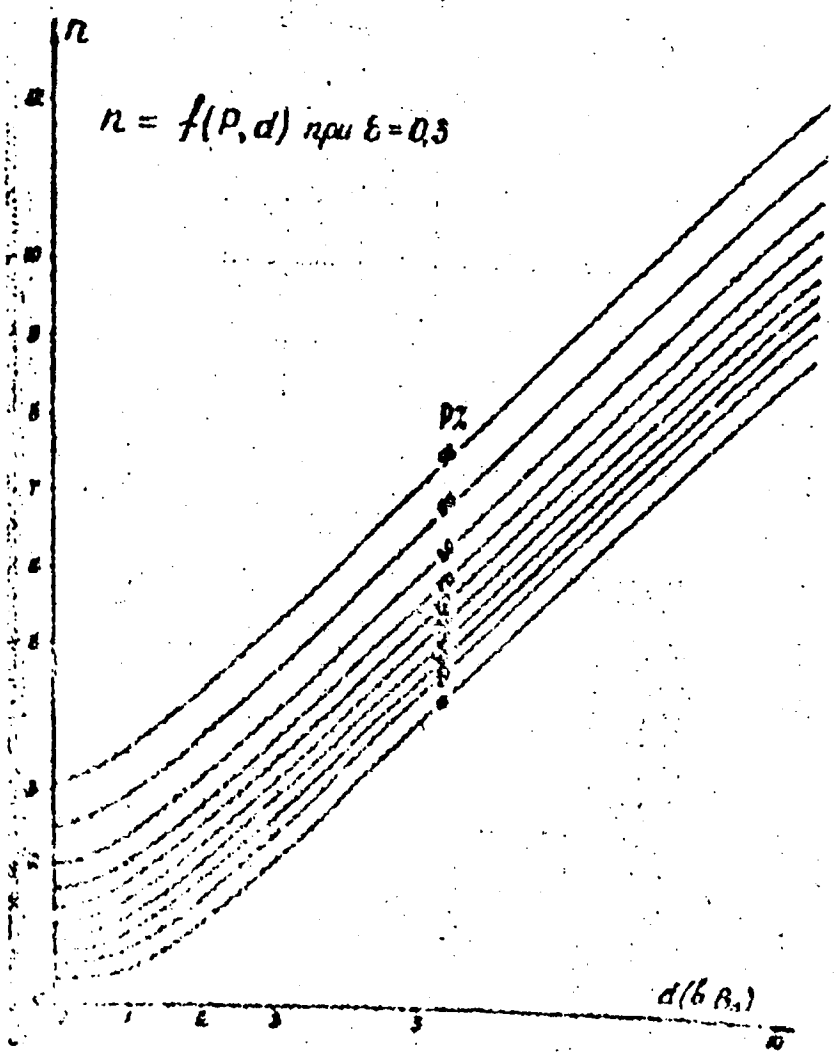

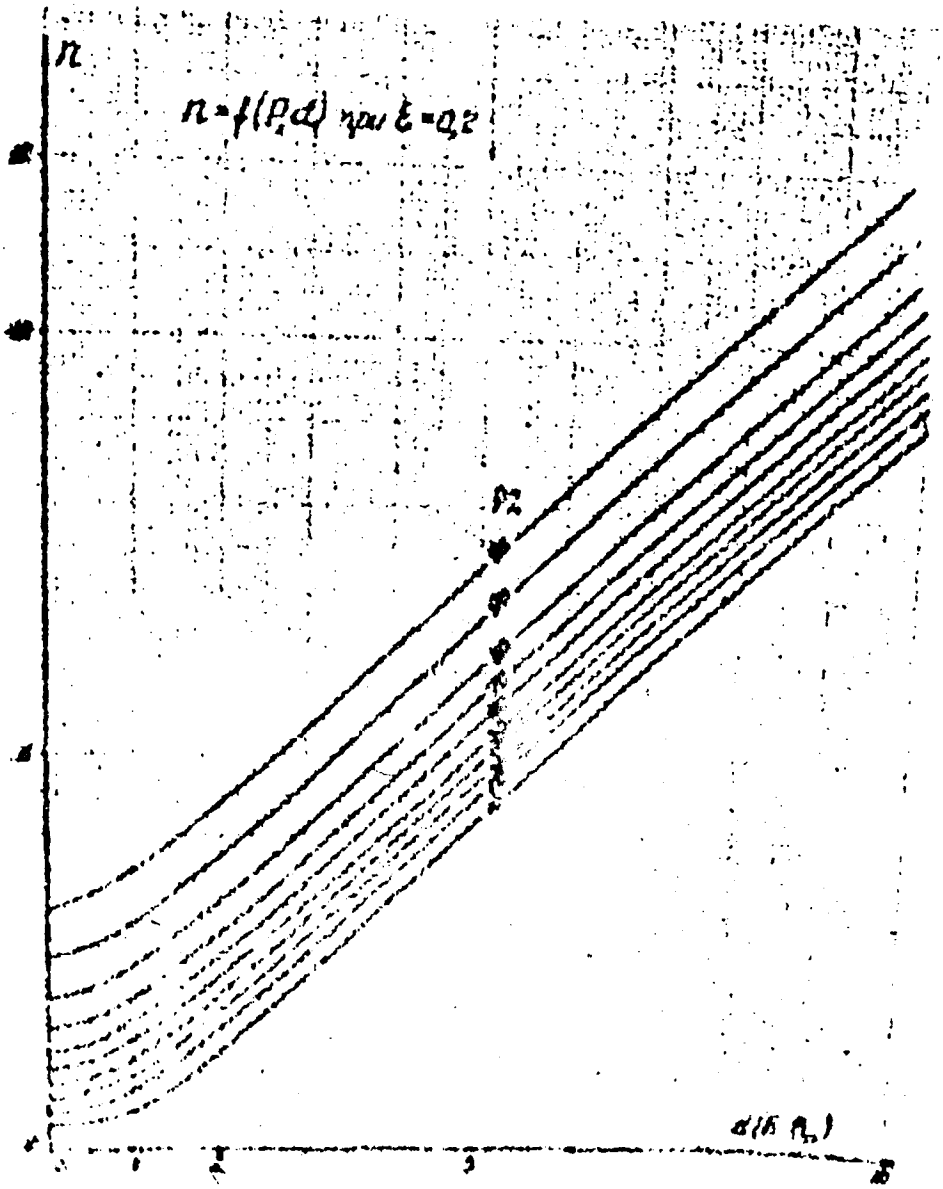
n
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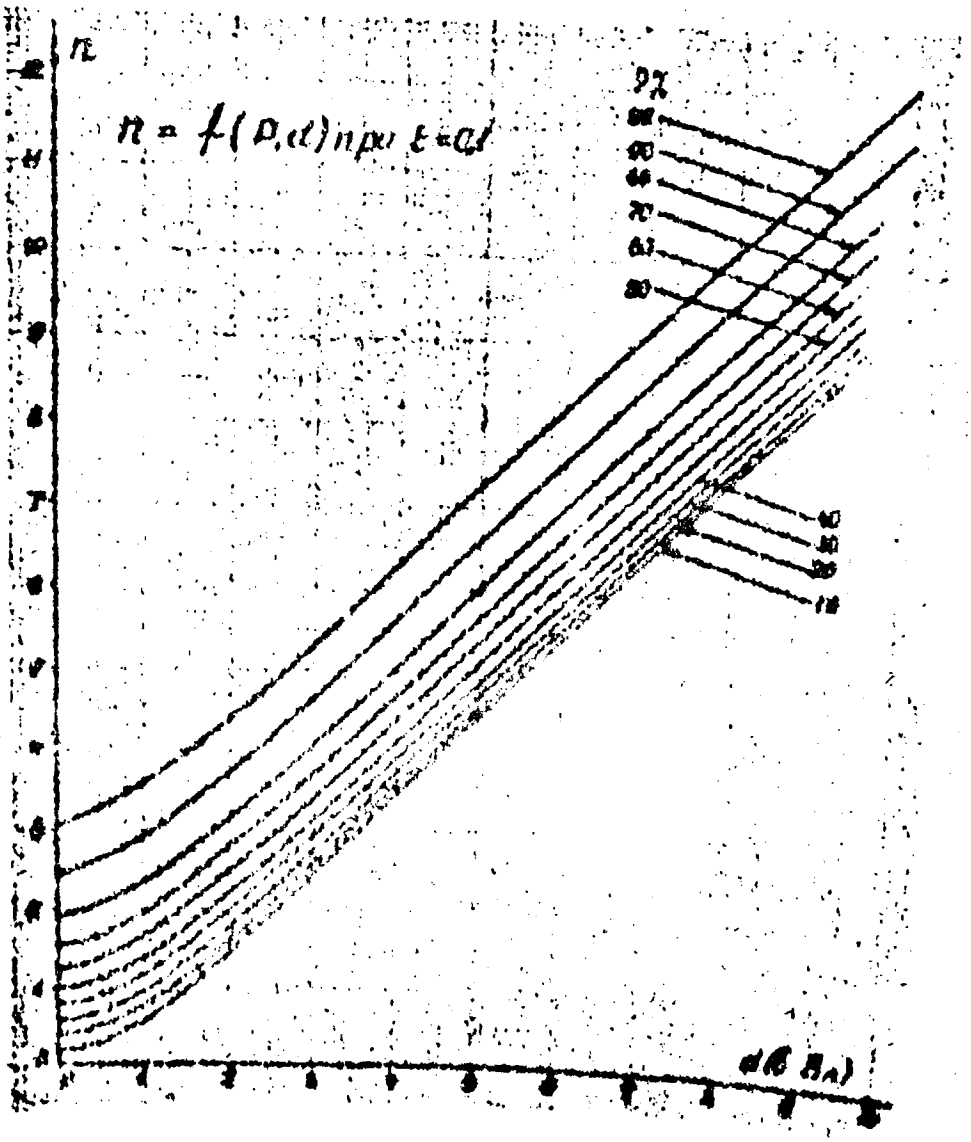
P2
d(R P2)


n
n = f(P,d) при ε=0,1
d(в Вт)

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