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CENTRAL INTELLIGENCE AGENCY
WASHINGTON, D.C. 20505

22 August 1980

MEMORANDUM FOR: The Director of Central Intelligence

FROM : John N. McMahon
Deputy Director for Operations

SUBJECT : USSR GENERAL STAFF ACADEMY LESSONS: Operational Calculations With the Use of an Electronic Computer to Determine the Capabilities of the Air Defense Forces and Means of the Front to Repel Massed Enemy Air Attacks

1. The enclosed Intelligence Information Special Report is part of a series now in preparation based on a collection of 29 lessons, classified TOP SECRET, prepared in 1977 for use in the Soviet General Staff Academy. The lessons are broken down into two parts: the first 19 lessons deal with the staff preparation of a front offensive operation with conventional and nuclear weapons, the remaining 10 lessons deal with the conduct of an offensive employing conventional weapons at first with a transition to the use of nuclear weapons. This report is a translation of the lesson used to instruct students in the use of the MINSK-32 computer to calculate air defense capabilities to repel a massed air strike from two different axes. The lesson also provides a sample air defense order of battle within a front.

2. Because the source of this report is extremely sensitive, this document should be handled on a strict need-to-know basis within recipient agencies.

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Intelligence Information Special Report

COUNTRY USSR

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DATE OF INFO. 1977

DATE 22 August 1980

SUBJECT

GENERAL STAFF ACADEMY LESSON No. 1d : Operational Calculations With the Use of an Electronic Computer to Determine the Capabilities of the Air Defense Forces and Means of the Front to Repel Massed Enemy Air Attacks

SOURCE Documentary

Summary:

The following report is a translation from Russian of a lesson, classified TOP SECRET, prepared for use at the General Staff Academy of the Armed Forces of the USSR. This lesson is designed to teach students in the role of front air defense chief to use the MINSK-32 computer to calculate air defense capabilities to repel a massed air strike from two different axes and to use the computer results to revise the order of battle to the best advantage. Three tables show the air defense assets available to the Coastal Front, the initial form used as the basis for the computer query, and the resulting final assessment.

End of Summary

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Lesson No. I-d

I. Lesson Subject: "Operational calculations with the use of an electronic computer to determine the capabilities of the air defense forces and means of the front to repel massed enemy air attacks."

II. Training objectives:

-- teach students to perform calculations using electronic computers to assess the combat capabilities of groupings of air defense forces and means to repel massed enemy air attacks;

-- train students to make an analysis of calculation results obtained on the MINSK-32 electronic computer and to prepare conclusions and proposals based on them;

-- examine capabilities to develop a machine algorithm for the optimal distribution of air defense means according to the altitudes of the enemy attacks.

III. Training topics and the time allotted for their completion.

Numbers-- in order	Training Topics	Time for their completion
1.	Study of procedure and preparation of initial data for calculations.	80 minutes
2.	Assignment of the task to perform the calculations and preparation of query forms.	25 to 30 minutes
3.	Analysis of the results of a calculation and preparation of conclusions.	40 minutes
4.	Report of the chief of air defense troops to the front commander.	20 minutes
	Critique of the lesson	5 to 10 minutes
		Total 180 minutes

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IV. Method of conduct -- Group exercise and actual performance of calculations on the MINSK-32 electronic computer.

V. Methodological recommendations on the preparation of students for the lesson.

Individual study is not planned for this lesson.

VI. Procedure for conducting the lesson

First training topic. A study of procedure No. 13 and preparation of initial data for calculations.

The instructor will set forth an overall procedure for conduct of the lesson to the students and he will emphasize that during the first two hours they should study the assignment and familiarize themselves with procedure No. 13 (Accession No. 101316, pages 1-10). Following joint clarification of the contents of the procedure with the instructor, the students should prepare the information for calculating the capabilities of the northwest axis. For this, they should independently determine the strength of the air defense means with respect to types and quantitative indices for enemy air attacks on this axis. The instructor will observe the work of the students and answer the questions they bring up. The instructor will give query forms to them to be filled out as the initial data are made ready. At the end of the second training topic, there will be a verification of the completed work.

Second training topic. Assignment of the task to perform the calculations and preparation of query forms.

a) Assignment of the task to perform the calculations (15 minutes). Operational time -- 0845 hours 1 September.

Students in the role of chief of the front air defense troops will assign a task to the chief of the operations department of the staff of the front air defense troops.

Assignment of the task should contain:

-- the axes of a possible enemy air attack;

-- the quantitative composition of the groups and echelons and their disposition;

-- the strength of the air defense forces and means allocated to each axis;

-- the conditions of an enemy air attack and the time to report the results.

Contents of the task assignment. To assess the combat capabilities of front troops in a departure position for the offensive, the repulse of a massed strike of up to 560 enemy aircraft operating from two axes will be taken as a basis for calculation: up to 130 aircraft from the northwest, and up to 430 from the west axis.

The enemy is expected to fly in two echelons on each axis. Accordingly, up to 30 percent of the enemy's aircraft designated to strike the air defense groupings will be in the first echelons.

The organization of air attacks will be according to altitude: the first echelon will be at low altitudes, the second echelon will have up to 30 percent at low altitudes, up to 50 percent at medium altitudes, and up to 20 percent at high altitudes.

In the air attack, the enemy will employ nuclear weapons and intense electronic jamming.

The following will be allocated to repel the initial massed air attack on the northwest axis: the air defense of the 4th Army, 13th Surface-to-Air Missile /SAM/ Brigade, 13th Motorized Rifle Division and the 2nd Army Corps of the Coastal Front, 1st Fighter Division of the 1st Air Army, 53rd SAM Brigade, 54th SAM Regiment, 34th and 33rd fighter regiments of the 6th Air Defense Corps disposed in the zone of the front up to its rear boundary on the ODER River. All remaining forces of the front, the 1st Air Army, and 6th Corps of the Air Defense of the Country /PVO Strany/ will be allocated on the west axis. Accordingly, in the first echelon of the disposition of front troops the following will participate in the repulse: the 7th and 9th armies, 15th SAM Brigade, 14th SAM Regiment, 17th SAM (S-125) Regiment, 3rd and 5th fighter divisions, 57th SAM Brigade, 35th and 36th fighter regiments of the 6th Air Defense Corps, and in the second echelon -- the 6th Army, 20th Tank Division, 10th Antiaircraft Artillery /AAA/ Division, 18th SAM Regiment, and also the 58th SAM Brigade and 52nd SAM Regiment of the 6th Air Defense Corps.

/The students should/ be ready to report an analysis of the results, conclusions, and proposals to me by 1330 hours 1 September.

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b) Preparation of query-forms (15 minutes).

Students in the role of chief of the operations department of the front air defense troop headquarters will report the following:

-- organization of the enemy air attack on the northwest axis;

-- strength of forces participating in the repulse of the air attack;

-- number of fire systems with respect to types and their affiliation with the different armed forces branches;

-- distribution of air defense means with respect to altitudes, i.e., they will report on the results of our work in the first two hours.

Contents of initial data

Preparation of initial data can be accomplished directly on a map or on a diagram (table) drawn up in advance.

It is first necessary to establish the composition and type of large units and units which will be able to participate on each axis and then calculate the number of fire systems by types.

The disposition and composition of an enemy air attack on the west axis has been set forth in the assignment. In all, approximately 130 enemy aircraft will operate on the northwest axis and of those, up to 40 aircraft will be in the first echelon and will be at low altitudes. There will be up to 90 aircraft in the second echelon (27 at low altitudes, 45 at medium altitudes, and 18 at high altitudes).

In keeping with the air defense forces allocated on the northwest axis, the following from the Coastal Front will participate in the repulse: seven motorized rifle divisions, one tank division, two SAM brigades, one separate AAA regiment, one SAM regiment, one fighter division from the 1st Air Army; and, from the Air Defense of the Country, one SAM brigade, one SAM regiment, and two fighter regiments.

The total number of air defense fire systems will be calculated on the basis of the organic complement of air defense means in a motorized rifle division and a tank division, and also the combat strength of units of the 6th Air Defense Corps and the 1st Air Army (the operational mission /is given in/ appendices 3, 4, and 10). Students will report the following complement of fire systems operating on the northwest axis.

Table 1

			Northwest axis
Ground forces air defense	Fighter Aviation, SAM troops & AAA	STRELA-2 /SA-7 shoulder fired/ launchers	915
		STRELA-1 /SA-7/ launchers	128
		ZSU-23-4 pieces	128
		57-mm batteries	18
		KUB /SA-6/ batteries	20
		KRUG /SA-4/ batteries	18
		S-75 SAM battalions	3
		MIG-21	40
		MIG-23	80
Air Defense Forces of the Country	SAM troops	S-125 /SA-3/ SAM battalions	2
		S-75 /SA-2/ SAM battalions	8
	Fighter Aviation	MIG-21	74

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In line with this, the organic complement of air defense means is to be taken as follows:

STRELA-2 Launchers: 120 per motorized rifle division, 75 in the tank division; STRELA-1: 16 per motorized rifle division (tank division); ZSU-23-4: 16 per motorized rifle division (tank division); KUB batteries (in conformity with operational mission data): five per motorized rifle division (tank division); 57-mm batteries: four per motorized rifle division (tank division); S-75 SAM regiment: three SAM battalions (four in Air Defense of the Country); S-125 SAM regiment: six SAM battalions; separate AAA regiment: six 57-mm batteries.

After determining the composition of air defense means, they /students/ will proceed to fill out separate query forms for the northwest and west air attack axes. The forms will be filled out so that the initial data will actually be distributed according to echelons and altitudes based on their /the means'/ combat characteristics, level of readiness, number of air targets, and the capabilities for follow-up sorties by fighter aviation.

A distribution variant for the west axis has been set forth in the assignment. At the lesson, students will fill out the form for the northwest aixs. If this is done in the first hour, they will report it then. Following this, the forms will be turned in to the computer center at the training control post.

In concluding, the instructor will emphasize the advisability of preparing several variants of the calculation so that the most optimum (variant) may be chosen more quickly.

Third training topic. An analysis of the calculation.

Operational time -- 1330 hours 1 September.

The instructor will distribute the results of the computer calculations to the students and he will give them 10 to 15 minutes to study individually (as concerns the northwest axis) and enter the data in the table in the appendix to the lesson. The instructor will ask students in the role of chief of the operations department of the air defense staff to report the main indices of air defense combat capabilities which were obtained as a result of the calculation, and the main conclusions:

-- total enemy losses for the entire air attack;

-- conclusions concerning axes and echelons;

-- conclusions concerning altitudes and the armed forces branches and branch arms;

-- proposals concerning further reinforcement.

Basic data in the report /see pages 16 and 17/

Total losses of the enemy: 195 aircraft, which constitute 35 percent of the 560 air attack aircraft. This percentage should be considered adequate for conditions of intense jamming of our radioelectronic means and the enemy's use of nuclear weapons. In the event of the absence of jamming, capabilities will be increased by 60 percent.

Losses for the northwest axis -- 47 percent (61 of 130 aircraft).

Losses for the west axis -- 31 percent (43 of 134 aircraft).

Conclusion: Air defense is not of equal strength on the two axes. It is necessary to strengthen the cover of the main grouping of front troops operating on the main west axis where the missile/nuclear means and second echelon of the front have been concentrated.

The enemy losses per echelon indicate that the second echelons sustain significantly fewer losses than the first echelons. Since the second echelons, as a rule, are supposed to deliver nuclear strikes against the main groupings of troops, then the action taken against these echelons should also be increased.

From columns 10 and 17, it is apparent that enemy losses with regard to altitudes are not equal: of all those destroyed, 67 percent were at low altitudes, 27 percent at medium altitudes, and 6 percent at high altitudes. An analysis of columns 6, 9, 13, and 16 shows that front air defense troops destroy 166 of 195 aircraft, i.e., 85 percent. The share for the Air Defense of the Country is only the remaining 15 percent. This conforms to the ratio of air defense means from those branches of the armed forces /present in the operation/.

Columns 4, 5, 11, and 12 show that the SAM troop means still constitute the backbone of the front's air defense by destroying 95 of the 195 aircraft, even with the participation of three fighter divisions composed of 360 aircraft.

Conclusions:

a) Strengthen the west axis by allocating from the northwest axis one fighter regiment of the 1st Fighter Division and the 1st Battalion of the 13th SAM Brigade, which is subordinate to the front, and also one fighter regiment from an adjacent air defense corps. In doing so, direct the above-mentioned means to destroy enemy aircraft operating in the second echelon.

b) Strengthen the northwest axis by allocating one fighter regiment and the 51st Surface-to-Air Missile Regiment from the 5th Corps of the Air Defense of the Country. In doing so, target them to destroy the second echelon.

In keeping with the considerations set forth, a follow-up calculation was performed, the results of which showed that:

-- the total enemy aircraft losses increased somewhat and consisted of 210 aircraft (37 percent).

-- as concerns the northwest axis, enemy losses were virtually unchanged, but on the west axis rose to 149 aircraft. In addition, second echelon losses increased to 28 percent (having been 25 percent) on this axis.

Fourth training topic. Report for the front commander.

Operational time -- 1400 hours 1 September.

Students in the role of chief of front air defense troops will report the following:

-- possible nature of the initial massed enemy air attack;

-- capabilities of front air defense troops to repel an enemy air attack;

-- the weakest places in the air defense;

-- proposals to ensure a further increase in air defense combat capabilities;

-- result obtained in the process.

Contents of the report.

1. An assessment of the enemy air grouping has indicated that his first massed air attack numbering up to 560 aircraft can be anticipated on two axes: up to 130 aircraft on the northwest axis and up to 430 aircraft on the west axis. The enemy will operate in two echelons on each axis.

2. The calculations performed showed that front air defense troops, in cooperation with the fighter aviation of the 1st Air Army and Air Defense Forces of the Country, can destroy up to 195 enemy aircraft, i.e., 35 percent of the total number of attacking aircraft. These data were obtained with account taken of the enemy's use of nuclear weapons and intense radioelectronic jamming of our air defense means. Under any other air attack conditions, the enemy losses would rise sharply.

3. The given operational disposition of front air defense troops is not equal in strength with regard to the axes (47 percent on the northwest axis; 31 percent on the west axis). Thus, the most powerful front troop grouping /sic/ operating on the main axis will be struck with lesser effect. In addition, the enemy's second echelons, intended to deliver attacks against front troops, will be struck more weakly than the first echelons.

4. For purposes of further improving the effectiveness of the front air defense system, it is advisable to strengthen the west axis and particularly the action taken against the enemy's second echelon, allocating in addition for this purpose one fighter regiment and the 1st Battalion of the 13th SAM Brigade from the northwest axis and one fighter regiment from an adjacent air defense corps;

-- it is advisable to allocate to the northwest axis one fighter regiment and a SAM regiment of the 5th Air Defense Corps.

Newly allocated means will be distributed against the enemy's second echelons.

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5. A follow-up calculation showed that, based on these proposals, an increase in the combat capabilities of the front air defense system and an increase in enemy aircraft losses can be anticipated, with total losses being up to 210 aircraft (37 percent) and 28 percent of the second echelon of the west axis.

A further increase in the number of enemy aircraft hit can be attained by bringing in air defense forces and means from the Combined Baltic Fleet to repulse the air attack, by operating aggressively in the battle for air supremacy (striking enemy airfields), and also having troops deliver organized small arms fire against enemy aircraft operating at low altitudes.

Critique of the lesson

The instructor will rate the students' preparation for the given lesson and he will emphasize that during the next lessons on problem No. 12, they should perform calculations individually using the given procedure, particularly when preparing for lessons 10 and 11.

Query Form (Procedure No. 13)

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Official Table (to be filled in once for the entire air attack and punched only for the first axis).

1) →

Number of axes in the air attack	Code, telephone of the user
2	--

DATA FOR ONE AXIS

** 2) →

Axis designation
n o r t h w e s t

Nature of the enemy strike		Jamming Level			
Non-nuclear	0	None	0	Medium	2
Nuclear	1	Weak	1	Intense	3

Mark the codes for selected conditions

Types of means			Number of targets	I. Area of repulse									** Means code	II. Area of repulse								
				1st ech.			2nd ech.			3rd ech.				1st ech.			2nd ech.			3rd ech.		
				39			27	45	18													
				Low	Md	Hi	Low	Md	Hi	Low	Md	Hi		Low	Md	Hi	Low	Md	Hi	Low	Md	Hi
Air Defense of Ground Forces	SAM Troops & AAA	1	STRELA-1	128			104															
		2	STRELA-2	915			735															
		3	ZSU-23-4	128			104															
		4	100-mm																			
		5	57-mm	18			10	4														
		6	KUB	20			6	10														
		7	KRUG	18				15														
		8	S-125	6			5															
		9	S-75	3					3													
	Ftr Avn	10	MIG-21PR/?/	10				20	10													
		11	MIG-21SM																			
		12	MIG-23	20			10	40	10													
Air Defense of the Country	SAM Troops	13	S-125	2			2															
		14	S-75	8					7													
		15																				
	Ftr Avn	16	MIG-21	38				20	16													
		17																				
		18																				
		19																				

** To be filled in by the operator of the electronic computer

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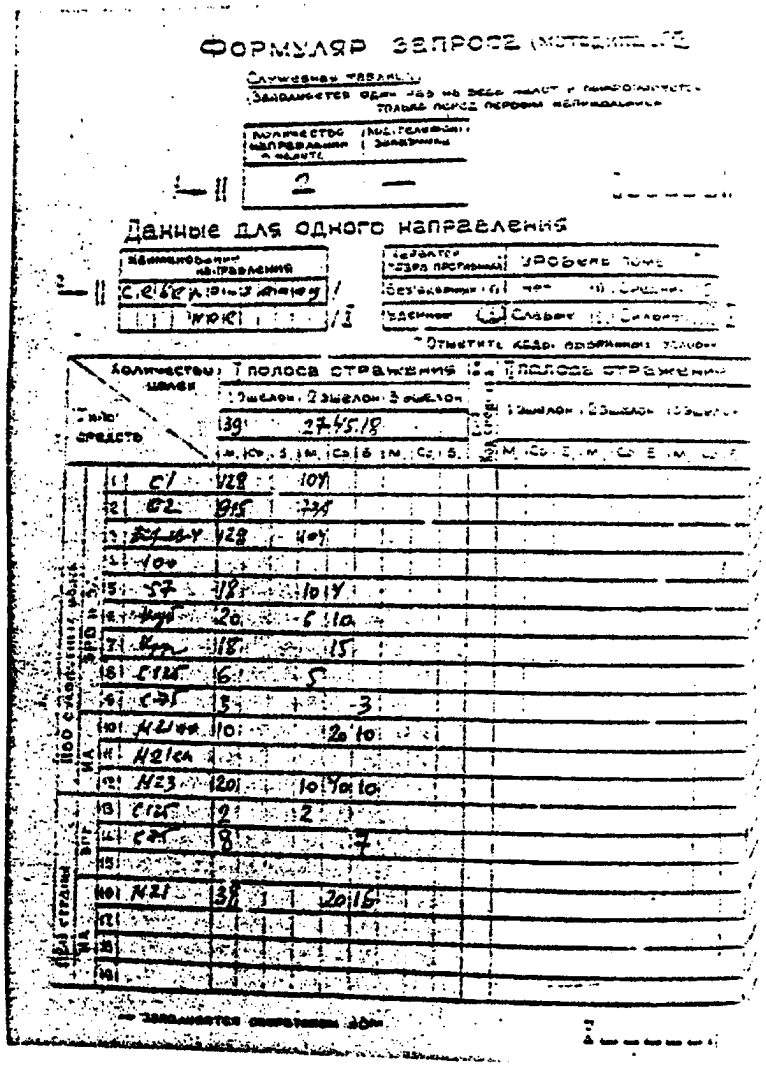

Query Form (Procedure No. 13)

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Assessment of Air Defense Combat Capabilities — User Code

Axis of the enemy air attack	Echelon	Number of targets at altitudes	Mathematical expectation of number of enemy aircraft destroyed															
			In the first repulse area							In the second repulse area							Total	
			Front Air Defense Forces			Air Defense Forces of the Country				Front Air Defense Forces			Air Defense Forces of the Country					
			SAM trps AAA	Fighter Aviation	Results	SAM trps	Fighter Aviation	Results	Total	SAM trps AAA	Fighter Aviation	Results	SAM trps	Fighter Aviation	Results	Total	In each Echelon	On separate axes
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
West		Low- 130	24	14	38	1	6	7	45	12		12	1		1	13		
	1	Med.-															58	
		High-															44%	
		Low- 90	15	10	25		2	2	27	9		9				9		
	2	Med.-150	7	21	28		4	4	32	1		1				1	76	134
		High- 60		5	5		1	1	6				1		1	1	25%	31%
North-west		Low- 39	13	5	18	1	5	6	24									
	1	Med.-															24	
		High-															61%	
		Low- 27	10	2	12				12									
	2	Med.- 45	4	12	16		4	4	20								37	61
		High- 18		2	2	1	2	3	5								41%	47%
Results for the entire air attack		559	73	71	144	3	24	27	171	22		22	2		2	24		195 35%

Nature and conditions of the air attack:

Axis: West -- Enemy nuclear strike in conditions of intense jamming

Axis: Northwest -- Enemy nuclear strike in conditions of intense jamming

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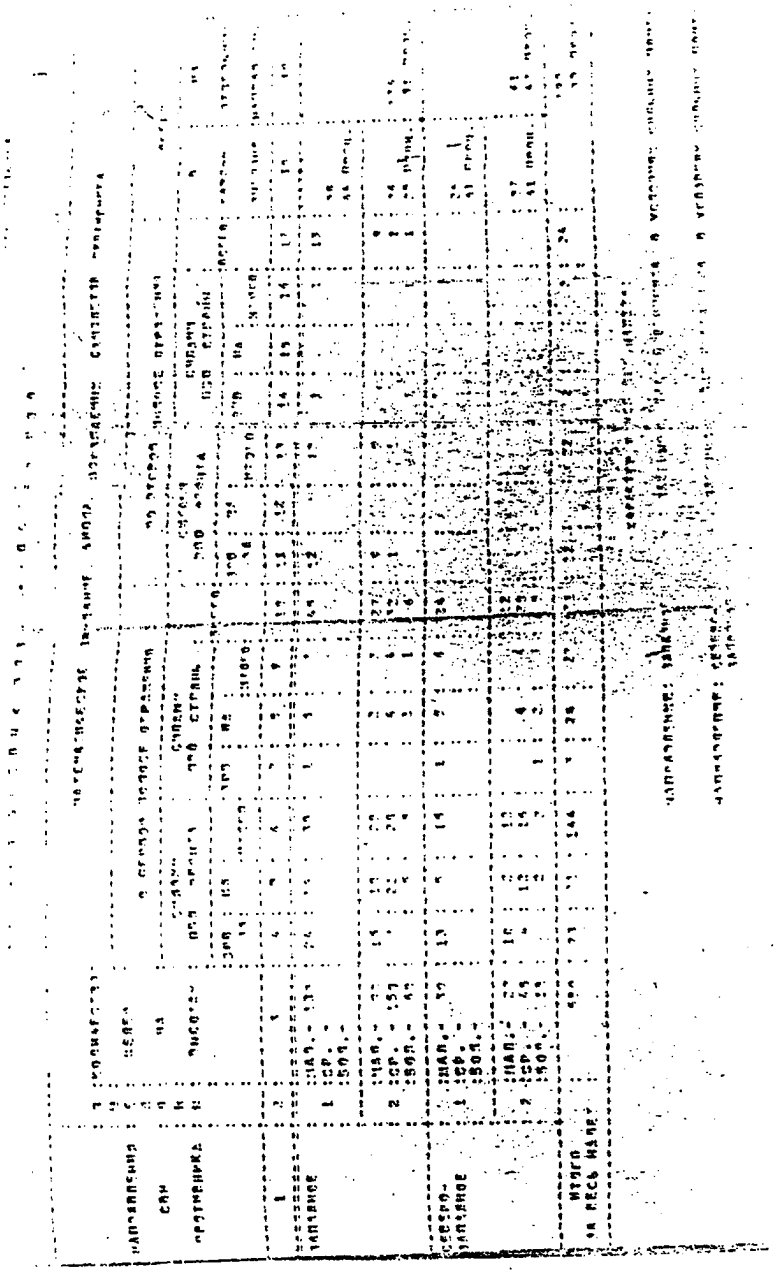
Form for Assessment of Air Defense Combat Capabilities



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