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CENTRAL INTELLIGENCE AGENCY

REPORT

# INFORMATION REPORT

50X1

50X1  
DATE DISTR. 17 Dec 1952

NO. OF PAGES 44

NO. OF ENCLS. 9 (A), (B),  
(LISTED BELOW)  
(C), (D), (E), (F), (G),  
SUPPLEMENT TO (H), (I)  
REPORT NO. 50X1

50X1 COUNTRY USSR/Germany (Soviet Zone)

50X1 SUBJECT Soviet Army Antiaircraft Artillery

50X1 PLACE ACQUIRED [ ]

50X1 DATE ACQUIRED [ ]

DATE OF IN [ ]

[ ]

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1. [ ]

2. During World War II and at the present time, AAA has answered an extremely important role in combatting enemy air power. Technical progress in the field of aviation and radio has posed a serious challenge to perfecting and developing AAA. Soviet AAA always lagged behind the development of the air force. This lapse was clearly demonstrated in World War II. AAA of medium caliber expended up to 1200 rounds for each aircraft brought down and small caliber artillery up to 1820. The Air Warning system was badly organized. Such defense weapons as barrage balloons, smoke screens and search lights did not prove effective. Taking this into consideration, Soviet experts proceeded to perfect and rebuild the AAA during the post-World War II years

3. The chief mission of AAA is to combat enemy airpower and destroy it. The mission is naturally not limited to the destruction of enemy aircraft but also to preventing the enemy from accomplishing his mission. AAA is also employed in combatting Airborne landings, including flares, tanks, armored vehicles and infantry, both by direct and indirect fire.

4. In certain exceptional cases, AAA, is used against bunkers and blockhouses.

5. The AAA is divided into three categories:

- (a) Small caliber AAA (MZA)
- (b) Medium caliber AAA (GZA)
- (c) Large caliber AAA (KZA)

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Small caliber artillery consists of the following: 25 mm AA gun M 1940, 37 mm AA gun M 1939, 57 mm AA gun M 1950.

Medium caliber artillery consists of: 76 mm AA gun M 1931, 76 mm AA gun M 1938, 85 mm AA gun M 1939.

Large caliber artillery consists of: 90 mm AA gun M (?), 100 mm AA gun M 1949.

6. Tactical doctrine divides AAA into two categories: Army AAA and Air Defense Command AAA. Army AAA moves with the ground forces and fulfills the following missions:

- (a) Defense from air attack of ground unit formations.
- (b) Defense of headquarters.
- (c) Defense of areas of troop concentrations.
- (d) Defense of tank and armored formations.
- (e) Defense of positions of the GHQ artillery reserve.
- (f) Defense of river crossings.
- (g) In self defense missions against tanks, air-borne landings and infantry (direct fire). On orders from the senior artillery commander AAA can be used in missions involving indirect fire.

Both small and medium caliber guns make up Army AAA. Small caliber AAA due to its mobility and rapid fire is used as cover for mobile troops, tank and armored formations. Army columns are given cover both by small and medium AAA. The tactics of the AAA depend on the circumstances at the given time and under given conditions and are dictated by the senior artillery commander. Sub-unit commanders are given freedom of action in order to permit maximum effectiveness under the circumstances and are dependent on the initiative of the commanding officers.

7. The 4th AAA Division, presently stationed in Konigsbruch(?) (Moiselanger(?), Germany, comes under the command of Artillery Headquarters 1st Mechanized Army located in Dresden. Its table of organization is as illustrated. See Enclosure (A)

8. A regiment of army AAA medium caliber consists of 16 37 mm guns M 1939, 16 12.7 mm machine guns, eight range finders type ZD, 12 radios type "RB" - 42, RB - 46, 30 telephones type UNA - F - 42, UNAI - 43 and 48 vehicles. All personnel are armed with small arms, carbines and submachine guns PPSH and with gas masks. Personnel totals 430 men with the following TO/E:

- (a) NCO School:

Commanding Officer - Major

Deputy Commanding Officer of NCO School, Political - Major; Deputy Commanding Officer of NCO School, Line - Captain; Four platoon commanders, Lieutenants or Senior Lieutenants; NCO's - nine sergeants.

Total personnel officers and NCO's included-- eighty-eight men

Officers - seven

Sergeants - nine

Enlisted men students-- seventy-two

- (b) Battery:

Commanding Officer of Battery - Captain

Deputy Commanding Officer, Political - Senior Lieutenant

Two platoon commanders - Lieutenants

Total personnel- - forty-eight

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Officers - four

Sergeants - fourteen

Enlisted men - thirty

Each platoon consists of two gun teams. Each of the teams consists of nine men.

Gun Team:

Gun team leader (37 mm gun)

No 1 Deputy leader - in charge of firing azimuth

No 2 Gunner in charge of angle of position

No 3 Gunner in charge of range and rate of fire

No 4 Gunner in charge of course of target and angle of trajectory

No 5 Gunner in charge of loading

No 6 Ammunition loader

No 7 Ammunition bearer

Driver

Each gun platoon has one range finder. Command squad of the battery consists of two liaison men, one radio operator and three scouts. One medic and one armorer are also assigned.

## (c) Machine gun company:

Total machine guns - 16

Dodge cars - 16

Officers - 7

Sergeants - 17

Total personnel - 72

## (d) OVS (Supply Section)

Commander

One Clerk

One Warehouse Keeper

## (e) PFS (Food Supply Section)

One Clerk PFS

One Warehouse Keeper

## (f) Motor Platoon

Commander of Motor Platoon

One Electrical Technician

One Clerk

One POL Attendant

Sixteen Drivers

## (g) Armament:

Commander of Armament Section

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One Armorer (senior)

Four Armorers

One Ammunition Dump Attendant

One Repair Shop Attendant

## (h) Administrative Service Platoon:

Platoon Commander

Six Cooks

One Mess Hall Attendant

One PX Attendant

One Movie Operator

One Library and Radio Attendant

Drivers, etc.

Total Personnel - (?)

## (i) Headquarters Platoon:

Platoon Commander

Radio Operators - 4

Liaison and Communications - 5

Scouts - 4

## (j) Staff:

Regimental Commanding Officer - Colonel

Deputy Commanding Officer, Political - Lt Colonel

Deputy Commanding Officer, Line - Lt Colonel

Medical Officer

Deputy Commanding Officer, Supply - Lt Colonel

Chief of Staff - Lt Colonel

Assistant Chief of Staff - Captain

Section - Lieutenant

Secretary of Party Organization - Major

Chief of Communications Section - Major

Chief of Chemical Warfare Section - Major

Secretary of Komsomol (?) (Communist League) Senior Lieutenant

Clerks - 3

For work in the field two staff cars specially equipped. Regimental Commander has a staff car for personal and official use.

## 9. An independent AAA Regiment Medium Caliber (OZAP) has the following equipment:

The regiment has:

32 - 85 mm guns M 1939

16 - 37 mm guns M 1939

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- 8 - Computers type PUAZO-3
- 16 - Machine guns DShK
- 8 - 7.6 mm machine guns
- 34 - Radios
- 105 - Vehicles
- 1 - Radar
- 16 - Range finders
- 12 - ( ? T3K ) abbreviations not known
- 14 - ( ? )
- 14 - Compasses
- 80 - Telephones
- 1500 - Personnel

## (a) Regimental Staff:

- Regimental Commanding Officer
- Deputy Commanding Officer, Political
- Secretary of the Communist Party Organization
- Secretary of the Communist Youth Organization
- Deputy Commanding Officer Rear Services
- Club Administrator
- Propaganda agitator
- Chief of Staff
- (1) Assistant to the Chief of Staff
- (2) Assistant to the Chief of Staff
- (3) Assistant to the Chief of Staff
- Chief of Ammunition Supply
- Chief of Motor Pool
- Chief of Chemical Warfare
- Chief of Special Section
- Headquarters Platoon Commander
- Chief of Supply Section
- Chief of Food Section
- Chief of Secret Section (Classified Documents)
- Chief of Base Housing
- Medical Officer

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- (b) Regimental Headquarters Platoon
  - Platoon Leader
  - 1 - Master Sergeant
  - 7 - Scouts
  - 9 - Liaison Section
  - 4 - Radio Operators
- (c) Medical Section:
  - Medical Officer
  - Medical Attendant
  - 3 - Medical Instructors
- (d) AAA Battalion - Medium Caliber:
  - Battalion Commander
  - Chief Adjutant
  - Deputy Commanding Officer, Political
  - Battalion Party Organizer
  - Armament Officer
  - Computer Equipment Technical Officer
  - Battalion Headquarters Platoon - 14 men
  - 4 Battalions - 300 men
  - Service Section - 21 men
- (e) AAA Battalion - Small Caliber:
  - Same number of officers as in medium caliber AAA Battalion
  - Smaller number of personnel - up to 250 men
- (f) Fire Control Company:
  - Commanding Officer
  - Four Operators
  - Total personnel on receiver and transmitter unit and on relocater - 41
  - (NOTE: This is the manning total for radar control (SON-2))
- (g) NCO School:
  - Same number of officers as in NCO School of medium caliber
  - AAA Regiment
  - 120 Students
- (h) Organization and personnel of machine gun company same as in medium caliber AAA Regiment
- (i) Battery of Medium Caliber AA Battalion:

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Battery Commanding Officer  
 Deputy Commanding Officer, Political  
 Executive Officer of Battery  
 Gun Platoon Commander  
 Headquarters Platoon Commander  
 Fire Control Platoon Commander  
 20 Sergeants  
 28 Gunners  
 12 Computer Operators  
 3 Range Finders  
 3 Machine Gunners  
 9 Drivers  
 6 Liaison  
 3 Radio Operators  
 6 Scouts  
 1 Cook  
 1 Medical Instructor  
 1 Armorer  
 1 Electrician  
 1 Master Sergeant

Total personnel in battery - 75 men

In service units the organization is the same as in the small caliber AAA regiment but personnel numbers twice as many.

Note: Independent artillery battalions have the same organization as the independent regiment but would have three to four batteries of medium caliber guns and one battery of small caliber guns. All other aspects of the organization would be similar to the regiment of medium caliber guns. The organization of component AAA regiments in the structure of brigades and divisions is the same as shown in the chart for the 4th AAA Division (Enclosure A) (without the battalions). The AAA brigade has a similar organization as the AAA divisions.

10. The chief mission of AAA is the defense from air attack of cities, important strategic objects, railroad stations, war factories, port facilities, railroad bridges, etc.
11. The Air Defense System (PVO) Artillery comprises not only heavy and medium caliber artillery but also small caliber and machine guns. Small caliber artillery and machine guns are often placed on rooftops of big buildings which increases the effectiveness of their fire.
12. The Air Defense System comprises, besides fighters, VNOs posts (air raid warning spotters), chemical companies, chemical warfare companies, smoke screens, searchlights, radar and barrage balloons.
13. The AAA of the Air Defense System is organized into separate regiments, regional battalions, corps air defense units and army air defense units. In World War II, 1941-1945, all air defense units were divided among four theaters: Northern, Western, Southern and Far Eastern Air Defense Theaters.

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14. All the theaters of the Air Defense System came under the authority of the Commander-in-Chief of National Air Defense, Colonel General Gramadin. At present the USSR is subdivided into Air Defense Systems of the 1st, 2nd and 3rd categories. The 1st category includes: Moscow, Leningrad, Baku, Sevastopol, Khabarovsk. Two to three Air Defense Armies are stationed on the periphery of these regions. The 2nd category includes: Gorky, Stalingrad, Murmansk, Odessa, Irkutsk, Riga, etc. Air Defense Units from Corp to Army are deployed to defend those areas.
- (Note: The Air Defense System areas are not confined by the boundaries of the cities after which they are named but include in these areas other points of major importance located within their boundaries.)
15. At the present time air defense areas come under the command of the Commanding General of the OKRUG (Military District) in which they are located. However, regions of 1st and 2nd category come directly under the command of the Headquarters USSR Air Defense System.
16. The re-deployment of major and distant Air Defense Systems closer to the front lines was not practised during World War II. After major cities were liberated, independent AAA regiments and divisions were allocated to their defense from units behind the front lines.
17. Three - four defense belts are organized around an objective of No 1 category (Moscow) (Enclosure (E)). At a distance of 50 kms from the circumference of the outer ring, radar installations operate. In these areas there are also fighter squadrons operating against the enemy up to the outer limit of the medium and heavy caliber AAA belts. Within the outer belt and up to the middle belt fighter squadrons are active. Fire power is most concentrated within the center and inner rings. Over the objective itself and along its approaches (three to five kms) medium and small caliber AAA operate along with AA machine guns and fighters.
18. Joint action between fighters and AAA is worked by Headquarters AAA and Air Force and all officer personnel is briefed along special lines in this type of operation.
19. At present the following guns are allocated to AAA units of the Soviet Army.

## (a) Heavy caliber AAA.

100 mm AA guns M 1949 with mechanical time fuze M-48 with automatic fuze setter.

Fire computer PUAZO-4 or radar unit "MALAKHIT". Battery consists of eight guns. Vertical range up to 14.5 kms - horizontal range up to 20 kms. Other ballistic data concerning this weapon are unknown as they have just recently been issued to AA units of Air Defense Areas of Category No 1.

90 mm AA gun type \_\_\_\_\_? has not received wide distribution and has almost been withdrawn from use. It was serviced by a SON-3 set.

## (b) Medium caliber AAA.

These caliber weapons received the widest use during World War II and were evaluated as one of the best weapons to combat enemy aircraft at high altitudes.

85 mm AA gun M 1939.

Weight - 4300 kgs

Vertical flight range 10.5 kms

Total range 15.5 kms.

360° horizontal traverse

Vertical traverse + 82° - 3°

Explosive pressure 2400



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Initial projectile velocity 800 meters per second

Velocity of fragments after burst 420 m/sec. Sliding-wedge-type breech mechanism semi-automatic, with semi-automatic mechanism of inertia type.

Rate of fire, 20 rounds per minute

24 riflings to the barrel; uniform twist 2.6 turns; 3° 24' 36" from axis of bore.

Volume of fluid in counter-recoil mechanism 10.8 liters (glycerine liquid).

Volume of liquid in recoil brake 7.1 liters

Initial pressure (nitrogen) 48 - 50 atmospheres

Distance of recoil 600 - 1150 mm

Installation on mount-type ZU-38

Solid tire

Ground clearance 400 mm

Time to change from march order to combat readiness, 1.5 - 2 minutes

Weight of fixed round 9.2 kgs

Fuze T-5 (165 calibrations). Each calibration corresponds to approximately 50 meters of flight.

Speed on paved surface road, 50 kms

Speed on dirt road, 25 - 30 kms

Speed cross-country, 10 - 15 kms

Towing truck Studebaker or GAS-63 (in wartime tractors CTZ were also used)

7 man crew services the gun

76 mm AA gun M 1931

Weight 5200

Projectile velocity, 850 meters per second

Ceiling of fire, 9 kms

Range, 14 kms

Fixed round with fuze T-ZUG

Time to change gun from march order to combat, five minutes

Speed on good road, up to 40 kms

Cross-country speed, 7 - 10 kms

Gun served by team of seven men and fire computer PUAZO-2

This system was not successful in wartime and is at present almost obsolete.

76 mm AA gun M 1938

Ballistic and construction characteristics were generally similar to AA gun type 1931 with the following exceptions:

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Installed on type ZU-38 mount

Weight of gun decreased can be used in conjunction with computer PUAZO-3

Speed increased to 50 kms

(c) Small caliber AAA

57 mm AAA gun M 1950 with special installation designed for fire against enemy fast-flying jet aircraft. The unit automatically computes firing data regardless of plane or flight of target. This unit may be utilized for firing on aircraft at medium altitude. Construction and ballistic data of this gun are unknown to me.

37 mm AA gun M 1939 with automatic sight M 1939 and 1943. Was widely used to cover movement to combat formations, tanks

Weight of unit, 2300 kgs

Number of riflings 16

Rate of fire, up to 140 rounds (theoretically)

Initial speed, 840 meters per second

Vertical range of projectile, up to six kms

Total range of projectile up to nine kms

Time to change from route to combat order, 40 - 50 seconds

Weight of shell with fuze type MG-8, 500 grams

Weight of liquid in recoil brake, 0.9 kgs

Counter-recoil mechanism spring type

Towed by any truck, mostly Studebaker and GAZ-63

Gun team eight men

Gun Commander

No 1 deputy commander and pointer of firing azimuth

No 2 angle-of-position pointer

No 3 gunner in charge of sighting

No 4 assistant gunner in charge of sighting

No 5 loader

No 6 and 7 ammunition bearers.

Driver

25 mm AA gun M 1940. Usually installed on vehicles.

Construction data similar to 37 mm AA with the exception of overall dimensions. Velocity of projectile has been stepped up to 900 meters per second.

12.7 mm AA machine guns type DShK are used mainly against diving aircraft and aircraft flying at low altitudes up to 2000 meters.

Rate of fire, up to 400 rounds per minute

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Carried on Dodge trucks and mounted on tripods. Are placed in firing positions in trucks

7.6 mm AA 4 band machine guns type "MAXIM". In general is used to cover formations and disposition of medium caliber AAA batteries; fire only on diving and strafing ground attack aircraft. Installed on GAZ-AA vehicles. Three man crew. Presently almost obsolete in AA armament.

(Note: For World War II, 1941-1945, 76 mm AA guns M 1914 were also used on stationary mounts and on special moving platforms. Today they are completely obsolete.

AAA Fire Computer PUAZO-2.

Computes firing data for anticipated azimuth angle of elevation and fuze setting.

Consists of firing chart, ballistic computer and central regulating (distributing) box (TZRIA).

11 Man crew.

Carried in special boxes on trucks.

Eight minutes to prepare for combat readiness.

Placed at distance of no more than 30 meters in center of battery.

PUAZO-2 was designed for slow flying aircraft hence is also obsolete.

Firing was synchronized with computer data or, as auxiliary means, was transmitted by voice telephone.

Similar to PUAZO-2, PUAZO-1 of still older design was used.

AAA Fire Computer PUAZO-3.

PUAZO-3 has the widest use in AAA.

The 1940 unit is installed on one vehicle with the batteries (accumulators).

Weight up to 1400 kgs

Serviced by 11 men (with electrician).

Suitable for transport and rapid operation.

Computation of firing data is performed by a conical system of coordinates  
(H Dg B) H - altitude  
DG- horizontal distance  
B - azimuth

Computed anticipated position data are fed into the guns by a synchronized system. The guns are situated 300 meters from the computer.

The basic computation is made by No 9 and reintroduced into the final computer data.

PUAZO-3 is built of the following components:

Base and computer.

Differential mechanism.

Mechanism of set forward point.

Mechanism for computing altitude, diving and climb (zoom).

Mechanism of spot (fractional) corrections.

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Mechanism of colored discs. This prepares data for time of flight, future azimuth and future elevation.

Parallax and wind computer.

Motor of constant rate.

Vehicle and electrical equipment.

PUAZO-3 is currently still used in the Soviet Forces.

AAA Fire Computer PUAZO-4.

This device is similar to PUAZO-3, but is improved and somewhat changed structurally; however, it has not proved itself and consequently only few AAA units are equipped with it.

20. The following observer equipment of AAA of the Soviet Army is in operational use.

Binoculars: B-6, B-8 used by all the scouts, officers and gun commanders. For use in target selection, approximate determination of distances to target and location of bursts.

Battery Commander Scope: TZK type 1944 used on command post and designed as one of the main means of judging burst deflection and obtaining correcting data. It is manned by two scouts, has 12 power and is very handy and of simple construction.

Binocular Spotter: Serves both for spotting the target and for determining necessary data for correction.

Power: 6X, 8X, 12X.

Is operated by two men.

Is not convenient to use against fast-flying aircraft and therefore is gradually becoming obsolete.

Compass, Aiming Circle type MIKHAILOVSKY - TOUROV. Serves in the disposition of the battery to point the gun, place the computer etc. in position. Used with medium caliber AAA guns to lay the guns in indirect fire against ground targets.

Operated by one man.

Transit (Theodolite): Serves for topographic orientation of battery and aiming points, and orientation of certain optical instruments.

Is not always in current use in medium caliber AAA but is available in units of instrument reconnaissance.

Range Finder "ZD": Is used by small caliber AAA and serves to determine range to aircraft.

Is operated by No 3 man in crew.

Base one meter; determines range up to five kms.

Manned by one man (stereoscopic observer).

Range Finder DYA-1, DYA-2: Is in use by medium caliber artillery to determine aircraft altitude as basic data for the PUAZO-3 computer to determine necessary firing data. Consists of a complicated optical system and necessitates thorough maintenance. DYA comes in two and four meter base dimensions. Radius of action, vertical 20 kms, range 50 kms, manned by crew of three.

The determination of altitude for the PUAZO-3 is the basic factor in computing firing data, hence the stereoscopic operators are particularly carefully trained.

Radar: Heavy and medium caliber AAA as well as observation and warning posts are equipped with the following radar:

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SON-2, SON-3, "PEGMATIT", "MALAKHIT" and also German radar of the "WURZBURG" type.

Some radar are located close to the batteries and are synchronized with them, others give data through a relocation center to several batteries simultaneously. AAA can fire at unseen targets at night and during the day (in bad weather). Positive results have been obtained by their use.

The new regulations of medium caliber AAA include present instructions on firing with "SON". It seems probable that with time the "MALAKHIT" radar will entirely replace the obsolescent PUAZO-3.

Instruments used in map work of the AAA include celluloid protractor M 1939 or M 1942, coordinate measure, CURVIMETER, weems plotter, compass.

Maps were available to all officers during World War II; at present, however, a map can be obtained only from a headquarters and has to be signed out for a definite length of time (up to eight hours).

21. Basic data and resolutions covering AAA tactics are taken from project for training manual of AAA 1950. An AAA formation is a disposition of vehicles, guns, computers and personnel as detailed in the regulations.

They include: Extended formation, echelonned formations and route column formations.

Extended formation: Units of a regiment or a battalion draw up in one line in numerical order. On the right flank is the regimental (or battalion hq) command platoon, 1st, 2nd, 3rd, 4th batteries, machine gun company, service unit and communications unit.

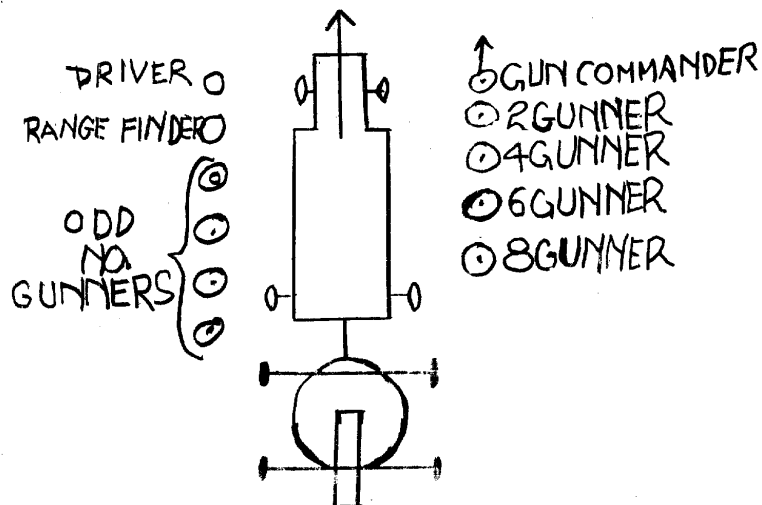
Interval between vehicles, five meters.

Interval between sub-units, 15 meters.

Company (battery) commander stands on the right flank of his unit, platoon commanders at the head of their platoons, vehicle commanders on the right side of the radiator of their vehicle, having behind them all even number gunners (2, 4, 6, 8), the driver stands on the left of the vehicle with the range finder operator behind him and all odd number gunners following.

The battery is drawn up as follows:

On the right flank, the command platoon then the battery computer platoon, firing platoon in numerical order of guns and the master sergeant of the battery.



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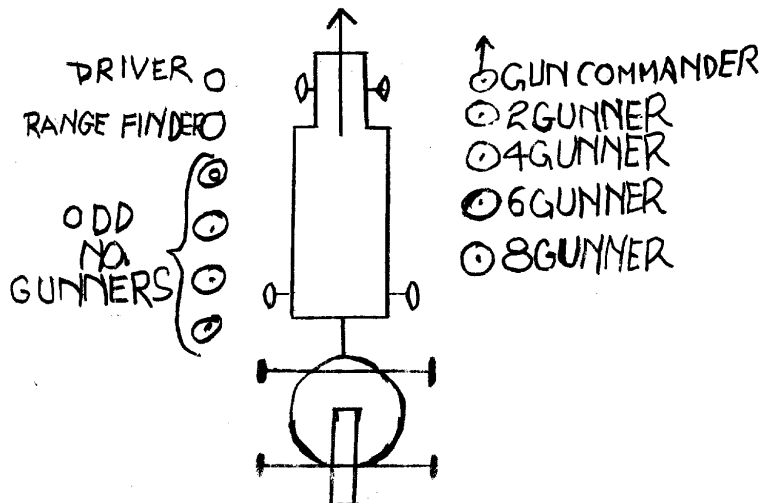
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Echelonned formation: This formation is employed when crossing water barriers, narrow defiles, sectors under fire, under air attack or when occupying firing positions.

In those circumstances each battery commander directs his unit on his own initiative and according to the situation.

Column route order: Employed in AAA when the situation necessitates change of firing positions by all the regiment, relocation of the regiment to a new sector of the front etc. The regiment can move in a column of mixed formations or independently, in both cases the regimental commander is responsible for the preparation and execution of the march.

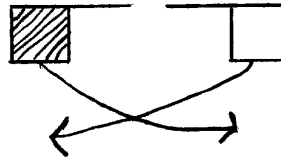
The control of units on the march is carried out by signals common to ground units when in mixed formation but when marching independently particular to AAA regiments and battalions. The signals used in AAA formations are:

ATTENTION:



White flag raised vertically.

VEHICLES TO BATTERY:



Flags extended horizontally and waved downward (for medium caliber AAA this means board vehicles).

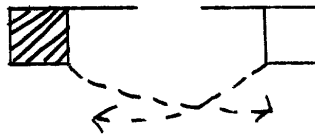
STAND BY VEHICLES:



Flags extended horizontally and stationary.

On this command personnel take their places by the vehicles and await the next command. The gun commander supervises the position of the gunners.

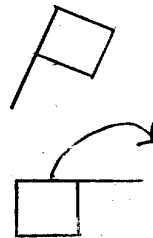
MOUNT UP:



Flags waved overhead.

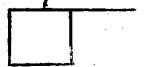
On this command all turn around and climb into the vehicles each man on board takes the next man's rifle to facilitate his loading.

READY:



White flag held obliquely.

START ENGINES:



Red flag revolved, signaler extending his arm forward.

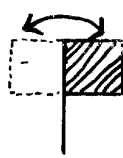
On this command all drivers start up their engines and await the next command.

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FORWARD, RIGHT  
LEFT (MARCH):



Red flag stretched overhead  
and waved in direction of  
movement.

HALT:



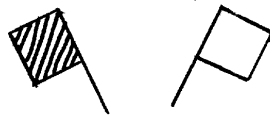
Red flag raised stationary  
overhead.

CUT ENGINES:



Waved red flag in front of  
signaler

TANKS:



Both flags held obliquely -  
stationary.

On this command battery commanders take batteries off the road, prepare for action and open fire on targets offering the greatest threat to the battery. After repulse of tank attack, column resumes movement.

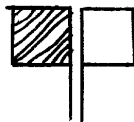
AIR RAID:



Red flag raised obliquely  
from signaler.

Depending on the type of enemy aircraft and on their tactics, the column may be echeloned out and may continue its march, but on being attacked will open fire on the most suitable target.

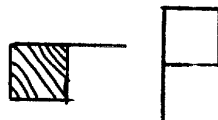
GAS ATTACK:



Both flags raised stationary  
overhead.

Personnel put on gas masks and resume movement.

RIGHT:



White flag raised vertically,  
red lowered in direction of  
movement.

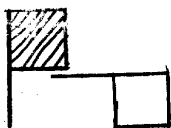
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LEFPE:



Opposite of above.

OBSTACLE:



Flags crossed overhead.

(Note: Each signal is preceded by the command "attention". The signal is repeated until the signaler is convinced of its reception and transmittal by the next signaler.)

22. During the preparation for the march the regimental (or battalion) commander receives briefing on the tactical situation and mission for the regiment from the senior artillery commander. Upon examining the situation and the given mission, the regimental headquarters proceeds to work out the operation for each of the sub-units of the regiment.

The briefing includes:

- General data on the enemy.
- Position of friendly and enemy forces.
- Mission of regiment and its sub-units.
- Route and order of march.
- Location of last halt.
- Chemical warfare defense enroute.
- Signals.
- Preparation of sub-units to open fire.

Each battery commander upon being briefed on the situation and upon receiving the mission notes it on the map and advises all his command.

ORDER: (SAMPLE)

Elevation 204.3	12.1Y	1952
Village Milchailovka	19.20	

Enemy in strength of two tanks, one mechanized and two infantry divisions with air support, intends to take Dresden and surround our units in the Leipzig - Chemnitz - Meissen sector. Our forces are heavily engaged in defensive action in the zone Niederlitz, Mentzhorri and 120-135 kms further north. Enemy aircraft type Boston, Manchester, B-26, etc, are carrying out heavy bombing of our troop dispositions and artillery positions. Our troops detrained tonight at railroad station in Dresden. Their mission is to stop the enemy and counter-attack. Mission of our regiment, to cover the 11th Tank Division enroute and in the assembly area.

Order of March: Advance party: 1st Battery, advance guard 2, 3 batteries, main body 4, 5, 6 batteries and machine gun company. Battery commander will open fire independently if attacked, guns to be readied for firing on the move. If attacked by tanks, open fire and act according to the situation. If subjected to chemical attack take countermeasures and proceed with march.

Signals: According to regulation, battery commanders to detail observers on each vehicle to scan the sky and land and to observe the signals along the column. Synchronize watches, it is now exactly 19:30.

Start 20:00 - Brief your personnel on situation and mission.

of regimental units [redacted] Location of last halt  
Last halt to be reached at 21:45.

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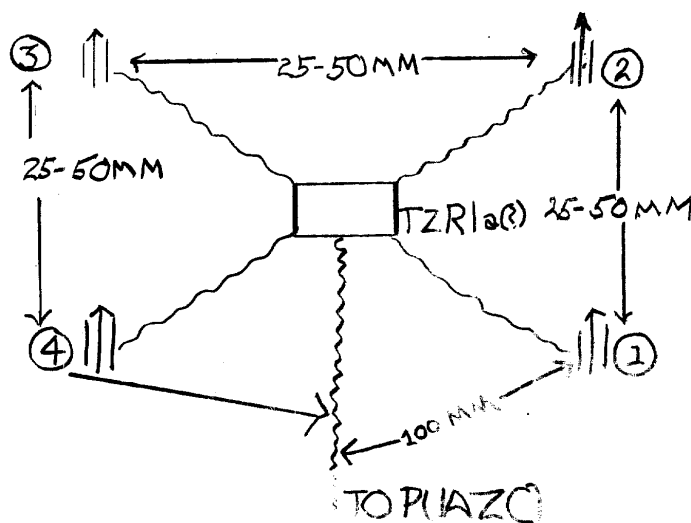
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Readiness of units to open fire, 30 minutes.

Units to be completely serviced and ready by daybreak, carry on!

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24. When a regiment of medium caliber AAA is on the move whether in a combined arms formation or independently, in both cases battery commander's parties and patrols are sent out. Close reconnaissance patrols are detailed by battalion (or battery) commanders when sub-units are involved in a march of no more than 24 hours. The patrol consists of three to four scouts, with entrenching tools. They also function as guides.
25. Long distance reconnaissance patrols are detailed by the senior artillery commander when the movement involves no less than two or three 24-hour marches. The long distance reconnaissance patrol also performs, as a rule, the function of the battery commander's party. Its mission consists of selection of the best routes (determining the condition of the roads and waterway crossings for the artillery). It must also select the firing positions of the batteries and the command post of the regiment (battalion). The long distance reconnaissance patrol consists of: Patrol Commander, Deputy Chief of Staff, all the headquarters platoon of regiment (battalion), one scout from each battery, one medic, one chemical warfare specialist and the Deputy for political control from one of the batteries.
26. When selecting a firing position, the location must be satisfactory for occupation and defense. The ground must not be stony and suitable for entrenching. Revealing signs or features must not be in the vicinity. Site of mask must not be above 0-50- to permit good field of observation. Depth of site must be 15 meters (for medium caliber AAA) to provide concealment of the equipment and of dust and flashes from the guns. The firing position must be satisfactory for antitank combat. All natural obstacles must be utilized. It must provide for easy dissipation of gases of a chemical attack. It must have easy access and natural camouflage (if such is available).
27. Following the examination of the area, and in conjunction with the given mission, the commander of the patrol selects the firing positions of the batteries and the regimental (or battalion) command post. The scouts from each battery arrange the battery fronts, taking into consideration the fields of fire allotted to each battery. The battery front is deployed with the aid of compass in accordance with the trapezoid or rectangle pattern and the guns numbered from right to left.

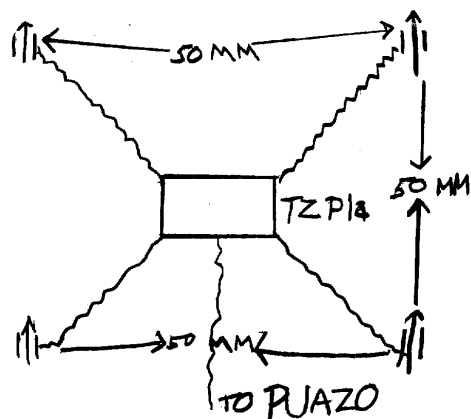


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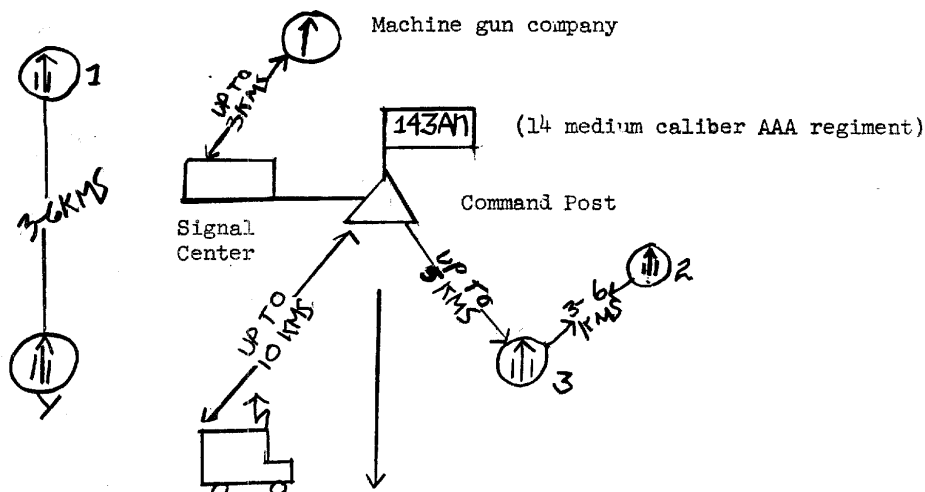
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## Rectangle System



The scouts select an area for parking the towing vehicles which should be no closer than 800 meters and would afford cover to the vehicles and be accessible to the position of the batteries. For orientation of batteries and adjustment of range finders, each battery selects two to three check points, which should be closer than 10-15 kms. The command post of medium caliber AAA is at a distance of 300 meters from the firing platoon. In small caliber AAA the battery command post is in the immediate vicinity of the fire platoons. Each battery selects one or two auxiliary firing positions.



Medium caliber AAA batteries are located around the objective depending upon its importance. To achieve a zone of fire with range spread between three batteries, the latter are located at distances not greater than six kms. Small caliber AAA batteries are placed three kms from one another.

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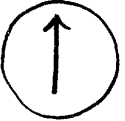
TACTICAL SYMBOLS USED IN AAA



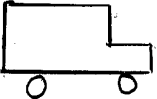
Medium caliber AAA battery



Small caliber AAA battery



Machine gun company



Radar



HN-2 Observation post of battery



Battery Command Post



Alternate battery position



Towing platoon



Ammunition service platoon



Individual gun medium caliber AAA



Individual gun small caliber AAA



Individual machine gun



Radio station



Radio center

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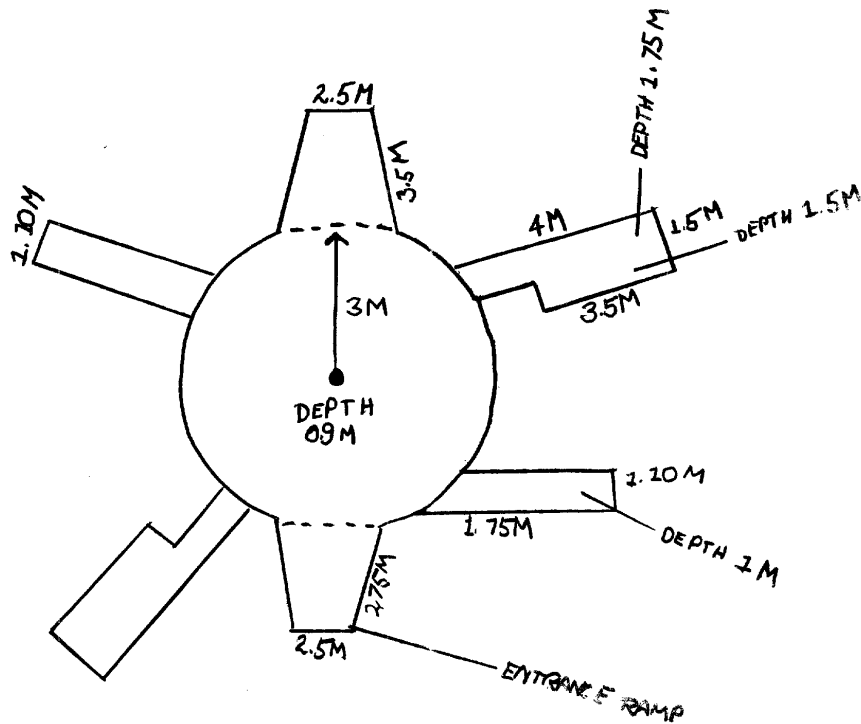
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ТН	Aiming point
ОИ	Principal direction of fire
БКП	Battery command post
ДКП	Battalion command post
ОН	Fire position

Note: All tactical symbols are drawn with plain black pencil; command posts of regiment (battalion) and battery are drawn in red. All inscriptions are in black. The majority of maps used in AAA are scale 25 - 50,000. Accentuation of lines of communication is done with a brown pencil on the right side. Friendly units are drawn in red, enemy in blue.

After selection of fire positions and command posts, each of the battery scouts stakes out positions of guns and command posts, tow vehicle parking area, one or two alternate firing positions and dummy position. After deployment of the battery front, trenches are marked out if time permits.

Dimensions of Trench Medium Caliber AAA



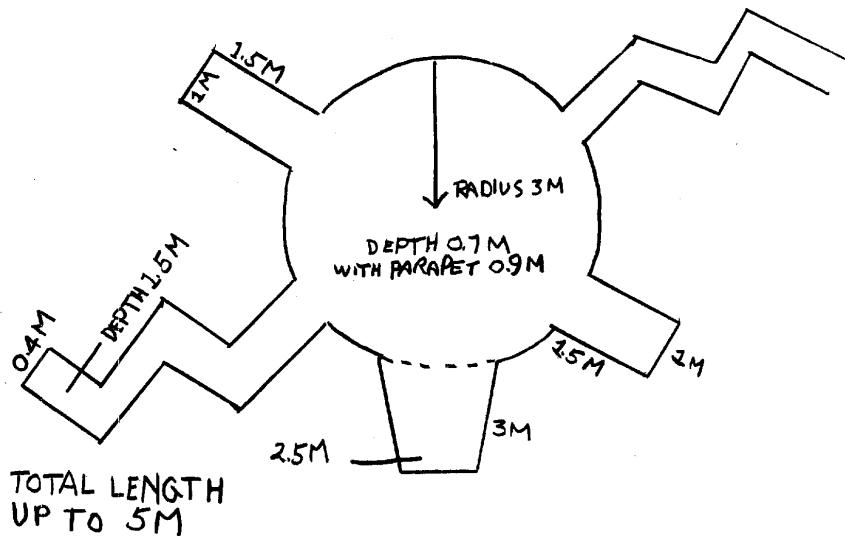
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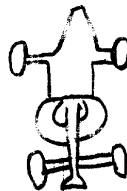
Time to dig the emplacement with concealment for gun crew, in hard ground up to 10 hours, medium hard ground 8 hours, soft ground up to 6 hours. Generally the battery completes all work for preparation of firing positions in 8 - 10 hours.

## Small Caliber AAA Trench



28. The order of occupying a firing position is as follows: sub-units of a regiment, or battalion, upon reaching the last halt position on the march, are met by scouts from each battery and these lead their respective units to the previously selected firing positions. Guns and instruments are taken to the firing position at speed and in echeloned order. The gun commanders personally lead their details. On reaching the gun position and at a distance of four to five meters from it, the gun commander commands, "Halt" and the vehicle comes to a standstill. On the command "Dismount" the crew quickly climbs out and unloads the necessary gun equipment and ammunition. On the command "Uncouple" No 1 and 2 gunners take the drawbar and uncouple the gun from the vehicle (towing). On execution, No 1 gunner reports "Ready" and raises his arm. On this command the vehicle moves forward 0.5 meters to one meter and waits until unloading is completed, whereupon the gun commander commands "Right," "Forward" etc, towards cover and the driver then drives off in indicated direction. After unloading the vehicle, the command "Ready for Action" is given by the fire platoon or battery commander. At this command all gunners ready the guns for firing. Gun commanders are responsible for getting the individual guns ready. Each gunner knows his duties thoroughly by learning them in daily training. An 85 mm AAA regiment with well-trained personnel is made combat ready in 50 secs. A small caliber AAA regiment with type 1939 gun in 30 to 40 secs.
29. The order of getting guns into combat ready position is as follows: At the command "Back of the gun" all gun personnel form one to two paces behind the gun facing the direction of fire in the following order:

↑ ① ③ ⑤ ⑦ ② ④ ⑥

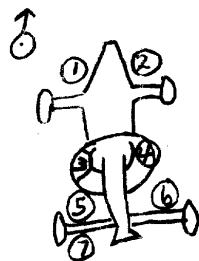


At the command:

"Back of the gun"

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At the command:

"Ready for action"

In guns of medium caliber the gun crew forms by the number upon the command, "Back of the gun". On the command "Ready for Action", even numbers to the left and odd numbers to the right of the gun facing in the direction of fire. Gun cover is removed. On the command, "Lower", the gun carriage is lowered to the ground. The system is unlocked according to march order [sic]. Covers are removed from the sights on the breech and the muzzle brakes (or the flash hider in small caliber AAA). Elevation is set at 30 degrees. Platform is suspended according to level of platform [sic]. All instruments and sights are set at zero. Safety lock is changed from "march" to "combat" position, also the stop-pawl of the semi-automatic breech. In small caliber AAA, "Combat ready" position is assumed only on opening fire.

As soon as the guns and instruments are placed in combat position, the thorough process of horizontal leveling with the aid of quadrant or with clinometer takes place. The gun muzzle is placed in a horizontal position in the direction of the main guides. All instruments and sight readings are set at zero. The plane [literal - platform] on the breech (and in small caliber AAA on the gun muzzle) is carefully wiped off. The quadrant is set and the bubble set at mid-point by means of the elevating mechanism. The entire system is traversed 180 degrees and if the bubble is off center it is returned to center partly by means of the elevating mechanism and partly by propping up the girders. The traversing and the procedure that follows is done until the bubble remains stationary. After this system is turned 90 degrees, the bubble is returned to center entirely by means of propping up the girders. The system is then considered as level horizontally. If the level bubbles on the platform are off center, then they are moved to center by the rotation of the hubs. If the indices on the instruments and on the sight do not correspond, they are brought to zero reading (i.e. index has to stand at zero).

30. After the horizontal setting, the line of sight setting at zero is checked. The commander of the fire platoon commands: "Check the line of sighting at zero setting". Gun commanders command: "Lateral lead zero - aiming point check." No 3 gunner sets lateral lead at zero and reports "0-00." Sticks cross hairs on muzzle face [literal translation]. No 2 gunner takes out the firing mechanism. No 1 gunner aims the gun at aiming point. No 2 gunner directs No 1 and 4 "up, down, right, left," until the cross-hairs correspond with the aiming point. In cases when the gun telescope does not point at the aiming point, it is adjusted by regulating screws and by the objective nut; first adjusting the nut in the vertical plane then setting the screws in the horizontal plane. All procedures are checked personally by the gun commander.

For the normal operation of a gun the pressure in the counter-recoil mechanism should be 48-50 atmospheres.

The gun is given three to five degrees elevation. The plug from the air valve is removed and a pressure gauge is screwed in. Pressure on a released knob makes the gauge register. In case of weak pressure, more nitrogen is added from a special bottle. Weak pressure accounts for the long recoil of the barrel. At this angle of elevation the volume of liquid in the recoil brake is also checked. The cap is unscrewed and the control rod taken out, if liquid is seen at that angle it is sufficient, if not, liquid is added through the same opening by means of a special can. The normal volume of liquid is 7.1 liters (chlorine liquid). Volume of liquid in the counter-recoil mechanism is checked at elevation angle of zero. The gauge without a dial is screwed in. On release of a knob, nitrogen and a spray should come out. The normal volume of liquid is 10.8 liters. If the volume of liquid is insufficient, the counter-recoil mechanism is taken out and liquid inserted

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through an opening in the gasket of the piston in the gun recoil mechanism. Insufficient amount of liquid produces noisy irregular recoils and counter-recoils. If the amount of liquid in the recoil buffer is insufficient, the recoils will be long. Time and condition permitting, the following checks are also made:

Backlash of traversing mechanism (1/8 turn of fly wheel)

Backlash of elevating mechanism ( $\frac{1}{2}$  turn of fly wheel)

Synchronization of azimuth made and receiving [Sic] azimuth plus -0-02.

Synchronization of elevation angle quadrant and receiving [Sic] of elevation angles (up to 45 degrees 0-02 from 45 degrees to 82 degrees plus -0-04)

Synchronization of angle of position tape with sighting arrow [Sic].

Synchronization of adjuster and sighting arrow [Sic].

Synchronization of angle of sight micrometer and sighting arrow [Sic].

Synchronization (parallel) of line of sighting at zero setting and reading on arc of gunners' quadrant. The check is done at different angle settings (0, 15, 35, 45, 50, 75, 82 degrees).

Parallel of zero line of barrel and the control platform [Sic] of the gun scope. Check is done at the same angles as when using the quadrant.

Backlash of drum for lateral lead.

31. By orientation of batteries is meant the adjustment of all guns and instruments to parallel line of sightings at zero setting. Orientation can be by reciprocal sighting or by sighting at a distant point. The most common means in medium caliber AAA is by reciprocal sighting. After checking the line of sighting at zero setting, the fire platoon or battery commander commands "Sheaf as per instruments" [Sic]. Commander of No 1 gun commands "lateral lead zero train on azimuth sight". No 1 gunner turns the flywheel of the traverse mechanism, trains the scope into the azimuth sight and reports, "Ready". The azimuth reading is then given for the gun; it is corrected by 30-00 and is set in the gun. After the setting, the gun commander commands, "Ready". Each gun is trained in a similar way and on execution the platoon commander reports, "Ready".
32. There is a similar laying for binocular spotter, range finder and for gun commander's scope. After the notation of all guns and instruments, the command to "coordinate transmission" is given. On this command, mechanical and electrical indicators on receiver [Sic] of the guns are set at zero. When each gun is ready, the gun commander reports "1st, sne [Sic] Ready." When all guns are ready, the command "Check transmission" follows. Each gun in turn reports its settings: "Fuze setting 0-00", "Azimuth 0-00", "Elevation angle 0-00.2". After each setting the instrument reports correct or not correct. Check of transmission follows until gun setting and instrument setting correspond. After transmission check, zero setting is determined (basic line). Guns are set at zero (direction south) as AA azimuth reads from South counter-clockwise, at a 45-00 angle of elevation. When training batteries on a distant point, the instrument is trained on the indicated point, azimuth is read off and is set without changes on each of the guns. This is rarely used due to the absence of aiming or the inability to see them.
33. After orienting the battery, it is ready to fire. For spotting the target, spotters are placed at the guns and at the command posts in the following order:

North No 1	Northwest	No 12
West No 2	Southwest	No 32
South No 3	Southeast	No 34
East No 4	Northeast	No 14

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12      14      24  
 2      •      4  
 32      3      34

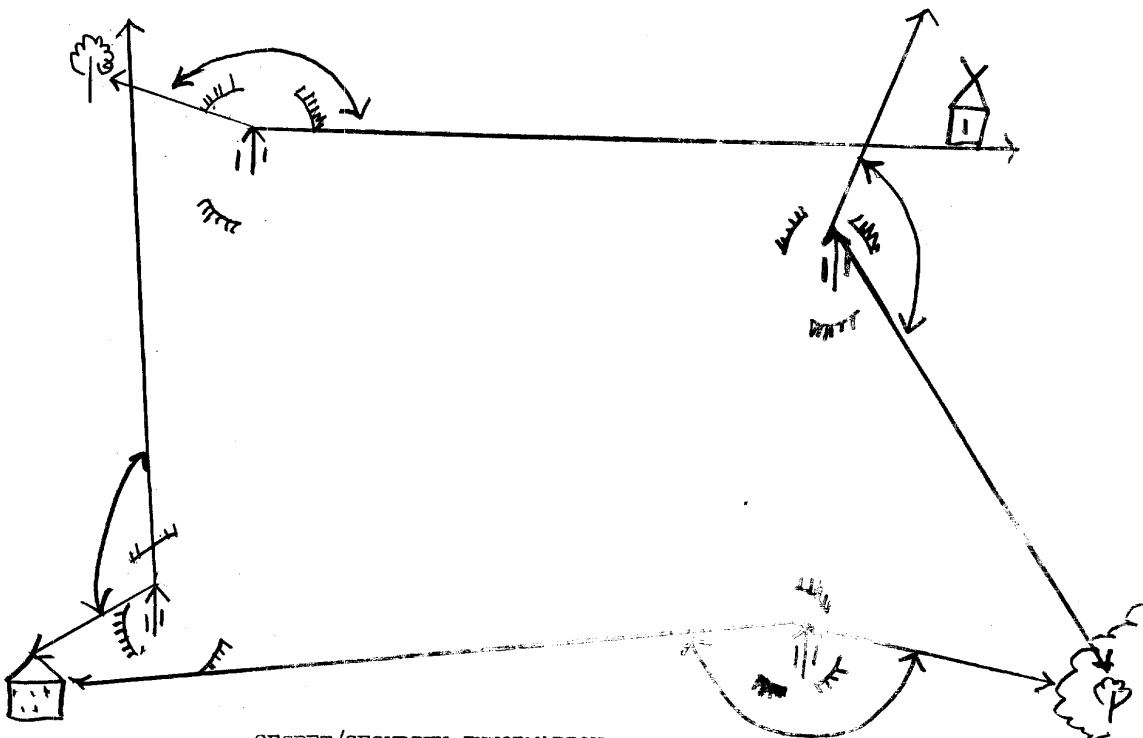


34. The order of field work on firing positions is as follows:

- (a) Digging of slit trenches for gun crews.
- (b) Digging of trenches for ammunition
- (c) Digging of gun pits.
- (d) Digging of trenches for the instruments, range finder, communications set etc.
- (e) Preparation of fox holes for infantry defense of battery.
- (f) Camouflage of fire position.
- (g) Digging and camouflage of alternate fire position.
- (h) Preparation of side tracks.
- (i) Preparation of antitank obstacles.
- (j) Preparation of dummy fire positions.

All of the above enumerated work is carried out completely when time and conditions permit. The first five points are carried out in all cases of combat.

35. In order to provide ground defense for the firing positions, foxholes are dug for riflemen (instrument operators, scouts, liaison and communications personnel etc) and a scheme of ground defense is prepared. Sketch of ground defense of battery:



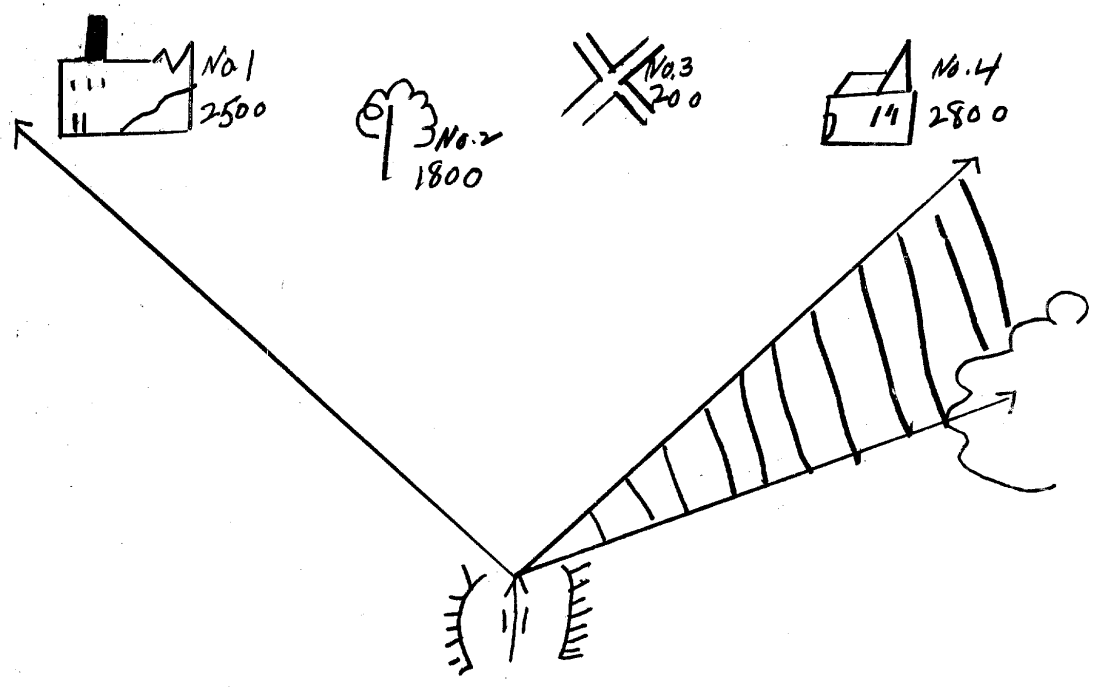
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For firing against ground-attack aircraft, tanks, and ground targets, each gun is assigned a primary and a secondary fire sector and a range card is made out for ground defense of firing position.

Range Card for Defense of Fire Position (Sample)



- Check point No 1 - factory chimney stack, 2500 meters.
- Check point No 2 - separate tree, 1800 meters
- Check point No 3 - cross roads, 2000 meters
- Check point No 4 - church 2800, meters
- Check point No 5 - Windmill, 1000 meters.

Additional sector



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The range card for the ground defense of the gun is made up by the gun commanders and approved by the fire platoon commander. If no visible check points are available within the sector, artificial ones are erected. For firing against attack aircraft, the gun commander makes out a fire plan according to firing regulations which are always carried with the gun. Nos 3 and 4 are expected to learn these by heart.

36. Before firing, the gun is thoroughly cleaned and checked by the platoon commander and gun commander for functioning of the breech and of the semiautomatic breech mechanism; normal emergence of the firing pin 1.72 - 2,25 mm; depth of wedge sliding in wedge type mechanism - 0,5 mm tolerance; connection of counter-recoil buffer rod with lug in breech ring; connection of recoil brake buffer rod with nut of lower lug on breech ring; fastening of muzzle brake and its condition (absence of cracks); cleanliness and condition of gun barrel; check for presence of cracks, pits, fouling or burn of powder chamber, dilated barrel; wear in the firing chamber is checked by a special mechanism (tolerance to 1/3 caliber); functioning and condition of traverse and elevation mechanism; condition of trim mechanism; presence of all screws, nuts, pins, and sufficient oil in grease cups; functioning of buffer action in breech lock; fastening of platform to the mount; function of revolution counter of cradle; condition of linear recoil guide; check of lighting and communications; check of traction gear.
37. Results of firing depend much on the quality of selection and preparation of ammunition. Ammunition (fixed rounds) is carefully wiped free of grease and dirt. Markings on each shell are checked; in their absence the round is not used. Check that the fuze is fully screwed in. Check for damage to and scratches on the casing, particularly on the bourelets (in case of major scratches the round is not used). Correct fit of shell and casing (absence of play and deformation). Checks are made for scratches and dents in the shell casing and flanges and to assure that the primer cup is screwed in. Ammunition is selected in categories and weight markings which are found on each round and on ammunition boxes.

Markings on shell casing

UO - 365

SV - 14/7 KN

0745

OS U1 52

UO - fixed round - fragmentation

fixed round - fragmentation

365 - nomenclature number of round

SV - Fresh - perexiline powder [Sic].

14 - length of charge in mms.

7 - number of orifices in powder [Sic].

KN - Name of manufacturing factory.

0745 - Series of charge with which shell loaded

OS - final charge

U1 - Sixth month.

52 - year of charge

[67] - Number of depot at which shell is finally assembled.

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Markings on shell

T

0-365

Either / / or -- or N  
57

0 - fragmentation

365 - Nomenclature number of shell

+ - Weight index - showing heavier than normal weight of shell within 1/10%

- Shell lighter than normal.

N - Normal weight of round

57 - Number of factory manufacturing shell core.

T - Trotyl, name of explosive charge

The round may further have the following markings on the metal (particularly on its base)

00354413 - Number of steel melt

● - Metal Mark

Ⓢ - Inspector

Ⓜ - Dept of technical control

★ - War Department

Such signs can be found on the flange of the casing; furthermore a mark is put on the flange denoting the number of times the casing has been used. A casing is not used more than two or three times after which it is sent to be recast.

38. Preparing the PUAZO - computer for firing is as follows: After all the field work has been completed and the battery oriented, the PUAZO is inspected, and if time and circumstances permit, the following checks are made:

Check of parallax and wind.

Check of function of colored discs (made up according to distance).

Check of functions of ballistic drums.

Check of No 3 mechanism (Mechanism of set forward point)

Check of mechanism of spot corrections 1, 5, 7.

Check of keys computing time of flight, future azimuth and future elevation data.

Check of sights.

Check of constant speed motor etc.

Installation of base and azimuth reader and parallax.

Speed and azimuth of wind.

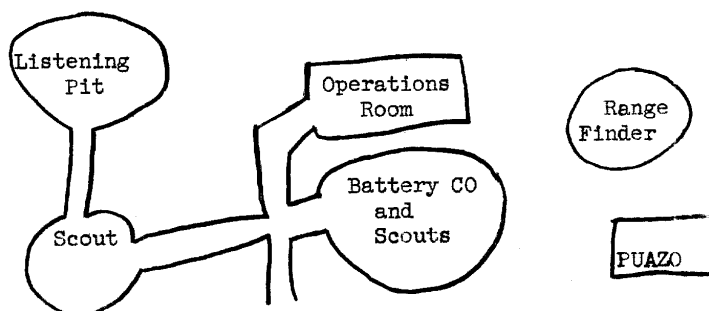
Angle measurement, final 0 connection and variation of time against actual time.

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39. After checking the horizontal setting of the range finder and of the check ruler [Sic] which is placed at a distance of 50 m from it, the range is checked for altitude and range. The best means of checking the range finder is on points of infinite distance, the moon, the stars. Check is performed every two hours in view of the constant changes in the currents of air and atmosphere. The check is done by taking 10 graduations towards oneself and 10 away. An average figure is worked out which serves as a check number. In case of bad weather and non-visibility of a distant object, the range finder is checked against the check ruler in a similar fashion. The difference in check of range finder against a distant object and the check ruler is indicated by  $\pm$  - in further work with the range finder. Time permitting, the height finder is checked, also the accuracy of distance scale etc.
40. Reconnaissance and liaison (communication sections) of AAA have the mission of collecting data on enemy air and ground activity and utilizing it in the best means possible for combat. Recon and liaison (communication) for the battery (battalions or regiment) is the responsibility of the command platoon leader. After setting up the observation, the command post platoon leader mans the command post as directed by the battery commander



The command platoon leader details a scout and gives directions on setting up communications between the command post of the regiment (battalion) and the commander of the combined arms unit (if circumstances warrant it). Communications are established within the observation post of the battery. In each direction of communication there are a commander and two men, whose problem it is to establish through which points to lay the lines of communications and at which time these have to be ready. Communications set up in AAA is from higher headquarters to lower (regiment, battalions, battery).

After the establishment of communications, the command platoon leader sets up a communications procedure which is confirmed by the battery commander. For telephone or radio communications, the command platoon leader of regiment or battalion establishes call signs for each sub-unit; for example:

Regimental CO - Wave  
 1st Battery - Snore  
 2nd Battery - Don etc.

Officers are assigned call numbers.

Regimental CO - 010  
 Chief of Staff - 011  
 Deputy Chief of Staff - 012  
 Deputy Commander, political - 013  
 1st battery Commander - 20  
 Platoon commander - 21  
 Command platoon leader - 22  
 2nd battery commander - 24 etc.

Call signs are changed no less than once a month. Call signs for battery observation posts are established by the command platoon leader of the battery.

For transmission of secret data by radio code is made up, the ciphers being changed often as is the entire code.

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04	Open fire	Report situation	Tanks on battery	Leave firing position
05	Advise losses	Surrounded - Help	Need ammo	Say it again - did not understand
06				
07				
	40	41	42	43

A cipher is given each 24 hours to the code form (vertical and horizontal).

The code form consists of 16 horizontal boxes and eight vertical - order of

transmission: 04 - 40 - open fire  
05 - 42 - need ammo

For transmission of top secret data a numerical coded form is used (four or five numbers).

2427	3148	4152	4394
2201	2784	2953	6109
5532	8231	3349	5163
7140	1947	9214	4587

Special attention is given to the training of radio operators in AAA. All radios are divided into categories:

1st category radio operator - Morse transmission up to 24 groups per min.

2nd category up to 16 groups per min.

3rd category up to 12 groups per min.

Check of ground communications is made on the hour; radio communications are tested every two or three hours.

At the command post of the regiment, one station with a senior artillery commander on duty stays constantly in operation. In case of damage of telephone communications, radio communications are immediately used until repairs are effected.

41. The battery commander and the command platoon leader are responsible for reconnaissance work in the battery. Reconnaissance is carried out on a 24-hour basis under any circumstances and weather conditions. Before sending the unit observer on duty to the observation post, the reconnaissance section leader briefs him on the following: All data on flights of friendly aircraft, time, heading, altitude and type of aircraft; main and alternate aircraft recognition signals; checks observers knowledge of every aircraft silhouette and their characteristics; the use and adjustment of observation instruments; state of maintenance of warning signal equipment; new data regarding the enemy and his tactics; the main sector of the battery.

On assuming his duty at the observation post, the observer scans all around with the aid of binoculars. He scans the sky in successive sectors from right to left or vice-versa. On spotting the target he reports: "Air", this being the signal for alert at which all the personnel of the battery assume their positions; "Above" one, two JUBB altitude 40 (hectometers) heading 180.

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All instruments and guns scan for the target in the sector shown by the spotter. If the target is spotted by one of the guns, target data are given to the PUAZO and range finder prior to their tracking the target.

"Azimuth 32-40, right, angular height 4-40."

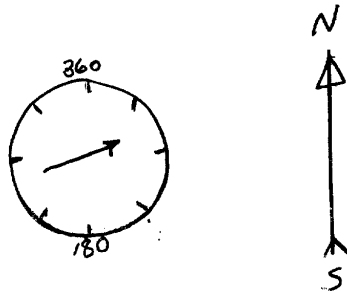
"Azimuth 32-15, right, angular height 4-80" etc.

When the target is tracked by the instruments and range finder, the operators report: "Target tracked" and continue tracking it into the zone of fire. The observer reports all important changes in the target: For example: "Target dives over 32", "Target loses altitude", "Target proceeds towards battery", "Target shot down". All instruments track the target until its disappearance after which the operators report "target lost".

All reports of the observer are relayed (doubled) by telephone to the command post of the regiment (battalion) where contact is constantly maintained with each battery. During the alert, all radio stations are also on stand by. The regimental command post receives information regarding the time that the battery opened fire, correction data, and the number of rounds fired. In the case of bombs dropped on the battery, losses and damage sustained, is also reported. During the flight of friendly aircraft, the scout reports: "Friendly over 34 altitude 20".

At night the observer reports, "aircraft engine noise over 2 altitude 40". "Target dropped flares over 4, range 80" etc.

During an alert, all battery scouts observe in their assigned sectors. In order to determine the heading accurately, the scouts have a heading indicator (see sketch).



The arrow is set in the direction of aircraft flight, i.e. parallel to it, and the heading of the aircraft is read off from the index.

42. The command platoon leader keeps the following logs: Log on flights of friendly aircraft showing type of aircraft, number, altitude and heading; log of enemy flights and spottings showing time target spotted, by whom, number of aircraft and their type, altitude and heading, time and heading, when target lost; log of receipt of meteorological bulletins; log of receipt of recognition signals from friendly aircraft; log of telephone and radio checks; log of receipt of transcribed telephone messages; log of observers on duty.

Example of report on friendly aircraft:

- 13.45 - 16.20 - 2385 - 2590 - 2695

- 14 - 018 - 35.

- from 13-45 to 16-20 in squares 2485, 2590, 2695, - 14 aircraft type 018. (coded) altitude 35 - flight will be made.

Squares on the maps and types of aircraft coded.

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Example of code of aircraft	3.4.52	4.4.52	5.4.52	6.4.52
LA-5	018	017	016	015
TU-2	019	018	017	016
TU-4	020	019		
YAK-9	021	020		
YAK-13	022	021		
MIG-15	023	022		
MIG	024	023		
etc	025	024		

Example of friendly aircraft recognition signals

	Dates		
Time of day	4.4.52	5.4.52	6.4.52
Day	(Basic-rocking the wings		Basic - red rocket
	(Alternate - yellow rocket		Basic-rocking the wings
Night	(Basic-Red Rocket		Basic-Blinking navigation lights
	(Alternate-Green Rocket		Alternate-White rocket.

For the code of VNOS (air spotting service) maps a cipher is given for a certain time (both a basic and an alternate cipher). The transition from one cipher to another is made by signals from the command post of the regiment by radio. To determine the heading accurately, data is recorded on the plotting board of the regimental (or battalion command post).

	80	85	90	95									
06													
08	<table border="1"> <tr><td>1</td><td>2</td><td>3</td></tr> <tr><td>8</td><td>4</td><td></td></tr> <tr><td>7</td><td>5</td><td></td></tr> </table>	1	2	3	8	4		7	5		e		
1	2	3											
8	4												
7	5												
010	c	d											
12													

Example: 08-80-A-6  
010-80-C-3-4  
012-85-D-7

Using such a map the exact course of a target may be shown. Such a map may also be coded to transmit data to other points.

43. The choice of an observation post for the battery is made by the command platoon leader in the sector designated by the deputy chief of staff of the regiment or by the battery commander. The requirements for an observation post must conform to the prescribed regulations of the field manual.

(a) - Good all around field of vision.

(b) - Site of mask 0-15, 0-20

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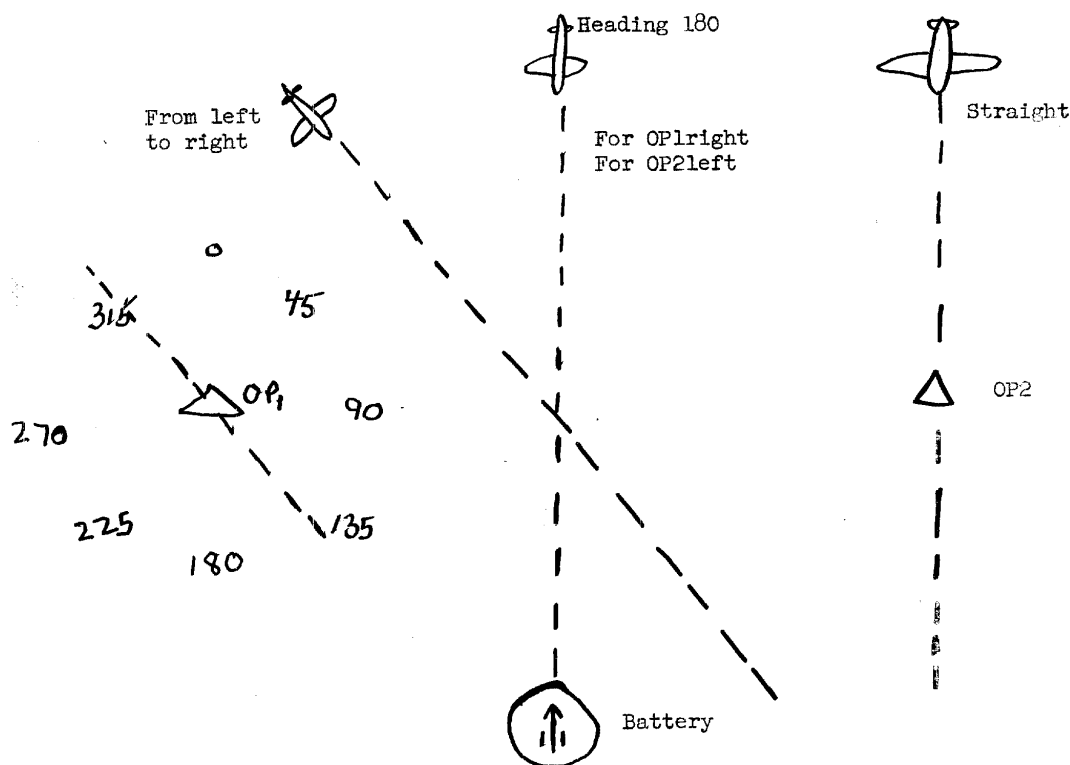
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- (c) - Good means of camouflage and observation.
- (d) - Facility of establishing communications. One or two battery observation posts are chosen per each battery at a distance of 20-25 kms, in most cases in the direction of the enemy's lines. The observation post is manned on a 24-hour basis and under any conditions. The commander of the observation post (sergeant) is responsible for the reconnaissance work; he transmits personally all data on the enemy and keeps the necessary documentation.

Example of transmittal of data:

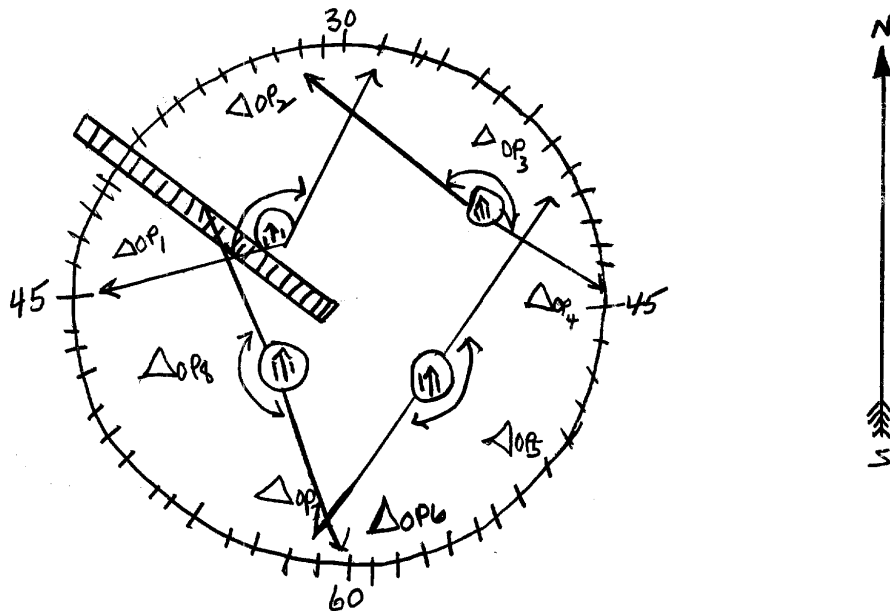
"Air, second 2 - M - 109 - heading 135, altitude 20, right/left/straight.



Based on the reports from different OP's, the regimental (battalion) CO determines in what direction the target moves and takes the necessary action for tracking it in the anticipated sector. On receipt of signals from VNOS (air spotting posts) that enemy aircraft have appeared in a given area, all observation posts are warned, they are also advised in the event of a state of alert at the battery and the presence of targets. Reconnaissance work in the regiment (battalion) is the responsibility of the regimental command platoon leader under the supervision of the deputy chief of staff for reconnaissance. Both in the battery and the regiment, scanning is done on a 24-hour basis. Sometimes the regimental command platoon details an (observation post but this is done very rarely. NCOs are employed in plotting work in case of an alert and combat firing.

Plotting board of fire control of AAA.

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On appearance of a report of a target from one of the VNOS (aircraft spotting service) posts, heading and location of target (distance) are determined by the aid of a special ruler. During the report from one of the observation posts, scanning is carried out in the given sector. The course of the target is constantly tracked on the plotting board, on the approach of the target into the firing sector of one of the batteries, the command "Target in sector is given", and on tracking it, the command, "Fire", follows. If the objective is protected by several regiments each regiment has its basic sector. The batteries conduct fire within gun range, but in order to reach the maximum of efficiency in the reconnaissance work of AAA and to confirm the responsibility of the commanders for the security of the guarded objective, each battery is given a basic sector. If an enemy aircraft crossed a sector without being subjected to fire by the assigned battery, the battery commanders and occasionally the regimental commanders were court-martialled.

The 253 Guards medium caliber AAA regiment stationed on the outskirts of Darnitz station (Kiev) in 1943 allowed an enemy aircraft to pass and cause enormous damage and destruction of the station; for this all officers of the regiment were court-martialled and the guards denomination withdrawn from the regiment.

44. In the case of several concurrent targets from different directions, they are designated target No 1, 2, 3, etc., and each operator on the plotting board follows only his target and reports on its changes. In regimental headquarters (battalion) there are three to four plotting boards and a VNOS (air spotting service) map where the target's course and location are plotted on an acetate covering the map. If a radar set is available in the regiment, a plotting board is used in conjunction with it.
45. Medium and heavy caliber AAA fires according to main and auxiliary systems. The main system of firing combines the use of PUAZO or radar. This system of firing is the most accurate and effective and is constantly the most often used in medium caliber artillery. The accuracy of fire depends on: Accurate determination of altitude of target (error not more than two theoretical errors (sic)); on condition and state of readiness of guns and instruments; on team work of battery i.e. the rapidity and accuracy of work by the personnel of the entire battery. Error in height gives an error in range. In view of the fact that the accuracy of determining the height of the target is of decisive importance, in the result of firing, particular attention is given to the training of stereoscope operators. The stereoscope operator is relieved from other assignments and details and works constantly on improving himself.

With the advent of radar, the importance of range finders and stereoscopists diminished, but in medium caliber AAA the stereoscope operator still plays a role of paramount importance. The state of readiness of guns and instruments also has

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much bearing on the effectiveness of fire. Inaccuracies in orienting, horizontal leveling, readiness of ammo, ballistics and meteorological estimate of conditions, the variability of angle and time and total 0 correction all combine to cause enormous dispersion of shells and lower the effectiveness of fire. In view of this, particular attention is given to the training of the battery which is carried out thoroughly and meticulously. Effectiveness of fire depends on the team work of the battery's entire personnel. In AAA, inaccuracy in the work of one of the gunners or particularly of one of the PUAZO operators, reflects on the firing capability of all the battery, therefore, the team work of gun crews, platoons and batteries is allocated almost 70% of all training time per year.

46. On the appearance of the target and prior to its tracking by the range finder and instruments, the battery commander commands: "On aircraft (or group of bombers) above 2, shell - height, rate 5 - Fire!" On the command "On aircraft above 2" all guns and instruments scan above the designated sector and immediately on spotting the target with a computer or range finder, report "Target tracked." Height is then read off, "42-50, 42-00, 43-00", the battery commander selects the average and commands "height 42-50." At the same time, after the target has been tracked on the computer, the commander of the computer section gives the correct data on speed of wind and azimuth, at the given height, and this data is fed into the parallax by No 9 gunner. In case several targets appear from different directions, the battery commander selects that target which gives the greatest threat to the objective or the battery, or the target which can be fired upon most effectively.

At the command "Shellfire" [Sic] the gunners detailed for fire setting select the designated ammo; if only one type of ammo is available at the battery - the command is not given. An approximate height is given for the computer because without it it is almost impossible to track the target. Therefore an estimated height is given first, and after range finding computation, a correct height is set. After the insertion of height into the computer, each operator reports "Superimposed", after the report of No 2 gunner "Ready" on the fuze setting, the battery commander orders "Salvo fire" or "Sustained fire". Salvo fire is carried out by all guns on the signal given by the platoon leader in the prescribed 5 secs tempo. In the case of "Sustained fire" command, the guns fire according to their state of readiness. If No 2 reports "Not superimposed" [Sic] firing stops on the command "halt do not reload." "Original settings" azimuth 35-00 is given when all guns and instruments report "1st Ready", the commands "Back of the gun" are followed by "Into cover." When firing has stopped the commanders report ammo expenditure "1st expended 20". When during the process of firing one of the guns jams or some other mechanical difficulty occurs, the gun commander reports "1st jammed" he then repairs the defect and when ready resumes fire. If circumstances and time permit, the firing results are examined by battery and platoon commanders and the basic deficiencies discovered during firing, plus the good work of the better crew member is also noted and commended. Such practise often gives positive results. On termination of fire, guns and computers are checked for horizontal leveling, line of sights and general orientation of the battery. On completion of this work, guns are cleaned and ammo readied for next firing. During major raids and in other circumstances, when all the regiment fires at a given target, fire results are evaluated on a regimental basis.

47. An auxiliary system of fire is used in extreme circumstances when firing by the main system is impossible (breakdown of synchronized transmittal system, rupture of cables etc). In such cases, the command "Auxiliary" is given, at which gunners No 1, 4, 3, put on earphones while computers' operators take microphones. Data is transmitted by telephone in the following order: "124, 35-20, 4-40" Fuze 124 - azimuth 35-20, angle of elevation 4-40. The gunner setting the azimuth and angle of elevation operates the flywheel in such a fashion that the following readings of azimuth and elevation angle setting would correspond. This method of firing was almost entirely unsuccessful in World War II and is now almost never used. In case the battery fired on a group of aircraft, and some of these started to dive, the battery commander would order "1-2 fire at diving." The designated guns then fire over open sights but the computer still tracks the target and at the earliest possible moment, the guns revert to the basic system of fire.
48. The effectiveness of AAA fire is measured by: Number of targets brought down, violent evasive action and changes in heading of targets, the location and symmetry of bursts around the target not exceeding circle 0-20. With an effectively trained and manned battery, the bursts will always spread as indicated above. The most productive burst is short 30-50 m ahead of the target. This is a sign of correct firing.

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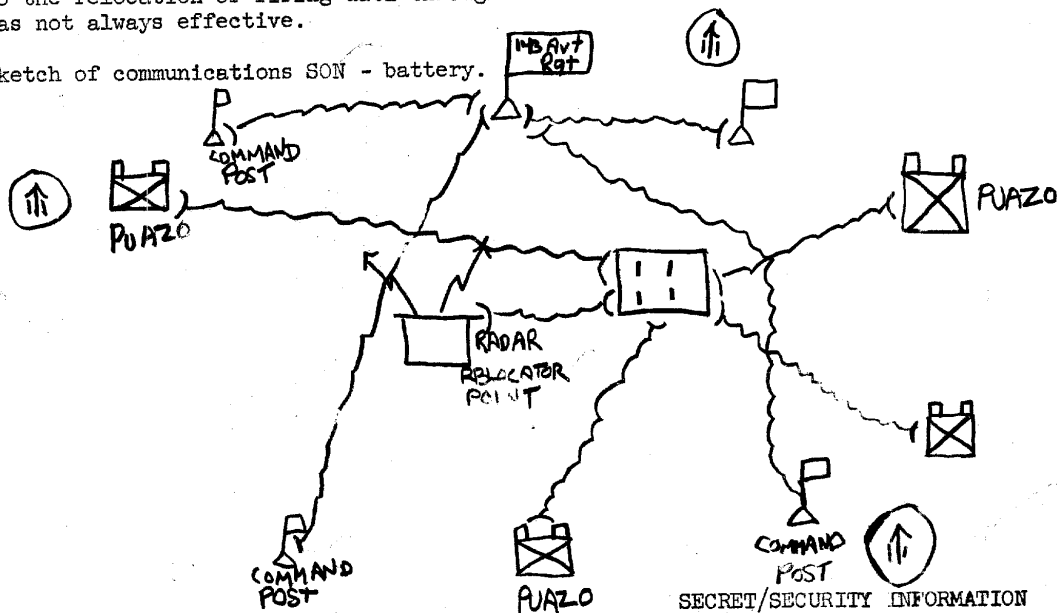
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Targets engaged in evasive action (change of heading 3-6 degrees and zoom or dive 10-15 degrees) are fired upon with dispersal bursts. Range corrections are made after two to three deviations and are made by changing height "Height over 50." Commander of the computer detail commands "Height 43-00" and firing continues. Correction in azimuth is made after two to three deviations and when the bursts are out of the 0-20 circle. In World War II, due to the great spread of aircraft, corrections were seldom made due to the short time of targets in the zone of fire. Therefore, the main mission of AAA is to make certain of the first salvo. In view of the aircrafts evasive action, successive salvos will never be as successful as the first.

AAA will fire on diving aircraft in cases when the target is diving on the battery or on a nearby objective which is no further than 500 to 700 meters. In case of an attack on the battery from all directions, the battery (or platoon) commander commands "Fire on diving aircraft in individual sectors." The gun commander commands "Fire on diving aircraft" (indicates by hand) fuze 13, down 20, fire!" As soon as the target is tracked at maximum intensity, the fuze is set according to data worked out by the computer. The vertical lead is set by No 4 on the adjustor. When the target comes out of the dive, firing is resumed according to the basic method.

49. Ground attack aircraft are those which operate at low altitudes, 200 to 500 meters not exceeding 700 meters. Firing is by individual guns under the direction of gun commanders at a signal from the platoon commander. The gun commanders have the firing chart for defense of the battery and establish in advance the lines of defense for firing against ground attack aircraft. According to these lines, fuze settings are determined in advance, 1000, 2500, 3000 and 4000 meters. Vertical and lateral leads are set by Nos 4 - 3 according to the firing charts which they have in constant possession and which they know by heart. Vertical and lateral leads are set from the firing charts in relation to the speed which the gun commander orders, as an example: "Ground attack aircraft over; Fuze 13, speed 120, Fire;" The signal of target reaching boundary lines can be given by the range finder which on tracking the target at the furthest boundary line reports "On." At the signal, firing is started and the next curtain of fire [Sic] is laid. No more than two curtains [Sic] are laid as the gun is not able to make more than two. Firing is done at maximum intensity and no correction is made. When the target is downed, the gun commander tracks the next target independently (if such a target exists in the vicinity). It is almost impossible to fire on fighter aircraft flying at low altitude due to their excessive speeds. Therefore, those aircraft are subjected to fire from small caliber AAA and machine guns with more effect.
50. Firing with radar is also considered a primary means of firing if the battery is synchronized with the radar set. If one radar set is available per regiment, all batteries are connected with it by telephone and computed data are relocated through relocater unit to the PUAZO unit and thence to the guns. The radar set transmits to each battery the height of target azimuth, angle of elevation and fuze setting. Base line radar battery is set into the Parallax indicator by No 9. All data from the radar set go through the relocation unit where the data is reworked on special firing charts. This means of firing was used at night and in cloudy weather. Due to the relocation of firing data through a whole network of relocater points, firing was not always effective.

Sketch of communications SON - battery.



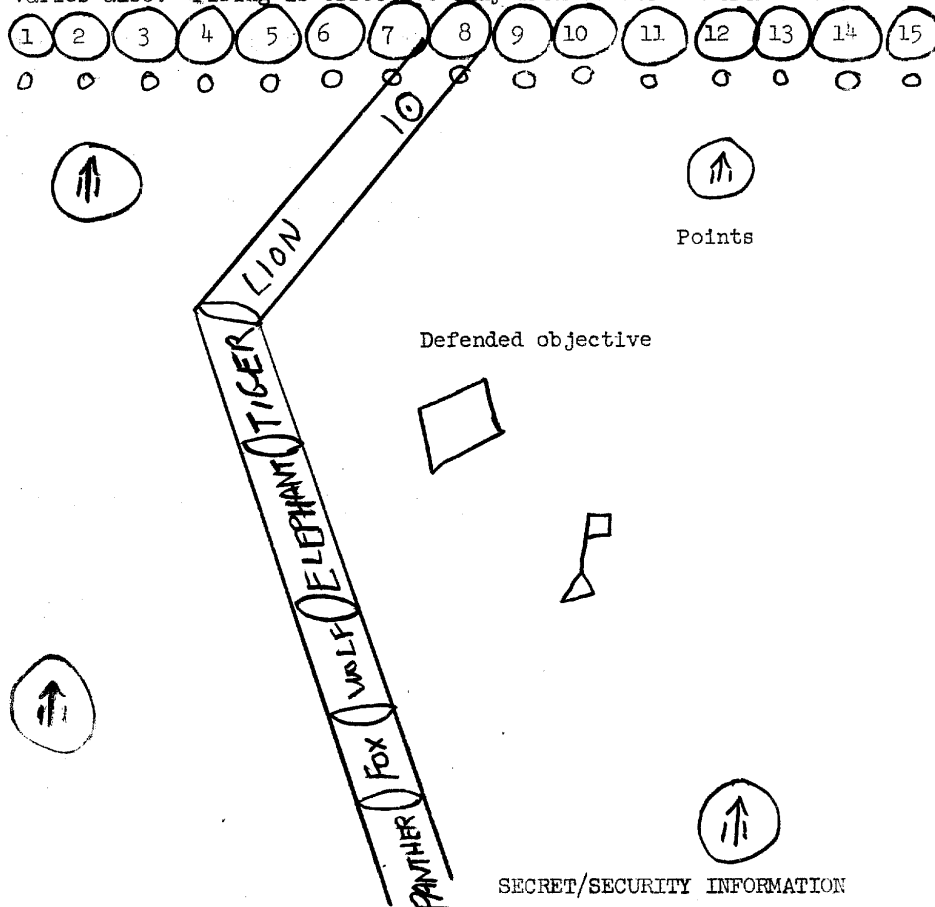
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51. At the present time medium and heavy AAA (particularly eight-gun batteries) are being equipped with radar sets of the "MALAKHIT" type. It computes firing data in day and night conditions. The new batteries are not equipped with range finders. Correction is almost never made in firing with SON. The order to commence firing is given from the regimental command post. When a regiment fires on one target with radar-controlled fire, it is very hard to determine the individual battery bursts, and therefore correction cannot be made in such cases. For firing under night conditions, the battery is made during the day (lights are set up and checked). Storage batteries of the N-10 type are mounted on the guns and are connected to a junction box from which lights branch out to all computer dials and scales. To check lighting equipment the command "Light up" is given; No 4 switches on the lights and all gunners report if the lights are on. The gun commander reports "No 3 gun lights OK". During night conditions firing with the PUAZO computer is carried out with the target illuminated by search lights, the firing procedures are then the same as in daylight firing with the PUAZO.

52. This means of firing is used when no radar sets are available and also when the objective is of particular importance and warrants curtains of fire set to impede the passage of night bombers. Firing charts for barrage firing are made from topographical maps from which data for cardinal points and barrage zones are taken. The zones are given code names "Lion", "Tiger" "Bear" "Falcon" etc. The data taken from the topographical maps are transferred to overlays which are available at each battery. For each point, an azimuth, an angle of elevation, and a fuze setting are worked out and put down in the firing charts for barrage firing. The signal, at which the time to open fire is determined, is relayed from the observation post when the target is overhead. At the command "overhead" time is taken and an estimating time of flight fire is opened.

The command to open fire is given from the command post of the regiment (battalion) "Barrage Tiger." The battery commander looks up in the firing charts the data for that curtain of fire and commands "Barrage, azimuth 0-00, fuze 0-00, angle of elevation 0-00 - fire." To obtain dispersal of bursts, each gun, after each round, effects an azimuth charge left or right through 0-50 degrees. Nos 4 and 2 guns to the right, Nos 1 and 3 to the left. The calculations for zones of fire and firing points is made for medium heights at intervals of 500 meters.

Firing is continuous to the maximum capacity of the guns. The angle of elevation varies also. Firing is effective only when sufficient AAA is available.

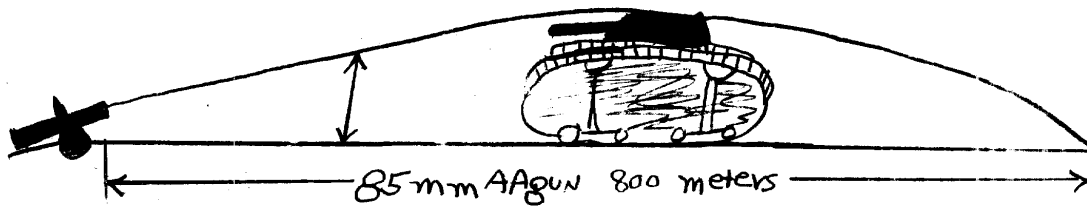


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53. Firing on airborne landing and flare bombs is over open sights by a battery or by individual guns and aimed at the denser groups of parachutists. At the command "Parachute landing - over! fragmentation down 10, Fuze 0-00 fire" guns are aimed at the center group of parachutists and the report, "the target tracked" is made. The range is determined by the range finder and the fuze is set accordingly. Fire is continuous to the maximum capacity of the gun. Correction is made if bursts are out of 0-20 circle beyond the main group of parachutists. When the target has landed, firing is over open sights as against infantry. The aiming point is the mid-point of the body of parachutists. Firing on flare bombs is the same as on the parachute landings with the exception that the setting down 0-05 is made in small caliber AAA. Velocity in meters per sec is also taken according to the wind. Aiming point is the central group of flare bombs. Light filters are used to prevent glare when aiming at flare bombs. Commands and corrections are the same as when firing on parachute landings.
54. Machine caliber AAA is a powerful weapon in combatting tanks and armored vehicles. With an armor piercing shell and a muzzle velocity of 800 m per sec, this gun pierced the armor of a heavy tank with a battle sight shot. Battle sight shot is that distance at which, with the sight at constant settling, the trajectory of the shell at all points crosses the target. An 85 mm gun has an armor-piercing shell with an MD-type fuze set in the base of the shell.



For convenience and effectiveness of firing, an antitank firing chart is prepared with indicated check points distance to them and sight settings. The sight setting in an 85 mm AA gun is at -2 for medium ranges. All gun crews are well trained in the use of antitank charts. Time permitting, each gun prepares antitank obstacles in its firing sector so that enemy tanks in avoiding them might present their most vulnerable points to the AA guns. For firing against tanks the battery or platoon commanders command "At tanks in individual sectors." The gun commander commands "On tank check point 2, armor-piercing, right 0-00, sight 0-00 - fire!" When tanks advance on the battery at angles from 0 degrees to 30 degrees no lateral lead is given but the sight set and the aiming point moves slightly over. When the pointer reports target tracked, fire is opened. Firing starts from 2000 meters in order to leave time to knock out all tanks, if there are only a few tanks they are allowed to come in closer to insure hits. Sights and lateral leads are set from firing charts depending on the speed of its heading. Frontal movement of tanks is considered as that within the angles 0 to 30 degrees and 150 to 180 degrees. In those cases the pointer moves the aiming point to  $\frac{1}{2}$  the length of the tank at distances of 800 meters and to one length of the tank at distances over 800 meters. Oblique movement is considered at an angle of 30 to 90 degrees and up to 150 degrees. Lateral leads are then set to the angles of movement: 30, 45, 60, 90 and, according to the speed of the target, up to 36 kilometers per hour and higher. Firing is at maximum velocity, and on destruction of one tank is transferred to the next one.

When firing is short, the aiming point is raised. In the case of overs up to 1000 m the aiming point is lowered, overs more than 1000 meters necessitate lowering of the sight by 0-02. At these ranges deflections are corrected by variations of the aiming point to from 0.5 to 1 length of target. At ranges of more than 1000 meters, deflections are corrected up to one length of the target by a change of aiming when greater than one length by lateral lead of 0-02, 0-04 (right or left) and depending on the amount of deviation. Small caliber AAA hardly ever fires on heavy tanks.

55. Medium caliber AAA fires on infantry at ranges up to 3000 m if the target is well observed. Firing is with fragmentation rounds in bursts of three to four rounds. Sights and fuzes are set according to range. Range adjustment is made with the range finder or any of the other optical instruments. Firing from indirect laying positions is the same as for field artillery with the only exception that medium caliber AAA has other ballistic charts and its own chart ZAMP (abbreviation unknown).

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Just as in field artillery, there exist three states of preparation of fire, estimation by eye [Sic] three to five minutes; abbreviated preparation and complete preparation, usually when firing on a regiment is involved (preparation of all data, four hours). Firing procedures, range adjustments, etc are almost identical with field artillery (76, guns ZIS-3 100 mm gun type 1944). AAA fires from indirect laying positions only on orders of a senior artillery commander and in extreme cases.

56. AAA will leave its firing positions if these are discovered and subjected to incessant air attack or artillery fire. Also, in cases of advance or retiring of units and subject to changes in the tactical situation. Order to leave firing position is received from HQ by telephone or radio in coded form. On receiving orders to leave position, the battery commander commands: "Recall - ready for march." At this command all guns and instruments are made ready for march and the towing tractors are called. When all loading has been completed and time is available, the trenches are filled in. The battery forms into a column at a point indicated by the battery commander, and at the time indicated by the regimental (battalion) commander, it arrives at the assembly area of the regiment. (This is when the march involves the entire regiment). The battery is permitted to change on its own decision from main to alternate firing position. If the battery (regiment) has to make a march of 24 to 48 hours, the mission and situation is fully explained, and all planning and preparations are carried out as explained above. The first halt is for 10 minutes, after 30 minutes of march, at which time equipment is inspected. Subsequent halts are made after two to three hours of march, to reform the column and rest personnel. A long halt is made during the second half of the 24-hour march for meal, rest and service of vehicles. Location of sleeping quarters is made by an advance party sent out ahead. Its duty is to find places for the equipment and quarters for personnel. The advance party consists of the Commander (Assistant Chief of Staff) Deputy for Political Affairs, Medic, Chemical Warfare Instructor, and scouts from each battery. Their mission is to select places for parking equipment, quarters for personnel, inspect wells and ascertain their servicability, and check on the political reliability of the population of the village or town. In case the populated area is not suitable for the requirements, units are trained and were trained in World War II to halt in forests and other unpopulated areas. To insure that no vehicles lag behind in case of breakdown or other mechanical deficiencies, a trail detail is organized which is commanded by the regimental (or battalion) chief of the motor pool.
57. The work of the regimental (or battalion) HQ staff in combat is as follows: On arrival at a new area, the regimental HQ occupies and mans the location selected by the chief of the advance party. It indicates the communications procedure, to whom and when; organizes the observation service in the regiment, and gives directions regarding the selection of observation posts for the batteries (indicates areas). Having received the dispositions of the batteries, it compiles the disposition of the regiment, indicates the main sectors of fire to the batteries, and organizes the topographical orienting to the main check points; indicates the process of call signs and codes; advises the batteries of the recognition signals of friendly aircraft, communications procedures and joint operation plans with friendly aircraft; advises of barrage firing plan and gives all necessary details regarding it; indicates to the batteries, air lanes for flights of friendly aircraft; organizes staff duty officers; controls ammunition, food, etc, supply services; checks the combat preparedness of the units and organizes their training; keeps the necessary documents pertinent to operations of the regiment and exercises operational control of its units in combat (if the regiment is assigned to an infantry formation, the regimental HQ ascertains the situation and the mission and coordinates the plans of the movement (operations) of the regiment).
58. Small caliber AAA fires as follows:
- (a) By basic method of sighting
  - (b) On diving aircraft and ground attack aircraft.
  - (c) On aircraft under partially visible conditions.
  - (d) On parachute landings and flare bombs.
  - (e) Firing from the move.
  - (f) Firing on tanks and armored vehicles.
  - (g) Firing on infantry.
  - (h) Barrage firing.

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Long and short bursts are made and occasionally individual rounds for range adjustment on ground targets. The basic method of firing in small caliber AAA is considered as firing on aircraft flying at average altitudes, up to 4000 meters with a straight course and constant speed. Firing is on command of the batter commander.

"On aircraft over 4, 90, 23, short bursts fire."

Pointers track the target in the collimators and report "Target tracked."

No 4 gunner sets the heading indicator parallel to the flight of the aircraft.

No 3 gunner sets the given speed of the aircraft 90 meters per sec and range 24 hectometers.

The range finder tracks the target and measures the range at intervals of 200 meters.

No 3 gunner establishes the rate of the fly wheel mechanism regulating changes in range. On the approach of the target to the range at which the battery commander decided to open fire, he will start firing in short bursts. Correction is made when two to three bursts deviate to the same side more than 0-20. Correction in the majority of cases is made by changing the speed to 5-10 meters per sec, more or less according to the necessity. In cases of change in target heading or evasive action, firing with burst dispersals is practised. Firing at diving aircraft is done at the command of gun commanders.

"On diving aircraft down 40 long bursts - fire." The pointers often do not track the target in the collimators, but watch the tracers and adjust the aim according to them. No 4 sets "down 40" according to the angle of the diving aircraft. No correction is made.

When firing at ground attack aircraft flying at low altitudes, firing is also in long bursts, with no correction, speed, heading and range set in. The signal is given by the range finder. Firing from the move is as follows: Pointers sit in their positions and the gun loaded with two clips (the rest of the crew are in the carrier). On the appearance of the aircraft the commander commands: "Halt" and - "On aircraft over 12", indicates by hand signals speed, range "short bursts - fire!" When the vehicle has pulled up, the crew take their positions and open fire at the command of the gun commander; range is estimated by eye. This firing usually takes place on the march, during sudden enemy air attack.

The other types of firing in small caliber AAA will not be described, as basically they are identical with those of medium caliber AAA, with the one exception that deflection is measured between tracer and target (firing on tanks, parachutists and barrage firing). Firing is from short ranges up to 2000 meters and at tanks up to 1000 meters. Barrage firing is by curtains of fire with azimuth and elevation angles given. Speed is set at average and range according to the curtain of fire. Rotations left and right for burst dispersal are same as for medium AAA.

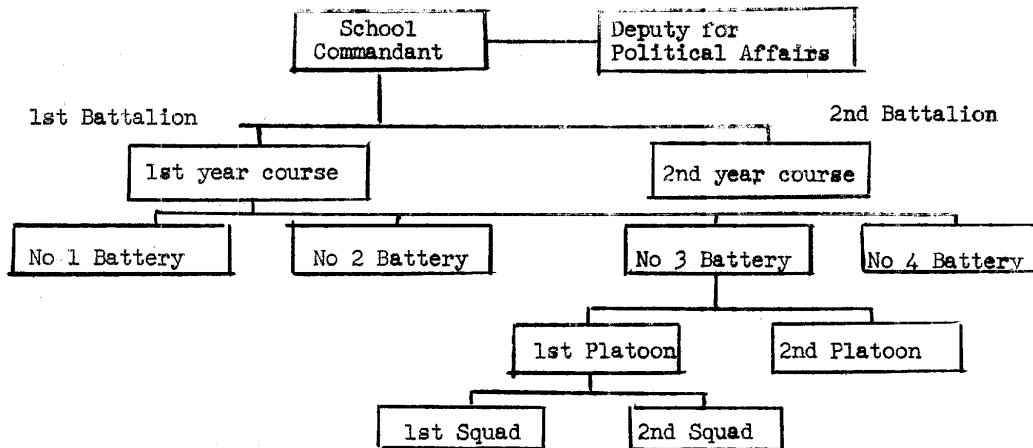
59. In view of the importance of AAA in future conflict, Soviet AAA has considerably expanded and changed in design and tactical use. This will be described subsequently. At present, in view of the organization of new units, all reserve AAA officers have been recalled. Many NCO's with five to six years experience who have a high school education have been commissioned (platoon commanders).
60. The following AAA officers schools are presently training the cadres of AAA specialists:

Gorky AAA School	GUZA
Baku AAA School	BUZA
Chelyabinsk AAA School	CHUZA
Sevastopol AAA School	SUZA
Borisoglevsk Technical AAA School	ETUZA
Leningrad Instrument School AAA	LIUZA
Kharkov Radar Academy	

All of the above schools train AAA officers both for medium and small caliber AAA such as fire platoon commanders, command platoon leaders, and computer platoon leaders for large, medium and small caliber AAA, plus armor technicians and instrument and radar technical officers. The length of the course is two years. Students must have a high school education; they are selected from civilians and from the military. Approximately 20-30% are students from the army, 20% students from Suworov cadet schools and 50 to 60% from civilians



Table of organization of AAA school



The following subjects are included in the curriculum:

Artillery

Tactics of AAA

Equipment

Communications

Engineering

Automobile equipment

History of the Communist Party

Drill

Regulations

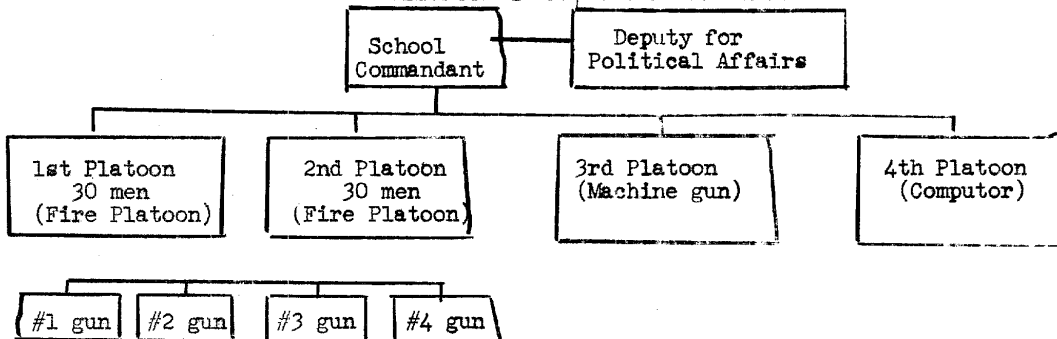
Topography

Infantry drill manual.

Artillery, tactics and equipment are the major subjects. On passing final exams, the students are commissioned lieutenants and are detailed to AAA units. The Kharkov Radar Academy prepares radar specialists; the length of the course is four years.

61. NCO's of AAA units are trained in NCO schools at each AAA regiment. The schools' quotas are filled with new recruits who have five years' education. The length of the course is one year. The school trains gun commanders and commanders of computer squads.

Table of organization of NCO school



NCO schools in small caliber AAA consists of 80 students not counting the officers.

The training of NCO's as radio operators, scouts and telephone operators is carried out in a special school at division or garrison level. Drivers are trained at motor pool schools; length of course, six months. Armament experts are trained at division or army level; length of course is one year. On completion of course and on passing final exams, the students receive sergeant ratings and are detailed as gun commanders, deputy gun commanders, computer operators etc.

62. Training schedules of AAA units begin 1 December (NCO schools, 1 November) and are completed by the end of the following September. Yearly training schedule (10 months) is divided into two phases - summer and winter. The winter training phase lasts from 1 December to 15 April and is subdivided into three stages.

- (a) 1st stage from 1 December to 15 January - training of individual specialists.
- (b) 2nd stage from 15 January to 1 March - training of gun and computer crews.
- (c) 3rd stage from 1 March to 15 April - training for combat firing, tactical training, inspection of winter training results, departure for camp.

The summer training phase lasts from 3 May to 1 October. It is also divided into three stages.

- (a) 4th stage (summer) from 3 May to 15 June - Platoon training.
- (b) 5th stage from 15 June to 1 August - Battery training.
- (c) 6th stage from 1 August to 1 October - Regimental (battalion) training.

Tactical training is at division or army level. The period 1 October to 1 December consists of preparation for next year's training schedule; administrative work, fuel storage, repair work, preparation of training aids etc, while the period 15 April to 1 May is concerned with preparation for summer phase of training.

The daily working schedule is eight hours plus two hours of political indoctrination or study. The rest of the time for meals, toilet, rest, free time, cleaning weapons etc.

Reveille in winter 0600, retreat 2300.

Reveille in summer 0500, retreat 2200.

The schedule of training hours per subject is made up at regimental headquarters, following the directives of the senior artillery headquarters. The training schedule is made up on a weekly basis by the battery commanders and approved by the regimental commander. The training schedule follows the training program of AAA. Each month a resume of the training is made up and goals are assigned for the following month. Political training takes place two times a week, each session lasts for two hours, and there are three periods of political information of 30 minutes each. The majority of training hours is devoted to the handling of equipment. Combat training and tactics are taught exclusively by officers, other subjects by NCO's under the supervision of platoon commanders.

The training of NCO personnel is four times a month and is conducted by the battery commander and instructor training with NCO personnel twice a week for two hours each session.

Officers' training is in two groups.

- (a) 1st group, battery commanders and equipment.
- (b) 2nd group, platoon commanders and equipment.

Both groups follow the same curriculum (with few exceptions) but on different days. Training is three times a month, eight hours each, under the supervision of the regimental commander, his deputy and chief of staff.

Training of regimental commanders and chiefs of staffs is at division or army level once or twice a month.

Besides the officers' training, instructional training is carried out once a week for two hours, artillery training, two hours per week, physical training once a week, firing once a week. Drivers, radio operators, communications specialists etc train in a regimental group.

63. Particular attention is paid to the combat readiness of AAA units. During an alert, the action of individual units is prescribed and timed to the smallest details. Each soldier, sergeant and officer knows beforehand what he has to do. All equipment guns, instruments, prime movers and small arms are in perfect operational condition. Any discovered deficiency draws severe penalties on the unit commanders. The motto in AAA is "Remember the Air!" "Be always combat ready!"

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64.

A combat alert in a regiment may be given personally by the army commander or with his written permission, to one of the staff officers. An alert may be given by telephone or by radio with the signal "Thunder" or "Storm". On receipt of this signal, the duty officer requests the controlling password and checks it with one

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kept in a sealed box and opened only on receipt of an alert signal. On ascertaining the veracity of the signal, the duty officer gives the alert by sounding the siren or by relaying the signal to the units. Combat alert in the 16th AAA Regiment was called at 0400 by the army artillery commander on written permission.

Having alerted all the personnel, the duty officer supervises the regiments' assembly. The battery commander receives from the duty officers topographic maps with the assembly areas of the regiment (or division) units. During this time the regimental commander and his chief of staff get briefed on the situation and mission by their commanders, following which they in turn brief the battery commanders who brief their men. During this time personnel get their arms, ammunition and personal effects which they load into vehicles. According to previously worked out regulations, each battery receives two units of fire per gun and 1.5 gas per vehicle. Assembly on alert is in a designated area by each battery independently (each sub-unit has a point designated in advance).

Signals for direction and assembly are given at night with a flashlight and during the day with flags.

During an alert, the battery CQ lowers air raid blinds and switches the light only at key spots. Each gun commander directs his gun crew and takes the necessary equipment designated in the regulation governing action of a battery during an alert. These regulations for the action of a battery during an alert govern the operations of officers, NCOs and enlisted men (what equipment to take where and by whom it is to be loaded, also who is responsible for checking battery property and warehouse). Each officer has a ready-packed suitcase with all equipment necessary for campaign and also a field bag. The enlisted men also have the necessary equipment prescribed in advance. Each soldier gets 48 hours of field rations and 120 rounds or two submachine clips, also steel helmets, entrenching tools, hand grenades etc. Battery commanders report to the regimental commander when their batteries are ready. Time from alert signal to the formation of a regimental route column is one hour and 40 minutes. On alert, the regiment picks up all armament, ammunition, equipment, and property, as it might not return to that same location. Each combat alert in training is followed by a complete critique of action by units and sub-units. At regimental level with the officers, at battery level with NCOs and enlisted men. All operations of batteries are adapted to combat situations. At present 60 to 70% of all AAA of occupation forces in Germany are on firing positions as part of the PVO defense. Combat alerts take place six to seven times per year.

65. Combat firing practice in AAA is carried out two times per year. Individual gun firing takes place in March and consists of firing on tanks, ground attack aircraft and parachute landings. In order to check gun crew proficiency, an inspector is appointed whose duty is to check each gunner according to special sets of standards.

For example: Track target 3 secs  
 Set speed 1.5 secs  
 Set range 1.5 secs  
 Gun combat readiness 30 secs  
 Horizontal leveling 10 secs  
 Check line of sights 40 secs  
 Loading 3 secs

If the gun crews do not meet the standards, firing is not permitted. Each battery receives two to three missions; the best gun crews fire one mission each.

Example of Mission 1951

Mission No 1 Small caliber AAA  
 Firing on towed sleeve target. Target moving uniformly on one heading  
 Height of target 30-35 hectometers  
 Course parameter 800 meters  
 Method of firing as per PS-44.  
 12 rounds per gun 10 secs time.

Rating: Direct hit on target or 75% tracers within 0-20 circle - excellent

Good - 50% tracers in 0-20 circle.

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Average - 25% tracers in 0-20 circle

Mission No 5 firing on tanks

Two tanks move against the gun from different angles, speed of tanks 35 kilometers per hour, range 1000 meters. Fire is opened from a range suitable to knock out both tanks before they arrive to within 400 meters.

Gun commander fires eight rounds, firing in short bursts.

Results: 3 hits on each tank - excellent

2 hits - good

1 hit - average

If one tank only is hit, the mission is not considered as fulfilled. If the time allowed is exceeded, or in case of delay and all rounds are not expended the mission is also not considered fulfilled. Such missions are carried out on the basis of 25% in spring and the remaining 75% in the fall after tactical exercises for a total of 12 missions, day and night missions. The rating of results is done by the firing ground. Crew and results of firing are noted by details from the regiment. The complete results are worked out by the firing ground command and the regimental staff and the scores made known. In 1951 all firing in the 1018 small caliber AAA regiment was rated as good. Tactical training is carried out twice a year at division level in spring and at Army level in the fall. Missions vary in type: In 1950 the tactical problem was: "Move of army into the breach in the enemy's defense and the corresponding mission of AAA units."

Each training or combat alert presents a definite tactical problem at regimental or divisional levels.

66.

There have been equipment and tactical changes in units during the post-World War II period. Small caliber AAA artillery, 37 mm gun M 1939, was not subjected to constitutional changes and is still operational. However, production of this model and of the 25 mm model has ceased. A new gun is being produced and is being issued to units. It is the 57 mm M 1950. It fires with SON PUAZO director or with its own sighting mechanism which is completely different from the M1943 sight on the 37 mm gun. The basic computation is on the basis of the rate of change in target irrespective of its plane. A new manual has been published (in project form) 1950, BUZA combat manual of small caliber AAA.

Firing regulations are still according to PS 1944. Firing training curriculum of small caliber AAA is now 1951.

Medium Caliber AAA, M1931 and M1938 76 mm guns are almost withdrawn from AAA armament. The 85 mm M1939 gun has been altered as follows: The semi-automatic breech system, which previously worked on an inertia principle, was changed in 1944 to a rotating fixed cam system. The breech lock has been simplified, the left trigger and cocking hammer and the pawl have been removed, there is one crank instead of two, and the cocking mechanism has been simplified.

In addition the corrector of the angle of elevation has been removed, one average speed of elevation and traverse has been installed, firing platform has been altered, a seat has been installed for No 3 gunner, the balancing mechanism simplified, powder fuze T-5 replaced by mechanical fuze M-46, and its firing regulation is according to PS-45.

A new draft of combat manual for medium caliber AAA (BUZA) 1950 has come out. PUAZO-3 is still operational. PUAZO synchronized with a range finder has not proved itself and has not been mass produced. Radar is presently used on a wide basis in medium caliber AAA.

Heavy caliber AAA is almost entirely new as previously there were virtually no heavy caliber AAA guns. At present, a 100 mm AA gun M1949 is operational in units. It has a mechanical fuze setting and is fired in conjunction with radar type "MALKHIT". Heavy AAA is organized on the basis of eight guns per battery. Battalion firing which before was non-existent, has been introduced. Firing, tactical and operation units of AAA have remained almost unchanged.

67.

From a quick examination of AAA units the following conclusions must be drawn: AAA is one of the most complex artillery services and necessitates time and much effort in the training of officer and NCO personnel. Experiences of World War II showed the weakness of AAA and its backwardness, in consequence of which, Soviet AAA has undergone serious constitutional and organizational changes in accordance with present day requirements. The next war will show how much AAA has grown and improved in order to solve the problems arising from modern conditions of warfare.

- end -

ENCLOSURE (A): Chart Showing the Organization of the 4th Artillery Division (AA)  
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- (B): Chart Showing the Organization of the 16th Medium Caliber AA Stationed in Meissen, Germany
- (C): Chart Showing the Organization of the 1023 OZAP (Independent AAA Medium Caliber Regiment) located in Ruda
- (D): Sketch Showing the Organization of 1st Category Air Defense System (PVO)
- (E): Sketch Showing the Deployment of Firepower in Air Defense Area, Category I with Legend
- (F): Sketch Showing the Organization of Air Raid Spotter Warning Service (VNOS) With Legend
- (G): Sketch Showing the Combat Disposition of a Medium Caliber AAA Battery
- (H): Sketch Showing the Communications System of a Medium Caliber AAA Battery
- (I): Sketch Showing the Communications System of a Medium Caliber AAA Regiment (or Battalion)



CHART SHOWING THE ORGANIZATION OF THE 4TH ARTILLERY DIVISION (AA)

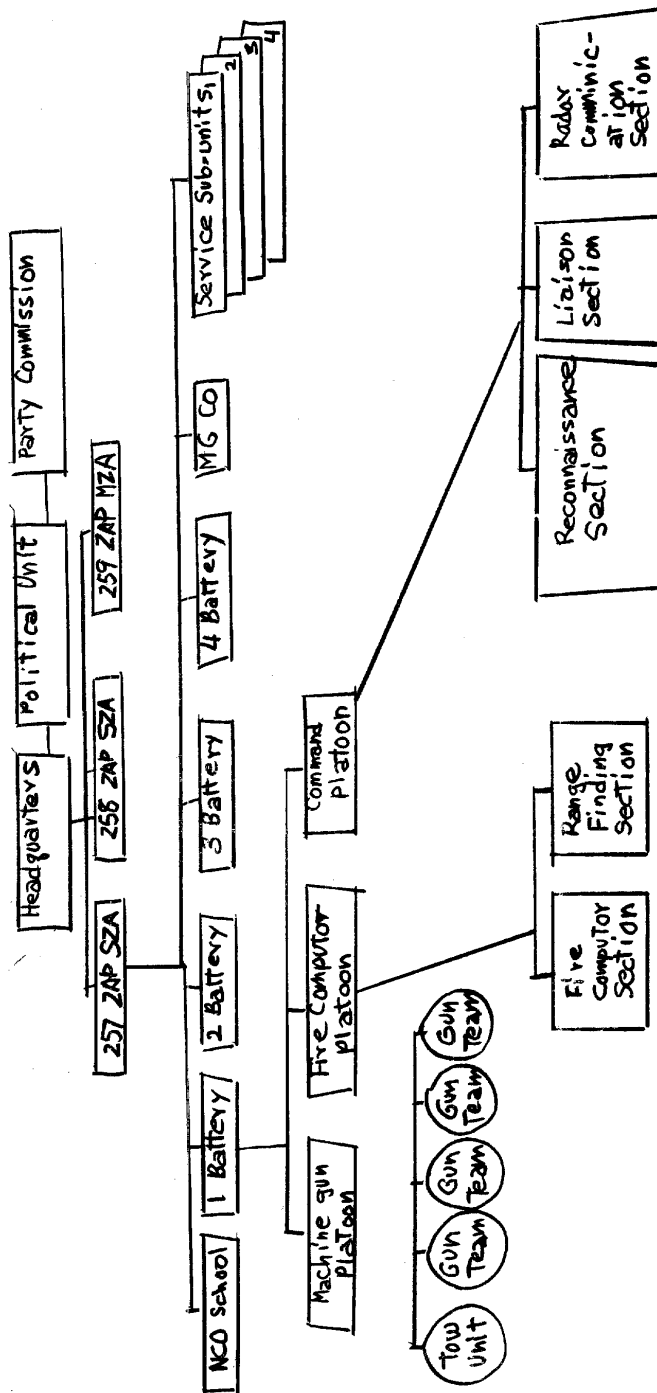
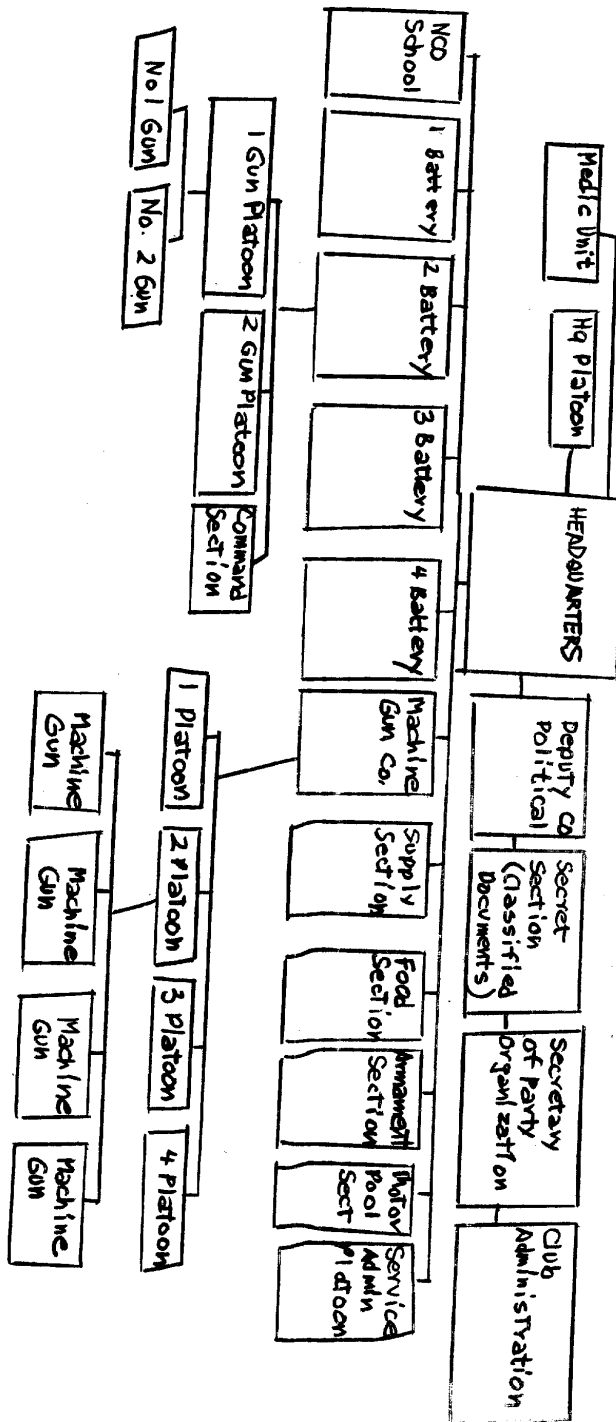
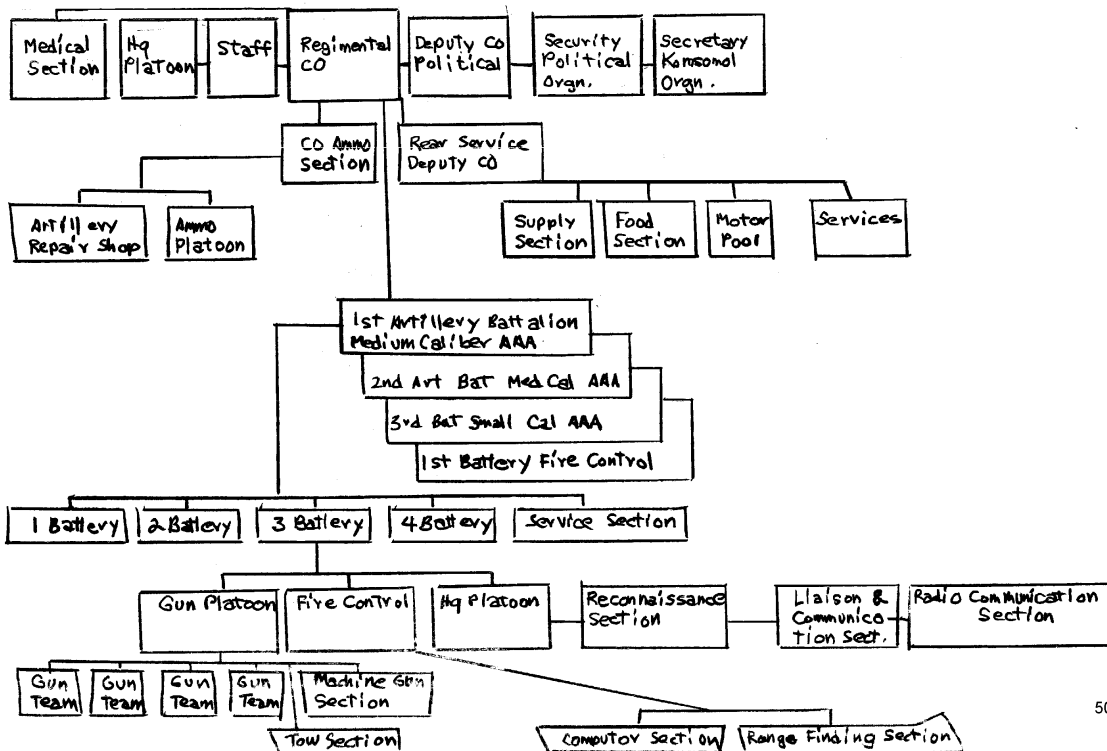


CHART SHOWING THE ORGANIZATION OF THE 16TH MEDIUM CALIBER AA REGIMENT STATIONED  
IN MEISSEN, GERMANY



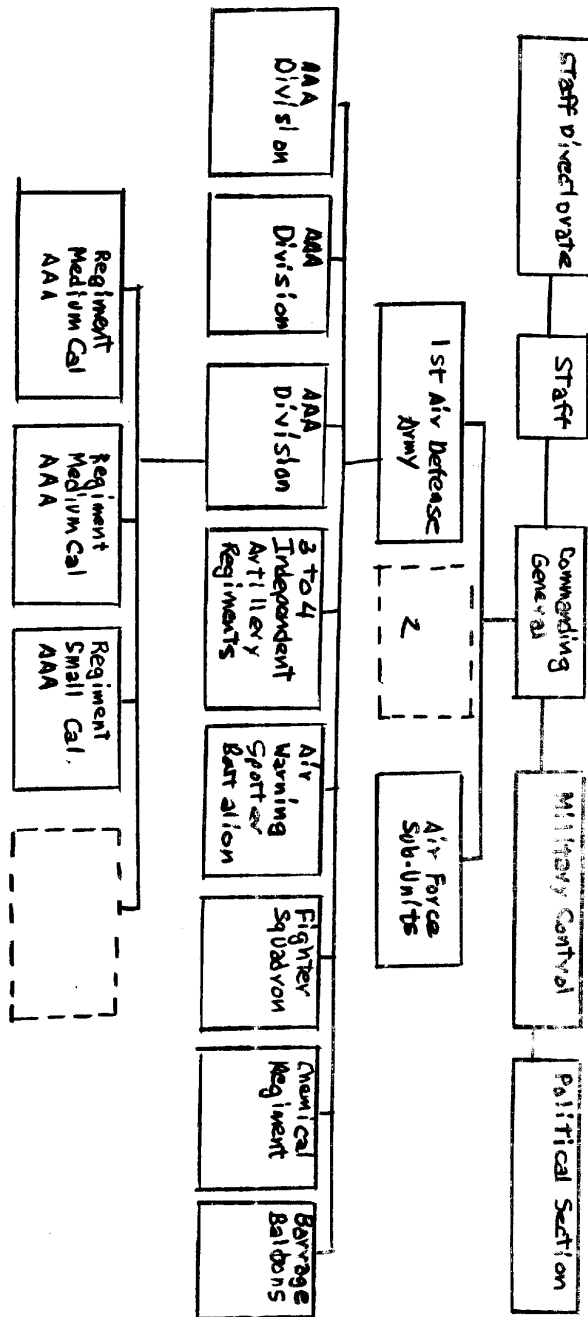


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SKETCH SHOWING THE ORGANIZATION OF 1ST CATEGORY AIR DEFENSE SYSTEM (PVO)



Note: Regiments of Medium Caliber AAA have up to 96 guns,

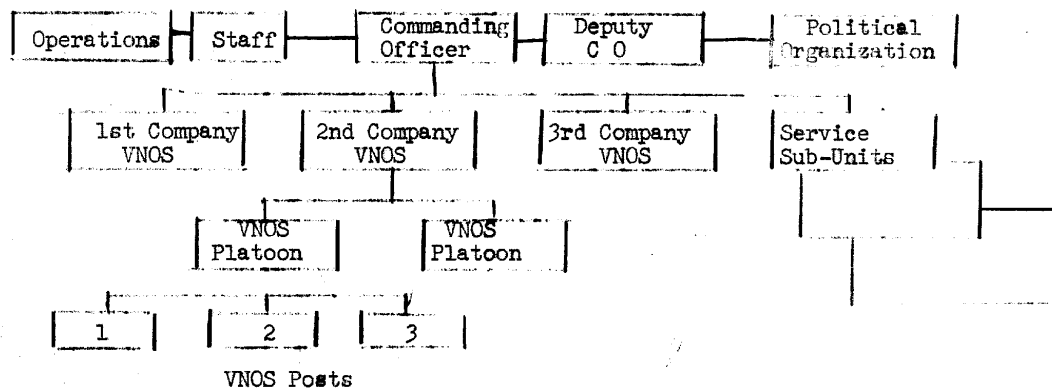


ENCLOSURE (F)

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SKETCH SHOWING THE ORGANIZATION OF AIR RAID SPOTTER WARNING SERVICE (VNOS) WITH LEGEND

**Legend:**

VNOS battalions are directly subordinate to the commander of the Air Defense Area. If these are of the 1st category (Army Air Defense Area) then the VNOS battalions are allocated to each divisional and Army Air Defense Group and are subordinate to them.

Total personnel - 250 men

Each Company - 44 men

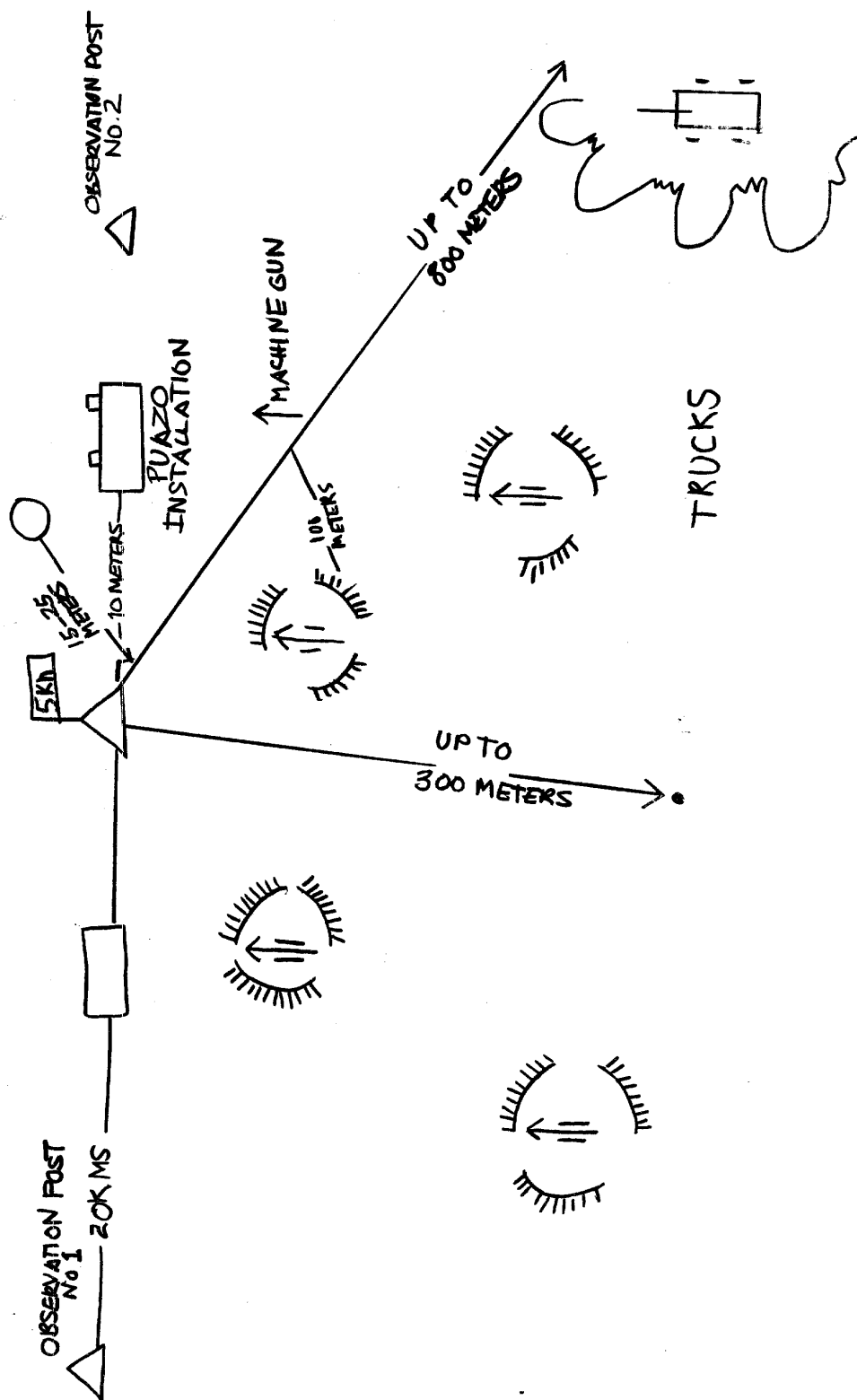
Each Platoon - 18 men

Each Post - 6 - 7 men (spotters, communications and radio operator)

VNOS posts are located 40 -- 60 kms from the objective in the direction of enemy approach.

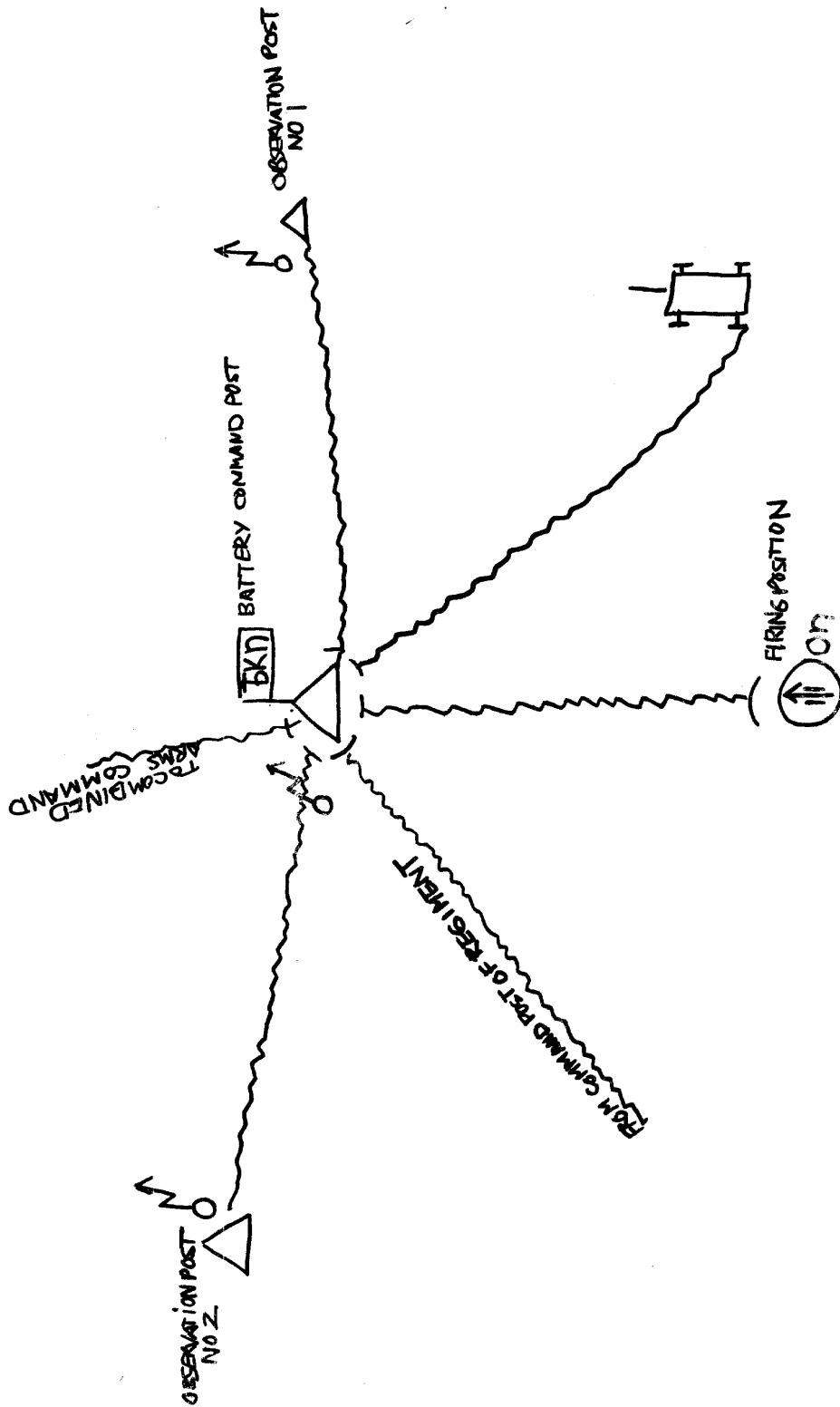


SKETCH SHOWING THE COMBAT DISPOSITION OF A MEDIUM CALIBER AAA BATTERY





- SKETCH SHOWING THE COMMUNICATIONS SYSTEM OF A MEDIUM CALIBER AAA BATTERY





SKETCH SHOWING THE COMMUNICATIONS SYSTEM OF A MEDIUM CALIBER AAA REGIMENT ( OR BATTALION )

