

ARTILLERY IN THE OFFENSIVE

(EXTRACTS)

BRUCHMULLER

U.S. ARMY MILITARY HISTORY INSTITUTE

ARTILLERY IN THE ATTACK IN POSITION WARFARE
(Die Artillerie beim Angriff im Stellungskrieg)

by

Colonel George Bruchmuller

Translated from the French version,
"L'Artillerie dans l'Offensive en Guerre de Position"
of Major Brunet and Captain N. Aizier

by

Maxwell D. Taylor, 1st Lieutenant, Field Artillery.

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INTRODUCTION BY THE TRANSLATOR.

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An appreciation of the present work of Colonel Bruchmuller implies a general knowledge of the principles of employment of the German artillery contained in the author's first work, "Die deutsche Artillerie in den Durchbruchschlachten des Weltkrieges"* "Die Artillerie beim Angriff im Stellungskrieg" is a study of the application of these principles in eight operations on the eastern and western fronts during the period 1916-1918. The order of presentation of the first six of these operations, the reduction of the Korytynca -- Swininchy salient and the attack on the Jacobstadt bridgehead a debouching from two defiles. It is to be borne in mind in the study of the evaluation of the artillery methods that the order is not chronological; that the final development of the German method is found in the Chemin des Dames attack of 27 May 1918, the fifth operation of the series.

The conventional abbreviations for the tactical subdivisions of the artillery are retained thruout the translation. They are:

IKA: Artillery in direct support of divisions for the neutralization of the hostile infantry position. One groupment for each front line division.

AKA: Artillery with the mission of counterbattery. One groupment for each front line corps.

KEKA: Artillery with the mission of interdiction, destruction and protective fires deep in the zone of attack of a corps. One groupment for each front line corps.

SCHWEFLA: Artillery with the mission of long range or interdictions and destructions on the front BARBARA of an army. One groupment for an army.

Col. Bruchmuller treats each attack under the following heads:

- I. The terrain.
- II. Preparations for the attack
Artillery orders of the various echelons (division, corps, army, groupments).
- III. The attack.
- IV. Discussion of measures Taken.

At the beginning of each of the first six operations, the translator has inserted an analytical summary showing the principal artillery features of that attack. It is hoped that this will assist the reader in following the central thought of the author which is sometimes in danger of being obscured by the mass of details.

M. D. T.

* Translated by Maj. J. H. Wallace and Lieut H. D. Kehm M9403 - G7 - J5-F.43, C.9S.S. Library.

Preface

My previous book "German Artillery in the Break Through Battles of the World War"* dealt with the principles underlying German artillery methods and at the same time traced their development. In the present work, we will follow the application of this system and will note how it was improved in the succeeding attacks. A certain number of the historical examples are repeated tho' amplified from the first book and others have been added. An example of the latter is the attack of the 18th Army in the offensive of 21 March 1918 which is of particular interest by virtue of the brilliant tactical success obtained.

In addition certain special operations are studied as:

(1) The reduction of the salient of Korytnica -- Swininchy 27 September 1916. This was effected by a pinching out operation which called for special artillery measures.

(2) The capture of the Jacobstadt bridgehead the 21 - 22 September, 1917. Here, the attack being launched from two defiles, extraordinary efforts were required on the part of all troops involved.

A special chapter is reserved for the lessons learned in the war. Special attention will be paid to the causes of our failures. The question of our July 15 offensive has already been examined; we will determine in detail the circumstances which led to the failure of the 17th Army the 21st and 28 of March around Arras. This chapter also evaluates French methods and compares them with our own.

The old title of my previous work, "German Artillery in the Break Through Battles of the World War" is no longer suitable. A new title corresponding more nearly to the new contents is needed. It is the one which appears at the head of this work.

My sources have been the artillery orders as one knew them in text and spirit, the artillery combat regulations, the regulation entitled "Conduct and Combat of the Combined Armies" and finally the archives of the Reich. From the latter, I have obtained the orders and reports regarding operations in which I did not personally take part. The reading of this evidence has often caused me to revise my opinion in numbers of cases, and I record here my final conclusions.

To discharge a debt of gratitude I have mentioned the artillerymen who had a special part in the success of our offensives. Any omissions which may occur find their excuse in the time which has elapsed since these events took place.

In the courses of this account, I have attempted to portray the heroic devotion of both officers and men in order that this book might be a memorial to our artillerymen. I would write on their monument:

"To the memory of those who have fallen;


To the remembrance of those who have survived;


As an example to the sons and grandsons of all artillerymen."


*Translated by Maj. J.H.Wallace, F.A. and Lieut. E.D.Kehm, F.A.


Military Symbols Used in Sketches and Tables


Abbreviations often used in sketches and tables are shown in parentheses after the corresponding sign.


 Light artillery btry, 77-mm. gun (F.K.)


 Light field howitzer btry, 105-mm. (l.F.H.)


 9-cm gun btry

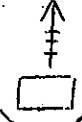
 10-cm gun btry


 12-cm gun btry


 15-cm gun btry


 15-cm gun, model 16


 17-cm gun


 24-cm RR gun


 Heavy field howitzer btry, 150-mm. (s.F.H.)

 Mortar btry

 Austrian light artillery btry (o.F.K.)

 Austrian light field howitzer btry (o.l.F.H.)

 Austrian 10-cm gun btry (o 10-cm K)

 Austrian heavy field howitzer btry (o.s. F.H.)

M.W. Trench mortars

When for technical reasons the symbols cannot be used, explanatory notes are appended to tables and sketches.

It should be noted that these symbols show only the approximate direction of fire.

Witonitz 1 November, 1916.

SUMMARY

Front of attack : 1400 M. (depth 600M). A division attack

Artillery employed . 39 btrys and 49 MW.

Artillery density 28 btrys per 1000 m.

Organization:

5 groupments of from 5 - 17 btrys

- A. Neutralization of Infantry positions 17 btrys.
- B. Counterbattery 6 btrys.
- C. Interdiction to east 5 btrys
- D. Interdiction and flankments to south 6 btrys.
- E. Interdiction and flankments to north 5 btrys

Prior to D-day

Accurate adjustment of each battery on its targets executed cautiously over a period of days. Certain destructions executed on D-2 and D-1.

D-day:

Daylight --8 AM. Final adjustments checking of weather conditions 8 AM - 1:15 PM . Preparation. All guns opened simultaneously.

- a. Infantry positions.

Divided into 5 phases. Frequent shifts of fire. Frequent simulated launchings of attack.

- b. Counter battery.

Simultaneous with infantry preparation.

- c. Interdiction.

The bridgehead completely boxed.

1:15 PM. Start of rolling barrage which ended in a system of defensive fires.

First 5 minutes of barrage on a time schedule; thereafter lifted on call from the infantry.

Conclusions.

1. Gas effective in counterbattery.
2. A period of reinforced counterbattery needed.

Attack by a Reinforced Division.

The Capture of the Witonitz Bridgehead (1 November 1916).

The Terrain.

During the Brussiloff offensive in the summer of 1916, fighting went on to the south of the Pripet marshes for the line of the Stochod River where the Russians had managed to establish several bridgeheads on the west bank. These constituted a permanent danger to us and their reduction was urgent.

The Witonitz bridgehead (sketch) which we are going to consider was separated from the Russian position on the east bank by the valley of the Stochod. This latter was 1500 meters wide and marshy in places. Several footbridges joined the two positions. The river itself was not a serious obstacle.

The bridgehead was on a flat dune called hill 192 which dominated the east bank. The position was about 1400 meters in width, and 600 meters in depth; to the north on the west bank was a detached post which reached as far as Witonitz; similarly, to the south was a small detached position, the Russenwald. The bridgehead had been considerably improved since the end of October, 1916. To the west of it, the German positions were only a few hundred meters away; but to the northwest and north the distance was greater. Our zone of deployment was partly covered with woods; to the north and northwest of the bridgehead the terrain was marshy.

PREPARATIONS FOR THE ATTACK.

The 121st Infantry Division (General von Ditfarth) which occupied the sector had received the order to execute the attack. The locating of the artillery had been given to an artillery specialist who had previous experience in similar operations. His relations with the division chief of artillery (Major Augstein) were cordial from the very beginning.

As was the custom in minor attacks, the division occupying the sector executed the attack. Consequently it was charged with all the preparatory measures.

There were available 39 batteries and 49 minenwerfer. As the number of batteries was small, it was necessary to resort to special measures which will be examined later in detail.

Most of the batteries arrived by marching. When the terrain favored it, they were immediately put in position; this was the general case.

The organization for combat and the coordination between artillery and minenwerfer are indicated in the following table.

Organization for Combat and Missions

Groupments	Subgroupments	Missions	77 - MM	10 - CM	Light Howitzers	Medium or heavy howitzers	Mortars	Other calibres
IKA A	X	Preparation on the organization of hill 192	1		1	2	1	
	B			1		2	2	
	Y		1	1	3	3		
AKA B		Counterbattery and neutralization of flankments to the east of the Stockod		1	1	3		1
(C		Interdiction east of hill 192	5					
D		Neutralization of the Russenwald and of flankments to north thereof.	3		3			
		Interdiction between the Russenwald and hill 192						
E		Neutralization of organization about Witonitz.	2		3			
		Interdiction between Witonitz and hill 192						
			12	2	11	10	3	1
					39			

The 39 Minenwerfer were organized into three groupments to supplement the artillery in the preparation and neutralization of the hostile positions.

Sketch No 2 indicates the artillery and minenwerfer positions.

ARTILLERY ORDERS FOR THE ATTACK.

A. Extracts from the division artillery order:

1. On D-day (to be announced later), the division will attack the Russian bridgehead on hill 192.

The infantry will attack from the west area northwest.

2. Organization for combat.) As above. Paragraphs 2 & 3 gave the allocations of
3. Mission's of groupments) artillery staffs and the battery missions indicated by their number and the number of their regiment.
4. Dispositions for the two days preceding the attack.

A. Adjustment.

Groupment commanders are to give instructions to the effect that the adjustment of each battery will be observed on each of its objectives.

B. Fire missions.

These will be fired by batteries already known to the enemy upon particularly important targets (accurately located machine guns, minenwerfer, infantry cannons, etc.) Adjustments and fires for effect will be conducted cautiously to avoid alerting the enemy. Mortars will not fire prior to the day preceding the attack.

5. Schedule for D-day.

A. Registration.

To begin at daylight or as soon as the visibility permits. Groupment commanders will issue the detailed orders. Groupment A will coordinate with the commander of the minenwerfers. It will be necessary to check only the weather corrections.

B. The Artillery Preparations.

1. Groupment B(counterbattery will receive special instructions.

2. The preparation fired by groupments A,C,D, and E is divided into 6 phases totalling 5 hours and 15 minutes.

Phase 1. Duration: 50 Minutes.

Distribution of fires: see sketch 3.
Rate of fire to increase progressively.
During the last 5 minutes, a surprise fire at maximum rate distributed as in sketch 6.

Phase 2. Duration: 50 minutes.

Distribution of fires: see Sketch 4.
Rate of fire to increase progressively.
During the last 5 minutes, a surprise fire at the

maximum rate distributed as in sketch 7.

Phase 3. Duration: 50 minutes.

Distribution of fires: see sketch 5

Rate of fire to increase progressively.

Phase 4. Duration: 60 minutes.

Distribution of fires: see sketch 6

Rate of fire to increase progressively.

After 45 minutes, a surprise fire of 5 minutes, at the maximum rate, distributed as in sketch 3, 10 - cm batteries cease fire, except those on counterbattery.

At the start of the surprise fire, the infantry will cheer to simulate the assault and thus induce the enemy weapons to reveal themselves.

Minenwerfers lengthen ranges 300 meters during the surprise fire. After 10 minutes of firing at the maximum rate they will return to the first line.

Phase 5. Duration: 60 minutes.

Distribution of fires: see sketch 7

After 50 minutes, a surprise fire at the maximum rate for 10 minutes, distributed as in sketch 3.

Another lifting of the minenwerfers and renewed cheering by the infantry.

Phase 6. Duration: 45 minutes.

Distribution of fires: see sketch 7.

Fire at the rapid rate.

At the end of the phase, the infantry attack without cheering.

C. Accompanying and protective fires.

The heavy howitzer batteries of groupment A firing on the most advanced enemy lines increase their ranges by bounds of 100 meters. The displacement of the artillery fires during the first five minutes of the assault appears in sketch 8.

The minenwerfers support the attack in conjunction with the artillery according to detailed orders emanating from their commander.

Subsequently the artillery fires of the heavy howitzers displace by bounds on pyrotechnic signals from the infantry until the marshy region to the east was reached.

The 10 - cm batteries cease firing except in counterbattery. The 77's and field howitzers are laid on their defensive barrages. See sketch 9.

6. Special prescriptions.

a. The attack with gas shell of enemy batteries and defensive works devolves on groupment B. The schedule of fires of this groupment is to be prepared and submitted at once to division headquarters.

b. At the beginning of the preparation, sections or single pieces of groupments C D & E interdict the footbridges across the Stochod in their respective zones.

c. Groupment C is to box off the rear areas of the bridgehead by placing zone fires in the area between the Russian trenches and the Stochod.

d. The destruction of the barbed wire is a mission of the minenwerfer and of groupment A during the 5th & 6th phases.

e. The neutralization of flanking positions is highly important. The Russenwald localities and those farther south are assigned to groupment D and to the artillery of the 19th Division on our right; the organizations east of the Russenwald to the northwest of Babie and to the southwest of Jasionowka to groupment B; those of Witoniz to groupment E.

A little before the attack, groupment B with all the batteries not firing counterbattery will fire on the flanking positions assigned it. At the jump off, the mortar batteries take over these missions from groupment B; after increasing their ranges medium field howitzers of groupment A not firing counterbattery do likewise. These flanking positions will be neutralized until our infantry is solidly installed upon its objectives.

f. The commander of groupment B is authorized to request in case of necessity additional batteries from the other groupments to reinforce the counterbattery. The 10 - cm batteries will be made immediately available; their use for this purpose will be reported at once to the chief of artillery.

g. If the enemy withdraws or counterattacks the guns and howitzers will concentrate the mass of their fire upon the counterattacks.

7. General prescriptions.

a. Designation of enemy trenches as shown on the division situation map.

b. The aviation is primarily for the use of groupment B. In case of necessity other groupments may request its support.

c. Displacements of artillery will be made as rapidly as possible and without affecting the plan of defensive barrages. The construction of OPs is to be expedited.

d. Groupment commanders are responsible for coordinating the fires of adjacent batteries and groups.

e. To avoid causing losses to our own infantry, fires for effect will begin at the over limit of brackets.

f. Groupment and sub-groupment commanders will inspect the Russian positions from balloon.

g. Each battery will prepare a schedule of missions including the firing data for each target. If observation fails, the fires will be continued unobserved.

h. Groupment A will send an artillery liaison officer to infantry battalions and higher units. Batteries of groupments A and C will send forward observers with the assault echelons. Written instructions will be furnished these observers and liaison officers.

i. The lifting of the preparations at the moment of the attack will be made without a break. The rate of fire will also be unchanged in order to assist in the surprise of the enemy.

Supplementary Instructions to the Division Artillery
Order.

These instructions were made necessary by last minute changes in the enemy's dispositions or in our own. They were of minor importance and are not recorded here.

Allocation of Ammunition

Groupments A, C and D.

per piece

Phases	Duration in Minutes	77	10 CM	12 CM	Light Howitzer	Medium & Heavy Howitzer	Mortars
Adjustment and fire for effect prior to D-day.		20	60		60	35	30
Adjustment on D-day		10	20		20	15	15
Fire for effect							
Phase 1	50	50	40		40	32	20
Phase 2	50	50	40		40	32	20
Phase 3	50	50	40		40	32	20
Phase 4	60	60	50		50	45	25
Phase 5	60	60	50		50	45	25
Phase 6	45	45	40		40	40	30
During the infantry attack		60	40		40	30	20
Total per piece		405	390		380	306	205

These figures indicate the maximum consumption.

Tubes must not be exposed to excessive wear.

Groupment B

per piece

Type of munitions	77	10 CM	12 CM	Light How	Med. How.
H E Shell		380	225	380	300
Gas Shell (Type T)					166
Gas Shell (Type K)					41
Total per piece		380	225	380	507

Assignment of Missions, Groupment B (AKA) (See Sketch 10)

No.	Calibre	Pieces	Objectives	Type of Projectile	Remarks	Modifications in case of an unfavorable wind
1	Medium	1	: 206, 213	(Gas (K or T		None
	How.	2	: 215, 205			
		3	: 207			
		4	: 209, 216			
2	Light	1	: Flankment	HE and	Duration: 1 1/2	
	How.	2	: No. 3	Time shell:	Mrs. There-	None
		3	: Flankment		after shift to	
		4	: No. 3	ditto	flankment No. 4:	
3	Medium	1	: 314, 308	gas	Duration: 1 1/2	Use AE against:
	How.	2	: 305, 306, 307			
		3	: 304			
		4	: 309, 302			
4	12 CM	1	: 320	Sharp- nel	None	None
		2	: 313			
		3	: 301			
		4	: 318, 319			

General Instructions
 (1) The batteries underscored have during the last two weeks. Bom-bard them during the first 10 minutes.
 (2) The gas concentrations on the underscored batteries will first be fired with projectile K, then with projectile T.
 (3) Gas fires will be placed to windward of targets.
 (4) As each battery has several targets to attack simultaneously, a schedule of fire must be made for each piece separately.

Assignment of Missions, Group B (AKA) (See Sketch 10)

No	Calibre	Fleets	Objectives	Type of projectile	Remarks	M. Modifications in case of an unfavorable wind.
5	10-CM	1	309,310			
		2	311,312	Sharr-		None
		3	401	nel		
		4	402,405			
6	Med.	Flankments			After 1 1/2 hr.	
	How.	1	No. 1 &		shift to	None
		2	No. 2		flankment 2	
			400,406	Gas		
		3	407,403			

B. Actions of Groupment B (counterbattery).

In conformance with the artillery order, Capt. Boliher commanding groupment B made his plans for the conduct of the counterbattery. The reduced number of batteries available caused him to assign objectives by piece. However, he could not assign more than two occupied hostile emplacements to those batteries not having gas shell. This allotment by piece justified itself. We were aware of the shortage of Russian gas masks and their inferior quality on this front. The gas bombardment was expected to take the enemy by surprise. Certain of our pieces were given several Russian emplacements to fire on, those positions receiving second and third priorities which had been silent for some time. The Russians were in the habit of shifting positions frequently; they generally had several positions prepared for a single battery and hence had many that were unoccupied.

C. Actions of Groupments A,C,D,E. (IKA)

Conforming to the artillery order, the groupment commanders prepared detailed plans for their batteries.

D. Actions of the Minenwerfer Commander.

The minenwerfer commander arranged the details of coordination, routes, deployment, positions, and plans for fires in conformity with the artillery order.

THE ATTACK

The adjustment (to establish the meteorological elements of firing data) began at daybreak for all groupments.

Counterbattery fires and bombardment of the infantry positions commenced simultaneously at 8:00 AM.

For groupment B, the schedule of fires went off without incident in spite of the difficulty of conducting fires with individual pieces firing on different objectives.

The enemy reaction at the start of the preparation was weak but could not be suppressed. The plan of fires nevertheless produced effect. Groupments A,C,D, E encountered no difficulties. The preparation began suddenly and, altho' difficult to observe because of its density, seemed to be accurate. The frequent shifts of fire were executed rapidly and correctly, a proof of the painstaking preparation of data by the groupments, sub-groupments, and batteries.

The attack gave rise to nothing out of the ordinary. Our well-trained infantry occupied the bridgehead in a minimum of time with few losses. The entire garrison was captured.

The division then ordered an attack on the Russenwald position. The artillery preparation was entrusted to Major Leidenfrost, an energetic groupment commander. He was reinforced by a few batteries from groupment A. His mission was perfectly executed and in a short time the Russenwald also fell.

The capture of the Witonitz bridgehead was a brilliant success due to the intelligent cooperation between the artillery, the minenwerfer and the infantry. The same principles as at Witonitz had been applied in 1915 at Przasnysz near Pultusk, on the Zelvianka and on the Niemen. It was also according to these principles that the artillery had been conducted at the Noratschsee (18 March, 1916) and at Zarzecze (18 September, 1916).

In the case of the Zarzecze bridgehead, it was an Austrian division attached to the German division commanded by General Clausins which executed the attack. The Austrian chief of artillery, Colonel Adler, had intended to bombard the position for days, a procedure which would have probably led the Russians to evacuate it. It would have been expensive in munition and the success would have been problematic. One of General Clausins' staff officers had an artillery specialist sent to the division who supervised the reorganization and emplacement of Adlers' artillery. The plans of the specialist were approved in toto by General von Bernnardi commanding the group of armies who personally watched from an OP the advance of the infantry behind a rolling barrage.

The original plan of Colonel Adler resembles the methods of the French up to 1918. We shall examine later some of the disadvantages of such a method.

DISCUSSIONS OF THE MEASURES TAKEN AT WITONITZ.

The principles governing the use of the artillery at Witonitz were;

(a) Surprise gained by secrecy of preparations, cautious registration, a simultaneous opening of fire by all batteries, a short preparation which did not seek material destructions, the punctual jump-off of the infantry without cheering.

(b) Neutralization obtained by massive concentration of artillery, a rapid rate of fire, the extensive use of gas shell in counterbattery, zone fires in the infantry positions, interdiction of the rear areas of the enemy, a rolling barrage preceding the assault.

(c) The effective exercise of command thru centralization, a complete distribution of orders and a careful preparatory instruction of the troops.

These principles were respected not only in the examples found in this book but partly at least in all the attacks we staged after 1915. In the course of the war, they were developed and perfected with a view to their application to offensives with extended objectives against zone systems of defense.

The preliminary adjustments were carried out with many precautions. They were spread over several days so as not to increase the apparent activity of the artillery and thus alert the enemy. On D-day, the corrections of the moment were determined by all batteries. Thus the fires for effect did not begin until after daylight following the determination of the corrections of the moment.

The bombardment of the artillery and infantry positions began simultaneously. Hence at the start of the preparation only the AKA batteries fired the counter-battery. As they were few in number, they were not sufficient to neutralize the Russian artillery completely. It is very important to achieve this neutralization from the very start of the preparations since even a weak counter-preparation on the troops assembled for the attack has a very bad effect on their morale. For this reason we were led to intensify the counterbattery in subsequent attacks in order to neutralize the enemy artillery completely.

The gas bombardment of the batteries was not distributed over a large zone but was directed against the emplacements themselves; we tried to get a dense concentration in the immediate vicinity of the batteries and to windward thereof.

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The frequent shifts of fire from one trench line to another was effective in keeping the adversary below ground. The simulated attacks accompanied by lengthening of artillery fires and cheers from the infantry accomplished their purpose and led to the destruction of several machine guns which had not been neutralized.

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The boxing of the bridgehead by one groupment succeeded in preventing its reinforcement or the withdrawal of its garrison.

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The rolling barrage advanced initially according to a time schedule; thereafter, on pyrotechnic signals. Thanks to the conditions favoring good observation, this method proved satisfactory. Had the visibility been poor, the infantry would have had to request the lifting of the artillery fires by telephone. There would probably have been interruptions which would have slowed up the attack. Fortunately this contingency did not arise.

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The shell "T" employed was our first gas projectile. The substance which it contained had been proposed by Dr. Tappen of the Goerz Photochemical Works. In the following letter he related to me the history of this shell "T":

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"In October 1914, as the armies passed from open warfare to position warfare, there was reported for the first time the use of 'stink shells' by the Allies. Were the gases reported from genuine gas shells or only the products of the explosion of HE projectiles? It has been impossible to determine this definitely due to the difficulty of obtaining unexploded shells.

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"At any rate, the French High Command must have made early researches into the use of gas projectiles since on February 21, 1915, the Ministry of War published an instruction for the use of gas. When this became known, the first steps were taken on the German side to develop gas warfare. A special commission was set up by the Minister of War and independently of this, General von Falkenhayn, the commander in chief, charged me with the study of this question: In the middle of November, 1914, I proposed the use as lachrymators of xylylbromide and xylyleubromide as well as other combinations formed by halogenous substitutions. Our High Command had specified that the substances employed be non-toxic. For this reason we limited ourselves to a projectile in which a part of the explosive charge had been replaced by an irritant. We chose for this the 15 cm projectile of the Medium field howitzer. The final development of this "T" projectile was the work of Capt. Garke, a member of the Experimental Board of the artillery. After several proving ground tests, these shells were made available at the front.

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"The chemical compounds which were developed were irritating to the eyes. They had quality of impregnating the soil and of causing subsequent casualties. when the enemy occupied shelled areas. This "T" shell remained our only lachrymator for a long time. The French in the spring of 1916 used for the first time gas shell which arrived at obtaining permanent casualties. This had a phosgene filling which soon caused us losses at various points along the front. The High Command then became convinced of the necessity of developing as quickly as possible a toxic shell; consequently after the summer of 1916, it was no longer a question of Shell "T".

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H)

(Signed) Tappen."

TOROLY. 3 April, 1917.

SUMMARY.

FRONT OF ATTACK: 4000m (southern sector of bridgehead).

A division attack.

ARTILLERY EMPLOYED: 76 btrys; 99 MW

ARTILLERY DENSITY: 19 btrys per 100 m.

ORGANIZATION:

4 Groupments of from 9 -- 34 btrys.

- A: Counterbattery. 9 btrys reinforced intermittently by 11 others.
- B: Neutralization of the infantry position. 34½ btrys.
- C: Interdiction and flankments. 21½ btrys.
- D: Support of a feint to the north 10 btrys.

PRIOR TO D-day:

Adjustment and destructions as at Witonitz.

D-day:

Daylight -- 6 AM. Adjustment by groupment A.

6 AM: Short concentration on hostile command system by groupments B, C, and D.

6 AM: -- 1 PM. Gas bombardment of Russian btrys by groupment A.

6 AM -- 7:30 AM. Adjustments by B, C, and D. Fire by B and D on certain OPs and CPs.

7:30 AM -- 1:15 PM. Neutralization of the infantry position. Same principles as at Witonitz.

1:15 -- Start of the rolling barrage. First 8 minutes on a time schedule; thereafter on call.

COUNTERBATTERY: Began 1½ hours ahead of the infantry preparation and continued during it. Gas fires on zones (rectangles). Protective fires in addition to counterbattery. 2 Russian batteries assigned to one German btry. Some reinforcement initially from IKA btrys.

CONCLUSIONS.

1. The effectiveness of disrupting the enemy command system at the start of the preparation.
2. The importance of a reinforced counterbattery phase.

PREPARATIONS FOR THE ATTACK

For the operation, the division disposed of roughly 300 pieces of artillery and 100 minenwerfer. It was impossible to consider an attack against the entire bridgehead with so little artillery; hence we decided to attack the southern part first. After the success of this operation and, if possible, on the next day, we planned to attack the northern part.

As at Witonitz, most of the batteries and a part of the minenwerfer could be put in position as soon as they arrived. The wooded terrain permitted this.

The following table indicated the missions and organization for combat.

Organization for Combat.

Batteries

Group-ments	Subgroup-ments	Mission	77 MM	10 CM	Light Hows.	Med and Heavy How.	Mortars	Other Calibres
AKA A	A1	Neutralization of hostile artillery and						
	A2	protective fires outside of the position allocated.		From none to 2	From 2 to 5	From 7 to 8	From none to 5	
B.	B1	1 Neutralization of infantry positions to the south of the zone of attack.	2	1	3	3	1	
		2			3	1		
IKA	B2	3 Preparation in the southern sector of the zone of attack.	2	1		2	2	
		4				4		
C.	B3	5 Preparation in the northern sector of the zone attack.	1	1		3	1	
		6				3	1	
C.	C1	Interdiction in the Stochod valley to the south.	6					
	C2	Same in Stochod valley to the north	5					
	C3	Interdiction of communications between the Stochod valley and the Russenmauer.	5	1/2				
	C4	Interdiction on the north.			5			
D.		Preparation for a feint against the village of Toboly, bombardment of the northern sector of neutralization of the batteries northeast of the Bayenwald.	6		2			2
			27	4	15	23	5	2

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Minenwerfer

Group- ment	Subgroup- ments	Missions	minenwerfer		
			Light	Medium	Heavy
A	1	Preparation of organized localities between point 340 and Grillmeirrhohe		2	2
	2			5	
	3			6	
		Neutralization of organized localities south of point 340; accompanying fire for the infantry attack.	18		
B	4	Preparation of the organized localities between Grillmeirrhohe and point 300.		2	2
	5			2	2
	6				4
	7			6	
	8			2	
C	9	Preparation on the organized localities between point 300 and point 260			3
	10			2	2
	11			1	3
	12			4	
	13				2
D	14	Preparation of the organized localities between point 260 and the Russ		3	
	15			2	
	16			2	
	17	Enfilade fire in front of zone C	22		
			40	37	22

99

Sketch No. 11 indicates the emplacements of artillery and minenwerfer. The mission of the latter was to assist in the preparations of the enemy front lines between point 340 and the Russenmauer 99 minenwerfer too part in the attack.

The battery positions had been chosen so that many of them could execute their missions against both the northern and southern parts of the bridgehead without displacing. Seven only had to move in order to fire into the northern sector. Actually, in the wooded region opposite the center of the bridgehead there was necessarily a considerable concentration of batteries which was unfortunate as the terrain here was marshy.

In order to increase to the utmost the density of our fires, when their positions permitted it, we utilized the batteries initially in position outside the sector of the attack to the north and to the south. As these batteries could not shift positions, they could not fire on the most distant objectives. Some of them were unable to participate in the attack except at the extreme limit of their ranges against the nearest enemy defenses.

In order to push forward a few 10-cm pieces immediately after the jump-off, we had prepared forward positions to be occupied just in rear of the front lines.

Certain minenwerfer placed opposite the northern sector could also take part in the attack to the south. A few were put at the disposition of groupment D.

Because of the severely cold weather, the attack was put off several times. Consequently the artillery had plenty of time to effect minute preparations which included: the accurate locating of batteries and OP's; the making up of firing charts; adjustments for batteries not yet arrived; work on new positions for batteries which were to displace to fire in the northern sector; study of the enemy emplacements, etc.

Division of Artillery Orders

A. The following is the general tenor of Division Artillery Order No.1:

1. D-day, we attack the southern sector of the Toboly bridgehead between Gelenin and the Russenmauer. The infantry attacks from the west between point 340 and the Russenmauer.

2. Organization for combat (see table page 21).

This paragraph included in addition the assignment of staffs and battery missions designated by their number and by the number of their regiment.

3. Missions.

4. Schedule for the preparation and for the attack.

I. The days preceding the attack.

a. Adjustments.

Detailed orders are to be issued by groupment commanders. Good observation is essential.

b. Fires for effect.

To be delivered against particularly important

objectives which have been definitely located: machine guns, infantry cannon, minenwerfer, etc., by batteries already in position.

Adjustment as well as fires for effect to be made in such a way as not to arouse the suspicions of the enemy. The mortars will not fire for effect prior to the two days preceding the attack.

II. The day of the attack

a. Adjustments.

To be effected after daybreak as soon as visibility permits. It will be sufficient to check the corrections of the moment. Groupment commanders will issue detailed instructions. Groupment B will confer with the commander of the minenwerfer.

b. Fires for effect.

1. Groupment A (counterbattery) will receive special instructions.

2. Groupment B :

The preparation on the infantry positions was divided into five phases of variable length varying from fifty to ninety-five minutes. At the end of each phase the fires were redistributed (See sketches 12 to 16 (incl)). At irregular intervals the artillery fired short bursts for about ten minutes at the maximum rate. During the fourth and fifth phases. At the start of the rapid burst, the infantry cheered and simulated the beginning of an attack.

3. Groupment D.

Same division into phases as for Groupment B.

For assignment of missions see Sketches (12 to 16 (incl.)). For the fifteen minutes preceding the attack Groupment C will fire the missions indicated on Sketch 17, using HE at the normal rate. Against visible targets, the rapid rate.

4. Groupment D.

To prepare recommendations for its use at once.

c. The Rolling Barrage to Accompany the Attack.

The location of successive lines, see Sketches (17, 18, 19 & 20).

(The barrage was to advance by bounds of 100 meters by the howitzers of groupment B (the only groupment firing the barrage) during the period from H hr to H ~~hr~~ 8. Thereafter it lifted on call by green rockets from the infantry to the successive lines shown in Sketches (19 and 20).

d. Standing barrages after the occupation of the bridgehead (see sketch 21).

x. Artillery Order No. 1 contains in addition dispositions for:

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(1) Four infantry cannon to be emplaced for close-in defense.

(2) The construction of dummy batteries.

(3) The gas bombardment of certain batteries.

(4) The interdiction of the Stochod Valley.

(5) Fire against balloons.

(6) Destruction of wire.

(7) Neutralization of flankments.

(8) Conduct in case the enemy counterattacked.

(9) General instructions regarding: counterbattery by groupment A, reconnaissance, signal communications, missions to aviation.

Conditions of gas masks, adjustments, filling out of B. C. positions books, pyrotechnic codes, liaison officers, the attack against the northern sector in case of success, defensive barrages before, during and after the infantry attack.

Artillery Order No. 2

In form it resembled that of Order No. 1. It was drawn up with a view to the attack of the northern part of the bridge-head and included 10 sketches.

Gas Annex to Order 1 and 2.

This order contained the technical instructions relative to the gas bombardment of batteries and parts of the infantry positions during the two attacks and in the time interval separating the two.

An overlay (sketch 22) showing missions of groupment A was included as an annex. It showed for the first time gas missions in the form of rectangles. The location of these rectangles was based on the assumption of no wind. Allowance for wind was made by shifting their map location thru the use of some prearranged phrase such as "Pitch tents 100 meters farther to the east." In firing on infantry positions we were careful not to hinder the subsequent advance of our own troops.

Supplements to Orders 1 and 2

As at Witonitz changes in the enemy situation made modifications necessary to the original plan. They were grouped under the heading "Program of artillery fires on D-day up to the beginning of the preparation on the infantry positions."

Extract.

1. D-day will be the first day of favorable weather. The decision will be communicated by telephone on the day of the attack prior to 5:30 AM. The code word will be "Highness"; "Hallali" will mean "understood."

2. Until further orders, all batteries will hold themselves in readiness to open fire at 5:00 AM.

3. On the day of the attack:

(EH)

Prior to 6:00 AM: adjustments by groupment A.

6:00 AM: opening of the gas bombardment.

6:00 AM: destruction of the wire lines crossing the Stochod south of Rudka Tschewitchi, of the telephone central 192 and of the central of the area south of point 199 (by groupment C); destruction of the central in Rudka Park near point 92 (by groupment D). Detailed instructions to be prepared by groupment commanders.

6:00 -- 7:00 AM. Adjustments by groupments B, C, and D (checking of corrections of the moment).

Fire by groupments B and D on certain CP's and OP's in accordance with verbal instructions.

7:30 AM: Opening of the preparation on infantry positions.

A tentative order was also issued for the artillery activity between the operations in the north and in the south. The measures taken were with the view to obtaining a maximum harassment of the northern part of the bridgehead with a minimum expense of munitions.

Orders for the Minenwerfer.

1. Time of opening fire: same as for the artillery.

2. In principle, the minenwerfer were initially to fire on the front line; it was not until later that they were to shift their fire to more distant objectives.

3. Priority of missions.

a. Cutting of paths thru the barbed wire and neutralization of flankments in the front line.

b. Preparation on the first line and on the second where it was near the first.

c. Bombardment of the enemy lines during the artillery. Phase 4.

4. As the infantry jumped off, the medium minenwerfer would lengthen their range, the heavy ones ceasing to fire.

5. The minenwerfer were to be protected as much as possible from earth and fragments at the time that the land mines are exploded.

6. They were to be coordinated with the artillery by the M.W. commander. Orders for the M.W. to be approved by the artillery specialist.

Allotment of Munitions.

There were available for the entire operation:

5000	rounds	per	battery	of	77's
4000	"	"	"	"	light howitzers
2000	"	"	"	"	10 cm
3500	"	"	"	"	medium and heavy howitzers
1000	"	"	"	"	mortars.

Table of Allotment of Ammunitions

(Extract)

Rounds

Batterys	At Btry.	At D.P.	Location of D.P.	Maximum expenditure per hour
77 Btrys				
1/96	4000	1500	Sessler	240
	4000	1500	"	240
	etc			
Light howitzers btry.				
5/270	(1000G (3200	800	Barbara	240
6/270	(1000G (3300		"	240
796	(200 G (3700	500	Sessler	240
10-cm Btrys				
4/26	2000	800	B.K.D.	240
4/13	2000	800		240
Mortar Btrys				
1/33	1000			60
2/33	1000			60
3/33	1000			60
Medium & heavy howitzer btrys.				
5/R16	(1300 G (2000	300	Buday	180
6/R16	(1300 G (1800		"	180
7/R16	(1300 G (1800			180
2/27	(1300 G (1800	1200		180
4/27	2000		B.K.D.	180
3/27	1300 G 1700	500	Buday.	180

G indicates gas projectiles.

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The regiments received orders not to fatigue unduly their troops; also an instruction for the use of the green cross gas shell and smoke shell; indications of the effect to be expected of the projectiles of the heavy howitzer and mortar on frozen ground (the results of experiments made at Toboly).

B. Plans for Groupment A.

The groupment commander made up a schedule of fires for the two parts of the attack. The model form is shown in the following table:

Schedule of fires for the first part of the Attack (Extract)

Groupment A.

Btry	Hours	Ammunition		
b	From: To	Num-ber of rounds	Type	
4/18	1 hr. : 30 min; U+5: 30	325	green cross HE	One Rectangles: a) Fire for 1 hr on the rectangles; Nos. XVI (batteries 115, 145a XX (btry.134). then on the 4 localities allotting to each one gun and 5 gas shells; 4. localities then on the main (designated by: locality (20 gas coordinates). shells, 10 HE in a Assembly area: surprise fire. (designated by: Repeat the gas bombardment of rectangles and at h + 2, the surprise fire on the localities. b) Mix with gas, HE in the proportions of 10%
	Begin: h+5:30 ing of Phase: 4	150	Smoke or H E	Edge of wood Flankments to be P458 at 457 or flankments.
	Begin: 1 hour; ing after: end of Phase: 4	average; rate and HE	green cross and HE	Gas rectangles; See first period Remark b.

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According to final reconnaissances, the enemy batteries were so numerous that it was necessary to give two to each Germany battery. However, it must be added that a goodly number of Russian batteries had not fired for two weeks, a fact which led us to believe that they had changed position. The Russians here as at Witonitz used roving batteries.

C. Plans for Groupments B, C, and D.

The groupment commanders assigned missions to batteries according to the artillery orders.

D. Plans for the Minenwerfer.

Lieutenant Heuschkel issued the orders and planned the details for the minenwerfer. He set up three heavy minenwerfer in shell holes in advance of our line within 50 meters of a Russian listening post. He connected them with a communication trench and gave them 180 rounds apiece. Several men were lost by machine gun fire in the construction of the trench but the minenwerfer were unharmed. The Russians had considered it impossible for them to take position in that locality.

THE ATTACK.

After receiving a favorable weather report from the meteorological service 3 April 1917 at 3:00 AM., the commanding general fixed the attack for that day.

After checking the corrections of the moment, the artillery opened the gas bombardment on the designated rectangles; at the same time HE and gas was put on the CPs, OPs and telephone Centrals. At first neither airplanes nor balloons could ascend to a high altitude because of the strong wind.

The preparation on the infantry positions began as planned at 7:30 AM.

During the first hour the enemy hardly replied. Then as the wind increased, the gas was swept away from the batteries and they commenced to fire. But the irregularity of this fire betrayed an absence of direction. We concluded that the telephone system had been badly shot up, a fact which was confirmed shortly after 6:00 AM by the appearance of a visual signal station north of Rudka. Almost all the Russian batteries which opened fire were quickly silenced. A few exceptional batteries fired a little longer.

After the explosion of a mine at 11:00 AM, the Russian fire became a little heavier. Apparently they were expecting the assault. The strength of the wind induced groupment A to replace a half of its 10% quota of gas shell with HE.

About noon the wind died down; groupment A increased its fire and airplanes and balloons took the air. The reports which they sent back were excellent. At 1:15 PM, the hour of the infantry attack there were no defensive barrages. During the attack a few concealed batteries opened fire without result upon our advancing infantry. A few rounds fell on our front lines which had long since been vacated. Soon most of these batteries also ceased firing. From that time on the Russian reaction was of a low order.

In a word, the fires of the groupments against the southern part of the bridgehead were executed as planned and in spite of the bad weather, the attack in the south succeeded extraordinarily well. Most of the enemy troops were surprised and taken

prisoner in their dug-outs by the German infantry which followed in the trace of the barrage.

The northern part of the bridgehead fell into our hands the same day. The infantry pushing forward without a pause accomplished brilliant feats in the northern sector. As a result of the energetic action of the groupment commanders, the shifts of fire were made as planned and the infantry was able to advance behind a rolling barrage (See sketches 23 to 25). At night fall, we were in possession of the entire bridgehead 10,000 prisoners including 150 officers, 15 cannons, and about 10 machine guns and minenwerfer fell into our hands. The Russians lost thousands in dead, wounded and drowned in the Stochod. On our side about 400 men were casualties. This success may be listed among the most brilliant of the war; it proves that troops can gain victories if they are inspired with a will to conquer. The infantry was splendid and the artillery none less so.

The opinion formed by the infantry of the artillery in this battle is indicated by the following message from an infantry regimental commander to the artillery commander?

"My regiment sends you its cordial congratulations for the brilliant success obtained to-day by your artillery and thanks you for the excellent support which made our task so easy."

Signed:
Rothardt.

The Kaiser telegraphed to the army group Leusingen:

"To all the leaders whose methodical preparations have won this great success on the Stochod, to all the troops whose dash and courage made it possible, I express my thanks and my gratitude."

Signed: Wilhelm

DISCUSSION OF THE MEASURES TAKEN.

The secrecy of the operation was endangered by the numerous delays caused by the unfavorable weather. Special measures were necessary to insure it. The division commander and the artillery commander were constantly issuing and supervising the execution of orders to preserve secrecy.

The artillery adjustments were made as at Witnoitz. For this reason, the artillery preparation could not begin until after daylight.

The experience of previous attacks had shown that at the start of a preparation it was first necessary to silence the enemy artillery. But here the AKA batteries were not sufficient for the task. Consequently some of the IKA batteries had to reinforce the counterbattery initially. The other IKA batteries fired on OP's PC's, telephone centrals and troop bivouacs. These measures were highly successful and were a forward step in the development of the methods of the artillery.

The counterbattery missions were executed with gas shells fired upon rectangles containing the batteries. This procedure was effective but costly in munitions.

The need of reinforcing the counterbattery with IKA delayed the preparation fired against infantry position with respect to the opening of counterbattery fires. The bombardment of infantry positions had to wait until fire superiority had been gained over the enemy batteries.

The rolling barrage was prepared as at Witonitz and was completely successful, thanks to the favorable conditions for observation.

In the course of the preparations for the attack which lasted for months, continuous and methodical instruction was given the troops. Numerous visits of inspection by the artillery commander and his associates allowed a rigorous check of the progress of instruction in the various units.

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Eastern Galicia 19 July, 1917.

SUMMARY

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FRONT OF ATTACK: about 9 KM. An attack by a corps of four divisions, with three divisions in line. (16th Div, 1st Guard Div. 2d Guard Div.)

ARTILLERY EMPLOYED: 134 btrys: 176 MW.

ARTILLERY DENSITY: 15 btrys per 1000 m.

ORGANIZATION.

4 groupments of from 19 to 42 btrys.

A. Counterbattery. 37 btrys.

B. Neutralization of the infantry position 42 btrys.

in zone of 6th Div. Interdiction of west and protection on the south.

C. Neutralization of the infantry position 19 btrys.

in zone of 1st Guard Div. Interdiction to the west.

D. Neutralization of the infantry position 36 btrys.

in the zone of action of the 2d Guard Div. Interdiction to west and protection to north.

ADJUSTMENT.

Btrys opening fire at night did not make a final check of weather corrections. A few were adjusted by sound and flash sections and the results communicated. Mortars forbidden to fire to D-day. IKA adjusted after daylight.

D-day

3 AM. Opening of gas bombardment of btrys and of interdiction fires on flanks and rear. Surprise fire on CPs and OPs.

5 AM. Neutralization of infantry position by IKA. AKA remains on counterbattery.

5:30 AM. MW open.

10 AM. Assault preceded by a rolling barrage. Smoke on flanks. (The preparation followed generally the methods of Toboly except for adjustment.)

Conclusions.

1. Own smoke may aid the enemy in covering his retreat.
2. Last minute changes in artillery commanders are dangerous.
3. A final adjustment on D-day may be dispensed with wholly or in part.
4. A good road net essential to the artillery.

(H)

The Attack of the XXIII Reserve Corps in Eastern Galicia,
19 July 1917.

The Terrain

The penetration took place between the South Seretmulde and the valley of the Graberka (Sketch 26). The terrain within the enemy's lines was mountainous and cut up by numerous valleys, some of them parallel to the front, others oblique to it. These conditions of the terrain made the attack especially difficult.

The defensive system was strongly organized. It included two main positions and an intermediate one, each being composed of several successive lines of organizations. The first principal position ran from the South Seretmulde along the valley of the Sereth to the northeast, crossing it obliquely and then turned north thru Batkow and Zwyzyn. Thence it followed the valley of the Graberka. The second position followed the line: Folw-Dabrowa -- Hmdawa -- Markapal.

Our lines faced those of the enemy at a short distance.

The zone of departure for our attack was also hilly, intersected by valleys partly parallel to the front and mostly wooded. These woods were interspersed with clearings.

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PREPARATIONS FOR THE ATTACK.

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The offensive took place in the Zloczow sector which was commanded by General von Winckler. The execution of the principal attack had been assigned to the XXIII Reserve Corps (General von Kathen). For this attack four divisions were put at the disposition of the corps, the 1st and 2d Guard Infantry Divisions and the 5th and 6th Infantry Divisions. The Guard Divisions and the 6th Division had been designed as assault divisions. Simultaneously with the main attack, a secondary attack was to be made by a division in the sector to the south. This division was not under the command of General von Kathen; it was given as a limited objective a ridge occupied by the Russians. An artillery specialist was assigned to all the corps staffs in the Zloczow sector, this to include the XXIII Reserve Corps. Here the specialist was fortunate in collaborating with such a chief of staff as Colonel Von Tschischwitz and an artillery technician as Captain Heydenreich.

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oded.

An Austro-Hungarian division had occupied the corps sector prior to the attack and had been charged with the initial preparations. The German General Kohler had been with this division as artillery advisor. As the preparations progressed, he was named groupment commander of the AKA for the attack; certain of the Austrian officers were designated to represent the groupment and subgroupment commanders of IKA and AKA. All of these officers performed their duties well. The counterbattery preparations of General Kohler were truly excellent.

For the attack it was estimated that 150 batteries, in round numbers, were necessary and that approximate number was made available. But scarcely had the first positions been occupied when the Russians themselves took the offensive and it was necessary to move the batteries. In order to stop the attack, batteries and artillery staffs had to be dispersed along the front even tho they had already taken position. This slowed up the preparations.

176 minenwefer of which one half were heavy calibres were available for the preparation of the enemy front lines.

The artillery arrived mostly by rail, a part of it coming from the Western Front. The broken and wooded ground permitted its immediate installation. But the roads were few and bad. There was but one road leading into the area of the battery positions and it was so poor that we soon had to stop all traffic and repair it thoroughly.

Organization for Combat

Groupments	Sub-Groupments	Missions	Batteries				
			77	10 cm	Light Hows.	Heavy Hows.	Mortars
AKA	A1	Neutralization of enemy artillery	3		3	2	
	A2		6	1	3	1	
	A3		3	1	3	2	
	A4		3		1	5	
BI	Ia	Preparation in the zone of attack of the 6th Division.	4		6	6	2
	Ib	Interdiction of enemy movement into the zone of attack of the 6th Division.	6	2	6		
	Ic	Neutralization of flank-ing positions to the south of the zone of attack	6		2	2	
BII	IIa	Preparation in the zone of attack the 1st Guard Divison.	4		2	2	
	IIb	Interdiction of enemy movement into the zone of attack of the 1st Guard Division					
BIII	IIIa	Preparation in the zone of attack of the 2d Guard Division	5		10	4	2
	IIIb	Interdiction of enemy movement into the zone of attack of the 2d Guard Division.	6	2			
	IIIc	Neutralization of flank-ing positions to the north of the zone of attack	3	1	2	1	
			57	10	38	25	4

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Organization for Combat and Missions.

Batteries

Groups	sub-groups		Batteries				
			77	Heavy Guns	Light Hows.	Heavy Hows.	Mortars
AKA	A1:	Neutralization of the enemy	5	5		2	
	A2:	artillery	6			1	
	A3:		7	2			
	A4:		7	1		1	
B	B1:	Preparation of the 1st Position in zone of the 19th Reserve Division.	4		8	6	3
	B2:	Preparation on the 2d position in zone of the 19th Reserve Division.			3	3	
	B3:	Interdiction to the east (flank of attack)	9	2			
IKA	C1:	Preparation on the 1st position in zone of the 14th Bavarian Division	6	2	7	10	5
	C2:	Preparation on the 2d position in the zone of the 14th Division.	2	2	3	3	
D	D1:	Preparation on the 1st position in zone of the 2d Guard Division	5		7	7	2
	D2:	Preparation on the 2d position in zone of the 2d Guard Division.	1		5	3	
	D3:	Interdiction to the west (on the flank of the attack) and contingent support of the 1st Reserve Division in case of attack by the Russians	6	2			
	D3:	Interdiction to the west (on the flank of the attack) and contingent support of the 1st Reserve Division in case of attack by the Russians					
			58	15	33	36	10
			152				

Sketch 26 indicates the artillery and minenwerfer positions.

Most of the batteries were sheltered in woods. The IKA batteries were located well forward so as to be able to reach the second positions (Folw Dabrowa -- Hindawa -- Markopol). They were all close to the enemy position, especially the northern groupment which was very near the Russian lines south of the Graberka.

ARTILLERY ORDERS FOR THE ATTACK

A. Corps artillery orders.

The corps orders followed the form of those issued at Riga, an operation which we shall study in detail elsewhere. They were based essentially on the methods applied successfully at Witonitz and Toboly.

The order for the AKA batteries was similar to that at Toboly. Along with technical details, it included four overlays (sketch 27) designating the fire missions.

The employment of the IKA batteries followed the principles of Toboly. Similar sketches were distributed showing the phases of the artillery preparation and the lines on which the rolling barrage paused. The assignment of battery missions was made a division function whereas at Toboly it was done by groupments. The divisions were to utilize their own information collecting agencies in making this assignment. The divisions were left free to fire on the howitzer targets with either light or medium howitzers.

B. Groupment Orders (AKA)

The groupment commander organized his fires in conformance with the corps order. He assigned rectangles to his batteries to be fired upon with gas shell.

C. Groupment orders (IKA)

In their capacity as groupment commanders of IKA the division artillery commanders assigned to the batteries the targets designated by the corps. They were authorized to make modifications of detail.

Sketch 27 - Eastern Galicia.

Distribution of fires of Groupment A (counterbattery)

The rectangles are for gas fires.

Because of the terrain, their long axis is not always in the direction of fire.

Ob 1é - light howitzer

Ob 1o - Medium and heavy howitzers

The V rectangles corresponded to positions not occupied when the order appeared.

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THE ATTACK

Counterbattery by AKA with gas shells, reinforced by some IKA batteries began at 3:00 AM, prior to the general preparation. At the same time, the subgroupments of IKA b and c, began the interdiction of the flanks and rear of the Russian position. Several batteries of subgroupment IKA, a, put down a sudden burst of fire with mixed types of projectiles on CPs and OPs.

Two hours after the beginning of the gas bombardment, at 5:00 AM, the IKA batteries began the preparation of the infantry positions. The AKA batteries continued to fire on the enemy artillery. The minenwerfers being short of ammunition did not open fire until a half-hour later. While the IKA a sub-groupments bombarded with HE the successive lines of the first position, the sub-groupments b and c continued during the whole preparation and until the approach of our own infantry the bombardment of the second position and the flankments to the north and south of the zone of attack. These fires were at first with HE, then with mixed types of projectiles during the hour and a half preceding the attack.

During the assault and on the terrain which our infantry did not cross, we put down smoke to box the zone of attack. The preparation lasted five hours. A rolling barrage preceded the attack pausing on successive lines. The progression by bounds of 100 meters was resumed upon rocket signal from the infantry.

The enemy reaction was insignificant. On a part of the front the Russians took advantage of the smoke in their front and fled to the rear abandoning their guns and material. Our infantry took the rest prisoner. The German troops pushed thru the entire organized zone. The Russian position for several kilometers to the south was shaken by this penetration. New divisions were thrown into the attack and in a few days Tarnapol fell into our hands.

Here as at Toboly, we owed a brilliant success to close collaboration between artillery and infantry. The highest praises are due each arm. Officers and soldiers were animated by the spirit of confidence which alone guarantees success.

DISCUSSION OF THE MEASURES TAKEN

The traffic congestion resulting from the poor and inadequate roads is a proof of the consequences of such a road net in position warfare. Another similar example occurred shortly after the capture of the Jacobstadt bridgehead, (21 September, 1917) when the Eichorn army group was compelled to give up an attack on Dunaburg because of the deplorable state of the roads.

Adjustment was strictly limited in accordance with the following orders:

1. Mortar batteries brought in from other fronts were to remain silent prior to D-day.

The artillery commander realized that this prescription rendered doubtful the fire of these pieces if the visibility was low; however, he preferred to lose the effective support of these batteries rather than betray the imminent attack by registration.

2. Most of the batteries which opened fire before dawn did not apply new corrections of the moment. A few checked their data by the sound and flash sections and transmitted the information obtained to adjacent batteries of the same calibre firing in the same direction.

In order to increase the effectiveness of the gas, counter-battery and fires on CPs and OPs were executed at night.

In order to check the atmospheric corrections, the preparation of infantry positions began after dawn.

The displacements of the barrage were made as at Witonitz and Toboly.

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RIGA, 1 September, 1917

FRONT OF ATTACK: 12000.m. An army attack with three divisions in the front line (19th Res.Div. Bavarian Div and the 2d Guard Div.)

ARTILLERY EMPLOYED: 170 btrys; 230 MW.

ARTILLERY DENSITY: 14 -/ btrys per 1000 m.

ORGANIZATION: 6 groupments of 22 -- 40 btrys.

A. Counterbattery 36 btrys.

B. Neutralization of positions and interdiction, zone of 19th Res Div. 38 btrys.

C. Neutralization of positions and interdiction, zone of the 14th Bavarian Div. 40 btrys.

D. Neutralization of positions and interdiction, zone of the 2d Guard Div. 38 btrys.

Ahlmann: Flanking fires from left bank and counterbattery 22 btrys

5 btrys

FEKA: Distant interdictions and

destructions.

ADJUSTMENT.

Reinforcing btrys registered cautiously on arrival. Groupment B, C, D, registered for direction only. Weather conditions calculated. Mortars and heavy guns silent. A few rounds for adjustment permitted on D-day. AKA adjusted for direction on gas rectangles.

D-day.

4 AM -- 6 AM. Reinforced gas counterbattery. Surprise fire by some IKA on CPs, OPs and telephone centrals.

6 AM -- 9:10 AM. Neutralization of infantry positions 4 Phases.

8:50 AM. Bulk of AKA switches to fire on rear infantry positions. A few btrys maintain neutralization of enemy artillery. All return to counterbattery at end of 3d period of the rolling barrage.

9:10 AM. Assault. Beginning of the rolling barrage divided into 6 periods. All movements on call from the infantry.

Conclusions.

1. Complete neutralization of enemy weapons along a river line is essential.
2. Captured artillery material may be turned against the enemy.
3. A satisfactory ratio of gas to HE in counterbattery is 3 to 1.
4. Artillery is needed early across the river in a river crossing.

5. Priority in crossing by ferry given to liaison detachments and forward observers.

6. A time schedule is inadvisable for a barrage moving away from a river line.

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157 (EH) (EH)

The Attack of the Eighth Army at Riga.

1 September 1917.

THE TERRAIN.

The region chosen for the penetration extended along the right (north bank) of the Duna river between Solen island and the river bend to the west of Scheeren island.

The Russian defensive system consisted of two positions. The first on the dunes along the river's edge comprised three or four lines. The other, about 3 kilometers back from the first, followed a line of wooded heights and was generally in two lines. Between the first and second positions was low ground covered by woods, fields and marshes. Borkum island was occupied and defended by strong works.

The Germans were installed on the south bank of the river on the dunes and in the woods to the rear. The terrain in which we were to deploy our means was generally covered by woods which in the center of the zone of attack reached up to the dunes but which receded on the flanks to a considerable distance. Between the woods and the river the ground was largely marshy.

PREPARATIONS FOR THE ATTACK.

The attack had been assigned to the Eighth Army (General von Hutrei) as the point chosen for the decisive effort was in that army sector.

For the attack the Army had available 3 corps totaling 11 infantry divisions and 2 cavalry divisions. Of the 11 infantry divisions, only three went into the first echelon, namely the 19th Reserve Division, the 14th Bavarian Division, and the 2d Guard Division. These three divisions were under the 51st Corps for the attack. The passage of the river was initially to be by pontoon ferries, then by three pontoon bridges as soon as they could be completed. One bridge was allotted to each division. The bridge sites were chosen to the east of Borkum island, between Borkum and Elster island, and the west of the latter island.

The 203d Infantry Division was occupying the line in the zone of the future attack. A few of the reinforcing artillery units were to be emplaced in the sector of the 1st Reserve Division which was on the left of the 203d. The artillery commander of the 203d Division, Colonel von Bercken, was assigned to command Groupment A for the attack. He was thus responsible for much of the preparatory work of which he acquitted himself so brilliantly that much progress was made prior to the arrival of the divisions of for the attack. Lieutenant Colonel Tullinarm commanding the artillery of the 1st Reserve Division was charged in particular with the artillery support of that part of the attack which, after crossing the river, was to push forward in the direction of Riga.

170 batteries were emplaced for the attack. This number did not quite correspond to that which had been requested. It was barely sufficient if we were willing to fire on but two lines of the defensive system simultaneously.

We had also requested a large number of light minenwerfer, 130 medium and 100 heavy, all of which were obtained. As a matter of fact, it was essential that we neutralize all the defensive organization along the river's edge if we were to have any chance of getting across. To accomplish this with our reduced artillery strength, we needed a large number of minenwerfer.

The strategic movements of troops and material were made by rail. Some of the batteries came from the west or from Galicia.

The artillery moved into the sector under cover of the woods without difficulty. Most of the minenwerfer could be located well in advance. (See sketch 28 for positions of artillery and minenwerfer).

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To these 152 batteries were added those of the 1st Reserve Division which remained in the sector. They were organized into subgroupment A5 and A6 with the mission of reinforcing the counterbattery to the limit of their range.

The FEKA groupment consisted of five batteries of heavy guns.

As previously stated, the second Russian position was in places more than 3 kilometers from the Duna. It was highly essential to keep it under heavy protective fires during the advance of the rolling barrage. Hence, the battery positions had to be well forward. In the center, this was easily achieved; on the flanks, however, the marshy ground prevented it. Fortunately this condition was not a serious handicap as the second position was nearer the river at these points.

Observation of the battle field could be had from dominating points in the lines along the left bank of the Duna. From the principal O.P., the enemy lines could be seen in detail except where they were under the cover of woods; the auxiliary OPs permitted observation only of the enemy front lines. A part of the German minenwerfer were emplaced in the front line, a part behind it.

The artillery commander of the three assault divisions became commanders of IKA groupment B,C, and D.

The artillery specialist for the attack set up his OP in that of the artillery commander of the sector division (203d Division).

ORDERS FOR THE OCCUPATION OF POSITION AND THE PLANS OF FIRE.

A. Army Artillery Orders.

There were separate orders issued governing the organization, the preparations, the distribution of missions during the artillery phases, the use of gas (with an appendix, "Instructions for the determination of weather corrections") the use of smoke and incendiary shells, the duties of auxiliary observers and liaison officers, the assignment of accompanying artillery after the break-through, the ammunition allowances.

The plan of schedule fires was based on the following extracted orders:

Army Artillery Order No. 3 for Artillery Fires.

Extract.

B. Preparation on infantry positions.

1. ---

2. Missions to be fired by Groupments B,C,D, and A, the latter participating only in so far as its counterbattery missions permit.

Phase 1. Duration: 60 minutes

Assignment of missions: see Sketch 29

After 30 minutes, a rapid burst of fire for 10 minutes by subgroupments B1,C1, and D1 shifted as indicated in Sketch 32. At the same moment, the minenwerfer enter into action.

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Phase 2. Duration: 40 minutes

Assignment of missions: see Sketch 30.

After 20 minutes, a rapid burst of fire for 10 minutes shifted as indicated in sketch 29. Batteries participating: the high angle batteries of sub-groupments B1, C1, D1; sub-groupments B2, C2, D2 who will fire on the railroad fill in their sectors; four mortar batteries who will shift their fire to the Uxkull station.

Phase 3. Duration: 40 minutes.

Assignment of missions: see Sketch 31.

After 15 minutes a surprise shift of fire for 10 minutes as during Phase 2.

Phase 4. Duration: 50 minutes.

Assignment of missions.

For the high angle batteries of sub-groupments B1, C1, D1 and sub-groupment B3 and D3 as shown in sketch 32. The gun batteries of sub-groupments B1, C1, D1 and sub-groupments B2, C2, D2 will conform to Sketch 31 during the first 30 minutes, thereafter to Sketch 32.

Ten minutes after the beginning of the phase, a 10 minutes surprise fire as in phase 2 except that sub-groupments B2, C2, D2 will not participate. During this 10 minute period, the minenwerfer cease fire. The infantry and engineers will simulate activity to induce the defensive weapons not yet neutralized to reveal themselves. Thirty minutes after the beginning of the phase, all batteries of sub-groupments A2, A3, A4 will conform to the missions of Sketch 32, except for one piece per battery which will continue the counterbattery.

The enemy positions west of sub-groupment D3 will be neutralized by the artillery of the 1st Reserve Division in conjunction with groupments A and D.

At the end of phase 4, the infantry crosses the Duna.

Phase 5. First period of the rolling barrage.

Howitzer batteries of B1, C1, and D1 and B3, D3 conform to Sketch 31; mortar batteries to Sketch 29. One mortar battery of B1 to neutralize the strong point of the Kahler Berg. Gun batteries of B1, C1, D1 and B2, C2, D2 conform to Sketch 32. Groupment A as at the end of phase 4.

Howitzer batteries to advance their fire by bounds of 100 meters, the mortars by a single bound to the line of Phase 6.

Phase 6. Second period of the rolling barrage.

Howitzer batteries of B1, C1, and D1 and of B3 and D3 conform to Sketch 30; mortar batteries to Sketch 29; gun batteries of B1, C1, D1, and B2, C2, D2 to Sketch 32.

Groupment A: no change.

Howitzer batteries advance their fire by 100 meter bounds.

Phase 7. Third period of the rolling barrage.

Howitzer batteries of B1,D1,D1 and B3,D3 conform to Sketch 29; gun batteries to Sketch 30. Mortar batteries fire on the second position. B2,C2,D2 conform to Sketch 30.

Groupment A returns to counterbattery. If enemy artillery becomes active prior to this, groupment is to assign the necessary batteries to suppress the fire.

All batteries increase their ranges by a single bound.

Phase 8. Fourth period of the rolling barrage.

Howitzer batteries of B1,C1,D1 fire on the railroad fill; the gun and mortar batteries on the second position. B2,C2,D2,B3, and D3 conform to Sketch 30. All batteries increase their ranges by a single bound.

Phase 9. Fifth period of the rolling barrage. B1,C1,D1; fire on the second position. The mortars cease firing or fire on distant targets, B2,C2,D2,B3, and D3 conform to Sketch 29.

Howitzer batteries increase their ranges by 100 meter bounds.

Phase 10. Sixth period of the rolling barrage. B1,C1,D1,B2,C2,D2, lift their fire by 100 meter bounds to a line 300 meters to the north.

B3 and D3 conform to Sketch 29.

Remarks.

1. If observation is impossible, the fire of the howitzers will displace at the rate of 100 meters per minute.

2. The rate of fire will be increased progressively thruout each phase.

3. The lifting of the artillery from the fifth to the tenth phases will be on call from the infantry (green rocket). The flame projectors will indicate the position of the front line.

Army Artillery Order No. 4. Gas.

Extract.

1. Miscellaneous instructions:

a. The gas bombardment of batteries and assembly areas is the responsibility of groupment A and groupment A5 of the 1st Reserve Divisions.

b. This bombardment will be reinforced during the first two hours of counterbattery by the field guns, the light howitzers and the heavy howitzers of B1, C1, D1 with the exception of three light howitzer batteries (see par c.).

c. Three light howitzer batteries of B1, C1, D1 will fire surprise concentrations on known CPs, OPs and telephone centrals.

d. The bombardment of distant assembly areas will be executed by the 10 - cm batteries of groupments B, C, D.

2. Beginning of gas bombardment: H -- 2 hrs.

(H hour = time of beginning preparations of the infantry positions) IKA batteries cease the gas bombardment at H hour

A2, A3, A4 cease the gas bombardment at H + 3

Reminder of Groupment A cease the gas bombardment at H + 6.

Green cross and blue cross* shell will be fired.

*Non-persistent.

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Artillery Order No 8, Ammunition.

1. Ammunition available for the first day of the attack.

a. Ammunition to be brought in for the attack.

Groupment A.

Subgroupment A1	Gas Shells	HE Shells
Per 77 battery	3000	800
" 10 cm "	900	800
" heavy howitzer btry.	800	400
Subgroupments A2,A3,A4.		
Per 77 battery	2100	500
" 10 cm "	850	400
" heavy howitzer btry.	600	400
Subgroupment A5 (1st Res Div)		
Per 77 battery	2300	500
" 10cm "	750	500
" light howitzer btry.	1200	1000
Subgroupment A6 (1st Res Div)		
Per 77 battery	2300	
" 10cm "	750	
" light howitzer btry.	1200	
" heavy " "	550	

Groupments B,C,D.

	H.E. Shell.	Rounds
B1,C1,D1,B3,D3,	per 77 battery	1500
C2,D2,	" " "	1700
B3,C2,D3,	" 10cm "	800
B1,C1,D1,	" light howitzer battery	1300
B2,C2,D2,	" " " "	1500
B1,C1,D1,	" heavy " "	800
B2	" " " "	500
C2,D2,	" " " "	1100
	12 cm batteries	1000
	15 cm batteries	1500

Gas Shell.

B1,C1,D1,	per 77 battery	1000
B2,C2,D3,	" 10cm "	800
B1,C1,D1,	" light howitzer battery	500
B1,C1,D1,	" heavy howitzer "	250
	model 1902 and 1913	
B2,	per heavy howitzer	600
	model 1896	

This ammunition is to be delivered to the battery positions.

In addition a supply of smoke and incendiary projectiles had been delivered to the heavy howitzers.

2. Ammunition for the second day.

The consumption of ammunition will be held within the following limits:

77 batteries	1000 rounds HE
10 cm "	800 " "
Light Howitzer batteries	1000 " "
heavy " "	500 " "
Mortar " "	400 " "

Minenwerfer.

In addition to the foregoing artillery orders, the army put out one for the minenwerfer.

Aviation.

Each of the artillery groupments, the attack divisions and the 1st Reserve Division received a squadron of observation aviation. In addition the three attack divisions had two squadrons to execute battle missions and corps and army headquarters had command airplanes available. The army had some pursuit aviation and a marine dirigible. Tables were published showing the allotment of units and missions such as artillery observation, close and distant reconnaissance, air combat and bombing attacks.

As the army was to be reorganized after the break-through into three corps of three or four divisions, an order was put out regulating the reassignment of aviation.

Ballons

Four balloon squadrons were grouped together under a single commander, a fifth being attached to the artillery for the attack. The artillery also received the service of the balloon of the 1st Reserve Division.

The balloon commander established his CP for the attack near that of the artillery. Location of units and missions were the subject of an army order.

Signal Communications.

Two orders regulated the establishment of radio nets, and of wave lengths.

Organization of Defensive Fires.

Three sets of defensive fires were planned:

(1) From the capture of the second position to the time when the bridges were to be completed.

(2) From the time when the bridges had been completed to the end of the registration by artillery which had displaced across the Duna.

(3) From the end of the artillery registration until the resumption of the advance.

Organization of Flanking Fires.

Lieutenant Colonel Tullinarm commanding the artillery of the 1st Reserve Division organized a groupment to obtain flanking fire from the left bank in support of the attack. The groupment was commanded by Major Ahlemann. It consisted of 5½ -- 77 batteries. For its plan of fires, see Sketch 33.

B. Orders by Groupment A (counterbattery)

The groupment commander assigned missions and arranged all details for the fire of his batteries.

C. Orders by groupments B, C, and D, (IKA)

Missions were assigned to batteries generally as had been done at Witonitz, Toboly and elsewhere. Groupment B made plans for an extension of the attack to the east corresponding to the measures taken by the Ahlemann groupment.

D. Orders for FEKA batteries by the FEKA Groupment.

Captain Buhle commanding the FEKA had been especially requested for the post. He had distinguished himself at Toboly and made very effective use of his guns here.

Missions assigned to FEKA batteries:

(1) Harassing or destruction fires on fixed targets (landing fields, bridges, works, railways, roads).

(2) Surprise fire by short bursts against targets of opportunity.

(3) Contingent missions for such targets as troop movements, troop assemblies, railroad artillery, balloons.

THE ATTACK

The gas attack began at 4:00 AM; the preparation on the infantry positions at 6:00 AM; the infantry attack at 9:10 AM. The artillery action went off as planned to include the rolling barrage. The enemy artillery reaction was generally weak punctuated by a few bursts of activity. On the right it was more active than on the center and left. Probably the enemy had OP's in the houses of Oger-;Galle, a point affording excellent observation. Our guns set fire to the buildings with incendiary projectiles. A short time before the construction of the bridges, the enemy fire almost ceased. During their construction, the eastern bridge (No. 1) received artillery fire which caused some losses. But in general, the losses during the crossing were very small. We learned later that in the case of some of the Russian batteries, the cannoneers were seized with panic and abandoned their pieces.

The two Russian positions were penetrated without difficulty. The bridges were completed and the rear divisions, pushed forward. The crossing of the Duna had succeeded brilliantly.

The behavior of our infantry had exceeded our expectations. The artillery had performed all its missions. Riga fell into our hands and all Germany rejoiced.

The fire of the German artillery had so impressed our infantry that one infantry officer remarked; "The artillery did it's work so well that the crossing became for us little more than a boat ride followed by a pleasant promenade."

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DISCUSSION OF THE MEASURES TAKEN.

The emphasis placed on secrecy in this operation by the high command in the East is indicated by the fact that the artillery specialist arriving from Galicia had to come by way of Berlin instead of by a direct route parallel to the front. In the Eighth Army, he was lodged more or less secretly to avoid announcing his presence. The arrival of a specialist was always a cause for comment and rumor.

Riga was merely an attack on a narrow front by three divisions. Hence the artillery orders and dispositions were in every respect similar to those of the attack in eastern Galicia. This similarity was increased by the fact that no corps headquarters was interposed between the army and the attacking divisions.

The form of the artillery orders was already that followed in our great 1918 offensives on the Western front. Adjustment was limited to that for direction only. As regards adjustment for counterbattery, the following order governed:

Extract.

a. Adjustment.

Batteries will be adjusted for direction on their "rectangles" or on clearly defined points in the vicinity thereof, using sound and flash sections, terrestrial, or aerial observation. It is not necessary to obtain a bracket on the enemy batteries themselves.

b. Determination of weather corrections.

Record transfers are of no use since the artillery preparation begins during darkness. Corrections of map data will be based on meteorological reports. Where this is impossible group commanders will adjust one battery of each Calibre and communicate the results to the others.

Adjustment on the infantry positions was regulated as follows:

(Extract)

Reinforcing batteries upon arrival will register cautiously. Batteries of groupments B, C, and D will limit their registration to one of direction only on some clearly defined point. The other corrections will be calculated. Mortars and flat-trajectory batteries (15 cm and larger) will remain silent.

On the day of the attack, we had planned some fire for adjustment but in consideration of the large number of batteries, this had to be limited to a few rounds. Necessarily the limits of our brackets for effect had to be quite large.

The barrage advanced only on call from the infantry and on rocket signals. This applied also to its first bound. This was necessary since our infantry, altho starting to cross simultaneously, could not reach the opposite bank and the enemy front line at the same time.

We pushed artillery across the Duna on rafts close behind the infantry. Experiments had been made on lakes in our rear to find a suitable method of embarking the artillery.

Forward observers and liaison detachments accompanied the first waves of infantry in the crossings. They established tele-

phone lines across the Duna, attaching them to stakes placed during the night near the ferry points. This, too, had been rehearsed previously and the experience thus acquired was indispensable.

In the case of this river crossing, it was necessary to plan a system of defensive barrages to protect the infantry during its pause on the second position while the bridges were being completed. During this delay, the enemy might counterattack. The small number of troops in the bridgehead and their ignorance of the terrain made artillery protection imperative.

The flanking fire of the Ahlemann groupment was supposed to support the advance of the left division toward Riga. To the northwest of the zone attacked and covering Riga from the east there were some fortifications which might stop our infantry. The division artillery even if somewhat reinforced would not have been sufficient to neutralize these works rapidly. It was thus essential to bring fire to bear from the left bank. Unfortunately the fire of the Ahlemann groupment was ineffective. The left division crossed and attacked the enemy position without asking for the support of this groupment. It was held up in front of Maschin-Kurthenhof and it could not be supported from the left bank because of the danger to friendly troops. It was out of the question to withdraw the division. Also liaison could not be established either with the division commander or the division artillery commander. According to reports, their respective CP's were separated by three kilometers instead of in close proximity as should have been the case. Only after a long delay was the division able to resume its advance. This is a good example of insufficient infantry - artillery liaison.

There was one unusual feature in the Riga attack. Cannoneers from our heavy batteries were employed to serve abandoned Russian pieces. Thus we were able to fire with captured material. We had planned this in advance and used only material with which our personnel was familiar.

Chemin des Dames 27 May, 1918.

SUMMARY.

FRONT OF ATTACK: 38 KM. (5 corps with 12 divisions in line)

ARTILLERY EMPLOYED: 1100 btrys.

ARTILLERY DENSITY: 29 btrys per 1000 m.

ORGANIZATION.

An IKA groupment for each front line division of from 21 -- 89 btrys.

An AKA groupment for each front line corps of from 22 - 67 btrys.

A FEKA groupment for each front line corps of from 5 - 11 btrys.

(IKA groupments were subdivided into IKA a (forward targets) and IKA b (rear targets). IKA c provide protection for the flanks of the attack).

ADJUSTMENT. NONE

D-day.

2:00 AM -- 2:10 AM Surprise fire by IKA and MW on infantry positions.

AKA opens gas counterbattery.

2:10 AM -- 3:15 AM. Reinforced counterbattery (gas).

3:15 AM -- 4:40 AM. IKA on infantry positions.

AKA on counterbattery.

4:40 AM. Infantry assault preceded by a double rolling barrage. AKA remained on counterbattery until barrage reached objectives, when they joined the barrage. Movements on a time schedule. Could be speed up on call.

Conclusions.

1. Artillery on the flanks of an attack should be included in counterbattery.

2. Adjustment may be completely suppressed.

3. Three German btrys to one French is a satisfactory counterbattery ratio.

4. The surprise fire on the infantry position should precede the reinforced counterbattery.

5. In the ordinary case, a preparation should be fired entirely at night with the infantry attacking at dawn.

AN ARMY ATTACK ON A WIDE FRONT.

Chemin des Dames 27 May, 1918.

THE TERRAIN

To the north of the Aisne, the French were in position between Soissons Sapigneuls along the ridge of the Chemin des Dames. The valley of the Ailette covered the front of the position. Naturally strong, the position was well fortified and supported by a powerful artillery.

The Germans occupied the high ground north of the Ailette. In the intervening valley, the outposts of both armies were in contact. The zone in which we were to make our preparations included the heights which we occupied and also the valleys at right angles to the front partly visible to the enemy.

PREPARATIONS FOR THE ATTACK.

The Seventh Army (General von Boehn) was to make the attack. General Ludendorff assigned an artillery specialist to the group of armies of the Crown Prince, the group of which the Seventh Army was a part. This specialist had the rank of general of artillery and was assigned by the Crown Prince to the Seventh Army. The army chief of staff, Colonel Reinhardt gave him every assistance also the army published a directive giving the force of orders to the recommendations of the specialist.

The initial plan called for an attack on a front of twenty-six kilometers between Filain and Sapigneul. Consequently the army received four corps staffs and eleven divisions (shock divisions numbered from 1 to 11). For tactical reasons, the front of attack was extended to the west to include Vauxallon and Pinon. To meet this extension, the 12th Shock division was added and the Crepy staff already in position on the right was given the mission of a secondary attack in the Vauxallon -- Pinon area with the 21st and 22d shock divisions. Thus the front was extended to 38 kilometers. The possibility of widening the attack even farther to the west was considered; the 7th Corps planned to attack in liaison with the Crepy divisions. However, this latter possibility was discarded as sufficient artillery was not available. Nevertheless the 7th Corps went into position and began preparations. On the east, the First Army was to assist the attack with its right flank.

Initially, the attack had a limited objective. This was explained explicitly to the troops in order to avoid any disillusionment. Later, the objective was advanced well beyond the original plan.

The divisions already holding the line were charged with the early preparation, their artillery commanders being destined to become commanders of counterbattery groupments for the attack. The staffs of the corps which were to attack came up early and directed the preparations.

The execution of these preparations were a model of their type. The corps artillery technicians and the divisions artillery commanders performed their tasks admirably. There was no friction between echelons. The reinforcing batteries found their nests made, so to speak.

The five attacking corps (A, B, C, D, and Crepy) had 1100 batteries available. This number was satisfactory. Major Witte, a staff minenwerfer specialist, made the estimates for the minenwerfer.

The emplacement of the heavy batteries of army artillery (Barbara) is shown in Annex IV. It consisted of:

6 railway batteries of 24 cm (9 pieces)

4 17 cm batteries (8 pieces)

1 15 cm battery (2 pieces).

Staffs were organized as needed.

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Organization for Combat

Groupment	subgroupment	Batteries						
		77	Light How.	Heavy How.	Mortars	10 cm	12, 13 & 15 cm	other calibres
Corps "A"								
IKA groupment 1	a	3	9	6	4			
	b	15						
	c	6		3	3		3	3
IKA groupment 2	a	3	6	7	5			
	b	13	8					
AKA groupment A		15		5		2		
FEKA groupment A						4	5	2
Total Corps A		55	23	21	12	6	5	5
1 127								
Corps "B"								
IKA groupment 3	a	3	9	9	6			
	b	18	6					
IKA groupment 4	a	3	9	12	5			1
	b	15	3				2	
IKA groupment 5	a	3	13	9	4			1
	b	11	6					2
AKA groupment B		24	3	4		8		
FEKA groupment B						2	7	
Total Corps B		77	49	34	15	10	9	4
198								
Corps "C"								
IKA groupment 6	a	8	23	14	8			1
	b	30	4				1	
IKA groupment 7	a	8	15	9	8			
	b	22	4					
IKA groupment 8	a	4	10	6	4			
	b	17	6				2	
AKA groupment C		33	9	6		11		
FEKA groupment C							9	
Total Corps C		122	71	33	20	11	12	1

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Groupment	Sub group- ment	77	Lt. how	Batteries				Other Calib- res
				Heavy how	Mört- ars	10 cm	12,13, 15 cm	
IKA group- ment 9	a	4	Corps D	7	2			1
	b	2	6 7					
IKA group- ment 10	a	4	12	6	2			
	b	6	3					
IKA group- ment 11	a	9	6	3				
	b		3					
IKA group- ment D		48	3			9	2	
Total Corps D.		73	40	16	4	9	8	1
				151				
				Corps Crepy				
IKA group- ment 21	a	2	12	8				
	b	15	3		6	1	2	1
	c		10	3				
IKA group- ment 22	a	2	5	6	4			
	b	15				3		
	c		9	2				
AKA group- ment E		39		14		12	2	
FEKA Group- ment E							5	
Total Corps Crepy:		73	39	33	10	16	9	1
				181				

The army confined itself to a division of the artillery into groupments and subgroupments. The detailed subdivisions was a function of the corps. In addition to the batteries shown here, Corps "A" received 59 batteries for the attack of the fort of La Malmaison by the 12th Division. These batteries consittuted IKA groupment 12.

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ARTILLERY ORDERS FOR THE ATTACK

A. Army Artillery Orders.

Army Artillery Order No. 1.

This order prescribed the artillery measures to be taken at once: secrecy, organization and missions of groupments, preparatory measures to be taken by the divisions occupying the line; designation of commanders for AKA and FEKa groupments, seconds in command for IKA groupments, and commanders of sub-groupments of IKA and AKA; missions of sub-groupments; reconnaissance and location of battery positions, of OPs, of CPs and of ammunition dumps; organization of telephone system and of the narrow gauge railway net; reconnaissance of the enemy's position. An annex contained the measures to be taken to eliminate the noise of the carriages.

Army Artillery Order No. 2.

This order prescribed the activity of the artillery up to the time of arrival on the line of the reinforcing batteries: final organization; date of arrival of groupment staffs; distribution of enemy intelligence; reconnaissances to be made by unit commanders; routes; reconnaissances for positions after the break-thru; plan of displacements; allotment of airplanes and balloons; conferences between commanders; ammunition supply.

Army Artillery Order No. 3.

This order covered the details of the arrival in the sector of the reinforcing batteries.

Army Artillery Order No. 4.

This order contained the plans of fire of Corps A, B, C, and D. The following is an extract.

Plan of Fire for Corps A B C & D.

X hour will be the hour of the beginning of the artillery preparation. It will be chosen so that the infantry attack at $x + 160$ minutes will take place at dawn.

Phase 1: 10 minutes (x to $x + 10$)

Surprise fire on infantry positions, batteries, minenwerfer, CPs, telephone centrals, and bivouacs.

All batteries including minenwerfer to take part (rapid cadence with blue cross shell*). Groupments of IKA a to fire in zone 2, IKA b in zone 4 (see Annex No. IV). AKA missions as in Sketch 34; SCHWEFLA and BARBARA as in Annex IV. Minenwerfer to concentrate on enemy minenwerfer

Phase 2: 65 minutes ($x + 10$ to $x + 75$)

Reinforced counterbattery. Firing to be continued on the most important CPs and bivouacs. Bridges to be shelled by a concentration of all batteries.

* Non-persistent gas.

IKA and AKA batteries on counterbattery* to receive missions in the proportion of one French battery to three German. FEKA and BARBARA to fire on distant targets (see Annex IV). Minenwerfer with ammunition exceeding requirements of phases 1, 3, and 5 to fire on the front line, the barbed wire and the listening posts.

Phases 3, 4, and 5: 85 minutes (x ÷ 75 to x ÷ 160)

Artillery preparation on the infantry positions with a systematic bombardment of batteries.

Phase 3: 20 minutes (x ÷ 75 to x ÷ 95)

IKA a in zone 3, IKA b in zone 4.

AKA: counterbattery, (See Sketch 34)

FEKA & BARBARA: distant targets (See Annex IV)

Ammunition: HE and blue cross.

Minenwerfer as during phase 2.

Phase 4: 20 minutes (x ÷ 95 to x ÷ 115).

IKA a in zone 2; IKA b in zone 4.

AKA: counterbattery (see Sketch 34)

SCHWEFLA and BARBARA: distant targets (see Annex IV)

Minenwerfer as during phase 2.

Phase 5: 45 minutes (x ÷ 115 to x ÷ 160)

IKA a in zone 1; IKA b in zone 4.

AKA: counterbattery

SCHWEFLA and BARBARA: distant targets.

Ammunition: IKA - HE; other batteries blue cross and HE.

Minenwerfer as during phase 2.

During all of phase 5, the batteries of IKA a will direct their fires on the northern slopes of the Chemin des Dames, particularly on the tactical localities, the wire and known or suspected machine guns.

Fifteen minutes after the opening of the phase, a surprise fire of 10 minutes to be placed by IKA b on zone 2. During the last twenty minutes, the minenwerfer will stop firing north of zone 1.

At x ÷ 150, fires will be regrouped to begin the rolling barrage. IKA a (less the mortars and heavy howitzers) will fire north of the Chemin des Dames, on the northern edge of

*-----
*On the flanks of the attack the number of known French batteries was very great. On the front of corps D and Crepy, the proportion of German to French batteries was more unfavorable than on the fronts of Corps A, B, and C. Hence, during the reinforced counterbattery, Corps A put 79 IKA batteries at the disposition of Crepy; Corps B, 20 batteries of IKA, at the disposition of Corps C; corps C, 40 batteries of IKA at the disposition of Corps D.

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zone 1, to the west of the Winterberg, on the enemy front line or as close thereto as the safety of friendly troops will permit. IKA b will fire on zone 2.

At the end of this phase the infantry must have closed up upon the barrage.

Phase 6 : rolling barrage beginning at x / 160.

(a) Batteries participating.

There will be two rolling barrages, one executed by IKA a (less the mortars and heavy howitzers), the other by IKA b. The mortars will displace their fire in front of the barrage of IKA a, the heavy howitzers will receive special missions.

Light minenwerfer will join the barrage to the limit of range. The medium and heavy ones will cease firing.

(b) Opening of the rolling barrage.

At x / 160 the barrage of IKA a will be put down on its initial line and will commence to displace on the precise second. To obtain this accuracy, time of flight of projectiles must be calculated and watches carefully synchronized.

The IKA b batteries will fire in zone 2 until the IKA a barrage arrives there; then they begin to displace their fire.

(c) Bounds of the barrage.

IKA a: by bounds of 200 meters.

IKA b: from one line of localities to the next as far as the crest of the Chemin des Dames. Thereafter by 200 meter bounds. After each bound of 200 meters all batteries pause and fire continuously for 6 minutes. Thus the barrages move at the rate of one kilometer in about 40 minutes. (After each pause, the barrage was timed to move off simultaneously along the front. During the advance of the barrages, the IKA a batteries were to concentrate on the spurs and lower slopes of the Chemin des Dames; the IKA b batteries, on the contrary, were to sweep the whole terrain, depressions and ridges, To the east of the Arnterberg the two barrages progressed superposed to the south -- Translator's note).

(d) Increase in rate of advance on request of the infantry.

To accelerate the advance of the barrage on call, a visual signal will be determined upon. It can be released only upon order of an infantry battalion commander after passing out of zone 4.

(e) Duration of the barrage.

The duration will depend on the range of the batteries. They will drop out as their maximum effective range is reached. Extreme ranges will not be fired.

(f) Special measures for the right flank.

(Special instructions were here issued to protect the right flank of the attack).

(g) Missions for FEKA and BARBARA during the barrage.

AKA and FEKA batteries will join in the barrage when it

comes abreast of their objectives; they will accompany it in its progression to the south.

(h) Ammunition for the barrage.

IKA a : HE

IKA b, AKA and FEKA: blue cross (non-persistent gas) at least 600 meters in front of our infantry.

Annexes.

These covered matters similar to those contained in Artillery Order No 1 of Toboly. To meet counterattacks and to suppress batteries which might suddenly disclose themselves, certain units were designated to respond to calls for fire on such targets. In the absence of such special missions, these batteries were to take part in the preparation. To assure the execution of these special fires, these batteries were assigned special OPs and a direct system of communication with sound and flash sections, balloons and observation airplanes (special radio nets). When a target of opportunity was indicated, they ceased their normal fires at once and gave it their undivided attention.

Army Artillery Order No. 5.

Counterbattery, fires on infantry positions and upon distant targets.

Methods of fire (extracts)

(1) Counterbattery.

From x / 10 (surprise fire), the AKA batteries will fire on the same targets as during the period: x / 10 to the beginning of the rolling barrage. They will fire on the French batteries using zone fire to include 50 meters over and 50 meters short, and 10 mils. right and left of determined locations.

From x / 10 to x / 75 (reinforced counterbattery) all the AKA and IKA batteries will fire counterbattery. AKA keep their same objectives; IKA batteries will receive their missions from the AKA groupment commanders who will take into account in assigning targets the normal zones of the IKA batteries. Each French battery should be fired upon by 3 or 4 of our batteries.

The fires will be conducted as follows.

w	<u> / 200</u>	W
x	<u> / 100</u>	X
z	<u> o []]]</u>	Z
y	<u> - 100</u>	Y
v	<u> - 200</u>	V

The AKA batteries will fire on line Z; the IKA batteries on lines X, Y, V and W. However if only two or three batteries are available to fire on this target, fire on V (or Vend W) will be omitted. Each battery will fire for 65 minutes at a single elevation. The amount of sweeping will be announced later.

From x / 75 until the moment that the rolling barrage reaches their objectives, the AKA batteries will continue on counterbattery as during the period: x to x / 10.

(2) Fires on infantry organizations.

From x to x / 10, the IKA batteries will fire on their targets in a manner similar to the AKA batteries during the same period. Regroupment for the rolling barrage at x / 75. The heavy howitzer batteries placing protective fire on the flanks and on enemy observations, principally in the region of the fort of La Malmaison will use smoke shells after x / 150 to blind the enemy OPs.

(3) Fire on distant targets.

FEKA and BARBARA during phases 1 to 5 will put down concentrations of variable dimensions depending upon the type of target. During the early hours, fires will be limited to harassment; as the hour of the infantry attack approaches interdiction missions will be given first priority. Railway stations will not be fired upon prior to noon of the day of the attack.

Army Artillery Order No. 5 also contained prescriptions relative to:

- (a) air observation and sound and flash sections;
- (b) lists of possible objectives for the artillery;
- (c) the correction of firing data for weather effects.
- (d) instructions for laying pieces for direction.

The following is an example of the latter:

"Put the sight and not the middle of the axle over the stake marking the battery position. Lay for direction on the aiming point indicated. Lay the other pieces parallel and check. Check the entire operation with the aiming circle. Adjust all sights before arrival in the sector."

The batteries were all given graphs showing the angle of fall of their projectiles. Careful consideration had to be given this matter because of the steep slopes of the Chemin des Dames. Reserve Lieutenant Hartig made up these tables with great accuracy.

Army Artillery Order No. 6.

This order contained instructions for auxiliary observers and artillery liaison officers.

Army Artillery Order No. 7.

This order contained instructions governing changes of position. It included the enumeration of those batteries which reverted to GHQ after the break-thru and of those which remained in army reserve. It also designated those which were released to divisions and those remaining in corps reserve.

It was necessary to give up some batteries after the first day because of the situation on the front of the other armies, particularly of the First Army on our left. These batteries were put at the disposition of either the Army Group or the first Army. As an army reserve, there remained 5 horse-drawn batteries, all the batteries not horse-drawn (53), the very heavy mortars and the FEKA batteries less the 15 cm batteries model 1916 placed at the desposition of Corps \$.

At the beginning of the displacement, divisions had only their organic light regiment and heavy battalion with, in

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addition, a few batteries of accompanying gund and mountain artillery. All the other batteries reverted to corps reserve and were released to divisions only as their need was felt and provided their supply of ammunition could be assured.

Army Artillery Order No. 8.

This order covered the matter of ammunition supply.

Allotment of munitions.

(1) With the batteries:

77's : 2½ days of fire.

Light howitzers: 2 days of fire not including green cross (non-persistent gas)

Heavy howitzers: same

10 CM: 2 days of fire.

Mortars : 2 days of fire

Heavy mortars : variable depending upon missions.

Detailed Allotment to Batteries

Groupments:Type or Subgroup- ments	Batteries							
	77s	Light How	Heavy How	10 cm	Mortars	15 cm &	15 cm G.P.	
AKA and FEKA	HE	500	500	200	420			350
	Blue Cross	2000	1600	800	780			
	Green Cross	250	250	100	120			
IKA a and c	HE	1750	1500	750		600		
	Blue Cross	750	500	250				
	Green Cross	250	200	100				
IKA b	HE	900	400		420			
	Blue Cross	1600	1500		480			
	Green Cross	310	250		120			

For the long range guns as follows: 24 CM, 250 rounds per piece; 17 CM, 200 rounds per piece.

The infantry cannons and accompanying batteries will receive rounds with reduced charges.

The mountain batteries will receive 2000 rounds per battery.

(2) With the combat trains and service trains:

One day of fire for all types.

With the batteries: one day of fire.

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(3) Elsewhere:

Any Ammunition remaining will be put in advanced division dumps. The order also contained instructions for the storing of ammunition; reports, supply after displacement and movement of empty caissons.

Army Artillery Order No. 9.

Supplementary orders for the Crepy Corps.

The plan of fires was similar to that for Corps A,B,C, and D. For objectives of IKA and FEKA, see sketch 35.

Army Artillery Orders No. 10 and 10a.

This order contained instructions with a view to a continuation of the attack on the heights of the fort of La Malmaison. The strength of this position made necessary special artillery measures. For this, a special IKA a groupment (No 12) of 59 additional batteries was formed.

Orders No. 10 and 10a prescribed the organization and missions of these batteries.

Army Artillery Orders No. 11 and 11a.

This order indicated the modifications necessary in previous orders as the result of final reconnaissances.

There were also certain special artillery orders issued covering the technique of fire, the meteorological service, and the signal system. The army also issued instructions governing the use of minenwerfer in conjunction with the artillery and of aviation. Airplanes and balloons were allotted as at Riga.

B. CORPS AND DIVISION ARTILLERY ORDERS.

In conformance with the army artillery orders, Corps and divisions regulated the remaining details. Corps commanders assigned normal zones to IKA groupments and regulated the use of AKA and FEKA batteries, Divisions designed to their batteries the targets indicated by corps.

THE ATTACK.

The day of the attack was favorable to the use of gas.

All groupments opened fire at 2 AM with extraordinary accuracy. After ten minutes, our observers reported the destruction of many enemy munitions dumps. We learned later that many pieces of his artillery were destroyed by target hits. Also a number of the cannoneers, panic-stricken at the start of the bombardment, had quit their pieces.

We neutralized the enemy batteries so effectively that our infantry suffered very little either before or after crossing the line of departure. However our right flank received rather heavy casualties during the preparation from French batteries established farther to the west outside the zone of attack.

Similarly the accuracy of the fires on the infantry position before the assault and during the rolling barrage was excellent. Scarcely anywhere was there a serious reaction of machine guns or of trench mortars. One corps being held up for a moment, the advance was resumed after a short artillery

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preparation. The corps artillery specialist Major Spillicke arranged this preparation. This officer was a model artillery technician, one of the best that I have ever known.

The FEKA succeeded in destroying the railroad and prevented the evacuation of fourteen pieces of railway artillery which fell into our hands.

After the penetration of the enemy position, the infantry continued to advance, crossed the Aisne and reached the Marne. The accompanying batteries and the batteries pushed forward to support the advance accomplished brilliant feats.

General Ludendorff in his book remarks that the success of the right flank could have been exploited more fully. It had none the less passed beyond the objectives set for it by the High Command. The break-through of the Chemin des Dames is one of the most brilliant successes of the 1918 campaign, a triumph of the intimate cooperation of infantry and artillery.

DISCUSSION OF MEASURES TAKEN

In this attack, the artillery was pushed extremely far forward. Hundreds of batteries were close up against the front lines. We wished to give the infantry the protection of the barrage not only to the crest of the Chemin des Dames but also along the spurs extending to the south. This artillery protection explains, no doubt, the unexpected measure of our success.

Single pieces of heavy artillery were put in position abreast of the light artillery in order to fire on the railway detraining points, the important C.P.s, etc. The emplacement of these pieces required extreme caution. The greatest help we received was from the frogs of the Ailette whose croaking at night covered the sounds of the batteries going into position.

There was absolutely no adjustment. In the great attacks prior to Chemin des Dames we had not gone so far. In these attacks, there was no adjustment in range for counterbattery so far as I could prevent it. However, for the fires against infantry positions, the prohibitions were less absolute. In the East, adjustment in direction only was allowed on infantry works; the day of the attack, the range was checked by the observation of a few rounds. In the West also, the range was customarily checked at the beginning of the preparation on the infantry positions.

It was possible to dispense with adjustment on the enemy batteries more easily than with that on infantry positions as the former were accurately located while the latter were known only from air photographs.

For the March attack and at Armentiers, in order to identify the rounds of the numerous batteries, an elaborate system of adjustment was devised. Some batteries fired a single piece, others by salvos, some by volleys. The preparation was effective in spite of a morning fog which prevented the checking of any but a few of our batteries. This fact led us to dispense with all adjustment.

At the Chemin des Dames, the artillery preparation began with a surprise concentration on the whole defensive system. Reinforced counterbattery followed immediately. Thereafter came the systematic bombardment of infantry and artillery positions. In the spring offensive of 1918, the surprise fire took place during the reinforced counterbattery. This procedure had the disadvantage of alerting the enemy infantry prior to the surprise fire. The Chemin des Dames method by the mass use of gas shells was highly effective against the sleeping infantry.

The gas bombardment of the French batteries was not calculated for a rectangle enclosing the battery but for the battery position itself. Ideas concerning the use of gas changed rapidly thruout the war.

For the preparation of the infantry positions, the army designated zones (1 to 4) enclosing the infantry localities. The width of the front of attack prevented an assignment of definite targets as the army had done at Riga. This latter task was passed down to the corps and the army merely approved the corps arrangements. Consequently the corps were put in the line quite early to give them the necessary time to secure information needed for their decisions.

Previously the counterbattery preparations took place at night while that of the infantry position began after dawn in order to permit checking of data. This time, the preparation was all at night and the attack was set for dawn. The advantage of this early hour was that the attacking troops could see the foreground sufficiently well without being visible to the enemy machine guns, and OPs. Also the maximum number of hours of daylight were available for the exploitation of the success.

The rolling barrage was double. The first of HE projectiles preceded the infantry by a short distance. Ahead of this one was a gas barrage designed to make the enemy seek shelter. This arrangement was highly successful. The advance of the barrage was by time schedule; however, it could be speeded up by a visual signals or by telephone calls. These signals sometimes were not seen and occasionally enemy rockets were taken for our own. These and other considerations urged the adoption of a time schedule for the barrage.

Thereupon a new difficulty became manifest. The rate of advance of the infantry, being a function of terrain and enemy resistance is varied along the front. In order to permit the rapid advance of the battalions which found the going easy, battalion commanders were allowed to speed up the movement of the barrage by a visual signal after the passage of a predetermined line.

The question is raised whether these artillery methods used in 1918 had been employed prior to this end, if so, to what extent. I wish to describe in some detail the artillery dispositions at Gaclice -- Tarnow 2 May, 1915.

The Eleventh Army (General von Mackensen) was charged with the attack. It consisted of four corps, each of two infantry divisions. The artillery allotment was as follows:

	Front of attack	Field batteries	Heavy batteries	Total	Batteries per CM. of front
Mixed Corps	8 KM	15	14	29	3.6
Guard Corps	9 KM	24	6	30	3.3
XII Reserve Corps	6 "	24	8	32	5.3
VI Austrian Corps	9 "	16	10	26	3
Total	32	79	38	117	

General Zuthen commanded the artillery. According to him, considerable freedom could be left to the corps in executing the preparation. Surprise was essential and was obtained in spite of great difficulties.

Adjustments were not allowed prior to the afternoon of the day preceding the attack. The visibility conditions were excellent. There was no wind so that the airplanes could work with efficiency.

After the adjustments and during the night, interdiction fires on the road centers and routes of ingress prevented the reinforcement of the front in case the enemy had been alerted by the adjustments. At the same time, shelters and localities were bombarded. To harass the enemy and draw him out of his dug-outs, the infantry simulated an assault by cheering just before each renewal of the fire. During the intervals, engineers cut lanes in the Russian wire which the succeeding bombardment prevented the enemy from repairing.

The real artillery preparation began 2 May at 6:00 AM and lasted four hours. Practically all our artillery could be directed against the infantry positions as the Russians had little artillery to be neutralized. The Russian reaction was very weak. Such of their batteries as fired were quickly silenced by our howitzers and heavy guns. The mass of our artillery was placed in front of our attack.

At the moment of the assault, the artillery lifted to the communication trenches, the distant positions and the routes of ingress 77 MM accompanying guns were pushed forward to attack by direct laying the Russian machine guns which had managed to open fire.

The attack succeeded everywhere. By the evening of 2 May the entire Russian position in the sector of the Eleventh Army had been occupied by a general advance of two to four kilometers. The adjacent armies made equal progress. Many of the Russian troops fled while others defended their positions with great tenacity. To break up this defense, it was necessary to call on the divisional artillery and also some of the mortars. In places there was hand-to-hand fighting. 17000 prisoners, several pieces of artillery and many machine guns fell into the hands of the Eleventh Army.

It is evident that, in spite of the deficiencies in gunnery technique in 1915, here at Gaclice - Tarnow are found all the essential principles of our subsequent artillery methods. It is true that there was no rolling barrage as in 1918. In the course of the attack, a standing barrage was jumped from one line to the next without raking the intermediate zone. However, the meticulous preparation by the artillery opened the way for the infantry to a brilliant victory. In the single month of May, the Eleventh Army captured 398 officers, 152,254 men, 160 pieces of artillery, and 403 machine guns.

21 March Offensive

SUMMARY

FRONT OF ATTACK: 37 KM. 11 divisions in line.

ARTILLERY EMPLOYED: 655 btrys. / MW.

ARTILLERY DENSITY: 18 - btrys per 1000 m.

ORGANIZATION

An IKA groupment for each front line division of from 19-43 btry.

An AKA groupment for each front line corps of from 12 - 65 btrys.

A FEKA groupment for each front line corps of from 8 - 11 btrys.

A SCHWEFLA groupment for the army of 12 heavy pieces.

(IKA groupments were subdivided into IKA a (line a of the 1st position) IKA b (line b of the 1st position and the intermediate position), IKA c (the second position) and IKA d (communication between the positions)).

ADJUSTMENT.

None except for some checking at the start of the neutralization of the infantry positions.

D-day.

4:40 AM -- 5:30 AM.	Reinforced counterbattery. Fire on command system.
5:30 AM -- 5:40 AM.	Surprise fire by all artillery on infantry positions.
5:40 AM -- 6:40 AM.	Reinforced counterbattery. Fire on command system.
6:40 AM -- 9:40 AM.	Systematic neutralization of infantry positions preceded by a checking of adjustments. Frequent raking of zones between positions. AKA on counterbattery.
9:40 AM	Assault preceded by a rolling barrage on a time schedule with visual signals to speed it up. Rate 200 m in 4 min. Btrys designated to fall out for concentrations on unexpected resistance. $\frac{1}{2}$ AKA on counterbattery, $\frac{1}{2}$ on second position.

Conclusions.

1. One light regiment and one medium battalion is about all the artillery that a division can supply in exploiting a break-thru.
2. All the artillery must be used continuously during the preparation.
3. A surprise fire on infantry positions should precede the reinforced counterbattery.
4. Officer conferences are important in preparing an attack

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THE ATTACK OF GROUPS OF ARMIES

The Battle of 21 - 22 March 1918.

The Positions.

It was proposed to launch a double attack simultaneously on the fronts: Croisilles (southeast of Arras) -- Moeurores and Villers -- Gnislain -- Olse river south of St Quentin, while avoiding the Cambrai salient. A limited objective attack near La Fere was to accompany the principal effort.

The defensive system of the enemy was highly developed, consisting of three successive positions. The terrain itself offered no especial difficulties.

The German lines were almost everywhere in contact with the enemy's. St. Quentin was included in our defensive system. The terrain where we were to deploy our means naturally differed considerably over the wide front of the attack. In some places it was quite favorable while in others it was dominated by the hostile observation.

PREPARATIONS FOR THE ATTACK

Originally, the attack was to be made by the army group of the Crown Prince Rupprecht with the Seventeenth, Second and Eighteenth Armies. Several artillery specialists were made available to the army group.

Later the front of the attack was extended on the left and the Eighteenth Army (von Hutier) was incorporated with the army group of the German Crown Prince. Thus, the conduct of the operation reverted to G.H.Q. The amount of artillery needed, its organization, movement forward and installation were matters which devolved upon the armies. These questions were handled as described in the subsequent attack of the Chemin des Dames with the army group and GHQ exercising general supervision.

ARTILLERY ORDERS FOR THE ATTACK.

A. Orders of GHQ and of the army group commanders.

These headquarters allotted the staffs, batteries and ammunition among the army groups and the armies. These orders specified that the duration of the artillery preparation for the Second and the Eighteenth Armies would be fixed by GHQ; that of the Seventeenth Army, by the army group. They also regulated the plans of fire along army boundaries and contained other instructions of a general nature.

B. Army Artillery Orders, Eighteenth Army.

The dispositions of the Eighteenth Army hold the principal interest since it was this army which gained the principal success in the March offensive. We shall study them in some detail while noting any important variations in the preparations of the other armies.

Army Artillery Order No. 1.

This order included the initial steps to be taken and followed the form of the same order at the Chemin des Dames (See page 29).

Army Artillery Order No. 2.

This order indicated dispositions to be taken prior to the arrival of the reinforcing batteries on the front (See page 29 Chemin des Dames)