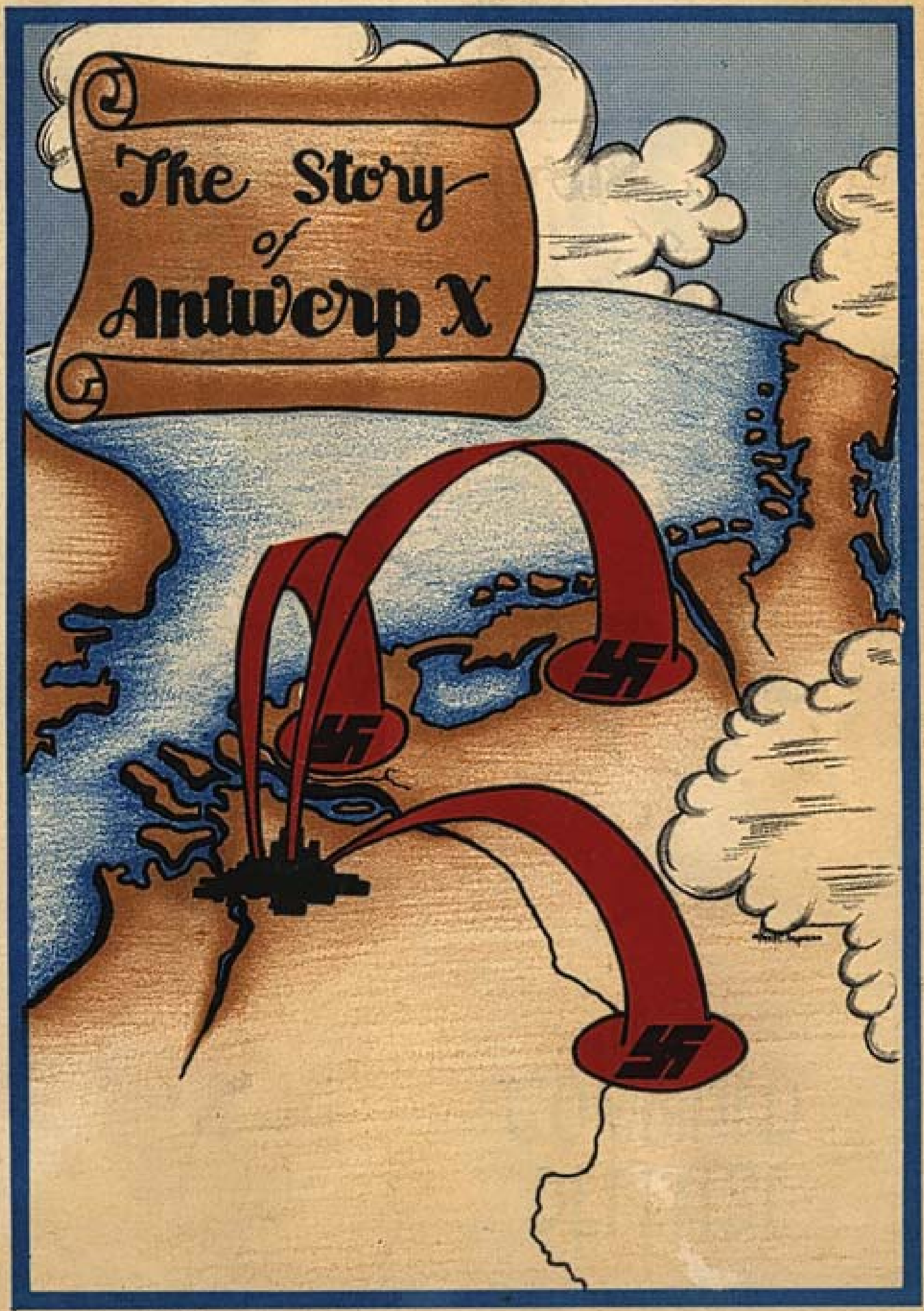

The Story
of
Antwerp X

Antwerp X

A COMBINED DEFENSE

HISTORY will record many outstanding feats and accomplishments of this war, but, none will overshadow the heroic defense of the port of Antwerp against flying bombs by 22,000 of the world's finest antiaircraft artillerymen.

Organized quickly and secretly, this huge command was dubbed "ANTWERP X" and placed under Brigadier General Armstrong as the attack on Antwerp started late in October 1944. Then for 154 days and nights without letup and with ever increasing fury, the "battle of the buzz-bomb" was fought on the cold wet flats of Northern Belgium and Southern Holland.

Bald facts and figures will never convey the full story of endless hours in freezing gun pits, the sweat and strain of endless "digging in", the constant roar of firing guns, the deeper and deathly roar of V1's in flight, the burning eyes from constantly seeking after that last small margin of error.

But facts and figures do tell of a clear cut victory over Hitler's vaunted Vengence Weapon Number One. In the words of Major General Revell - Smith, 21st Army Group; "This is a great victory; perhaps not heralded or understood by the world at large in the same way as they would appreciate a victory by other arms. The victories of other arms have territorial gains to show. You have not, but nevertheless this does not make it less important than any other form of major military success on the final outcome of the war".

Towards a better understanding of this major victory, the following pages are presented.

Antwerp X

HEADQUARTERS
ANTWERP X

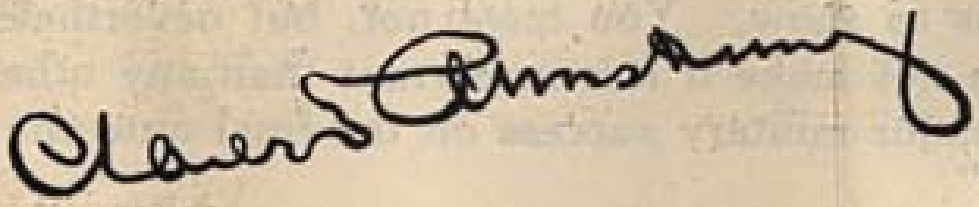
Subject : The Story of Antwerp X.

To : All Concerned.

1. This booklet is published for one purpose — to record permanently the defeat of the flying bomb attacks on Antwerp during the period from October 1944 to April 1945.

2. I should like to take this opportunity to personally commend every officer and man who took part in this long and gruelling campaign. Only through your steadfast devotion to duty, your unflinching determination and your utter disregard for self while facing hardship and danger, was this unparalleled antiaircraft record made possible. I defy contradiction when I say the men of ANTWERP X were and are the "best damn gunners" in the world.

3. You are now scattered far and wide... the team is broken up... but to each of you, British, Polish and American, I want to extend my sincerest thanks for a job well done and wish you the best of luck in all future tasks.

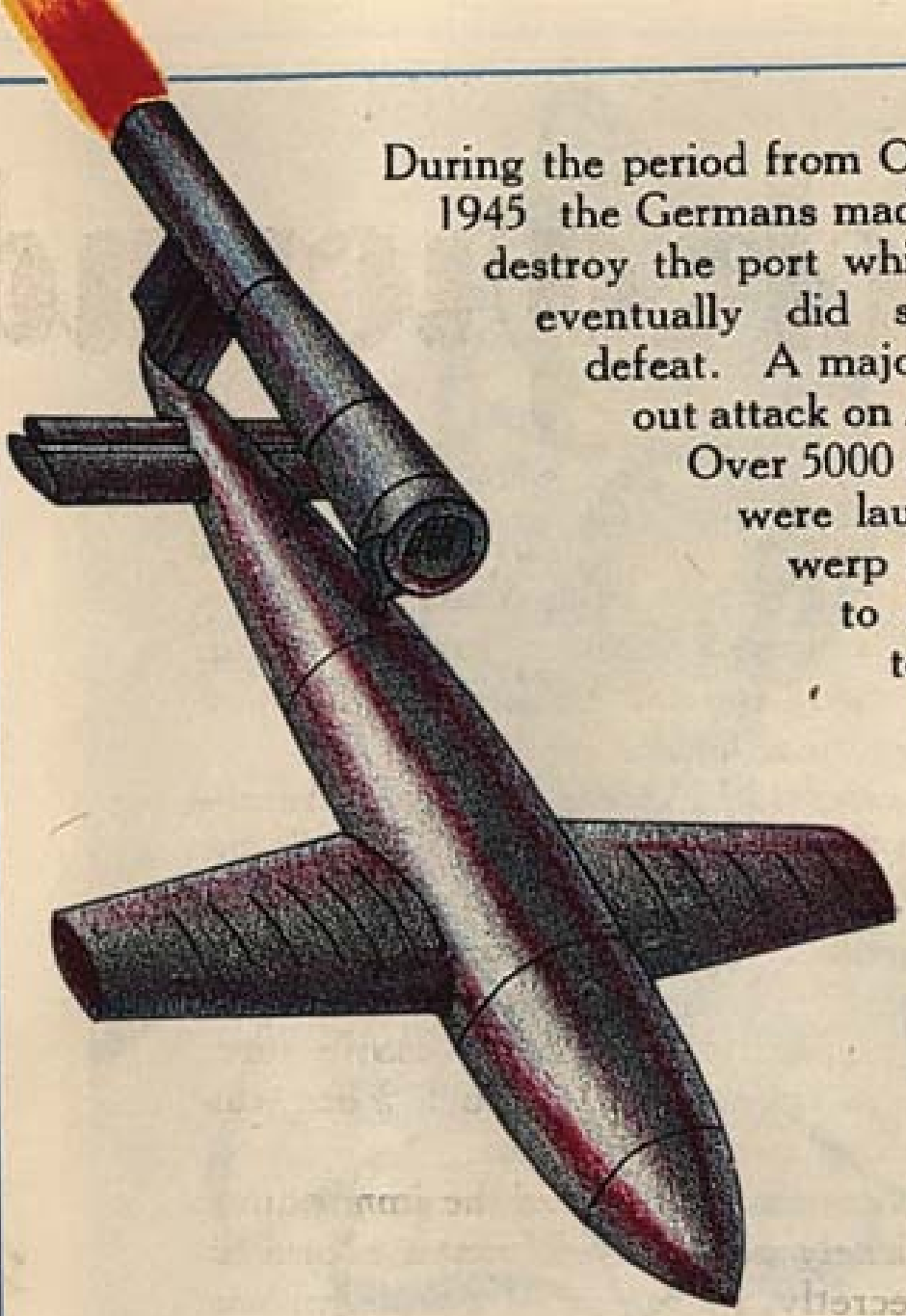


CLARE H. ARMSTRONG
BRIGADIER GENERAL, USA
COMMANDING.

CLARE H. ARMSTRONG
BRIG GEN, U S ARMY
COMMANDER, ANTWERP X

Though they climb up into Heaven
thence will I bring them down.
Amos 9:2

During the period from October 1944 to April 1945 the Germans made an all-out effort to destroy the port which could and which eventually did spell their ultimate defeat. A major weapon in this all-out attack on Antwerp was the V1. Over 5000 of these flying bombs were launched towards Antwerp in a belated attempt to deny this vital port to the Allies. Over five million pounds of ultra high explosive Antwerp bound.



Background

In the fall of 1944, the successful allied armies found themselves with supply lines stretched almost to the breaking point. The famed invasion beaches, Utah and Omaha, were much too far behind the lines to continue to be a practical source of supply.

Then on September 4th, Field Marshal Montgomery's forces, in a brilliant 110 mile, eight hour drive, captured the largest port on the continent virtually intact. Antwerp... capable of handling 90,000 tons of freight a day. Antwerp... hundreds of miles nearer the fighting armies than any other usable port. Antwerp... actually in operating condition. Here was the answer to the allied supply problem.

The German high command realized the importance of their loss immediately and started frantic efforts to deny us the port. Secretly, in dozens of wooded places east and southeast of Antwerp, frenzied building of V1 launching sites began... not, however, unknown to allied intelligence.

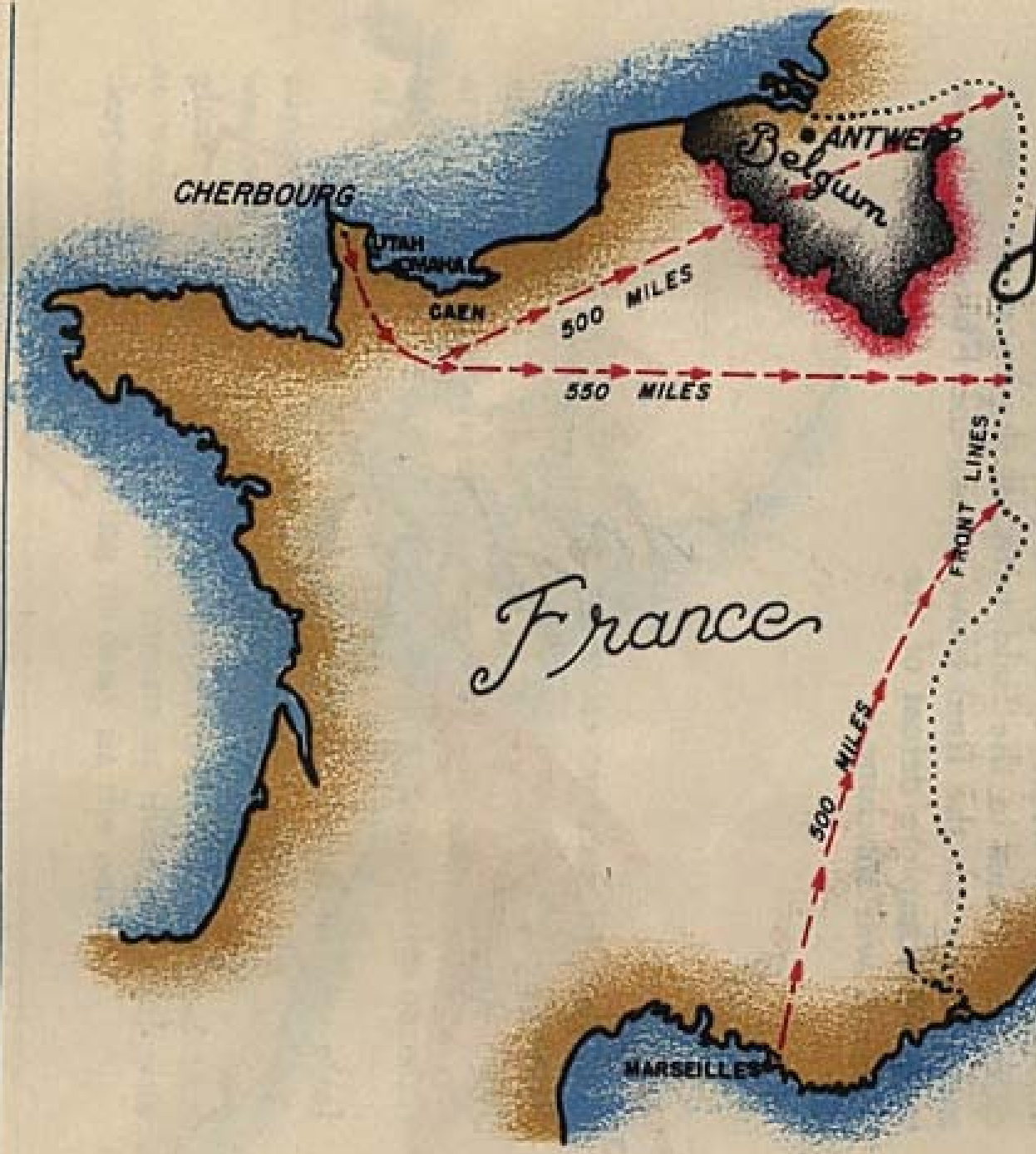
Just as secretly, we prepared to counter this attack.

Both American and British Antiaircraft units were deployed between Antwerp and the threat to the south and east. Deployed, camouflaged, and told to hold fire... to fire only on the inevitable buzz-bombs. The time of waiting was short, for, within 24 hours of the time allied intelligence had predicted, the attack on Antwerp began... on 24 October 1944.

Ports

In the fall of 1944, although allied armies had captured hundreds of miles of coastline on the continent, including many formerly fine ports, no one or combination of several of these ports was capable of handling the mountains of supplies necessary for our field armies. Suicide garrisons or demolition had denied every sizable port to our demands. Utah and Omaha were soon to be destroyed by winter storms. Antwerp alone stood between the allies and an intolerable supply situation.

Arteries

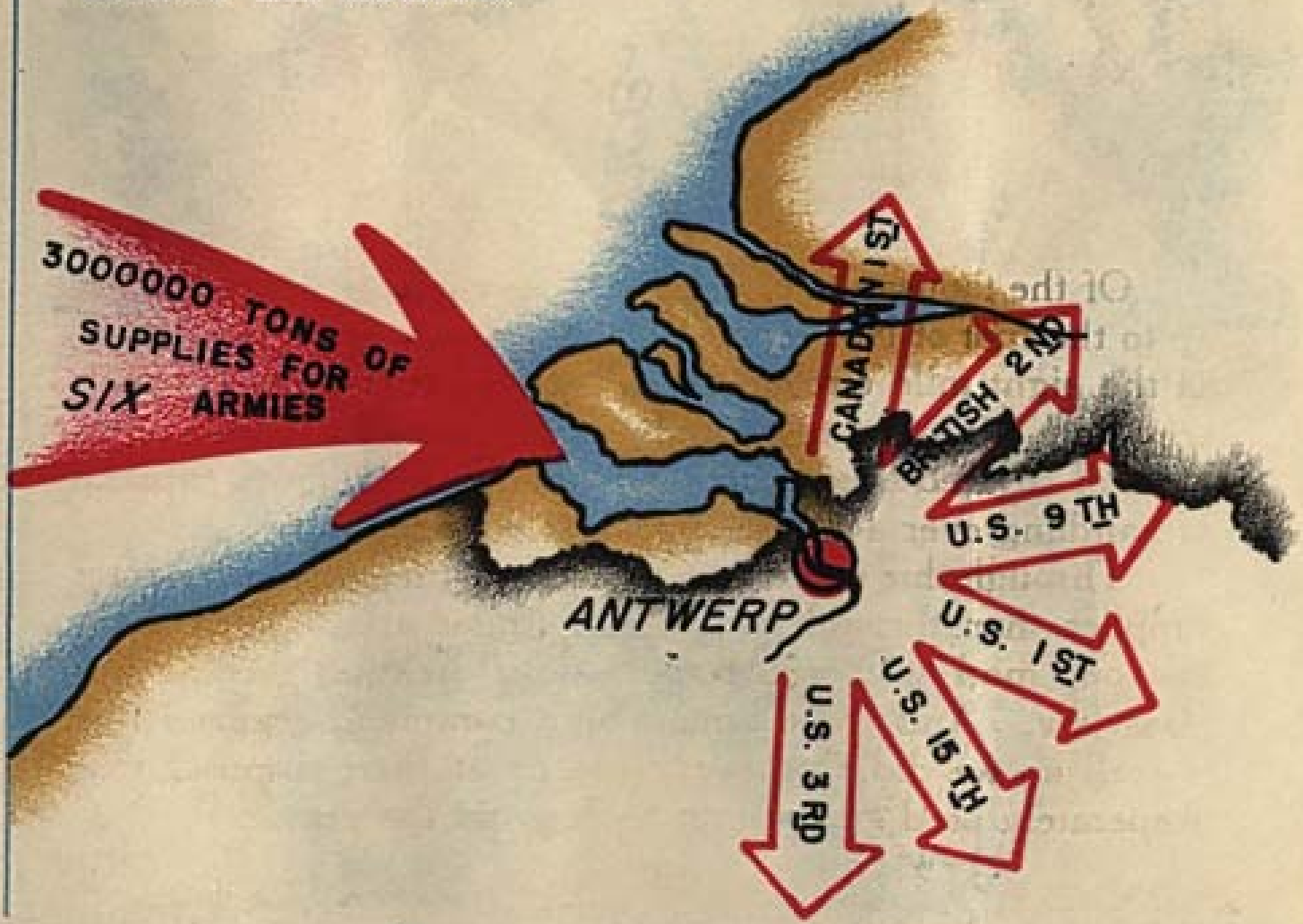


In the fall of 1944, as a result of the port situation, allied service forces were trucking vital supplies over incredible distances. The famed "Red Ball Highway" sprang into existence, but, at best, it was a temporary measure to meet an emergency. Its spectacular 1000 mile round trips were wearing out men and machines. Once again the port of Antwerp was the only answer. If this port could be used, supply lines would be shortened as much as 400 miles. Antwerp must be operated for the successful culmination of the war.

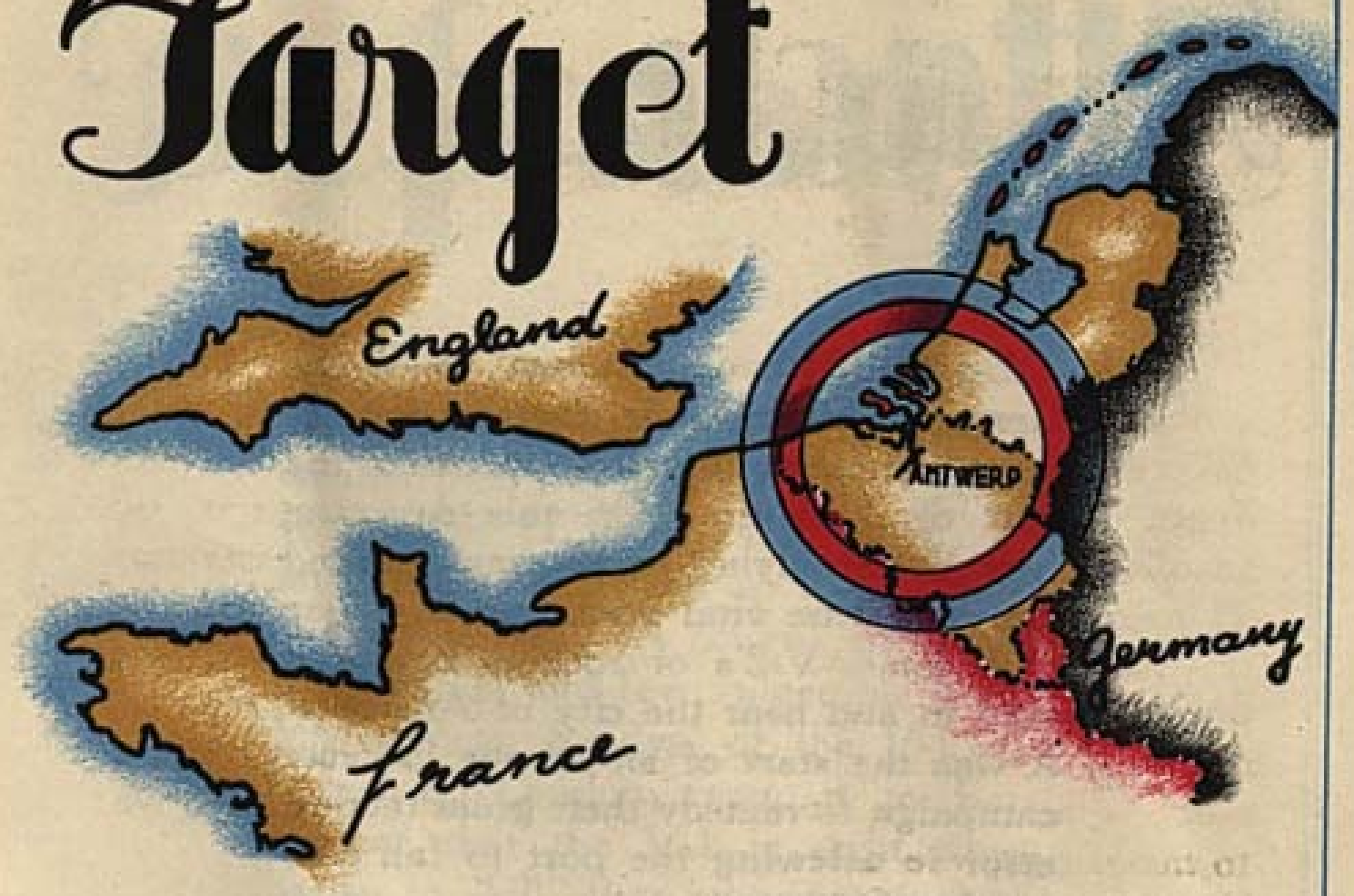
Supplies

Armies in the field have always needed supplies. But a modern army demands volumes of supplies that would have staggered the imagination of a Caesar or Napoleon. Food, ammunition, clothing, shoes, trucks, jeeps, oil, gasoline, to mention only a few of the absolute essentials, all needed in ever increasing quantities by every army.

Yet, such was the size of the port of Antwerp, that, during the fall, winter and spring of '44-'45, it supplied six complete armies in the field with all the necessary equipment to launch the final blow across the Rhine that was to mean complete defeat of the German war machine.



Target



Of the thousands of square miles captured by the allies up to the first of November 1944, no area was so important as the eight mile circle which included the Antwerp dock area with 30 miles of wharves, 632 operating hoists, 186 acres of covered shed space and oil storage facilities capable of handling over a hundred million gallons.

Through this eight mile bulls-eye must pass more vital supplies than through any other similar area. This then, was our most vulnerable spot... our Achilles' heel... our glass jaw. And the German high command realized this as well as we did, for every means at their disposal was desperately used attempting to deny us the port.

Attack

On the 24th of October, 1945, the Germans began their most desperate attempt to deny the allies the use of the port of Antwerp. On this day, the first V-1 or flying bomb was detected aimed for the vital dock area. A few days later, V-2's or rockets began to land in and near the city of Antwerp. It was the start of an all-out 154 day campaign to remedy their gross tactical error in allowing the port to fall into our hands intact.

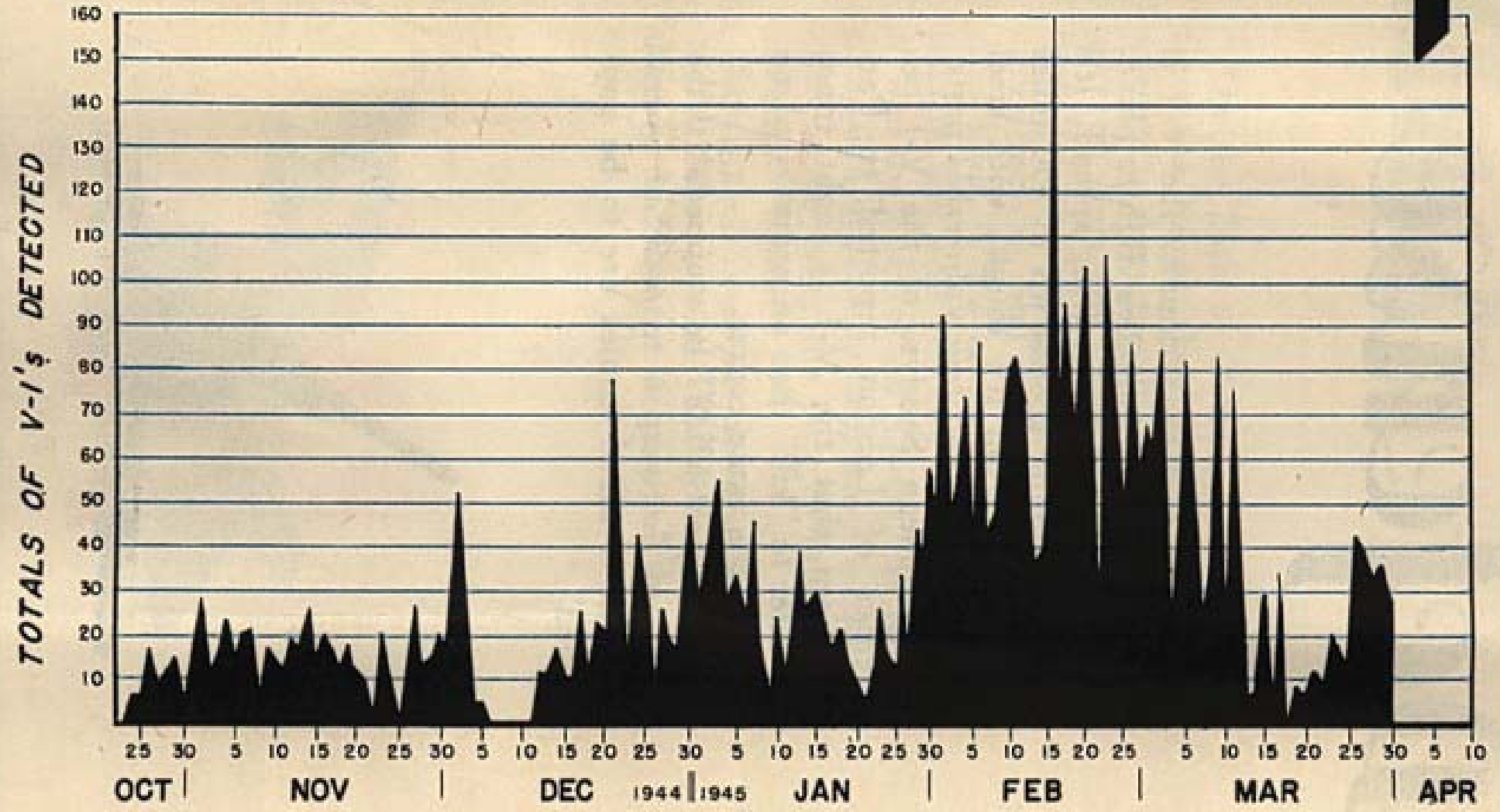
Since there was no defense against the V-2's, it became doubly important that the V-1's must be stopped at any cost.

Defense

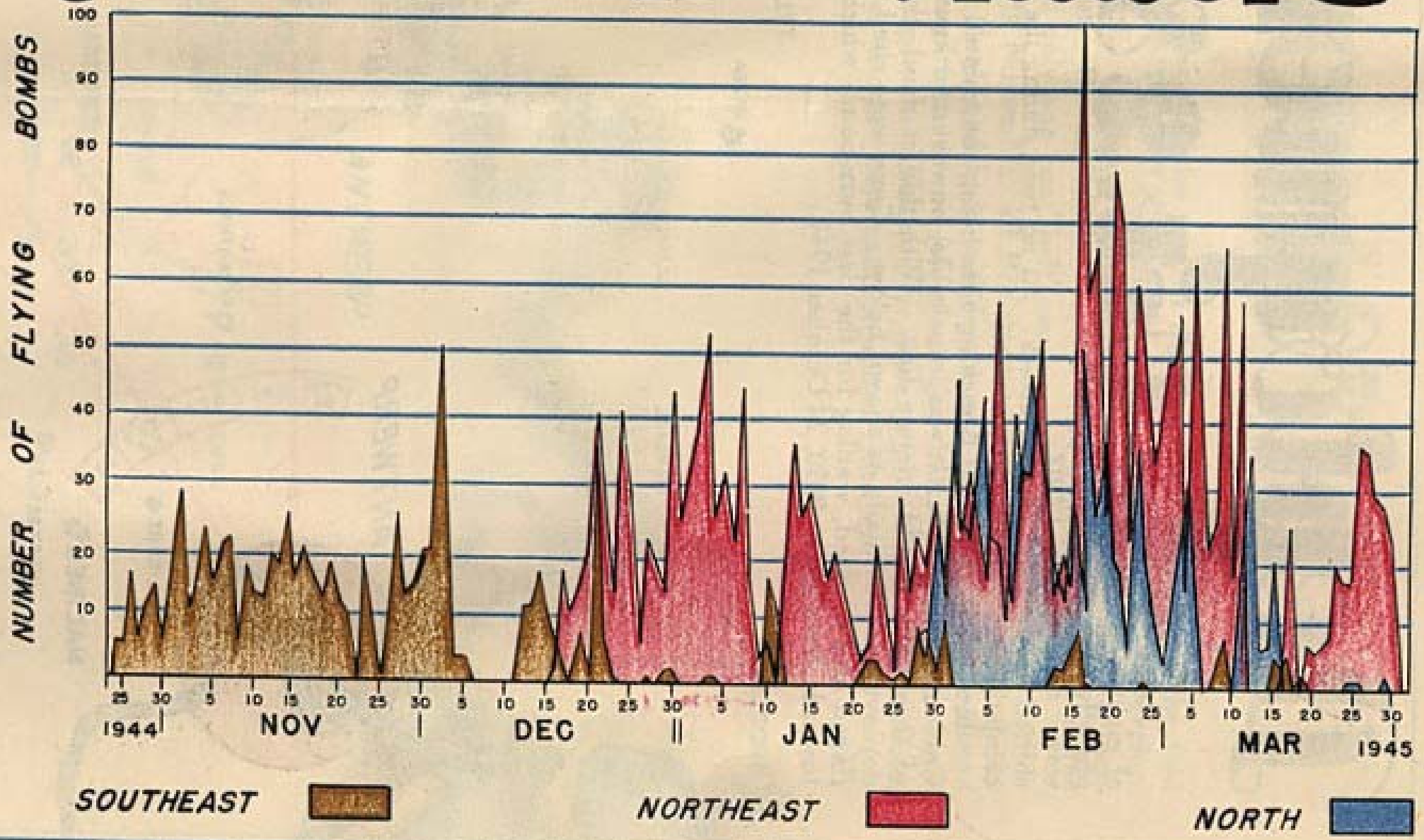
Easier said than done... the V-1 is smaller than the smallest fighter plane, with only a 17.5 foot wing spread. It's fast, attaining speeds up to 450 miles an hour. And it's tough, with steel construction and few vulnerable parts. Mr. Duncan Sandys, of the V-1 defenses of London, reported to Parliament that the V-1 is eight times harder to "kill" than an ordinary plane flying the same course.

Still... "it MUST be stopped... if the port of Antwerp is to continue operation... if allied armies are to be supplied.".

Attack On Antwerp



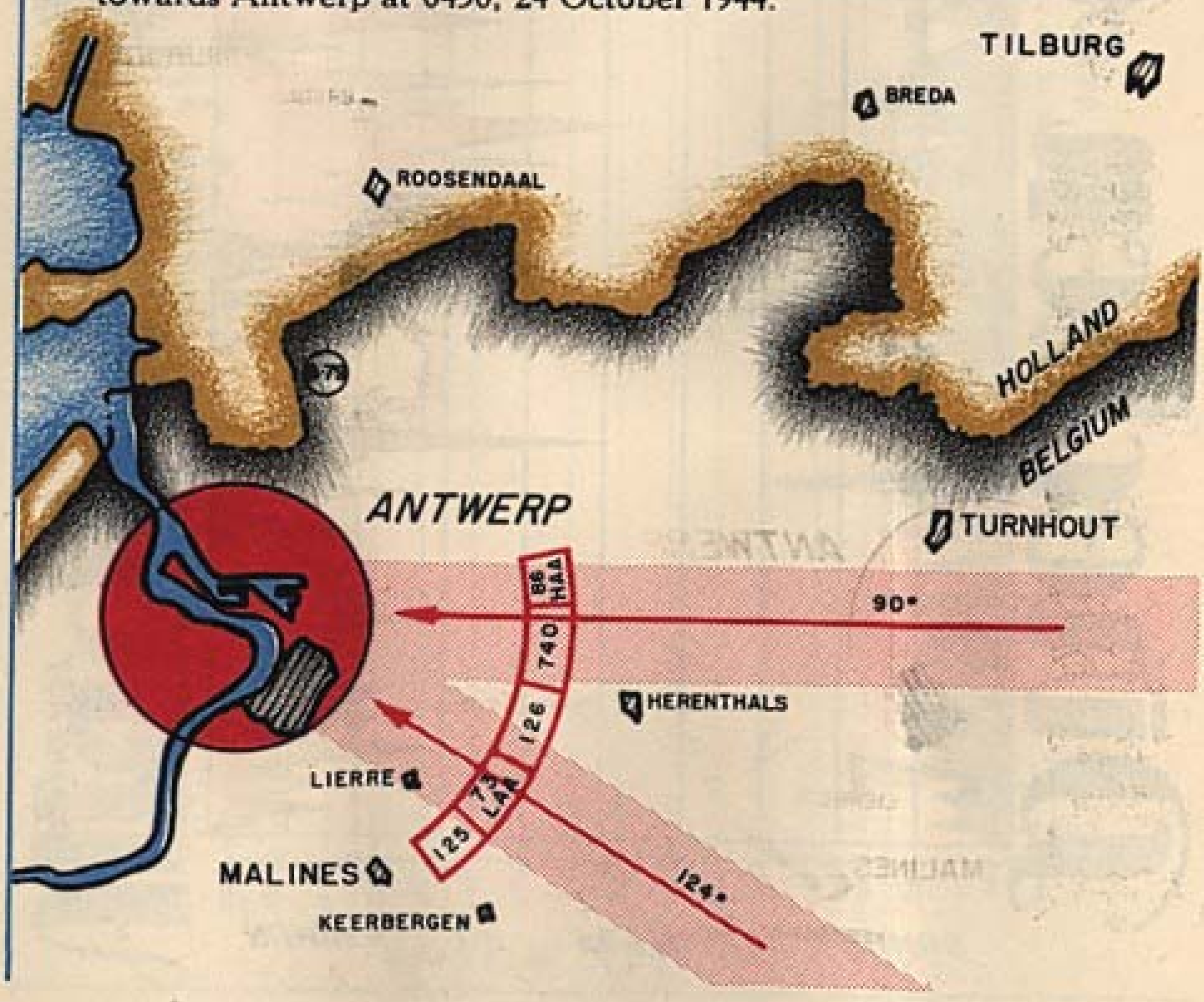
Direction of Attack



Deployment Oct. 28th

The following series of eight charts show graphically how the defense was constantly being shifted to meet the varying attack. At no time during the 154 day campaign were the defenses static.

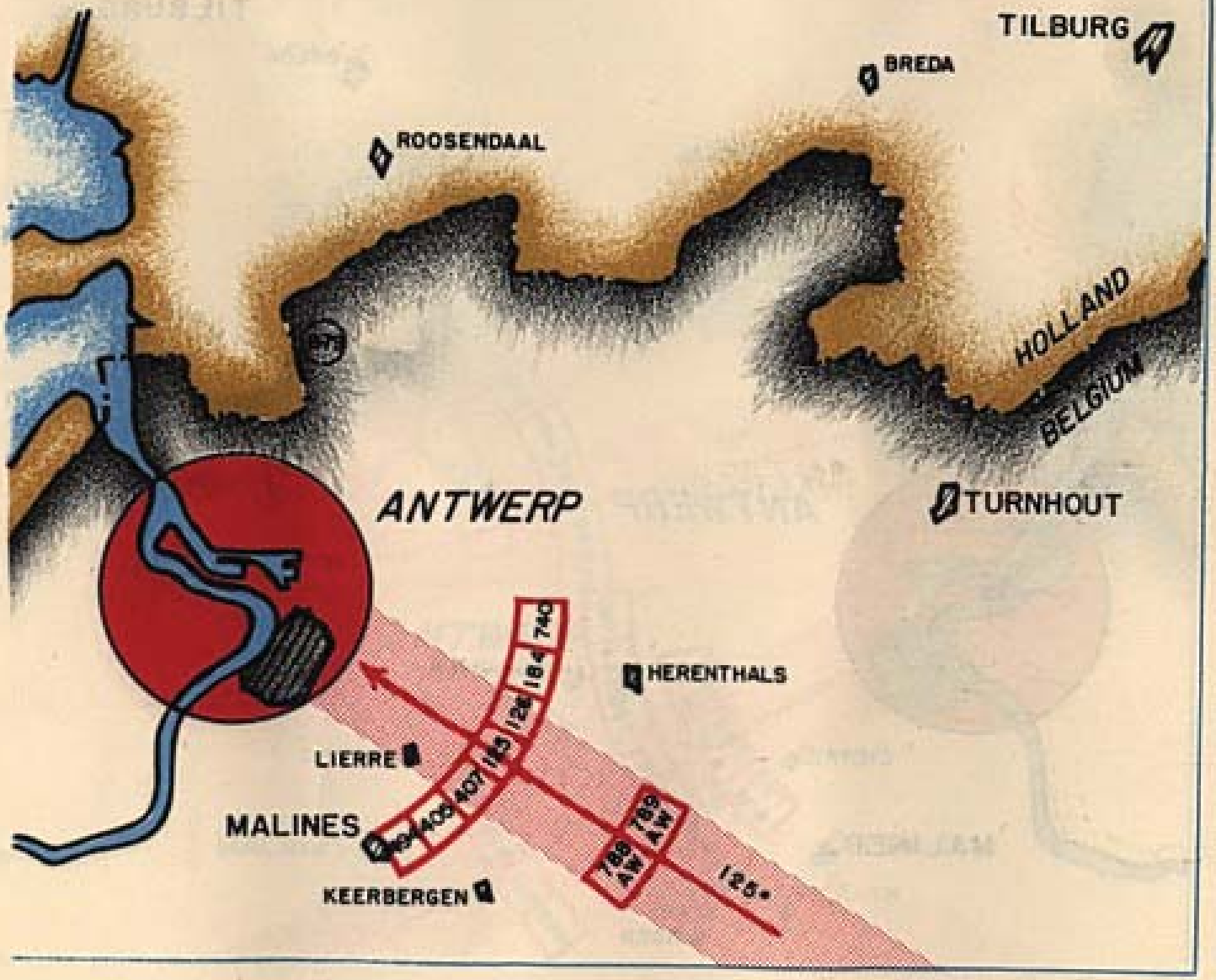
Intelligence reported launching sites being constructed between Coblenz and Bocholt. It was impossible, however, to know which of these sites would operate first. With this in mind, the initial deployment was made as shown below. Guns were sited, camouflaged and silenced, waiting for the first buzz-bomb which roared towards Antwerp at 0430, 24 October 1944.



Nov 10th

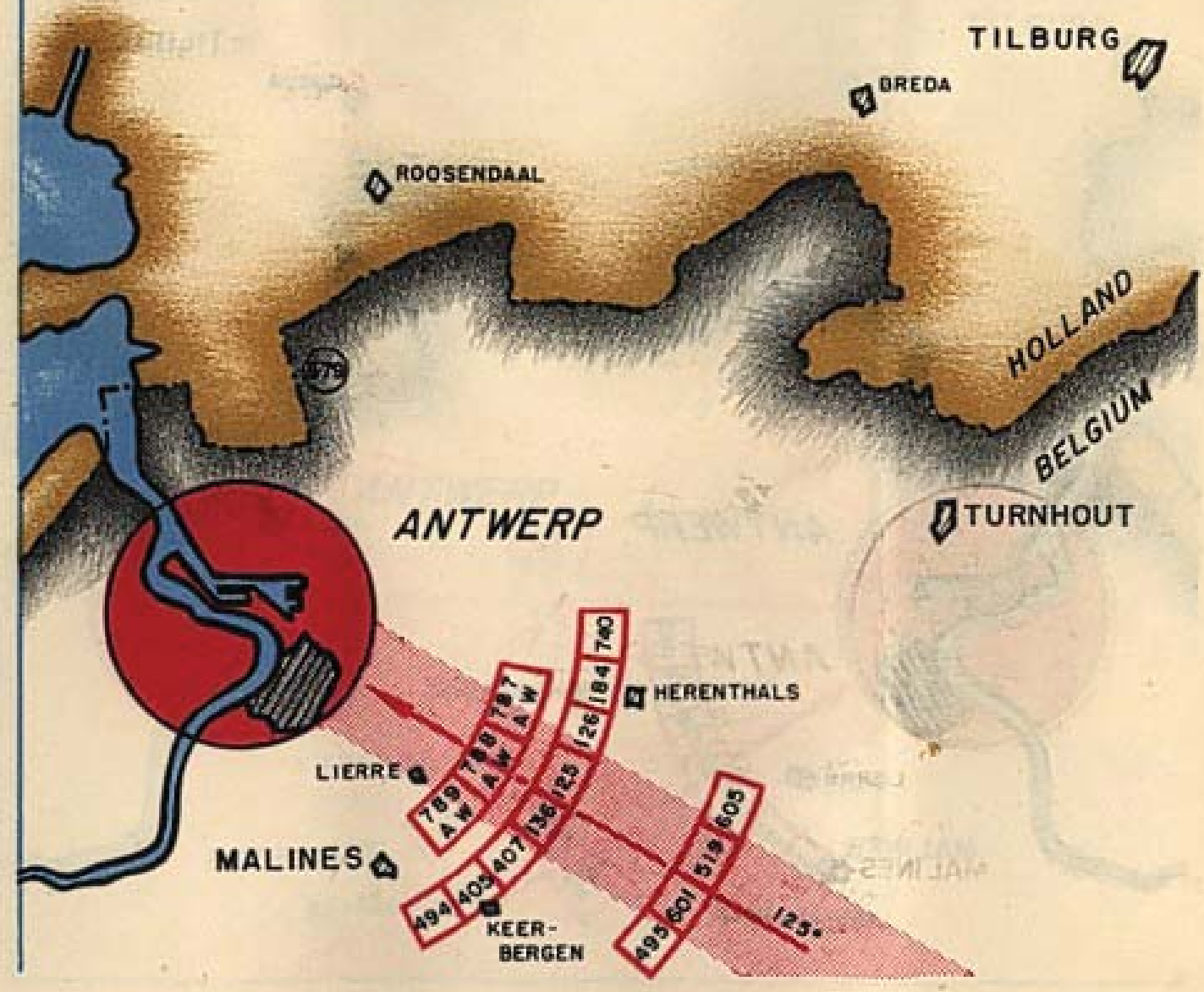
The attack on the port of Antwerp had started and the first guns of "ANTWERP X" were in action. This first attack developed from the direction of Trier and defenses were shifted to meet the threat. The automatic weapons were deployed in front of the guns and only one gun "belt" was in existence.

By 10 November, all British units, with the exception of the 42d S/L Regt, had been withdrawn and ANTWERP X consisted of this regiment, seven American gun battalions and two automatic weapons battalions. Five more gun battalions were enroute, as well as another automatic weapons battalion.



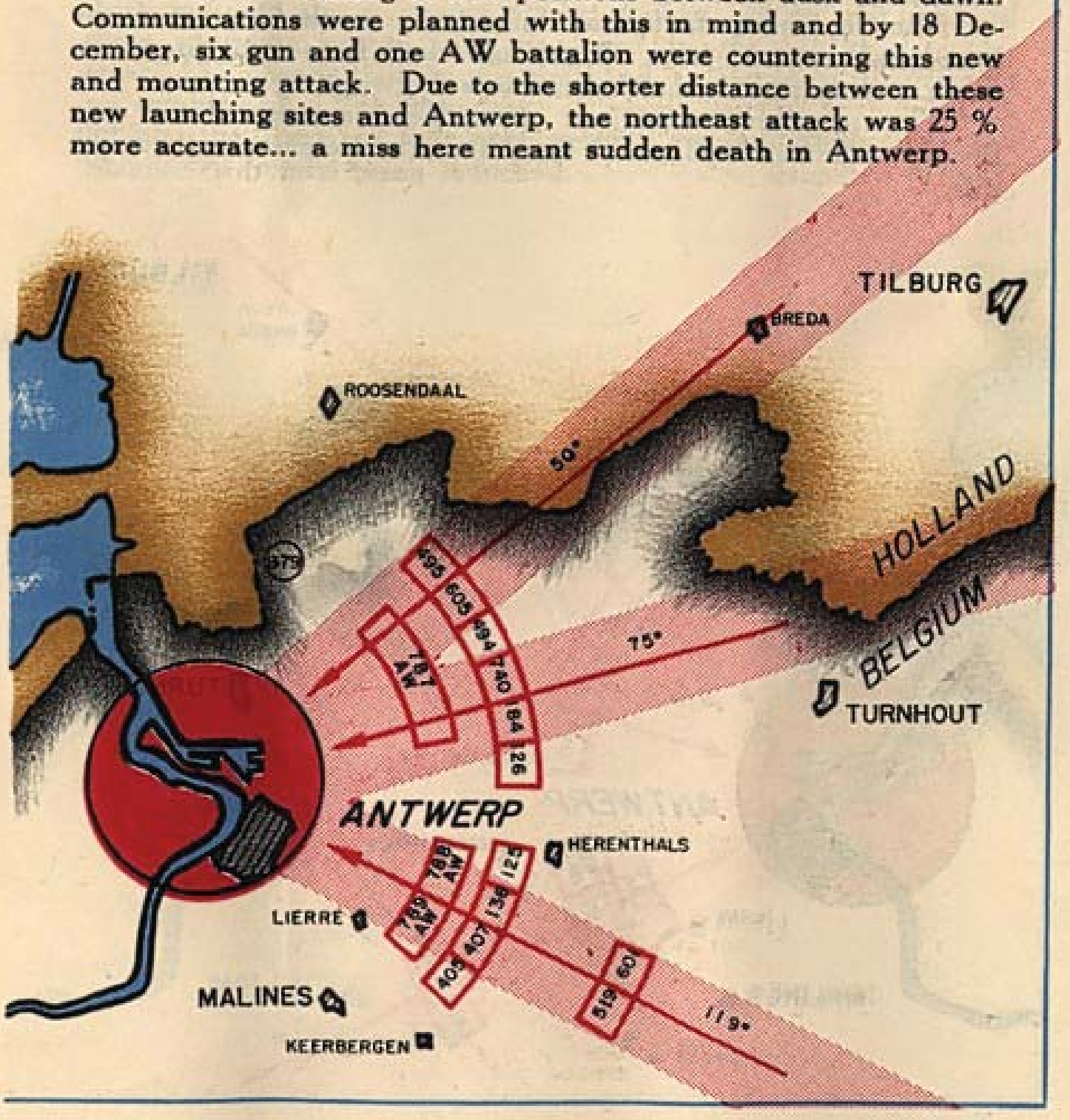
Dec. 6th

By 6 December, the additional gun and AW battalions had arrived in ANTWERP X and were deployed as shown below. As the attack had channelized to a great extent, it was possible to establish another gun "belt" in front of the original one across the path of the approach, thus materializing a defense in depth which was employed throughout the campaign. The automatic weapons were shifted to the rear of the inner gun belt. The attacks from the southeast continued to increase in intensity until on 2 December, over 50 V-1's approached Antwerp from this direction.



Dec. 18th

On 15 December, simultaneously with and as part of von Rundstedt's offensive in the Ardennes, a new V-1 attack was launched at Antwerp. This time the flying bombs were roaring out of the northeast. But plans had been made and positions reconnoitered for any eventuality and no time was lost. Battalions moved and were firing in new positions between dusk and dawn. Communications were planned with this in mind and by 18 December, six gun and one AW battalion were countering this new and mounting attack. Due to the shorter distance between these new launching sites and Antwerp, the northeast attack was 25 % more accurate... a miss here meant sudden death in Antwerp.

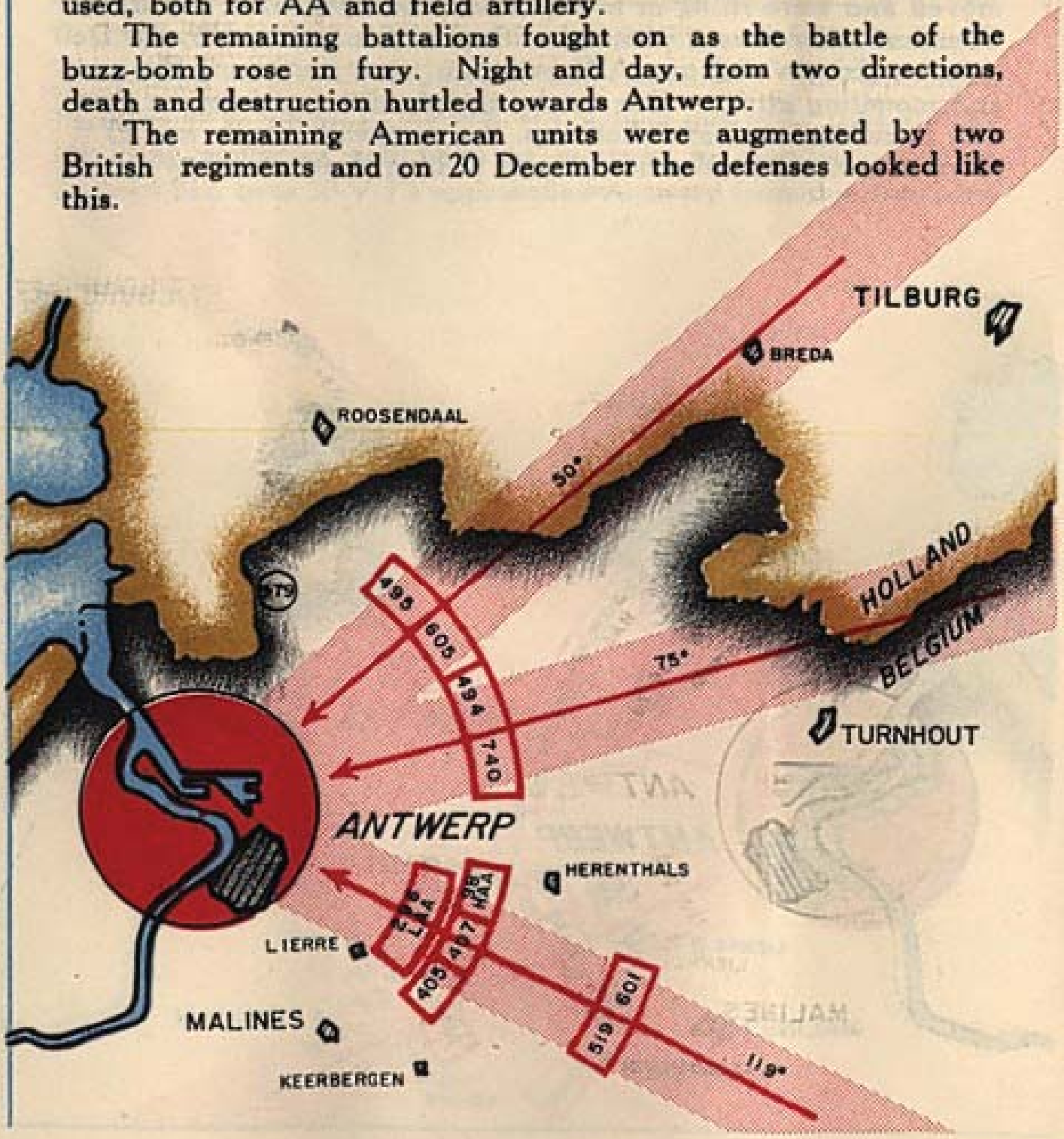


Dec. 20th

As von Rundstedt's offensive gained momentum, and the threat to allied supply lines became more acute, five gun and two AW battalions were withdrawn from ANTWERP X to help stem this rising tide. Rushed to the vicinity of Liege, they were used, both for AA and field artillery.

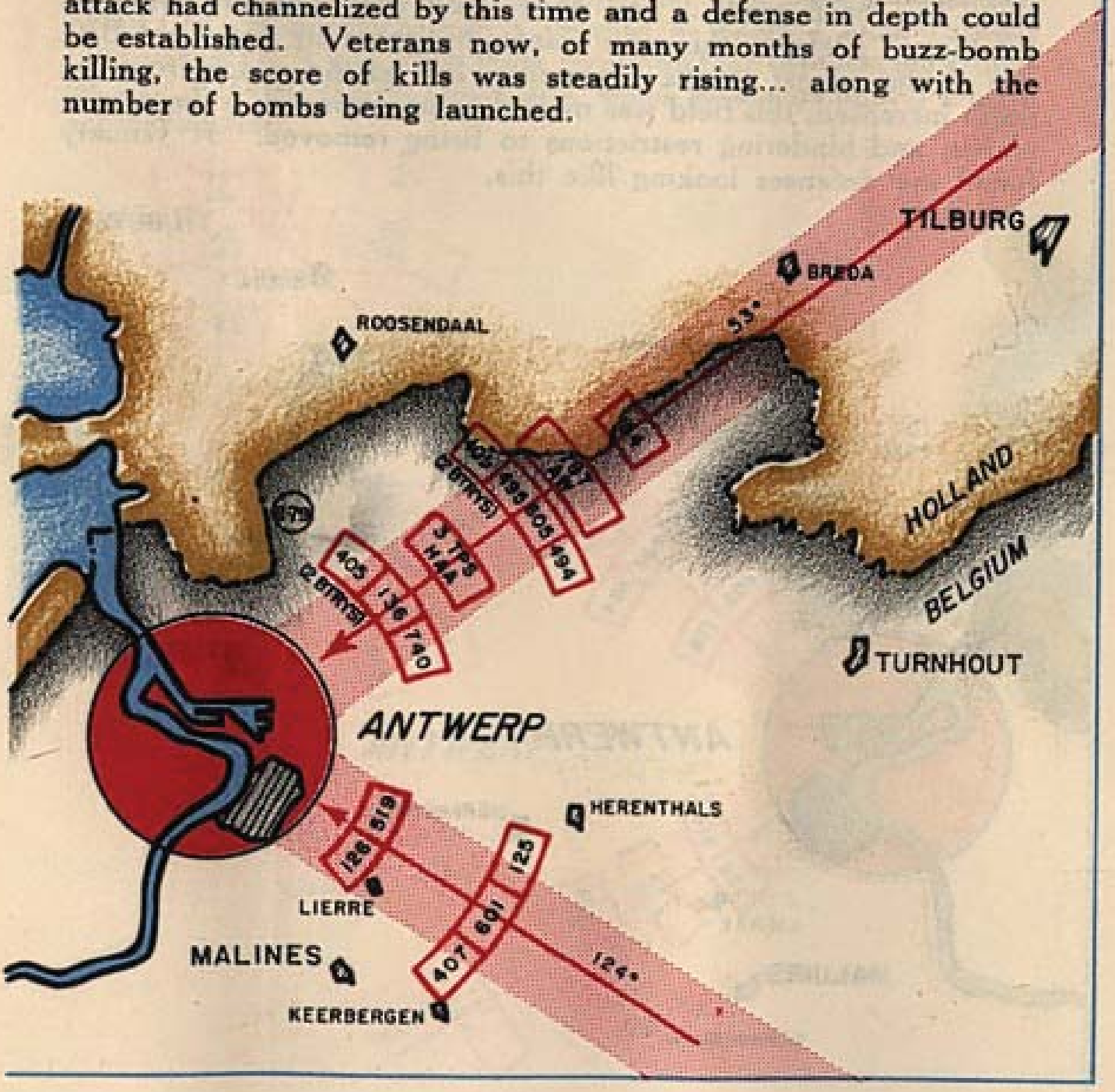
The remaining battalions fought on as the battle of the buzz-bomb rose in fury. Night and day, from two directions, death and destruction hurtled towards Antwerp.

The remaining American units were augmented by two British regiments and on 20 December the defenses looked like this.



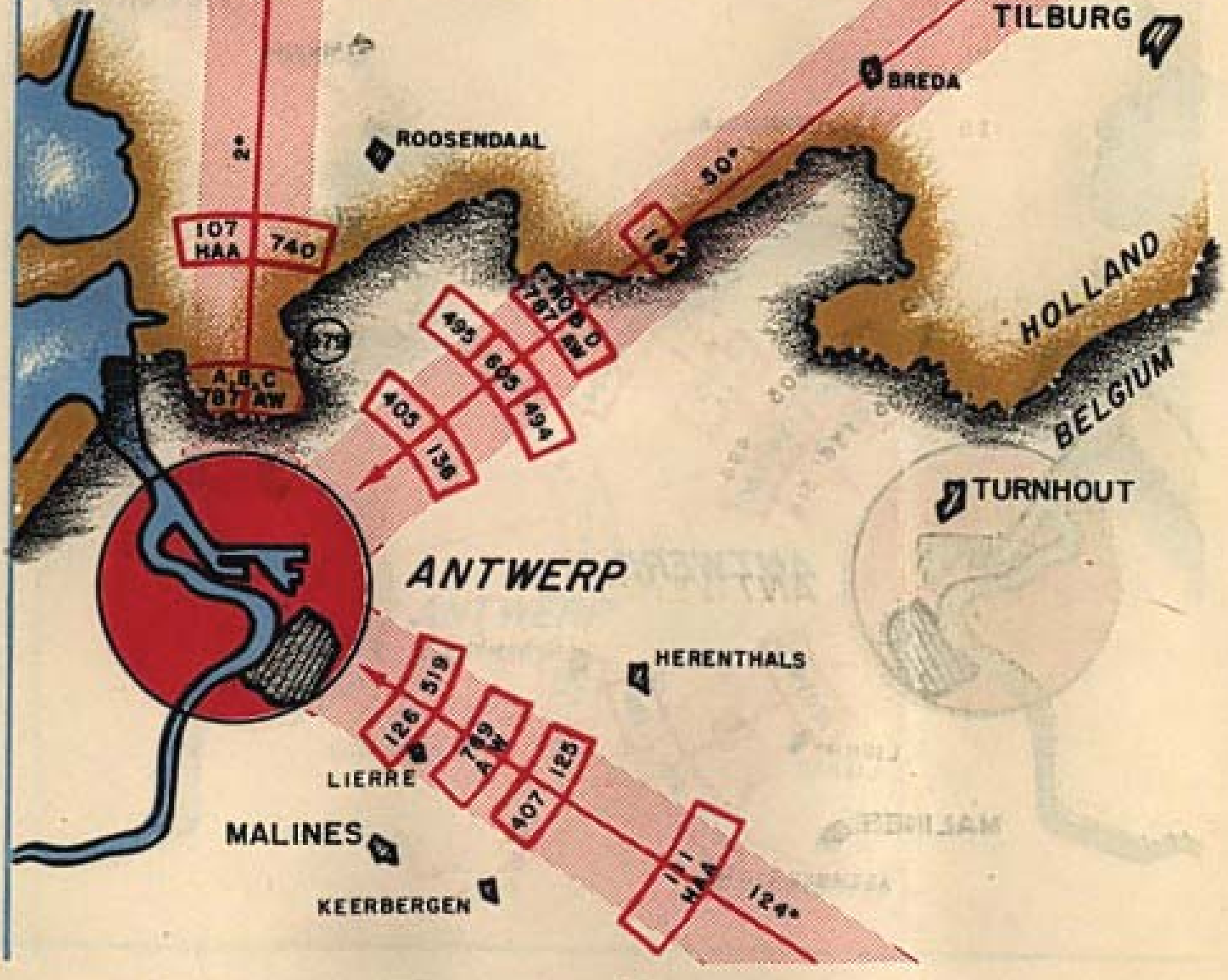
Jan. 11th

By 11 January, the battle of the Bulge had been finished and those units from ANTWERP X that had been rushed to help were back. The Luftwaffe's abortive bombing raid of 1 January had been beaten off with a loss of 11 planes to the guns of ANTWERP X. The northeast V-1 attack had increased and the southeast attack slacked off so that most of these returning outfits were deployed in the northeast. This attack had channelized by this time and a defense in depth could be established. Veterans now, of many months of buzz-bomb killing, the score of kills was steadily rising... along with the number of bombs being launched.



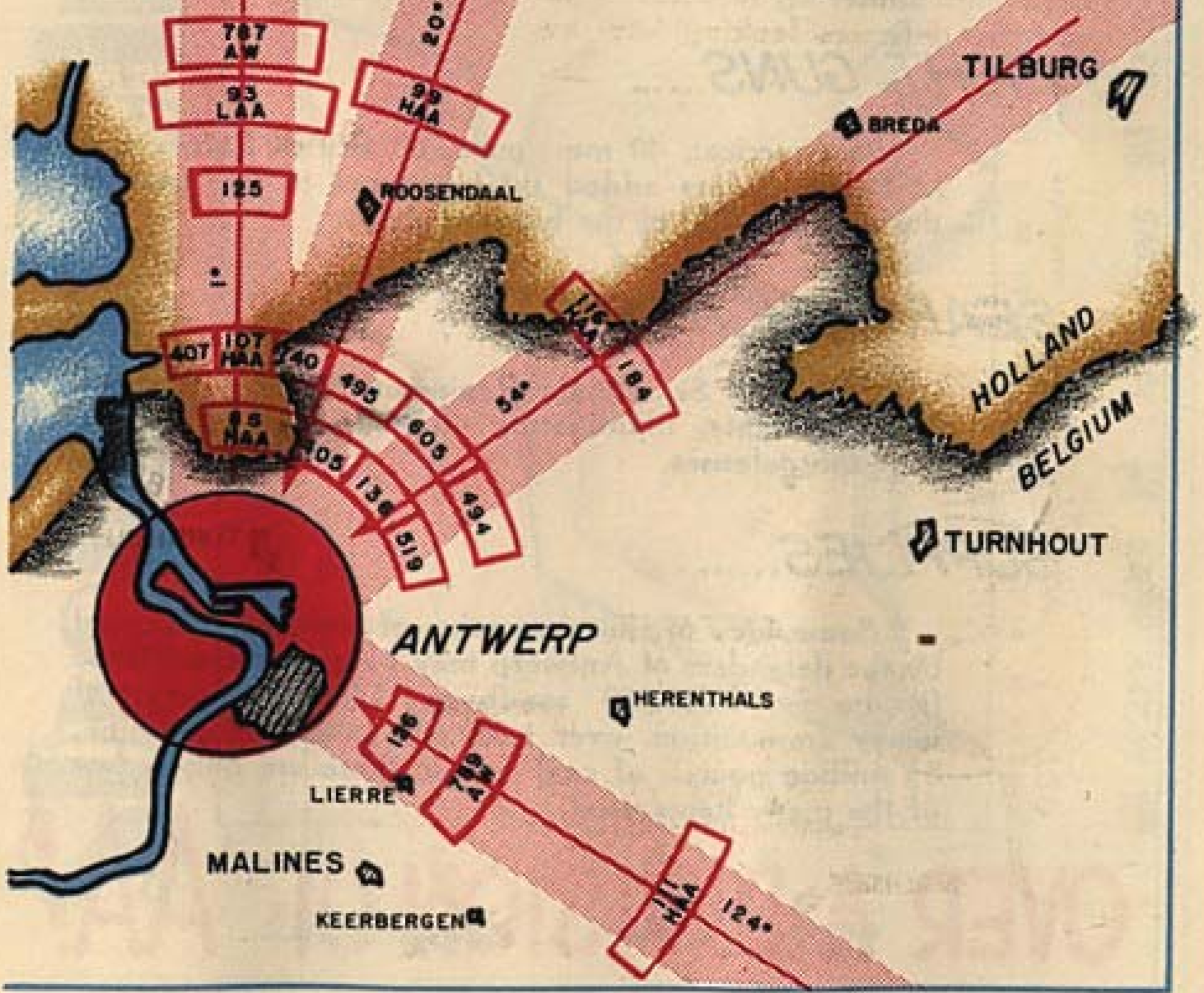
Jan. 31st

In the last few days of January, the third and last major direction of V-1 attack on Antwerp began. This time the launching sites were due north of Antwerp and so close that 90 % of those launched, but for the guns of ANTWERP X, would have found their way into the vital port. But once again plans had been made... and once again the battalions were on the move. Defense this time was complicated by Air Field B79, one of the largest on the continent. But as the attack from the north increased, this field was moved, guns deployed in the proper places, and hindering restrictions to firing removed. 31 January found the defenses looking like this.



Feb. 28th

During the month of February, the attacks on Antwerp reached their highest peak. As many as 160 bombs a day were launched from three directions. But the defenders continued to meet these attacks with never failing vigilance. As the attack from the north increased, a defence in depth was established to meet it and units drawn from the southeast approach which was drying up. During February and until the end of the campaign on 30 March, the defenses were deployed substantially as shown below. Each approach with a defense in depth... each channel fully covered. It was from these positions that the unprecedented six day score of 97.8 % was made, when 89 out of 91 V-1's were accounted for.



THE SIZE OF Antwerp X

MEN.....

Over 22,000 men and officers, British, Polish and American, participated in this 5 month campaign.

HEAVY GUNS....

208 - 90 mm guns, American, and 128 - 3.7 inch guns, British, roared night and day in the defense of Antwerp.

LIGHT GUNS.....

96 American 40 mm guns, 60 British Bofors and 32 Polish Bofors added their support to the heavies during the battle of the buzz-bombs.

SEARCHLIGHTS....

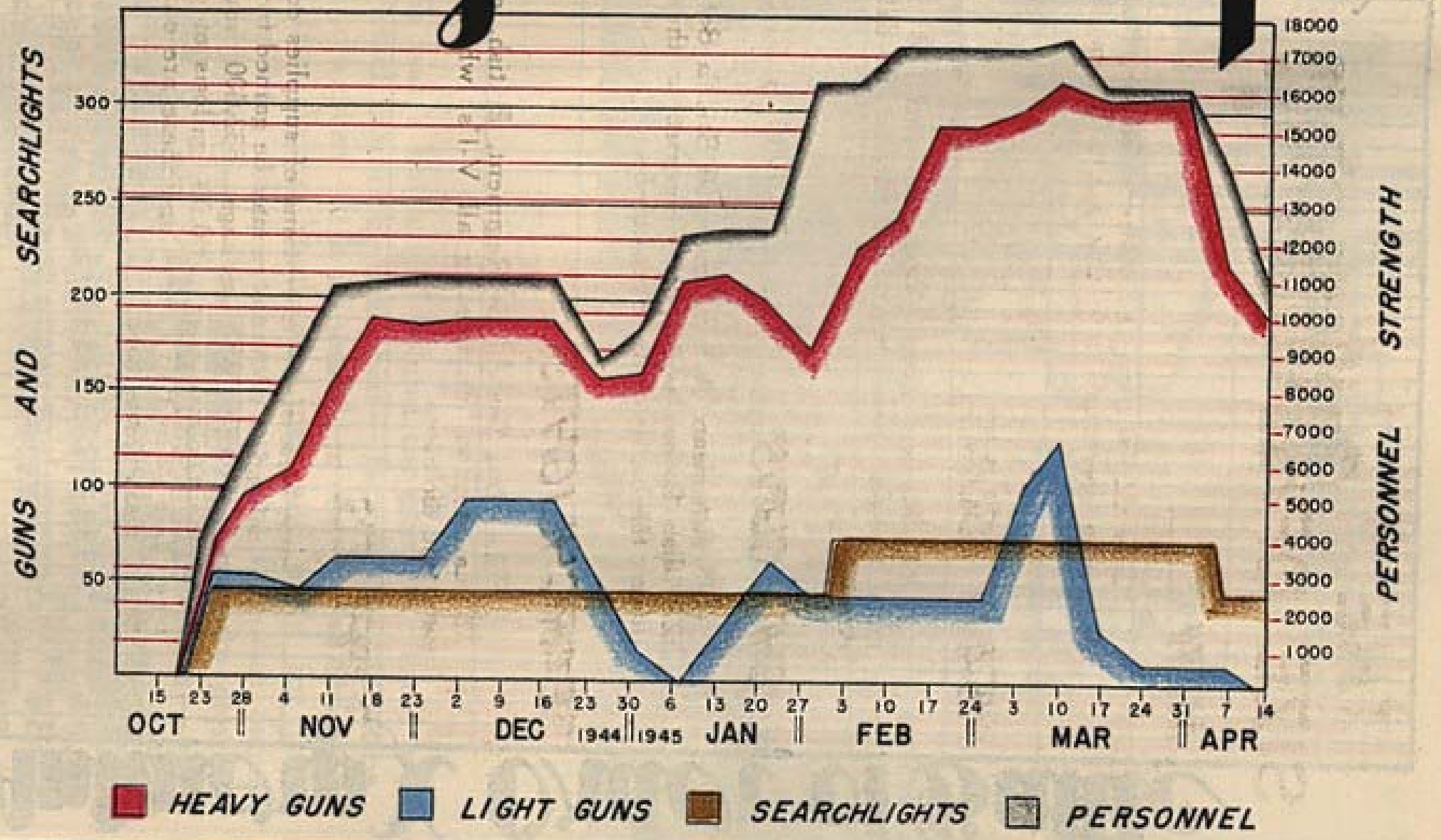
The 42nd Searchlight Regiment, British, operated 72 searchlights, illuminating all V-1's which passed over the defenses.

SUPPLIES.....

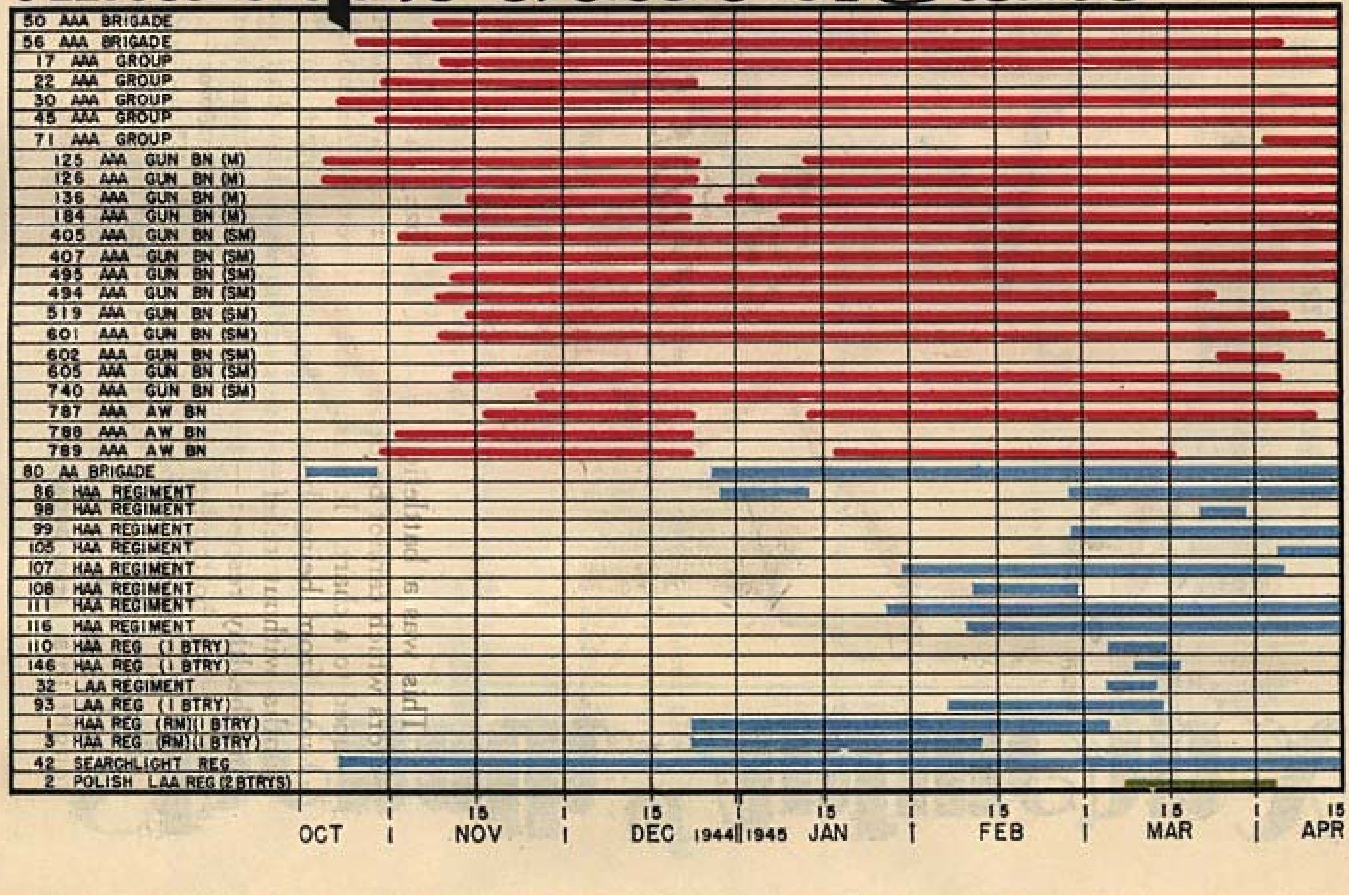
Some idea of the mountains of supplies consumed by the defenders of Antwerp may be gained from these figures — 3,255,000 sandbags, 532,000 rounds of heavy ammunition, over 1,000,000 gallons of gasoline, 8½ million pounds of coal — and these are only a few of the many items used.

OVER A DIVISION OF AA!

Strength of Antwerp X



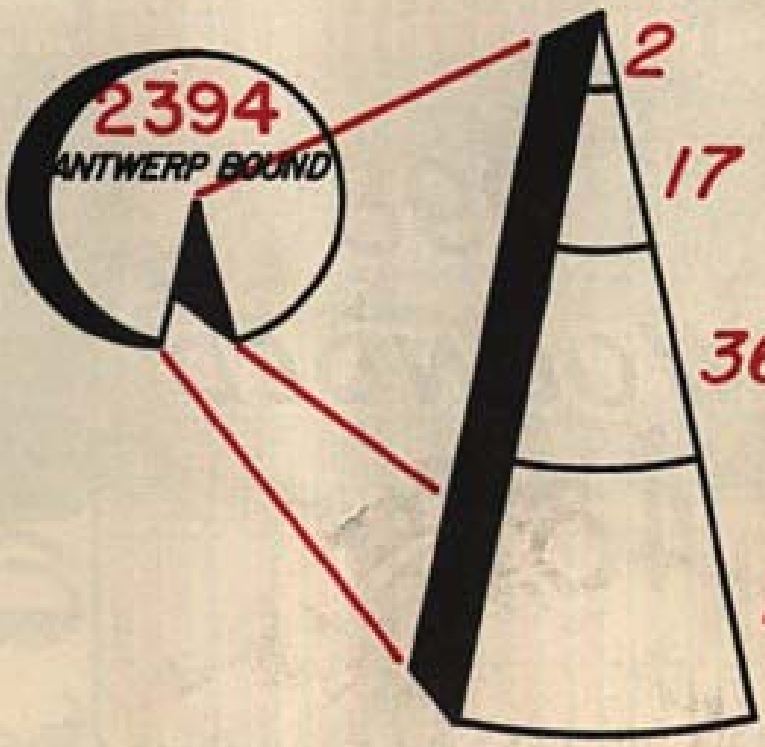
Antwerp X Order of Battle



The Human Factors

This was a battlefield behind the line, and there are factors which cannot be described — factors that cannot be reduced to a chart. It is impossible to convey the constant tension from being bombarded day and night for five months without relief — the ever present fear that came from healthy respect — the aching tiredness from eternal work — the bottomless mud of the low countries — the freezing hours in gun pits 24 hours around. These are the human factors that can't be charted — that can't be explained — but which will remain forever with the men who fought this "rear area" battle of the buzz-bomb.

The Result ?



OVER TOP RESTRICTION

DETECTED BUT LOST IN FLAK OR RAIN CLUTTER, OR, FRIENDLY PLANE IN FIELD OF FIRE

FIRST TARGETS FROM NEW DIRECTION

PASSED THROUGH THE DEFENSES

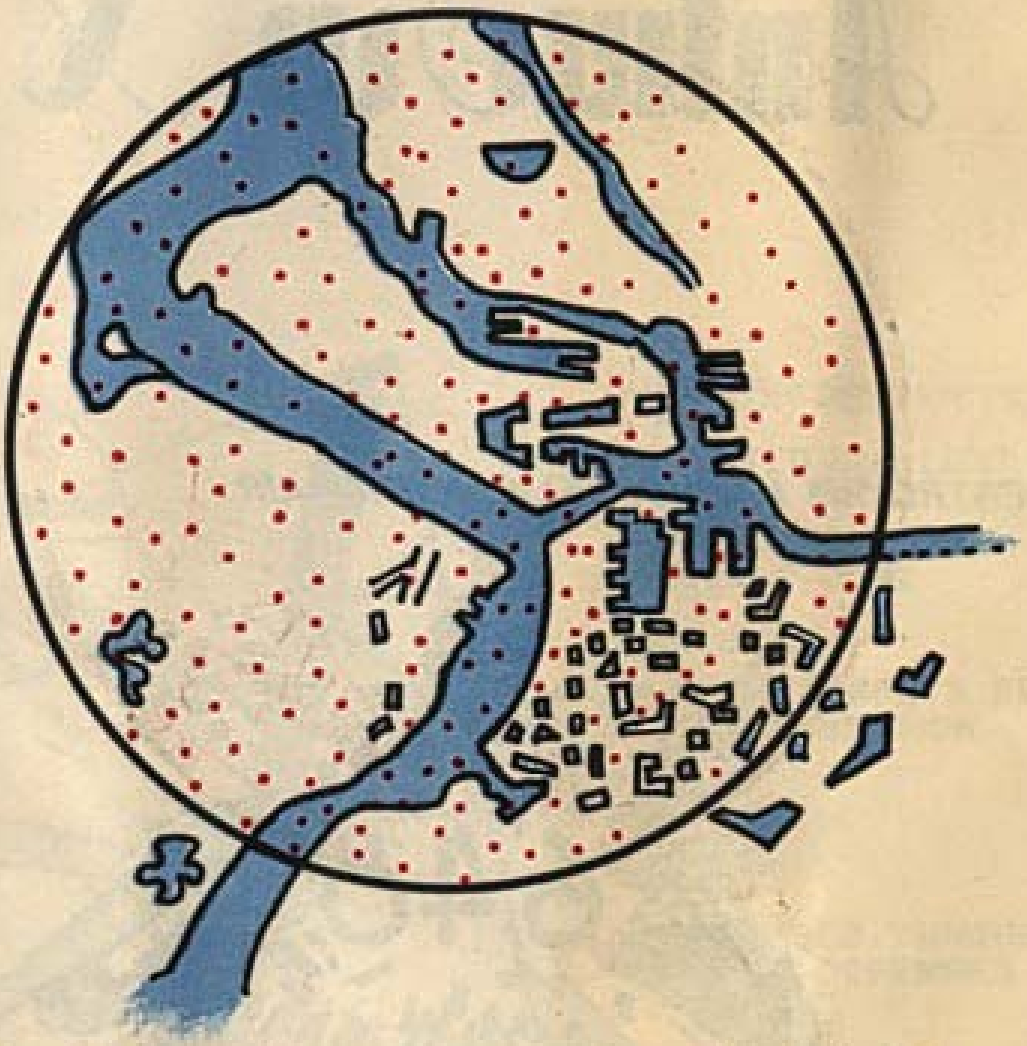
Eight times as hard to kill as a Plane!

The 211 ?

2183 FLYING BOMBS DESTROYED BY

Antwerp X

The 8 mile bulls



211 HIT THE TARGET

Here is the best test of the defenses. Of the 4883 bombs detected, 211 fell in the vital area. A similar tonnage of explosives has been dropped on Berlin in three minutes. Port authorities reported that never was a single day of work lost during the five months. And over 3,000,000 tons of supplies came in during the 154 days and nights of attack.

— eye that counts

2394 COULD HAVE HIT!

Add to the 211 that hit, the 2183 Antwerp X stopped with a wall of steel. Here is what the bullseye would have looked like. Knowing what did happen, think of what would have happened had there been no defenses. There'd have been no port, no Antwerp... and the victories in Germany would have been delayed if we could have gained them at all. This then, is the victory of Antwerp X.

Ground

Defense Plan

GROUND DEFENSE PLAN

During the battle of the Bulge when von Rundstedt was pushing back the Western Allies, the US antiaircraft defenses of Antwerp offered ground support to Headquarters Port Area Nº 3 in event of a break-through by the Germans. It was generally believed that one of the prime aims of the German counteroffensive was to isolate and then destroy the port of Antwerp.

The Commanding General, 50 AAA Brigade, heading the American AA defenses of Antwerp, formulated a plan by which his AA troops could be utilized as Field Artillery and Infantry in emergency and for a short time, as well as continuing their job as Antiaircraftsmen.

The purpose of this far-sighted and most ambitious plan was to delay, harass or deny enemy troop movement by gun fire in the area occupied by AA troops and further, to meet the enemy as infantry using artillerymen, where they could be spared, cooks, bakers, clerks and other non-killers twenty-four hours a day to maintain a holding action until relief in the form of a British or American mobile reserve could be committed from elsewhere along the front.

In order to accomplish a ground defense of the approaches to Antwerp, a document known as the "Ground Defense Plan, Antwerp X Command" was drawn up by the staff of the 50 AAA Brigade Hq. It included down to the last detail, the manner in which the defense would be carried out, at the same time permitting continuous operation of the Command against its primary target, the Pilotless Aircraft, without interruption.

At once two main divisions of the General Plan were apparent — the first, Plan A, was a method of bringing fire to bear from antiaircraft tactical positions on road junctions, crossroads, bridges, defiles and various critical points. The second division — Plan B — called for the organization of task forces capable of meeting any threats by formations of enemy troops against the vital installations of the area. The same troops could not be used in both Plan A and Plan B because it was most likely that both plans would have to be used simultaneously under the title of Plan AB.

In general, Plan A necessitated no change in the normal control or organization. No movement of 90 mm or 40 mm guns was contemplated, as fire was to be brought to bear from the normal tactical disposition. However, Plan B obviously called for the reorganization of the AA personnel into infantry formations. A provisional regiment was set up consisting of as many combat teams as there were AAA Groups in the Command. Each combat team consisted of as many infantry companies as there were AAA Gun Battalions in the Group, plus a heavy weapons company per combat team drawn from AW Battalions, and finally, each AAA Gun Battery formed a platoon of 35 men, as shown in Chart N°2. The chart typically depicts the regimental organization, whose strength varied with the strength of Antwerp X Command.

The regiment's foreknowledge of enemy attack — its intelligence sources — was drawn from the antiaircraft early warning system, plus GHQ AA Tps of 21 Army Group and the British 7 Base Sub Area in Antwerp. Information from the American Port Area N° 3's G-2 Section was also available. These sources, as well as the Command's complicated system of interlocking AAOR's, AAAIS and mobile, visual OP's, organized for the purpose, assured immediate and continuous information of enemy activity anywhere within the area to be defended — that was — the area from Antwerp north and east along the Albert Canal to Herenthals, south to Aerschot, west through Keerbergen, Malines and back to Antwerp.

Intelligence as well as commands were to be communicated through normal early warning channels under the aegis of the 150 AAA Operations Detachment, supplemented, where possible, by wire to the provisional combat teams and radio where wire was impractical or impossible due to the fluidity of the situation.

Inasmuch as the action to be taken by the infantry part of the Ground Defense Plan was to be of short duration, necessary supplies were to be carried by the personnel and transport taking the field. Emergency rations, POL, and ammunition for three days were available for instant use. Re-supply would come through normal channels if necessary. Exactly what each man would wear and carry on his person, as well as the exact amount to be loaded on the trucks, was stated and passed on to all concerned.

Frequent drills were held to insure the practicability of the plan and to perfect the training of the artillerymen turned doughboys in their new duties. Practice alerts were given, inspectors went out to insure the proper execution of the plan,

and determine that the men involved had the necessary equipment and knew their jobs. The first job was Plan A.

PLAN A

In order to control the fire of the 90 mm guns in their ground role of interdiction fire, the 150 AAA Operations Room was set up to function as a fire control center. Battalions had their choice of operating fire direction centers or having their batteries prepare gridded fire control maps and precalculate firing data to critical points within range of their guns.

Each battalion would receive its firing mission from the 150 AAA Operations Room through normal early warning channels. So that firing could be "seen", each battalion organized a mobile spotting team equipped with a two-way radio to insure the battalion fire direction center knew how accurate was the fire.

A list of points to be brought under bombardment was given the battery, enabling the computation of data for all such points within range of the guns. However, only one primary target was assigned per battalion in order to bring the greatest amount of fire power to bear on the most important places. See Chart N°3

Upon reception of the alert, "registration" and "zero height of burst" fire problems were to be initiated, using the mobile spotting teams for sensings. Meteorological conditions for computation in these problems were to be sent to battalions through the AAA Operations Room from the Antwerp X Meteorological Section.

Further, Plan A called for each battalion to set up and defend a road block at a given point (See chart N°3) utilizing sufficient bazookas, molotov cocktails, machine guns and small arms to do the job. Road block detachments were to be composed of squads generally organized as typical infantry squads. Battalion commanders fixed the number of squads in their detachments according to the number of men and weapons needed to adequately defend the obstacle.

Plans for the demolition of bridges, et al., were prepared from a list of critical points selected by Headquarters Antwerp X, but, only Headquarters Antwerp X could authorize actual demolition.

The next and more difficult job to be undertaken was Plan B—a straight infantry role for the artillerymen.

PLAN B

The provisional regimental Hq personnel headed by Colonel Harold P. Hennessy, Chief of Staff, Antwerp X Command, were drawn from the 50 AAA Brigade, combat team Hq personnel from the three Groups, and the command posts set up at Brigade and Group Headquarters. Neither the personnel nor installations of Hq 56 AAA Brigade were committed to any specific job, so that there was this complete establishment held in reserve for use as necessary in any emergency.

Each combat team, organized under a provisional Table of Organization and Equipment, was to be assigned one of several rendezvous points previously reconnoitered by the combat team commander, depending on the direction and type of enemy attack. The companies of the combat teams were organized and equipped as shown in Chart N°1.

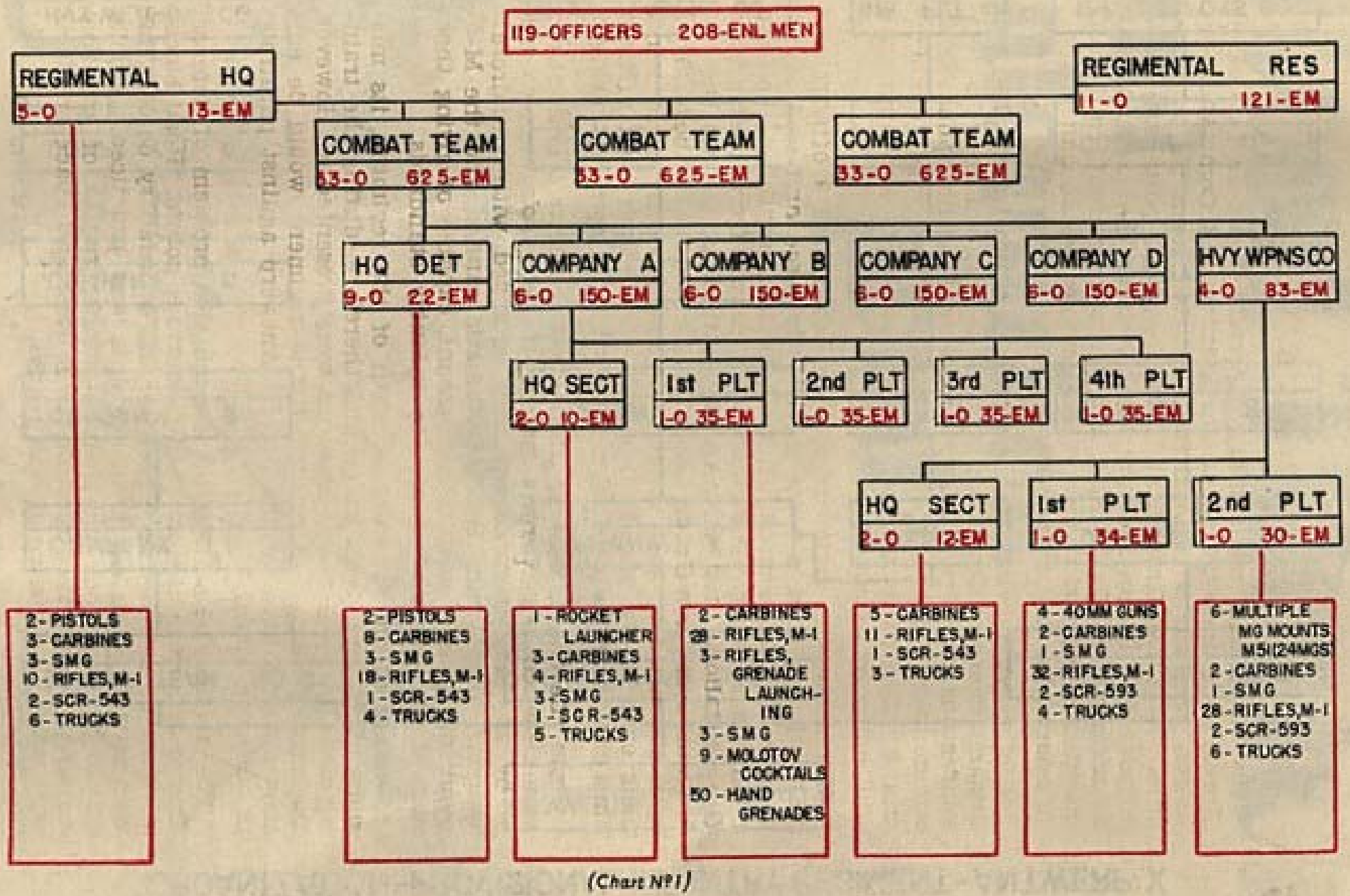
Ultimately, the regiment was composed of 119 officers and 2081 enlisted men, a force sufficiently large and well armed to give a good account of itself against anything the Hun could throw at it. Personnel were drawn from twelve AAA Gun Battalions and two AAA AW Battalions, besides the two Brigades and three Group headquarters mentioned above. They were organized in such a manner that privates served under their own NCO's and both served under their own officers, thus obviating the confusion inherent in a new organization.

From the chart, it is apparent that the lettered companies were designed to perform a straight infantry role, supplemented by a heavy weapons company equipped with antiaircraft weapons, the 40 mm Bofors automatic cannon and the M-51 quadruple 50 cal. machine gun mount, capable of giving them more than adequate support by infantry standards.

Because of the inherent strength of the regiment, its missions might have been legion and therefore, during the training drills many different problems were presented it. However, the most probable one in which the regiment would be employed was defense of the port of Antwerp against paratroop or airborne attack.

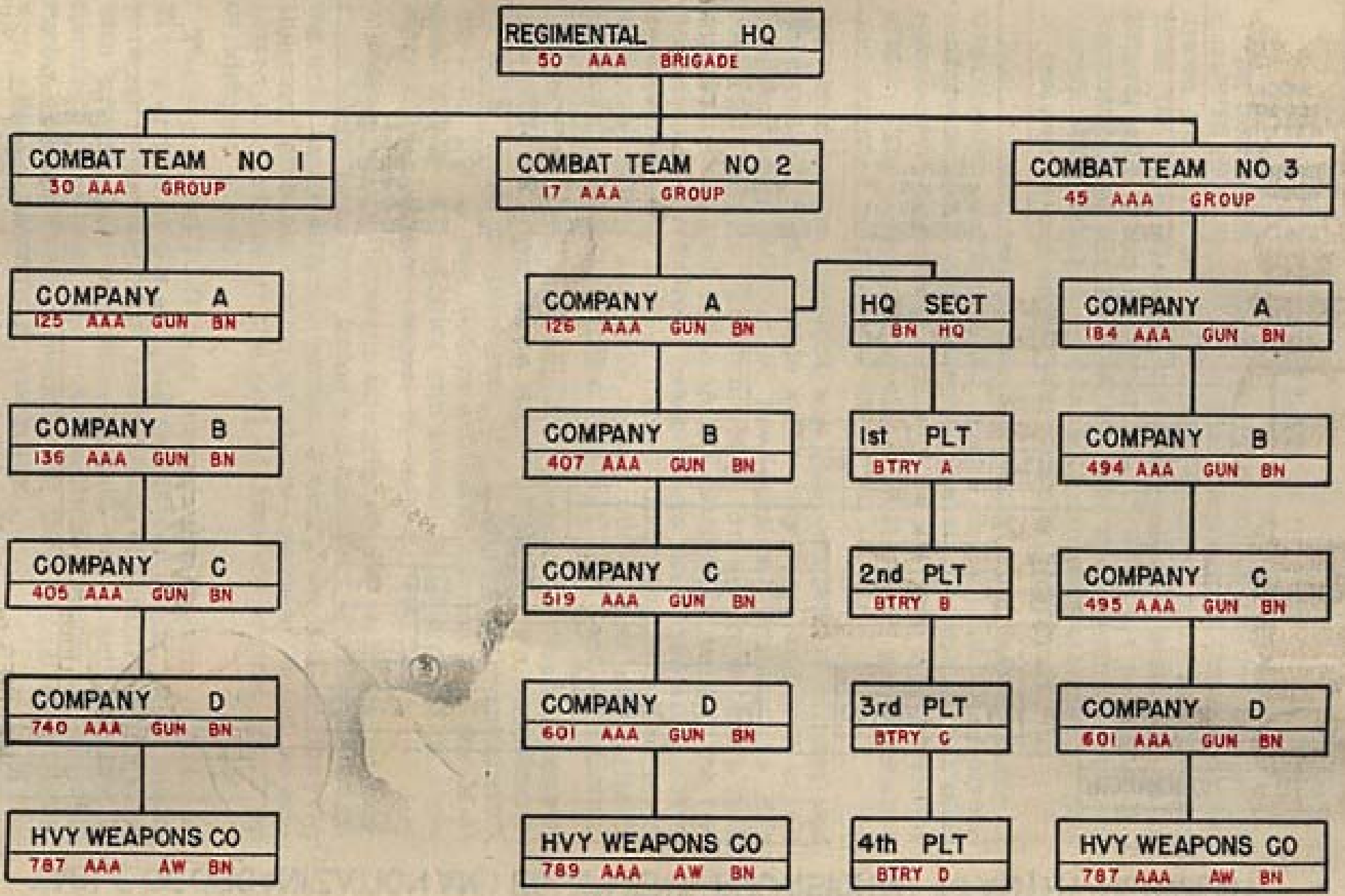
The regimental staff went through this problem of defense. Troops arrived at the assigned rendezvous points. Road blocks were set up as scheduled; coordination of infantry deployment with artillery fire on critical points was practiced. Mobile spotting teams took up their positions; routes of probable enemy approach were reconnoitered; time and space problems were solved — Antwerp X was ready.

TABLE OF ORGANIZATION AND EQUIPMENT-PROVISIONAL INFANTRY REGIMENT



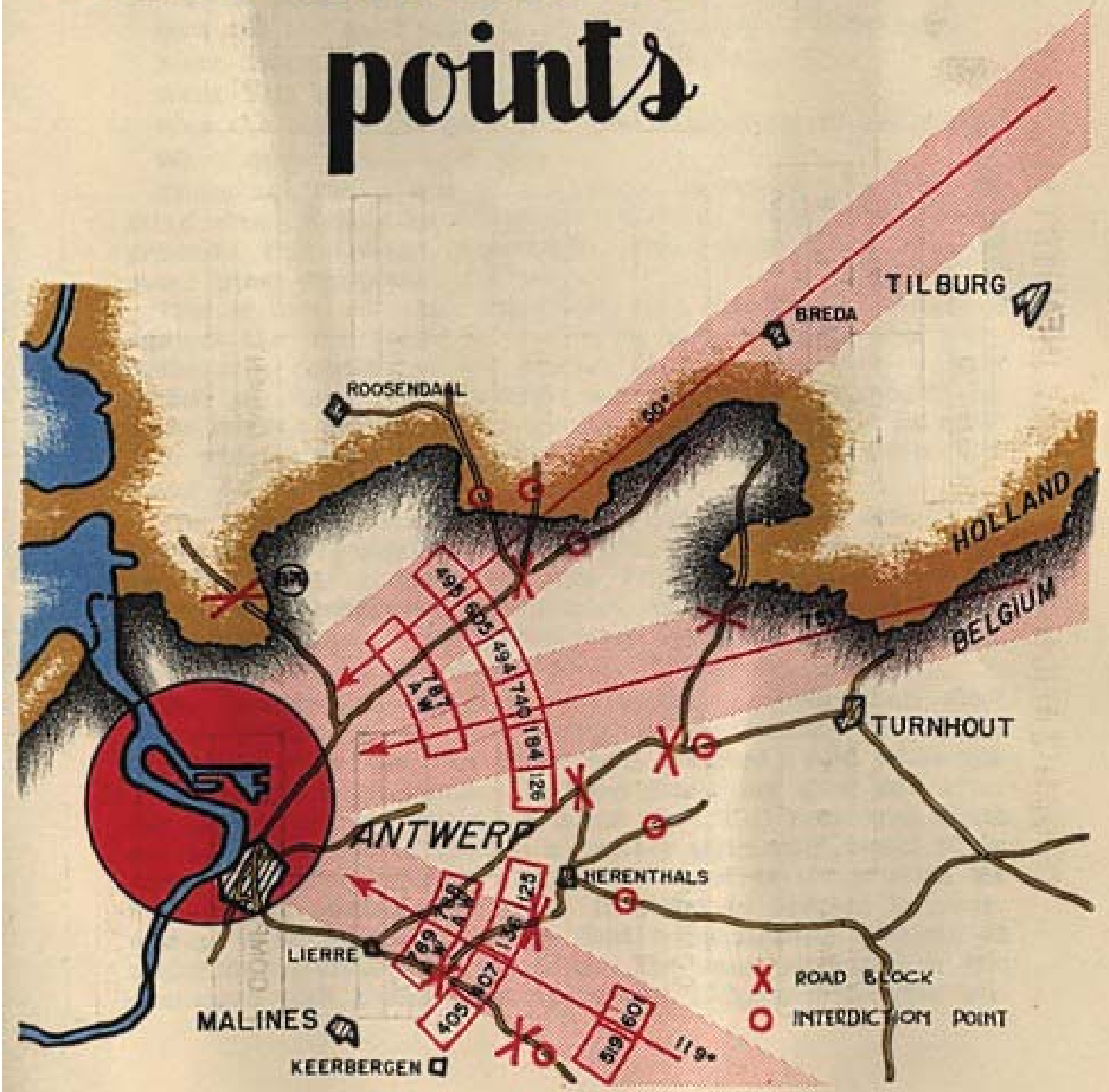
(Chart Nº1)

ORGANIZATION-PROVISIONAL INFANTRY REGIMENT-ANTWERP X



(Chart Nº2)

Road Blocks and Interdiction points



(Chart Nº 3)

THE BATTLE OF MATERIEL

The defenders of Antwerp against the flying bomb were ready to face an attack twenty-four hours a day for over 154 days.

In that statement is implied problems of materiel maintenance and tests of materiel stamina never before faced by American antiaircraft equipment and personnel.

How did the guns and fire control equipment stand up ?

Were maintenance problems overwhelming ?

Were T/O personnel adequate ?

Was the equipment able to function properly at all times ?

What broke down and why ?

Those are but a few of the many questions that come to mind which should be answered from this battle field proving ground... this deadly "Aberdeen" where men's lives were at stake when equipment failed.

The nature of this operation, the defense of Antwerp against the V-1, made it possible to keep accurate and comprehensive records of all phases of operation over a long period of time. The results and tendencies evidenced by these records are condensed in the following pages to generalities which should be of interest to every member of the far-flung AA Command.

The most effective and therefore, the most used weapon in these defenses, was the 90 mm gun. 90 mm operation may be divided for convenience into five broad and sometimes overlapping categories ; personnel, guns, fire control and related equipment, communications equipment, and tactics. Each category will be discussed in that order.

The twenty-four hours a day, 7 days a week, high alert status demanded in the flying bomb defense, proved an extremely severe test for those men involved. And while the T/O personnel did manage to keep going day after day after day, it was proved beyond a doubt that T/O personnel alone are not sufficient to operate a battery efficiently under these conditions. For example, T/O's 44-17 and 44-117 provide six men as fire control operators. In order to operate 24 hours a day, it becomes mandatory that a substantial number of additional operators be provided. The same situation is encountered with power plant operators; T/O's provide only two

which proved insufficient. Generally, T/O's do not provide for full scale manning of equipment throughout the 24 hours of the day. They do not allow for such necessary items as establishment of local security or the manning of battery plotting boards now needed in all AA units. These extra-curricular activities were accomplished only through the most economical use of man-power and skillful scheduling of duty which, at best, required that each men be at his assigned position 12 hours a day. In many cases, longer tours were necessary when no substitute for a particular man was available. Briefly then, T/O's 44-17 and 44-117 are inadequate for 24 hour sustained operation.

The general opinion throughout using personnel in the defense of Antwerp was that the 90 mm gun is unquestionably a superior piece of equipment. The recoil mechanism, recoil throttling valve, equilibrator, and tubes have stood the strain beyond that believed possible. Except for a few malfunctions, the maintenance and repair of the 90 mm gun consisted of simple, routine and minor items that are to be expected with any piece of mechanical equipment.

Many batteries shot through three and four sets of gun tubes and it was found that the life expectancy of these tubes was between 1500 and 2000 rounds. Tubes were used with as high as 2500 rounds, however, with this amount of wear MV was usually erratic and lands tended to peel. Several instances showed that after three changes of tubes, it was necessary to change worn gun slides or the gun would whip in elevation. The recoil system proved more than satisfactory and is one of the best features of the gun. However, a Fuze Setter, M-13, was a constant source of worry and error. A detailed study of this piece of equipment has been recommended, with a view towards improving or replacing it. The present cartridge rammer did not prove to be a very efficient mechanism and was disconnected and rounds rammed by hand. Many minor modifications could be made on the 90 mm gun to improve ease of operation, but fundamentally, and generally, it remains the most efficient comparable piece of equipment in the world to-day.

Fire control equipment used with the 90 mm gun also proved itself of a superior nature as the record testifies. Many field modifications were made during the five months of continuous operation, but, as with the gun itself, fire control equipment was basically sound. One of the greatest problems was maintenance, as the equipment was operated 22 hours a day, leaving only two hours for accomplishing all of the many checks needed. However, with practice, the

maintenance men learned to make this two hour period adequate. To better utilize the fire control equipment and to give more time for this maintenance, experiments were conducted with an "8 gun battery"; that is, eight guns using one set of fire control equipment with one set being serviced while standing by. This method also cut down on the required personnel. However, adjustment of fire on fast V-1's being impossible it was felt that the saving in personnel and providing a longer maintenance time did not justify halving the chance of making a kill by depending on but one set of fire control equipment. The equipment stood the strain better than anyone had dared hope for and breakdowns were rare. Data was accurate and, as much as any one thing, this equipment made the defeat of the buzz-bomb possible. Detailed reports on operation of this equipment are available.

The installation and maintenance of communications in the Antwerp defense was a gigantic undertaking made possible by the efforts of all communication men and officers. Early Warning and administration lines comprised a network of over 6000 miles of line. And parallel with every wire line was a radio link. The early warning system, whereby gun sites had as high as 8 and 9 minutes warning of an approaching buzz-bomb, was the greatest problem of communications. In many cases, these lines were commercial circuits... in fact, over 4000 miles of commercial circuits were used... but much of this system had to be laid by army personnel. Where army cable was used, "spiral four" proved the most reliable over a long period of time. W-110-B, loaded and on poles, produced a good talking circuit only up to about 15 miles. Repeaters and amplifiers, non-T/E equipment, were constantly needed and it has been recommended that these be added to the T/E of all brigades and groups. Generally speaking, the communications sections provided by the T/O's were the most undermanned sections and had to be augmented more than double their original strength. In fact, only through augmenting of personnel, procuring of non-T/E equipment, extensive use of commercial circuits and constant work by all involved, was it possible to maintain communications at the necessary peak of efficiency.

The tactics of meeting the threat of the V-1's was an unusual and completely new application and disposition of AA units. The form of these tactics constantly improved during the campaign. The overall plan of defense was to place belts of gun batteries astride the alleys of approach. These belts varied from 10,000 to 12,000 yards apart, with the inner belt approximately 10,000 yards from the outer edge of the vital

area. Three belts per alley were used in the Antwerp defense. Effectiveness was increased with the addition of each belt which established the "defense in depth." The "belt" disposition was used for many reasons... a few being successive engagement of targets, elimination of flak clutter in fire control equipment, and better engagement of multiple attacks. The final proof of this method of defense is in the record of "kills" which reached unparalleled heights.

Because of the small number of Automatic Weapons battalions used in the defense of Antwerp, experience with this weapon has been limited. However, in general, the performance of AW was satisfactory. But due to the comparative ineffectiveness of both the 40 mm and M-51 against the V-1, the opportunity of a conclusive field test was not given.

Complete and comprehensive record of all phases of operation of the defense of Antwerp against the V-1's is available to anyone interested and brings to light many sidelights not possible to mention here. However, an expression of commendation and admiration is given to the many and unnamed heroes responsible for conceiving the equipment used in this defense... the scientists, the inventors, the laboratory technicians, the manufacturing men and many others, who did their work truly and well, and without whose efforts, the successful defense of the port of Antwerp would not have been possible.

A TOAST TO OUR DELIGHTFUL HOSTS, CAPTAIN AND MADAME PEERE, WHO HAVE BEEN SO THOUGTFUL AND KIND TO THE ENTIRE STAFF OF HEADQUARTERS **ANTWERP X**, SINCE OUR ARRIVAL 10 NOVEMBER 1944.

THE "**GRAND VENEUR**" HAS BEEN OF INESTIMABLE AID IN FACILITATING THE DEFENCE OF ANTWERP AGAINST THE * **V-1** *

THE RECORD SPEAKS FOR MY MEN, GUNS AND LIGHTS OF ITS DEFENCE.

I EXPRESS THE FEELINGS OF ALL WHEN I SAY TO YOU MANY, MANY THANKS AND MAY ALL NICE THINGS BE YOURS IN THE FUTURE.

Clare H. Armstrong

CLARE-H. ARMSTRONG
BRIG. GEN. U.S.A

Captain Julien Peare
by his hospitality & consideration
has helped us to achieve
our end. for all thank him.

MAJ. GENERAL REVELL SMITH
COMMANDING H.Q. G.H.Q. A.A. TPS.

L Revell Smith
Maj. Gen.

March 17th 1945.

BRIG. GENERAL LOCKHART (R.A.)
2 IN C H.Q. G.H.Q. A.A. TPS.

Lt Lockhart
Brigadier

BRIG. GENERAL H. W. DEACON CBE DFC
COMMANDING 80 A.A. BRIGADE (R.A.)

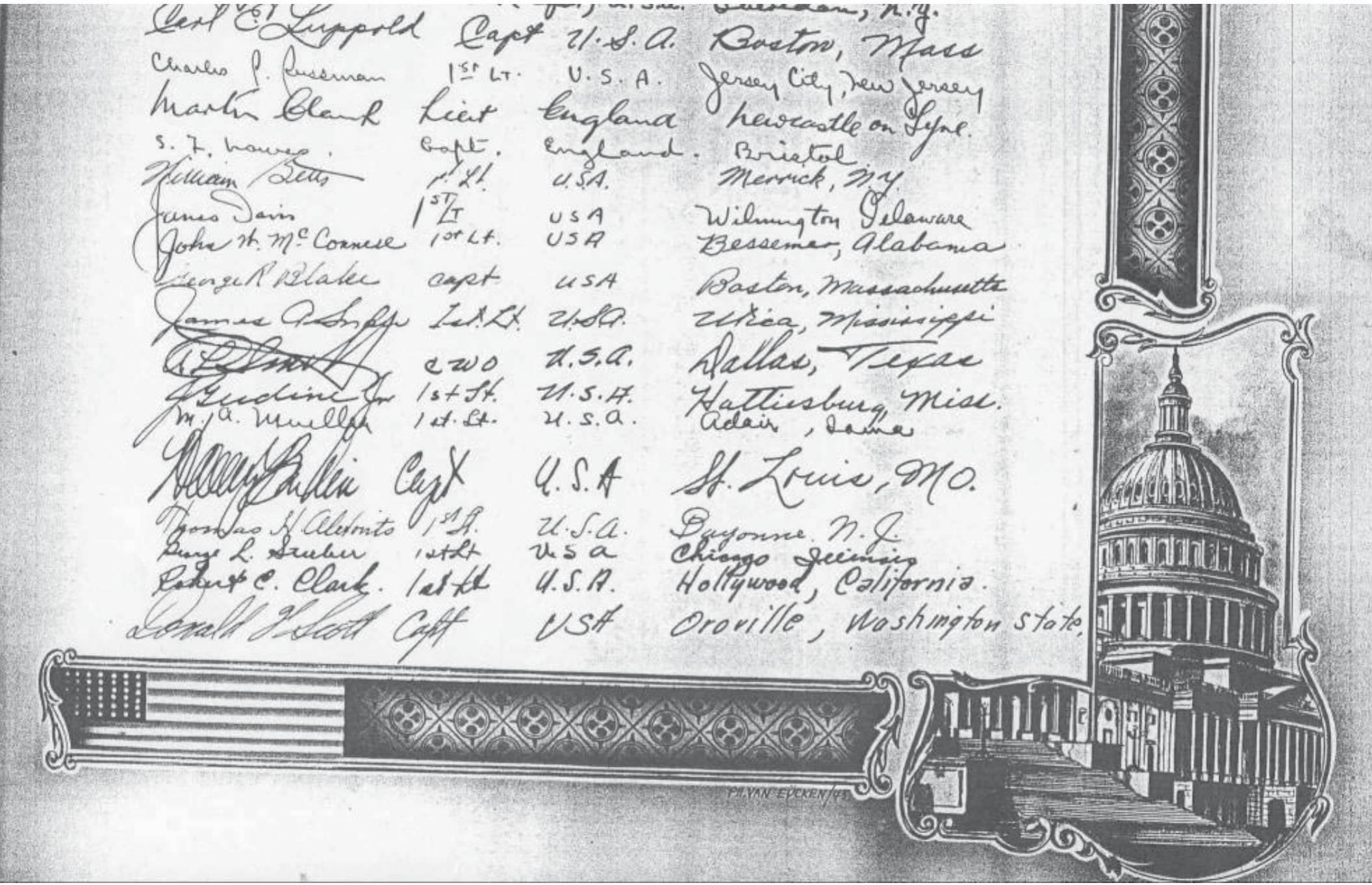
H.W. Deacon Brigadier

BRIG. GENERAL GEORGE M. BADGER
COMMANDING 56th A.A.A. BRIGADE

Geo M. Badger,
Brig. Gen. U.S.A.

COLONEL HAROLD. P. HENNESSY
EXECUTIVE OFFICER 50th A.A.A. BRIG.

H P Hennessy
Col. C.A. U.S.A.


Capt U.S.A. Boston, Mass
1st LT. U.S.A. Jersey City, New Jersey
Lieut England Newcastle on Tyne.
Capt. England. Bristol
U.S.A. Merrick, N.Y.
1ST LT USA Wilmington Delaware
1st Lt. USA Bessemer, Alabama
capt USA Boston, Massachusetts
Lt. Lt. U.S.A. Utica, Mississippi
CWO U.S.A. Dallas, Texas
1st Lt. U.S.A. Hattiesburg, Miss.
1st. Lt. U.S.A. Adair, Iowa
Capt U.S.A St. Louis, MO.
1st Lt. U.S.A. Bayonne N.J.
1st Lt U.S.A Chicago Illinois
1st Lt U.S.A. Hollywood, California.
Capt USA Oroville, Washington State.
PI. VAN EYCKEN