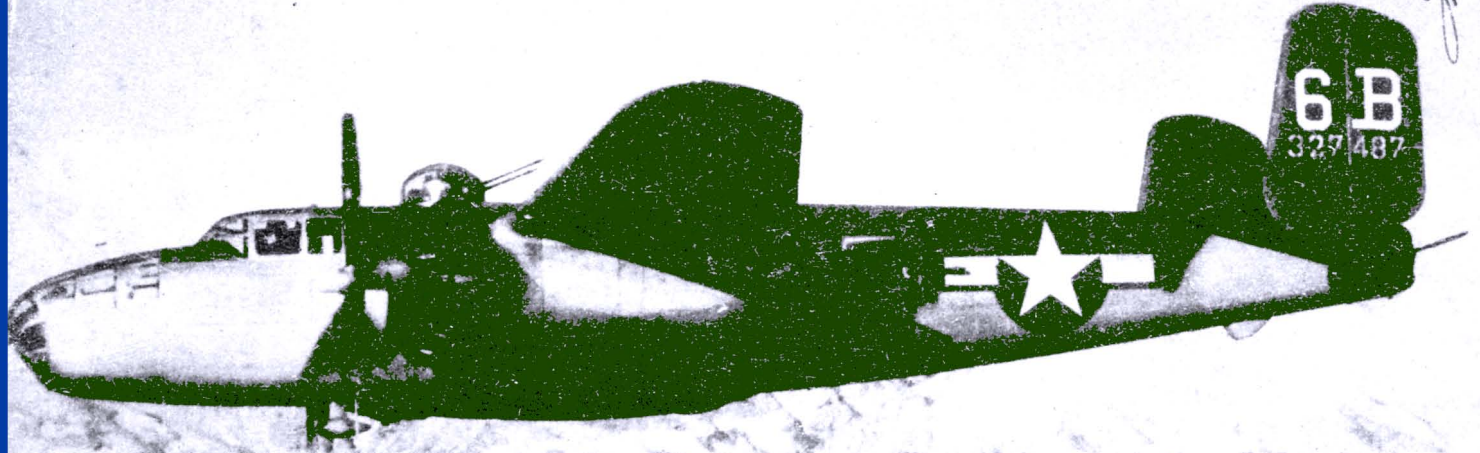


Battle of the Brenner

*HK for
Carriage to US
Classified
may be
of P-2*



Confidential



Date	Group	Target	Tons Bombs	Sorties Dropped	Flak Losses	Remarks
April 1945 - Cont'd						
19	360	Ora-Main RR Br	21	38.30	N/A	Destroyed
20	321	San Michele-RR Div Br	18	36.00		Blocked
20	321	Salerno-6 RR Mill	18	36.00	175	Blocked
20	321	Salerno-Sta RR Br	15	30.00		Blocked
20	360	Volturno-RI Mill	18	35.00	175	Blocked
20	360	San Ambrogio	12	18.00	N/A	1 2 Unknown
20	310	San Ambrogio-RR Mill	18	36.00	R 5	Blocked
21	310	Stalmech-W RR Br	18			Unknown
21	360	Matred-W RR Br	18	36.00		Blocked
21	310	Salerno-RR Sub	18			Unknown
21	310	Dolce-RR Mill	18	36.00		Blocked
21	310	Stas di Cassino-RR Mill	18	36.00		Blocked
21	321	Volturno-RR Mill	17	34.00		Blocked
21	321	San Ambrogio-RR Br	18	36.50		Blocked
24	310	Orsenigo-RR Mill	18	36.00		Blocked
24	310	Pari-RR Mill	18	36.50		Blocked
24	321	Ala-St Br	24	38.85		Destroyed
24	321	Va Sialestro-RR Br	21	37.80	175	Blocked

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P R E F A C E

In the six-month period preceding the cessation of hostilities on 2 May 1945, the Air Forces carried out a powerful attack on the enemy's lines of communication. This co-ordinated attack centered on the Verona-Innsbruck or Brenner pass rail line and was carried out by 57 Bomb Wing and 22 Tactical Air Command of the 12 Air Force and the 15 Air Force. This is the history of the part played by medium bombardment aircraft, B-25s of the 57 Bomb Wing, in the Battle of the Brenner.

The information contained in this report is for the most part based on Intelligence information dating from prior to the German collapse in Italy. In many cases later information derived from German documents and interrogation may add to or amend the material available at the time this report was written.

57 BOMBARDMENT WING (M)
-TWELFTH AIR FORCE-



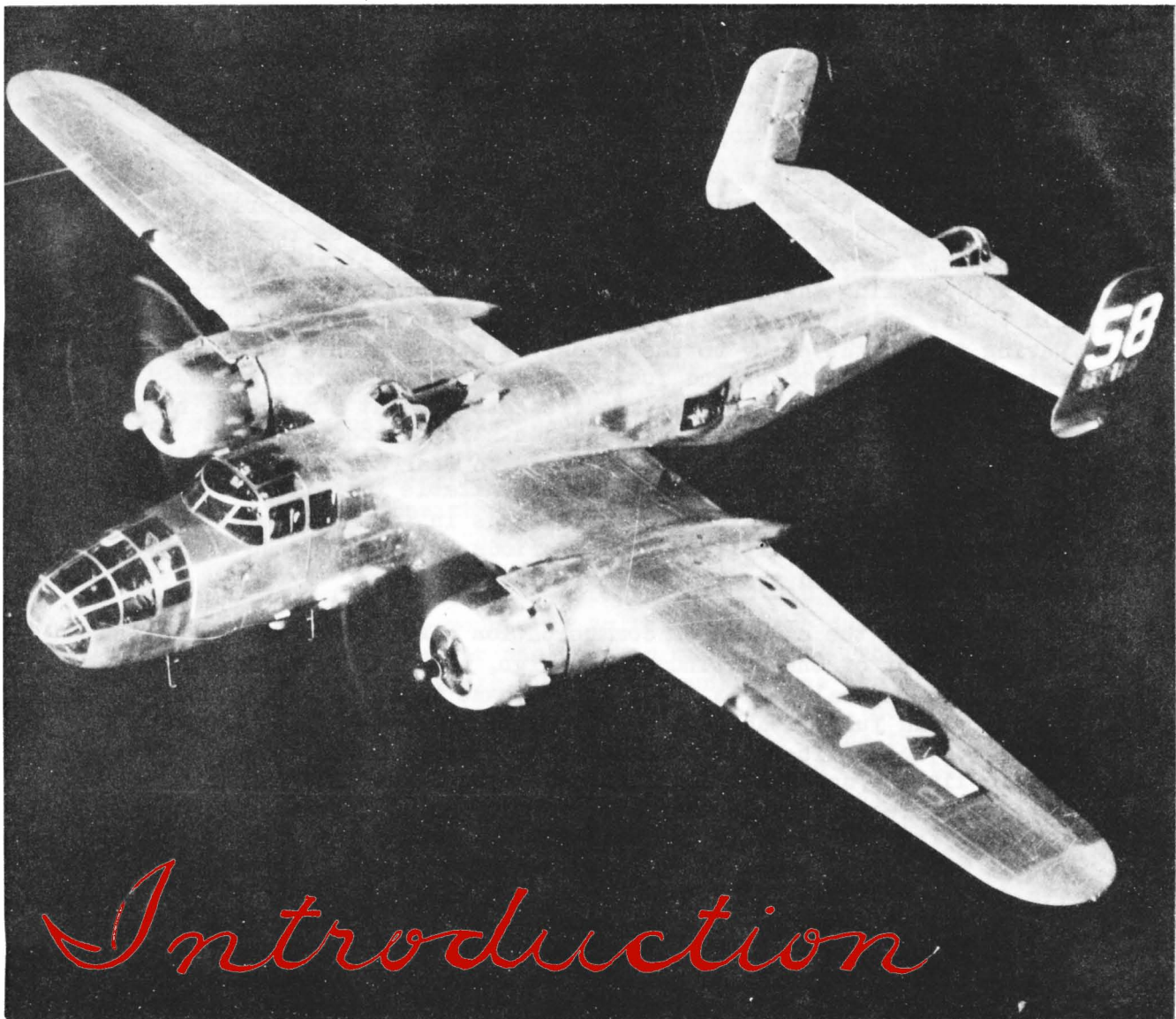


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THE GROUND AND AIR BACKGROUND TO THE
BATTLE OF THE BRENNER

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From early spring of 1944 until the capitulation of the German armies in Italy, and southern Austria, the Mediterranean Allied Tactical Air Force engaged in a continuous campaign against enemy lines of communication. The establishment of air supremacy, the first principle of tactical air doctrine, had been accomplished prior to this time; however fighter bombers and fighters of MATAF struck regularly at any German airfields which showed activity and swept the sky to prevent interference with our own air operations. Thus the overwhelming share of the tactical air effort remained available for the application of the second and third tactical air principles; namely, isolation of the battlefield and the close support of the ground forces. The largest part of the medium bombardment effort was assigned to the task of isolating the battlefield. To batter, weaken and disorganize the enemy

so that he would be unable to resist effectively the attack of the Allied ground forces was the long range policy of this grinding air war.

Because of the enemy's critical shortages of motor transport and fuel, it was well known that he hoped to transport supplies as far forward as possible by rail. Attacks on rail communications contributed largely to the isolation of the battlefield by choking the enemy's main artery of supply and forcing him to use valuable motor transport for moving supplies and troops. Having forced the enemy to the roads, we struck at his convoys, motor parks and depots, and fuel stores. As long as the ground front remained static and his requirements were at a minimum, he was capable of supplying himself adequately. A considerable amount of transport had to be committed to rear communications, but at the same time there was sufficient available to fulfill his requirements for supply and communications in forward areas. With his requirements multiplied during periods of heavy ground fighting, his supply and transport proved insufficient.

Though the attacks on communication since February, 1944, were all part of one continuous campaign, they may be divided into three general phases. The first phase took place between February and July, 1944, and was in support of the Allied ground offensive which liberated Rome and then carried north to the Gothic line. The area of rail interdiction first extended from Rome to Florence, but as the Allied armies moved forward, it was extended farther north to the main Rimini-Bologna-Piacenza railroad. The second phase began in July and continued into October. Its sphere of operation extended over the length and breadth of the Po valley in support of the attempts by the ground forces to break through the Apennines into the Po valley during the late summer of 1944. The third phase of this campaign, in preparation for the final offensive in the spring of 1945, began in the fall of 1944 and continued until the cessation of hostilities in Italy on 2 May, 1945. During the third phase the first priority area of interdiction was limited to northeast Italy, extending from Verona-padua-venice area north and east to the Italian frontier.

The air operation "Strangle", leading up to the Rome breakthrough, represented the first phase in the long Italian air war against communications. In this operation our attacks on rail communications multiplied the demands for motor transport in rear areas and resulted in an almost complete collapse of front line mobility and distribution. This phase was extremely successful and comparatively easy to carry out because between Rome and Florence there were only two major rail lines and a half dozen alternate lines to be cut in order to interdict rail traffic completely. In addition, at almost all bridge targets, valleys were steep-sided and rivers were deep, making repairs difficult and the construction of diversions nearly impossible. Lastly, considerable reductions had been made in equipment and personnel devoted to the

maintenance of rail lines.

After the Rome break-through in May-June, 1944, the Allied armies in Italy sped on to the north in pursuit of the weakened German formations. However, because of his shortening supply lines and our rapidly extending supply lines and our need for regrouping, the German commander could afford to give ground, which finally permitted him virtually to break contact. During mid-summer, when our ground forces again moved forward, they found the Germans reorganized and holding a series of good screening positions from south of Florence in the west to near Ancona in the east. Though opposition was sharp, our ground forces were able to push on forward to Florence and to drive to the Metauro river just south of Fano in August. These delaying battles by the Germans were designed to protect the approaches to their Gothic line and to permit the proper completion and manning of its prepared positions. The Gothic line consisted of elaborately prepared fortifications and took advantage of the spine of the Apennine mountains.

The decision to break through the Gothic line and to attempt to break through the mountains to the Po plains during the remaining months of summer weather was made in mid-August. The second phase of the air forces' battle against communications was in support of the Fifth and Eighth Armies' efforts to accomplish these objectives. The Eighth Army on the east flank was to drive along the narrow Adriatic coastal area, through the mountains and on to the west to reach Rimini and the plains. The operation was designed as a major blow, but simultaneously Fifth Army units were to clear the plains and foothills north of Florence. Then, if the Germans should draw off enough troops in trying to stop the British drive, the Fifth Army was to drive straight through the mountains to Bologna and the plains. The Germans controlled a force superior in number of divisions, but substantially equal in number of troops. Our advantages, pitted against the Germans' superior defensive positions, were air, artillery and armored superiority. The Eighth Army attack along the Adriatic coast struck off on 26 August, when British, Canadian, Polish and Indian units crossed the Metauro river south of Fano. The strength of the drive surprised the Germans and our forces drove 15 miles against moderate but stiffening resistance. On 30 August, Polish troops entered Pesaro, but the town was not cleared for another week in some of the hardest fighting since Cassino. These operations, combined with advances further inland, had broken through a 20-mile stretch of the Gothic line from the Adriatic inland. Bitter fighting continued along the Adriatic coast as additional infantry and armor were brought in by the Germans. Our troops inched forward to take Riccione, just five miles south of Rimini, on 11 September. German reserves were brought up in increasingly greater strength, but after three weeks of intense fighting in the hills south of the city, Rimini was taken 21 September.

Meanwhile, Fifth Army met only rearguard resistance in the west as Pisa fell on 2 September with Lucca, Pistoia and Prato following in

rapid succession. By mid-September Fifth Army troops had contacted outposts of the Gothic line at many points above Florence. Infantry divisions of II Corps with British troops on the right flank began all-out attacks up the Florence-Bologna, Prato-Bologna and Florence-Forli axes on 13 September. During a week of extremely bitter fighting, mountain positions east of Firenzuola and Futa pass were successively overcome. Before the Germans could recover from the initial assault our troops were 15 miles south of Bologna, 12 miles from Via Emilia, on 23 September, and another gap had been made in the Gothic line. The success of the Fifth Army offensive through seemingly impregnable defenses could be largely attributed to deception of the German commanders into the belief that the operation was merely a feint to draw troops from the Eighth Army sector.

About 26 September, Marshal Kesselring began to appreciate the full extent of Fifth Army's threat to Bologna from the south, and to re-dispose his divisions to stop the drive. The bunching of troops for the defense of Bologna built up rapidly after our initial surprise break-through of the Gothic line. At least 10 German divisions were concentrated in this area toward the end of October.

All along the II Corps and XIII Corps fronts gains were measured in hundreds of yards as mountain after mountain became the scene of bloody hand-to-hand fighting. By the second week in October heavy rains and chilling weather brought mud and discomfort comparable to the winter conditions of the previous winter before Cassino. However, our troops edged forward to a point 10 miles south of Bologna. This key city was visible from mountain top OPs on the few clear days, but the remaining mountain positions were by now heavily garrisoned by crack German troops with good, short supply lines to the rear. Our own supply line deteriorated rapidly. Trucks could only come to within 10 miles of many forward positions. Jeeps could struggle forward another five miles with precious ammunition, but often the last five miles had to be made by mule pack and human portage. A final effort to reach the plains between Bologna and Imola was made by Fifth Army in mid-October, but gains were small and costly. Supply and weather conditions prevented close coordination of ground and air operations. The attack began 15 October, but gains were hard won and held only against repeated counter-attacks. By 21 October we had taken the village of Frassineto, only five miles from the Via Emilia. On highway 65, directly south of Bologna, gains of two miles were made north of Livergnano, reaching a point nine miles south of Bologna, after a week of bitter fighting. The South African Armored Division captured heights around Vergato to the west, but this strong point was not to fall for many months.

Thus, by the end of October the Gothic line had been broken, and we had secured a foothold on the southeast edge of the Po plains, but had not broken out. Approximately 20,000 enemy troops had been killed or captured and our own casualties had been extremely high. The Germans were deployed in strength to meet any new thrust we could

SWITZERLAND

AUSTRIA

ITALY

INNSBRUCK

BOLZANO

TRENTO

BELLUNO

TRIESTE

MILAN

VERONA

VENICE

PADUA

TURIN

PAVIA

CREMONA

MANTUA

25 APR. 1945

ALESSANDRIA

PARMA

FERRARA

POLA

9 APRIL 1945

MODENA

BOLOGNA

1 NOV. 1944

GENOA

SPEZIA

PISTOIA

PISA

FLORENCE

FANO

26 AUGUST 1944

LEGEND

- ROADS
- RAILROADS
- RIVERS
- INTERNATIONAL BOUNDARIES
- BATTLE LINE 26 AUG 1944
- " " 1 NOV. 1944
- " " 9 APR. 1945
- " " 26 APR. 1945

make and, despite our air program, were adequately supplied. Worst of all, the rain, mud and cold of the Italian winter had engulfed the front to make the soldier's life miserable and very nearly to paralyze the movement of supplies and mechanized equipment to and at the fronts. It became apparent that the battle of the Apennines had reached a stalemate.

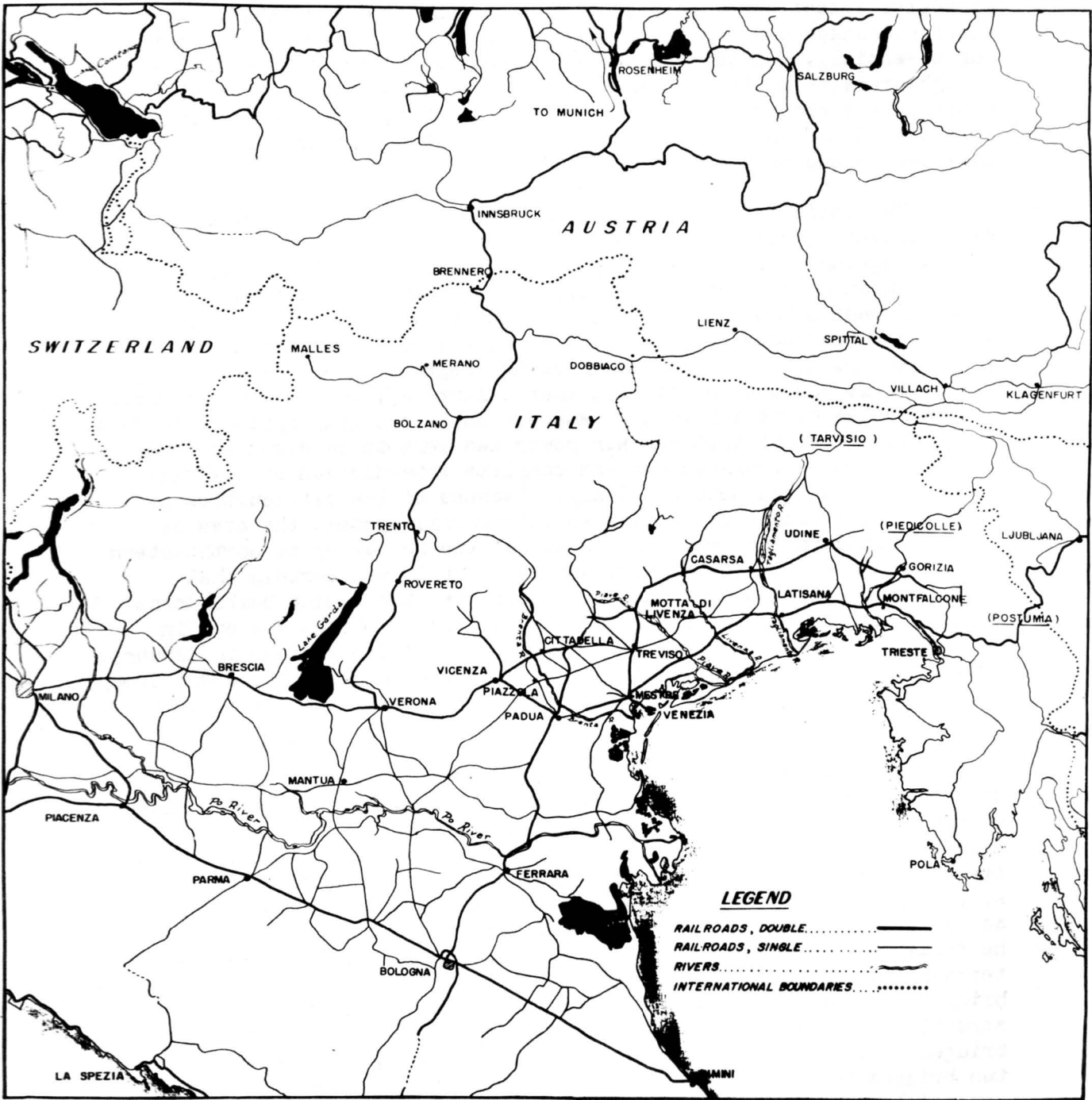
During these operations of the Fifth and Eight Armies the second phase of the air forces' battle against communications continued. The interdiction campaign was carried out in the Po valley where conditions were considerably altered from those encountered in operation "Strangle". In order to block traffic effectively, a dozen main lines and many more alternate lines had to be cut. Shallow, low-banked rivers permitted easier repair and facilitated the construction of diversions. More important, by the time our air attacks had extended to the Po, the enemy had built up a large, efficient and well-equipped repair organization which was capable of undertaking much more extensive repair and construction work than had been attempted previously. We achieved considerable success in cutting east-west traffic, primarily through the destruction of rail bridges crossing north-south Po tributaries. However, we had less success in blocking north-south lines which, with few exceptions, presented profitable targets only at the Po itself. (The outstanding success in this period was the operation "Mallory Major", carried out by 57 Bomb Wing and 42 Bomb Wing, in which 23 Po river bridges were destroyed or blocked in 72 hours.) Because of the difficulties facing our interdiction program and the fact that the ground forces were bogged down by winter weather, a rapid retreat was not forced upon the enemy. Supplies continued to reach the enemy in quantities at least equal to the minimum required to maintain a slow withdrawal. Rail lines were not so thoroughly immobilized that the limited available motor transport was unable to carry out both rear and forward distribution and maintain communications.

By 1 November a change in army policy was put into effect. Fifth Army attempts to break through the last fringe of mountains south of Bologna were abandoned. Exhausted, hard-hit troops simply could not break through the revitalized German defenses. Supplies of artillery ammunition, food and mechanized equipment could not be brought forward in sufficient quantities over the tortuous roads clogged with mud and ice. Eight Army was faced with terrain which was cut up into innumerable small segments by a fine network of rivers and canals. Fall and winter flood waters, aided by the enemy's artificial flooding, made these waterways into raging torrents and kept the normally dry fields in a swamp-like condition. Allied troops had fought two months of the bitterest action; units were tired and needed rest. Building of roads to the front, which could support our forces in offensive action, was necessary; forward dumps of materials of war had to be established. We were extended and faced determined resistance at least as strong as our offensive power.

Clearly, conditions required a considerable period of time for recuperation and regrouping of troops. Accordingly, large scale offensive intentions were abandoned until the spring of 1945. Army tactics changed over to an aggressive defensive, designed to conceal our essentially defensive intentions from the enemy, but to keep enough pressure on the Germans so that any weakness or withdrawal on their part could be exploited immediately. From 1 November until 9 April, 1945, not a single offensive action of more than local importance took place on the Italian front.

The shift in strategy by the Allied ground forces called for a readjustment in air plans. Therefore the third and decisive phase of the war against communications was inaugurated. Local operations would continue to require close support of fighter bombers and occasional medium bombers, particularly to aid in the deception of the enemy as to our defensive intentions. However, as our troops intended to use the lull in fighting for resting, regrouping and replenishing supplies, it was not anticipated that a large effort would be required of the medium bombers for close support until the 1945 spring offensive. The major effort of tactical air power was left to be directed toward destruction of communications and complete interdiction of all rail traffic to and from northern Italy. Because of the difficulties presented by the complexity of the Po valley rail system, the area of rail interdiction was moved north across the Po valley to northeastern Italy. Here was a similar rail network, but it was certain that winter would limit operations. In addition, the medium bombardment force which had been available during the summer months was cut in half by the departure of 42 Wing in November, and 319 Group in January. Units remaining for the interdiction program were 310 Bombardment Group, 321 Bombardment Group and 340 Bombardment Group, all of the 57 Bomb Wing.

Rail communications in this new area of interdiction may be divided geographically into three parts. The first of these consists of the three parallel lines running northeast across the Venetian plain. Most important and first in priority for repair was the double-track Vicenza-Casarsa-Udine rail line. South of this route is the single-track Piazzola-Treviso-Motta di Livenza line and still further south is the double track Padua-Mestre-Latisana-Monfalcone line. It was necessary to cut all of these lines to interdict traffic. The flat terrain, low river banks, shallow streams and short-span, low-silhouette bridges in this area were all factors which made repairs and construction of diversions comparatively easy. Seven of the ten major bridges were by-passed by diversion bridges making it necessary to cut two bridges to create one block in a given line. However there were several long bridges and only a few of these were protected by flak. After the initial interdiction of the Brenta, Livenza, Piave and Tagliamento river lines by medium bombers, occasional return attacks by mediums, and persistent postholing and bridge attacks by fighter bombers maintained a high state of interdiction throughout the winter and spring.



The second geographical part of rail communication is the northeastern frontier which includes three of the four frontier routes which were available to the enemy. In order of importance these routes were the Tarvisio, the Postumia and the Piedicolle. Attacks were extended to this zone, northeast of the Venetian plain, in December in an effort to cut the enemy rail lines at points where repairs and construction of diversions would be most difficult. Though terrain imposed moderate difficulties, there were several high, long-span bridges on each line. Because of this and outstanding bombing results, a very high level of interdiction was achieved and maintained. On 27 December, 1944, the 120-foot-high Borovnica rail viaduct on the Postumia route was attacked by bombers of 57 Bomb Wing and one span was destroyed. Although construction of a long, difficult diversion was begun shortly thereafter and work progressed steadily, it had not been completed when the line was over-run by Tito's forces in April, 1945. The Piedicolle route was blocked by B-25s with the destruction of a single span of the Canale d'Isonzo bridge, ten miles north of Gorizia, on 31 December. The bridge was passable for a few days late in January and early in February. This bridge, as well as the bridge at Dogna, five miles northeast, which was also out in February, remained impassable until the cessation of hostilities.

The third geographical part of the rail communications involved in the third phase of the air war was the Brenner pass line. Its northern terminus is at Innsbruck, Austria, and the line runs south through the Alps to Verona, ten miles east of the southern tip of Lake Garda. Three rail lines funneled supplies, equipment and troops from the north into Innsbruck for passage over the Brenner route into Italy. The most important of the three feeder routes was the double-track line from the northeast, running along the Inn river from Munich and Rosenheim. The second passed south through the mountains from Munich and the third ran east from Lake Constance. All three of these lines were fed in turn by the complex Austrian and south German rail systems. At Verona, the southern terminus of the route, rail lines fanned out east, west and south into the Po valley. The main lateral line ran west to Milan and Turin and east to Vicenza. Three single-track lines ran south to the Po and the battlefields beyond.

The electrified, double-track Brenner line was the most direct route from Germany into Italy and, even when operating at a fraction of normal capacity, it was capable of supplying fully the needs of the German armies in Italy. At the height of its traffic, 72 trains of German troops and supplies passed south over this route each day. Verona, by virtue of its position at the southern terminus of the Brenner line, became the center of the largest concentration of military installations and dumps in Italy. Some 30 factories, ammunition, fuel and general stores dumps, and motor transport depots, all fed by the Brenner line, were located there. Of the routes between Germany and Italy, the Brenner ranked first in importance for transporting troops and supplies into Italy. It ranked first in importance as well for any possible German withdrawal from Italy. It was the enemy's best escape route, the gateway to any possible Austrian redoubt and his best means of transporting troops to other fronts and stolen Italian machinery and food back to the Reich. The Brenner was the key to the enemy's communication system in Italy and its destruction was essential to the Allied armies in Italy.

THE BRENNER RAIL LINE





TARGETS TERRAIN AND WEATHER

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The greatest difficulty confronting B-25 medium bombers in the interdiction of the Brenner rail line was the lack of suitable targets. Guided by past experience it was known that to create lasting breaks in the line it would be necessary to destroy bridges. Long term cuts were essential during winter weather which cancelled operations for days at a time. Damage to marshalling facilities, tunnels, open track, fills and cuts could be repaired quickly and easily. But on the Brenner there were only eight bridges 200 feet or more in length. Bolzano, Ora, San Michele and Lavis were four bridges by-passed by diversions. The fifth bridge, Verona, was so strongly protected with flak that it was not considered profitable to attack. Campodazzo, the sixth, could not be bombed because of terrain difficulties. The remaining two, Bressanone and Vipiteno bridges, after the first successful strikes, were defended by large concentrations of heavy flak guns, making them uneconomical targets.

This lack of long, vulnerable bridges forced attention to small bridges, some only 40 to 60 feet long. Targets of this size demanded the most accurate pin-point bombing and their low, short-span construction facilitated repairs or building of by-passes. Fills were attacked and marshalling yards bombed when the more important yards were clogged with backed-up rolling stock. Some small effort was directed against landslides, tunnel-mouths and cuts with unsatisfactory results the rule. Excellent results were achieved against three transformer stations.

In the six months of operations, B-25s of 57 Bomb Wing attacked 70 different rail targets on the 168 miles of track between Verona and Innsbruck. A total of 370 individual attacks were carried out. The following chart shows the scale of effort on the several types of targets:

<u>Type target</u>	<u>No. targets attacked of this type</u>	<u>Total No. attacks on this type target</u>	<u>Sorties</u>	<u>Tons Dropped</u>
Bridge	30	250	4843	7110
Fill	20	75	1254	2084
Marshalling yards	10	21	384	560
Transformer station	3	5	102	183
Possible landslide	3	8	159	176
Tunnel mouth	3	10	88	137
Cut	1	1	9	17
	70	370	6839	10267

In addition to the scarcity of good medium bombardment targets, other factors made interdiction particularly difficult. The rugged mountainous terrain imposed burdens upon aircraft and the combat crews by forcing them to fly at 13,000, 14,000 and even 15,000 feet to reach their objectives. Many targets were nestled against hillsides in deep, V-shaped valleys, complicating the task of the pilot-navigator-bombardier team. Many times the target was visible for only three or four miles from the bomb release point, making it essential that the aircraft come in on the bomb run exactly on course. In the few seconds available to him, the bombardier had to pick up the small, shadow-covered target, make all necessary corrections and release bombs. Approach photographs proved of great value in such operations. (K-8A-B cameras were installed in the nose of several aircraft and oblique photographs were taken at intervals along the bomb run. On later missions to the same target the bombardier could study the series of pictures. He would then be able to make an accurate bomb run, even though the target were hidden, by synchronizing on a higher, visible point.) The terrain surrounding some targets permitted only one axis of attack. Almost all approaches to the Rovereto, Ala and Calliano bridges, for example, were made on an axis of between 285 and 305 degrees magnetic heading.



Hidden by steep mountains several targets were not visible on the bomb run. In the photo above, taken by a K-8A-B camera mounted in the nose of a B-25, the Calliano bridge has not yet come into view. Its position in the valley is indicated by the white arrow. Approach photos similar to the one above proved of great value to bombardiers in locating difficult targets.

Although the enemy reaction to our bombing will be discussed at greater length in subsequent pages, it should be mentioned here that it was opposed by strong concentrations of flak. About one-third of the 1,400 heavy enemy flak guns in Italy were allocated to the Brenner. Nature also played her part in the form of adverse weather, cancelling some operations and imposing difficulties on others.

The Brenner pass rail line is standard-gauge, electrified and double-tracked throughout its 168 miles. For purposes of discussing targets, the line may be divided into three sections, the lower Brenner from Verona to Trento, the middle Brenner from Trento to Bolzano and the upper Brenner from Bolzano to Innsbruck.

On the lower Brenner section, the line runs from Verona north to Trento along the steep-sided Adige river valley, on the east bank of the river. At points where the heavily wooded Alpine foothills rise abruptly from the river's edge, the rail line runs along fills at the bottom of the steep slopes; where the valley is wider, it often leaves the river and runs in the shadow of the mountains one-half mile distant. At times, within two miles of the line, the hills rise to 4,000 feet above the track level. At Trento a secondary, single-track line branches southeast to join the lateral Udine-Vicenza-Verona line, 40 miles away at Cittadella. This route threatened to be an effective alternate to the lower section, but only a comparatively small effort was required to keep it blocked.

On the lower Brenner, attacks were carried out against 38 individual targets. These included 10 rail bridges, 14 fills, three transformer stations, three possible landslides, two tunnel entrances, and one cut. One hundred and eighty-six, 50 per cent of the total number of 57 Wing's attacks on the Brenner, were carried out against these targets during the entire campaign.

There was only one bridge on the lower Brenner over 135 feet long, the heavily defended bridge at Verona. The 10 remaining bridges crossed small streams feeding into the Adige river, averaged 95 feet in length and, with the exception of the Rovereto and Ala bridges, were squat, strong, masonry structures. The most attacked target on the entire Brenner line was the Rovereto rail bridge, 12 miles south of Trento. A total of 27 attacks were carried out against this target. The original 135-foot parallel-span steel structure was destroyed in December and four replacement bridges were subsequently destroyed. In addition, several times the replacement bridges were damaged or the line blocked. The 120-foot Ala bridge was attacked 24 times and destroyed on seven occasions. Despite the fact that the bridges were extremely short, experience proved, as had been anticipated, that they were more profitable as interdiction targets than as fills or cuts. While these bridges could be replaced in from two to five days, they created longer cuts than the easily repaired fills or marshalling yards.

The lower Brenner offered a large number of fills or embankments, carrying the track over low ground, and 14 of these were attacked. The fills varied from a few hundred feet to several thousand feet in length and in places were 20 to 30 feet high. The best fill targets proved to be those closest to the river, as those at Marco, Dolce, and Ossenigo, where water conditions hindered repair. The greatest weight of bombs fell on the Ossenigo rail fill which was attacked seven times. However, fills continued to be considered as secondary in importance, to be attacked only when the bridge targets were already cut or blocked or when it seemed advisable to forego temporarily attacks on heavily defended bridges.

The essential purpose of attacks on the Brenner was to interdict traffic and not to destroy rolling stock or rail facilities. Supplies coming over the Brenner from Innsbruck were consigned directly to destinations in Italy and no marshalling or break-down of trains was required north of Verona. So attacks on marshalling yards delayed the movement of traffic only so long as it took to repair a single line through the yard. As the enemy always had sufficient rolling stock to carry essential freight, the destruction of the rolling stock itself contributed only in delaying the repair of track. Rail yards were seldom congested but a few precious steam engines and repair facilities were of course, destroyed or damaged. As the battle of the Brenner progressed, and the air front was pushed further north, valuable shipments of equipment and supplies were being isolated between the cuts. This forced the enemy to keep his trains in marshalling yards or disperse them along the track. Some of the yards were quite small and as few as 150 to 300 units of rolling stock filled them to 75 per cent of capacity. When the yards became congested they were attacked both to interdict traffic further and to destroy valuable supplies.

North of San Ambrogio, ten miles northwest of Verona, the rail line passes under a series of 300-foot limestone cliffs. This formation had been weakened through the dissolving by water of a stratum along its base. According to reports of geologists of the Italian railroad association, two dangerous rocks, several hundred cubic meters in volume, were displaced as a result of subsidence and had long been in danger of collapsing onto the railroad below. Temporary steps had already been taken by the Italian government to prevent such an occurrence. B-25s made eight attacks with three different aiming points along this formation in an effort to create a landslide. These attacks enjoyed only fair success, and though the tracks were cratered, only an insignificant amount of rubble was brought down. Attacks on the tunnel at San Ambrogio, just north of the landslide target, were also unsuccessful and the limestone formation appeared too sturdy to be dislocated by 1,000-pound bombs.

North of Trento on the middle Brenner the valley floor widens slightly as the line runs north to Bolzano. The mountains rise steeply from the valley floor and in places, eight to ten miles from the river, tower over 10,000 feet above sea level. In this section of the line, 16 targets were attacked, including nine bridges, five fills and two marshalling yards.

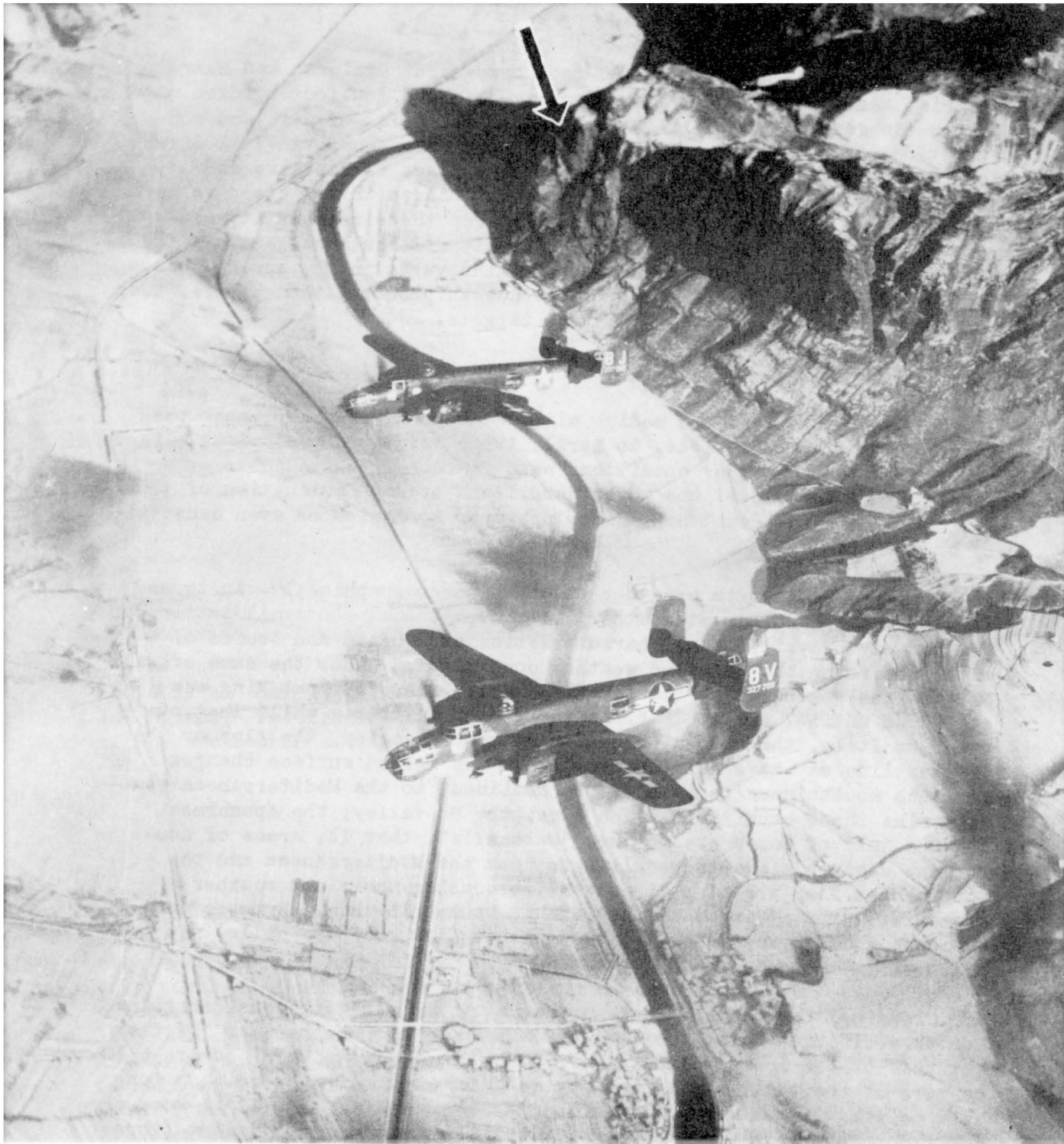
Unlike the lower Brenner, this section offered few small bridges or fills. The greatest problem confronting the interdiction program was the enemy's construction of three diversions. These offered alternate routes for one-half the distance of the main line between Trento and Bolzano. On the main line between the diversions there were no targets of importance making it necessary to block both the main and the main diversion lines.

Five miles north of Trento was the 3,000 foot, 35-span, masonry Lavis viaduct carrying the tracks across the Avisio river. This target was attacked seven times and spans were destroyed on four occasions. The viaduct was by-passed by a two-mile diversion, begun in May 1944. The 90- and 170-foot bridges on the diversion were attacked 21 times, blocked on several occasions and destroyed three times. The viaduct and the diversion had to be destroyed or damaged repeatedly as the enemy made an effort to keep both serviceable. At San Michele All'Adige, eight miles north of Trento, the track crosses to the west bank of the Adige river and proceeds 15 miles further north to Ora where it recrosses to the east bank. Two of the best targets were the 350-foot steel bridges over the Adige at Ora and San Michele. However, both these bridges, as well as several smaller bridges on this section of the main line, were by-passed by the 15-mile Ora-San Michele diversion on the east bank of the river. It was reported that 5,000 men were employed in the construction of the diversion and its completion on 5 December 1944 made it necessary to block both it and the main line. There were only two short bridges on the diversion. A total of 48 attacks were carried out against the diversion, 24 against the 120-foot San Michele diversion bridge and 12 against a short fill at Salorno. The third diversion by-passed a large bridge just south of Bolzano. Because two cuts would have to be made and a heavy flak concentration was in the area, these targets were never attacked.

At Bolzano, approximately half way between Verona and Innsbruck, a single-track electrified line runs northwest to Merano and from there west to its terminus at Malles Venosta. This line was used to disperse trains and several dumps were built up along it but it was not employed for through traffic.

On its difficult passage north to Brenner, the upper Brenner line runs northeast from Bolzano up the narrow Isarco river valley. Crossing the river at several points, the line is closely confined in the narrow valley and passes through numerous tunnels and under avalanche hoods. At Aica, a single-track line branches east, crosses into Austria near Sillian and joins the main line running north from Villach at Spittal. At Brennero the rail line crosses the Alpine watershed, 4,600 feet above sea level, and enters Austria. From here it descends the Sill river valley to Innsbruck, 22 miles north. Tracks of the northern end of the route again pass along a narrow confined valley.

On the upper Brenner the problem of terrain became most acute. Attacking formations had to pick their way through the mountainous areas where the snow-covered peaks reached 12,000 and 13,000 feet above sea level. The targets were practically hidden in the steep shadow-filled valleys and a successful mission required the greatest skill on the part of the combat crews. Forty-three attacks were carried out against 11 bridges, three marshalling yards, two fills and a tunnel. Sixteen of



Shadow often made pin-point targets difficult to pick up. Such a target was the 120-foot San Michele diversion bridge indicated by the arrow in the above photograph. For most hours of the day this small target was all but hidden in the shadow of a nearby outcropping.

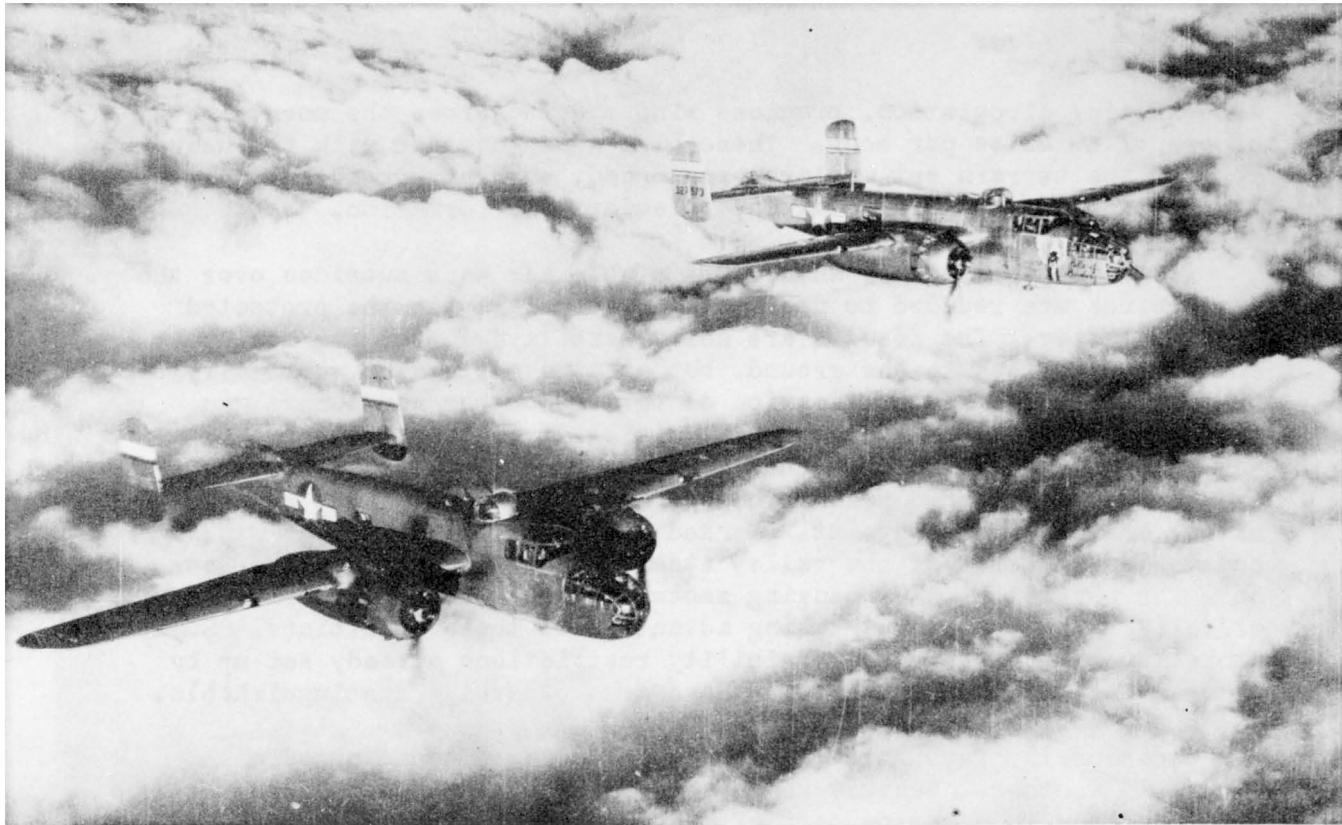
these attacks were against the 90-foot bridges at Steinach and Matrei, Austria, and 12 were against the heavily-defended 150-foot bridges at Jambo. In general, the best targets, from the point of size and construction, were on the upper Brenner. There were four bridges 200 feet long and none was by-passed. However the bridges at Vipiteno and Bressanone were the only two which were not hidden in the steep valleys, and both were strongly defended by flak. For these reasons it was again necessary to concentrate on the small, difficult targets. A few attacks were carried out against marshalling yards in the spring when they were being used extensively for trans-shipment, although here, too, bridges were considered the principal targets.

Weather as it affected medium altitude bombing of the Brenner pass targets from November, 1944, to April, 1945, was often precarious. Base, route and target weather conditions were factors in the success of a mission. If any one of the three conditions or any combination of them was unfavorable or doubtful, it could hamper a mission or even cause it to be abortive.

It is convenient to consider the problem geographically, in terms of base, route and target weather. Although the same overall pattern of weather may prevail, local characteristics of terrain and bodies of water determine the detailed weather conditions. Under the same overall pattern the weather over the Corsican bases, where 57 Bomb Wing was stationed until 7 April, 1945, may have been favorable while that over water to Italy, the mountains of Italy, the Po valley, the Alps or the Brenner line may have been unfavorable. The marked surface changes from the mountainous terrain of the continent to the Mediterranean sea determine these conditions. The Alps, the Po valley, the Apennines and the Gulf of Genoa are weather "catchalls", that is, areas of convergent weather elements peculiar to both the Mediterranean and the continent. They are also "breeders", producing their own weather elements. Frontal areas may be made or broken in them. Fronts, anticyclones (high pressure cells) or cyclones (low pressure cells) may stagnate in these areas.

Cloud ceiling and coverage were usually the limiting considerations for take-off from base. Ceiling as defined by the weather man, is the altitude of the lowest cloud layer, below 10,000 feet, which covers 5/10 or more of the total sky as seen by an observer on the ground. So long as a ceiling is not more limited than 3,000 or 4,000 feet, 12 or more aircraft can form with room to spare. Visibility must be sufficient (three miles) to allow single aircraft to see the others while joining. Occasionally strong airport surface winds had to be considered. Even less frequently, the condition of the fields after prolonged rains was a factor.

After joining, the formation needed the same ceiling over the water routes to Italy as was needed at base. In addition, an overcast cloud layer below the levels of the east-west range of the Apennines, south of the Po valley, had to be surmounted either before or just after reaching the coast, so that the formation could safely clear the mountains. Upon



Above is an example of stratified cloud coverage which prevented successful attack. Forecasting the dissipation of this type cloud is the bane of the weatherman's existence.

reaching a safe altitude it was necessary that no cloud layer have a solid top at 13,000 feet or over because fully loaded B-25s begin to strain at these altitudes. Also, personnel without additional oxygen, when at these altitudes for any appreciable length of time, suffer ill effects. On the other hand, the bases of a complete overcast had to be 14,000 feet or over since the Alps range up to 10,000, 12,000 and even 15,000 feet along approaches to targets. Similarly, a formation had to be able to top a cloud layer of 5/10 or more at 12,000 feet. Over a Brenner target it was necessary that cloud cover be not more than 5/10, if it were approximately 5,000 feet below the formation, or 3/10 or less if it were nearer the altitude of the formation.

Weather factors, other than cloud ceiling and coverage, which had the most influence on the success or failure of a mission were severe turbulence and heavy haze. With the passage of a cold or occluded front across the Alpine barrier, winds veer into the northerly quadrant and much dense air is banked up in southern Austria. The pressure gradient thus created between southern Austria and the Po valley, augmented by

the existing circulation, produces wind speeds across the mountains in excess of 40 miles per hour. These high winds coupled with the unevenness of the terrain set up large-scale eddy currents or turbulence, a significant hazard to aircraft, particularly in formation.

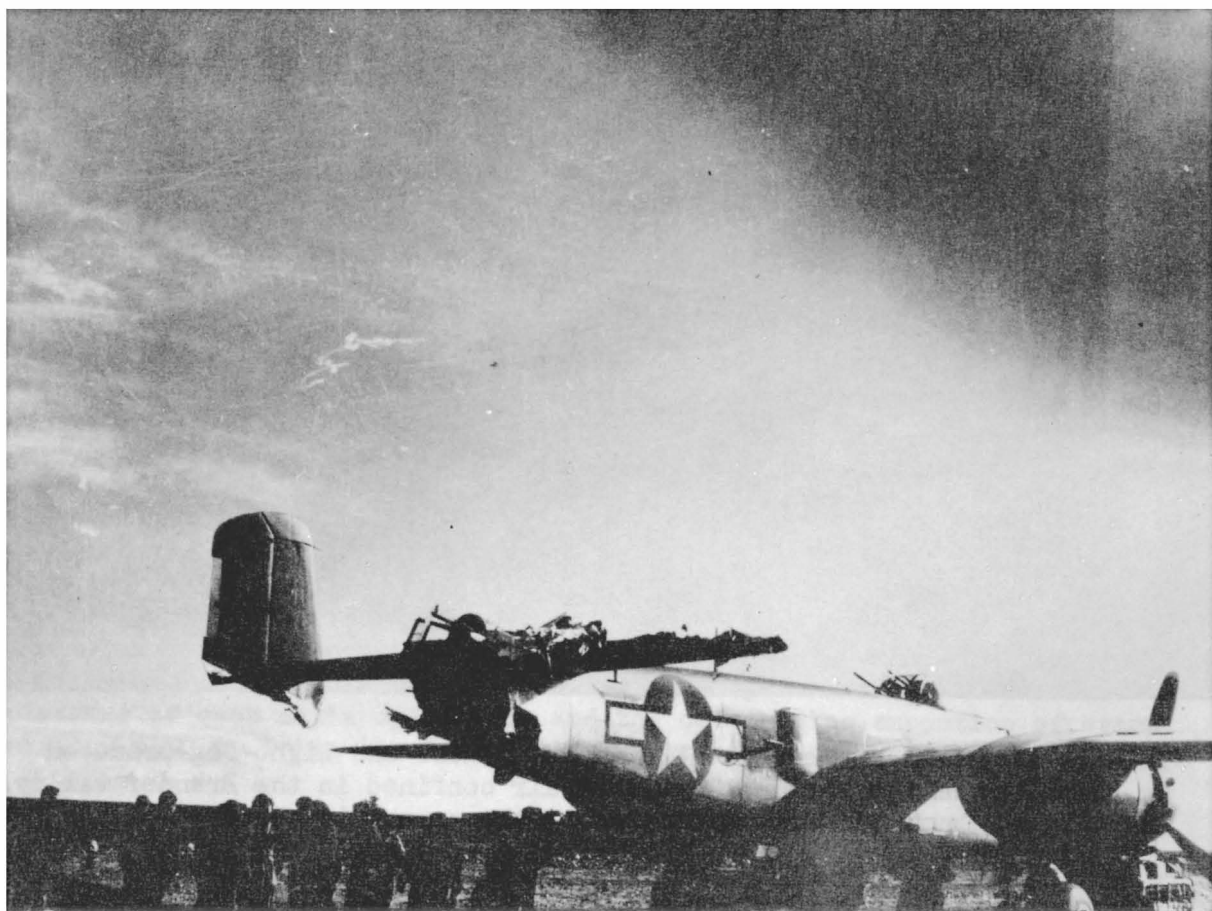
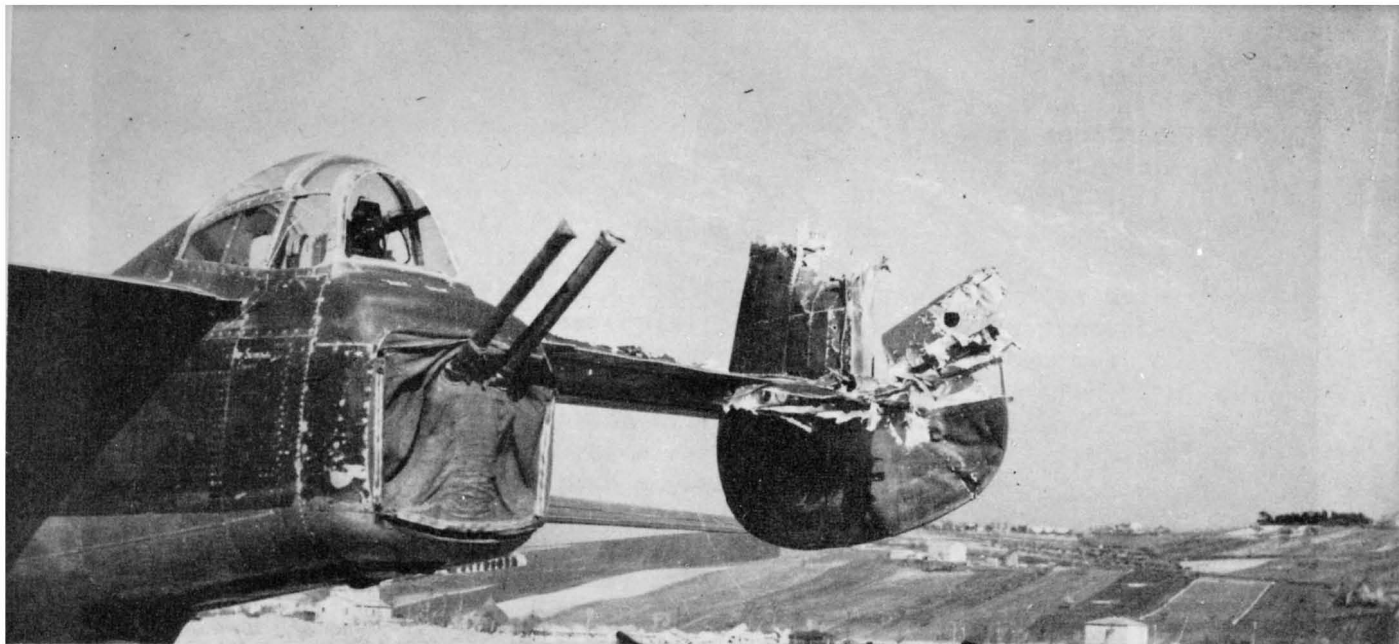
At the other extreme, when a dry stable air mass subsides over the Alps, winds are reduced to near calm, particularly in the protected Brenner valley. The results are heavy haze layers, for the most part concentrated close to the ground, but at times extending vertically to bombing altitude. Identification of targets on the approaches was extremely difficult. Even vertical visibility, aircraft-to-ground, was sometimes so restricted that anywhere from two to four bomb-runs had to be accomplished before the bombardier felt sure that he was aiming at the right pinpoint. Marked stability, light valley winds and the confinement of the valley itself were all particularly favorable for persistent, low-hanging smoke layers. Smoke pots were used effectively by the enemy, taking advantage of these conditions. Such smoke layers increased the visibility restrictions already set up by natural haze and nearly obscured landmarks otherwise distinguishable.

Occasionally favorable sun altitude had to be coordinated with favorable weather. Because some targets lay close to the ledges or were confined in a narrow part of the pass, where mountains rose abruptly on either side, they received direct light from the sun only for a few hours of the day. It was not always possible to coordinate minimum cloud cover with the best sun light. Under operational necessity, when both considerations were critical, favorable weather dictated the time of attack.

57 Bomb Wing inaugurated its attacks on Brenner pass targets on 6 November, 1944. Between that date and 2 May, 1945, when the Brenner was dropped from daily operational directives, there were 118 days when B-25s were able to drop bombs on their targets. On 85, or 72 per cent, of the days when bombing was possible, they dropped successfully. Because of the small targets, natural difficulties of terrain and weather made the interdiction of the Brenner line the most difficult operation of its type undertaken in Italy. Valley haze and smoke screens accompanied by low visibility, difficult weather consisting of clouds and turbulence, and mountainous terrain causing shadow and limited time when targets were visible are the factors to be considered. They demanded most careful planning of each day's operations and the outstanding execution of every mission plan to bring the Battle to a successful conclusion.

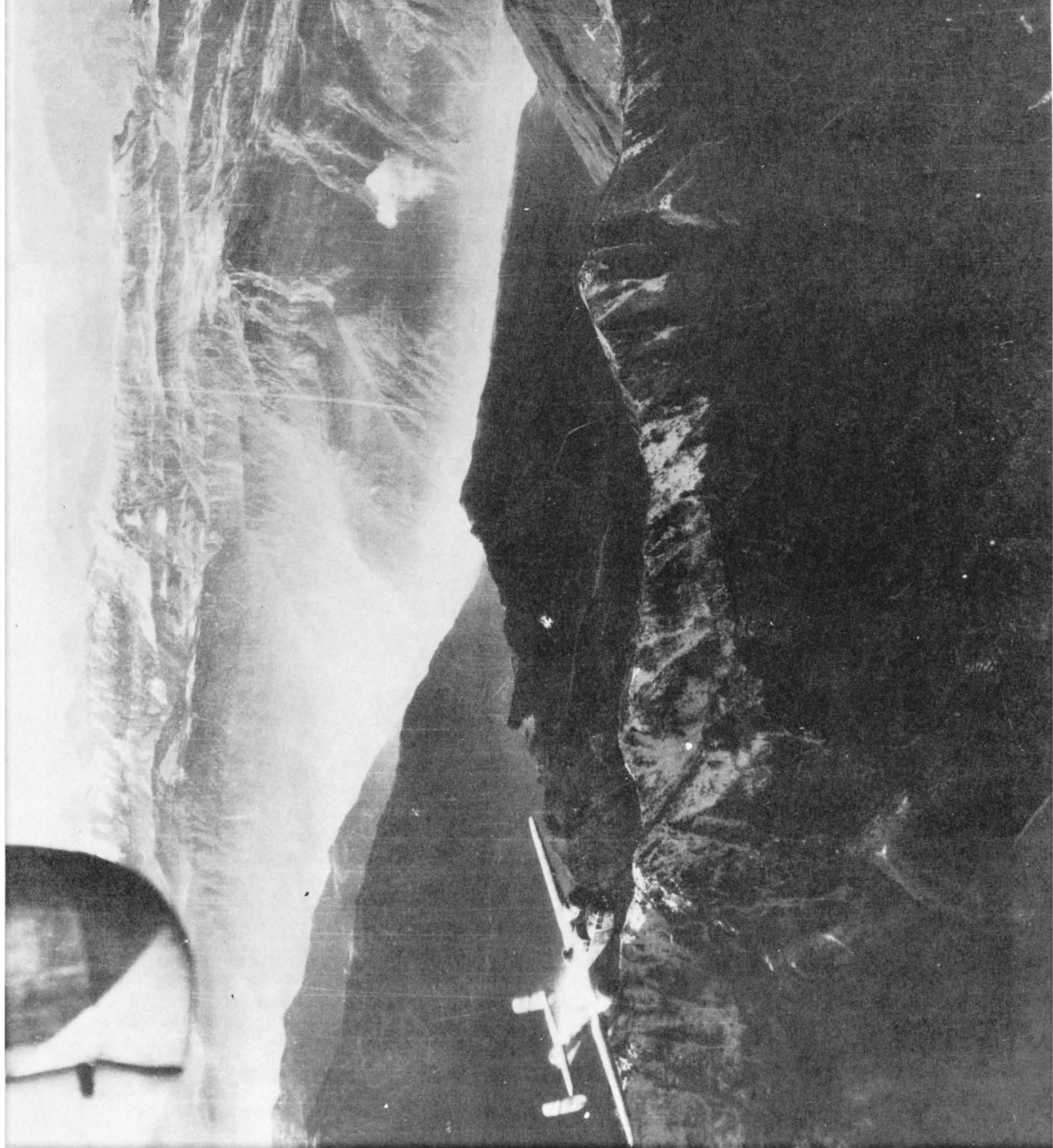


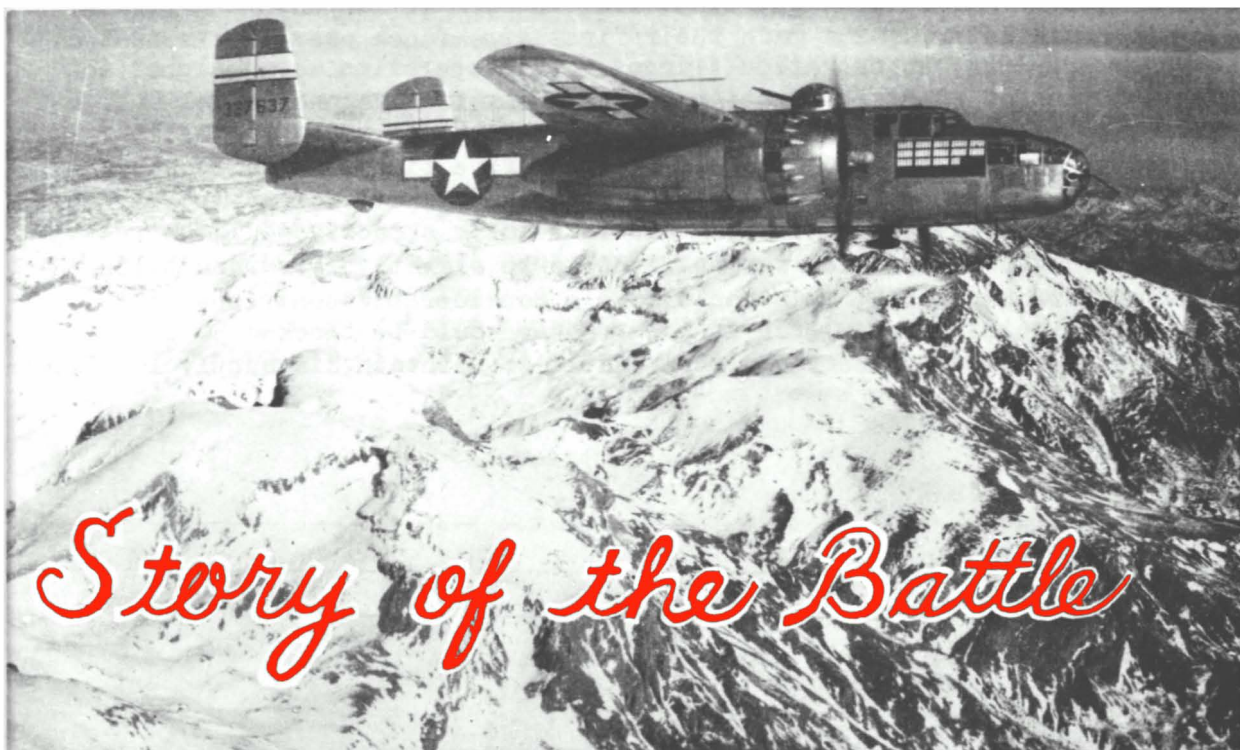
This is a typical and excellent example of haze and light fog produced by stability of the shallow layers of air confined in the Brenner valley. The target, Lavis viaduct, indicated by the arrow, is obscured.



The above picture shows the flak-damaged tail of a B-25. Below is shown a similar result from turbulent air which caused two planes, flying in a tight formation, to collide. This one was brought home safely despite its damaged tail chewed by the propellor of another Mitchell, which failed to return.







The Campaign

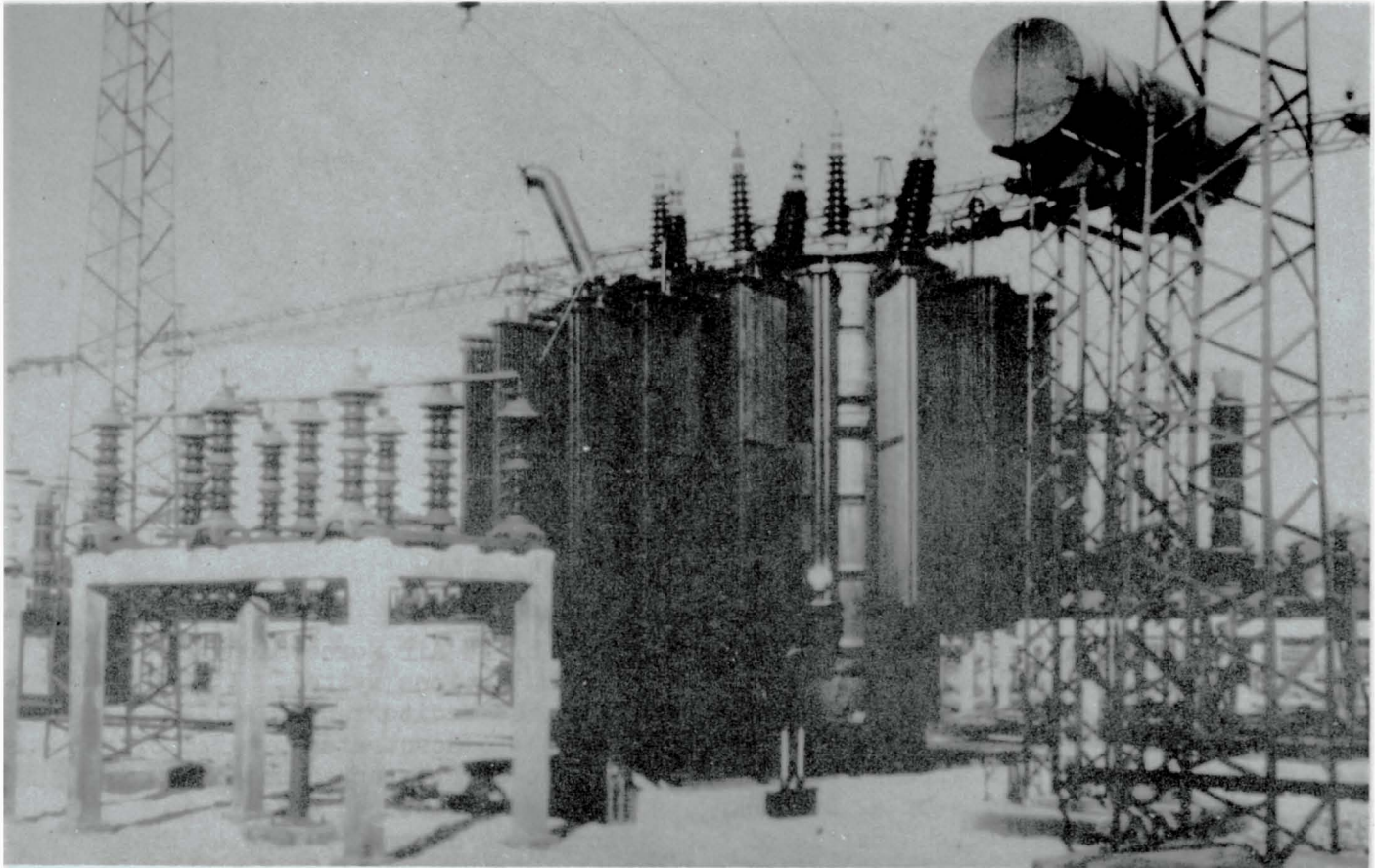
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Prior to October, 1944, heavy bombers of 15 Air Force had made several isolated attacks on the Brenner communications system. It was not until 4 November, 1944, that aircraft of the Mediterranean Allied Tactical Air Force struck their first blow in a concentrated program of Brenner rail line attacks that was to continue uninterrupted until 25 April, 1945. B-26s of 42 Bomb Wing, after a few scattered attacks in October, initiated the Battle of the Brenner on 4 November. The 42 Wing continued to send a large effort against the Brenner until 21 November, 1944.

Fighter bombers of XXII Tactical Air Command joined the battle in late November, 1944, and made a large contribution to the interdiction program. During the winter but particularly in April, 1945, after the start of the 15 Army Group spring offensive, 15 Air Force heavy bombers returned to the Brenner on several successful missions. From 21 November, 1944, to 25 April, 1945, the weight of the campaign was carried by B-25s of 57 Bomb Wing. Except when close support of the army took precedence,

first priority attacks of each day's effort were directed against the Brenner.

Though the full weight of 57 Wing was not thrown into the Brenner battle until later, B-25s made their first appearance over the Brenner on 6 November, 1944, in operation "Bingo". This operation was designed to deny the use of electric traction to the enemy from Verona to Bolzano. Employing electricity, the Brenner line was reported to have a daily capacity each way of 24,000 tons, more than five times the daily requirement of the German armies in Italy. If the enemy were forced to rely on steam traction, it was estimated that this daily capacity would be reduced to 6,740 tons, which was believed to be slightly less than twice the daily requirement. This would make a considerable contribution to the interdiction program, for if the Brenner could be blocked 50 per cent of the time the enemy would be unable to maintain his supply level.



In operation "Bingo" on 6 November, 1944, B-25s of 57 Bomb wing successfully destroyed three transformer stations between San Ambrogio and Trento, thus obliging the Germans to substitute steam for electricity, vastly reducing the daily capacity of the Brenner line. Above is a typical Adige valley transformer installation.

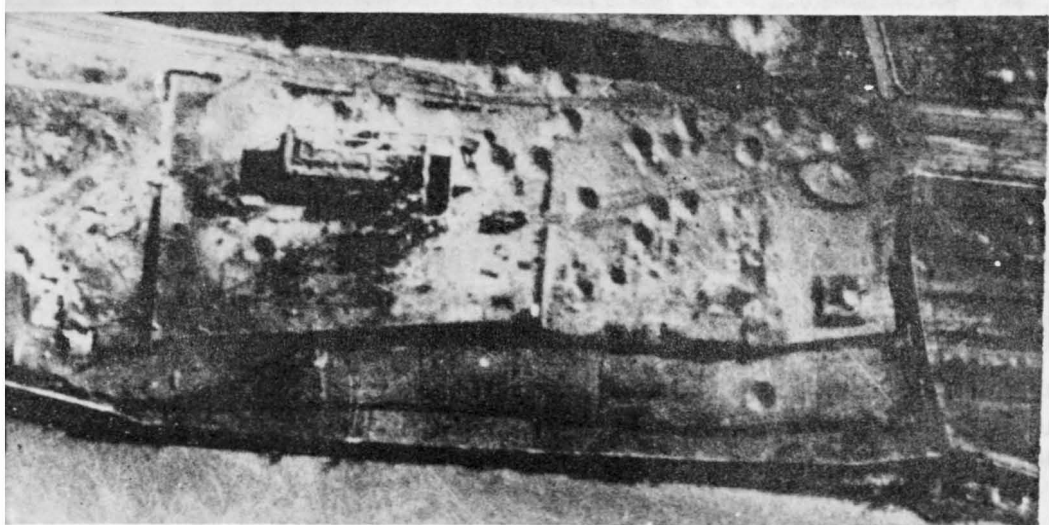
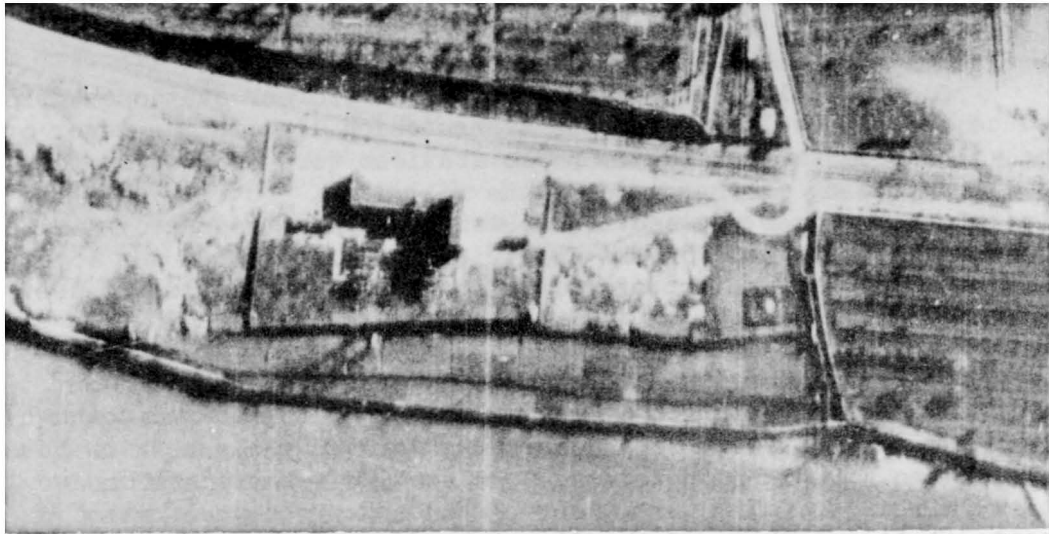
On the entire line there were 14 transformer stations employed to reduce the high voltage from the transmission line to the lower operating voltage of the railroad. These stations were located 10 to 20 miles apart, depending on the grade of the rail line. To eliminate the use of electric power over any section it was necessary to destroy at least three consecutive stations, for the electrical feeding system was so organized that even the destruction of two adjacent stations would not deny its use completely.

On 6 November, 36 aircraft of 310 Bomb Group carried out two attacks on the transformer station at San Ambrogio. Five-hundred-pound bombs destroyed two transformers and severely damaged the generator house, as well as two high-tension towers. The station was rendered unserviceable. Thirty aircraft of 340 Bomb Group placed a heavy concentration on the Trento station. Three of the five transformers were destroyed and the remaining two were damaged. The control house and cabling were damaged. Ala was attacked by two formations of 321 Bomb Group. The control house was heavily damaged and the roof destroyed. The transformer yard received at least six direct hits completely destroying all the transformers. Fighter bombers also carried out attacks of 16 aircraft each on the stations at Trento, Ala, San Ambrogio and Verona.

The success of the operation as indicated by photo reconnaissance was confirmed by several reports from ground sources, one of which, dated 25 November, stated that "due to damage to four electric sub-stations, only steam locomotives operate between Verona and Trento". So heavy had been the damage to these stations that they were never repaired nor replaced by mobile units. Because of our interdiction program north of Trento and the enemy's reliance on the non-electrified diversions in this area, the use of electric power was denied to the enemy as far north as Bolzano, which became the southern terminus for electric traction on the Brenner line.

In addition to the "Bingo" operation 57 Wing carried out 10 other attacks on the lower Brenner in November. On 6 November 319 Group damaged and blocked the bridges at Calliano and Rovereto and cratered the fill at Rovereto, adding further gaps to the line, already cut in several places from 42 Wing attacks early in the month. On 7 November 340 Group destroyed Ala rail bridge and 310 Group cratered Ossenigo fill. On 8 November Ossenigo fill was again struck and before 16 November three attacks were carried out on San Michele bridge and another at Calliano. This completed 57 Wing effort on the Brenner in November. Prior to 22 November the weight of the attacks on the Brenner was carried by 42 Wing and in the days following, weather and army support commitments prevented further operations. The line was probably blocked to through traffic for the first 22 days of the month.

The weather favored the enemy in December. During late November and the greater part of December, much of the effectiveness of earlier attacks was lost as weather prevented bombing and allowed repairs. The Brenner pass line was confirmed as cut only 12 days in December, but due to lack of regular photo cover it is impossible to say exactly how many



The above photo shows a "Before, during and after" series of the attack on the transformer station at Ala during operation "Bingo", 6 November, 1944. So complete was the destruction that the enemy abandoned all attempts at repair and the operation was successfully completed in one day.

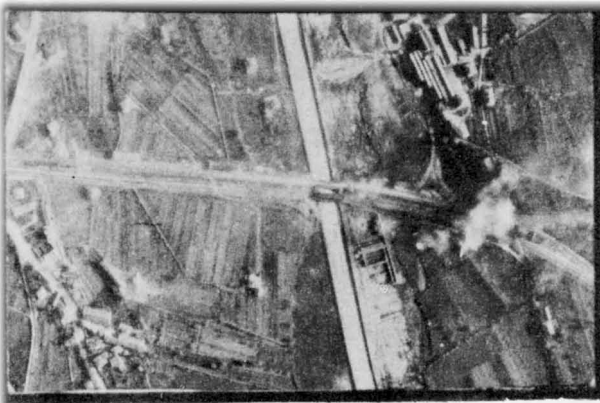
days the line was blocked. It is safe to assume that traffic was interrupted for a considerably greater portion of the month, probably 19 days, than was actually confirmed by photographs, although route and target weather and other commitments restricted effective Brenner attacks to only five days for the entire month.

The line was open for through traffic on 1 December. On 2 December the bridges at Ala, Rovereto and Calliano on the lower, and at San Michele on the middle Brenner, were attacked. Ground haze and smoke from generators along the river bank and roads partially obscured the targets at San Michele, Calliano and Rovereto and heavy, moderate to intense flak opposed all of the missions. While they definitely closed the line, no bridges were destroyed, and it was again open on 5 December. Photo reconnaissance that day also showed a large accumulation of rolling stock scattered along the line between Verona and Bolzano, evidently caught by attacks on the 2nd.

Weather stopped the B-25s until the 10th, when four bridges, two fills and two potential landslides on the lower Brenner, and the San Michele bridge on the middle Brenner were attacked by 57 Bomb Wing. These attacks were opposed by 12 to 15 enemy fighters, mostly ME-109s, which made attacks on five of the formations and destroyed one B-25 in the Lake Garda area. Four enemy aircraft were destroyed. At the targets flak was heavy, moderate to intense, and destroyed two B-25s. Photo reconnaissance showed seven cuts between San Ambrogio and San Michele; but again it was a matter of cratered approaches and track cuts, with no structural damage to any of the bridges. It is impossible to say just how long these cuts were effective, for our next complete photo coverage was not until 22 December, when the line was seen to be serviceable. Weather prevented medium bombing until the 26th, but fighter bombers claimed numerous track cuts as well as the destruction of rolling stock.

On 26 December 57 Wing bombed bridges at Rovereto and Calliano, a fill at Dolce and a potential landslide at San Ambrogio, blocking the line at four places. On the same day heavy bombers of 15 Air Force attacked Lavis viaduct and the main bridge at Ora, making temporary blocks at these points.

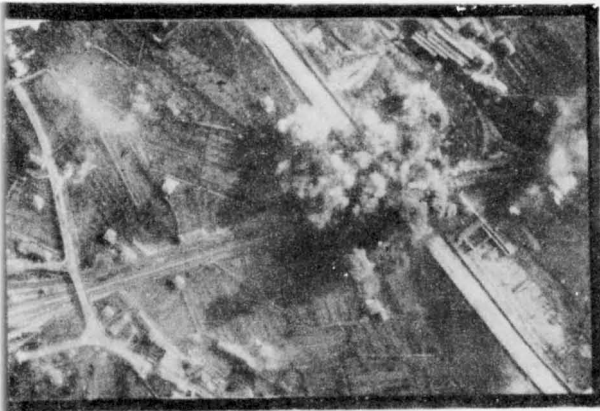
On 27 December medium bombers were again over the bridges at Calliano and Rovereto, and a tunnel entrance at San Ambrogio. 15 Air Force heavy bombers attacked Bressanone bridge on the upper Brenner. Photo reconnaissance of 27 December showed at least a single-track line open from San Ambrogio to Innsbruck, except for cuts at Rovereto and Calliano. Heavies, on 28 and 29 December, attacked Innsbruck and Verona marshalling yards at either end of the Brenner route, the loop line at Celle Isarco and a bridge at Bressanone. 57 Bomb Wing concentrated on the lower Brenner on 29, 30 and 31 December, on bridges at Calliano, Rovereto, San Margherita and Ala, and a fill at Dolce. The middle Brenner was struck once with Lavis viaduct as the target. Numerous cuts were made, but at the end of the month the middle and upper Brenner were serviceable throughout. It was only by repeated attacks that interdiction on the lower Brenner was maintained, for seldom had the German put forth



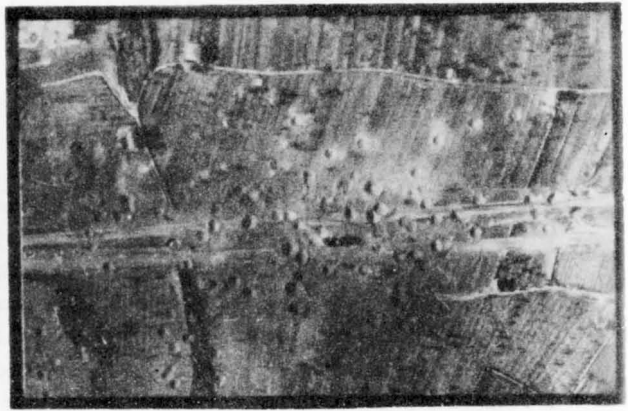
BEFORE



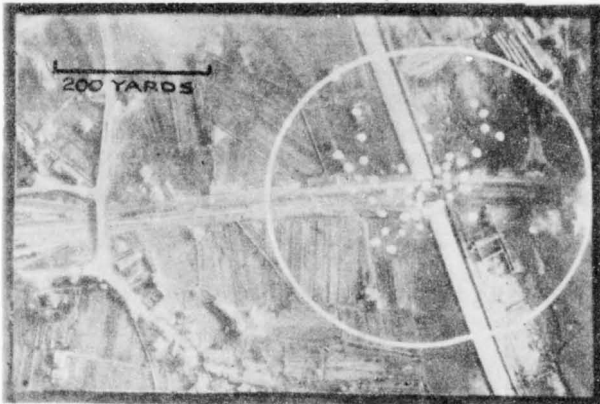
DURING



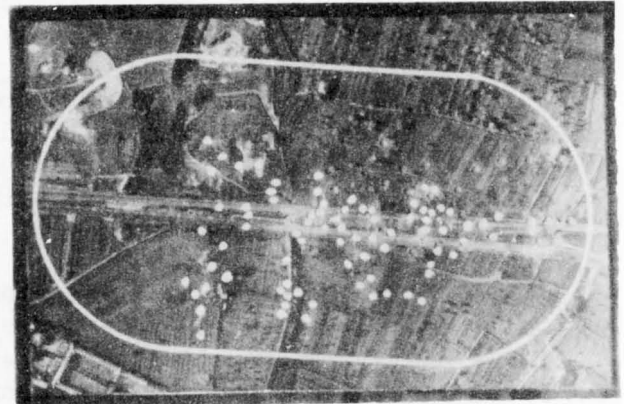
DURING



AFTER



BOMB FALL PLOT



BOMB FALL PLOT

ROVERETO RAILROAD BRIDGE

ROVERETO RAIL FILL

both of these important targets at Rovereto were attacked and effectively cut on 6 November, 1944, when 36 B-25s dropped 72 tons of 1000-pound bombs, without loss.



CALLIANO R. R. BRIDGE



SAN MICHELE R. R. BRIDGE

The above "Before, during and after" series shows successful attacks on two Brenner line bridge targets, both of which had spans destroyed by the bombings. The bridge at Calliano, 120 feet long, is typical of the small size of most of the Brenner bridges, the successful bombing of which required a maximum degree of pinpoint accuracy.

such strenuous repair efforts. The bridge at Calliano was completely destroyed on the 27th, and within 48 hours was again serviceable for single-line traffic. The badly damaged Rovereto bridge and its cratered approaches were opened for traffic within 24 hours.

January had a total of 16 days on which unfavorable flying conditions kept 57 Bomb Wing from even third priority communication targets. Although the enemy's repair activities were also retarded, the advantage was in favor of the Germans. The line was open to through traffic from the 6th to 15th and 25th to 27th, or 12 days during January. The lower Brenner was blocked for the first five days of the month, serviceable from the 6th to the 15th, closed from the 15th to the 24th, open until cut at Rovereto on the 28th, and blocked for the remainder of the month. The middle Brenner was blocked temporarily at Trento marshalling yard by 15 Air Force heavy bombers on 4 January, was open from the 5th to the 20th, cut at Lavis from the 20th to the 25th, and was then serviceable for the remainder of the month, with the possible exception of a temporary block at Trento marshalling yard on the 30th.

The 57 Bomb Wing, unable to attack the Brenner pass line due to target weather on 1 and 2 January, struck the Lavis viaduct and diversion bridges, Rovereto bridge, Calliano bridges, and the south

bridge at San Margherita on 3 and 4 January. Photo reconnaissance showed the line blocked at Rovereto, Calliano, and Lavis. Lavis diversion was not covered and may have been serviceable. A ground source stated "There was no railway traffic in either direction on the Brenner line between Verona and Germany from 1 to 7 January.". Another ground report which lends credence to the reported blocks said, "Road traffic on the east side of Lake Garda increased considerably during the first week in January when 750 motor vehicles passed southward and 940 northward."

The weather closed in on the 5th and prevented operations until 15 January when they were resumed by 57 Wing with three missions on the middle Brenner and four on the lower Brenner. Photo reconnaissance showed the latter cut at Ala and San Margherita. An example of the interdiction is the experience of 710 Infantry division which entered Italy during the first part of January, having left a Danish port by train for Italy on 2 December. The division passed through Munich and instead of using the more direct Brenner line was routed through Salzburg and entered Italy over the Tarvisio line. Weather again cancelled operations on the 16th, but on the 17th and 18th B-25s made a total of 12 successful attacks from San Ambrogio on the lower Brenner to Ora on the middle Brenner. Although smoke screens interfered, several cuts were made at Ora and San Michele. The lower Brenner bridge at Ala was destroyed and the line blocked at Calliano and San Ambrogio. At this time a ground report confirmed the fact that the line was available for such short intervals of time that only first priority military goods were moved. Another report stated in part, "From 15 to 21 January only three trains carrying ammunition and petrol passed over the Brenner for the south. The Brenner is functioning spasmodically." When weather closed in on the 19th, the line was known to be cut at three points. Many reports indicated that its partial interdiction had driven the enemy to the roads. Heavy motor transport movement was observed from the air all along the Adige valley and down the east side of Lake Garda on the night of 17-18 January, while very little rail activity was reported south of Trento between 16 and 20 January. In view of the enemy's lack of gasoline, relative inefficiency of substitute motor fuels and his none-too-adequate motor transport, the importance of keeping the railways in operation could not be overemphasized.

When the Russians began their winter offensive on 12 January, with such overwhelming success, it became necessary for the German high command to secure additional forces for that front. Five average divisions could be withdrawn from Italy without seriously affecting the German ability to hold winter positions. For the first time concrete results of the Battle of the Brenner and the rail interdiction in northeast Italy became apparent. About 15 January, 1945, Kesselring's 356 Infantry division began a move to the eastern front. Three weeks later all elements had not yet cleared Italy. Conditions for movement of large bodies of troops were chaotic. Units sat on rail sidings for days awaiting clearance of road blocks and repair of bridges. Only by successive stages of rail, motor and foot movement could any progress be made. In normal times the Brenner pass lines alone could carry three to five divisions simultaneously. The German armies in Italy had become relatively self-sufficient in food and

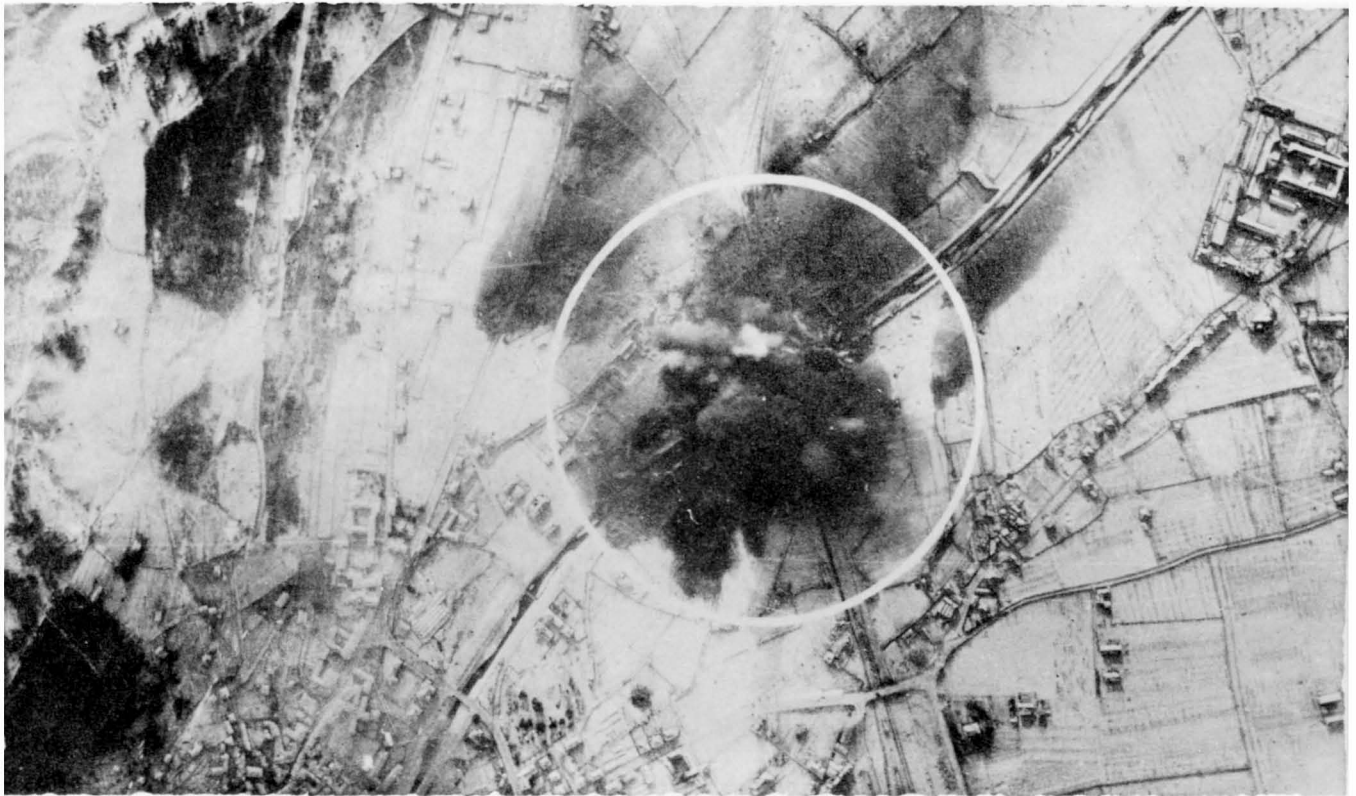


Smoke pots combined with the ever-present haze often increased the problem of identification of many Brenner pass targets. Here are seen B-25s after the completion of a 180-degree turn, following the successful attacks on the Ora main and diversion railroad bridges on 6 March.

many other supplies, so that their minimum necessary tonnage from Germany had been adequately handled. But the attempt at large scale troop movement showed the full effect of Allied interdiction bombing in isolating the Italian front.

Weather cleared somewhat on the 20th and four successful missions were made against the middle Brenner. One B-25 was lost to heavy, intense, accurate flak at Trento. Attacks on the middle Brenner and on Roverete bridge continued on the 21st and 22nd in spite of high winds and extreme turbulence. Three spans of Lavis viaduct were destroyed and cuts or blocks were inflicted at six other points. One B-25 was lost in a mid-air collision caused by turbulent air at San Michele. Non-operational weather prevented bombing on the Brenner until 28 January. From the 28th to the 31st inclusive, eleven missions successfully attacked primary targets. Route and target weather caused four other formations to bomb alternate targets or to turn back to base. Extreme turbulence interfered with accurate bombing and, although the line was blocked at many points, no great damage resulted. Photo reconnaissance on 31 January revealed

that the Germans continued to maintain their repair activities on a high level. The line was known to be blocked at only four places.



On 31 January, 24 B-25s secured complete coverage of this Brenner rail-road bridge. The bomb pattern, which partially blends into the snow-covered terrain, is circled, showing the center of impact to be squarely on the target.

The month of February was the turning point in the Battle of the Brenner. For the first time since medium bombers commenced attacking the enemy's rail lines leading into Italy, the Brenner pass route was blocked throughout the month. Rail interdiction during February probably did not result in any acute shortage of supplies because of the lull in ground fighting, but no build-up was possible. The only direct information on enemy supply was from numerous reliable ground reports of coal shortages for both railways and industries. Troop trains were delayed, and much movement was made by motor transport, with a consequent increase in motor fuel consumption, which the enemy could ill afford. The movement of 16 SS panzer Grenadier Division "Reichsfuehrer" out of Italy, which commenced at the beginning of the month, took approximately three weeks and at least part of the division had to move by motor transport. According to ground reports, some troops of 16 SS Division were seen moving on foot through the rear areas, while in the Adige valley, northward-moving motor transports were held up when their fuel was exhausted. One unit was al-

legedly reduced to buying fuel on the black market. Weather was unusually good during the latter part of February and bombing on the Brenner was prevented on only eight days during the entire month.

Ground sources and prisoners of war reporting on the difficulties encountered in traveling by rail made it evident that repair facilities were being taxed to their maximum. With the Brenner interdicted, it might have been expected that some use would have been made of the Fortezza-Dobbiaco-Conegliano and the Trento-Cittadella loop lines. The latter route was out at Cismon bridge where a 60-foot span was down during the entire month. It was suggested that the bridge might have been night operational since, whenever the approaches were damaged or other points on the line were cut, repairs were always effected without delay, but frequent photo reconnaissance did not reveal any unusual activity. The alternate route via Dobbiaco could have been used only for the transportation of troops, since trans-shipments would have been necessary at both Dobbiaco and Piave di Cadore, as this stretch is narrow-gauge electric while the remainder of the route is standard-gauge steam. Some slight activity was noted, but nothing to indicate that the line was used for any large-scale troop movement.

By 8 February, four substantial blocks had been created, principally at Lavis (Avisio) where destroyed spans made both the viaduct and diversion bridge impassable, at Rovereto, which was heavily damaged, and at Calliano, where the bridge approaches were cratered. Heavy, moderate to intense, accurate flak which opposed the medium bombers destroyed seven and damaged 93 of the 240 B-25s on these missions. Favored by the weather, which prevented attacks on the 9th, 10th and 11th, German repair crews made gains. Calliano was repaired by the 10th and Rovereto was passable by the 11th. The day following the completion of repairs at Rovereto the bridge at Ala was completely destroyed and remained so until 18 February. In this connection it is pointed out that the bridge at Ala was attacked 11 times by mediums and five times by fighter bombers during February, blocking the bridge continuously from the 11th to the end of the month, and leaving it open only six days during the first part of the month.

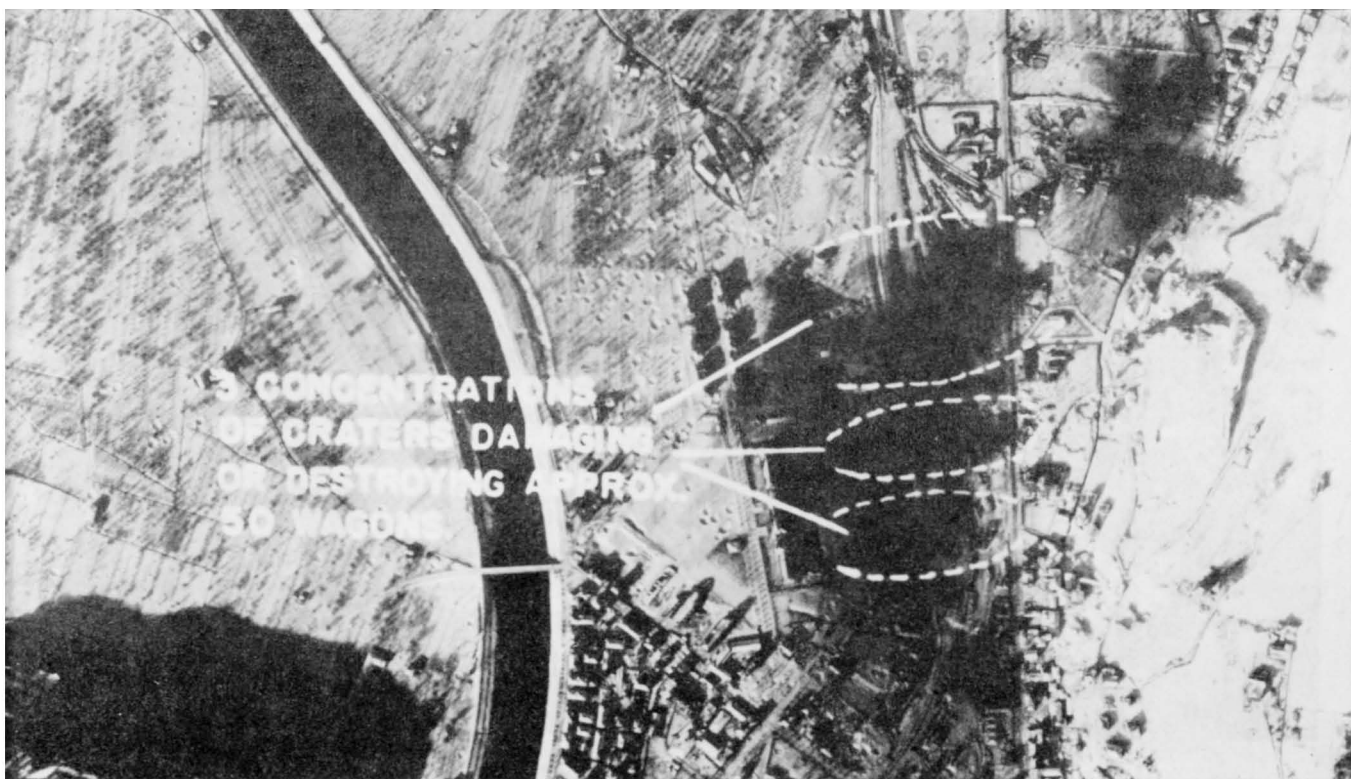
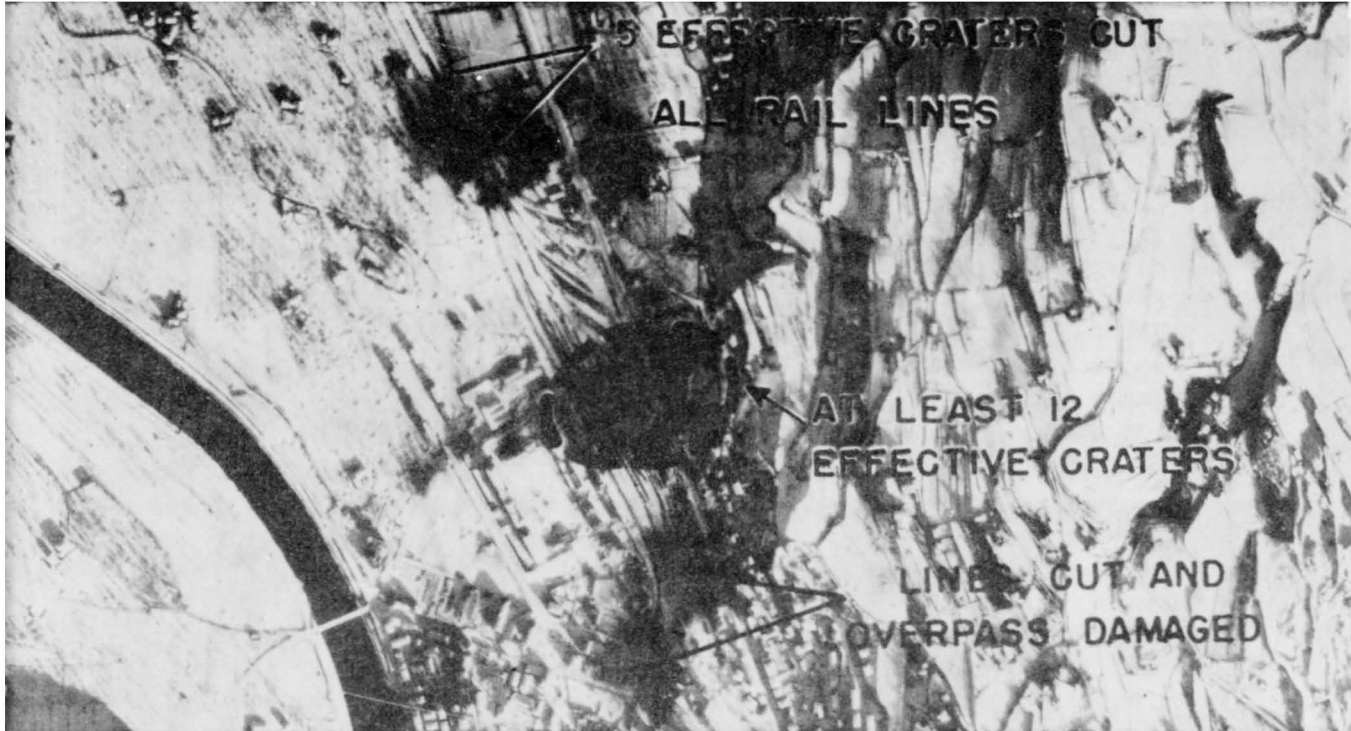
Perhaps the most important development in February was the fact that B-25s extended their zone of interdiction northward to a point only 25 miles south of the Brenner pass itself. On 14 February, the line was blocked by several well-spaced cuts below Bolzano. The first attacks by medium bombers on the upper Brenner were made on this date and during the remaining two weeks of the month a total of nine attacks was made on bridges north of Bolzano. An attack on Ponte all'Isarco bridge on 14 February was unsuccessful because of adjacent steep-sided mountains which made it impossible to pick up the target in sufficient time before the bomb release point. However the attack on the Bressanone bridge on the 14th blocked the line, the first time the Brenner had been blocked north of Bolzano in over two months. The damage caused was slight and repairs may have been completed before the bridge was again attacked on the 17th. This time damage to the

bridge required several days to repair. It was again attacked on 22 February and as a result of these three attacks was impassable from 14 through 23 February. Temporary blocks were created at Campo di Trens, making the line impassable at that point on 23, 25 and 26 February. The Vipiteno bridge, attacked on 25 February, was severely damaged and remained impassable for the remainder of the month. Heavy flak opposition to the attacks on the upper Brenner on 14 and 17 February was scant and inaccurate. However, the flak defenses of the upper Brenner were quickly strengthened and re-deployed in such a way that the attacks on 22, 23 and 25 February were opposed by heavy, moderate to intense, accurate flak which destroyed three and damaged 25 of the 129 B-25s participating in the missions.



In February, for the first time, B-25s struck north of Bolzano and on the 17th a formation of 30 aircraft successfully bombed this rail-road bridge near Bressanone.

Medium bombardment operations over the lower and middle Brenner, in the face of formidable flak concentrations, difficult weather and terrain and targets demanding pin-point accuracy, had achieved considerable success. Although these operational difficulties grew as attacks moved further north, it was determined to push the medium bombers still farther to the upper Brenner. Before these attacks in February, medium bombers had struck as far north as Ora. Until now the enemy had practically continuous use of the railway north of Bolzano, occasional attacks by heavy bombers having cut the line for only short periods. With the blocking of the Bressanone bridge, the zone of rail interdiction was deepened by 40 miles and ultimately, as the zone of attacks was moved still further north to Matrei, Austria, by more than 80 miles. Until this time the enemy had been able to maintain his forward railheads in the Ora and Trento area; now he was forced north of Bolzano. Increased handling of supplies and trans-shipment was required. More important, as the depth of



TOP: A very successful attack was carried out on 20 January against the Trento north marshalling yard. In the face of intense flak and a moderate smoke screen, 54 B-25s cut through lines in several places and destroyed or damaged 60 to 70 units of rolling stock. Aiming points were well covered as shown in the snow-covered reconnaissance picture above. BOTTOM: Ten days later an almost equally successful attack was carried out when through lines were again cut and approximately 50 units of rolling stock were destroyed.



This photo looking up the Trento yard clearly shows the heavy damage done to the tracks and repair facilities. Note single through line which has been repaired along west side of yard.

rail interdiction was doubled, the commitment falling on Brenner motor transport was also doubled. As the air front moved north, the enemy was forced to hold his supplies along the upper Adige and Isarco river valleys until transport could be made available to move them south. This extension of attacks also added to the burdens of repair crews who were now forced to travel appreciable distances to mend the line. At the beginning of February there was evidence that the enemy's rate of repair had increased. By the end of the month, however, the position was reversed, and there were many indications that the Germans were unable to cope with the rate at which damage was being inflicted.

While temporary blocks lasting anywhere from 12 hours to five days were continually created on the middle Brenner, there was no long term block involving heavy structural damage, until 27 and 28 February when the main bridge at San Michele and the diversion bridge were both destroyed. On 28 February a full scale effort against the Brenner pass line was made by 15 Air Force on the bridges at Verona and Bressanone, and marshalling yards at Ora, Bolzano, Bressanone, Fortezza, Vipiteno and Colle Isarco. The Bressanone bridge was rendered impassable, with both approaches cut, the south span of the west track destroyed, the north span damaged, and both spans of the east track damaged. The Verona-Parona bridge, five miles northwest of Verona, had two spans destroyed and the north abutment severely damaged. This meant that the only available rail route to the Brenner pass line from the South was the old standard-gauge, single-track, by-pass line out of Verona. The southern terminal of this by-pass is in the northwest sector of the city and there was no connection with the two main marshalling yards, both of which are located in the southern part of Verona. A steep-grade, connecting line was built to the Brenner route at the San Ambrogio station, a point which would very quickly become a serious bottle-neck if any large quantity of traffic were involved, since the marshalling facilities are extremely limited. A second connection to the main line by-passing the Parona bridge was later made further south, but no reports were ever received which would indicate either by-pass saw much use. By the end of the month, with at least nine well-spaced and substantial cuts, interdiction was established on the Brenner pass line throughout its entire length. It quickly became evident that the policy of attacking as far north as possible and spacing attacks along the line so that one or more cuts had to be repaired before repair trains could reach another cut was paying dividends. The rate at which the enemy was completing repairs was declining rapidly.

Unusually good March weather permitted 57 Wing to carry out Brenner attacks on 24 of 31 days, including 20 consecutive days from the 6th through the 25th. In this month B-25s broke their previous record for total number of rail bridges destroyed. Photographic reconnaissance showed that 41 rail bridges were destroyed, 10 more than the record of 31 set in July, 1944. Considering the scarcity of bridge targets on the Brenner and the large number of fills attacked, this figure becomes even more outstanding. In addition to those destroyed, 11 other bridges were seriously damaged. The Brenner was blocked during March for the second straight month and the scale of

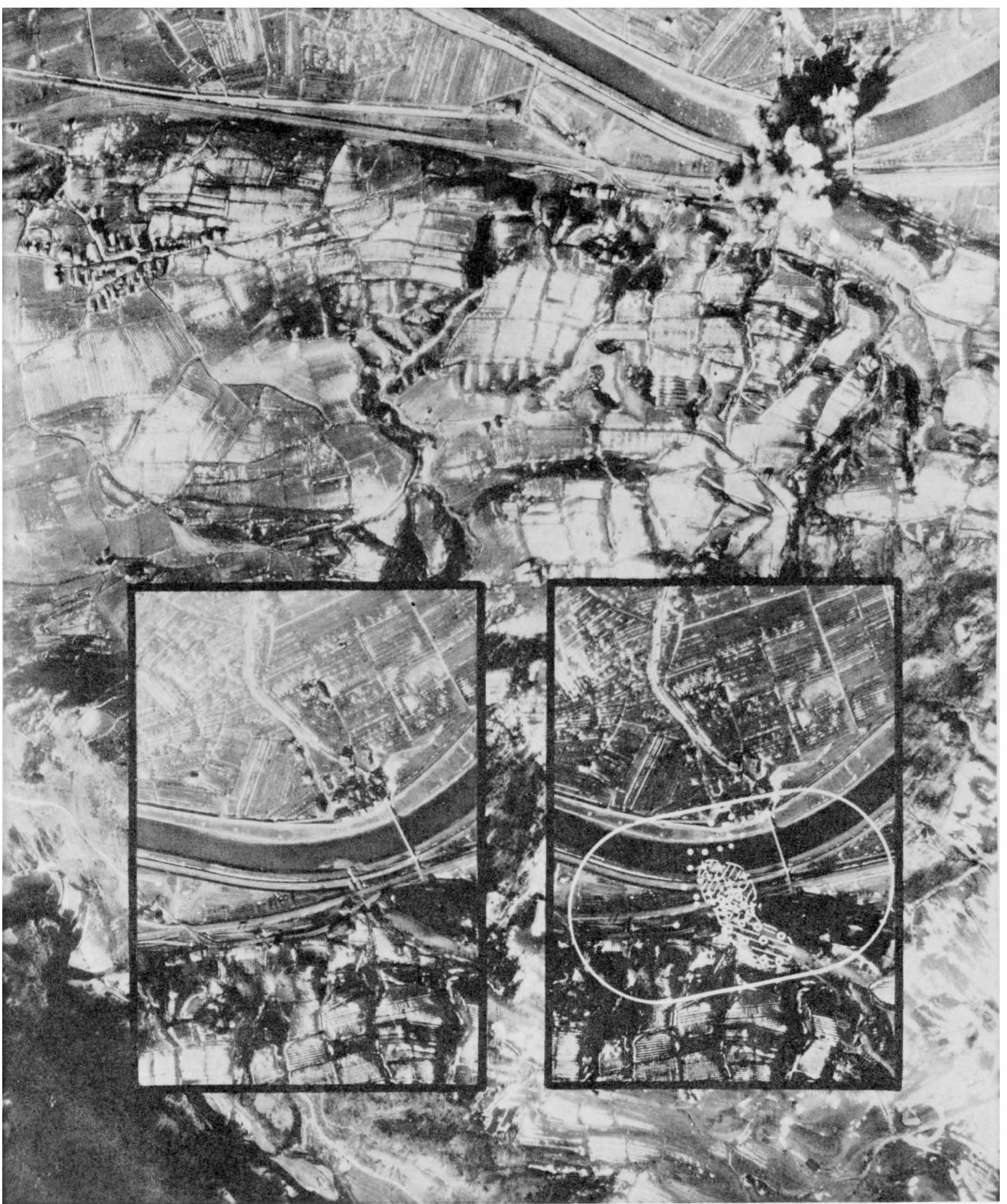


photo reconnaissance taken after this 23 February attack on the San Felice rail fill showed the tracks cut by seven craters. As a result of this bombing the Brenner line was blocked at this point for at least eight days.

interdiction was considerably higher than at any previous time. During February the line had been cut in at least one place for 28 consecutive days. In March the middle Brenner was out every day, the lower Brenner was out for 29 days and the upper Brenner for 23 days. As a direct result of 57 Wing attacks, through traffic was prevented throughout the month. Until the four days of bad weather beginning 25 March, B-25s maintained unusually effective interdiction, especially so because the cuts were well-spaced throughout the 168 miles of track between Verona and Innsbruck. Photo cover of 12 March showed 14 substantial cuts, 13 by 57 Wing. There were at least six other days when 10 cuts or more were reported by photographic reconnaissance.

Heavy interdiction continued to force the enemy's rail heads north to Bolzano and on occasion still farther north. Throughout the month, fairly heavy road traffic was noted moving up the Adige valley and along the roads through the mountains to the west. This movement probably represented the passage north of 715 Infantry Division which followed 356 Infantry Division and 16 S.S. Panzer Grenadier Division on the trek to Germany. Instead of the rapid movement of these troops which would have given real aid on the eastern front, the evacuation of these three divisions was spread over two months. Actually, none of these divisions was able to re-equip and re-organize in time to make a contribution to other fronts commensurate with its potential strength. Air power in Italy had cancelled effectively the value of these units for the enemy's most critical period.

Rail movement in March included some shipment of foodstuffs and industrial equipment and products to Germany. However, ground sources stated that large amounts of goods and materials destined for Germany were stored in the Adige valley because of transportation difficulties. The enemy's administrative position in Italy was severely threatened. He was probably meeting his day-to-day supply requirements only with great difficulty. The stage was being set for the great spring offensive when these daily requirements would be greatly increased. His need for motor transport and fuel were critical. In the face of this grave shortage of fuel, the enemy was forced to employ methane, alcohol, and benzol as substitutes supplemented by the production of a few small oil fields in Italy. Second only to the shortage of motor fuel was the shortage of coal. Practically none is produced in northern Italy and, except for a small amount from Istria, all the coal required by both the German armies and the Italian industries and railways had to be imported from the Reich. Up to 1 March the majority of this supply was transported through Switzerland; however, on or about that date the Swiss government placed an embargo on the passage of coal and by mid-March it was reported that only one-fifth of the daily requirement was reaching Italy. In spite of the most rigid control, coal stocks in the country were at that time reported to be sufficient for only 30 to 40 days and it is probable that later they were much lower. So acute was the shortage that railway steam engines were forced to burn wood, but it was impossible to replenish Italian stocks.

On 1 March no operations were carried out because of weather, but on that date photo reconnaissance showed the line effectively cut

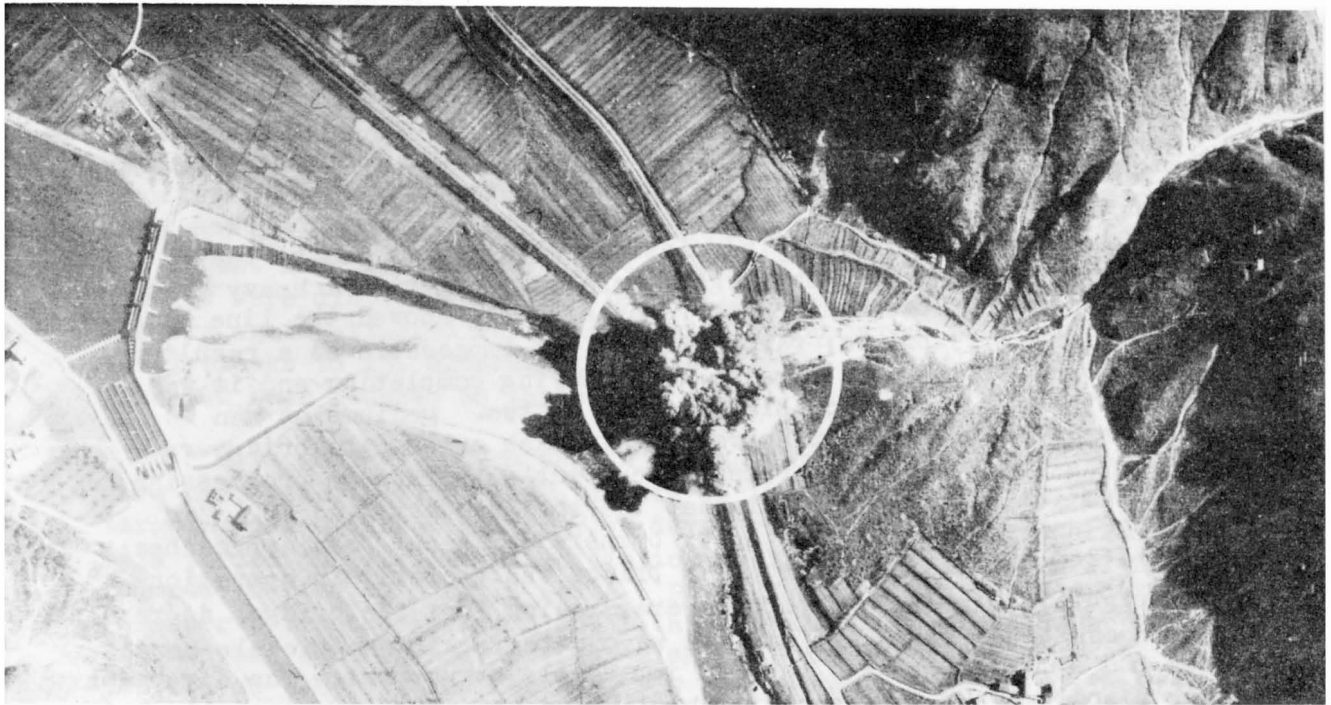
by attacks carried out late in February. As a result of 57 Wing efforts the lower Brenner was blocked at Ala and the middle Brenner at Nave San Felice, San Michele junction and the San Michele main and diversion bridges. On the upper line, the Vipiteno bridge remained cut. In addition, 15 Air Force on 28 February cut the line at the Parona and Bressanone bridges, making a total of seven effective blocks, covering approximately 125 miles. Five of these cuts remained through 4 March, and on 3 and 4 March, clearing skies permitted the mediums to return to ten targets on the lower and middle sections, re-establishing the total cuts on the line at seven. Included among these were strikes at the San Michele main and diversion bridges. The diversion bridge was attacked eight times during the month, and despite feverish repair was never made serviceable. Spongy ground hindered repair. Culverts, prefabricated spans and fills were attempted by the beleaguered repair crews, but in each case accurate bombing demolished their accomplishments. When it appeared that repairs were nearing completion at this target the medium bombers would hit it again to insure that a continuous block was maintained. Though repairs were carried out rapidly here, at other points, particularly on the lower Brenner, track cuts remained unrepaired much longer than had been anticipated. The overburdening of facilities and the first spring thaws were increasing the repair problem. Photo reconnaissance showed that craters in fills and approaches were filled with water, a condition which lessened the stability of the rail bed and slowed repairs.

Weather prevented operations on 5 March, but on the 6th a period of 20 consecutive days of operations was begun. On several occasions during this period, weather resulted in abortive missions and excessive turbulence often limited results, but on each day at least one attack was carried out on the Brenner. The attacks on 6 March added three temporary blocks to the line and a fourth was added the next day. On 8 March the Rovereto bridge was destroyed and remained out until the 24th, supplementing the blocks on fills. San Ambrogio bridge was hit and blocked again. Continuing through the 13th, attacks were concentrated on fills south of Trento. Other bridges which were attacked included the Ala and San Michele diversion which were destroyed, and the bridge at Ora, where four B-25s were lost on 10 March to intense flak. Ala bridge remained impassable until the 25th. Motor transport movements made it clear that troops departing over the Brenner had moved by road at least as far north as Bolzano before loading on trains, and road movement had been observed even beyond Bolzano. This heavy use of motor transport intensified the acute lack of gasoline which had made it necessary to issue orders requiring trucks to save their fuel in certain areas and resort to oxen for power.

Throughout the month photo recce had picked up definite indications of troop movements and considerable rail activity on the upper Brenner, and for this reason it was becoming more important daily to extend attacks as far north as possible, despite the operational difficulties involved. On the 14th, with eight cuts effective on the lower Brenner, and the middle Brenner cut at San Michele by medium

bomber attacks, three formations penetrated to the bridges at Vipiteno and Campo; one span of the former was destroyed and the latter was blocked, again closing the upper Brenner which had been open since the 9th. These attacks made it necessary for troops to travel by truck or foot all the way to Brennero or, if loaded in the Bolzano area, they had to be trans-shipped after a rail movement of only 40 miles. However repair was fast and the line was re-opened on the 18th. Both bridges were reattacked on the 20th and spans knocked out of each. After these second attacks the Vipiteno bridge was repaired by the 23rd, but the Campo bridge was not returned to serviceability until the 30th. From the 20th until bad weather interrupted operations on the 26th, the bulk of the medium effort on the Brenner was sent against this section of the line. The targets included the Brennero marshalling yard in the Brenner pass and the Steinach and Matri bridges in western Austria, the most northerly penetration on the Brenner by Mediterranean-based medium bombers.

Meanwhile, interdiction of the middle and lower Brenner was maintained by medium and fighter bombers. Very little movement was seen in this area, except for local shifting of rolling stock. The general condition of the lower Brenner during this period was well illustrated by the account of a prisoner of war of his movement to and from Italy while on leave. Because of lack of transport it took him a week to get from Trento to Mantua, a distance of approximately 60 miles.



On 13 March a formation of 18 B-25s placed this compact cluster on the 65-foot railroad bridge at Vo Sinistro. B-25s accounted for 13 of the 14 cuts in the Brenner line reported by photo recce as of this date.

With no medium attacks possible between 26 and 30 March, it was to be expected that the Brenner would see considerable repair. It is possible that it was open for a short time, although it is doubtful. In any event, the Brenner showed considerable activity, reflecting the movement of material along the railway by means of trans-shipment. Photo cover of the 29th revealed an unusual amount of movement since the 25th and it was evident that the enemy took advantage of the several days of bad flying weather. On 30 and 31 March medium bombers, imposed new blocks on the lower at San Ambrogio and Rovereto, strengthened the block in the middle and cut the upper Brenner at Steinach. Carrying the Parona bridge at Verona as "night operational", seen to be "in" on photo cover of the night of 1/2 April, the month closed with six effective blocks.

Bad weather limited operations on 1 April, when only two of six formations were able to reach their targets, but one block was added on the middle Brenner bringing the total cuts to seven. Better weather followed on 2 April and six formations attacked targets all along the line. Satisfactory results were achieved by four missions on 4 April, but photo reconnaissance following medium attacks on that day showed repairs being carried out rapidly. The Brenner was cut in only five places, three on the lower Brenner and two on the middle Brenner, with the best cut at the Rovereto bridge, destroyed by the mediums on 4 April. Following this attack two spans were removed from the Ala bridge a few miles south, presumably to protect it from attack until the Rovereto bridge could be opened. In an attack on the middle Brenner on 4 April, one formation strengthened the block here by destroying the 100-foot San Michele bridge north of the main bridge, which at this time, with repair nearly completed and a large rail crane present on the approach, was believed to be night operational. Two of four missions on 5 April were dispatched against the upper section, blocking the line at Matrei and possibly at Steinach. Weather again prevented operations on 6 and 7 April, but on 8 April, the day before 15 Army Group was to launch its spring offensive, five missions were dispatched to the Brenner by 57 Wing, and seven targets were attacked by 401 heavy bombers of 15 Air Force. Subsequent photo reconnaissance showed the line blocked at the following 13 points; Parona bridge was impassable as a result of a 15 Air Force attack, but repairs were nearing completion and it was expected it would be serviceable in a day or two. Mediums at San Ambrogio and Vo Sinistro cut approaches in each case. Ala bridge remained impassable. Rovereto remained cut but repairs were progressing rapidly and it appeared doubtful that the soil was still soggy. San Michele main bridge was hit by heavy bombers which cut both approaches; although it was now impassable, this bridge was probably in operation on the night 7/8 April. Two spans were missing from the bridge, a crane was seen on the approach and ballast wagons to repair San Michele north bridge had appeared between the two impassable structures. The diversion bridge also remained impassable. The line to the north remained blocked south of Salorno station, while across the Adige river on the diversion, Salorno fill remained cut. At Ora bridge the north approach was cut, probably by fighter bombers and the diversion remained blocked. MASAF attacks were concentrated on the line north of Bolzano where coverage

prior to the five attacks showed the line open. Bomb damage assessment photos showed both approaches cut at Vipiteno bridge, one approach cut at Campo north bridge and the line blocked at two places farther north. Fortezza marshalling yards were attacked but through lines remained open. At Bressanone bridge one span was knocked out and another damaged. Campodazzo bridge was blocked.

On 9 April, 15 Army Group launched what was to be the last battle in Italy. The railways in the northeast, particularly the Brenner, were badly crippled. While no immediate collapse by the enemy was expected from a shortage of supplies, it was thought that he would not have sufficient transport to move men, equipment and supplies as battle requirements developed. For eight months the German command in Italy had done everything in its power to cut down on the consumption of gasoline and diesel fuels by the use of substitutes, heavy reliance on horse-drawn transport, movement of troops on foot and other economy measures. However, the continual dislocation of the railways over a long period had forced him to use a large number of motor vehicles, aggravating the critical shortages of both vehicles and fuel. On 10 April a ground source reported that in the case of a general withdrawal, fuel stocks were enough to take 10 and 14 Armies' vehicles only as far as Verona and those of the Army Liguria to Brescia. Any further movement would have to be by rail.

With all available aircraft on army support targets on 9 and 10 April, Brenner repair crews were granted some respite from the heavy attacks carried out earlier in the month. On 9 April the 13 blocks had been reduced to 11 and on the 10th this number was further reduced to six. On the lower Brenner, with the Parona and Ala bridges open at will, only the Rovereto bridge was definitely cut and there repairs appeared to be approaching completion. In addition there were three cuts in the middle and two on the upper Brenner, but of the six cuts, only the middle Brenner cut at San Michele appeared lasting. Despite the urgent need for close support on 11 April, 78 of the 354 B-25 sorties were dispatched to Brenner rail targets. 15 Air Force heavy bombers again attacked the Brenner and the combined effort boosted the total blocks to 13, although prior to attacks of that day the total cuts had been reduced to three.

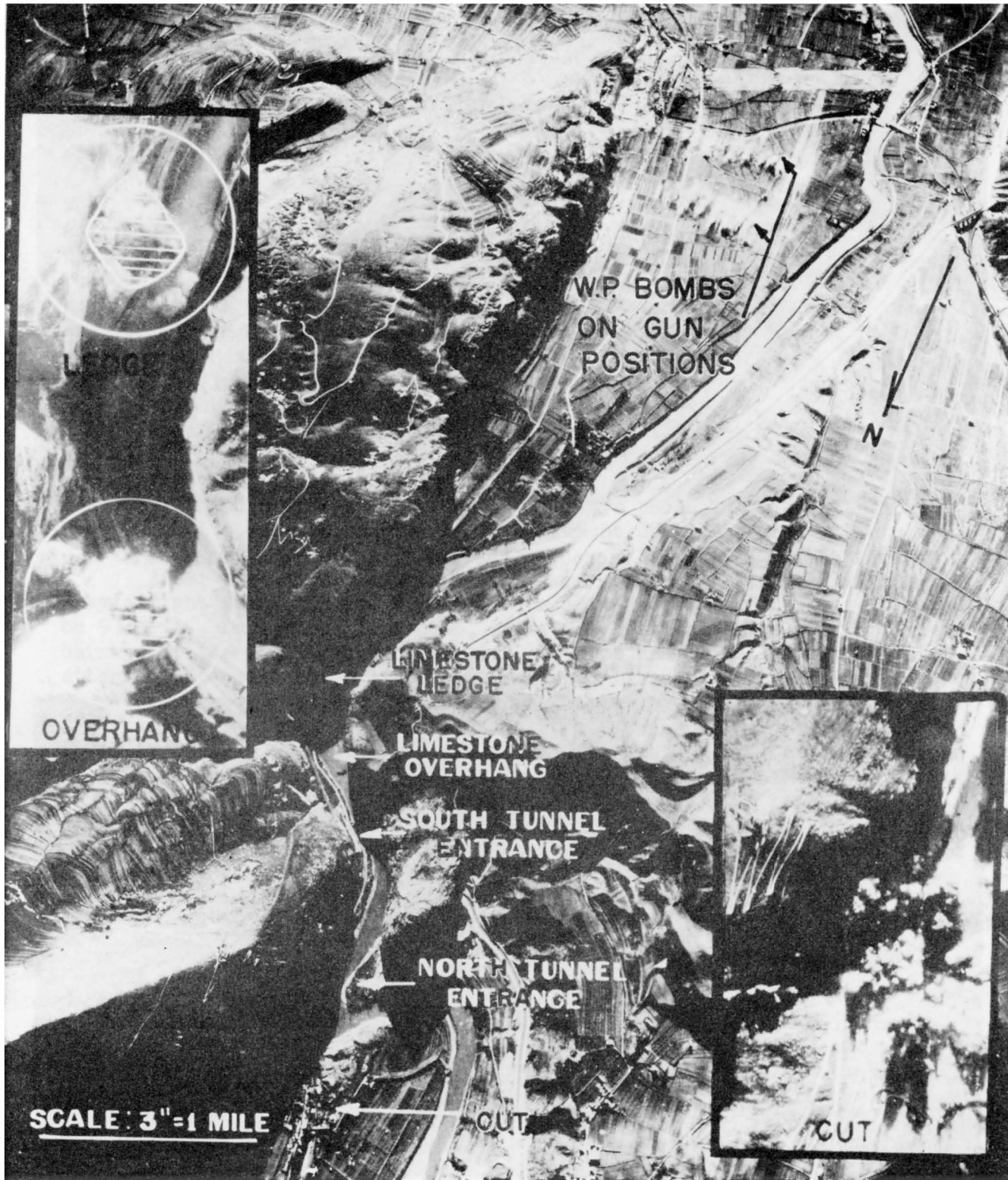
With army support missions taking first priority (398 sorties were dispatched against army targets on 16 April) only five Brenner targets were attacked on the five days from 12 to 16 April. During this period the scale of interdiction declined rapidly and had been reduced to five cuts by 15 April. Photographic cover on this day (weather prevented cover on the 16th) showed that the entire upper Brenner had been opened, so four missions were dispatched to that section on the 17th and the line was cut in two places at Steinach and one at Matrei. On the 17th it was seen that all but three of the blocks on the lower Brenner were repaired and that these were nearing completion. Attacks were again moved south on 18 April and

three formations blocked the line at three points. The Brenner was not attacked on 19 April but was hit by mediums on each of the six succeeding days with the exception of 22 April when all 16 missions were dispatched to the vital Po river crossings. An extremely high state of interdiction was achieved on these six days. There were ten cuts present on 19 April but a combined effort by 15 Air Force and 57 Wing on 20 April brought this to 15. One of these 15 Air Force attacks was carried out against the Vipiteno marshalling yards, which careful photographic interpretation had indicated as another target which the enemy would have considerable difficulty repairing because of soggy ground. On 24 April mediums attacked the Calliano bridge for the same reason with equally good results. By the 22nd the number of cuts had dropped to eight, but heavy attacks by 57 Wing on the following three days raised the total to 11, then 15 and finally on 25 April to 18, the highest state of interdiction reached on the Brenner. Photo recce on that day showed 12 cuts south of Trento with the Parona bridge approaches cut, the San Ambrogio, Ala and Rovereto bridges cut, the fills at Volargne, Ceraino, Dolce, Ossenigo, Vo Sinistro and Calliano all heavily cratered and the through lines in Rovereto station cut. The middle section was heavily cut in three places in the Ora-San Michele area, and three well-spaced cuts closed the upper Brenner.

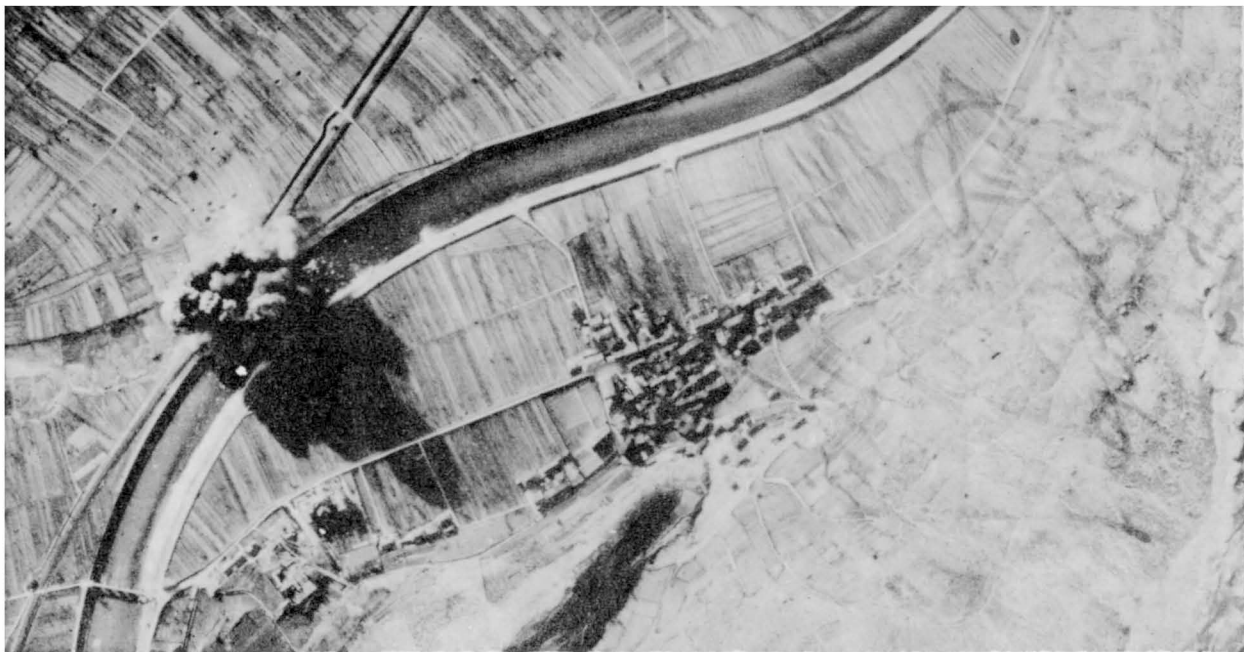
By 25 April the enemy's supply position was seriously weakened. In his retreat to the Po crossings he was forced to use a large part of his already depleted fuel stocks. At the same time he lost his methane sources and alcohol producing factories; producer gas was probably his only substantial source of gasoline and its use was limited to rear areas. Without the arrival of considerable stocks of gasoline and diesel fuel from Germany, 10 and 14 Armies were close to a point where continued large scale motor movement would be impossible. The enemy was unable to evacuate large amounts of the supplies which had been held in dumps south of the Po river and thus a large part of the stocks were overrun. Ammunition in the north was estimated to be sufficient to maintain 10 full divisions for one week to 10 days of hard and continuous fighting. This situation could have been helped by a large increase in deliveries from Germany during the previous weeks. The air interdiction of the Brenner had made this impossible and during the past winter had so over-committed his transport facilities that now he was unable to move his dwindling resources.

25 April, 1945, marked the last attack on the Brenner line and the close of the Battle of the Brenner. With 10th Mountain and 88th Infantry Divisions already in Verona the enemy had abandoned the line south of Trento. Although never carried out, missions were planned for the upper and middle Brenner until the date of von Vietinghof's surrender on 2 May. Photo cover as late as 30 April showed these sections still blocked and it is doubtful that they were ever returned to serviceability. In any event the issue had been decided conclusively.

During the Battle of the Brenner 57 Bomb Wing flew 6,839 sorties and dropped 10,267.51 tons of bombs on Brenner targets. Forty-six aircraft were lost and 532 aircraft were damaged. Three hundred and seventy individual attacks were carried out. Of the 231 attacks for which results were definitely established by photo reconnaissance 209 cut the line, a record of over 90 per cent.



Tunnels, fills, cuts and overhangs often obscured by heavy shadows, were repeatedly attacked in the successful effort to keep the Brenner line blocked. Here is seen a part of the line north of San Ambrogio, where five targets are located within the space of one mile. But despite the natural obstacles, many successful attacks were made, as illustrated by the inset pictures taken on 10 December 1944.



Several direct hits were scored on the 120-foot railroad bridge at Calliano in this 4 January attack by 12 B-25s.



Both the span and abutment were destroyed by this excellent concentration of bombs on the small masonry railroad bridge north of San Michele.

Weeks before the start of the offensive, the ground line-up for the final battle in the Italian campaign had become clear. The 21 Allied divisional organizations were opposed by 25 German and five Italian divisions. Numerical strength was substantially equal, but on a front line of our own choosing our entire force could be concentrated against 19 enemy divisions deployed there. Aerial supremacy, reserves of tanks and artillery, plus full personnel replacements, gave the Allies superiority in the Italian fighting that was disproportionate to the comparative numbers of troops involved. The quiet months of winter had been utilized to rest and replenish our troops. Fifth Army had built new supply roads through the mountains, and unlimited stockpiles of all materials of war had been built up. The rest period had helped the Germans in many ways, and von Vietinghof, successor to Kesselring, had done the utmost with his resources. But the many air blows and the offensive threat of many heavy patrols and local action had kept his troops off balance. Supplies, eked through wrecked communication lines, had been made adequate through the winter with some delving into reserves, but for a heavy offensive in unseasonably dry Po plains everything was short; personnel replacements, ammunition, food and, most critically, motor fuel. The throttling by our air power throughout the winter had not always shown immediate tangible results, but a slow strangulation of Wehrmacht power had been effected.

After preliminary attacks which improved the position of Eight Army's right flank and put 92nd Division into Massa, the big drive began on 9 April. During the afternoon, after the heaviest aerial and artillery barrage of the Mediterranean campaign, V Corps and II Polish Corps troops attacked the Senio river lines behind massed flame-throwing tanks. Over 800 heavy bombers dropped 175,000 fragmentation 20-pound bombs ahead of the attack. Diverted from the Brenner, 234 B-25s spread 25,000 frags on artillery and reserve areas. With this display of power the attack surged across the Senio. During the night 100 heavy bombers attacked again, with carpet bombing by 800 heavies and several hundred mediums repeated 10 April. One thousand sorties of fighter bombers per day were also flown in closest support. The attack rolled forward, grinding German defenses with incessant aerial, artillery and infantry assault. V Corps swung north toward Argenta, which was captured 17 April. The Polcorps, aided by XIII Corps now on its right flank, carried each river defense line which the Germans attempted to hold. Medicina fell 17 April as our troops overran the Idice river defenses, the last before Bologna.

Fifth Army's operations began 14 April as 10th Mountain Division struck north from Castel d'Aiano. In three days this division and other IV Corps troops had taken Vergato and captured Monte Tole. On the 16th, II Corps began its attack with four infantry divisions from south of Bologna. The Germans fought stubbornly and well, particularly in the strong defenses below Bologna, but 10 Mountain Division moved steadily forward to break into the plains and cut the highway northwest of Bologna on 20 April. Bologna's defenses then collapsed and on 21 April, American and Polish troops met in the center of the city. Throughout these breakthrough efforts, tactical air power was used to the utmost. The usual assault of the heavies preceded the II Corps attack 16 April. Mediums struck road bridges around Bologna and dropped frags precisely



The original Rovereto bridge before and after attack by B-25s.

on every known troop concentration. Fighter bombers ranged over every road and above all positions held by the enemy.

A bridgehead across the Po at San Benedetto was established by 10th Mountain Division 22/23 April with troops driving rapidly ahead against little resistance. Evacuation of the enemy over the Po, from San Benedetto to the Adriatic, was mercilessly pounded by fighters, fighter bombers, and B-25 mediums from the 21st to the 24th of April. The last Germans south of the Po were eliminated by 25 April with heavy casualties in personnel and equipment. Over 50,000 prisoners of war were taken, including GOC of 76 Panzer Corps. While 1,000 destroyed and abandoned motor transport, tanks and self-propelled guns were counted in the final bridgehead area around Polesella, another 300 motor transport were found abandoned and burned for lack of fuel to the west - mute evidence of the effectiveness of our throttling of the enemy's supplies by air.

As 25 April saw the end of the Battle of the Brenner, so it saw the rapid dissolution of the enemy's power in Italy. Our 1st Armored Division cut northwest to reach Switzerland on 28 April. The large Nazi and Fascist forces in west Italy were cut off and subsequently put in the bag. Other American forces, the 85th, 88th and 91st divisions, swung east to take Vicenza on 28 April, as British Eight Army troops, spearheaded by 2 New Zealand Division and 56 Division took Padua the same day. Venice fell 30 April. Udine and Spilimbergo were occupied 1 May, when New Zealanders linked up with Tito's Jugo-Slav National Army at Monfalcone.

The surrender by General von Vietinghof of his Army Group Southwest at 021400 May, 1945, was anti-climactic in many ways. His Italian combat armies of 325,000 men were destroyed. Possibly only 10,000 combat soldiers, mostly paratroopers, had escaped into the mountains. However, the surrender permitted our 85th Division's patrols to link up with 103rd Division, of Seventh Army in Austria through the Brenner pass on 4 May. The battle for Italy and the Battle of the Brenner were ended with Allied troops in full control. The German defeat in Italy was absolute. This first capitulation of an entire army group by order of its commanding general formed the pattern for the further capitulation of German army groups in Europe, and final unconditional surrender of the Reich at 090001 May, 1945.

Many factors contributed to the German defeat in Italy. Our Allied armies, with troops from many nations welded into a cohesive fighting force, carried out a long, bloody and oftentimes brilliant campaign. Other successes in Europe added to the ultimate victory. Yet the part played by the tactical air forces in securing undisputed control of the air and smashing the enemy unceasingly on the ground was of untold value. In the final analysis there is no doubt that the relentless fight to close off the railroads from north Italy was a major contribution to the success of General Clark's armies. 57 Bomb Wing, in its arduous, sometimes monotonous, and always dangerous mission of closing the Brenner, effectively denied the enemy his major line of supply.

TOTAL NO. OF
DAILY CUTS.

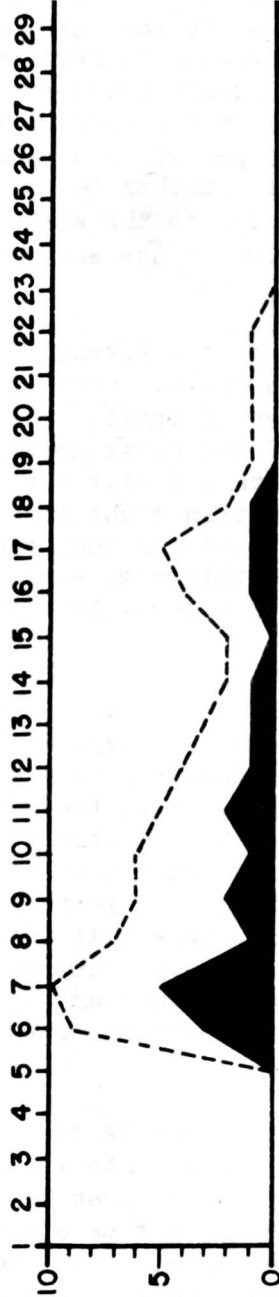
DAILY STATUS OF THE BRENNER RAIL LINE

6 NOV. 1944 TO 25 APRIL 1945

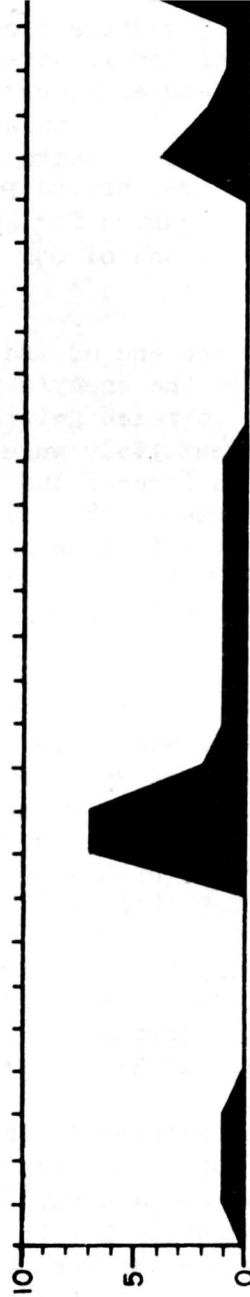
BASED ON PHOTOGRAPHIC RECONNAISSANCE

TOTAL NO. OF CUTS
IMPOSED BY THE
57TH BOMB. WING.

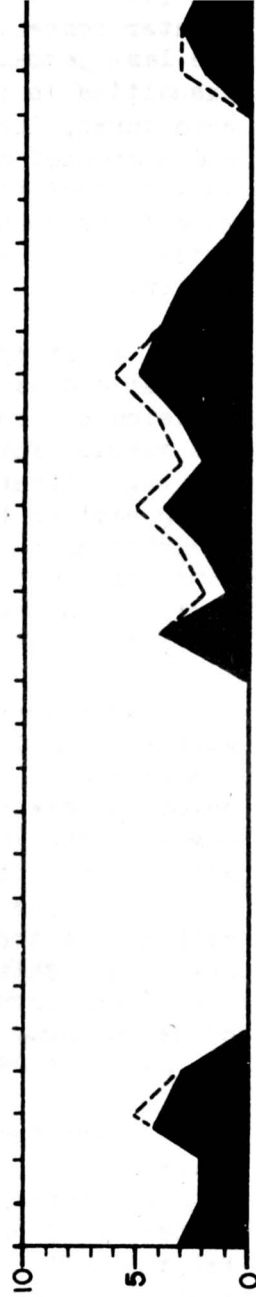
NOVEMBER



DECEMBER



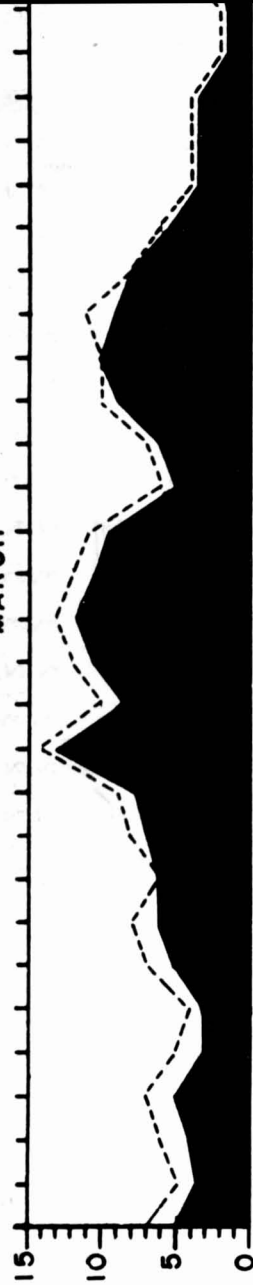
JANUARY



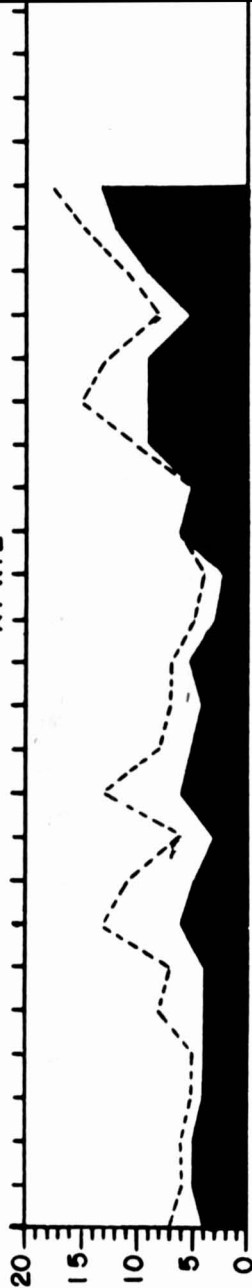
FEBRUARY



MARCH



APRIL



NOTE: Status of the Brenner Rail Line as shown on this chart is based on photographic reconnaissance reports. In some cases these reports are incomplete and on several photographic cover was not flown until several days after the attack, or after had been completed. Thus it is quite possible that the number of cuts shown on given day is lower than the actual number of cuts that existed in the line at that time. Definite results were never obtained on 100 57 Wing attacks; in almost all cases missions are not credited with cuts.

STATUS OF BRENNER RAIL LINE
 Nov. 6, 1944 to April 25, 1945
 Based on Photo Reconnaissance

NOVEMBER

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Line Blocks						9	10	7	6	5	4	3	2	2	4	5	2	1	1	1	1	1	0	0	0	0
57 Wing Blocks					3	5	1	2	1	1	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0

DECEMBER

Line Blocks	0	1	1	1	0	0	0	0	7	7	2	1	1	1	1	1	1	1	0	0	0	0	0	0	0	4
57 Wing Blocks	0	1	1	1	0	0	0	0	7	7	2	1	1	1	1	1	1	1	0	0	0	0	0	0	0	4

JANUARY

Line Blocks	3	2	2	5	3	0	0	0	0	0	0	0	4	2	3	5	3	4	6	4	3	1	0	0	0
57 Wing Blocks	3	2	2	4	3	0	0	0	0	0	0	0	4	1	2	4	2	3	5	4	3	1	0	0	0

FEBRUARY

Line Blocks	1	1	1	2	4	4	5	4	2	2	3	2	3	3	2	3	3	3	2	3	2	1	3	4	3	6	8
57 Wing Blocks	1	1	1	2	4	3	5	3	2	2	3	2	3	3	2	3	3	3	2	1	3	4	4	3	6	6	8

MARCH

Line Blocks	7	5	6	7	5	4	7	8	6	8	9	14	10	12	13	12	11	6	7	10	10	11	8	6	4	4
57 Wing Blocks	5	3½	4	5	3	3	5	6	6	7	7½	13	8½	10½	11½	10½	9½	5	6	9	10	9	8	5½	3½	3½

APRIL

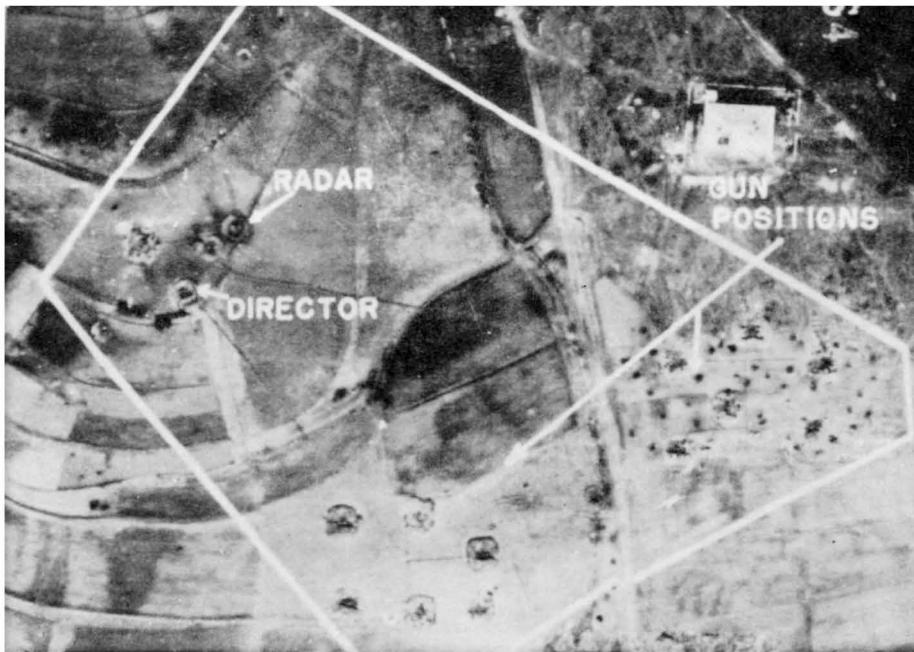
Line Blocks	7	6	6	5	5	8	7	13	11	6	13	8	7	7	5	4	6	5	10	15	13	8	11	15	18
57 Wing Blocks	4	5	5	4	4	4	4	6	5	3	6	5	4	5	3	2	6	5	9	9	9	5	9	12	13



GERMAN DEFENSE MEASURES

On 6 November operation "Bingo" was put into effect and a concerted effort against the Brenner pass line was begun by the 57 Wing. German opposition to this program consisted of three defense measures. Flak and fighter planes constituted the active defense and smoke screens made up the passive defense. By far the most effective of these was flak; fighter opposition and smoke screens were a poor second and third.

On occasion our aircraft encountered a limited number of enemy fighter planes but they were usually driven off by the defenses of the formations and the escorting fighters before inflicting any damage. The largest part of the activity in Italy was carried out by the Second Group of the Italian Fascist Republic Air Force, its Italian pilots manning ME-109s with German markings. This Italian unit, which had about 50 aircraft at the beginning of our Brenner campaign, used five or six airfields



SIX HEAVY GUN BATTERY AT ALA



GROSSE BATTERIE AT CAMPO DI TRENS

These sites show typical layouts of Brenner line heavy anti-aircraft artillery guns and fire control instruments.

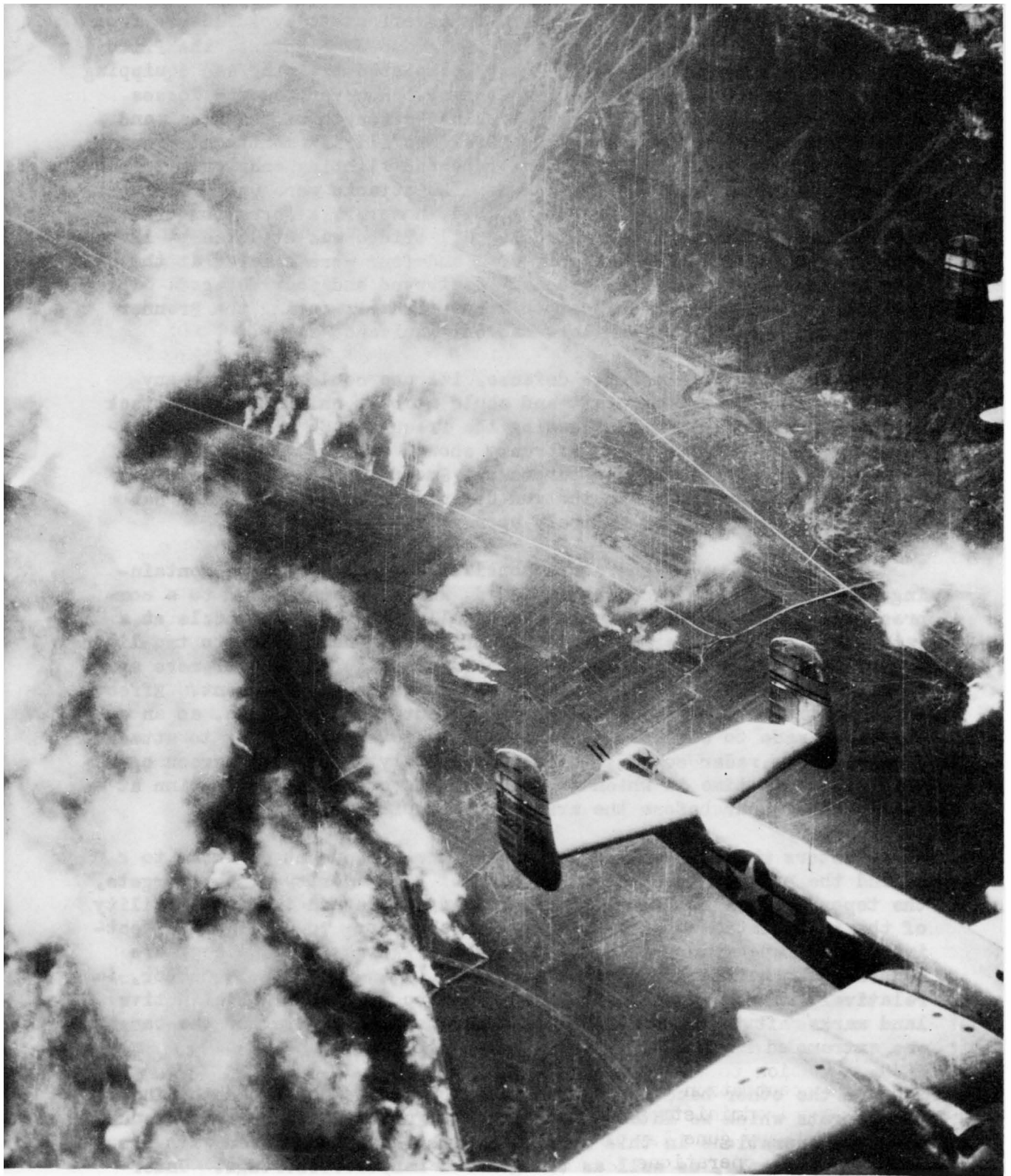
and dispersed their planes carefully in an effort to avoid losses from Allied attacks. During January a second group of fighters, the Primo Gruppo Caccia, or First Fighter Group, completed training and equipping and was brought back to Italy from Germany. However, due to losses suffered by the Second Group, the combined strength of the First and Second Groups was only about 55 ME-109s. In all six months of Brenner attacks by B-25s only 24 formations reported sighting enemy fighters and only 13 formations were attacked. The attacks were unaggressive for the most part. On 10 December, 1944, however, a formation of 17 aircraft on a mission to San Michele rail bridge was attacked by 12 to 15 ME-109s. One B-25 was shot down and four were damaged at the cost of four ME-109s destroyed, one probably destroyed and four damaged. This was the only medium bomber lost to enemy fighters during the Brenner campaign, as most of the attacks had only nuisance value.

Since smoke is a passive defense, its use could not cause any damage or loss to our aircraft and could at best only hold off attack until another day without affecting the frequency or magnitude of future attacks. January and February showed the most extensive use of smoke screens for defense purposes. Smoke was used at Verona and Rovereto as a supplement to the gun defenses while at Lavis and San Michele the enemy relied entirely upon smoke.

The Germans used generators consisting of a metal drum containing 40 gallons of chlorosulphonic acid, which was connected to a compressed air cylinder. The acid was expelled through the nozzle at a rate which could be varied as required from one-half liter to two liters per minute. Each generator was operated manually and one or more spare drums of acid was normally kept on hand for quick replacement. Effective densities could be accomplished in about twenty minutes, so an attempt was made to commence operation 30 to 40 minutes prior to attack. With complete radar coverage of northern Italy, the smoke screen operators had ample time in which to get the generators into operation at least a half-hour before the arrival of our formations.

Factors which aided the Germans in the employment of smoke to defend the Brenner were the small size of the majority of the targets, the topographical features, the prevailing winds and the accessibility of the installations to rail and road transport. To use smoke effectively, moderate winds, such as those in the Adige river valley, are necessary. The valley, especially in the Lavis-San Michele sector, is relatively narrow, which made it possible to blanket all distinctive land marks. Under such conditions accurate pin-pointing of the target was extremely difficult.

On the other hand the Germans had the problem of pre-determining the targets which we intended to attack. Furthermore, because of our numerous operations in this area, they must have been faced with the problem of supply, as well as the general manpower shortage. Under normal conditions smoke screens were placed so the heavy flak positions were not covered. This reduced the accuracy of fire greatly, since smoke coverage caused the gunners to rely entirely on unseen, or radar, fire-control, which is only about 25 per cent as accurate as visually controlled fire.

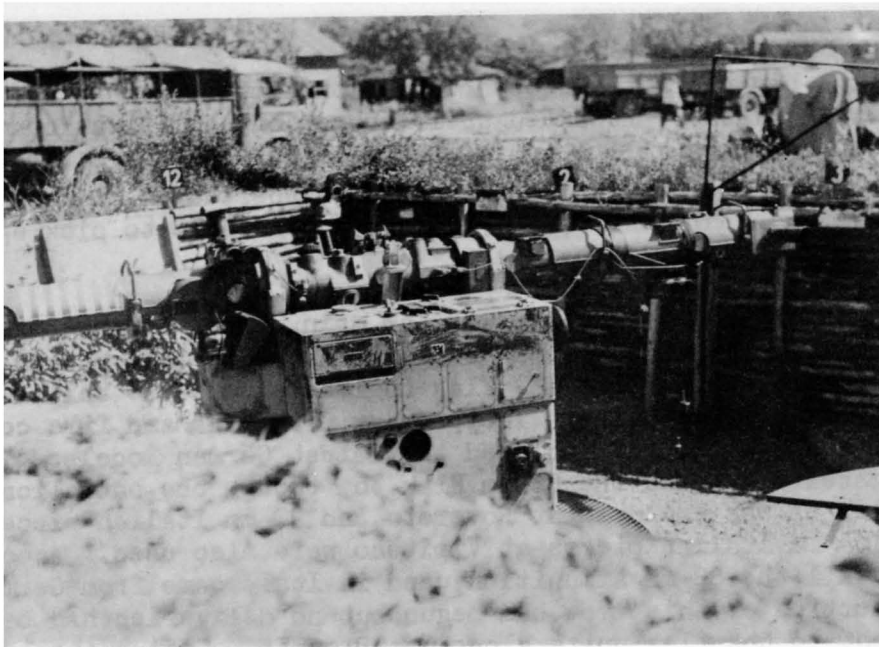


Though not a major threat smoke screens often made bombing difficult. This photo was taken at San Michele.

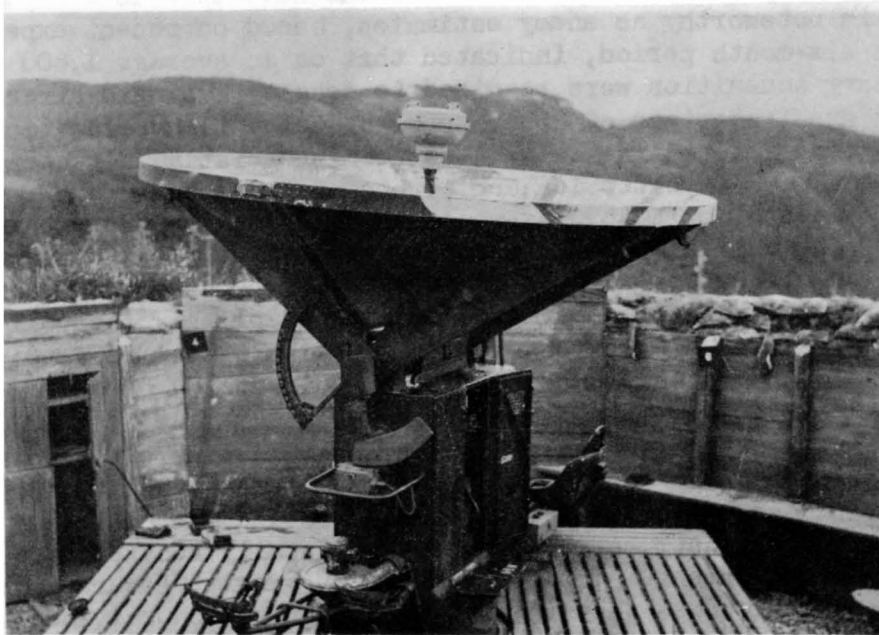
From the beginning the presence of smoke pots was reported. However, only 18 missions reported their operation, and five found coverage sufficiently complete and dense to interfere with accurate bombing. Probably its most effective use was reported on 22 January at San Michele when only three of 17 aircraft were able to pick up the target and drop their bombs.

Flak, as stated previously, was the main German defense against air attack and constituted the most serious threat to the success of our medium bombers. The 5 and 137 Flak Regiments were the units which defended the Brenner rail line. Their heavy flak guns and fire control equipment were excellent and included the latest German models. In almost all cases they used the 88-mm Flak 36, though one battalion of the 88-mm Flak 41 was employed at Rovereto and 90-mm Italian pieces at Verona and 105-mm Italian pieces at Vipiteno were also used. According to prisoners all the 88-mm ammunition used in Italy came from Germany. Italian production of this type had begun but no deliveries had been made, at least to the flak units along the Brenner. During the last months of the war a critical shortage of 88-mm ammunition developed and only 2,000 rounds per day were allotted to the Luftwaffe in Italy. This figure is noteworthy as enemy estimates, based on recent experience over a six-month period, indicated that on an average 1,600 rounds of heavy ammunition were required to destroy a single aircraft. There was no great shortage of other types of heavy flak ammunition, as they were manufactured in Italy. The Kommandogerat 40 director was used with all 88-mm batteries and if one of these units was knocked out, a spare, or KG36, was received as a replacement within a few hours. The delicate FMG 41 D radar was used with all heavy batteries north of the battle area and was relied upon for the range and altitude of the attacking formation. Fire completely controlled by radar was used only as a last resort. The Italian batteries also used the German radar though they used the Italian director.

Most flak installations along the Brenner line were formed into "Grosse Batterien", which consisted of two or more heavy batteries at one locality. These batteries were installed around the centrally located fire control instruments. The latter usually consisted of two complete sets of equipment. The most important single feature inherent in a "Grosse Batterie" was that the two sets of fire control instruments made it possible to track simultaneously two separate formations of attacking aircraft, one with each set, permitting the fire of the guns to be transferred rapidly, by means of the Rhonrad switching device, from one formation to the other. In addition, these large flak sites afforded a concentration of fire power, and simplified repair, maintenance, supply and administration. The greatest weakness of such a concentration of heavy guns lay in the fact that it provided a larger target for anti-flak operations than was provided by independently sited batteries. For example, all 16 guns at Rovereto were located at one site. As proof of the successes of our anti-flak operations, these 16 guns, after being bombed, were split into two batteries of eight guns each.



KOMMANDOGERÄT 40



FLAKMESSGERÄT 41-D

These fire control instruments, photographed at Bolzano, were standard and were typical of installations on the Brenner. The Kommandogerät 40 is the latest model of German director. It is a mechanical calculator with stereoscopic height finder incorporated, capable of predicting a rectilinear or curvilinear course. The Flakmessgerät 41-D, gun laying radar is one of the latest German models, capable of furnishing present azimuth, angular height and range to the director. More accurate visual tracking was used to furnish azimuth and angular height when possible. Radar range, however, is more accurate than stereoscopic range. Note the strong revetments which are typical of those built around the dug-in guns and instruments.

The gun, director and radar emplacements of all batteries were heavily revetted for protection of equipment and crews. When it was possible to make a suitable drainage ditch to keep the emplacement from filling up with water the positions were dug in approximately one-half below ground level. When the gun position was in a low place where it could not be conveniently drained it was built above ground.

The terrain on the Brenner presented difficulties to the German flak units as well as to the attacking aircraft. There were relatively few positions where high mountains did not restrict fields of fire or interrupt radar reception. This made it impossible to emplace guns at San Michele, for example, or to rearrange the position of the defending guns at several other targets. The lack of motor fuel and the great amount of preparation necessary to emplace a heavy battery properly were other factors which limited the movement of batteries.

Since the capitulation German officers have stated that they always had warning of our bombing attacks. Our radio transmissions were monitored by listening posts along the Po and it was nearly always possible to detect aircraft taking off on a mission. The information obtained at the radio listening posts or by radar was telephoned and radioed to the fighter control room at Verona. There it passed through a filter room where it was evaluated and forwarded to the plotting room. In the plotting room a large vertical map was kept showing the location, course, altitude and number of aircraft operating over Italy. When a formation approached within 200 kilometers of a defended area, its position was radioed and telephoned to the area "Flakfuehrer". The "Flakfuehrer" of the defended area in turn pre-alerted his heavy gun batteries, and his crews prepared to man their apons and instruments. If the formation approached within 80 kilometers of the area the alert was given. At that time the approximate course and altitude of the formation was relayed to the battery commander. The crews manned the weapons and instruments, checked orientation and synchronization, and made ready to commence firing as soon as the range was favorable.

The usual procedure when a battery picked up a target was to use radar tracking for range and optical tracking for direction. The height finder operator tracked the target in his instruments but this data was not used unless the radar became unreliable because of chaff or some other interference. In that event the altitude was set so as to remain constant until data could be sent in by the height finder, a process requiring approximately five seconds. If the aircraft was obscured from the director by clouds or white phosphorous smoke, one of two methods was used. Either the radar was used to supply all elements of data to the director or barrage fire was used. In either case the accuracy of the battery was reduced.

Defended areas were divided into sectors, one for each battery. The battery commander was free to fire on any hostile aircraft that entered the sector of the defense assigned to his battery; however, the "Flakfuehrer" ordered fire on aircraft not in his sector. It was general practice for batteries to fire on aircraft only as long as they were approaching a target. The data from the radar were plotted on a board to give the battery commander a graphical picture of the situation. It was common practice for data from neighboring batteries to be plotted on the board.

The personnel manning the Luftwaffe flak batteries were ordinarily 60 to 70 per cent German and 30 to 40 per cent Italian. The batteries at Verona were the exception, in that they were manned entirely by Italians. The majority of the German personnel had several years of experience with their equipment and was well trained and capable, though their average age was high. However, there had been some turnover in German personnel when men overage in more active units were transferred into the flak units in exchange for younger men. Turnover of Italian personnel was very high and as a result their state of training was usually low.

The Battle of the Brenner started with approximately 366 heavy guns from Verona to Innsbruck. All of these were concentrated around the four key points of Verona, Trento, Bolzano and Innsbruck. Attacks early in November and the operation "Bingo", which forced conversion from electric to steam power, convinced the Germans that attacks would continue. They immediately started building up the defenses by adding guns and redeploying others. By 7 November guns were in operation at Ala and Rovereto. Attacks of the first two weeks were confined to the lower Brenner between Verona and Trento. During this period six batteries, 42 guns, were added, but the overall Brenner line defenses remained substantially the same, as those above Trento were reduced. By 11 November, for example, enough guns had been moved to new positions that, of 18 B-25s on a mission to the Calliano rail bridge, nine aircraft were holed and one crash-landed as a result of heavy, intense, accurate flak all the way from Verona to Ala.

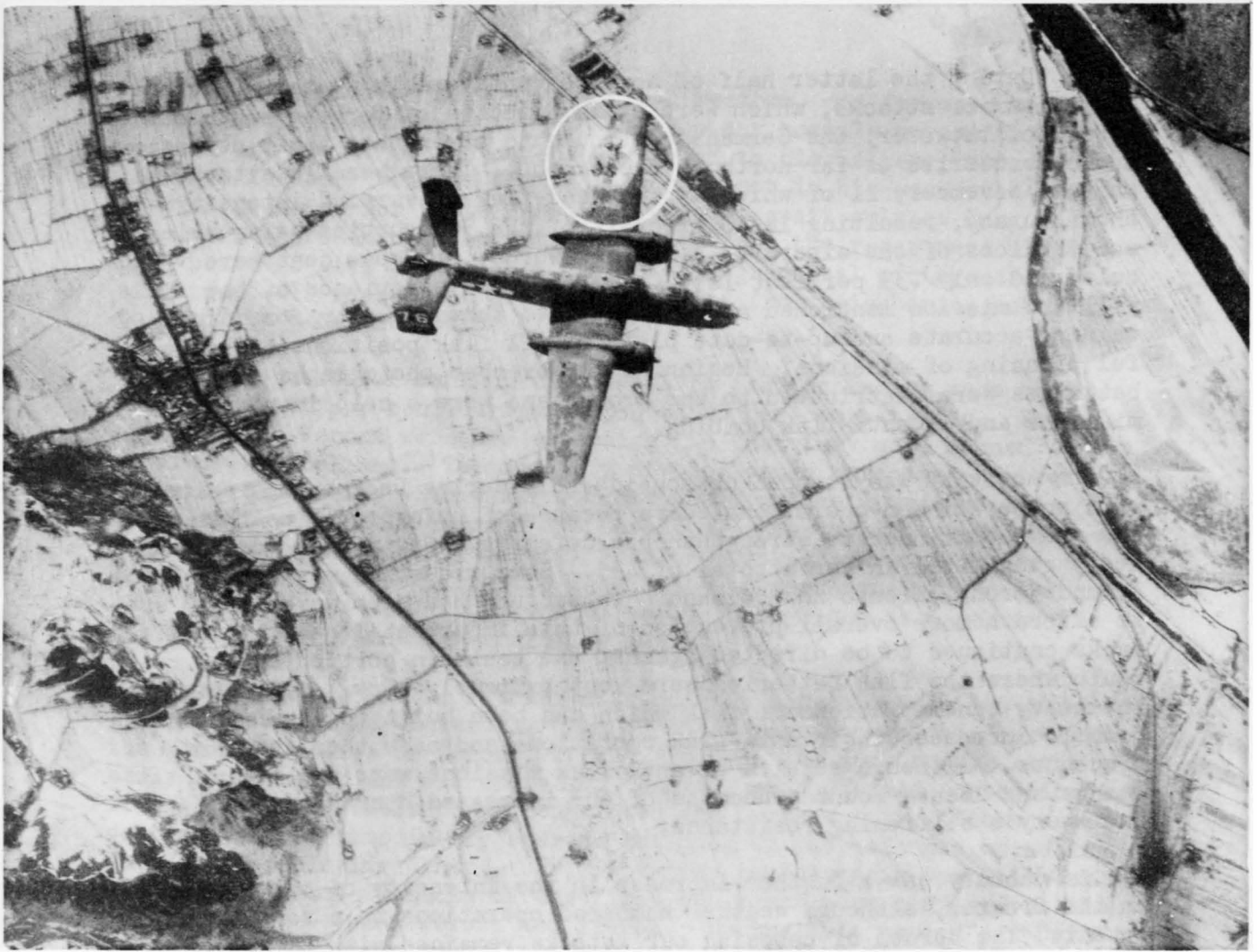


During the latter half of November unfavorable weather reduced the number of attacks, which were again directed at targets south of Rovereto. However, the Germans continued to strengthen their defenses, adding batteries as far north as Bressanone. There were 16 attacks made in November, 11 of which experienced flak of varying intensity and accuracy, resulting in 20 aircraft of the 300 sorties being holed and the loss of one aircraft. In other words, 6.67 per cent were holed and only .33 per cent lost. However, the experience of the Calliano mission mentioned above emphasized the necessity for maintaining accurate and up-to-date plots of all flak positions and careful planning of missions. Beginning in November photographs of flak batteries were distributed to the groups and were a help in planning missions and in anti-flak bombing.

Activity was stepped up considerably during December in spite of a number of non-operational days because of unfavorable weather. The enemy continued to strengthen his defenses. Sixty-nine additional heavy guns moved in for a total of 435. Some reduction was noted around Verona, Trento and Bolzano. These guns had been moved north to afford a more overall protection of this important line. All attacks continued to be directed against the southern portion of the route where the flak batteries were kept extremely busy. To counter the heavy concentrations of flak which had been built up, the medium bombers increased their anti-flak operations and made them standard procedure. Although results of anti-flak missions were gratifying, damage and losses mounted because of our increased operations and the enemy's stiffening resistance.

January saw a further increase in the intensity of our attacks on the Brenner, although weather hampered operations to a considerable extent. The burden of opposing our attacks remained with the enemy flak units. Flak-free routes to and from the targets were used which required anti-flak measures only immediately before and after the bomb run when the formations were actually within range of the guns protecting our targets. About the first of the year Air Crew Flak maps, 1:1,000,000 scale, began to be distributed in quantity to the groups for each navigator and lead pilot. The scale was ideal for use in aircraft. They proved especially useful on long range missions where any condition such as poor weather forced formations off their briefed courses. They also served as a reminder of dangerous areas pointed out in briefings. Selection of these routes and the use of anti-flak measures accounted for a continued saving to our aircraft and personnel.

The flak defenses along the Brenner pass route continued to increase slightly, although the main German effort at improving their effectiveness was in shifting the guns to more advantageous locations. A number of batteries were placed along the roads in the mountains as high above sea level as the Germans could get them. Considering the altitudes from which the B-25s bombed, this did not materially increase the range of the guns, but it did serve to eliminate some of the blind spots caused by the mountains. Also, batteries located in these rough, out-of-the-way places were difficult for anti-flak bombers to find. Batteries at Trento, Bressanone and Ponte All'Isarco were each about 3,000 feet above sea-level, while one west of Ala was approximately 4,100 feet high.



Heavy, intense and accurate flak, encountered throughout the bombing breakaway, on the 7 February attack on the Lavis rail viaduct, accounted for the large hole in the left wing of this B-25. Although reported losing altitude when last seen near the target, the plane flew for one hour and 20 minutes before the entire crew bailed out safely over Switzerland.

In January the total number of guns at Bressanone rose from 22 to 34 while at Trento the number rose from 24 to 32. Eight guns were removed from Bolzano, probably to Ora, while San Ambrogio also lost eight, probably to Verona, where an increase of eight was noted. The total for the whole route rose by 40 to 475 heavy anti-aircraft guns. Fifty-eight missions were flown, comprising 1,250 sorties. Of these, 39 formations were subjected to flak which damaged 224 B-25s (17.92 per cent) and caused the loss of five aircraft (.40 per cent).

In February the organization of the defenses against our extensive aerial operations continued to be the main problem confronting the German flak units. The gunners were being forced to share the strain of combat since their batteries were constantly brought under direct attack. Both B-25s and fighter bombers were being used to destroy and harass flak units. No longer were units, placed outside the normal bomb pattern area, safe. It seemed that the enemy was making a frantic search for something new to bolster his defenses. Reports of what were thought to be rocket projectiles and other types of pyrotechnics came from crew members on several occasions. Since the surrender, however, German prisoners have denied that they ever used anything but the usual type of projectile with either black or red bursts.

As a result of the increased flak defenses and the successes achieved on the lower Brenner, our bombers began attacking bridges further to the north. To counter this, more batteries from the southern section of the line were shifted north. This was evidenced by the removal of the following guns: 24 from Peschiera, six from Belluno Veronese, and six of 18 from Brantino Belluno. Decreases of six at Bolzano and 10 at Ora were also made. On the other hand the number of heavy guns at Trento rose from 32 to 42, at Laion from six to 16, and at Bressanone from 34 to 44. New batteries also appeared, including 12 heavy guns at Castelrotto, 20 heavy guns at Lavis and four heavy guns at Brennero. At San Michele a certain amount of anti-aircraft protection was received for the first time from these new guns at Lavis. As a result our B-25s experienced more opposition when attacking the San Michele bridge than formerly. The overall change was an addition of seven heavy guns, making a total for the line of 482. This was more than one-half of all the remaining guns in Italy.

The stepped-up frequency of the medium bomber attacks during February is indicated by 82 missions flown against Brenner pass route targets. These comprised 1,771 sorties. Of the 82 attacks, 62 were subjected to anti-aircraft fire which caused damage to 305 B-25s (17.22 per cent) and resulted in the loss of 14 aircraft (.79 per cent).

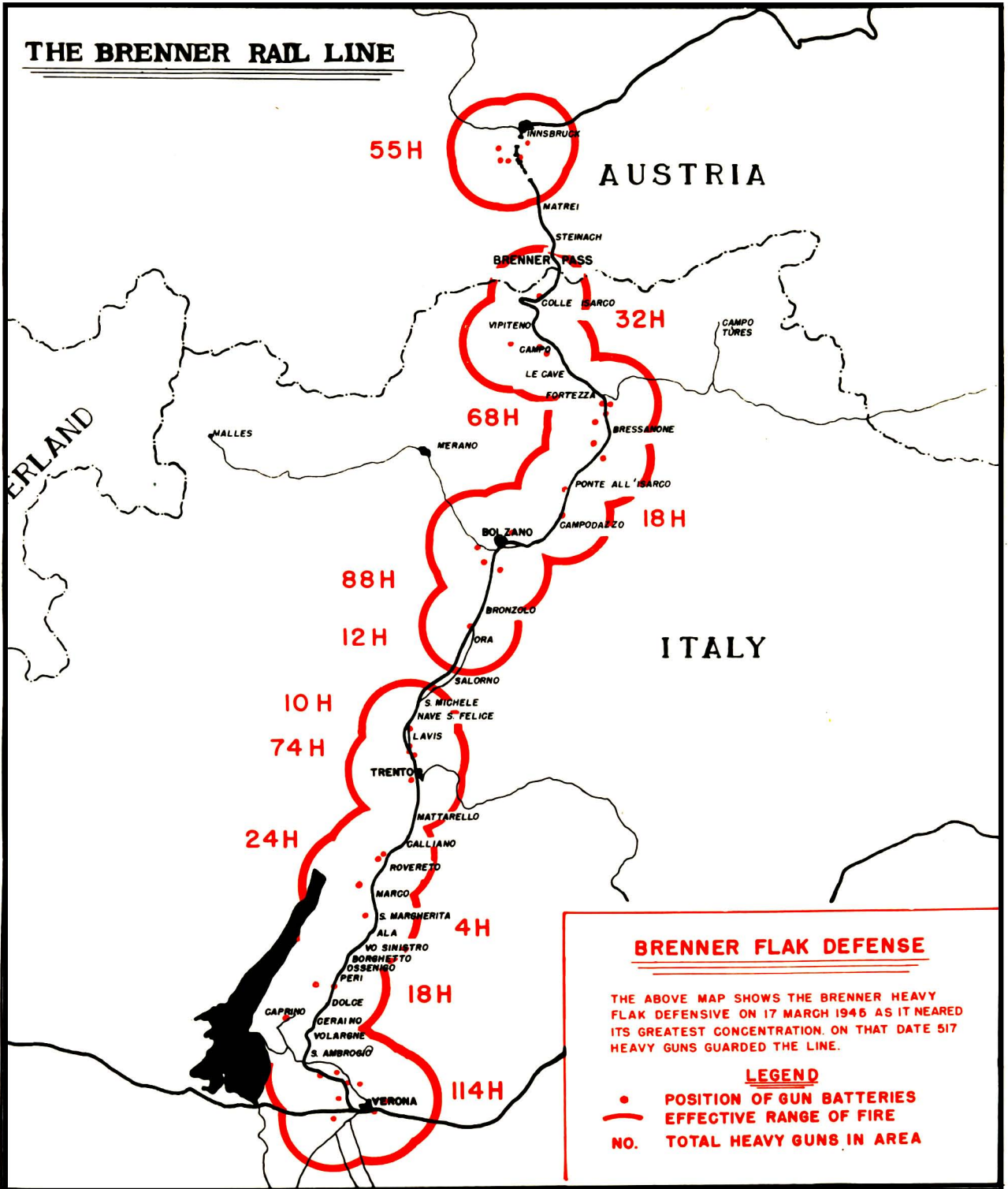
The peak in intensity of our bombing was reached during the month of March when excellent weather prevailed. The continued careful selection of targets, planning of flak-free routes, flak evasion tactics and anti-flak measures paid large dividends. March not only saw the greatest number of Brenner attacks, but also the selection of targets was extended to those on the upper Brenner, including targets in Austria for the first time. This was done both to extend the zone of interdiction and also to find undefended targets. While every effort was made to find flak-free targets, it should be pointed out that this consideration did not prevent formations from being dispatched if the destruction of a target were essential. In addition, no formation was ever turned back by intense, accurate flak without dropping its bombs.

As long as our bombers were based on Corsica, they almost invariably followed a route to and from the Brenner which crossed the coast near Levanto. Day after day several formations would make landfall at this point. Although it was a direct route, the Germans never made any effort to defend the coast line and force our bombers to take a longer, less efficient route. From that point the bombers ordinarily flew an almost straight course to Lake Garda and up either the east or the west side of the rail line to their I.P.. After 57 Bomb Wing moved to Italy, 7 April, 1945, a different route was planned. From base the formations would go out over the Adriatic and make landfall on the Italian coast in the vicinity of Caorle or they would cross over to the center of Lake Marano. The Adriatic coast was much more heavily defended and only presented a few narrow flak-free corridors. Before long a four-gun battery was emplaced at San Stino di Livenza which cut down the corridor and necessitated very careful navigation. North of Pordenone the route became clear. Either a reciprocal return route was used or the formations, after crossing the Brenner line, could proceed south on the west side of the valley, circle the battle area and return to base. Thus it is seen that though some problems were encountered in route flak it was seldom a major problem.

Concrete evidence that our anti-flak missions were having a positive effect upon the enemy's anti-aircraft tactics was demonstrated by the fact that German battery commanders began to use camouflage as a passive defense for the protection of their gun batteries. They transplanted trees and shrubs around batteries originally emplaced without any form of camouflage. Since this type of camouflage does not present much of an obstacle to accurate photo interpretation, it was evident that the enemy hoped to confuse or mislead the bombardier in the anti-flak element by increasing the problem of target recognition. A striking example of tree camouflage and a demonstration of the enemy's intent to reduce the effectiveness of anti-flak bombing was shown north of Lavis. On 26 February, photo interpretation showed the six-gun position to be entirely without camouflage. On 7 March a different story was revealed when photos showed the original guns still present, four additional guns and the entire position skillfully shrouded by a seemingly natural continuation of a nearby forest. Obviously this deception did not mislead photo interpretation, but it was confusing to a flight whose mission was to shower the position with well-placed phosphorus bombs. Other batteries along the Brenner line later resorted to the same type of camouflage. At Campo an eight gun battery and later an additional six gun battery employed tree camouflage. An eight gun battery at Vipiteno and a position of 12 heavy guns at Bressanone likewise adopted this type of deception. Reports of the Germans' employment of various unusual types of flak continued to come in during March but again none of our aircraft suffered damage from these strange bursts.

For the fifth consecutive month, March showed a steady increase in flak along the Brenner route, with especially heavy reinforcing of the defenses in the north. The defenses of Bressanone rose from 44 to

THE BRENNER RAIL LINE



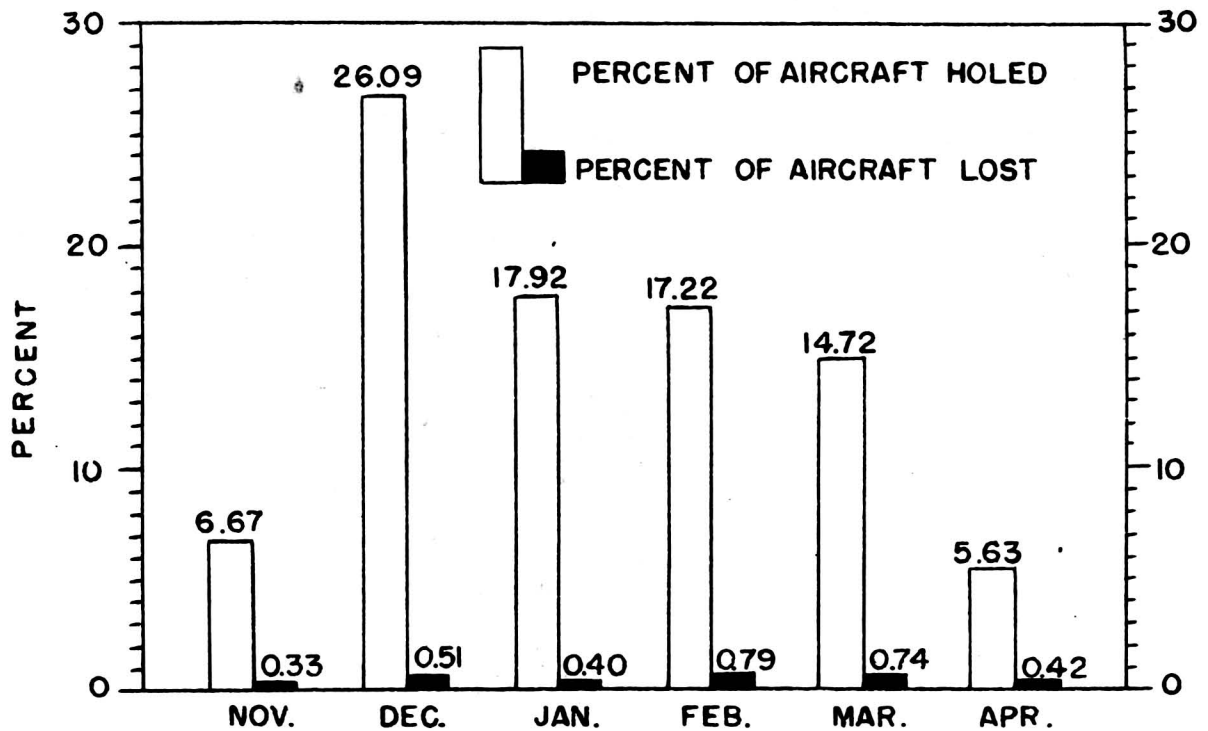
BRENNER FLAK DEFENSE

THE ABOVE MAP SHOWS THE BRENNER HEAVY FLAK DEFENSIVE ON 17 MARCH 1945 AS IT NEARED ITS GREATEST CONCENTRATION. ON THAT DATE 517 HEAVY GUNS GUARDED THE LINE.

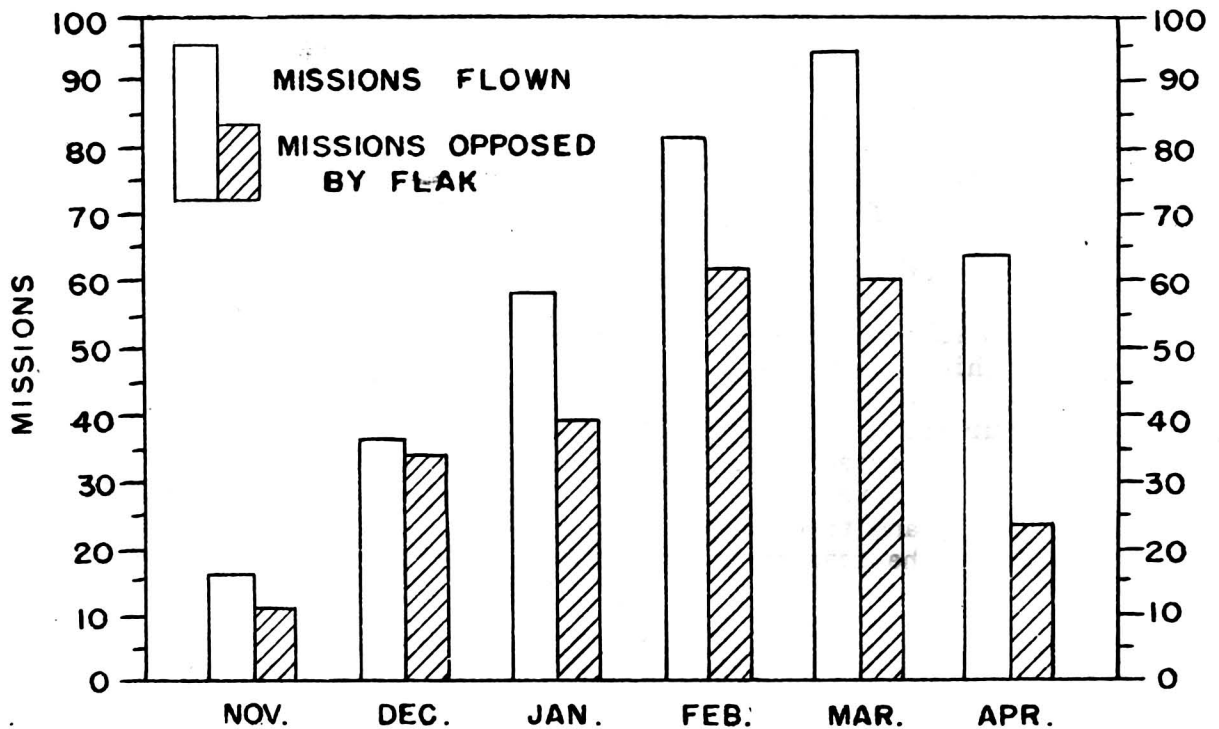
LEGEND

- POSITION OF GUN BATTERIES
- EFFECTIVE RANGE OF FIRE
- NO. TOTAL HEAVY GUNS IN AREA

PERCENT OF AIRCRAFT LOST & DAMAGED DUE TO FLAK



FLAK OPPOSITION TO BRENNER ATTACKS



68 guns; at Campo di Trens there was an increase from eight to 20 heavy guns; at Bolzano one four-gun battery was emplaced to bring the total to 88 heavy guns. Reduction in heavy flak occurred at Ora where 10 heavy guns were removed, leaving 12, and at Ala where eight heavy guns were moved out leaving only eight. In all, 43 heavy guns were added to the Brenner defense system, which brought it to its maximum strength of 525.

In spite of the extent of our operations, which included 96 Brenner missions, the percentage of aircraft damaged and lost because of flak fell below that of February. Only 58 of the 96 missions were subjected to flak. Sorties to the Brenner totaled 1,895 and of these, 279 aircraft, or 14.72 per cent, were damaged and 14 B-25s, or .74 per cent, were lost as a result of flak damage.

With April came the ground offensive in Italy. Although attacks on the Brenner continued in force, they were necessarily reduced from the March activity in order to give close support to the ground forces. During April, especially the latter part, many guns were moved from all parts of the Brenner line. Verona lost 18 heavy flak guns, leaving 84. Dolce lost all six guns. Ala's defenses rose from four to 10 guns temporarily, but finally all 10 were removed. Mori was reduced to none by the loss of eight. Rovereto's defenses were cut by six to only eight guns. Trento suffered a loss of 24 guns, 50 remaining. Twenty-six guns were taken from Bolzano's defenses. Of 30 guns Bressanone gave up 18. Innsbruck took a cut of 29 guns from 71 to 42. Ponte All'Isarco was alone in gaining 12 new heavy guns. This loss of 129 guns left at the end of April, virtually the end of the campaign, 296 heavy anti-aircraft guns. During this period it became more and more apparent that our mission to interdict the Brenner pass route had been accomplished and that the Germans were finally about to concede that it was hopeless to endeavor to keep it open. There were ground source reports indicating that the enemy was running short of ammunition for his anti-aircraft guns, and prisoners of war have stated that Italy was only allotted 2,000 rounds per day. However, the guns which remained never failed to give an excellent account of themselves when given the opportunity. The only indication of a shortage of shells was the fact that the Germans usually held their fire until the formations were well within range. However, they always opened fire when a formation passed within extreme range en route to its target.

Sixty-four separate attacks were made during April, but only 25, or the smallest percentage for any month, were opposed by flak. These missions constituted 1,190 sorties with damage to 87 B-25s or only 5.63 per cent, and five, or 0.42 per cent, were damaged seriously enough to cause the loss of the aircraft.

Throughout the entire six months of the campaign against the Brenner, the Germans continually improved their defenses and at the same time our effort was doubled and redoubled. In almost all instances the type of fire used by the enemy was "continuously pointed" which is the most effective type. Only rarely, when phosphorus smoke interfered with visual tracking but the gun positions were not directly hit, were there any reports of the less effective types of fire, either "predicted concentration" or "barrage", being resorted to by the Germans. Regardless of these facts, it should be noted that for the last three months the percentage of missions encountering flak was reduced. Also percentage of aircraft damaged showed a decline each month since December. A loss of less than one per cent was maintained throughout. This record can only be attributed to the careful study of the enemy's flak potential by operations and intelligence personnel which made possible the correct selection of targets, the planning of flak-free routes to and from the targets, the best possible evasive tactics at the target and the employment of the most effective anti-flak measures consistent with accurate bombing.

The mission of flak intelligence was accomplished by means of a broad program. Most of the factual information as to the exact number and location of gun positions originated with photographic interpretation in the Third Photographic Group Reconnaissance as directed by the Mediterranean Allied Tactical Air Force. This was augmented by interpretation of bomb strike photos within the groups and Wing and by interrogation of crew members. The information was compiled and continually kept up to date by all units. Flak maps, scale 1:100,000 were periodically published by the Third Photo Group as a check on the uniformity of the records of these units. Air Crew Flak maps, scale 1:1,000,000, were also published by the Third Photographic Group from time to time as changes in the situation warranted their issue. The up-to-the-minute situation was kept readily available and posted on large war-room flak maps for use in planning all phases of future missions. Analyses of gun defenses were made for all targets where deemed necessary. Records of flak experiences and statistics of results of all missions were kept for future planning. The results achieved in the interdiction campaign of the vital Brenner pass line and the saving in crews and aircraft amply justified this expenditure of effort by flak intelligence personnel.



ENEMY MAINTENANCE

Our interdiction program on the Brenner was hindered by the natural difficulties of terrain and weather. Of the active defensive measures taken by the enemy, flak was constantly dangerous and smoke-screens and fighters were occasionally a threat. Our last major adversary was the enemy's repair system. In the early days of the attacks on rail communications it had not been necessary for the enemy to devote large numbers of men and quantities of equipment to rail maintenance and repairs. However, as the attacks moved north and bombing accuracy reached its peak, it became necessary for the enemy to develop a large and complex system of rail repair and maintenance. It was to be expected that the enemy's greatest repair effort should be expended on the Brenner pass line.

In general, bridges were the most difficult part of the rail line to repair. Experience showed that the higher the bridge and the longer the span, the more difficult and lengthy were repairs. Bridges

in Italy 60 to 70 feet high and with a span length of over 90 feet presented a serious problem to repair crews, because it was difficult to construct piers of that height. Unfortunately there were no bridges of this type on the Brenner; as a result even if a bridge were destroyed, repair crews were seldom faced with a lengthy or difficult repair job.

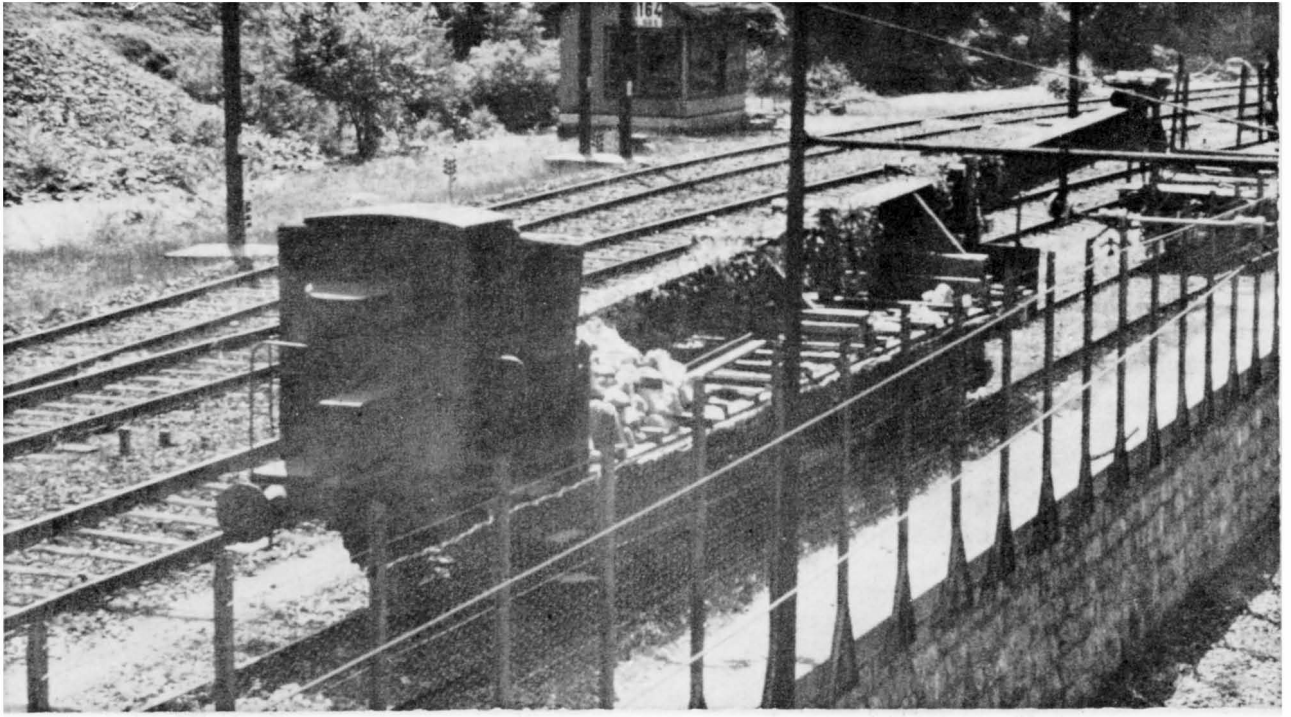
On the Brenner line the enemy maintained a well-equipped and well-manned repair organization. His units were dispersed over the line in such a way that specific points of damage could be reached in the shortest possible time. In addition repair trains were employed to rush men and equipment to blocks in the line. According to prisoner of war information and analysis by photographic interpretation these trains were made up approximately as follows:

1. One car for administration and repair files and from three to nine expert technicians.
2. Two to four workshop cars for welding equipment, tools, spare parts, switches, etc.
3. One to two cars for quarters and kitchen facilities.
4. One to two flat cars for spare rails and ties and girders and other replacement parts.
5. One to two hopper cars for cement, gravel and stone blocks, for fill and track bed construction.

It was reported that often two trains approached the damaged area from either side, so that work could begin on each side of the damaged section simultaneously. In some cases small emergency trains carrying unskilled workers were dispatched to the scene of damage prior to the completely equipped train; in such a case they cleared the rubble and completed other preparatory tasks, enabling the repairs to begin immediately upon the arrival of the expert crews.

The railway crane, one of the most important pieces of repair equipment, was invaluable in handling heavy spans or prefabricated piers. The typical crane featured a long boom, varying in length from 100 to 150 feet. One or sometimes two standard flat cars, in addition to the cab car which housed the machinery, were usually distinguishable at the base of the boom. The long shadow cast by the boom when mounted was distinctive and facilitated its identification. When in a traveling position the boom was lowered on flat cars. Its shadow in this position is similar to that of a girder, and unless the photographs were of large scale it was difficult to recognize.

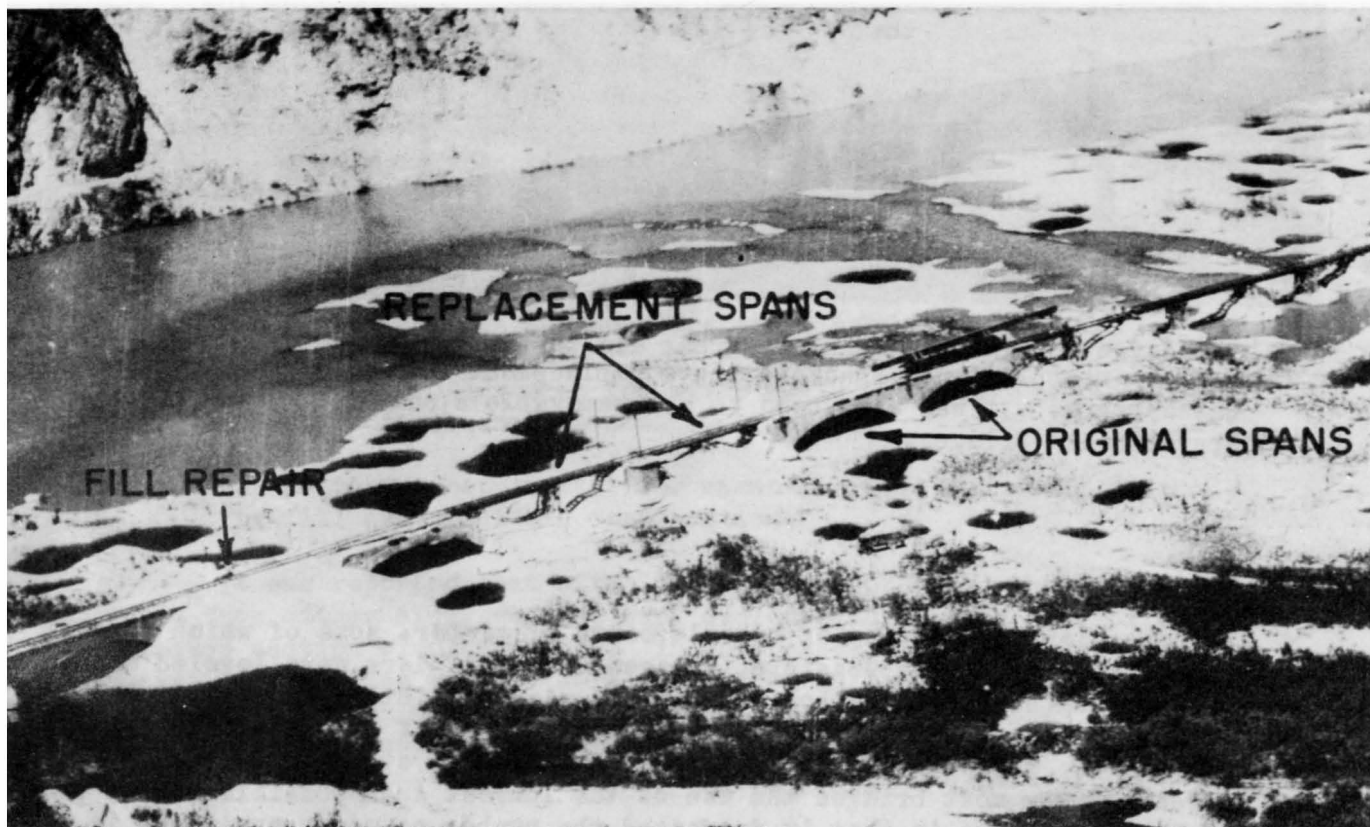
Repairs to piers were the most difficult part of bridge repair and were accomplished in most cases by the erection of sub-



The large railroad crane was a great aid to the enemy in bridge repair, particularly in handling heavy replacement spans and prefabricated piers. It was also used to set removable spans in "night operational" bridges.

stitute piers consisting of trestle bents of timber, some of which were pre-fabricated. When possible, damaged original piers were leveled and trestle bents placed thereon or a wooden pier consisting of crosslaying of timbers was built to the desired height on top of the cleared original piers. These substitute piers were spanned by steel I-beams or girders. For most bridges the use of the longest span possible had an obvious advantage in that it decreased the number of necessary piers in the gap. The advantage thus gained was appreciable, since the most difficult and lengthy job in bridge repair was the erection of the piers. A long span had its limitations, however, since its weight increased out of proportion to its length. Not only did this involve economy in the use of steel, but eliminated setting a large, heavy span in place. In north Italy, it was found that the length of span varied, in general, directly with the height of the pier. For bridges on the Brenner the length of span most commonly utilized was between 40 and 60 feet. This was apparently the longest girder which could be readily handled with available equipment, and which still reduced the number of piers to be erected following an attack. In a few cases destroyed spans crossing dry river beds were replaced by fills. The advantage gained here, notably at Lavis and Calliano, was that fills were considerably easier to repair than bridges.

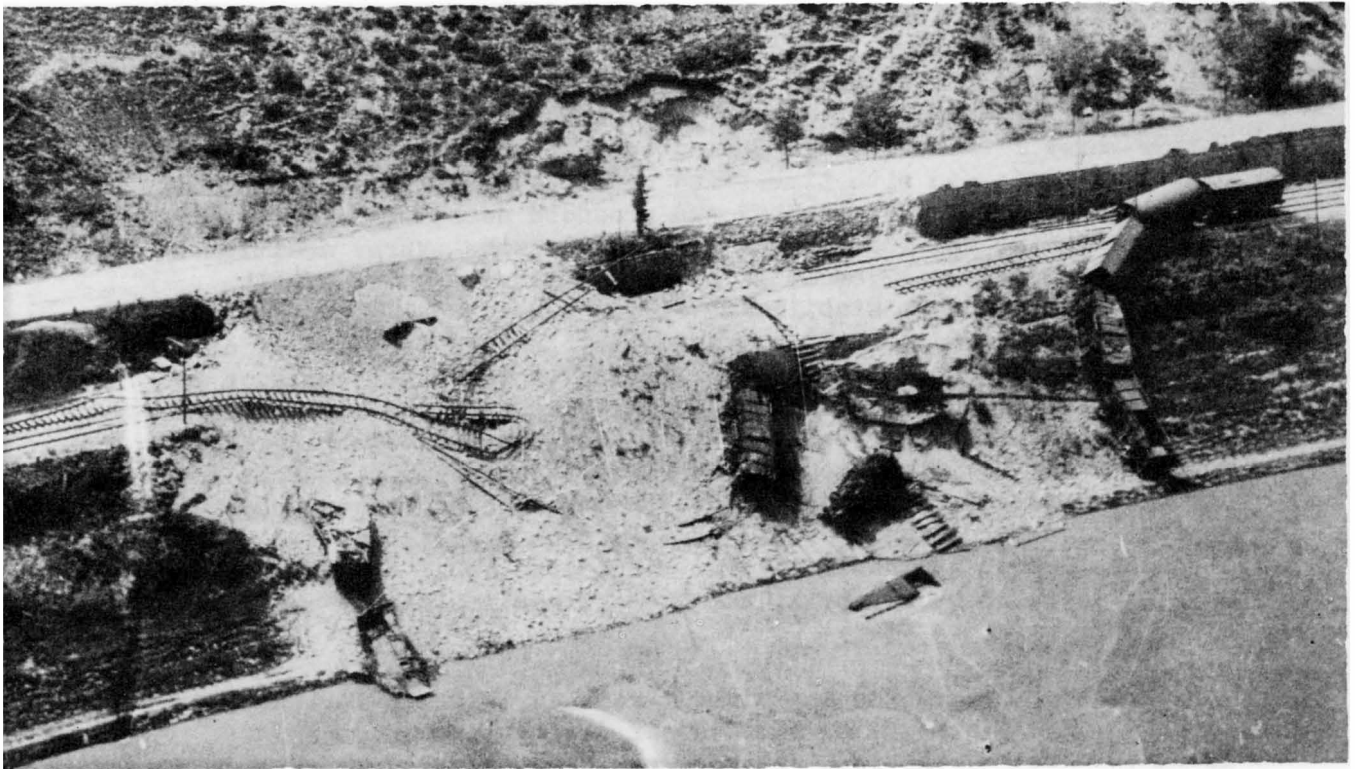
As a general rule repair on the Brenner enjoyed a first priority in the enemy's repair efforts and it was not until March and April, 1945, that it definitely appeared that the large number of attacks was swamping the enemy's repair facilities. There were cases, notably at the Lavis viaduct and San Michele bridge, where repairs lagged considerably but it will be remembered that these targets were by-passed with diversions. The first priority repair effort was generally expended on the diversions as they were in all cases easier to repair.



The Lavis viaduct offers an interesting study of Brenner bridge repairs. In the center of the above photograph are seen two of the original 35 masonry spans. Farther to the left two original spans have been destroyed and replaced by typical repair spans. These spans are approximately 40 feet long, are made of steel I-beams and are supported at their junction by trestle bents. The destroyed span at the left of the photo has been replaced by a fill. Note that the joint pier of two replacement spans is supported by a fill.

Because of flak and terrain difficulties and the small number of suitable medium bombardment targets, our interdiction program on the Brenner was of necessity based, first, on the destruction of small bridges and, second, on the cratering of fills. As a general rule it may be said that four to seven days were required to repair a typical Brenner bridge if one or more spans and an included pier were destroyed. There were a few examples at Vipitene, Rovereto and Calliano when

damage was more rapidly repaired; in a few cases repair required more than seven days. However, a four to seven day repair expectancy proved reliable. Fills and cratered approaches to bridges could be repaired in only a few hours and under normal conditions did not require more than 24 hours to repair. Exceptions to this general rule were observed throughout the winter and increased in March and April. Fills very heavily cratered with six or eight or more direct hits often required more than 24 hours to repair. When a large number of attacks fell along a short section of line, the same delay was often noted. Such a condition delayed repairs, as crews were forced to start at the ends and work toward the middle of the damaged section, and it also overburdened existing repair facilities in the immediate area of the points of damage. Pre-fabricated bridge sections were occasionally used to span craters, notably at Roverete and San Michele.

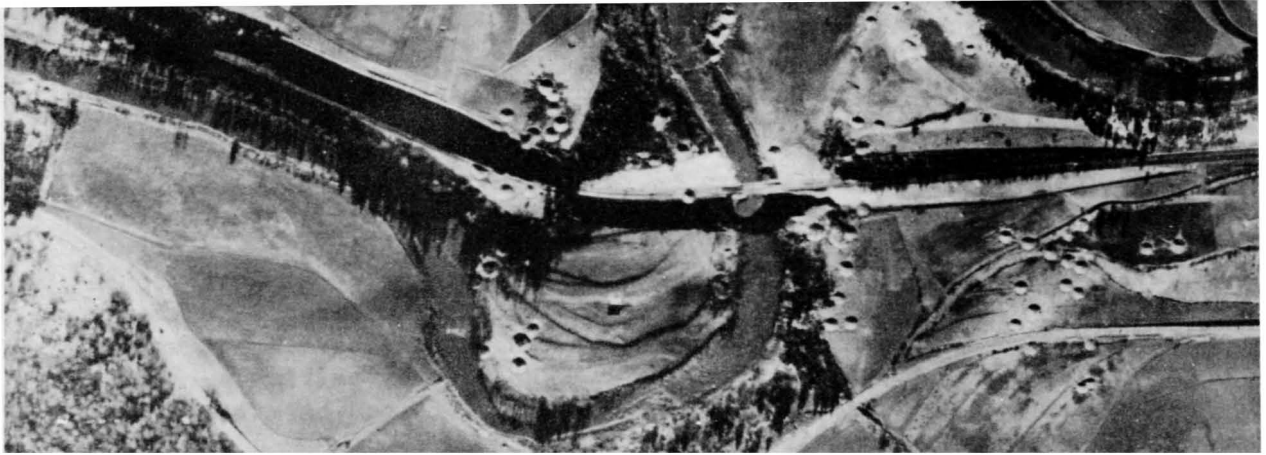


This photograph shows a lower Brenner fill cut by a direct hit. Damage of this type target was repaired in a few hours.

Two factors contributed to the repair difficulties the enemy encountered in March and April. First was the increased tempo of our attacks, which overburdened existing repair facilities and greatly extended the area of repair. Second was the spring high-water table which imposed severe difficulties on repair crews in their effort to stabilize cratered rail fills and approaches. In

the spring rain water and melted snow from the slope along the Bremner line caused a considerable rise in the level of the Adige river and its tributary streams and canals. In certain cases, when the flat valley floor lacked natural drainage, a high-water table resulted. The San Michele north rail bridge is a good example of the difficulties encountered in repairing lines where water-logged conditions existed. This bridge was a single-span, 100-foot steel girder bridge. Both approaches were over embankments. It was attacked on 31 March when the following damage was inflicted; the north abutment was destroyed; the 100-foot span was severely damaged; the approaches were cratered. By 4 April the damaged span had been removed and the north abutment rebuilt and set forward 50 feet from its original position. The south approach was repaired and craters in north approach were approximately half-filled. The north and south abutments were again destroyed on 4 April and approaches again cratered. Based on previous experience with repair to similar damage, the time estimated to make the bridge serviceable was three to four days. However, on cover 8 April the ground was still water-logged and seven gondolas loaded with coarse ballast for the rail bed had been moved up to the south approach. On 12 April it was seen that of the seven ballast wagons present on 8 April, three remained. This indicated that some ballast was used, probably reinforced with timber and rails, as was the general rule in such cases, but was absorbed and produced no stabilizing effect. The repair time was extended an additional week. Three additional ballast wagons were moved in on 12 April making a total of six present, but still no stabilizing effect was noted. Between photo cover of 18 and 20 April it appeared that the construction of abutments had been completed and some filling of the south approach had been made. On 22 April no additional repair progress had been made but the high water was beginning to recede and the water-logged condition was no longer acute. By 24 April the single 50-foot span had been laid and filling of the north approach had begun; however, no further progress on the fill of the south approach was noted. It was estimated at this date that the bridge could possibly be made serviceable by 25 April, but it remained impassable until the end of the war.

Photographs of the San Michele rail diversion bridge dated 17 March, 1945, showed the same repair difficulty encountered. About 400 feet of the fill had been cratered, part of it that day and part by previous attacks. Though repairs were started by the following day, they still had not been completed by the end of the month. On photo cover of 30 March it was seen that a new rail bed was being built alongside the badly mauled existing bed. This, together with the water-filled craters and the water-logged appearance of the fill, was regarded as strong indication that the extreme slowness of repairs could be attributed to the enemy's inability to provide a satisfactory foundation for the rail bed. By 2 April the new rail bed had been almost repaired, though the tracks were not laid, and it appeared as though it were being allowed to dry before



The top photo shows Campo rail bridge prior to attack by B-25s. The second photo shows the destroyed bridge the day after the successful attack on 21 April. The bottom photo shows the bridge repaired and passable nine days later. Repairs here were carried out by the typical construction of an intermediate pier and the laying of 60-foot repair spans.

subjecting it to rail traffic. It was attacked the same day, however, and on several subsequent days within a week. On 11 April repairs were again pressed, and finally on 17 April the line was made serviceable after having been out for over a month. Similar water-logged conditions were noted elsewhere on the Ora-San Michele complex, notably at the Salerno fill and Salerno station bridge. By attacking these two targets the San Michele block received additional reinforcement. To a lesser extent the same condition was noted at Rovereto on the lower Brenner. Although part of the slowness of repair in the illustrations may well be attributed to the overall strain put on the enemy's facilities, no small part of the delay in repairing certain cratered approaches and fills on the Brenner line can be attributed to the water-logged condition of the soil.

In the case of bridges that were particularly vulnerable because of their height or length, considerable emphasis was placed on the construction of diversions by-passing these vulnerable targets. On the middle Brenner, between Trento and Bolzano, diversions were built at Lavis, between San Michele and Ora, and at Bolzano. The absence of diversions south of Trento is explained in part by the existence of a by-pass line from Trento southeast to Cittadella and, more important, by the presence of short, easily repaired bridges in this section.

The construction of the Lavis diversion was begun in May, 1944, and completed by October, 1944. It was built to by-pass the vulnerable 35-span viaduct at Lavis. Over 90 per cent of the diversion was across easily repaired fill, and two short spans, separated by an island, across the water-gaps were the only vulnerable part of the diversion. The spans of this diversion bridge were supported at short intervals by timber piers set on mud-sills to insure their stability. The advantage of this type of construction was that a long bridge structure was eliminated by the fill embankments over the dry river bed. In addition, short piers, roughly four to six feet over mean water level, were relatively easy to erect and, because the spans were short, could be bridged by light structural members. It was found that cuts in the embankment were repaired in a very few hours, while a single hit on the structure, assuming a pier was destroyed, could be repaired in about one week. The 15-mile Ora-San Michele rail diversion, built along the east bank of the Adige river, reportedly by the cumulative efforts of 5,000 men, was completed on 6 December. Unfortunately the diversion offered few vulnerable targets. The most-attacked target on the diversion line was the San Michele rail diversion bridge. At first the damage inflicted here was quickly repaired and craters in the embanked approaches were filled within a few hours. Fill material for the embankment was accessible at a nearby stone quarry, and the low trestle bents and short spans required could be replaced within approximately three days. Later, however, considerable repair difficulty was encountered because of repeated attacks which pulverized the road bed and surrounding area, and the water-logged condition of the soil.



The 60-foot San Michele north bridge was destroyed by B-25s on 5 April. The insert above shows the bridge prior to attack. Repair at this target was hindered by the water-logged condition of the ground. Note water in the craters.

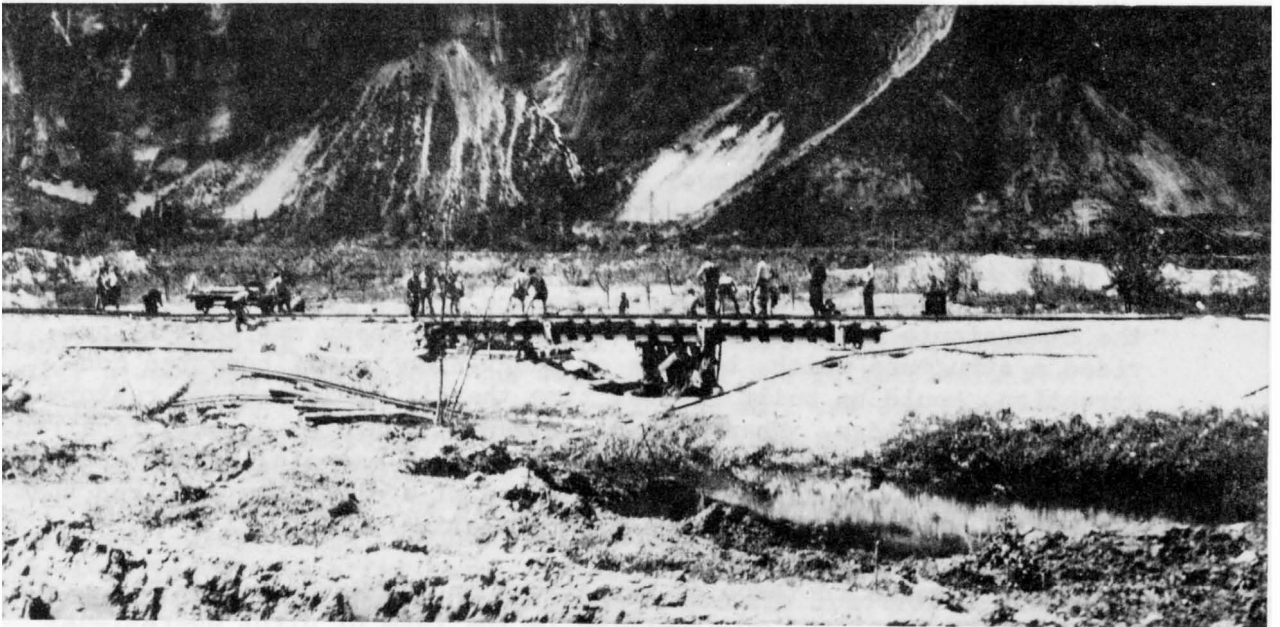
It is undoubtedly true that advantages accrued to the enemy by his use of diversions as a countermeasure. As a replacement bridge, the diversion's most appreciable value to the enemy was that it provided a structure which, because of short-span low-silhouetted construction, could be built in less time than it would take to restore the original bridge. When it was damaged it could be quickly repaired by the use of relatively light, easily-handled materials and standard repair methods. In addition the presence of a diversion required that two bridges be cut to block the line effectively.

The increase in tempo of our attack on the Brenner line was partially met by an attempted deception in the form of night operational bridges. These were bridges from which spans were removed to make them appear unserviceable, but which were quickly made serviceable again at such time as was desired. Because of the missing spans, these bridges appeared to be damaged to our air crews who, unless they had been briefed on this deception, might have withheld attack in

favor of attacking other obviously serviceable but less important bridges.

The pattern by which a night operational bridge revealed itself to photographic interpretation was so consistently similar as to make its existence readily apparent:

1. It was usually first detected by removal of a span or spans.
2. Subsequent damage was consistently repaired although the missing span or spans were not replaced during the day.
3. The bridge was invariably a vital link in a line on which all other bridges were repaired following attack.
4. The spans were the standard girder type used by the enemy for construction and repair of bridges on the Brenner. They were usually of such length that they could either be set manually or with a crane. In the latter case, the crane was often visible.
5. Although inactive rolling stock was sometimes kept on the approaches to create the impression of a block, at least a single track was kept clear.
6. Activity studies showed movement of rolling stock on the lines on either side of the bridge.

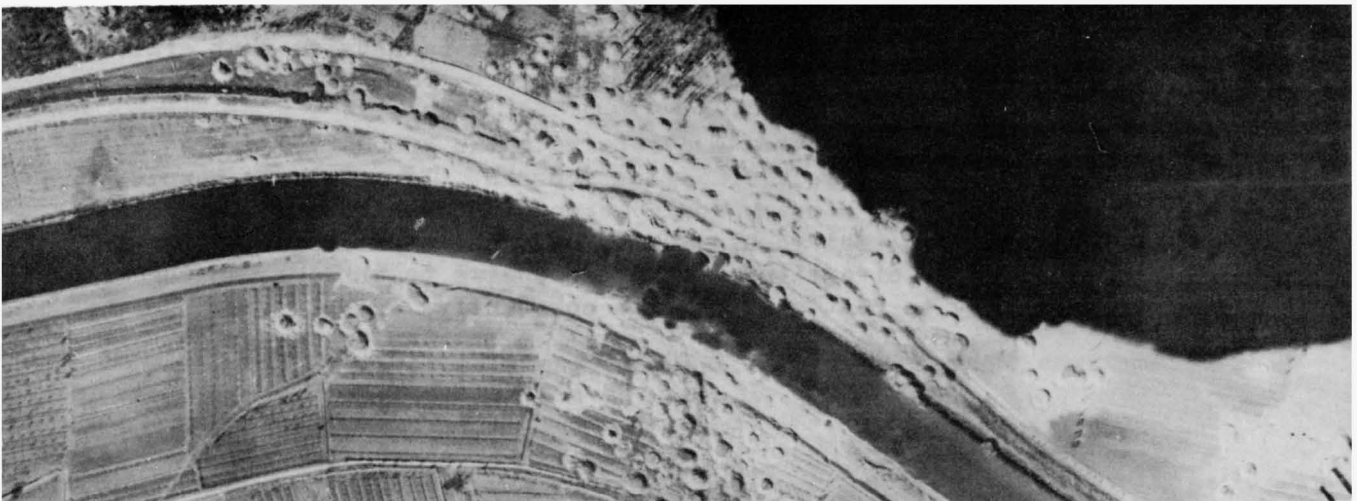
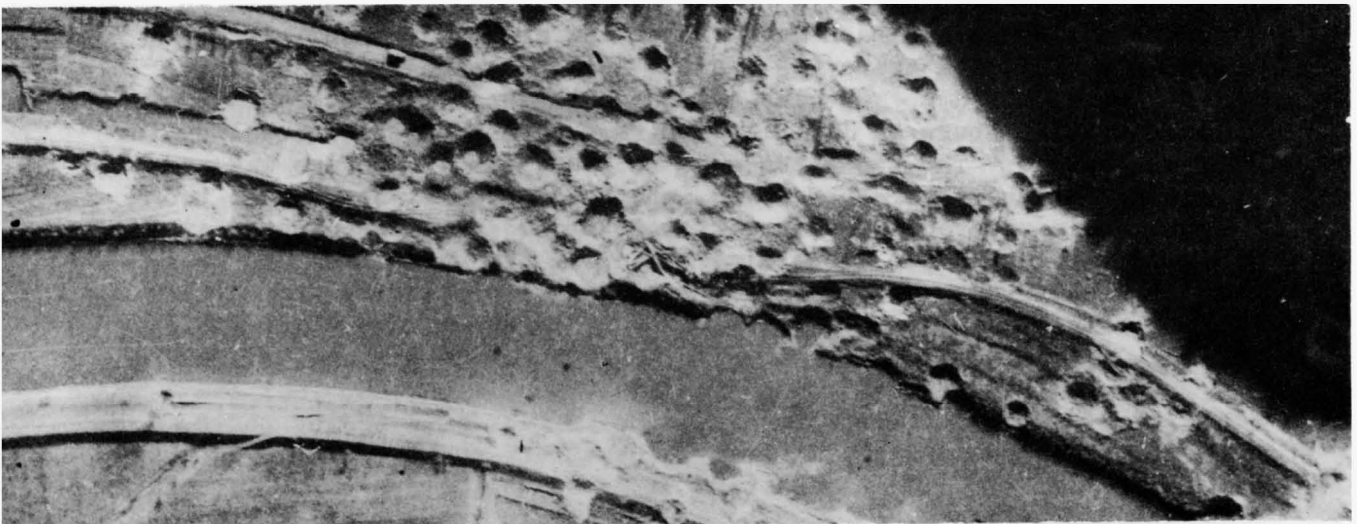
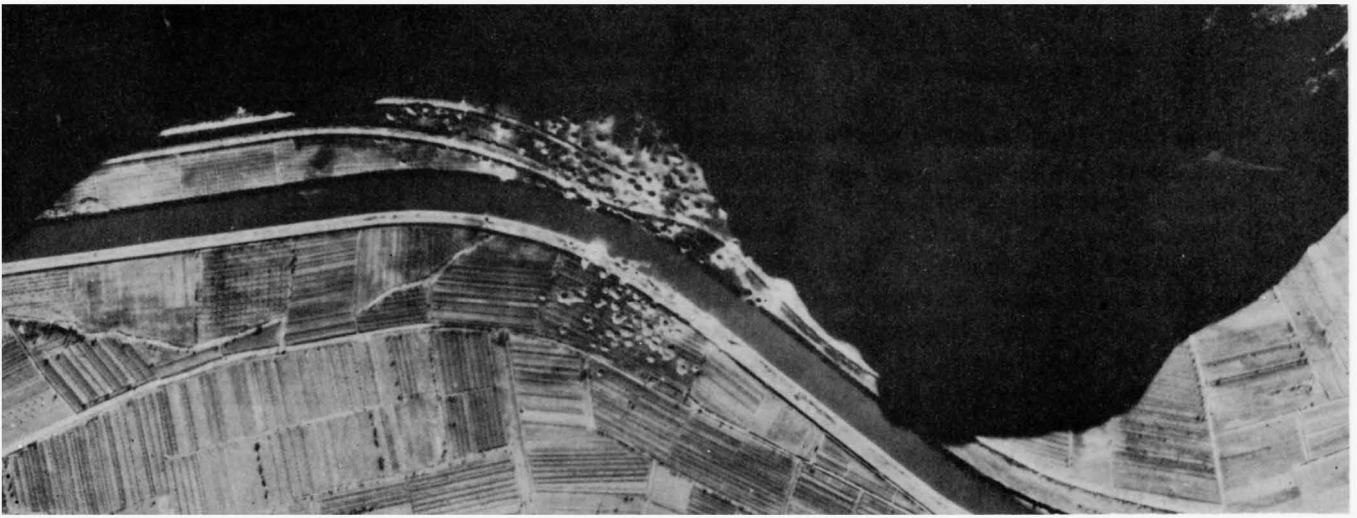


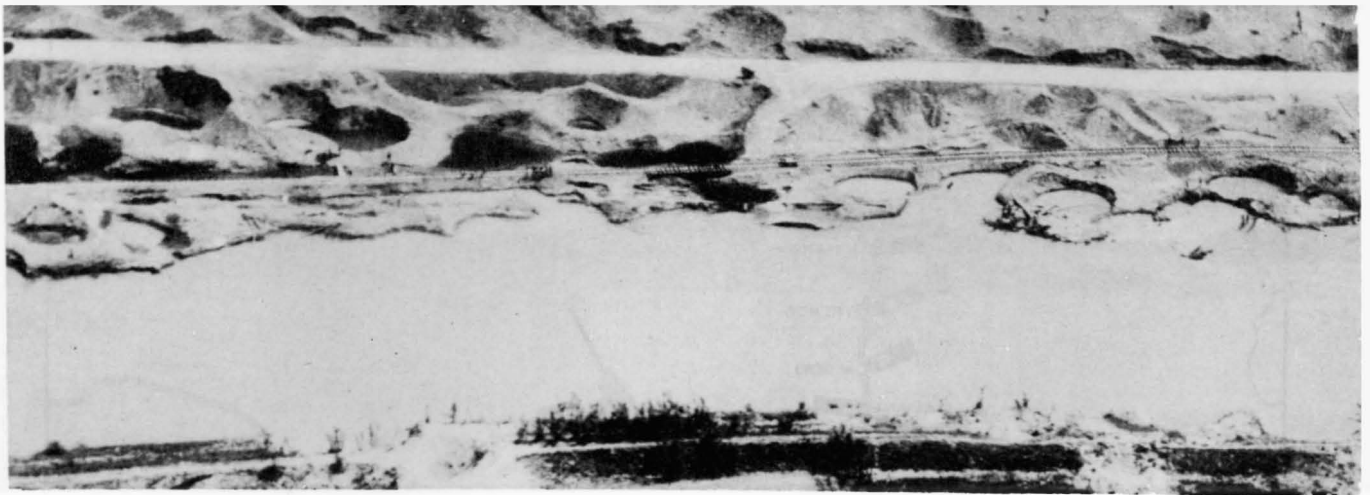
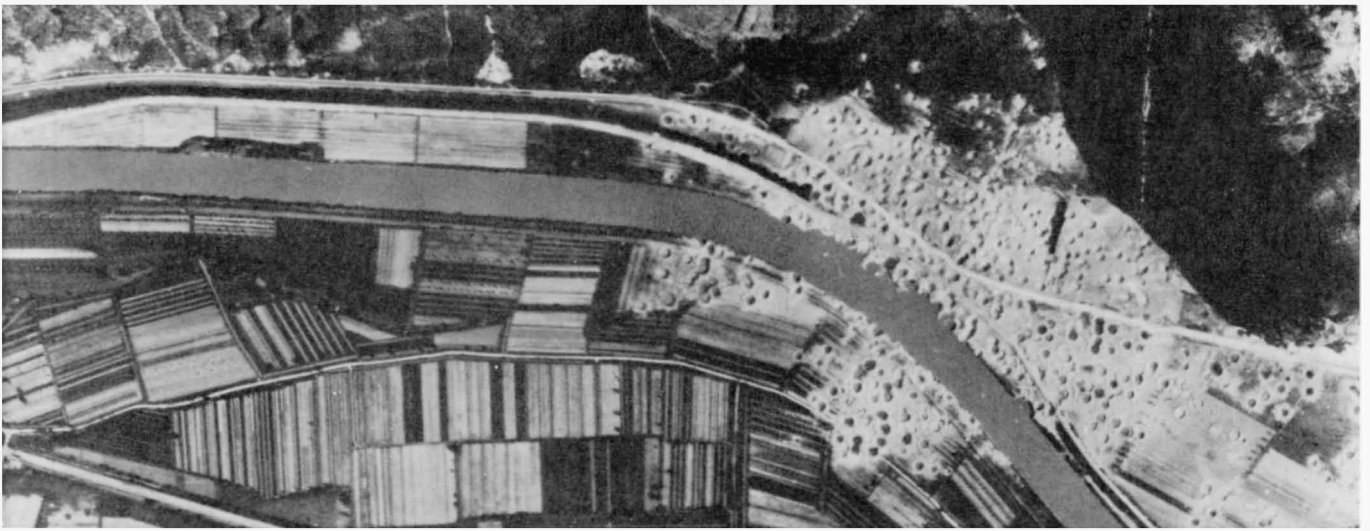
Short spans, such as this one on the lower Brenner, were sometimes employed to bridge craters in an unstable rail bed.

At Verona-Parona an attempt at deception was noted when the bridge was severely damaged in an attack by 15 Air Force on 28 February. On 3 March repairs were under way and it was noted three or four flat cars, two or three girders and a large railway crane were present on the south approach. The crane was assumed to be the one usually present at Peschiera marshalling yard, since cover of Peschiera revealed the crane no longer present in the yards. The bridge was made serviceable again in about six days and the crane returned to Peschiera. Two attacks on 9 and 10 March again severely damaged the bridge. On cover of 15 March the crane had again arrived from Peschiera and repairs were well under way. It was estimated the bridge would be serviceable on 18 or 19 March. On cover of 20 March however, the bridge was still impassable with the 60-foot span, second from the north end of the bridge, remaining out. By 31 March a second 60-foot span had been removed from the north end of the bridge and it was thought possible that the repairs were deliberately held up awaiting the completion of repairs six miles northwest at San Ambrogio. However, the night operational pattern was clearly evident and an additional crane had been moved in on the north approach. It was probable that each crane was used to set one span, thus shortening the time required to make the bridge operational. Night photos taken at 2150 hours on 1 April confirmed the night operational status of the bridge. The two spans were in place and the bridge was passable to single-line traffic. However, photos of 4 April showed the two spans again removed. Similar attempts at deception were noted at the Ala, Rovereto and San Michele mainbridges. In some cases the enemy deliberately removed a span from a bridge to protect it from attack. For example, the Rovereto rail bridge was destroyed by B-25s on 4 April. Shortly thereafter the two north spans of the nearby Ala bridge were removed and placed near the track about 800 feet south. These methods of deception had previously been analysed by photographic interpreters as far back as December, and as each bridge was brought into the familiar pattern of deception, it resumed its position on the target list.

A unique type of deception appeared in the latter part of the campaign. In March it was observed that 15 black dots ringed with white were painted on the tracks at the north choke point of the Trento marshalling yard, presumably to give the impression that craters blocked the line.

The enemy's construction and repair on the Brenner presented a serious difficulty to our interdiction program. If granted a respite for only a few days, the enemy could be counted upon to mend the cuts in the line and move through his trains of supplies and equipment; his construction of diversions and rapid repairs to bridges and tracks made it necessary to reattack the line constantly.





Repeated attacks were carried out against the San Michele diversion bridges to maintain a permanent point of interdiction. These photos illustrate several stages in the repair;

1. The diversion blocked after the first few weeks but the rail bed still in its original position.
2. After a successful attack in February the bridge and a large section of the rail bed were destroyed.
3. In rebuilding, a new rail bed was made and the 100-foot bridge replaced by a 30-foot span.
4. After a successful March attack the rail bed was moved again to a third position.
5. A low level shot of the diversion as it finally appeared after repair by Allied engineers.

BRENNER PASS TARGETS SUMMARY OF OPERATIONS

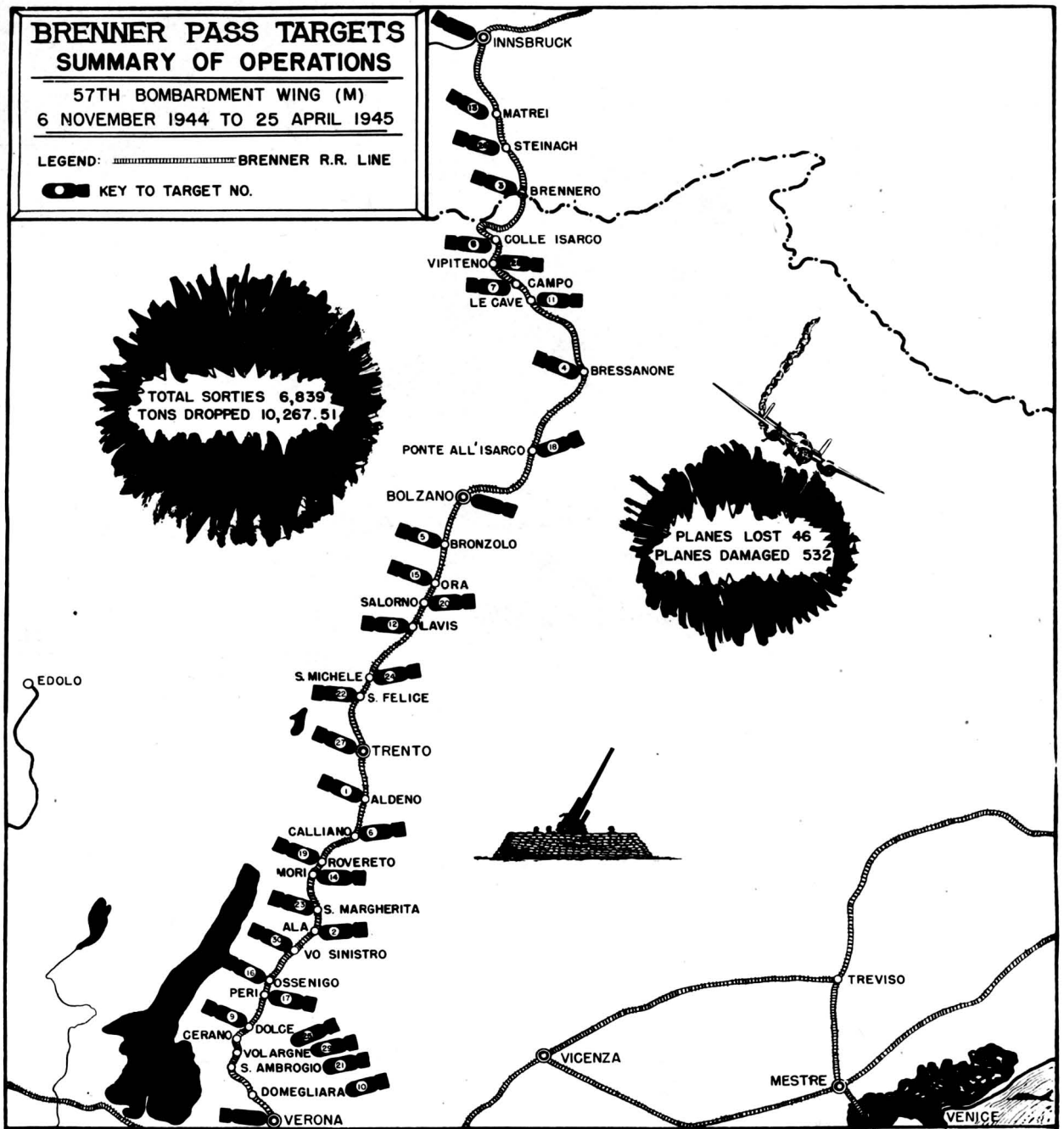
57TH BOMBARDMENT WING (M)
6 NOVEMBER 1944 TO 25 APRIL 1945

LEGEND:  BRENNER R.R. LINE

 KEY TO TARGET NO.

TOTAL SORTIES 6,839
TONS DROPPED 10,267.51

PLANES LOST 46
PLANES DAMAGED 532



NO.	TARGET	TONS DROPPED	SORTIES FLOWN	RESULTS			NO.	TARGET	TONS DROPPED	SORTIES FLOWN	RESULTS		
				DES.	DAM.	BLOC.					DES.	DAM.	BLOC.
1	ALDENO	96:00	58				16	OSSENIGO	254:70	153			6
2	ALA	959:86	617	7	4	10	17	PERI	52:00	27			1
3	BRENNERO	37:70	26				18	PONTE ALL'ISARCO	3:60	24			
4	BRESSANONE	116:40	159				19	ROVERETO	1,072:10	717	5	6	13
5	BRONZOLO	23:00	39				20	SALORNO	499:00	324	1	1	10
6	CALLIANO	629:90	503	2	5	13	21	SAN AMBROGIO	797:77	512	1	4	11
7	CAMPO	314:60	212	1	2	4	22	S. FELICE	75:00	41			3
8	COLLE ISARCO	36:00	20				23	S. MARGHERITA	324:42	223			2
9	DOLCE	171:50	103				24	S. MICHELE	1,394:25	823	10	7	17
10	DOMEGLIARA	71:75	36				25	STAZ DI GERANO	235:40	129			5
11	LE CAVE	31:00	24				26	STEINACH	286:00	208	1	3	4
12	LAVIS	933:80	730	7	1	6	27	TRENTO	201:05	124		1	1
13	MATREI	267:50	162				28	VIPITENO	139:55	86	3		
14	MORI	124:20	77				29	VOLARGNE	231:05	151			6
15	ORA	464:36	317	2		8	30	VO SINISTRO	371:05	214	1		8



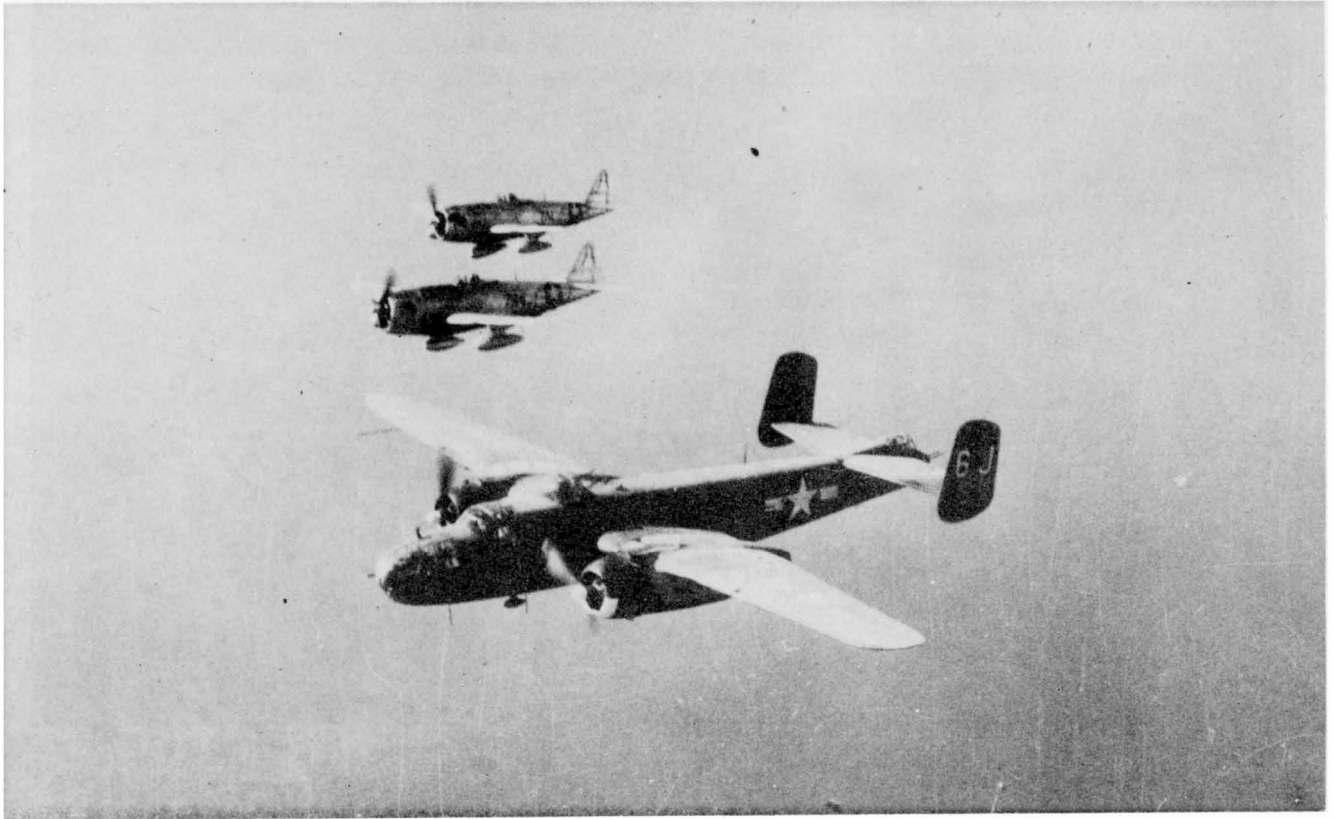
A Pictorial and Statistical Summary

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For eight months prior to the opening of the Battle of the Brenner, B-25s of 57 Wing had been engaged in bombing bridges. During that period tactics and training methods appropriate to bridge bombing had been developed and refined. As a result, B-25s came into the Battle of the Brenner well trained and experienced for the precision bombing that would be required for the successful isolation of the Italian battlefield.

Before and during the battle of the Brenner all the groups of 57 Wing carried out extensive training programs despite the heavy operational effort. Perfect pilot-navigator-bombardier team work was necessary and it was only reached through long hours of training on the bomb trainer and practice bombing range, P.D.I. runs, and in target recognition and simulated missions. This training, keen competition between groups and good staff work, had its effect on the Wing bombing accuracy, percentage of bombs within a 600-foot radius of the target.

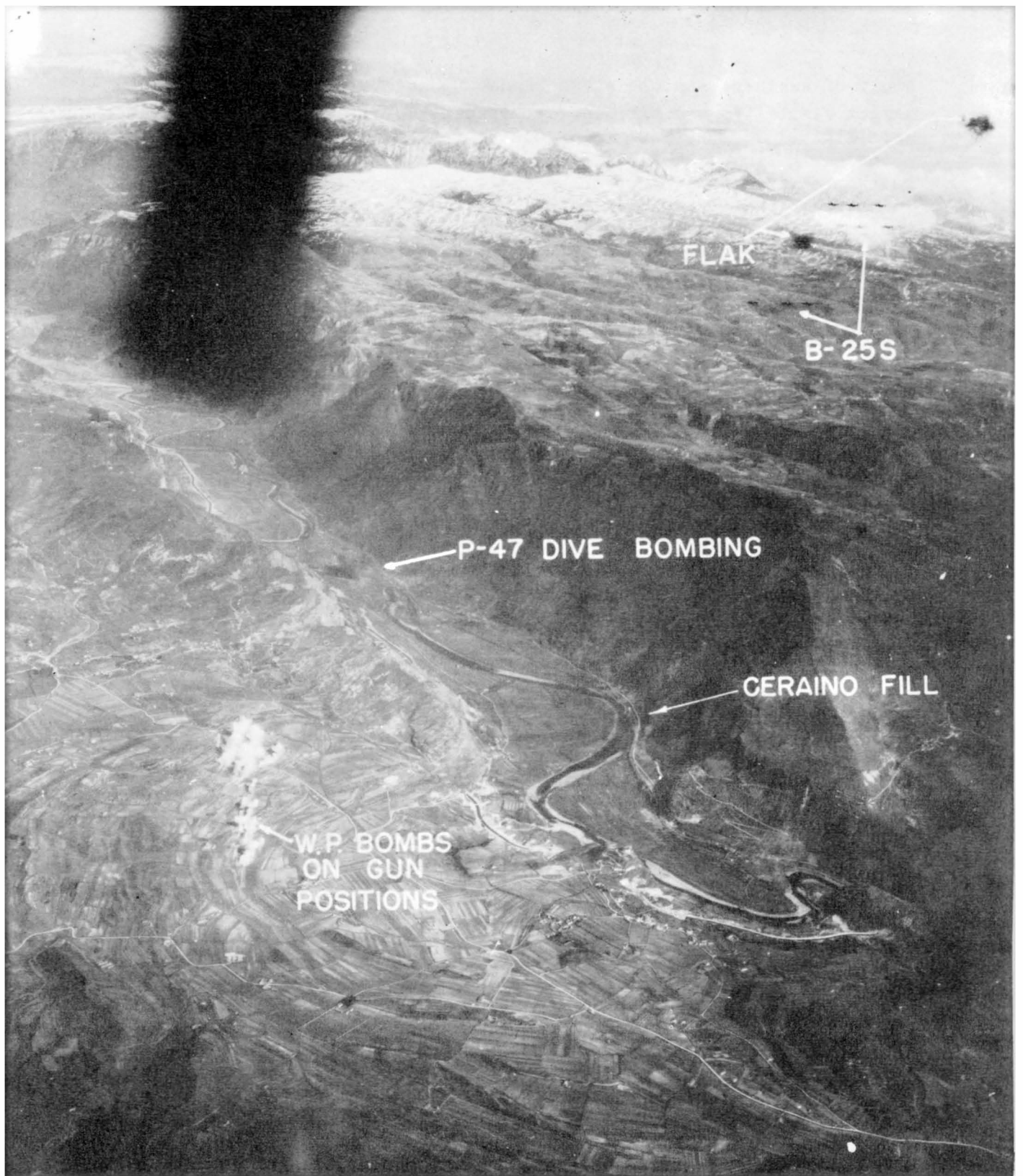
In the spring and summer preceding the Battle of the Brenner this bombing accuracy was doubled and finally maintained at a level consistently over 80 per cent.



Close cover, area cover and anti-flak bombing was provided by fighters of XXII Tactical Air Command.

Despite the high standard of training and the experience gained in bombing bridges in the Po valley, it was found that Brenner targets demanded even more thorough planning and a high degree of skill in execution than had previously been required. The three major factors to be considered in Brenner attacks were terrain, weather, and enemy defenses.

The limitations imposed by weather and terrain were closely allied with the targets themselves and have already been discussed at some length earlier in this report. Routes to and from the target, as well as the bomb run itself, could be planned only after a careful



This photograph shows phosphorus bombing of gun positions defending the target. Although there was a total of 18 heavy guns within range of the fill, no planes were lost and the bombing cut the line in three places. Anti-flak bombing by fighters and bombers was effective.

study of weather, sun angle and shadow, possible turbulence and haze, target visibility and terrain. Approaches to almost all Brenner targets were limited to a narrow sector due to terrain. This required point-to-point navigation, a method which was made difficult by changes in terrain appearance with heavy snows and thaws. Terrain also made target identification difficult as some targets did not come into view until the formation was within two to four miles from the dropping point. This was further aggravated by shadow and extremely small targets. These problems all complicated the bombing problem and in turn had to be balanced against the third major consideration, the enemy's defenses.

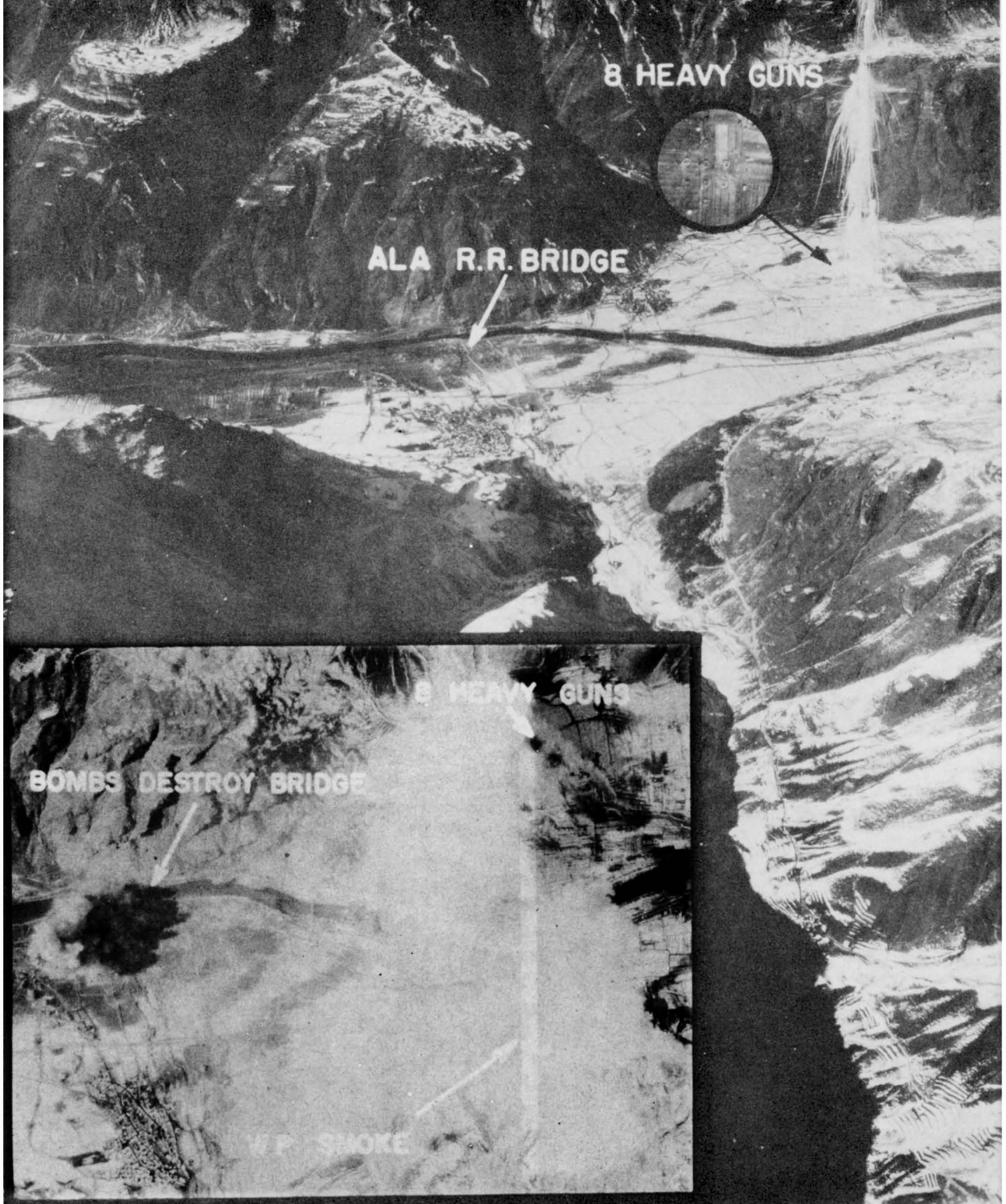
Though normal evasive action was taken on the breakaway from defended targets, pinpoint bombing precludes even moderate evasive action on the bomb run. Protection for the formation on the bomb run was provided by anti-flak bombing.

Counter flak defense measures were first employed by 57 Wing in the summer of 1944 but saw their greatest development and employment in the Battle of the Brenner. At first only chaff was dispensed by the bombing formation. Later an anti-flak element was sent in ahead of the main formation, both to dispense chaff and to drop fragmentation clusters on the gun positions. M-17 500-pound incendiary clusters and GP bombs were also tried. But after early experimentation, the combination of the M-47 100-pound white phosphorous bomb and chaff was found to be the most satisfactory.

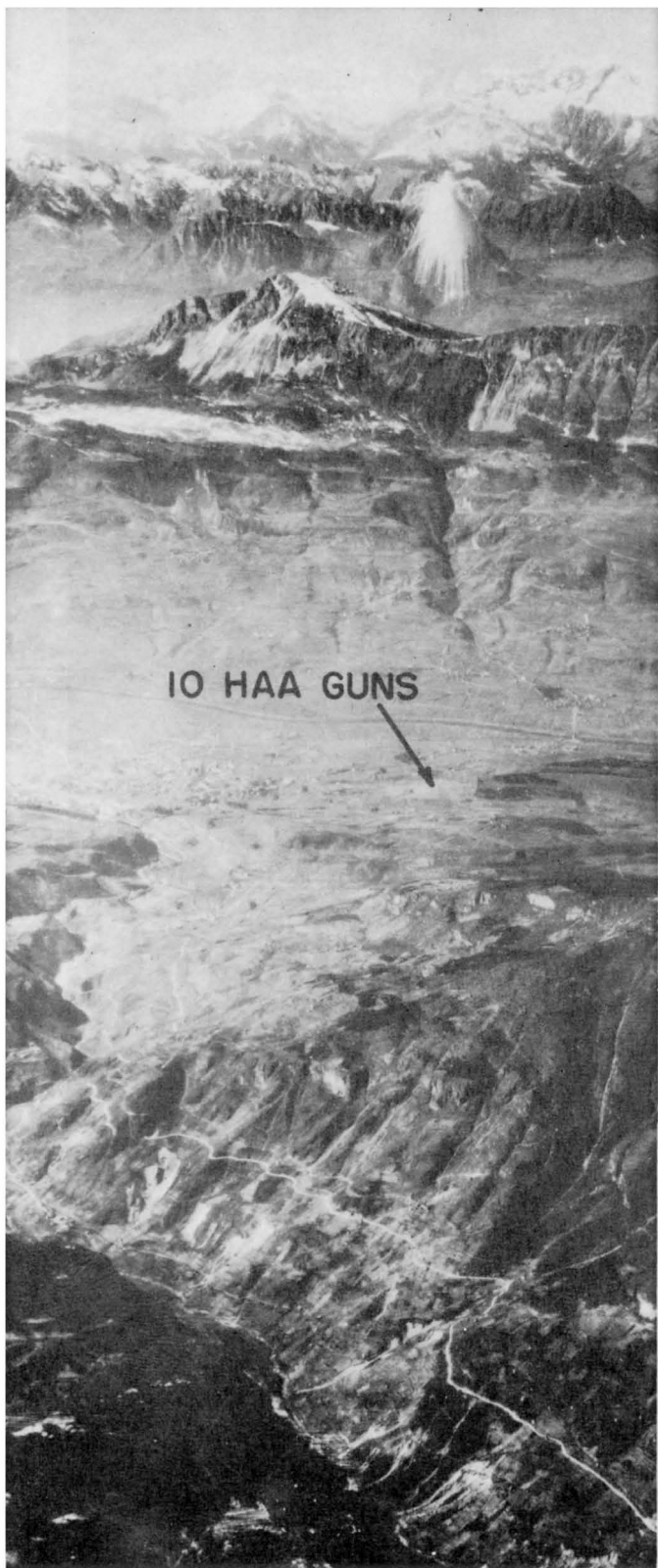
Phosphorus, which is primarily a smoke producing agent, seemed to give better results than frag bombs, and by the middle of February all of the groups were using it exclusively. Direct hits were not necessary since the billowing effect of the smoke between gun emplacements and the formation affected visual fire control. The smoke is not dangerous to breath nor will it damage any material with which it comes in contact. However the burning particles of phosphorus cause a body burn which is extremely painful and lasting. Therefore, the gun crews were forced to put on gas masks and other protective clothing which hindered operations.

Because of the screening effect of the phosphorus bombs, the position of the gun battery in relation to the axis of attack was always considered in planning the aiming point so that smoke would shield the approaching aircraft. Wind also affected the selection of the aiming point. Both ground burst and air burst fuses were employed. The air burst type was set to go off at 300 to 600 feet above the target. This type formed a quicker and more effective screen cloud but had a lower lasting quality.

Anti-flak measures were designed to accomplish two results ; to create a cloud and prevent visual tracking of the approaching aircraft formation, and to dispense chaff in such a way that it was impossible to locate the formation accurately on the radar scopes. Hence the prime consideration was not the destruction of the battery but rendering



Although defended by 16 HAA, only scant and inaccurate flak was encountered in this 12 February attack on the Ala railroad bridge, which was destroyed by the pattern of bombs shown in the inset. The above picture, an approach photo taken from the nose of a B-25 in the bombing formation, shows the aerial-burst type of WP bomb completely covering the eight guns to the north of the target. Inset picture shows fuller development of the phosphorus bombs, which effectively obscured the bombing formation from the gun crews.



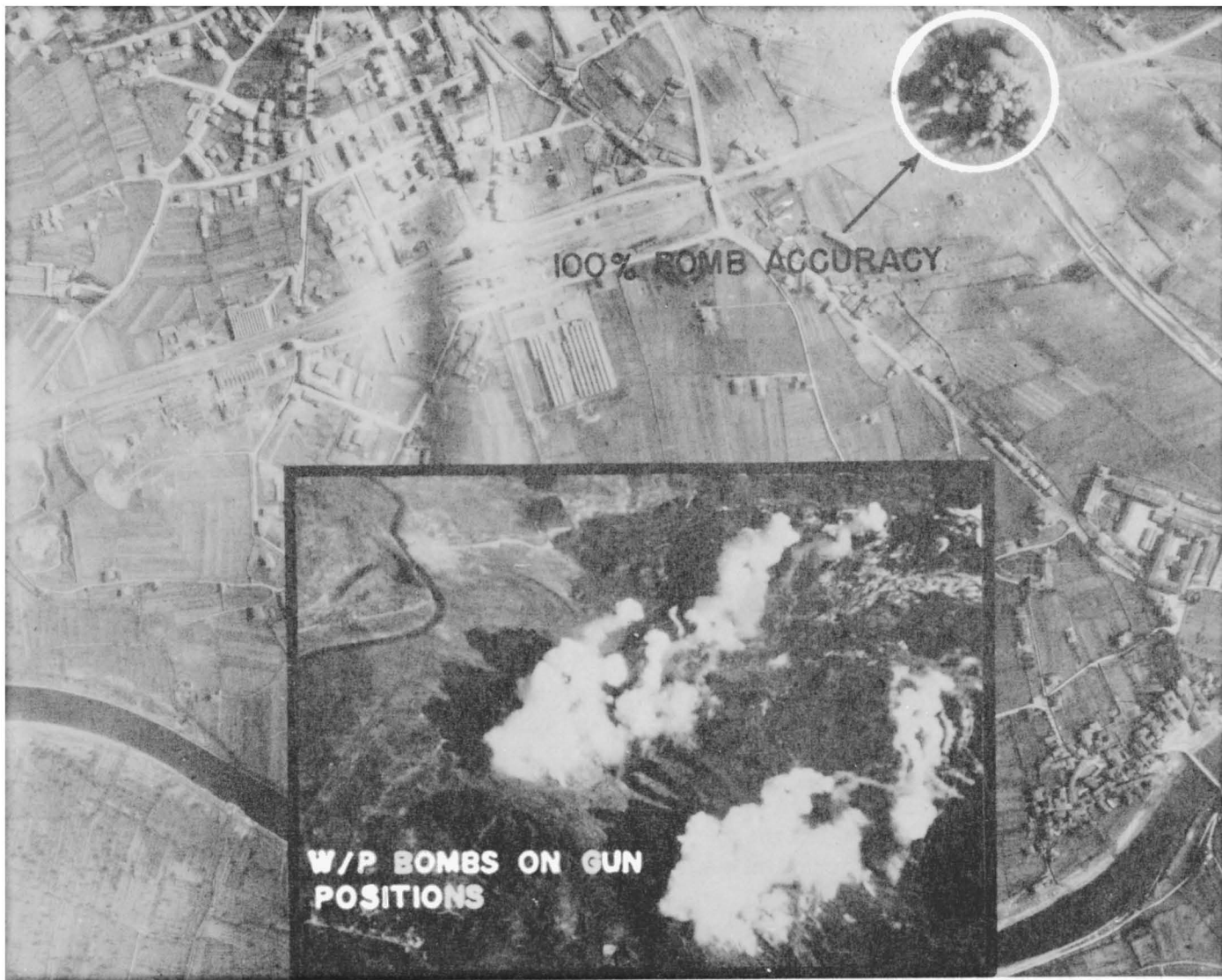
Air burst WP bombs covering a Rovereto flak battery are seen in two stages of development.

its fire ineffective. The tactics and number of aircraft employed in anti-flak bombing varied according to the situation prevailing at each individual target. In general an element of three aircraft was assigned to each separate battery within effective range of the bombing formation while on its bomb run. A four-gun battery on the approach to the target required more attention than a 12-gun battery emplaced three miles beyond the target.

Generally, whenever only one battery was involved, it was possible to have a single element combine both phosphorus and chaff functions. But if two or more batteries required neutralization, two or more elements were used to carry phosphorus bombs. The element whose course was closest to, or upwind from, the bombers' axis of attack also dispensed chaff. Occasionally a separate chaff element was required, as, for example, when the guns were downwind and strong winds prevailed at right angles to the bomb run. We know from experience and the statements of a German radar officer that when properly dispersed, chaff served its purpose quite effectively, though in many cases on the Brenner the enemy favored visual data because of the many false echoes produced on radar scopes by the mountains.

The placing of the anti-flak element or elements in the formation varied with the individual mission and the different groups. Whenever there was only one anti-flak element it was usually attached as a third element in the lead box of six aircraft. When more than one element was used, they normally made up their own box and flew as the rear box or boxes in the first flight. The anti-flak elements return to their normal position in the formation as soon as possible after completion of dispensing and bombing.

Since the timing of the chaff dispensing and phosphorus bombing must be perfect in order to achieve the maximum effectiveness, the approach of the anti-flak formation and its distance ahead of the bombers had to be carefully planned and efficiently executed. The anti-flak flight was sent in about six miles ahead of the main formation; this amounted to a time spacing of about two minutes. This distance was selected because the maximum range of the German 88-mm gun is estimated to be approximately seven miles. This spacing was usually gained at the bombers' initial point by cutting off a corner of the formation's briefed course. When that was not possible, a dog-leg was arbitrarily established for the main formation on the route just prior to the I.P. in such a manner that the chaff flight continued on course, gaining the required spacing. This latter method also gave the bombardier an opportunity to work a double drift in the close vicinity of the target. When more than one anti-flak element was employed, the elements separated at the I.P. and proceeded directly to their assigned individual targets, joining up as soon as possible after the breakaway. When the timing was correctly executed, the white phosphorus bombs burst just before the main formation came within range of the guns.



effective anti-flak operations increased bombing accuracy.

Chaff-dispensing was begun at a minimum distance of eight miles prior to reaching the gun defended area. This distance, plus the six mile interval from the main formation, made a total distance of about 14 miles from the maximum effective range of the guns, or about 19 miles from the actual gun positions. Often chaff was also dispensed by the first element in the formation of 18 aircraft, and in larger formations, in order to cover succeeding flights of 18 or 24 planes, chaff was dispensed from the rear element of each preceding flight. Because of chaff's slow rate of descent, it was important to consider the direction and velocity of the winds.

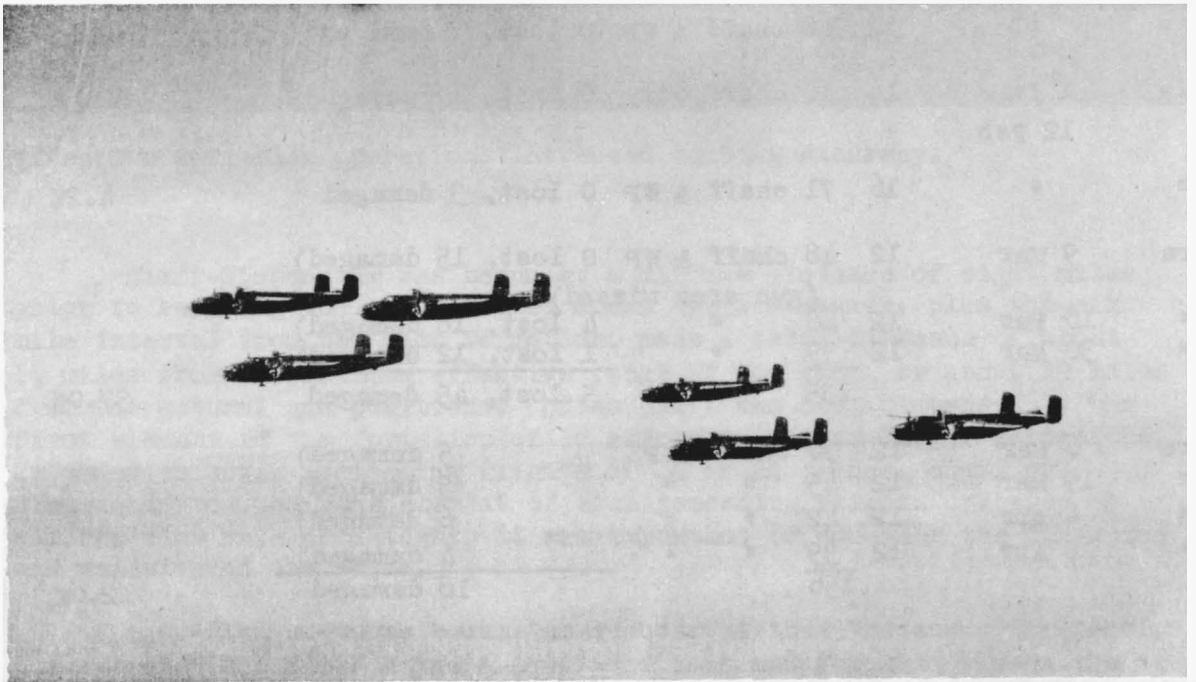
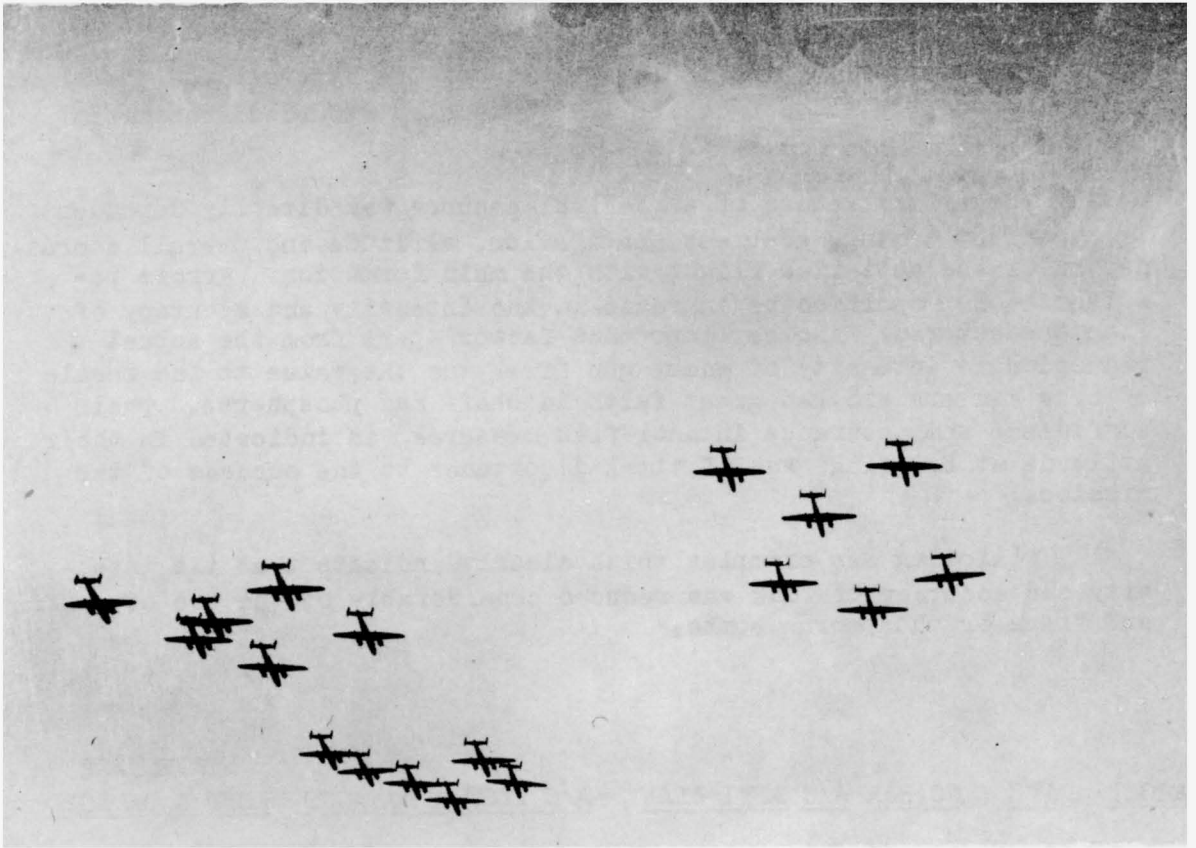
Anti-flak measures became so successful that the enemy frequently concentrated his fire on the anti-flak flight and for this reason the anti-flak aircraft flew a very loose formation. There were numerous missions on which the anti-flak aircraft received intense and accurate fire, whereas the main formation encountered only scant and inaccurate flak. This condition necessitated the employment of defensive tactics

by the anti-flak aircraft, usually taking the form of mild evasive action which, coupled with the dispersion of the aircraft and the protection of the widening chaff trail, usually afforded reasonable protection.

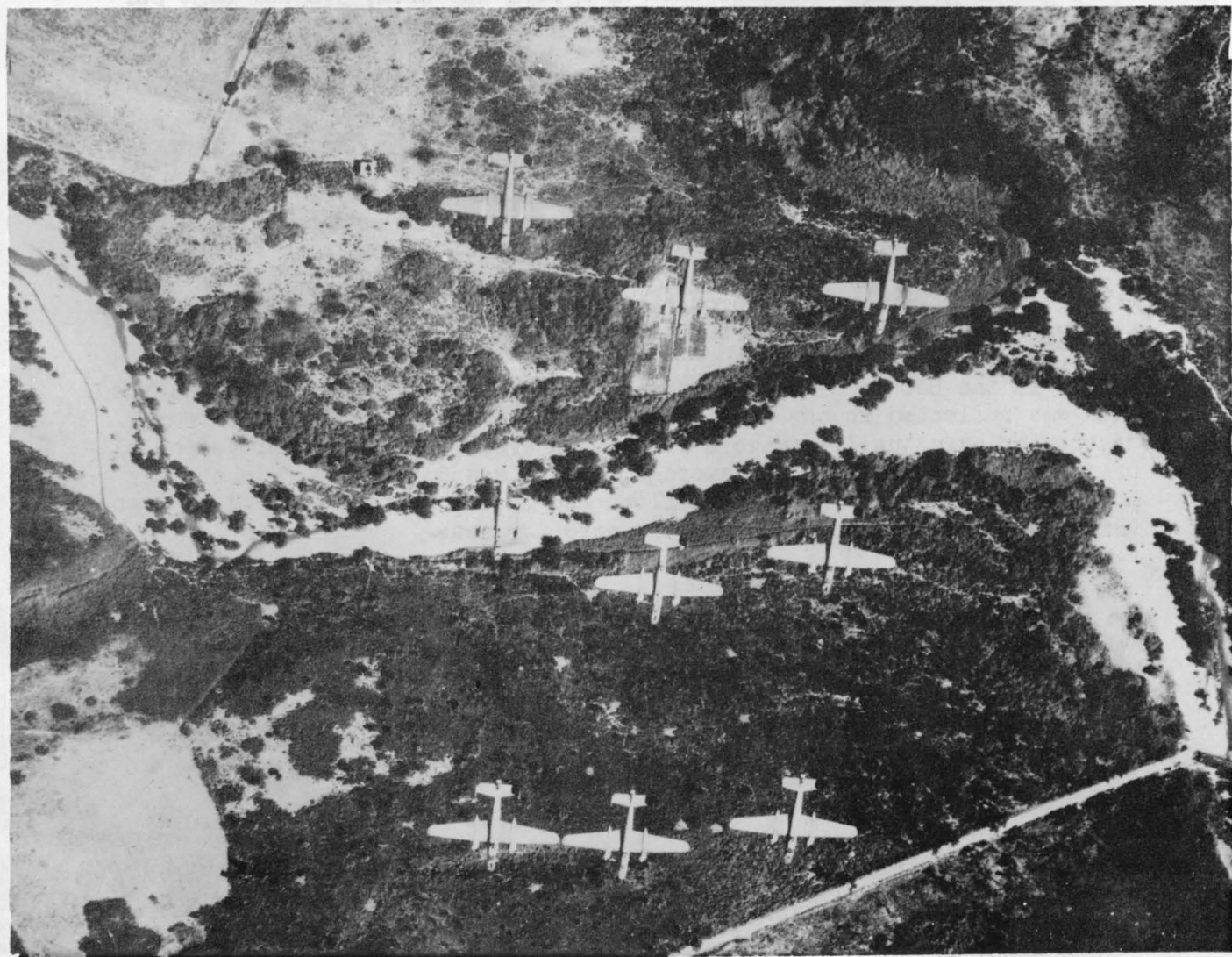
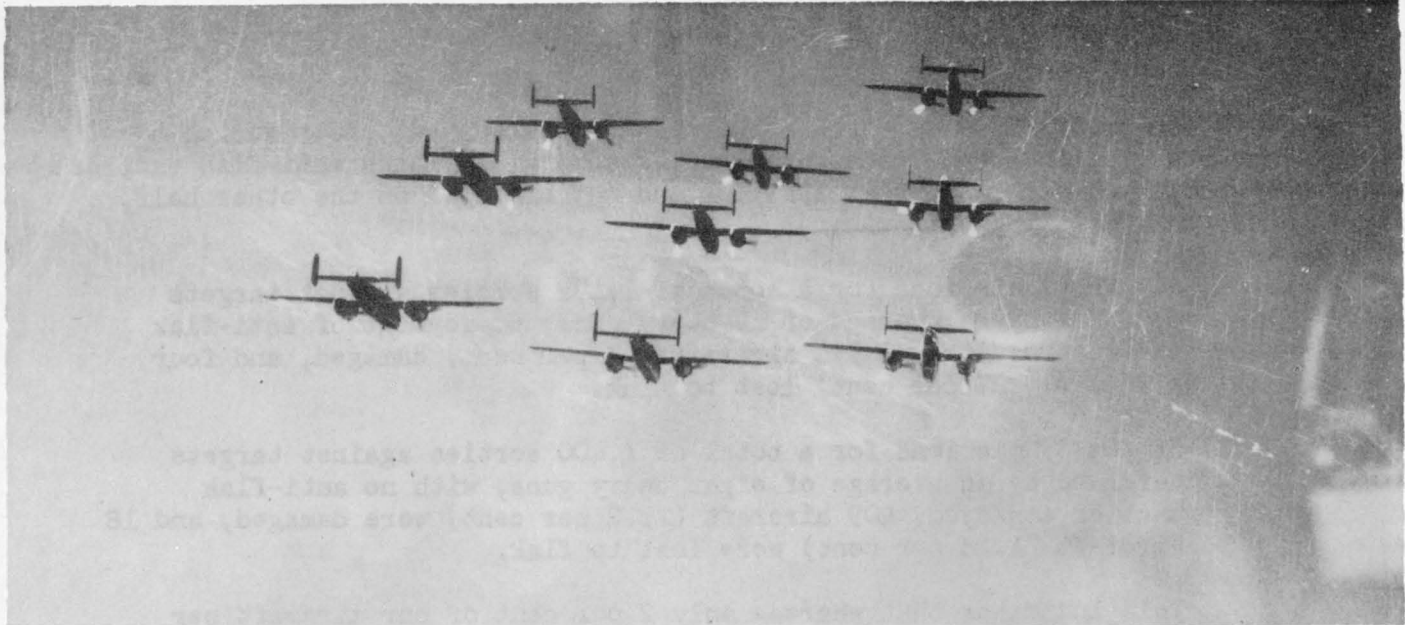
The effectiveness of anti-flak measures was directly dependent upon correct timing, accuracy, navigation, altitude and overall coordination of the anti-flak flight with the main formation. Errors resulted in a proportionate increase in the intensity and accuracy of flak encountered. Another important factor apart from the actual reduction in intensity of enemy gun fire, was the value to the morale of crew members who had great faith in chaff and phosphorus. Their confidence and assurance in anti-flak measures, as indicated in their attitude at briefing, was of vital importance to the success of the mission.

Following are examples which clearly indicate that the intensity and accuracy of flak was reduced considerably by the use of chaff and frags or phosphorus bombs;

<u>TARGET</u>	<u>DATE</u>	<u>NO.HAA</u>	<u>A/C</u>	<u>ANTI-FLAK</u>	<u>A/C LOST & DAMAGED</u>	<u>PERCENTAGE LOST & DAMAGED</u>
Lavis	29 Dec- 18 Feb	12	326	chaff only	3 lost, 80 damaged	25.5%
"	"	12	48	chaff & WP	0 lost, 6 damaged	12.5%
Ala	4 Jan- 12 Feb	16	40	chaff only	0 lost, 17 damaged	42.5%
"	"	16	71	chaff & WP	0 lost, 3 damaged	4.2%
Ora	9 Mar	12	48	chaff & WP	0 lost, 15 damaged)	
"	10 Mar	12	48	"	(gun area missed) 4 lost, 18 damaged)	
"	30 Mar	12	39	"	1 lost, 12 damaged)	
			135		5 lost, 45 damaged	37.0%
Ora	6 Mar	12	30	chaff & WP	5 damaged)	
"	19 Mar	12	45	" "	3 damaged)	
"	4 Apr	12	42	" "	6 damaged)	
"	19 Apr	12	39	" "	4 damaged)	
			156		18 damaged	12.0%



Boxes of Six



Boxes of Nine

An analysis of a total of 114 missions throughout Italy during a five month period from September through January, in which anti-flak tactics were employed on half of the missions and not employed on the other half, shows the following comparisons:

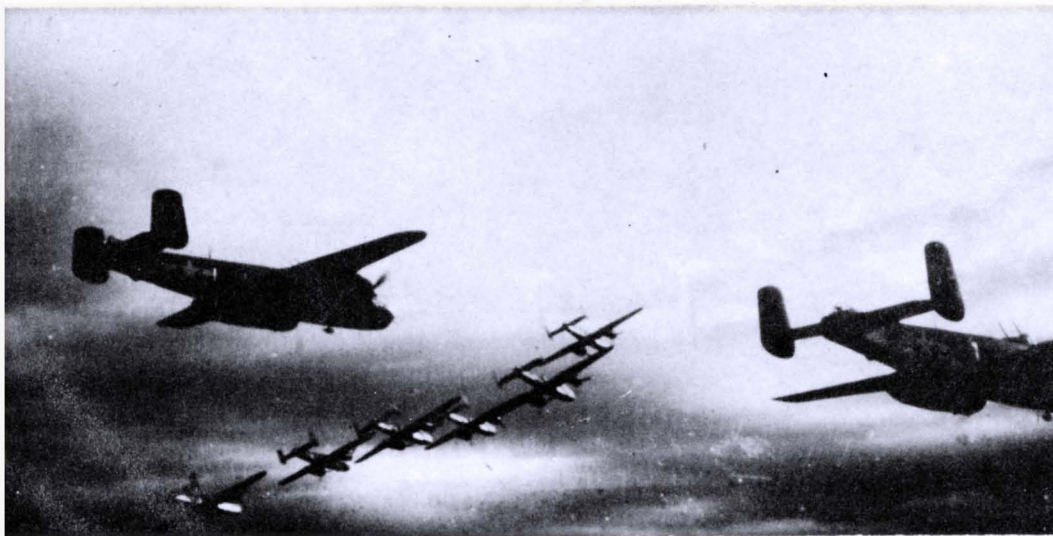
a. On 57 missions for a total of 1,477 sorties against targets defended by an average of 12 heavy guns, employment of anti-flak tactics resulted in 354 aircraft (24 per cent) damaged, and four aircraft (.27 per cent) lost to flak.

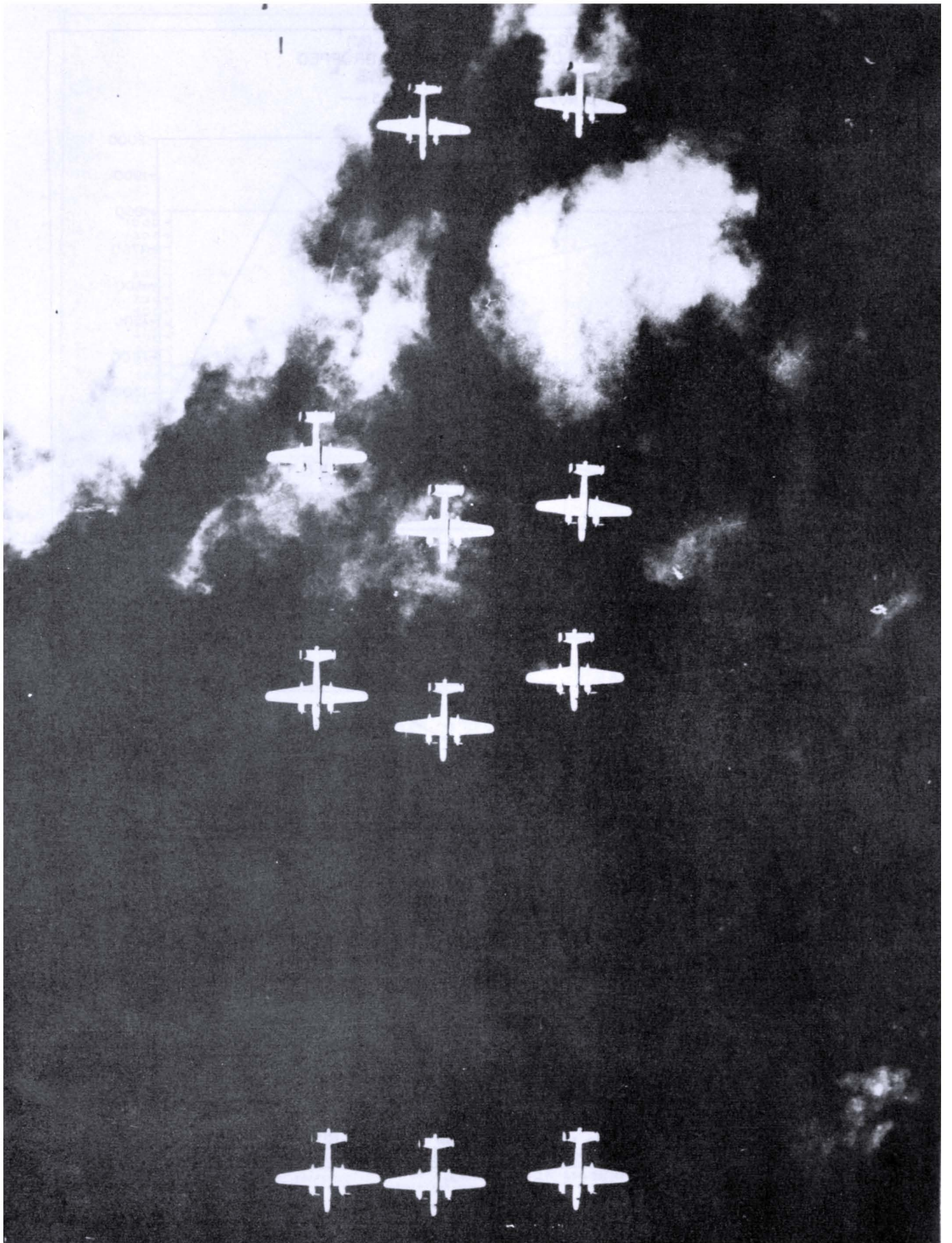
b. On 57 missions for a total of 1,400 sorties against targets defended by an average of eight heavy guns, with no anti-flak tactics employed, 409 aircraft (29.2 per cent) were damaged, and 18 aircraft (1.28 per cent) were lost to flak.

This indicates that whereas only 2 per cent of our aircraft per heavy gun were damaged or lost when anti-flak was used, 3.6 per cent per heavy gun were damaged or lost when no anti-flak was employed.

Aircraft formations used on the Brenner varied because latitude was given each group in developing and selecting its own methods of attack. In the case of the six-ship box the formation was made up of three boxes in a staggered V. Formations employing the nine-ship box staggered each box alternately high and low following the lead nine. Both formations were well-suited to Brenner missions for they proved free enough for route formation flying and were well adapted to the close formation required for a compact bomb pattern. In addition, in either formation maximum fire power could be brought to bear against attacking aircraft and evasive action was easily performed.

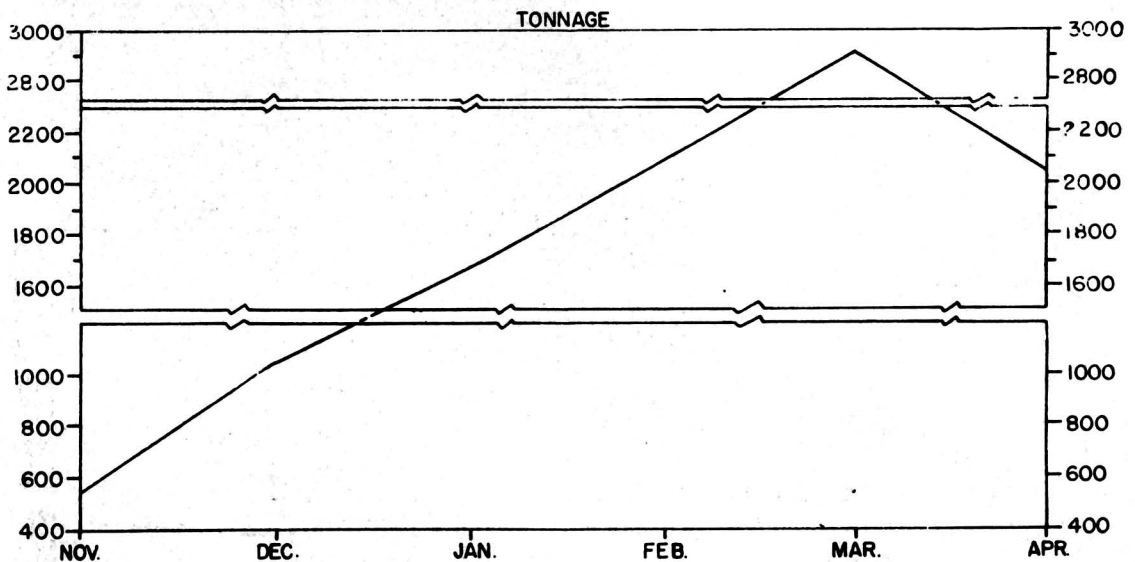
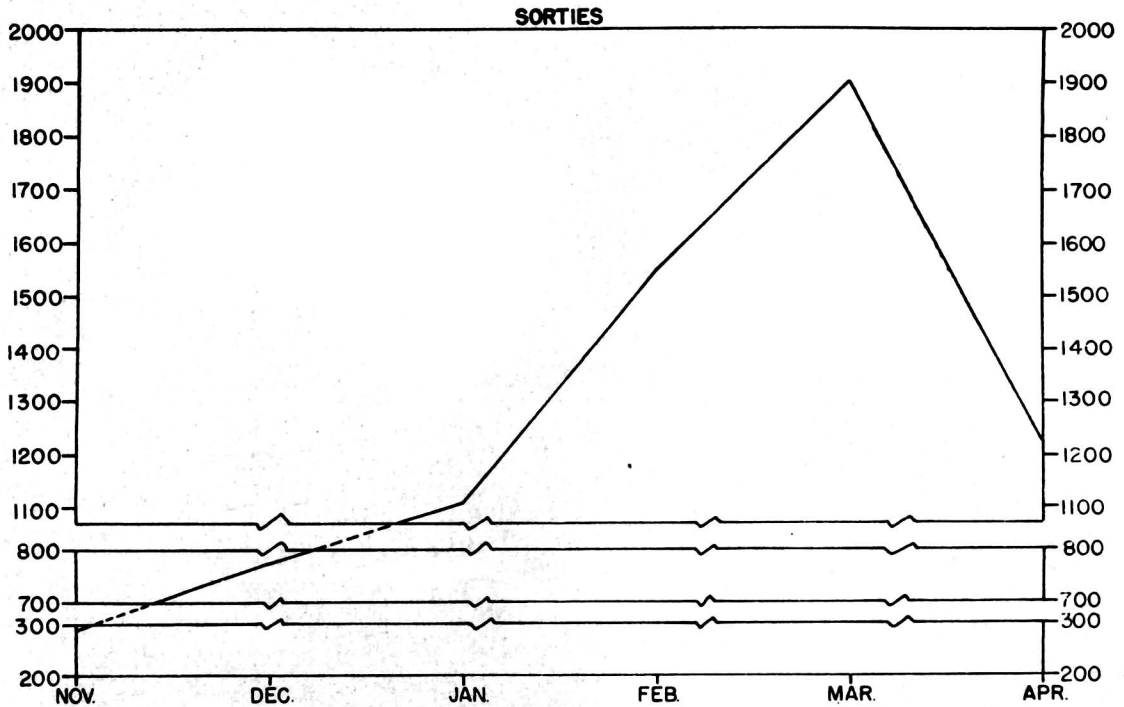
In the Battle of the Brenner a high bombing accuracy was maintained. This was reflected in the consistently low number of sorties required to destroy or structurally damage a bridge, an average of 58.82 sorties on all Brenner bridge attacks. The average tonnage was 86.72 tons. In the six months period 6,839 sorties were flown and 10,267.52 tons dropped on Brenner targets. 46 B-25s were lost and 532 were damaged.





**57TH BOMBARDMENT WING (M)
SORTIES FLOWN AND TONNAGE DROPPED
ON BRENNER PASS TARGETS**

— 6 NOV 1944 — 25 APRIL 1945 —

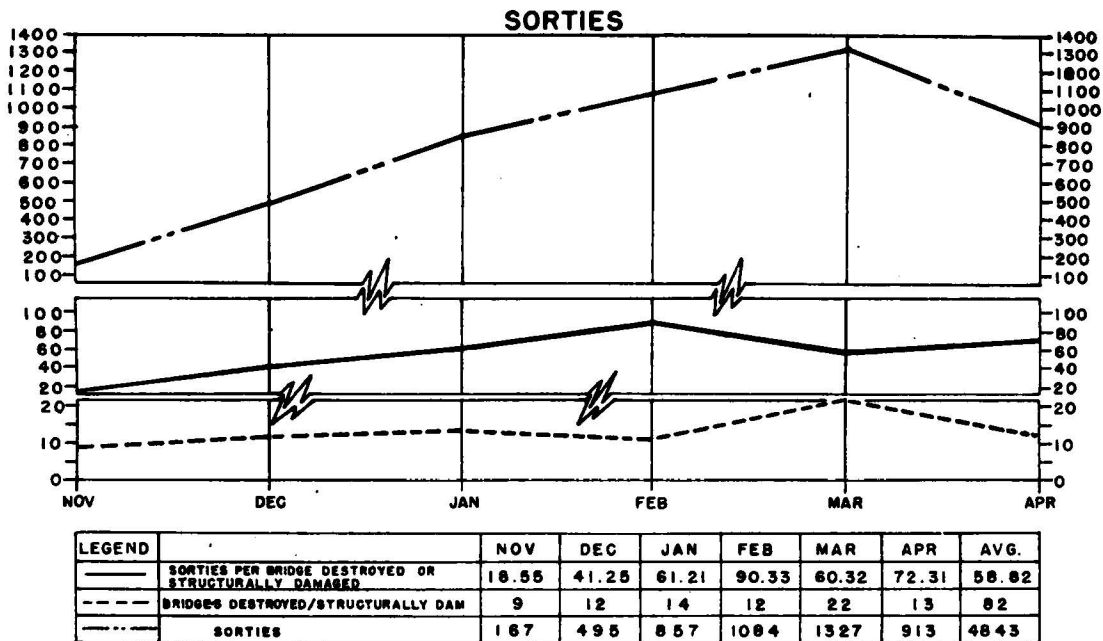


	NOV.	DEC.	JAN.	FEB.	MAR.	APRIL	TOTAL
SORTIES	293	771	1107	1549	1901	1218	6839
TONNAGE	476.75	1023.85	1702.45	2103.25	2916.66	2044.55	10,267.51

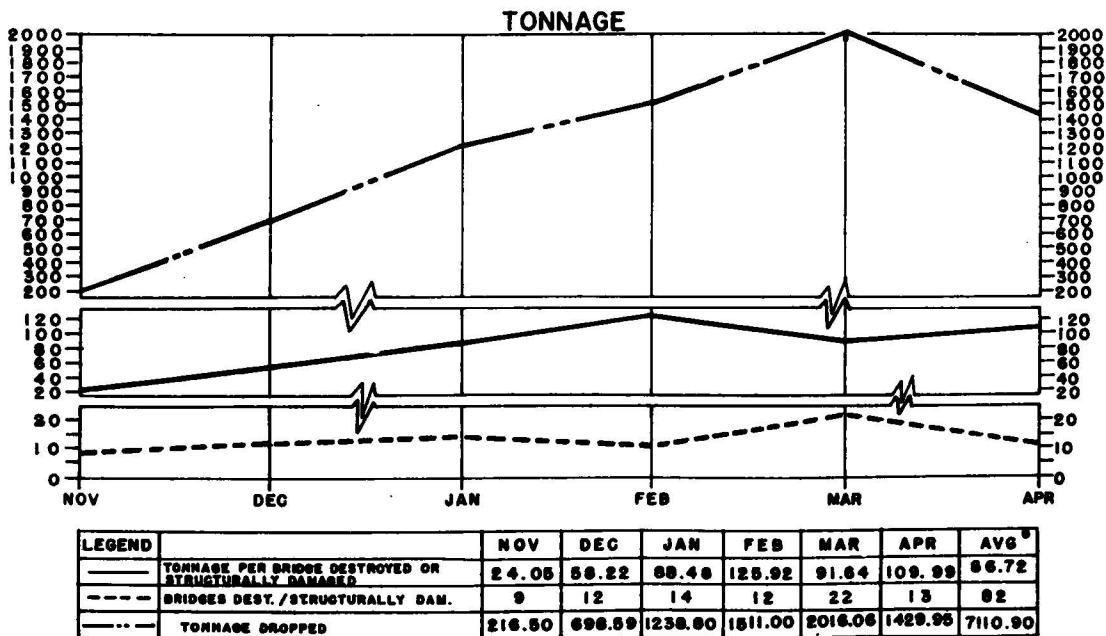
PREPARED BY 57TH B.W.
STATISTICAL CONTROL

**57TH BOMBARDMENT WING (M)
BRENNER PASS OPERATIONS
6 NOV. 1944-25 APRIL 1945**

**EFFECTIVE & NON EFFECTIVE SORTIES PER
BRIDGE DESTROYED OR STRUCTURALLY DAMAGED**



**BOMB TONNAGE DROPPED PER BRIDGE
DESTROYED OR STRUCTURALLY DAMAGED**



PREPARED BY 57TH BM. WG.
STATISTICAL CONTROL

BRENNER RAIL LINE DAILY SUMMARY OF OPERATIONS

Date	Group	Target	Sorties	Tons Bombs Dropped	Flak	Losses	Dem	Results
November 1944								
6	310	Domegliara-Transf Sta	18	35.75	HIS			Damaged
6	310	Domegliara-Transf Sta	18	36.00	HIS			Damaged
6	319	Calliano-RR Br	18	35.50				Damaged
6	319	Rovereto-RR Br	18	36.00				Damaged
6	319	Rovereto-RR Fill	18	36.00				Blocked
6	321	Ala-Transformer Sta	18	36.00				Damaged
6	321	Ala-Transformer Sta	18	32.00				Destroyed
6	340	Trento-Transformer Sta	30	43.50	HDM		2	Damaged
7	310	Ossenigo-RR Fill	18	36.00	HIS			Blocked
7	340	Ala-RR Br	17	34.00	HIS			Destroyed
8	310	Ossenigo-RR Fill	18	36.00	HIS			Blocked
9	319	San Michele-RR Br	18		HIS			Unknown
11	310	Calliano-RR Br	18	26.00	HAI		1	2 Blocked
11	319	San Michele-RR Br	12	24.00	HAM		5	Destroyed
13	319	San Michele-RR Br	18					Unknown
16	319	San Michele-RR Br	18	30.00	HMS		1	Blocked
December 1944								
2	310	San Michele-Rd & RR Brs	18	36.00	HAM			Blocked
2	310	Ala-RR Br	21	28.38	HIS			Not Hit
2	340	Rovereto-RR Br	12	13.65	HVAI		6	Not Hit
2	340	Calliano-RR Br	11	12.00	HAI		1	Unknown
10	310	Dolce-RR Fill	20	37.20	HAM		2	Blocked
10	310	San Ambrogio-Tun & Fill	20	55.20	HDM			Blocked
10	319	San Ambrogio-Landslide	24	55.26	HMS		8	Unknown
10	319	Ala-RR Br	18	34.00	HMI		7	Blocked
10	319	San Michele	18	31.50	HIS		1	4 Blocked
10	340	Calliano-RR Track	29	41.80	HIS			Blocked
10	340	Rovereto-RR Br	17	29.50	HII		4	Blocked
10	340	Ossenigo-RR Fill	21	31.30	HAI		8	Unknown
13	319	San Ambrogio-Landslide	24		LIS			Unknown
14	319	San Ambrogio-Landslide	24		HIS			Unknown
14	321	Lavis	53					Unknown
14	340	Calliano-RR Br	24		HIS			Unknown
26	319	San Ambrogio-Landslide	24	43.26	HMM			Unknown
26	319	Dolce-RR Fill	24	47.00	HMS		2	Unknown
26	321	San Michele-RR Br	23		HAM		2	Unknown
26	340	Rovereto-RR Br	20	26.30	HIS		1	Blocked
26	340	Calliano-RR Br	21	34.00	HIS			Blocked
27	319	Rovereto-RR Br	22	44.40	HAM		3	Damaged
27	321	San Ambrogio-Tunnel	18	34.50	HDM		1	Not Hit
27	321	San Ambrogio-Tunnel	20	32.00	HDM			Blocked
27	340	Calliano-RR Br	23	33.80	HIS		1	Damaged
29	310	Lavis-Viaduct	27	47.00	HAM		2	Not Hit
29	321	Rovereto-RR Br	20	33.50	HAM		5	Damaged
30	310	Dolce-RR Fill	20	34.00	HAM		5	Blocked
30	319	Ala-RR Br	24	30.13	HMM		9	Destroyed
30	319	San Margherita-RR Br	12	24.00	HIS		1	Blocked
30	319	San Margherita-RR Br	12	16.42	HIS		3	Not Hit

Date	Group	Target	Sorties	Tons Bombs Dropped	Flak	Losses	Dam	Results
December 1944 - Cont'd								
30	321	Rovereto-RR Br	21	37.25	HAM		3	Damaged
30	340	Calliano-RR Br #3	13	20.00	HAM		1	Destroyed
30	340	Calliano-RR Br #2	20	22.00	HAI		1	Damaged
30	340	Calliano-RR Br #1	14	12.00	HAI		2	Damaged
31	340	Calliano-RR Br #2	18	12.00	HAI		1	Damaged
31	340	Rovereto-RR Br	21	34.50	HAI		2	Destroyed
January 1945								
3	340	Lavis-RR Viaduct	21	35.00	HAI		3	Damaged
3	340	Lavis-RR Diversion Br	17	16.00	HIM			Destroyed
4	310	Lavis-RR Bridge	26	46.00	HAM			Unknown
4	310	Lavis-RR Div Bridge	21	35.50	HAM	1	1	Blocked
4	321	Rovereto-RR Bridge	20	26.00	HAM		7	Not Hit
4	321	Calliano-RR Bridges	26	49.00	HAM		2	Bl & Dest
4	340	San Margherita-RR Br	24	27.10	HIS		1	Unknown
15	310	Lavis-RR Viaduct	27	46.00	HIS			Destroyed
15	310	Lavis-RR Div Bridge	20	32.00	HIS		1	Unknown
15	310	San Michele	6	12.00	HIS			Destroyed
15	321	Rovereto-RR Bridge	14	24.00	HIS			Not Hit
15	321	Rovereto-Sta/Yard	26	49.00	HIM			Blocked
15	340	San Margherita-S. RR Br	5	10.00	HAM			Blocked
15	340	Ala-RR Bridge	18	25.00	HIS			Blocked
17	321	Ora-RR Bridge	18	36.00	HAI		3	Not Hit
17	321	Ora-RR Bridge	15	19.00	HAI	1	5	Blocked
17	321	San Michele-RR Fill	18	36.00				Unknown
17	340	Calliano-RR Br #2	20	22.00	HMS		1	Blocked
17	340	Calliano-RR Br #1	16	28.00	HAS			Blocked
17	340	Rovereto-RR Bridge	20	25.80	HAS		4	Not Hit
18	310	San Ambrogio-Landslide	21	37.80	HAM		2	Blocked
18	310	San Ambrogio-Landslide	20	23.80	HAM	1	3	Unknown
18	321	Ala-RR Bridge	19	33.00	HAM	1	5	Destroyed
18	321	Rovereto-RR Bridge	18	30.00	HAM		2	Damaged
18	340	San Michele-RR Div	23	42.00				Damaged
18	340	San Michele-RR Bridge	18	36.00				Destroyed
18	340	Salorno-Road Bridge	6	12.00				Damaged
20	310	San Michele-RR Bridge	12	24.00	H M			Damaged
20	310	San Michele-RR Bridge	6	12.00				Unknown
20	310	San Michele-Rail Line	18	36.00				Unknown
20	340	Trento-M/Yds	54	95.15	HAI	1	6	Blocked
21	310	Rovereto-RR Bridge	28	48.90	HIS			Blocked
21	321	Lavis-RR Bridge	24	44.50	HAI	1	8	Blocked
21	321	Lavis-RR Viaduct	24	44.50				Destroyed
21	340	San Michele-RR Fill	24	37.50		2		Unknown
22	310	Rovereto-RR Bridge	28	50.40	HAS		1	Damaged
22	321	Lavis-Rail Diversion	9	14.00	HIM		2	Unknown
22	321	San Michele-RR Tracks	4	6.00				Unknown
22	340	San Michele-RR Div.	12	12.00				Blocked
27	340	Rovereto-RR Bridge	27					Unknown

Date	Group	Target	Sorties	Tons Bombs Dropped	Flak	Losses	Dam	Results
January 1945 - Cont'd								
28	321	Lavis-Rail Diversion	26	47.00	HAM		4	Unknown
28	340	Rovereto-RR Bridge	27	43.80	HIS		1	Blocked
28	340	San Michele-RR Bridge	18	28.00				Damaged
29	321	Ala-RR Bridge	20	4.00	HIS			Unknown
29	321	Lavis-M/Y	3	6.00	HIM			Unknown
29	340	Calliano-RR Bridge #3	8	10.00	HAI		2	Blocked
29	340	Rovereto-RR Bridge	16	23.80	HAI		3	Blocked
30	310	Trento-M/Y	40	62.40	HAM		11	Unknown
30	321	Calliano-RR Bridge Fill	20	32.00	HIS			Blocked
30	321	Rovereto-Station Yards	20					Unknown
30	321	Rovereto-Rail Bridge	18					Unknown
30	340	Lavis-RR Br. Diversion	18	35.00	HIM			Unknown
30	340	Lavis-RR Station Yards	20	29.50				Unknown
31	321	Lavis-RR Div. Bridge	20	38.00	HAM		4	Unknown
31	340	San Michele-RR Bridge	18	36.00				Unknown
31	340	Rovereto-RR Bridge	24	36.00	HAI		3	Blocked
31	340	Rovereto-Station Yards	18	32.00	HAI		1	Unknown
February 1945								
2	310	Rovereto-RR Bridge	17	24.60	HAM		1	Blocked
2	321	Calliano-RR Bridge #3	20	25.00	HAM			Unknown
2	340	Lavis-RR Bridge	20	18.00				Blocked
4	321	San Michele-RR Div. Br.	18	36.00				Blocked
4	340	Ala-Station Yards	24	35.00	HIS		1	Blocked
4	340	Ala-RR Bridge	18	28.00	HIS			Not Hit
4	340	Lavis-RR Bridge	18	36.00	HAS		1	Destroyed
5	310	San Ambrogio-Landslide	21	33.00	HIM			Blocked
5	310	San Ambrogio-Station Yd.	18					Unknown
5	310	San Michele-RR Fill	18	36.00				Blocked
5	340	Calliano-RR Bridge #3	24	31.20	HMM	1		Blocked
5	340	Calliano-RR Bridge #2	18	32.00	HAM		3	Blocked
6	310	Ala-RR Bridge	22	38.20	HAM		10	Unknown
6	310	San Ambrogio-M/Yds	15	25.55	HAM		4	Unknown
6	321	Rovereto-M/Y	10	8.00	HAI	3	5	Unknown
6	321	Rovereto-RR Bridge	20	28.50	HAI		2	Destroyed
6	321	Mori-RR Fill	20	28.50	HAI		7	Not Hit
6	340	Lavis-RR Viaduct	21		HAS		2	Unknown
6	340	Lavis-RR Div.	18		HIS			Unknown
6	340	Lavis-Station Yard	18		HIS			Unknown
7	321	Lavis-Div. Bridge	18	30.00	HAM		1	Unknown
7	321	Lavis-Viaduct	11	20.00	HAI	1	7	Destroyed
7	321	Lavis-Sta Yard	18	36.00				Unknown
7	340	San Michele-RR Div	18	36.00				Blocked
8	321	Calliano-RR Bridge #3	21	22.50	HAI	1	6	Unknown
8	321	Calliano-RR Bridge #2	21	22.50	HAI	1	6	Unknown
12	340	Ala-RR Bridge	24	38.60	HIS			Destroyed
13	321	San Michele-RR Div Br	18	32.00				Unknown
13	321	Lavis-RR Div Bridge	24	25.60	HIM		1	Unknown
13	340	San Ambrogio-Landslide	15	21.00	HAI	2	5	Unknown

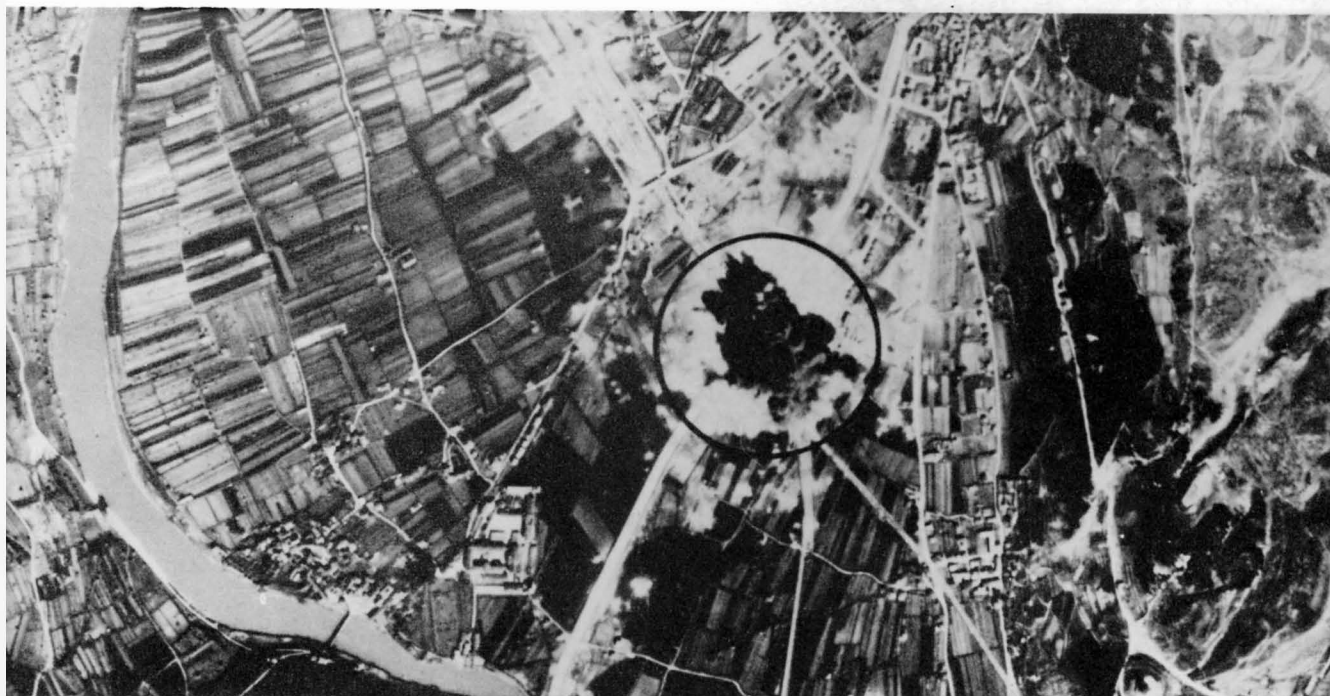
Date	Group	Target	Sorties	Tons Bombs Dropped	Flak	Losses	Dam	Results
February 1945 - Cont'd								
13	340	San Ambrogio-Sta Yard	11	14.30	HAM			1 Unknown
14	310	Ponte Colle Isarco-S RR Br	24	3.60	HIS			2 Unknown
14	310	Bressanone-S RR Bridge	24	39.60	HIS			3 Blocked
14	321	Lavis-RR Div Bridge	24	24.40	HAM			3 Not Hit
14	321	San Michele-RR Div Br	17	34.00				Blocked
14	340	San Michele-RR Bridge	24	34.00				Blocked
17	340	Bressanone-RR Bridge	30	43.10				Unknown
17	340	Lavis-Rail Div	15	12.00	HAM			3 Unknown
18	310	Lavis-RR Div Br	42	34.00	HIS			4 Destroyed
18	321	Bressanone-S RR Br	27					Unknown
18	321	Lavis-RR Bridge	24	23.00	HIM			Unknown
18	340	Ala-M/Yds	24	27.30	HAI			Unknown
18	340	Ala-RR Bridge	17	30.00	HAI			3 Unknown
20	321	Calliano-RR Br #3	26	28.80	HAI			4 Unknown
20	321	Rovereto-RR Bridge	27	55.40	HAM			4 Unknown
21	340	Bressanone-RR Bridge	24		HIM			Unknown
22	310	Ala-Sta M/Yds	18	34.00	HIS			Blocked
22	310	Ala-RR Bridge	24	39.60	HAI			3 Damaged
22	321	Lavis-RR Bridge	38	65.00	HAM			Destroyed
22	340	Bressanone-RR Bridge	24	33.70	HAI			3 Blocked
22	340	Lavis-Sta Yds	21	32.00	HAM			6 Unknown
23	321	Campo-S RR Bridge	24	39.60	HIS			Unknown
23	321	Campo-N RR Bridge	18	35.50	HAI			1 Blocked
23	340	San Felice-RR Fill	17	29.00	HAS			5 Blocked
24	310	Lavis-RR Div Br	21	24.00	HAI			7 Blocked
24	310	San Felice-RR Fill	6	12.00	HIS			1 Blocked
24	321	Ala-Rail Bridge	19	41.20	HAM			Unknown
24	321	Rovereto-Road Bridge	3	6.00				Unknown
24	321	Mori-Rail Fill	3	6.00	HIM			Unknown
24	340	San Michele-Rail Junc	18	34.00	HIM			Blocked
25	310	San Margherita-RR Br	18	25.80	HAM			1 Blocked
25	310	Ala-RR Bridge	12	24.00	HIM			Blocked
25	321	Campo-S RR Bridge	24	33.80	HAM			7 Blocked
25	321	Campo-N RR Bridge	18	30.00	HIS			4 Damaged
25	321	San Felice-Rail Fill	18	34.00	HAI			7 Blocked
25	340	Vipeteno-RR Bridge	21	32.80	HAI		3	2 Destroyed
26	310	Ala-RR Bridge	18	27.60	HAM			3 Blocked
26	321	San Michele-RR Div Br	18	32.00				Blocked
26	321	San Michele-RR Bridge	24	48.00	HAM			1 Destroyed
27	310	Bressanone-S RR Br	30		H S			Unknown
27	310	Ala-RR Bridge	24	27.00	HIS			7 Blocked
27	321	San Michele-RR Div Br	18	36.00				Destroyed
27	321	Lavis-RR Div Br	23	37.80	HAM		2	7 Blocked
28	321	Ala-RR Bridge	18	36.00	HAI			1 Blocked
28	321	San Margherita- N & S RR	23	33.00	HAS			Blocked
28	340	San Michele-RR Bridge	21	36.00				Destroyed
28	340	Salorno-RR Emb	21	26.00				Unknown
March 1945								
3	310	Salorno-RR Emb	18	24.00				Unknown

Date	Group	Target	Sorties	Tons Bombs Dropped	Flak	Losses	Dam	Results
March 1945 - Cont'd								
3	310	Salorno	5	9.50				Unknown
3	310	San Michele	5	10.00				Unknown
3	321	Salorno-Rail Emb	19	36.00				Unknown
3	321	San Michele-Br & N Div	24	33.75	HIS			Unknown
3	340	Ala-RR Bridge	15	27.30				Blocked
3	340	San Margherita-RR Br	9	9.30				Blocked
4	310	Salorno-RR Emb	18	24.00	H S			Blocked
4	310	Salorno-RR Emb	12	12.00	H S			Unknown
4	321	Ala-RR Bridge`	30	49.80	HIS			Blocked
4	340	Staz di Ceraino-RR Fill	27	49.30	HAM		3	Blocked
4	340	San Ambrogio-Overpass	17	20.00				Blocked
6	310	Ossenigo-RR Fill	29	51.00	HAM		4	Blocked
6	321	San Ambrogio-RR Bridge	18	34.00	HIM			Damaged
6	340	Ora-RR Bridge	15	8.00	HIS			Destroyed
6	340	Ora-RR Div Bridge	15	23.30	HAM		2	Blocked
7	310	San Michele	9	18.00				Unknown
7	310	Staz di Ceraino-RR Fill	27	46.30	HAM		8	Blocked
7	340	Ossenigo-RR Fill	25	32.00	HII		3	Blocked
8	321	Rovereto-RR Br	24	39.60	HAM		2	Destroyed
8	321	Mori-RR Fill	27	43.80	HAI		3	Blocked
8	340	Ala-RR Br	21	15.30				Not Hit
8	340	San Margherita-Gun Pos	21	3.30	HAM		3	Unknown
9	310	Ora-M/Yds	18	27.60	HAS		10	Unknown
9	310	Ora-RR Div Br	18	24.00	HAS		3	Blocked
9	321	San Michele-N Div Br	19	24.00				Blocked
9	321	San Ambrogio-RR Br	18	36.00				Blocked
9	340	Ala-RR Br	29	28.60				Damaged
9	340	San Margherita-RR Br	18	36.00				Blocked
10	310	Ora-RR Bridges	24	40.76	HAM		1	6 Blocked
10	310	Ora-RR Div Br	36	36.00	HAI		3	3 Not Hit
10	321	San Michele-New Div Br	24	36.00				Blocked
10	321	Staz di Ceraino-RR Fill	21	33.80	HAM		1	Blocked
11	310	San Michele-RR Div Br	18	36.00				Blocked
11	321	Ossenigo-RR Fill	24	32.40	HAM		1	Blocked
11	321	Peri-RR Fill	9	16.00	HAS		4	Unknown
11	340	Volargne-RR Fill	27	39.30	HAM		1	Blocked
11	340	Staz di Ceraino-RR Fill	18	36.00	HIM		2	Unknown
12	321	Ala-RR Br	21	35.80				Destroyed
12	321	San Margherita-S RR Br	12	24.00	HIS			Damaged
12	321	San Margherita-N RR Br	12	22.00	HIS			Blocked
12	340	San Michele-RR Div Br	18	36.00				Destroyed
12	340	Aldeno-RR Fill	21	36.00	HAI		4	Blocked
13	310	Salorno-RR Emb	18	35.50				Blocked
13	321	Vo Sinistro-RR Br	18	31.75				Blocked
13	321	Vo Sinistro-RR Fill	12	23.50	HIS			Blocked
14	310	San Margherita-N RR Br	18	36.00	HIS			Blocked
14	310	San Margherita-S RR Br	21	35.50	HAS		3	Damaged
14	321	Vipiteno-RR Br	27	35.30	HIS			Destroyed
14	321	Campo-N RR Br	12	24.00	HAI			Blocked

Date	Group	Target	Sorties	Tons Bombs Dropped	Flak	Losses	Dam	Results
March 1945 - Cont'd								
15	340	Mori-RR Fill	27	45.90	HIM			Blocked
15	340	Rovereto-RR Br	18	36.00	HIS			Destroyed
16	310	Campo-N RR Br	24	15.60	HAM		13	Unknown
16	310	Campo-S RR Br	18	29.00	HAM		3	Blocked
16	340	San Ambrogio-RR Br	13	24.00				Damaged
17	310	San Michele	18	36.00				Not Hit
17	340	Aldeno-RR Fill	21	34.00	HAI	1	10	Blocked
17	340	Aldeno-RR Br	9	12.00	HAI		2	Not Hit
17	340	Aldeno-RR Fill	7	14.00	HII			Blocked
18	321	Bronzolo-RR Br	27					Unknown
18	340	Salorno-RR Fill	18	36.00				Blocked
19	310	Vo Sinistro-RR Fill	18	22.00	HIM		5	Unknown
19	310	Vo Sinistro-RR Br	18	24.00				Unknown
19	310	Rovereto-RR Line	8	10.00	HAI	1	13	Unknown
19	321	Bronzolo-RR Br	12	23.00				Blocked
19	321	Ora-RR Div Br	27	37.25	HAM			Unknown
19	321	Ora-RR Br	18	36.00				Blocked
19	340	San Michele-RR Div	18	34.00				Blocked
20	321	LeCave-Sta Yds	24	31.00	HAM			Unknown
20	321	San Ambrogio-RR Br	15	30.00				Destroyed
20	340	Vipiteno-RR Br	17	34.00				Destroyed
20	340	Campo-N RR Br	17	20.00	HAI	3	8	Damaged
20	340	Campo-RR Br	15	27.30	HAI		9	Not Hit
21	310	Salorno-S RR Fill	18	22.00				Unknown
21	310	San Michele-RR Div Br	18	36.00				Unknown
21	321	Campo-S RR Br	18	25.80	HIM			Unknown
21	321	Campo-N RR Br	12	22.00	HAI	1	5	Destroyed
21	321	Vipiteno-RR Sidings	21	37.45	HAI	1	2	Unknown
21	340	Brennero-M/Yds	26	37.50	HIS			Blocked
22	310	Salorno-RR Emb	18					Unknown
22	310	Steinach-RR Br	18	36.00				Blocked
22	310	Matrei-RR Br	18	36.00				Not Hit
22	340	Volargne-RR Fill	21	15.30	HIS			Not Hit
23	310	Salorno-RR Emb & Dr Cam	12	24.00				Blocked
23	310	San Michele-N RR Br	12	24.00				Damaged
23	321	Matrei-S RR Br	18	24.00				Blocked
23	340	Vo Sinistro-RR Fill & Br	39	68.00	HII			Unknown
24	310	Steinach-RR Fill	12	22.00				Not Hit
24	310	Steinach-RR Br	18	36.00				Damaged
24	321	Ora-RR Div Br	6	3.05	HFS			Unknown
25	310	Ala-RR Br	21	51.30	HIS		3	Not Hit
25	321	Volargne-RR Fill	21	13.45	HAM		1	Unknown
25	340	Steinach-RR Fill	18	24.00				Not Hit
25	340	Vo Sinistro-RR Br	21	36.00	HIS			Destroyed
30	310	Rovereto-RR Bridge	33	51.60	HAI	1	15	Blocked
30	310	San Ambrogio-RR Br	21	39.30	HIS			Damaged
30	340	Ora-RR Div Br	21	37.30	HAI	1	1	Unknown
30	340	Ora-Main RR Br	12	8.00	HAM	1	1	Unknown
31	310	Steinach-RR Br	6	12.00				Destroyed

Date	Group	Target	Sorties	Tons Bombs Dropped	Flak Losses	Dam	Results
March 1945 - Cont'd							
31	340	Salarno-RR Fill	12	22.00			Blocked
31	340	San Michele-RR Div Br	12	16.00			Destroyed
31	340	San Michele-RR Br	18	36.00			Destroyed
April 1945							
1	340	Colle Isareo-E RR Br	12	24.00			Blocked
1	340	San Ambrogio-RR Overpass	6	12.00			Unknown
2	310	San Michele-RR Div Br	18	36.00			Blocked
2	321	Matrei-S RR Br	18	33.00			Damaged
2	321	Matrei-N RR Br	18	36.00			Blocked
2	340	Steinach-S RR Br & Tun	18	36.00			Damaged
2	340	Colle Isarco-E RR Br	8	12.00	HIM	1	Blocked
2	340	Vo Sinistro-RR Fill	10	20.00	HIM		Blocked
4	321	Ora-RR Br	17	19.80	HIM	2	Blocked
4	321	Salorno-RR Emb & Dr Can	7	14.00	HIM		Unknown
4	321	Ora-RR Div Br	18	36.00	HFM	1	Blocked
4	340	Calliano-RR Br #3	17	32.00	HAI		Blocked
4	340	Rovereto-RR Br	24	30.10	HAI	1	9 Destroyed
5	310	Matrei-S RR Br	18	36.00			Damaged
5	310	Steinach-S RR Br	18	34.00	H S		Unknown
5	340	Salorno-Sta RR Br	18	34.00			Blocked
5	340	San Michele-N RR Br	18	34.00			Destroyed
8	310	San Michele-RR Div Br	24	43.50			Damaged
8	321	Salorno-Sta RR Br	18	34.00			Destroyed
8	321	Salorno-RR Fill & Can	17	34.00	HIS		Blocked
8	340	Vo Sinistro-RR Br	15	24.00	HIS		Blocked
8	340	Vo Sinistro-RR Fill	6	12.00	HIM		Blocked
11	321	San Ambrogio-RR Culvert	21	37.80	HIS		Blocked
11	321	Volargne-RR Fill	18	36.00			Blocked
11	340	San Margherita-N RR Br	18	22.00	HIS		Blocked
11	340	Ala-RR Br	21	29.30	HIS		Damaged
12	310	Vo Sinistro-RR Fill	18	36.00	HAS	5	Blocked
12	310	Vo Sinistro-RR Br	18	36.00	HAS	4	Blocked
14	310	San Ambrogio-RR Br	18	36.00			Blocked
14	310	San Ambrogio-RR Br	18	36.00			Blocked
14	321	Salorno-RR Emb	18	36.00			Blocked
14	321	Steinach-S RR Br & Tun	18				Unknown
15	321	Steinach-S RR Br & Tun	18				Blocked
15	321	Matrei-S RR Br	18				Unknown
17	321	Steinach-S RR Br & Tun	18	36.00			Blocked
17	321	Steinach-RR Fill Br	9	18.00			Blocked
17	340	Matrei-N RR Br	18	36.00			Not Hit
17	340	Matrei-S RR Br	18	32.50			Damaged
18	321	Volargne-RR Fill	18	36.00			Blocked
18	321	San Ambrogio-RR Br	18	22.50			Blocked
18	340	Staz di Ceraino-RR Br	18	34.00			Blocked
18	340	Dolce-RR Fill	21	17.30			Blocked
19	310	Rovereto-RR Br	24	29.50	HAI	3	18 Blocked
19	310	Calliano-RR Br #1	18	36.00	HIM		Blocked
19	340	Ora-RR Div Br	18	24.00	HIS		Blocked

Date	Group	Target	Sorties	Tons Bombs Dropped	Flak	Losses	Dam	Results
April 1945 - Cont'd								
19	340	Ora-Main RR Br	21	38.30	HAM			Destroyed
20	321	San Michele-RR Div Br	18	36.00				Blocked
20	321	Salorno-S RR Fill	18	34.00	LIS			Blocked
20	321	Salorno-Sta RR Br	15	30.00				Blocked
20	340	Volargne-RR Fill	18	35.00	HIS			Blocked
20	340	San Ambrogio	12	12.00	HAI	1	2	Unknown
20	310	San Ambrogio-RR Fill	18	36.00	H S			Blocked
21	310	Steinach-N RR Br	18					Unknown
21	340	Matrei-N RR Br	18	34.00				Blocked
23	310	Salorno-RR Emb	18					Unknown
23	310	Dolce-RR Fill	18	36.00				Blocked
23	310	Staz di Ceraino-RR Fill	18	36.00				Blocked
23	321	Volargne-RR Fill	17	34.00				Blocked
23	321	San Ambrogio-RR Br	18	34.50				Blocked
24	310	Ossenigo-RR Fill	18	36.00				Blocked
24	310	Peri-RR Fill	18	36.00				Blocked
24	321	Ala-RR Br	24	38.85				Destroyed
24	321	Vo Sinistro-RR Br	21	37.80	HIS			Blocked
24	340	Calliano-RR Br #1	21	36.80				Blocked
24	340	Rovereto-RR Br	18	36.00				Blocked
25	310	Calliano-RR Br #3	18	36.00				Unknown
25	310	Rovereto-RR Br	18	36.00				Blocked
25	321	San Michele-RR Div Br	18	36.00				Damaged
25	340	Steinach-N RR Br	12	20.00				Damaged
25	340	San Ambrogio-RR Br	6	12.00				Unknown
25	340	Steinach-RR Br & Tun	7	12.00				Blocked
25	340	Volargne-S RR Fill	11	22.00				Blocked



Date	Group	Target	Tons Bombs	Sorties Dropped	Flak Lower	Results
April 1945 - Cont'd						
19	360	Ora-Main RR Br	21	38.30	NAW	Destroyed
20	321	San Michele-RR Div Br	18	36.00		Blocked
20	321	Salerno-6 RR Mill	18	31.00	HTS	Blocked
20	321	Salerno-Sta RR Br	15	30.00		Blocked
20	360	Volturno-RI Mill	18	35.00	HTS	Blocked
20	360	San Ambrogio	12	18.00	HAI	1 2 Unknown
20	310	San Ambrogio-RR Mill	18	36.00	R S	Blocked
21	310	Stalnach-W RR Br	18			Unknown
21	360	Matred-W RR Br	18	34.00		Blocked
21	310	Salerno-RR Sub	18			Unknown
21	310	Dolce-RR Mill	18	36.00		Blocked
21	310	Stes di Cassino-RR Mill	18	36.00		Blocked
21	321	Volturno-RR Mill	17	31.00		Blocked
21	321	San Ambrogio-RR Br	18	31.50		Blocked
21	310	Orsenigo-RR Mill	18	36.00		Blocked
21	310	Pari-RR Mill	18	36.50		Blocked
21	321	Ala-St Br	24	38.85		Destroyed
21	321	Va Sialestro-RR Br	21	37.80	HTS	Blocked

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