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HEADQUARTERS
MEDITERRANEAN ALLIED TACTICAL AIR FORCE
APO 650

B L O C K A D E

The Isolation of ITALY from the Reich

by

Mediterranean Allied Tactical Air Force

29 August 1944 - 1 May 1945

11613

[redacted]

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FOREWORD

"Blockade" is the story of the efforts of MATAF, ably supported on many occasions by MASAF, to completely seal off the German forces of Army Group "C" in North ITALY from rail connections with the Reich. It is the story of the dogged execution of a carefully planned program of rail interdiction in the most difficult terrain our airmen have ever faced, the ALPS. It is the story of flak, the very heaviest concentrations the Germans could muster, and what we did to counter it. It is the story of attacks on large bridges whose destruction caused permanent blocks of the lines and, more frequently, the story of attacks on small bridges and fills which though hit and destroyed would have to be attacked again and again in the furious, never-ceasing battle between our air forces and the German repair crews. It is the story of perseverance, determination, and success --- success because it is generally conceded by the senior German personnel on the staff of General Von Veitinghof, C-in-C of the Wehrmacht in ITALY, including the General himself, that the interdiction of supply lines and the destruction of stores of ammunition and fuel were the main reasons for the quick defeat of the Germans in ITALY.

In October 1944, when it became apparent that the Fifth and Eighth Armies' efforts to break through the Gothic line into the PO Valley would involve a costly and long campaign, it was decided to concentrate our bombing to disrupt lines of communication linking ITALY with the Reich. The design of the Italian rail system lent itself admirably to our task, although the task of complete interdiction was an ambitious one to be undertaken with the forces that could be diverted from close support for this purpose. Nevertheless the program was energetically maintained throughout the entire winter until the Allied offensive was launched in early April. That the Fifteenth Army Group swept forward, against resistance, tough at first, but rapidly deteriorating, to complete victory over two of the best armies in the Wehrmacht in the short period of only three weeks, is a tribute to the effectiveness of operation "Blockade".

Much information on the actual effect of our bombing program is still preliminary in nature. Continued interrogation of German personnel actively engaged in combatting our air blockade and personnel in the transport and supply services of the Wehrmacht in ITALY is producing additional factual data. Tangled records of the Italian State Railways are slowly being put in order. But from the reports so far received and analysed, the trend of the effect-

iveness of our bombings is evident and it is not believed that subsequent reports will materially alter the results as now appreciated.

Reduction in Rail Traffic over Frontier Routes. During the seven month period of attacks on communications, portal traffic, excluding rail movements through SWITZERLAND, was reduced from an average of 53 trains daily in October to 6 trains daily in April. The limited traffic moving at the last was handled with great difficulty due to the general dislocation of the entire rail system in North ITALY. Since this average of 6 trains daily represented traffic movements both into and out of ITALY and included work trains, the rail movement alone was insufficient to meet the absolute minimum requirements of Army Group "C".

Effect on Supply. Coupled with attacks against supply installations in North ITALY, the interdiction of the Axis supply routes caused the level of stocks of critical items in corps, army, and army group dumps to drop steadily until, at the end, supplies for less than a week of operations remained. The traffic that worked through the interdiction zones was too limited to allow an accumulation and build-up of reserves in ammunition, fuel and other stores.

Withdrawal of Troops from ITALY. The withdrawal of seasoned German divisions from the Italian front to reinforce the Western and Eastern fronts, ordered by Hitler himself over the objections of Kesselring, was so seriously hampered by the state of Italian railways that the project was abandoned. It was found, as Kesselring had appreciated, to be possible to return but three divisions past our blockade during a three months period. While the appearance of a number of crack German divisions on either of the fronts North of the ALPS would have greatly influenced the conduct of operations, the arrival of the trickle of troops from ITALY was of no tactical importance.

Manpower Tie-up. Another result of our attacks on communications was one the effect of which cannot be easily assessed; in view of the overall shortage of manpower throughout the Reich and the shortage of replacements in the Wehrmacht itself, it may well have been of great consequence. This was the tying down of over 100,000 able bodied men in defense and repair organizations. Of this total, 50,000 men manned the flak defenses of

the BRENNER and other communications targets, while there were 55,000 troops engaged in the full time job of repair and maintenance of the railway system in Northern ITALY. The latter figure does not include the Italian laborers who were impressed by local levy. Thus, in effect, air attacks alone tied up the manpower equivalent of 10 divisions.

Traction in the BRENNER: Steam against Electricity. Operation "Bingo", the attacks on transformer stations on the BRENNER South of TRENTO, permanently reduced this section of the rail line to steam traction. Records show that the effect of this on the rail traffic was even greater than was anticipated. It is unfortunate that the planned program of destruction of transformer stations North of BOLZANO was never executed; such a program would have reduced the capacity of this critical section more effectively than did the intermittent bombing of bridges.

Evacuation of Looted Industrial Equipment. The reduction of the capacity of the frontier rail nets stopped the evacuation to GERMANY of equipment looted from the great industrial installations of Northwest ITALY. Hundreds of car loads of this equipment were side-tracked along the main line from MILAN to VERONA because of troop and supply movements and were eventually recovered.

Elimination of Italian Industrial Production. Blocks on the rail lines plus the economic block by the Swiss Government of the movement of coal and other raw materials over the Swiss railways into ITALY virtually eliminated the Italian industries that were engaged in the production of certain war materials, particularly munitions, for the Germans. The overloaded railways, taxed far beyond their reduced capabilities by the movement of more essential military supplies and troops, could not absorb the coal and raw material tonnage formerly passed by the Swiss. As a result of this, an acute coal shortage occurred which closed down most Italian war industries and, indeed, threatened to immobilize many steam-traction sections of the railways.

Shortage of Locomotives and Rolling Stock. Records show that the enemy was not short of rolling stock. Although a steady decline in available stock is apparent, as only a limited amount of rail movement was possible on the thoroughly disorganized system, the situation was not critical. However, in all areas that were heavily attacked, temporary shortages occurred due to the difficulty

of bringing locomotives and rolling stock into the area over damaged and congested lines. Destruction of sheds and repair shops caused many difficulties in the servicing and repair of damaged stock.

Fighter Bomber and Night Bomber Effectiveness. Although the actual effectiveness of fighter-bombers in establishing track cuts and destroying bridges was great, benefits far greater were obtained simply by their continued presence over an area. It was impossible to keep labor gangs on the job when fighter-bombers were about, and this had a tremendous influence on the efficiency and speed at which repairs were effected. Night bombers caused the same demoralization and confusion among repair crews. It was found from German records, however, that twilight periods were invariably low points in our air operations; this fact was fully exploited by the enemy who planned his activity to take full advantage of the comparatively alert-free periods.

Communications Target Systems. There is no doubt but that attacks on large bridge structures are the most effective in accomplishing interdiction. However, as in the case of the BRENNER rail line where all major structures had been by-passed or were for other reasons unsuited for medium bomber attack, it was found that interdiction could be maintained by attacks on small bridges, fills, cuts, and even open stretches of the line. Such blocks, though normally easy to repair, if multiple, cause more than proportional difficulty. Fighter-bombers and medium bombers make an excellent team in establishing and maintaining such a zone of blocks.

It is hoped that the documentation of Blockade will be of benefit to those whose lot it may be to plan a similar operation in the future and of interest to those who, in time to come, may seek recognition for the role played by Mediterranean Allied Tactical Air Force in the final battle of the Italian Campaign.

William A. Adams

WILLIAM A. ADAMS
Colonel, G.S.C.,
Deputy Chief Intelligence Officer.

My congratulations not only on domination of the air over enemy armies, but even more on disruption of their communications, to such an extent that it was impossible for them to withdraw their troops from the trap in which they were caught and destroyed.

Winston Churchill
to MAAF, May 1945

Photo No. 1

CERAINO RAILWAY STATION

Photograph was taken on 10 March, when 21 B-25's attacked this BRENNER line target, cutting both the railway and highway with three craters.

PART I

S I T U A T I O N

STRATEGIC IMPORTANCE OF INTERNATIONAL ROUTES

1. Except for food and a small quantity of light ammunition, the German Armies in ITALY in the winter and spring of 1944-45 were wholly dependent on the Fatherland for their sinews of war. Between their fixed defenses on the approaches of the PO Valley and their sources of supply in the Reich lay the great mountain mass of the Central Alps - a possible Nazi haven as a last redoubt but meantime a certain obstacle to the transit of manpower and supplies. With FRANCE liberated and with the control of the sea firmly in Allied hands, the destiny of the Wehrmacht in ITALY depended on the lines of communications which ran across this crest of EUROPE. If they could be severed, not only the immediate battlefield but the whole of occupied ITALY might be isolated and the enemy exhausted, trapped, and ultimately destroyed.

2. Function of Inter-Axis Routes. Close to the frontier, the inter-Axis rail lines via AUSTRIA and YUGOSLAVIA are reduced in number to five. According to figures compiled in 1943, their respective daily capacities when fully serviceable were as follows:

Route	No. Trains Each Way	Tons Cargo per Train	Total Net Tons Each Way
BRENNER	30	800	24,000*
	72	550	39,600
TARVISIO	24	400	9,600
PIEDICOLLE	12	400	4,800
POSTUMIA	48	500	24,000
DOLOMITE	4	50	200

Of these, the DOLOMITE Railway was of such low capacity as to be negligible from a military point of view. The POSTUM IA Route was the most roundabout of all and was constantly menaced by Marshal Tito's Partisans. The PIEDICOLLE Line functioned as an alternate

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* Lower estimate for BRENNER supplied by Italian Railway officials and will be used throughout this report. All other figures drawn from ISTD Special "C" Report on North ITALY, Railways. Due to variance in conditions taken into considerations, it is virtually impossible to state the capacity of a railway in exact terms.

to the TARVISIO. All three were of relatively minor significance. Of primary strategic importance to the enemy's military organization were the BRENNER and TARVISIO Routes.

3. During the German campaigns in the East in 1939-41, the BRENNER Line was unimportant for transport of war materials, but early in 1941 it was already heavily taxed with coal deliveries moving South. In the spring German troops started moving South over this line in large numbers. By 1942, as the war in the desert mounted in intensity, traffic became still heavier. Thereafter large shipments of all types of war material flowed through the BRENNER Pass. In September 1943, immediately after the Italian armistice, all deliveries to the South stopped for four days. Furthermore, during the month heavy bombers attacked the Line near BOLZANO and motorized SS troops which were being transferred to ITALY had to move by road over the BRENNER and by rail down the TARVISIO Route. After seven days, 20 to 24 troop trains started moving during each 24 hour period again. Also at this time some of the loot from ITALY began flowing North. Strategic bombardment early in 1944 reduced traffic to 12-15 trains per day, but during March and April it gradually recovered toward a daily capacity of 24 trains each way. During October 1944, the first month of MATAF effort on the BRENNER, a daily average of 7.8 trains (or 202 cars) travelled South along the Line. Most of these carried troops and guns.

4. The TARVISIO Route, the most direct connection to VIENNA, assumed importance early in the war as a path for troops, workers, and material bound for the Russian front. In the spring of 1944, in actual performance it ran slightly above the BRENNER Line. Untouched by aerial or ground attack, it was actually operating close to its theoretical capacity of 24 trains daily. By October, its 18 southbound trains daily (or 626 cars) was more than double the volume of incoming traffic on the crippled BRENNER. Most of this was petrol and fuel.

5. In autumn 1944 the daily minimum requirement of supplies for Army Group C was 5500 to 6500 tons. Part of this was obtained from ITALY, but at least 3600-4000 tons, equivalent to eight or nine trains, had to be obtained from the Reich, and was brought primarily over the BRENNER and TARVISIO Routes. By January 1945 minimum military import requirements had dropped to four trains daily, or a total of 1900 tons. While these requirements could be expected to rise sharply with accelerated ground activity, on the basis of the scale of fighting which prevailed during the winter of 1944-45, this amount constituted only a fraction of the capacity of the BRENNER Line alone. A very thorough-going paralysis of all the inter-Axis routes would be necessary to accomplish the desired starvation of the Wehrmacht in ITALY. With this end in view, it was necessary for MATAF to take account, not only of the above supply lines, but also those which passed through SWITZERLAND.

RAIL AND RIVER SYSTEMS IN AREA OF MEDITERRANEAN ALLIED TACTICAL AIR FORCE OPERATIONS

LEGEND

- STANDARD GAUGE, DOUBLE TRACK
- STANDARD GAUGE, SINGLE TRACK
- NARROW GAUGE

8° 9° 10° 11° 12° 13° 14° 15°

47° 46° 45°

Salzburg
Innsbruck
MATREI
STEINACH
COLLE ISARCO
VIPITENO
CAMPO DI TRENS
FORTEZZA
FRASSE
DOBBIACO
MESSANONE
CHIUSA
PONTE ALL'ISARCO
Bolzano
OBA
SALORNA
MICHELE
Trento
MATERELLO
ALDENO
CALLIANO
ROVERTO
MORI
MARCO
S. MARGHERITA
ALA
S. Sinatio
BORGHETTO
OSSENIGO
PERI
DOLCE
STAZ. DI CERAINO
VOLARGNE
S. AMBROGIO
PESCHIERA
Verona
Brescia
Lago di Garda
EDOLO
BORGO
CISMON
Bassano
CASTELFRANCO
GIAVERA
TREVISO
Vicenza
MONTEBELLO
Padua
Mestre
VENICE
GULF OF VENICE
Rovigo
Ferrara
Modena
BOLOGNA
Parma
Piacenza
Cremona
Mantua
MONAGO
Alessandria
Pavia
Milano
TURIN
Como
LONGARONE
Ponte nelle Alpi
Belluno
Vittorio Veneto
SACILE
CASARSA
PORDENONE
CONEGLIANO
NERVESA
MOTTA DI LIVENZA
PONTE DI PIAVE
S. DONA DI PIAVE
Udine
CODROIPO
CERVIGNANO
PORTOGUARO
Gorizia
Monfalcone
Grado
TRIESTE
Fiume
Ljubljana
BOROVNICA
Postumia
SESANA
SONCHI
S. PIETRO D. CARSO
PIEDICOLLE
CANALE D'ISONZO
Villach
Klagenfurt
Graz
Leoben
Judenburg
LIENZ
MUHLDORF
SPITTAL
Drava R.
Gail R.
Isarco R.
Adige R.
Piave R.
Tagliamento R.
Livenza R.
Sava R.
Ticino R.
Oglio R.
Mincio R.
Secchia R.
Po R.
Serio R.

6. Relation of Swiss Routes to Blockade. Other than the BRENNER and the Northeastern frontier, the only possible corridor for rail communications between ITALY and GERMANY lay through neutral SWITZERLAND. The extent to which the Swiss Routes might be used to circumvent a blockade of the Italo-Austrian rail lines was a factor which the Allied High Command had to seriously consider in judging the repercussions on enemy logistics of such a blockade.

7. Throughout the period of German control in ITALY, the enemy was engaged in the widespread requisitioning of foodstuffs for consumption within the Reich. However, until the Armistice of September 1943, there was no evidence of the removal to GERMANY of industrial plants or materials. At this time the Germans set up the Italian branch of R.U.K. (Rustungs und Kriegsproduktion), an organization which existed in all occupied countries, whose responsibility was arranging for the transfer of machinery and industrial plants to the Reich in a "legal" manner. Although the Swiss had always embargoed completed munitions, until the summer of 1944 they permitted the transit of a vast range of materials which more or less directly served the German war machine.

8. During the Allied advance which began in May 1944, the enemy stepped up the evacuation of industrial plants and materials which he was ruthlessly looting from Northern ITALY. In the first half of 1944 the traffic from ITALY to GERMANY via SWITZERLAND averaged 56,000 tons per month. Between May and August the Germans removed 54,000 tons of pyrites which were considered to be a legitimate export. However, at various dates during the year, restrictions were imposed by the Swiss on the transit of loot and these soon began to have their effect. The restrictions covered the removal of such materials as railway materials and rolling stock, electrical and other machinery, scientific instruments, ball bearings, hides, leather, footwear and various minerals, metals, chemicals and fats for industrial uses. They resulted in a steady monthly decline in the Swiss transit traffic, which in December in the South-North direction amounted to no more than 17,000 tons and seemed to be limited mainly to food.

9. Southbound cargo through SWITZERLAND in the first half of 1944 averaged 404,000 tons per month, but at the time when MATAF undertook to isolate ITALY, this tonnage was confined to coal, iron, steel and scrap iron. On 17 October the Supreme Allied Commander, Mediterranean Theater suggested that MATAF interdict the rail lines from ITALY to SWITZERLAND on equal priority with the TICINO and PO bridges. However, this was not felt to be necessary as it was considered that the Swiss Routes offered no serious gap to the interdiction program, provided sufficient watch and if need be pressure, was kept on this traffic by diplomatic means. In November SACMED proposed to the Joint Chiefs of Staff that the Swiss be asked to

stop traffic of certain products to and from ITALY, and, upon orders from MAAF, Tactical Air Force developed plans for the interdiction of the SIMPLON and ST. GOTTARD Routes in the event of Swiss refusal. These plans, however, were never implemented as the critical items - oil, ammunition, heavy military equipment, and the movement of troops - did not form part of the Swiss traffic. Also, the Swiss government at this time maintained that trade with Germany had been reduced to the strict minimum required to supply SWITZERLAND with her vital needs. Coal became thus the only commodity allowed shipped from GERMANY to ITALY via SWITZERLAND.

10. In December 1944, ITALY was importing 50,000 tons of coal a month from GERMANY as compared to 1,000,000 tons per month in pre-war days. This average tonnage continued to be shipped through SWITZERLAND until negotiations in early 1945 between the Swiss and the Allied Governments virtually eliminated this traffic.

11. In February 1945 economic discussions between SWITZERLAND, GREAT BRITIAN and the UNITED STATES aimed at severing economic relations between SWITZERLAND and GERMANY. Two specific points in these negotiations were: to stop German-Italian traffic via SWITZERLAND, and second, to terminate the Swiss-German agreement under which locomotives, motor cars and certain machinery were sold to the Reich.

12. On 8 March 1945, the Swiss government signed an agreement with the Allies which added coal, iron, steel and scrap iron to the list of goods which they would not accept for transit from GERMANY to ITALY. Other traffic was limited to 14,000 tons monthly as compared with previous monthly totals as high as 460,000 tons. At the same time all Northbound traffic was to be regarded as "loot" or "goods sold under pressure" and therefore prohibited until the contrary was proved; the maximum Northbound traffic permitted in any one month was to be 5900 tons. By this agreement, the Germans lost the use of the Swiss corridor and "Blockade" by treaty became as effective as "Blockade" by MATAF.

13. By this time the enemy's shortage of coal in ITALY had become second only to the shortage of fuel. As practically no coal was produced in Northern ITALY, almost all the fuel required by both the Germans and the Italian industries and railways had to be imported from the Reich. Since the majority of it passed through SWITZERLAND, the embargo, combined with our blockade, had a shattering effect. By mid-March it was reported that only one fifth of the daily coal requirements were reaching ITALY, and thereafter none passed through SWITZERLAND. During the second half of March and through April, shipments from GERMANY to ITALY via SWITZERLAND were confined to such commodities as soda, rock salt, apples and lumber. On the ST. GOTTARD Route from the 11th of April to at least the 20th

of April nothing at all moved from ITALY to GERMANY. Diplomacy had sealed the major leak in MATAF's blockade.

DESCRIPTION OF ROUTES AND CHIEF TARGETS

14. The BRENNER Line. The most important international route in ITALY, the BRENNER rail line provides the only direct double track connection with the Reich. From the Italian terminal at VERONA to its junction with the German rail system at INNSBRUCK, a distance of 172 miles, the railroad affords a through electrified standard gauge two-way route through the heart of the Alps. In the thirties, express trains covered the distance in seven hours. From VERONA, through connections via the BRENNER could be made to VIENNA and BERLIN in 17 and 24 hours respectively.

15. All but the last 25 miles of the railroad lies within territory which belonged to AUSTRIA before the first World War. Following the valleys of the ADIGE River and its tributary, the ISARCO, the line reaches the frontier at the BRENNER Pass. Slightly less than 4500 feet high, the BRENNER Pass is the lowest over the main chain of the Alps, and as a result the railway is the only one to cross the main crest without a tunnel at the top of the pass.

16. No newcomer to the stage of history, the BRENNER Route has constituted the main thoroughfare for travel across the Alps for centuries. Used by the Romans as the VIA CLAUDIA AUGUSTA to AUGSBURG, it was also the first Alpine road to be remade for carriages (1772). In 1863-67 the railway was constructed paralleling the highway, and in 1928 its electrification was begun. In 1940 it brought the Axis partners together at BRENNERO to plan ITALY's entry into the war. In 1942 the railway carried Rommel's legions to the battlefields of AFRICA, while at the same time workers, trains and troops sped Northward over the route to the Russian front. Total capacitym highest of all international routes, was reported to have increased in 1942 to 36,000 tons per day each way.*

17. At VERONA, largest city between VENICE, BOLOGNA and MILAN, the BRENNER Line meets the East-West trunk route from TRIESTE to TURIN and feeds as well a network of communications leading South across the PO. As the Southern terminus of the BRENNER, VERONA became the center of the largest concentration of dumps and supply installations

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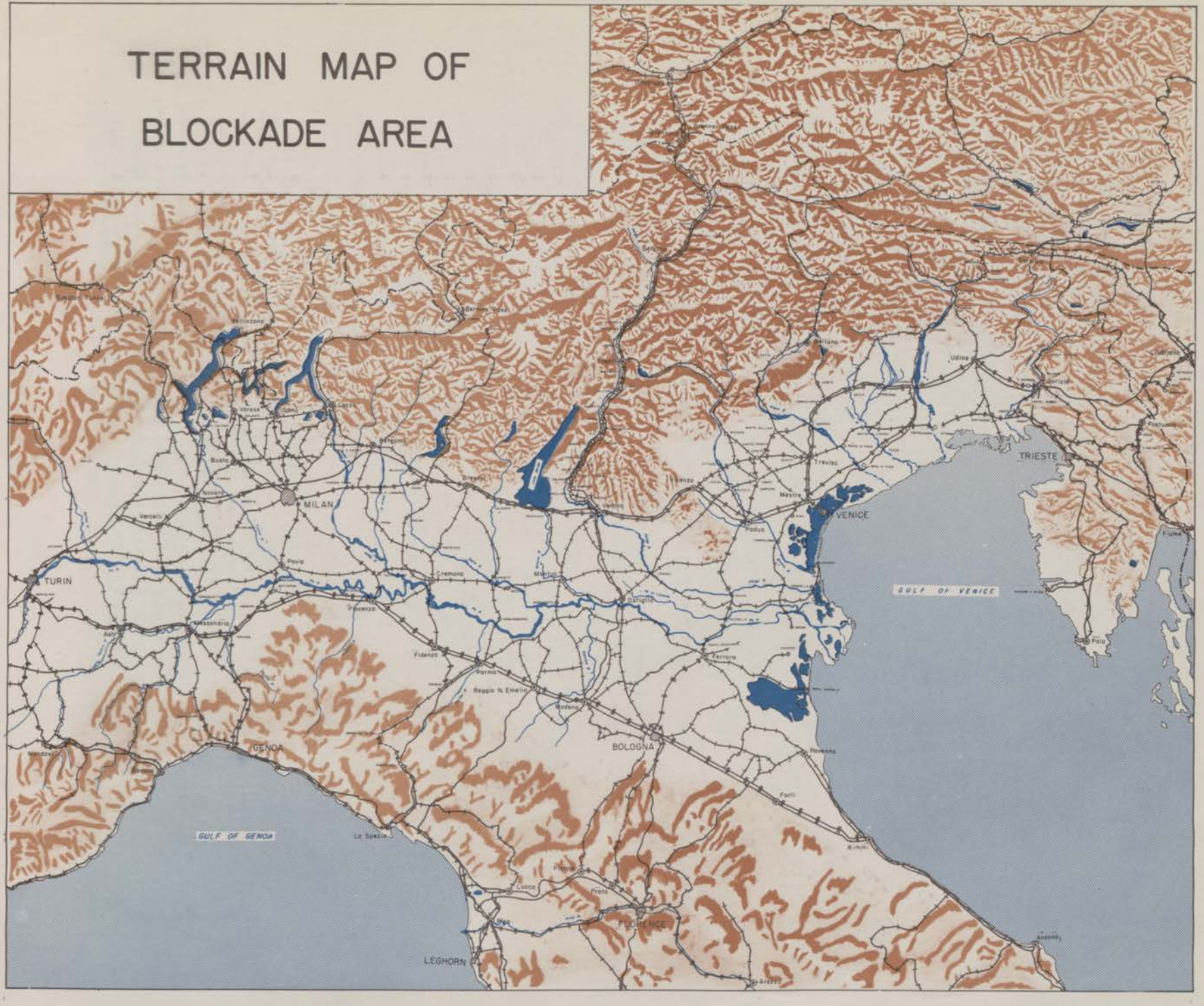
* Military Intelligence Service, War Department, Survey of ITALY (S30-722), p. 103. Although differing from the figures supplied by Italian State Railway officials, this estimate finds confirmation in the testimony of a train conductor on the BRENNER Line who reports that in 1942 from three to five trains were moving South over the route every hour. Hq. MAAF, PW Intelligence Section, Rail Road Communications in Southern GERMANY, 4 March 1945.

TERRAIN MAP OF BLOCKADE AREA



in ITALY. Some 30 ammunition factories, dumps, and M/T depots were located here, all fed by the BRENNER Line. The city also became a "Frontleitstelle", or base area, at which many of the transfers between motor and rail transport were accomplished and distribution was made of replacement troops and material. Of the VERONA rail yards, the West yard did the major portion of the marshalling for the BRENNER Route, but this target was left by MATAF for strategic bombardment in view of the tremendous scale of flak defenses. At the Austrian terminus of the BRENNER, picturesque INNSBRUCK, capital of the TYROL, handled traffic moving East and West on the electrified line between AUSTRIA and Southwest GERMANY and was the funneling point for traffic moving from GERMANY onto the BRENNER Line. Because of its strategic location, facilities for marshalling and servicing of trains were highly developed with the result that INNSBRUCK Main became the classification yard for freight traffic in the entire area. On the route between these terminals, there were more than 50 stations, most of which were small. However, with the destruction of permanent double track bridges which were replaced by single track structures, the unused sections of the double track system became available as sidings. As a result, the route was virtually a marshalling yard all the way up, offering extensive facilities for storage of rolling stock, thus reducing the potential concentration of cars in the regular yards.

18. From a terrain and target point of view, the BRENNER Line falls into four main sections:

a. <u>VERONA-ALA exclusive.</u> Leaving VERONA, both road and railway for the first ten miles skirt the hills at the edge of the PO Plain. At SANT' AMBROGIO, the line turns North up the narrow valley (approximately one mile wide) of the ADIGE River. At DOLCE the slopes of the hills steepen, rising to over 4300 feet within a mile on either side. At SANT' AMBROGIO the tracks pass through a deep narrow gorge. Numerous fills and embankments mark the course of the railroad North of SANT' AMBROGIO and at places it is closely confined by the cliffs of limestone rock which flank the valley. However, there are no major bridges.

b. <u>ALA-TRENTO inclusive.</u> At ALA, 32 miles from VERONA, the first of numerous side streams joins the ADIGE. As a result there are eight small bridge targets from here to TRENTO, none of which are more than 135 feet long. The valley bottom opens up to an average width of a mile and a half and opportunities for inundating the tracks with earth diminish. Past vineyards and small groups of houses, the railroad follows the East bank of the ADIGE into TRENTO. Situated at a point where the hills break away on either side, TRENTO, with a population of close to 60,000, is the

Photo No. 2

Looking eastward across Lake GARDA (center), the ADIGE Valley is discernable in the background. From Lake GARDA a road winds eastward through the break in the ALPS to join the BRENNER Route at MORI. The heavy ground haze which appears in the ADIGE Valley was one of the constant problems which confronted navigators and bombardiers.

largest city on the BRENNER Line. Here the main route is joined by a loop-line running Southeast down the perilous gorge of the BRENTA River to the VENETIAN Plain joining the VERONA-UDINE rail line at CITTADELLA.

c. TRENTO-BOLZANO exclusive. North of TRENTO, bridges become fewer in number but larger in structure. The railroad crosses the ADIGE at SAN MICHELE, recrosses at ORA, and also spans the AVISIO, where a 3140 foot viaduct carries it over the main channel and the flat marshy area on either side. However, the valley floor is often over two miles wide, which afforded the enemy an opportunity not only to by-pass the AVISIO Viaduct with a two mile diversion, but also to construct a 15 mile by-pass line to the East bank of the ADIGE which circumvented both the ORA and SAN MICHELE bridges. As a result no really satisfactory target for medium bombardment existed South of BOLZANO.

d. BOLZANO-INNSBRUCK. Half-way house and second largest city on the BRENNER Route is BOLZANO. While the town itself is only 870 feet above sea level, many of the surrounding peaks range up to 9000 feet. Here the rail line leaves the ADIGE and enters the valley of its tributary, the ISARCO, which it ascends to the frontier. Closely confined in the narrow wooded valley between the snow-capped pinnacles of the DOLOMITES, the railroad crosses back and forth over the river and passes through numerous tunnels and avalanche hoods. At FORTEZZA, 30 miles North of BOLZANO a second rail connection meets the main line--a single track, heavily graded and sharply curved railway running East to VILLACH via SAN CANDIDO Pass. Principal importance of this line is as a link between the BRENNER and TARVISIO Routes. Above FORTEZZA, the BRENNER Line continues up the ISARCO Valley to BRENNERO on the frontier, where it then descends the SILL River Valley to INNSBRUCK, 25 miles within AUSTRIA. Bridges, cuttings and tunnels continue to be numerous. In contrast to the area farther South, the precipitous slopes North of BOLZANO made the construction of diversions a difficult, if not impossible task. By-passes were constructed around the marshalling yards at BOLZANO and INNSBRUCK but none were attempted between those points. The same terrain features made strafing practically impossible and only too frequently made identification of the target in sufficient time for an adequate bomb run impossible.

19. VENETIAN Plain. Between the ADIGE and BRENTA Rivers two groups of rocky hills rise abruptly from the lowlands that lap around them and mark the edge of the PO Valley. Northeastward the plains of VENEZIA extend to the foothills of the JULIAN ALPS. From the

lagoons, swamps, damp thickets, and omnipresent drainage ditches which front the sea, the lowlands rise gently to grassy, wooded terraces bordering the mountain zone. Tree-lined wheat and maize fields alternate with pasture throughout the area. A series of shallow, torrential rivers running perpendicular to the ADRIATIC Coast crosses these plains and floods the lowlands except as restrained by man. Consequently the river banks are protected by levees and the roads and railroads are built on embankments. The river beds of the PIAVE and TAGLIAMENTO are particularly wide, being in some stretches over 6500 feet across. However, their braided courses are frequently dry because of the abundant withdrawal of water for irrigation and power and also because of the considerable dispersion of water through the alluvial mattress. May and November are normally the flood months, while minimum flow occurs either in February or March.

20. Three interlacing rail lines cross the VENETIAN Plain, linking the PO Valley with the mountain exits to the Reich. With the closing of the Franco-Italian frontier and the restriction of military traffic through SWITZERLAND, these railways formed the base of the only routes out of ITALY aside from the BRENNER. The northermost line, a through double track railway beginning at VICENZA, is the most important of the three. Passing through CITTADELLA, CASTELFRANCO, and CONEGLIANO, it connects directly with the TARVISIO Route at UDINE, and at GORIZIA it joins the PIEDICOLLE Line. Below this, at the border between the low plain and the terrace lands, a single track rail line provides an alternate route via PIAZZOLA, TREVISO, and MOTTA DI LIVENZA as far as CASARSA. On the edge of the marshy coastal area a second double track railroad runs through MESTRE, PORTOGRUARO, and CERVIGNANO. This last line joins the North-South trunk line across the PO to FERRARA at PADUA, while at its Eastern extremity it reaches TRIESTE and merges into the POSTUMIA Route.

21. Because of the many transverse connections between these three principal rail lines, interdiction on a route by route basis was not feasible. However, the BRENTA, PIAVE, LIVENZA, and TAGLIAMENTO Rivers cross all of the rail lines. Consequently each of these main rivers potentially forms a complete barrier to rail traffic through Northeast ITALY to the frontier. The most attractive targets were the bridges on the Northern rail line over the PIAVE and TAGLIAMENTO Rivers. The former was spanned by a 1300 foot stone structure at NERVESA, while at CASARSA the railroad crossed the TAGLIAMENTO on a 36 span steel girder bridge almost twice as long. However, the bombers were not free to pick and choose, for all the crossings on each river had to be demolished to effect a satisfactory stoppage. In addition to bridge busting, further disruption could be inflicted on rail traffic in this area by attacks on marshalling yards. Most important of these were at the terminals - PADUA and VICENZA at one end, GORIZIA and UDINE at the other; and at the main intersection

points within the area - MESTRE, TREVISO, and CASTELFRANCO. UDINE which stands at the Eastern end of the Northeast Italian road and railway networks, formed a natural unloading point for reserve stores entering ITALY via the TARVISIO and PIEDICOLLE Routes. This area, which was also the main forward dump zone for the old Italian frontier defenses, always contained a number of permanent military installations which the Germans turned to their own use.

22. The strength of the VENETIAN Plain as a zone of interdiction lay in its depth and the number of successive barriers possible. Its weakness arose from the many opportunities which the rail network afforded for re-routing traffic around incomplete blocks, and from the shallowness of the rivers, which could easily and quickly be spanned by temporary structures. Indeed, as the water level fell in December, the enemy was able to lay the tracks of his diversions over the PIAVE and LIVENZA directly on the river-beds. And the permanent bridges over these shallow, low-banked rivers, although frequently long, were generally of low sihouette and short span construction, and consequently could be readily repaired.

23. Northeastern Frontier. Above the VENETIAN Plain the Italian rail network thins out into a few widely seperated outlets across the mountain-girt frontier. Here the difficulties which confronted an interdiction program farther South were notably absent. Each rail line forms a bottleknck to traffic, for the lack of transverse connections prohibits the shuttling of trains from one route to another. A single cut in any line requires the enemy either to abandon use of it, or else to tranship. Also, targets were better in this area. The height and long span of the bridges, the steep banked river valleys, tunnels, and other features made repairs slow and difficult, while the construction of diversions was nearly impossible.

24. The railways in this area are as follows.

a. TARVISIO Route. Second only to the BRENNER of all the international lines, the TARVISIO Route constitutes the main coridor for movement between GERMANY and the VENETIAN Plain. At GEMONA, last outpost of the plains country, the main rail line South to UDINE is joined by a branch line which links at two other points with the northermost coastal railway. From GEMONA to the TARVISIO Pass where the boundaries of AUSTRIA, YUGOSLAVIA, and ITALY converge, the single track electrified railway wends its way North through a boulder-strewn region of barren jagged promontories and cascading streams. After quitting the level cultivated ground of the TAGLIAMENTO Valley North of GEMONA, the rail line follows the wild valley of its tributary the FELLA, cut deeply into the DOLOMITES, to the watershed between the BLACK SEA and the ADRIATIC. Here, at the TARVISIO Pass between the

Photo No. 3

DOGNA bridge on the TARVISIO Route appears in the foreground at the left. Much of the time the precipitous slopes of the FELLA River Valley cast deep shadows over this and other targets along the Route.

JULIAN and CARNIC ALPS, it meets the diminutive SULIZZA River which flows North to the great East-West valley of the GAIL. It is the interlocking of the TAGLIAMENTO and GAIL basins which makes the TARVISIO such an important natural route. The route frequently tunnels through rocky mountain features and crosses gorges between them on viaducts. On one 17 mile stretch, the railway passes through 24 tunnels. The primary targets were bridges of five or more spans at DOGNA and CHIUSAFORTE, where the presence of tunnels on the approaches and the absence of open track for construction trains made repair difficult.

b. PIEDICOLLE Route. From GORIZIA a steam traction, single track railway ascends the gorge of the ISONZO through the the rugged Austro-Italian battlefields of 1915-17, then turns right between the JULIAN ALPS and a limestone mass to the South. At PIEDICOLLE, the railway enters a four mile tunnel which pierces the main chain of the JULIAN ALPS along the frontier. The high masonry arch bridges which carry the railway back and forth across the ISONZO constituted the primary bombing objectives.

c. POSTUMIA Route. Past TRIESTE, the double track coastal railroad from PADUA and MESTRE continues across the CARSO, an arid windswept limestone plateau rising to the mountains on the Yugoslav border. The area is honeycombed with numerous ravines and funnel-like caverns. At LJUBLJANA, main rail junction in Northwestern YUGOSLAVIA, through connections lead directly to VIENNA. However, this railsystem, under continual strain serving the Balkan front, was not greatly used to supply Army Group C in ITALY. Both the POSTUMIA and PIEDICOLLE routes also tie in with another Yugoslav railroad running Northwest from LJUBLJANA and affording connections via TARVISIO to central GERMANY. For such traffic both the PIEDICOLLE and POSTUMIA routes served only as more roundabout alternatives to the TARVISIO. The best target on the POSTUMIA Line was a massive 1500 foot viaduct located at BOROVNICA within YUGOSLAVIA.

d. DOLOMITE Route. This minor railroad of very low capacity was built in 1917 by the Austrian Army and before the war was used mainly for tourist traffic. Beginning in the upper PIAVE Valley it twists Northward through the resort country of the DOLOMITES to join the lateral FORTEZZA-SPITTAL-VILLACH line at DOBBIACO. Thus it constitutes another pathway for movement between the VENETIAN Plain and the Reich via the upper part of the BRENNER Line or the SAN CANDIDO Pass to central AUSTRIA. However,

from CALALZO, where it leaves the PIAVE, to DOBBIACO, the railway has a narrow gauge with electric traction. Consequently all through traffic must undergo two reloadings, and the line was seldom used except for hospital trains. Steeply graded, it had numerous tunnels, bridges, and many sharp curves in rapid succession. The main target was a high five span, brick and masonry viaduct at LONGARONE.

25. The Austrian Feedlines. The last target system in the program for isolating ITALY were the rail lines of Southern AUSTRIA which fed into the international routes across the frontier. By cutting these, MATAF might erect still another barrier, as much as 200 miles from the battle area, to movement to and from ITALY. These lines fall into two categories: the three routes running North from INNSBRUCK toward MUNICH; and the rail lines radiating from VILLACH. The latter presented a more complex situation, as railways converged from four directions on the triangle VILLACH-KLAGENFURT-ST. VEIT.

COMPARISON WITH PREVIOUS INTERDICTION PROGRAMS

26. Crucible of military doctrine, the grim Mediterranean campaign has influenced no air policy more decisively than that of interdiction. Evolving under changing geographical conditions and against increasingly shrewd enemy reaction, the struggle to deny hostile forces access to their sources of supply assumed its greatest proportions and achieved its fullest triumph in the blockade of the international routes North of the PO Plain.

27. When Air Vice Marshal Coningham employed his small Air Force to nip off Rommel's tenuous and over-extended supply lines, history was furnished its first classic example of the use of tactical air power to isolate a battlefield. Two factors, however, prevented North AFRICA from being a complete proving ground for the tactics of interdiction. Not only did the strength of the Luftwaffe oblige the Allied Air Forces to devote a large portion of their effort to counter-air force operations, but also the German lines of communications in North AFRICA were too simple and too vulnerable to provide a real test of air potentiality. In SICILY and Southern ITALY the Allies came to grips with a well developed and complex communications network, but here bombing of marshalling yards, which characterized air operations, failed to prevent the enemy from moving from place to place. In Operation "Strangle", launched in mid-March 1944, a clearly defined policy of interdiction - as opposed to blunder-buss smashing of rail facilities - was first put into effect. Here was established the pattern of attacking target systems with the object of setting up complete belts of interdiction.*

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* See Hq. MATAF, Report on Operation "Strangle", 24 July 1944.

28. Following the Allied offensive which opened 11 May, Operation "Diadem" kept the routes South of PISA-RIMINI disorganized, and while the ground forces surged North, MATAF advanced its stranglehold to the bottleneck of the Northern APENNINES and then to the PO Valley.* In the latter region, the PO River afforded the only complete East-West line of interdiction. Despite its width, the River failed to halt the Southward flow of supplies after its bridges had been destroyed in Operation "Mallory Major", and the lesson was demonstrated anew that multiple barriers are necessary to effectively undo the enemy's logistics.** When MATAF clamped a vise on the international routes, this condition once more obtained, and a situation comparable to "Strangle" emerged.

29. Operation "Strangle" had exploited the fact that the complex Italian rail system reduced itself to four major routes crossing a line from CECINA to FANO. In the same way, the rail network dwindles to a like number near the frontier. In both cases a deep zone of interdiction was established, and in both instances the outer limits of MATAF operations were as far as 250 miles from the battle front. Both air campaigns were carried out during impatient months of deadlock on the ground - a situation which permitted MATAF to undertake an all-out offensive against the enemy's lines of supply. Neither in Operation "Strangle" nor in the blockade of ITALY did air power alone force the enemy to withdraw. By fatally reducing his capacity to sustain and wage warfare, however, both air programs prepared the way for a great and successful Allied offensive. The enemy was critically short of M/T and fuel; with his rail lines cut, he was forced increasingly to use M/T to transport supplies and troops. Rail interdiction was imposed at such depth that M/T could not meet this new requirement in addition to forward commitments, and in the face of a major attack, inadequate M/T at the front resulted in the collapse of distribution and mobility.

30. In other respects, MATAF's "Blockade" operations were unique in the history of interdiction. "Strangle" and "Diadem" had absorbed the whole of MATAF's effort against communications. They had involved interdiction close to the front as well as deep within the enemy's rear. In Northern Italy, however, the broad valley of the PO with its maze of interlacing rail lines lay between the international routes and the Allied Armies stalemated below BOLOGNA. Consequently the campaign against the inter-Axis routes was carried out at the same time that a subsidiary but nevertheless large

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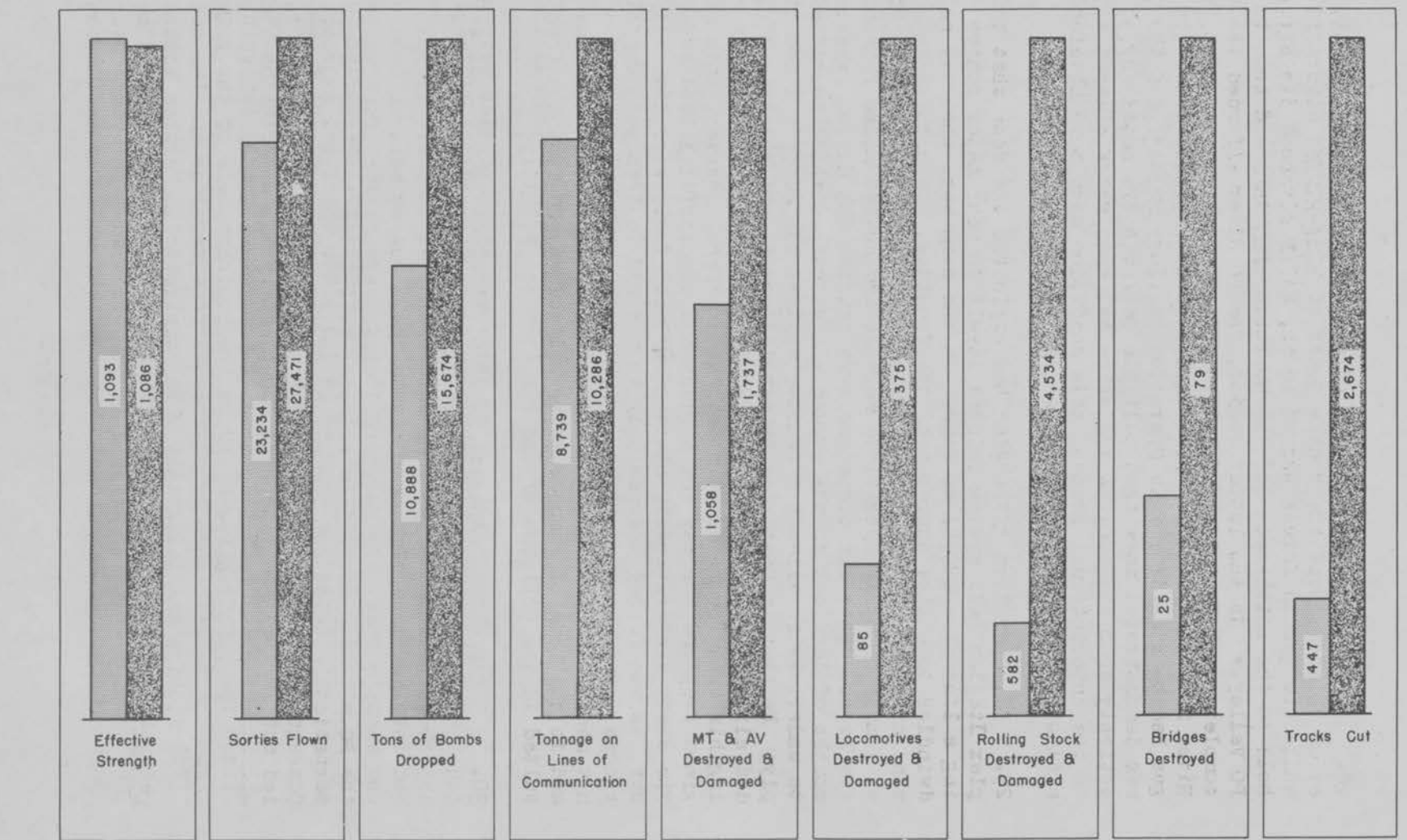
* See Hq. MATAF, Report on Operation "Diadem", 5 January 1945.

** See Hq. MATAF, Report on Operation "Mallory Major", 15 January 1945.

COMPARISON OF M.A.T.A.F. EFFORT
APRIL 1944 AND MARCH 1945



NOTE: PERIODS COMPARED SHOW AIR EFFORT IN THE MONTHS IMMEDIATELY PRECEEDING THE MAJOR ALLIED OFFENSIVE ON 11 MAY 1944 AND THE FINAL PUSH ON 9 APRIL 1945.

23rd SCU

scale effort was also being expended against communications targets in other areas. In addition to holding secondary lines of interdiction at the PO River and its tributaries, communications were extensively disrupted throughout the length and breadth of Northern ITALY and in YUGOSLAVIA as well.

31. That MATAF could duplicate in the ALPS and along the VENETIAN Plain the success which it had achieved in Central ITALY and at the same time shoulder heavy responsibilities elsewhere testified to the growing efficiency of the Air Force. The substitution of better fighter models and their wholesale conversion to fighter-bombers added to our striking power while the medium bombers brought bombing accuracy to a new peak. The results are vividly illustrated by comparing MATAF's performance during the climctic month of "Strangle" and of "Blockade" - the months immediately preceding the Allied ground offensives.

	April 1944	March 1945	Percent Increase
Effective Strength	1,093	1,086	--
Sorties Flown	23,234	27,471	18%
Tons of Bombs Dropped	10,888	15,674	44%
Tonnage on lines of Communications	8,739	10,286	23%
M/T and A/V, dest. and dam.	1,058	1,737	64%
Locomotives dest. and dam.	85	375	340%
Rolling Stock dest. and dam.	582	4,534	680%
Bridges destroyed	25	79	216%
Track cuts	447	2,674	498%

Thus while MATAF's strength was actually slightly less in the second period than in the first, while the proportion of total bomb tonnage on lines of communication also fell, and while sorties were not far different, destruction to every category of rail target leaped to several hundred percent more during "Blockade" than it had been in "Strangle".

32. In many respects, too, the obstacles confronting interdiction of the frontier routes surpassed those which had existed in Central ITALY. Between FLORENCE and ROME valleys at almost all bridge targets were steep-sided and the rivers were deep, making repairs difficult and the construction of diversions nearly impossible. Along the VENETIAN Plain and on the Southern half of the BRENNER Line the terrain encouraged the use of diversions and the task of interdiction was infinitely more complicated. Farther North, where the ALPS towered thousands of feet above sea level, pilots met new problems of flight. As late as October 1944, operations over the Central ALPS had been considered impracticable for medium bombers.

When they were undertaken, it was in the face of weather hazards such as turbulence and icing, as well as difficulties in target identification and navigation. To the problems of terrain were added those of enemy opposition. Milk runs were few and far between and flak defenses a greater threat than ever. The enemy repair organization had grown tremendously in equipment and personnel; its effort reached a peak of intensity and versatility.

33. Finally, the isolation of ITALY involved closer co-operation between Strategic and Tactical Air Forces than any previous interdictory effort had called forth. In the past, the two air arms had held generally to a geographical line of demarkation in their co-ordinated program against enemy lines of supply. In the blockade of ITALY, however, strategic and tactical effort overlapped. Intentions were passed directly between the two headquarters daily, planning of both policy and detail were carefully co-ordinated, and MATAF assumed increased jurisdiction over the employment of heavy bombers in ITALY. All this served to develop a flexible and unified bombing team functioning with maximum utilization of every weapon in the arsenal of Allied air power.

Photos No. 4-5

OSSENIGO RAIL FILL

Attacked on 15 October by 18 B-25's of the 320th Bomb Group, 42nd Bomb Wing, with 144 x 500 bombs. The tracks were cut by five craters. At least fifteen items of rolling stock were destroyed. Some 320 mixed items of rolling stock are seen, mainly on the southbound track and west of SINISTRO Station. This was one of MATAF's first attacks on the BRENNER, and remained a main point of interdiction during October.

Photos No. 6-7

CISMON RAIL BRIDGE

This was the primary target on the line from TRENTO to CITTADELLA, by-passing the lower part of the BRENNER. Eighteen B-26's of the 320th Bomb Group, 42nd Bomb Wing, attacked it on 5 November with 63 x 1000 and 6 x 1000 (6 hour delay) bombs. A probable hit is seen on the southernmost of the three spans, and the north abutment was also damaged.

PART II

P L A N N I N G

PLANNING FOR A BREAK-THROUGH

1. Never before had the heady winds of triumph borne Allied hopes so high as late in the summer of 1944. The dramatic advance up the RHONE Valley in Southern FRANCE was paced to the North by a swift conquest of all the land between NORMANDY and the MOSELLE River. In the East the Soviet juggernaut ground through Hitler's crumbling Balkan empire. Nor did the enemy's position in ITALY escape the general disintegration which was affecting his forces everywhere. After the pell-mell flight of the German Armies past ROME and up the Italian peninsula and the fall of LEGHORN, AREZZO, and ANCONA in mid-July, Field Marshal Kesselring temporarily stabilized his front at the ARNO River. The respite however, was brief and came to an end on the last day of August. With the collapse of the German Armies in Northern and Southern FRANCE, Kesselring had been obliged to surrender two P.G. divisions to the Western front and to assume as well, with the liberation of the RHONE Valley, the additional commitment of holding the Franco-Italian frontier. No longer tenable, positions on the ARNO were relinquished. At the same time, the Eighth Army breached the Gothic Line on the ADRIATIC sector; poised at the edge of the Southeastern tip of the PO Plain, it gravely endangered all of the vaunted Gothic defenses further West. On 6 September the AAI Intelligence Summary summed up the situation as follows:

> The whole enemy position in ITALY now depends on holding the Eastern flank of the APENNINES. A break through there would directly threaten the communications and essential routes of withdrawal of the forces on the rest of the front and even the threat of a break through must cause the enemy to start a withdrawal from the Gothic Line for such a movement will call for the most skillful timing and co-ordination, especially as the movement must be continued across the bridgeless PO.

Clearly, abandonment of most or all of Northern ITALY by its defenders and retreat to a shorter Alpine line loomed as an imminent possibility.

2. Air power policy revisions reflected the mood of the day. Early in July, while the Allies still hoped to pursue a disorganized

enemy across the unbroken bridges of the PO, it seemed possible that the Fifth and Eighth Armies might soon be able to push across Northeastern ITALY and pierce the LJUBLJANA Gap between the JULIAN ALPS and the DALMATIAN Hills. The prospect of isolating this anticipated battlefield evoked MATAF's first matured planning for the interdiction of the rail lines leading out of ITALY. On 8 July the Chief Intelligence Officer submitted an appreciation which recommended establishing successive belts of interdiction along the rivers of Northeastern ITALY beginning with the ADIGE and including cutting the BRENNER Route. These plans, however, were soon dropped as it was realized that the reduced air and ground resources in ITALY (due to the coming invasion of Southern FRANCE) would render a rapid advance in this theater unlikely. Instead, it was decided to destroy the bridges across the PO, which was accomplished in Operation "Mallory Major".

3. Late in August, when the enemy's retreat once more revived expectations and a wholesale break-through into the PO Valley seemed destined to be achieved, the desire to interfere with German evacuation of ITALY revived plans for sealing the enemy in, and activated the first efforts of M editerranean Allied Tactical Air Force to cut the rail lines leading out of ITALY. On 29 August, MATAF, still located in CORSICA, signalled to TAF (ITALY) as follows:

> we are considering blockage of escape routes in ITALY and contemplate destruction of all bridges over BRENTA River as reinforcement to PO interdiction. This river better water obstacle than PIAVE or ADIGE. In addition to above, work to be done on BRENNER Route. As situation may develop as in Southern FRANCE, these blocks must be started well in advance to be completed in time. Would action in BRENTA conflict with any Army requirement? Have GSI any ideas?

AAI instantly expressed approval of severing enemy withdrawal routes through the BRENNER Pass and across the VENETIAN Plain, but recommended the PIAVE River as a better barrier than the BRENTA for three reasons:

a. Spate is more severe with the PIAVE in dry weather and not less frequent than with the BRENTA in bad weather.

b. There are fewer bridges over the PIAVE.

c. VENICE, situated between the two rivers, would be cut off by interdiction of the BRENTA (but not of the PIAVE) from South and West, and AAI expected to use the port extensively for future operations.

4. As the initial effort was accordingly laid on, MAAF requested MATAF's recommendations for heavy bomber targets which would tie in with the interdiction of the PIAVE and create an effective barrier against the withdrawal of the German 10th and 14th Armies. On 1 September MATAF nominated these rail lines:

a. The BRENNER Pass Line between TRENTO and BOLZANO.

b. The TARVISIO Line between GEMONA and TARVISIO.

c. The PIEDICOLLE Line between GORIZIA and PIEDICOLLE.

d. The POSTUMIA Line between RONCHI and S. PIETRO DEL CARSO.

e. The line between DOBBIACO and PONTE NELL ALPI.

The BRENNER Route and the area North of the PIAVE were still regarded as peculiarly a Strategic Air Force responsibility.

5. In addition to bottling up a beaten foe, MATAF was also anxious to starve a stubborn one. At the moment this seemed less dominant a consideration in the blockade of ITALY than the prospect of interrupting a retreat, for the strangle of enemy supplies was being undertaken closer to the battle area. As the main striking power of Tactical Air Force shifted back to ITALY from Southern FRANCE late in August, much of it was absorbed by Army demands for close support. The interdiction effort was first of all pledged to maintenance of a barrier to enemy movement at the PO River. Aside from the primary task of keeping the PO bridges down, medium and fighter-bombers struck at rail lines both North and South of the River in order to paralyze transportation throughout the PO Valley. However, it was appreciated that a deeper zone of interdiction - that denial to the enemy of passage <u>into</u> the PO Valley - was highly desireable. With the Franco-Italian frontier closed, for the first time this seemed possible.

6. All through September 1944, the progress of Allied ground forces continued to uphold hopes of an early and decisive enemy evacuation. While the Fifth Army forced the Gothic Line North of FLORENCE and pushed over the APENNINE watershed toward the plain, the Eighth Army fought its way past RIMINI to deepen its salient into the ADRIATIC lowlands. MATAF continued to put a portion of its medium bomber effort on the BRENTA and PIAVE crossings in the hope of disorganizing the expected withdrawal and continued as well to place major emphasis on the line of the PO. During the month, however, two tendencies of thought became evident:

a. A growing concern for a stricter blockage of the routes leading North from the PO Valley out of ITALY. This

concern gave rise to a desire for more continuous interdiction of the frontier routes by Strategic Air Force and a dawning realization that medium bombers might be effectively employed against at least a section of the BRENNER Line.

b. Dissatisfaction with the dispersed nature of MATAF attacks on bridges and rail lines throughout the PO Valley, and a rising interest in concentrating such attacks on selected river barriers.

7. These ideas came to a head on 20 September when MATAF Intelligence submitted a body of recommendations designed to throttle the supply lines of the German Armies in ITALY and at the same time to hamper their withdrawal. These objectives, it was appreciated, could best be attained by establishing lines of interdiction in the following priority:

a. PO River, East of PAVIA.

b. BRENNER Pass.

c. PIAVE River.

d. TICINO River, PAVIA to SESTO CALENDE.

The PO was retained as top priority because it isolated the largest German force and suggestions were submitted for reducing the number of night bridges and ferries which the enemy was using to cross it. Interruption of the BRENNER was still regarded as MASAF's task, but it was suggested that MATAF co-operate on a small scale:

> To insure interdiction of this line it is recomm ended that in addition to the primary cuts, which are the responsibility of Fifteenth Air Force, medium bombers should be employed postholing sections of the railroad route North of VERONA, which could subsequently be kept cratered by limited fighter-bomber action. It is submitted, however, that the maintenance of cuts in the BRENNER Line North of TRENTO, is essential to any bombing program which will affect enemy supply or withdrawal at the present time.

In recommending the PIAVE River for third priority the report noted that with the increasing bad weather it afforded a perfect water barrier to all enemy transport entering or leaving the Northeast PO Valley. The caution was added, however, that it depended for full effectiveness on the cutting of the BRENNER North of TRENTO. "If this is not maintained by Fifteenth Air Force it would be necessary for us to carry out interdiction of the BRENTA Line, which is not so

economically effected." Finally the paper urged that intermediate rail and road objectives be assigned a much lower priority. "Before any additional communications attacks are made it is submitted that when the interdiction of the above four lines is successfully accomplished, a concerted attack should be made on enemy fuel dumps."

8. Meanwhile MATAF pressed for greater heavy bomber effort on the BRENNER Route. More confident of its own ability to interrupt the Northeastern routes, Tactical Air Force was less anxious for assistance in that area, although it welcomed strategic bombardment of the TAGLIAMENTO River on a weather alternate basis to reinforce its own interdiction of the PIAVE. In September the Fifteenth Air Force was directed to obtain and maintain interdiction of the BRENNER, TARVISIO, and POSTUMIA Routes and to attack at each weather opportunity regardless of the status of interdiction. On 1 October, however, it surrendered continuing responsibility for all the international routes except the BRENNER to MATAF. On that date, MAAF instructed Strategic Air Force as follows:

> Upon recommendation MATAF your only requirement for maintenance interdiction of rail exits from North ITALY is the BRENNER Route. Desire that you continue its interdiction by multiple cuts. Will welcome attacks on other routes when force available but MATAF has continuing responsibility.

More and more the duty of blockading ITALY was gradually becoming a tactical function. However, Strategic Air Force continued to work on the rivers of the VENETIAN Plain, and the few attacks which the medium bombers carried out at the base of the BRENNER Line during October were regarded as merely supplementary to the heavy bomber effort North of TRENTO.

9. As deteriorating weather conditions and an intensified enemy repair effort increased the handicaps to strategic operations in the BRENNER area, the heavy bombers intensified their efforts. On 19 October MAAF Bombing Directive No.87 instructed MASAF to sustain its attack on a special priority basis. "Until further notice, you shall allow only weather to interfere. Enemy has proven capability to restore serious breaks in a matter of a few days. It is therefore essential that effort be continuous, although at time of attack route may still be inoperative." Several days later, at MATAF's request, Strategic Air Force also undertook to block the TRENTO-BASSANO loop line.

PLANNING TO STRANGLE A STUBBORN DEFENSE

10. October's drenching rains washed out day after day of air operations. They swamped the battle lines and slowed to a crawl the

Eighth Army's progress across the water-logged ADRIATIC lowlands. They dropped a curtain behind which Kesselring summoned up fresh reserves for an adamant defense of every inch of Italian soil. They drowned hard-dying Allied hopes of a quick collapse of enemy resistance. On 30 October, after weeks of heavy losses and disappointing gains, the Fifth Army Commander ordered his troops to cease offensive operations. It was necessary for air tacticians to re-orient an interdiction program which no longer need envisage a sudden enemy withdrawal but which did have to cope more fully with Army Group C's unyielding defense.

11. That defense was made possible in large measure by the enemy's ability to pass supplies forward across the PO by the nocturnal use of ferries and pontoon bridges. These had become so numerous that despite the destruction of all the permanent bridges across the river, Kesselring had been able to keep his forces adequately supplied. It was necessary for MATAF to seek a stronger barrier against the incoming flow of material. On the other hand, the most effective phase of October air operations had been the limited scale of attacks on the lower BRENNER Line and in Northeastern ITALY, which had caused a considerable build-up of rolling stock, resulting in increased fighter-bomber targets. However, the rate of repair on the BRENNER had been quickening and the single belt of interdiction at the PIAVE was being neutralized both with by-pass diversions and with transshipment to trains on the far side of the breaks. Deeper zones of interdiction in the North seemed called for in order to effectively throttle the flow of supplies.

12. Another characteristic of Kesselring's strategy necessitating a change in program was the reduction of the number of divisions manning the Franco-Italian border and the Gulf of GENOA. Originally the enemy had anticipated an outflanking drive into ITALY through the French ALPS and had assembled as many as nine divisions in that area. By late October these were cut to three German and two Italian Fascist divisions, the remainder being transferred to the main battle front. As such movement took place entirely South of the PO, the interdiction of the TICINO River bridges dwindled in importance.

13. Finally, measures had to be taken to hinder German looting of the PO Valley. Trains leaving ITALY were carrying food and industrial equipment to the Reich instead of troops and war materials which it was originally appreciated Kesselring would be forced to withdraw by this time. While successive Swiss restrictions during the summer of 1944 reduced traffic via SWITZERLAND, the amount of German looting increased enormously, and September saw a great speeding up in the removal of industrial plant and raw materials through the other rail exits. On some days during September 33 trains were reported to be travelling in a northerly direction toward the BRENNER

Pass.* During October a daily average of 28.5 trains left ITALY on the BRENNER and TARVISIO Routes combined, and total outgoing traffic slightly exceeded incoming. Certain of the larger industrial plants of the PO Valley were said to have had the whole or part of their machinery removed to GERMANY.

14. These considerations were set forth on 28 October in MATAF Intelligence Appreciation No.5, which recommended reducing to a secondary or weather alternate priority the interdiction of the PO, eliminating the TICINO as a continuous belt of interdiction, and transferring first priority to the Northern and Northeastern lines. In addition to intensification of medium bomber attacks on the BRENNER South of TRENTO, resort to fighter-bombers when weather might prevent such medium operations, and continuance of M ASAF attacks North of TRENTO on the highest priority, the report asked for an extension of the zone of interdiction in the Northeast by breaking all the bridges across the BRENTA and TAGLIAMENTO Rivers as well as the PIAVE. It concluded:

> It is submitted that our bombing program during the bad weather period of this winter (the next two or three months) should, now that the enemy is not being forced to withdraw from the PO Valley, be directed to denying all movement by rail to and from ITALY . . . . The effort of such a program will, it is submitted, be a gradual wearing down of the enemy's potential power to resist in Northern ITALY. By isolating ITALY from the Reich, however, it may prove possible to turn the scales, and, with the Russian advance Northwest towards VIENNA, force Kesselring to withdraw to the ALPS, through which, by reason of our bombing, he will have no easy rail escape route.

15. On 3 November these suggested revisions became bombing policy. On that date, MATAF Operational Directive No.21 set forth the principal task of Tactical Air Force as the isolation of ITALY and directed the 42nd and 57th Bomb Wings to maintain lines of interdiction in the following priority:

a. BRENNER Pass.

b. Northeast Italian lines.

i. PIAVE River line
ii. BRENTA River line
iii. TAGLIAMENTO River line

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* AFHQ Combined Weekly Intelligence Summary No. 5, 6 January 1945.

c. PO River and ADDA River

Although the PO Valley was to remain the principal commitment of the fighter-bombers, the first provision was made for their employment further North. "When weather prevents medium bomber operations in ITALY, and it is considered that the BRENNER or Northeastern rail Routes are in danger of being reapired, fighter-bombers will be directed by this Headquarters against vulnerable targets on these routes until such time as renewed medium effort is possible."

16. Previously a thinly established barrier, by this stroke the program North of the PO Valley became, in the full sense of the word, a blockade. Holding it had become, as well, the primary task - aside from close support - of Tactical Air Force.

17. To spark the inauguration of rull scale effort, it was deemed important to destroy the electrical system on the BRENNER Line. Because of the much lower efficiency of steam than of electric power in mountainous terrain where gradients are long and steep, the chief engineers of the Italian State Railways estimated that without electric locomotion the BRENNER Railway's capacity would be reduced to 6750 tons in each direction daily, or about one fourth of its full capacity. Hence the volume of supplies rushed through during spells when non-operational weather would prevent us from keeping the line blocked would be drastically curtailed. It was determined that not less than three consecutive transformer stations must be destroyed in order to make the use of electric power impossible on the section of the line fed by those stations, and thus force the enemy to convert to steam traction. Permission for this operation was sought from MAAF on 27 October, inasmuch as previous policy prohibited the bombing of public power utility installations outside of the Reich itself. The following day MAAF granted permission. Under the designation of Operation "Bingo", MATAF ordered its medium and fight-bombers to execute co-ordinated attacks on the four transformer stations from VERONA to TRENTO. MASAF was requested to destroy the three stations immediately to the North.*

18. In Operation "Bingo" as well as in all other attacks on the BRENNER rail line, MATAF still shared responsibility with Strategic Air Force. The latter continued solely responsible for the most crucial part of the time - that North of TRENTO. On 11 November, however, the Commander-in-Chief, Mediterranean Allied Air Forces, relieved MASAF of all continuing responsibility for attacking communications targets in ITALY including the Italian side of the BRENNER Route. Several days later a new priority schedule for strategic bombardment subordinated the lines between ITALY and South

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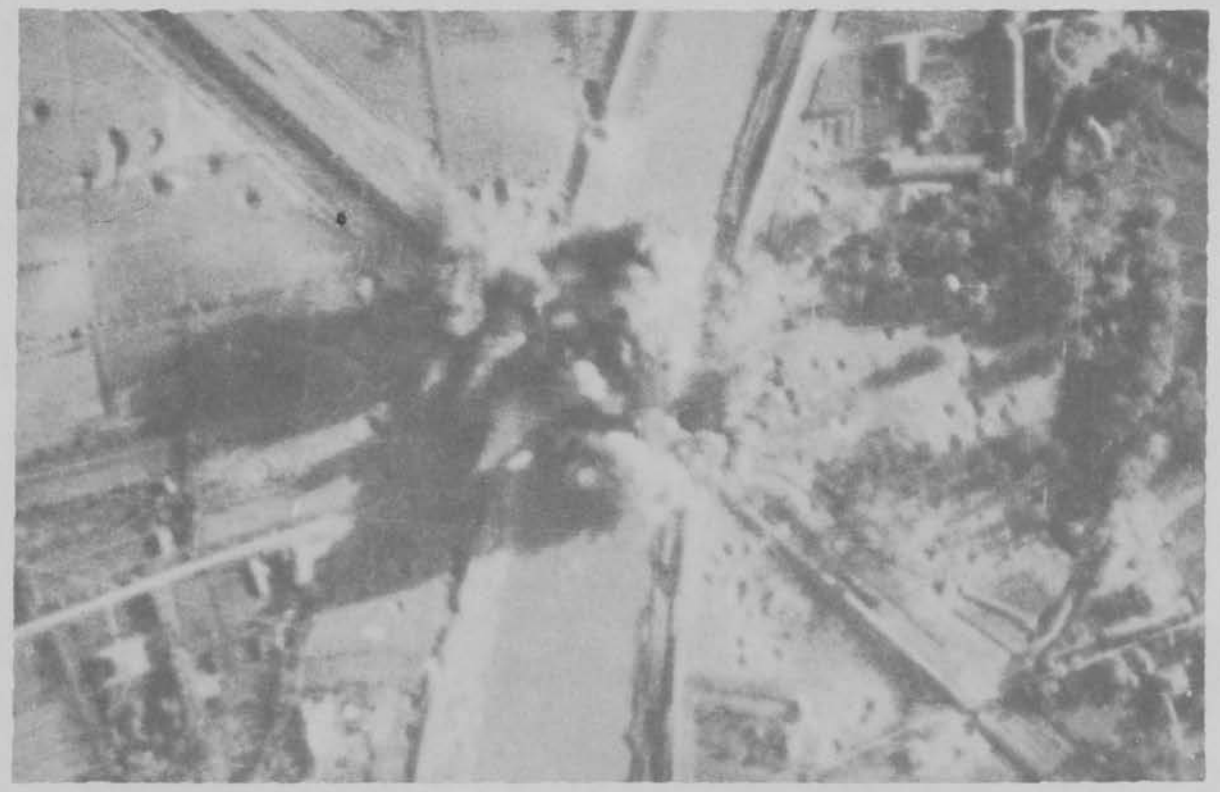
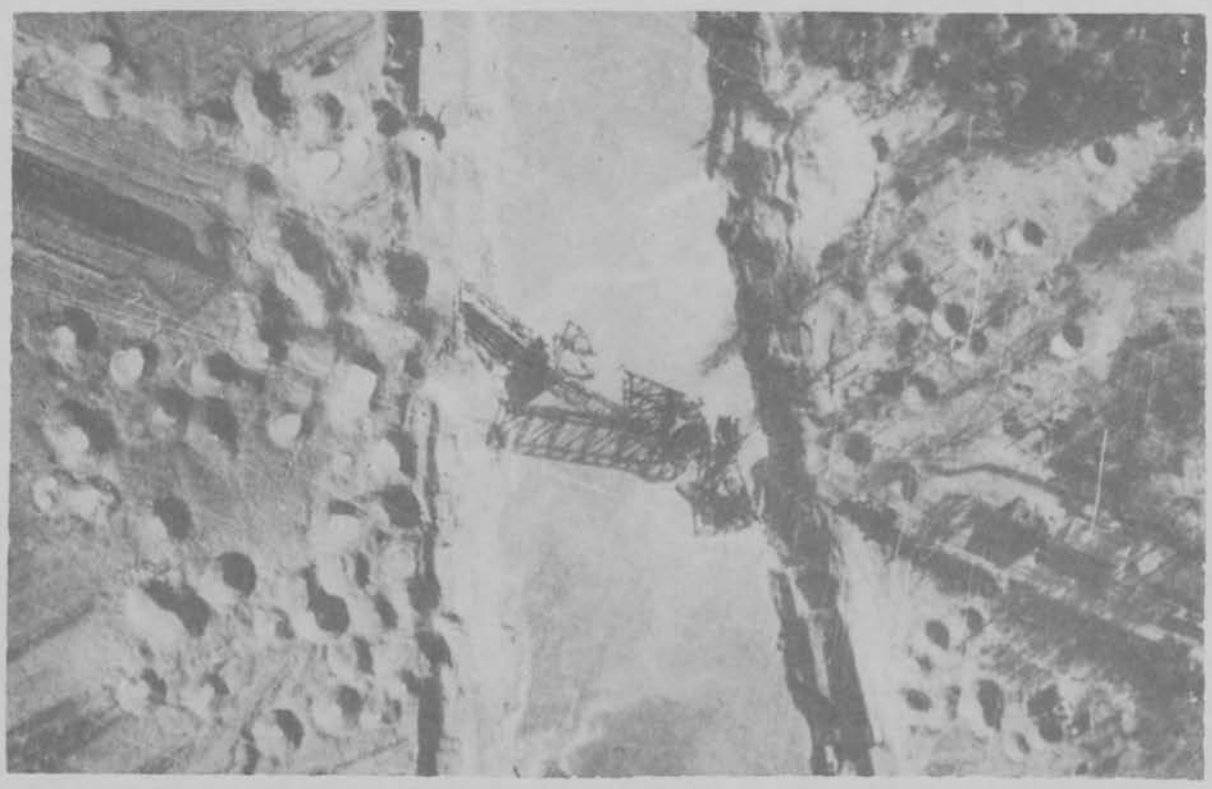
* See Hq. MATAF, Report on Operation "Bingo", 20 January 1945.

GERMANY (including AUSTRIA) to those between Southeast GERMANY and the DANUBIAN plains; and all communications targets were placed secondary in priority to oil. Although Strategic Air Force, at MATAF's request, thereafter carried out occasional attacks on Northern Italian communications (primarily on a weather alternate basis), from mid-November on the full job of isolating ITALY rested squarely with Tactical Air Force.





Photos No. 8-9

PADUA EAST RAIL BRIDGE

This important bridge over the BRENTA River was in the first line of interdiction on the Venetian Plain. It was attacked on 7 November by 18 B-25's of the 319th Bomb Group, 57th Bomb Wing, dropping 60 x 1000 GP bombs. Only two of the original six spans were left standing, and these were severely damaged.

PART III

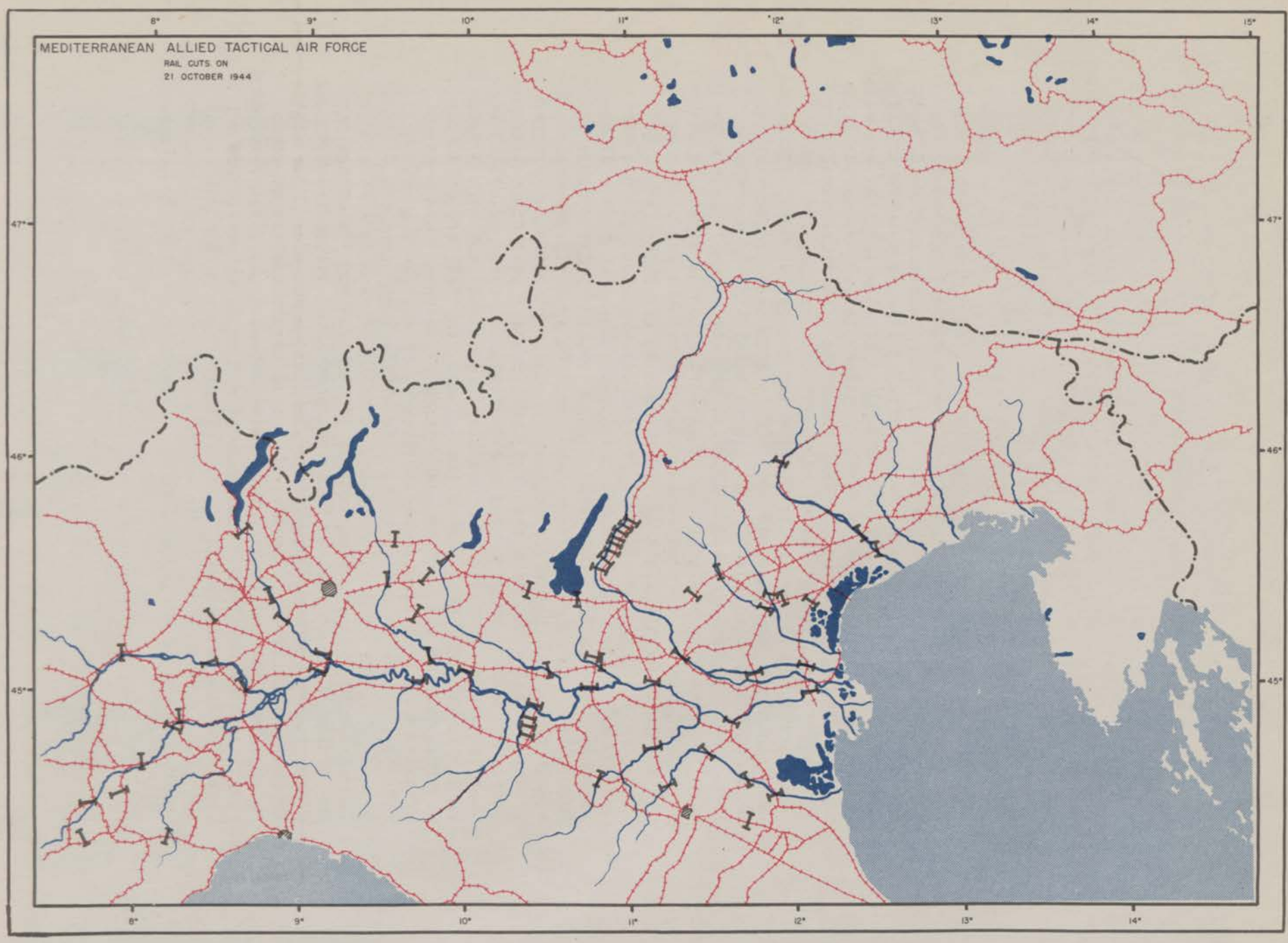
O P E R A T I O N S

EARLY ATTACKS

1. Prelude by Strategic Air Force. The effort of the Allied air forces to sever the frontier routes dates back to a period before the inception of the Italian campaign. On the second of September 1943, Strategic bomber forces of 43 B-17's struck BRENNER Line marshalling yards at TRENTO and BOLZANO. Soon the heavies were also attacking rail bridges close to the frontier passes and marshalling yards at VERONA and along the VENETIAN Plain. During Operation "Strangle", rail facilities at PADUA, VERONA, and BOLZANO received top priority in Strategic Air Force's program of disrupting Italian communications, and in March 1944 almost 1000 heavy bombers attacked the Italian terminals of the international lines. For the most part, however, the effort was intermittent and overridden by extensive tasks elsewhere. After May it lapsed almost entirely. However, when the invasion of Southern FRANCE and the rapid penetration Northward of the Sixth Army Group sealed off ITALY from the West, the inter-Axis rail links assumed new importance. On 26 August, MASAF returned with emphasis to these targets. In a four day period, more than 1200 tons were dropped on the BRENNER, TARVISIO, PIEDICOLLE, and POSTUMIA lines, and for the first time all were cut simultaneously. Thereafter bridges in the ALPS and over the rivers of the coastal plain were frequent heavy bomber targets. Nevertheless, Strategic Air Force remained committed to first priority assault on German oil production and was diverted as well by heavy interdiction responsibilities in the Balkans. By fall its effort was proving insufficient. At the same time the mediums' sphere of operations was creeping steadily Northward. The stage was set for MATAF's entrance into the campaign to divide ITALY from the Reich.

2. Overture by MATAF: August - October. MATAF's effort in the Northeast began earlier than its operations against the BRENNER. Along the latter route, the best targets lay North of TRENTO, hundreds of miles from the mediums' bases and surrounded by mountain heights in which medium operations were believed impossible. Since strategic bombing of the BRENNER Route was at first considered sufficient, the opening phase of Tactical Air Force participation was the interdiction of traffic to and from the PO Valley at the first water barriers of the coastal plain - the BRENTA and PIAVE Rivers.

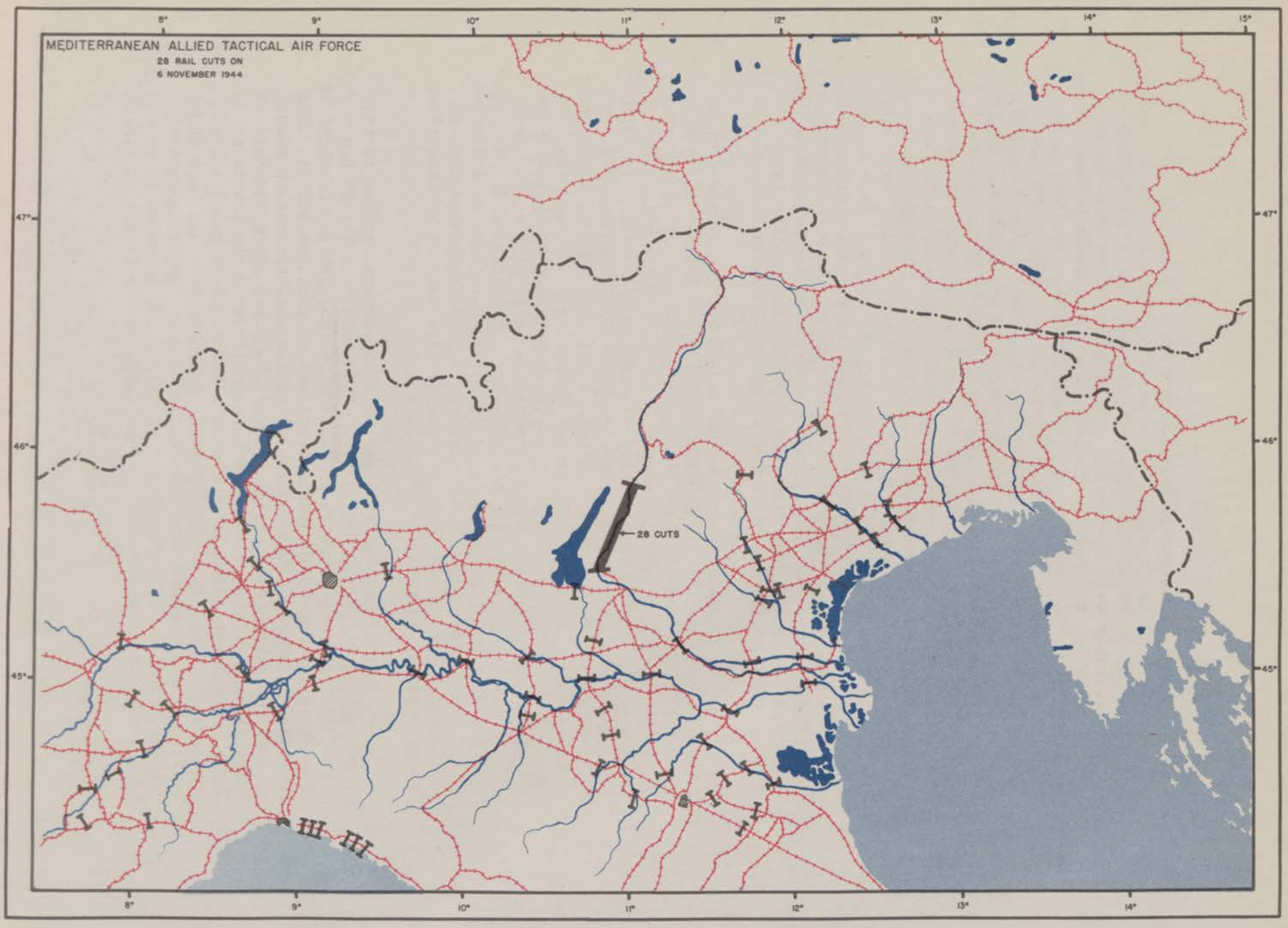
3. Immediately upon the cessation of medium operations in


MEDITERRANEAN ALLIED TACTICAL AIR FORCE
RAIL CUTS ON
21 OCTOBER 1944
8°
9°
10°
11°
12°
13°
14°
15°
47°
46°
45°

Southern FRANCE, the attack began with a brief period of intensive effort. During the four days 29 August - 1 September (medium attacks in Southern FRANCE had ended 28 August), 216 B-25's and B-26's bombed crossings over the BRENTA at PADUA and CITTADELLA and at six points along the PIAVE. These followed the burst of heavy bomber assaults on the frontier outlets and created a complete inner ring of interdiction in the Northeast. All through traffic was blocked at the line of the PIAVE for perhaps as long as two weeks. As a consequence of this and of the heavy effort allocated to the PO Valley, no further pressure was applied by MATAF in the Northeast until late in the month; on the 22nd, 23rd, 26th, and 30th, repeat attacks were made against the same targets. This effort was maintained on a restricted scale throughout the following month. During October, 12 missions of 187 sorties were flown against the Northeastern routes at the BRENTA and PIAVE bridges. This represented only one seventh of the 85 bridge attacks which the medium bomb wings executed during the month. The blows of the mediums were coupled with a number of heavy bomber assaults in the same area. Together the two Air Forces kept all lines blocked at the PIAVE for 16 days during October and sometimes at other points as well.

4. The BRENNER program opened on an even smaller scale and with even less augury of the gigantic effort which it was to become. Ultimately convinced that medium bombers could be profitably employed in postholing the bridgeless lower extremity of the Line to complement heavy bombardment further North, MATAF struck its first blow on 3 October. In all, operations during October were limited to five B-26 missions of 87 effective sorties. Four of these attacks occurred from 13 to 20 October when an attempt was made to keep the BRENNER Route continuously blocked South of ALA. Targets in every case were either the OSSENIGO or DOLCE rail fill. Each mission cratered the tracks and effected a temporary block. Best results were obtained on the 15th, when 320 rail cars were trapped North of OSSENIGO and many of them hit. From that date until the 23rd, a period of nine days, the BRENNER Line was closed to through traffic at one or more points.

5. During this initial period of operations in the North and Northeast, only the medium bombers of the 42nd and 57th Wings were employed. Late in October fighter-bomber armed recces began to extend into the TREVISO-VICENZA area, but the emergence of the fighter-bomber as an interdiction weapon in this region was yet to come. Also, the light bombers and Marauders of Desert Air Force were still confined to operations - primarily of a direct support nature - close to the battle area.


MEDITERRANEAN ALLIED TACTICAL AIR FORCE
28 RAIL CUTS ON
6 NOVEMBER 1944
28 CUTS
8°
9°
10°
11°
12°
13°
14°
15°
47°
46°
45°

THE BATTLE JOINED: 4 NOVEMBER - 25 DECEMBER

6. Bomber Operations. On the morning of 4 November, the clouds broke over Northern ITALY, and six formations of B-26's winged Northward to the BRENNER Line. The full scale campaign to blockade ITALY was under way. Excellent bombing resulted in 24 cuts on a thirty mile stretch South of TRENTO. The following day additional stretches of track were torn up, and, on the 6th, 102 B-25's, followed by 60 P-47's and 22 Kittyhawks, struck at the BRENNER power stations in execution of Operation "Bingo". All four stations from VERONA to TRENTO were destroyed or seriously damaged. Despairing of the task of repairing the shattered transformers, the enemy never regained use of electric locomotion on this section of the line.

7. Weather permitting, the offensive against the railway itself continued unabated through 19 November. At first, when MATAF's operations were confined to the southern extremity of the Route where bridge targets were few and unsatisfactory, open stretches of the track, especially when running over a fill, received most attention. Once Tactical Air Force was committed to the area North of TRENTO too, bridges resumed their normal predominance as medium bomber targets. A large effort, however, continued to be placed on vulnerable fills and corniches.

8. On 11 November the mediums pushed past TRENTO to attack rail bridges over the ADIGE at SAN MICHELE and ORA, where two spans were severed. On the 17th, the long viaduct at LAVIS over the mouth of the AVISIO River was added to the growing list of targets. In this area between TRENTO and BOLZANO, however, the northward movement of medium bomber operations came to a halt for the time being. Anxious though MATAF was to interdict the upper reaches of the BRENNER Route - especially in view of the construction of a diversionary rail line lacking suitable medium targets between BOLZANO and TRENTO - operations North of BOLZANO were considered impracticable because of terrain difficulties.

9. Indeed, during December small effort was devoted to the TRENTO-BOLZANO sector, for the completion by 6 December of the 15 mile alternate line by-passing both the ORA and SAN MICHELE bridges posed as a problem that MATAF was not yet prepared to solve. Most emphasis during the month was placed on the smaller bridges South of TRENTO and the fills at the base of the line. Here attempts, twice made in November, to cause a landslide over the tracks at SAN AMBROGIO were redoubled. Should a landslide be precipitated across the tracks, it was calculated, the Germans would have more difficulty in clearing away the rubble than in repairing several bridges. While a limestone cliff at this point appeared to be the best landslide objective South of BOLZANO, it was almost constantly

darkened by heavy shadows, and the peaks on either side hid the aiming points until the attacking aircraft were almost at bomb release point. During December, five missions strove to jar the cliff loose but without really satisfactory results, although the line was temporarily blocked by craters after each attack.

10. Partly because of weather and partly because of the necessity for maintaining continued effort against an army target in the FAENZA area, from 21 through 24 November, the mediums were unable to reach their BRENNER targets from 20 November through 1 December. Hostile skies again interrupted operations for a fifteen day period in mid-December. Another factor which reduced our effort was the transfer of the 42nd Bomb Wing to the European Theater of Operations. On 19 November it flew its last mission under this command and the Twelfth Air Force was left with only four groups of medium bombers. In all, the mediums expended 44 missions on the main BRENNER Route in November, while in the first 25 days of December (through Christmas) only 12 missions took part in this program. In addition, another 14 missions in November struck at the loop line running Southeast from TRENTO to the VENETIAN Plain. Thereafter fighter-bombers maintained the interdiction of this rail line, and in December it received only one medium attack.

11. Meanwhile in the Northeast other MATAF bomber formations were systematically closing the rail exits across the coastal plain. Begining with an attack on the PIAZZOLA bridge over the BRENTA on 4 November, the campaign soon embraced all four river belts and extended as far North as the TOMBA bridge over the TAGLIAMENTO. The three railroad bridges at PADUA, gateway into the PO Valley, sustained ten attacks from 5 through 17 November. On the northernmost double track line from VICENZA to UDINE, the most important of the three coastal routes, diversions were already in operation around two or three of the key bridges. In such cases an effort was made to put both the original crossing and the diversion out of use. A total of 35 missions were carried out over this sector in November, with an especially strong effort devoted to the BRENTA River bridges. The weather, non-operational in the Northeast after the 18th, was even more unkind during the first three weeks of December, and through Christmas only 5 missions succeeded in reaching their objectives on these routes.

12. It was appreciated that the enemy would make every effort to overcome the logistical obstacles imposed by MATAF's daytime bomber force by maximum road and rail movement and repair activity under cover of darkness. To disrupt such movement and to interfere with repair, MATAF on 1 December directed the employment of a proportion of night bombers on armed reconnaissance of the BRENNER Line and Northeast ITALY. In response, XXII TAC assigned several A-20's on a nightly basis, beginning 2 December, to cover the BRENNER Line

Photos No. 10-12

LATISANA RAIL BRIDGE

Attacked on 11 November by 18 B-25's of the 310th Bomb Group, 57th Bomb Wing, with 66 x 1000 GP and 6 x 1000 (6 hour delay) bombs. Two spans were knocked down and the west approach was damaged.

as far North as TRENTO. As M/T convoys were the principal targets, the intruders patrolled the heavily travelled roads on the shore of Lake GARDA as well as along the main route. Desert Air Force undertook night coverage of the Northeastern rail lines although the effort available was small for some time in view of the first priority commitment of the RAF light bombers in YUGOSLAVIA. The first blow was struck on the night 9/10 December with a carefully planned attack on UDINE. For forty-five minutes 14 Bostons hovered over the city while Partisans, under cover of the air raid alarms, sabotaged the marshalling yards; then the aircraft bombed the railway station.

13. Fighter-Bomber operations. Beginning late in October, fighter-bomber armed recces had penetrated the lower part of the VENETIAN Plain, where rolling stock and locomotives in the marshalling yards of VERONA and PADUA and on the lines from there to TREVISO and CASTELFRANCO had constituted the chief targets. On 6 November strong forces of P-47's and Kittyhawks ably co-operated with the mediums in wrecking the BRENNER transformer stations. No attempt was made, however, to employ fighter-bombers beyond the PO Valley against the rail lines themselves until late in November. Then their effort became indispensable if the blockade of ITALY was to hold. The redeployment of the 42nd Bomb Wing after 19 November coincided with a deterioration of the weather which prevented MATAF's remaining mediums from reaching the international routes for the rest of the month. The fighter-bombers took up the task and performed it so successfully that although their assistance had originally been intended only for critical periods when the mediums stood down, it was continuously maintained and vastly extended.

14. The continuing fighter-bomber effort against the BRENNER Route commenced on 19 November when XXII Tactical Air Command began postholing the tracks on the lower extremity of the Line between VERONA and ALA. During the last week of the month, from 26 November through 2 December, 148 sorties were employed, and the zone of operations was extended North to TRENTO. On one of these early flights, a strafing attack near SAN AMBROGIO blew up a rail truck which blasted 280 yards of trackage from the road bed. The debris of burned-out trucks was thrown more than 100 yards from the line and blast damaged buildings as far as 330 yards away. Again on 28 November 46 P-47's tore ten gaps in tracks over a 40 mile stretch. During December an average of 20 P-47's ranged up and down the BRENNER Route daily, sometimes reaching as far North as SAN MICHELE. In addition to cutting open stretches of track, marshalling yards at TRENTO and other points were attacked. Pilots claimed 149 cuts on the BRENNER Route during the month.

15. Fighter-bomber effort in the Northeast got under way simultaneously. On 22 November MATAF directed Desert Air Force to employ a good proportion of its fighter-bomber forces against comm-

unication targets. As a supplement to medium bomber attacks, it was given primary responsibility for the rail lines MESTRE-CASARSA, and NERVESA-CASARSA inclusive. These were the sections of the three coastal routes crossing the PIAVE and LIVENZA Rivers. On the same day DAF began cutting the lines from PADUA to CASTELFRANCO and to VICENZA. On the 29th, its fighter-bombers struck at bridges over the LIVENZA River. In December the VENETIAN Plain was the locus of a large part of DAF's communications targets. Particularly good results against rolling stock were scored along the Northern route to UDINE, and in addition to numerous track cuts, 18 attacks were concentrated on the rail bridges across the PIAVE and LIVENZA Rivers. Because of Desert Air Force's heavy close support commitments, XXII TAC also invaded the Northeast, where its Thunderbolts bombed rail links over the BRENTA River on 12 occasions during the month.

16. Results. This initial phase of MATAF's blockade of ITALY was a constant struggle against weather conditions which seemed as determined as the enemy repair organization to nullify the effects of aerial bombardment. During November the situation was more favorable from the Allied point of view than in the weeks immediately before Christmas, for the strong effort applied during the fair days of early and mid-November built up interdiction to a degree that was not speedily overthrown. On the BRENNER Route, beginning on 4 November, the offensive resulted in continuous stoppage and in multiplication of cuts which at one time reached a total of 35. Although interdiction weakened after 19 November, it is not considered likely that the line was open to through traffic for more than two or three days at the end of the month. From 1 through 25 December no structural damage was inflicted on any of the bridges and the blocks created were in the nature of cratered approaches and track cuts. While the enemy's labor gangs were never given a moment's respite, particularly by the repeated fighter-bomber attacks in weather unsuitable for medium operations, interdiction was intermittent and short-lived.

17. On the coastal plain as well, through traffic from the PO Valley to the frontier was impossible after 4 November, and at one period during the month three lines of interdiction, comprising 9 destroyed bridges, were successfully established at the PIAVE, LIVENZA, and TAGLIAMENTO Rivers. At the same time the BRENTA was breached only by a by-pass at CITTADELLA. Swift repairs and non-operational weather permitted an increase in traffic during the last week of November, but because of the number of lines of interdiction and the necessity of repeated trans-shipments over an 80 mile zone, an effective barrier was still interposed against transportation of heavy supplies into ITALY. By the beginning of December at least one bridge or by-pass was open across each river barrier. Thereafter although the enemy was frequently barred the most direct

connections and forced to use round-about routes, through traffic seems to have moved Southward at least as far as the BRENTA the great proportion of the time. There was only a very short period during December when any one of the four belts of interdiction could be considered as closed.

18. On Christmas day traffic flowed without hindrance from VERONA to the Reich both by way of the BRENNER Pass and the VENETIAN Plain. Celebrating the day in his hidden villa, Field Marshal Kesselring might well have congratulated himself on the ability of his repair organization to re-knit the severed rail lines upon which the supply of his armies so vitally depended. In the savage onslaught of Allied air power during the sunny days to come there would be little time and less occasion for congratulations.

REVISING TACTICS

19. From the beginning of November until the end of December MATAF had devoted a major portion of its medium bomber effort and some light and fighter-bomber effort to the disruption of the rail lines leading out of ITALY with the design of throttling the forward passage of supplies to Army Group C and thus gradually sapping its strength. During the same period MATAF was also fulfilling extensive communications commitments in the PO Valley and maintaining intensive pressure on the enemy front in support of 15th Army Group, which was poised for a major offensive. Now, just as a hostile Italian winter was combining with frenzied enemy repair activity to demonstrate the desireability of a tighter strangle on supplies, considerations were emerging from the over-all European situation to introduce a new urgency into the blockade of ITALY.

20. Staking everything on a savage counter-offensive, on 16 December Field Marshal Von Rundstedt hurled two panzer armies into the ARDENNES Forest in an effort to split the western front in two. Having burst out into BELGIUM, by Christmas they were still driving Westward toward the MEUSE River and the NORTH Sea ports beyond. To upset these plans and quickly regain the initiative, the Allies needed to bottle up the German forces in ITALY and prevent their use as reinforcements in the desperate gamble in the West. There was no more likely source from which Von Rundstedt might replenish his expended reserves with tough, experienced divisions than Army Group C. On 25 December Lt. General Eaker relayed to Major General Twining and Cannon an urgent call from General Spaatz which brought this new consideration in the blockade of ITALY sharply to the fore.

> It is considered of great importance here that the BRENNER and TARVISIO Routes be kept as fully immobilized as possible and therefore the most important contribution you can make to our battle.

Intensive air reconnaissance should be especially maintained of the GOTTARD-SIMPLON Routes with immediate notice to us of any intensification of traffic, indicating possible movement of German divisions in ITALY to this theater.

General Eaker asked both MATAF and MASAF to undertake maximum compliance to meet this commitment by 26 December.

21. A similar request from the Russian High Command underlined the importance of the blockade of ITALY. The generals in command of the forthcoming Russian winter offensive were just as desirous as were their counterparts in the West that German reinforcements from ITALY should not be moved up to oppose them.

22. Henceforth, the interdiction of the international routes, while losing none of its significance as a strangle operation, was increasingly motivated by the further desire to hamper the transfer of German manpower reserves from this to other theaters. The BOLOGNA-directed offensive which 15th Army Group had planned to mount in December had also had as its object the engagement of Kesselring's forces in order to prevent the withdrawal of any part of them to strengthen resistance against the major Allied offensives on the Eastern and Western fronts. On 26 December, however, the imminently scheduled assault was indefinitely postponed and on 2 January cancelled. The Fifth and Eighth Armies then withdrew maximum forces from the line for rest and reverted to a purely defensive role of holding their existing positions. This shifted to the airmen most of the responsibility for containing German formations in ITALY. The collapse of Guderian's front in POLAND in mid-January in the face of a gigantic Soviet offensive lent still additional reason to this strategy. It also motivated the first instance of the enemy's anticipated redeployment. About a week after the Russian offensive began on the 12th of January, 356 Division was withdrawn from the line and started on its arduous journey across the gauntlet of the ALPS to HUNGARY.

23. Spurred by the dual aims of starving the forces which the enemy might choose to leave in ITALY and paralyzing the transfer of those which he might wish to relinquish, MATAF prosecuted its interdiction program with growing vigor. It was determined to disorganize the international routes to such an extent that the enemy would find it beyond his strength to recover during the intervening bad weather periods. To choke off the influx of supplies, continuous interdiction was imperative in view of the enemy policy of waiting, unless supplies were desperately needed, until a line was repaired and then rushing through as large a volume as possible. Effective interference with troop movements required a program of

Photos No. 13-14

PORDENONE RAIL DIVERSION

The 526th Fighter Squadron, 86th Fighter Group, dropped 18 x 500 GP bombs on this rail diversion on 4 February. Photographs show the two center spans destroyed.

Photos No. 15-16

LISIERA RAIL BRIDGE

This small bridge just east of VICENZA on the main route across the Venetian Plain was attacked by eight P-47's of the 64th Fighter Squadron, 57th Fighter Group, on 7 February, scoring three near misses. The three center spans were damaged and impassable.

interdiction in great depth, for men more easily than material could be trans-shipped around breaks in the line, and proceed via shuttle trains to their destination.

24. To accomplish these aims MATAF took the following steps at the turn of the year:

a. The zone of interdiction in the Northeast was deepened to encompass the frontier routes through the ALPS above the VENETIAN Plain.

b. The Baltimore and Marauder squadrons of Desert Air Force previously operating almost exclusively South of the PO River, were committed to the blockade.

c. An all-out fighter-bomber effort was laid on. Released from all but a minimum of close support when the Allied Armies in ITALY passed to the defensive, MATAF's fighter-bombers swarmed North to the international routes, which replaced the PO Valley network as their first priority communications responsibility. No longer limited to post-holing tracks, the single engine aircraft now undertook the destruction of rail bridges on a vast scale. As bridge busters, the fighter-bombers emerged as keen rivals of the mediums.

25. These developments were crystallized in MATAF Operational Directive No.23 on 9 January. This order dropped air effort on the fronts of the Armies as a major responsibility and re-defined the principal task of Tactical Air Force as maintaining the isolation of Northern ITALY. First priority for 57th Bomb Wing was assigned to the following targets:

BRENNER Line.
Railroad bridges over the BRENTA, PIAVE, LIVENZA, and TAGLIAMENTO Rivers.
TARVISIO, PIEDICOLLE, and POSTUMIA rail lines.

XXII Tactical Air Command and Desert Air Force were directed to employ the bulk of their effort to destroy comm unications on crucial stretches of the routes which joined ITALY to the Reich. Isolated craters in the tracks were not what MATAF desired, but rather a series of broken bridges and yawning gaps in the line. Consequently the fighter-bombers in attacks on rail communications were instructed to concentrate first on destruction of bridges and diversions, and secondly, on the destruction of tracks in open country. In the latter case it was emphasized that attacks must be pressed against one particular section of line until it is rendered completely unserviceable. The following priorities for rail interdiction were

allocated to XXII Tactical Air Command:

a. BRENNER Line

b. VICENZA-CASARSA Line

c. VICENZA-TREVISO-CASARSA Line

d. TRENTO-BASSANO Line

Desert Air Force was assigned priorities for attacks against rail communications as follows:

a. TARVISIO Line (GEMONA-CHIUSAFORTE)

b. PIEDICOLLE Line (GORIZIA-CANALE D' ISONZO)

c. POSTUMIA Line (LATISANA-SESANA)

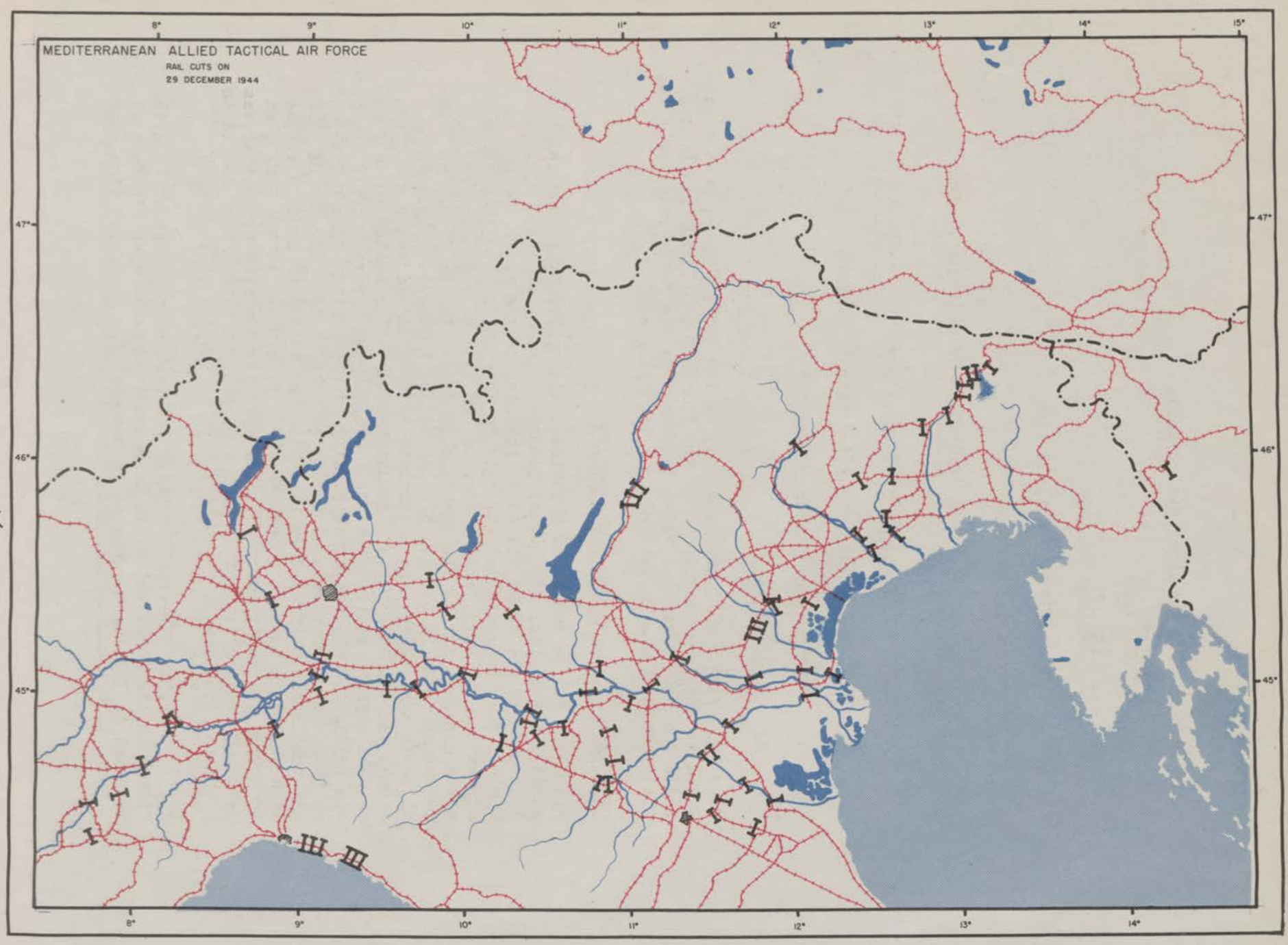
d. PADUA-LATISANA

Thus XXII TAC gave highest priority to the BRENNER Line, Desert Air Force to the lower stretches of the TARVISIO and PIEDICOLLE Routes, while the two commands divided between them the three railways along the VENETIAN Plain on succeeding priority bases.

CRESCENDO: 26 DECEMBER - 28 FEBRUARY

26. On the day after Christmas, the oppressive clouds which had sheltered the enemy all during December yielded to ideal bombing conditions. In the scant six days remaining of the month the medium bombers rose in redoubled strength to make up for the long stand down which had held their effort on the international routes to three missions during the previous 15 days. On the 26th, ten fighter-bomber attacks on rail bridges in the Northeast supplemented three by the B-25's, and a complete belt of interdiction was flung across the VENETIAN Plain. Simultaneously other medium formations cut the BRENNER Route. Not for a single day, however, could the airmen relax, for the enemy, especially on the BRENNER Line had seldom put forth such strenuous repair efforts. The bridge at CALLIANO was completely destroyed on the 27th, and within 48 hours a single line across it was again serviceable. Five miles to the South, at ROVERETO, the badly damaged bridge with its cratered approaches was reopened for traffic within 24 hours, and the B-25's were forced to bomb the structure on 5 out of 6 days at the end of the month.

27. MATAF's revived campaign received strong support from the Fifteenth Air Force which, in response to General Spaatz's request, returned to Italian targets on 26 December for the first time since


MEDITERRANEAN ALLIED TACTICAL AIR FORCE
RAIL CUTS ON
29 DECEMBER 1944
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12 November. In the interim the heavy bombers had devoted some effort to the Austrian terminals of the international routes, and on 15 December 47 B-24's inflicted very heavy damage to INNSBRUCK Main Marshalling Yard. Such attacks, while adding to the destruction of rail facilities, were perhaps more important for the destruction of supply-laden freight cars and oil tank wagons piled up behind the blockade. While continuing these blows, MASAF now joined as well in the interdiction of the rail exits from ITALY. From 26 December through 4 January, heavy bombers carried out 25 raids on bridges and other rail targets along the BRENNER Route and the Northeastern lines, ending with a shattering twin assault of 197 B-17's and B-24's on both of VERONA's marshalling yards. Thereafter Strategic Air Force participatation in the isolation of ITALY lapsed until late in February, as the heavies returned to their more customary objectives farther North.

28. Closing the Northeastern Frontier. While the battle of the BRENNER raged on, other B-25 formations were striking into the farthest corner of ITALY to block the tortuous frontier routes beyond the VENETIAN Plain. Hidden deep in the jagged terrain, the vital bridges in this area were extremely difficult to identify from the air, and many of the bombers were forced to seek alternate targets elsewhere; others made two or three bomb runs before dropping. By dint of intensive effort, however, the three rail lines across the Northeastern frontier were sealed off one by one.

29. The POSTUMIA Line was the first to go. The assault on the frontier routes began on 27 December, and on the same day the center of the great BOROVNICA Viaduct was demolished. The enemy never succeeded in putting it back in use. In a major engineering effort, 700 men labored to construct a long winding diversion, to aid in which the broken viaduct was stripped of some of its steel. When the war ended, this long and fruitless labor remained still incomplete. The TARVISIO Route was blocked almost as quickly, although neither as easily or as permanently. On 27 December tracks were cratered at several points; on the 28th, heavy bombers broke a bridge at VENZONE, andon the 29th, the B-25's, after four previous attempts had failed, knocked a span out of the principal target at CHIUSAFORTE. Rail activity, which had been very heavy when the attack commenced, quickly slumped to a small scale, and through traffic along the Route was not resumed until mid-January. The PREDICOLLE Line, last of the three to yield, was disrupted on 31 December, when the Mitchells employed "Shoran" equipment at long range for the first time and destroyed a span of the sturdy masonry bridge at CANALE D' ISONZO, As a result, the entire Route was abandoned during most of January, and the bridge was not repaired until the last day of the month.

30. Entry of the DAF Bombers. To increase the intensity of

Photos No. 17-18

CITTADELLA RAIL DIVERSION

Attacked on 11 February by seven P-47's of the 65th Fighte Squadron, 57th Fighter Group, when a direct hit and several near misses destroyed 75 feet of the bridge. This was one of the earliest diversions in northeast ITALY. The Germans always exerted maximum effort to keep this BRENTA crossing open. Although it was blocked during the entire month of February by day, it was probably "night operational" part of the time.

effort in the growing area of blockade, Desert Air Force began on 21 December to employ its daytime bomber force, then comprising 4 Marauder and 3 Baltimore squadrons, against the marshalling yards of the VENETIAN Plain. This served to augment fighter-bomber attacks in Northeastern ITALY and to compensate for the diversion of part of the B-25 effort in the frontier routes. After initial Marauder attacks on TREVISO marshalling yards, on 26 December the Baltimores joined in the assault and coverage of rail junctions in Northeastern ITALY became widespread. From 26 to 31 December 359 Baltimores and Marauders engaged in a series of raids on yards at TREVISO, CASTELFRANCO, UDINE, CONEGLIANO and other points in the vicinity. These blows smashed tracks, depots, workshops, and rolling stock, and broke adjacent bridges.

31. Medium Effort on the BRENNER: January. The smiling weather that had favored operations in the ALPS late in December deteriorated during most of January, and on all but twelve days during the month weather conditions prevented attacks on the BRENNER Line by the mediums. On only five days could a full-scale effort be put on. In those brief periods, however, 53 B-25 missions bombed bridges, tracks and fills between VERONA and BOLZANO. Three-fifths of the total bomb tonnage unloosed by the 57th Bomb Wing during the month came crashing down on the BRENNER Line. Never before had Tactical Air Force mediums tried so hard to paralyze a single railroad. Extreme turbulence and high velocity winds frequently rocked the formations on their bomb runs; glare from the snow sometimes blinded the bombadiers; flak continued to take its toll; results were sometimes disappointing. On the 15th, 120 B-25's bombed the BRENNER railway at seven points but succeeded only in cutting the approaches to two bridges. During the month, however, the relentless bombing program gradually began to pull ahead of the enemy's repair effort. No longer was he capable of reactivating all the points of interdiction at maximum speed; it was becoming necessary to pick and choose. Most significant of all, MT movement up and down the ADIGE Valley was on the increase - a sure sign of decay in the strength of the German supply lines.

32. For the first time during January the medium bombers put a heavy effort on the TRENTO-BOLZANO section of the line, a sector which had previously received little attention due to the construction of by-passes around all three bridges. On 3 January the bombers began attacking the miniscule targets presented by these diversions in an effort to maintain the interdiction of both the original and by-pass lines. The paucity of satisfactory targets kept MATAF continually on the watch for new and better methods of creating more permanent blocks on the section South of TRENTO also. Once again the mediums, using semi-armor piercing bombs, attempted to create a landslide over the tracks at SAN AMBROGIO. Because

Photo No. 19

PONTE DI PIAVE RAIL BRIDGE AND DIVERSION

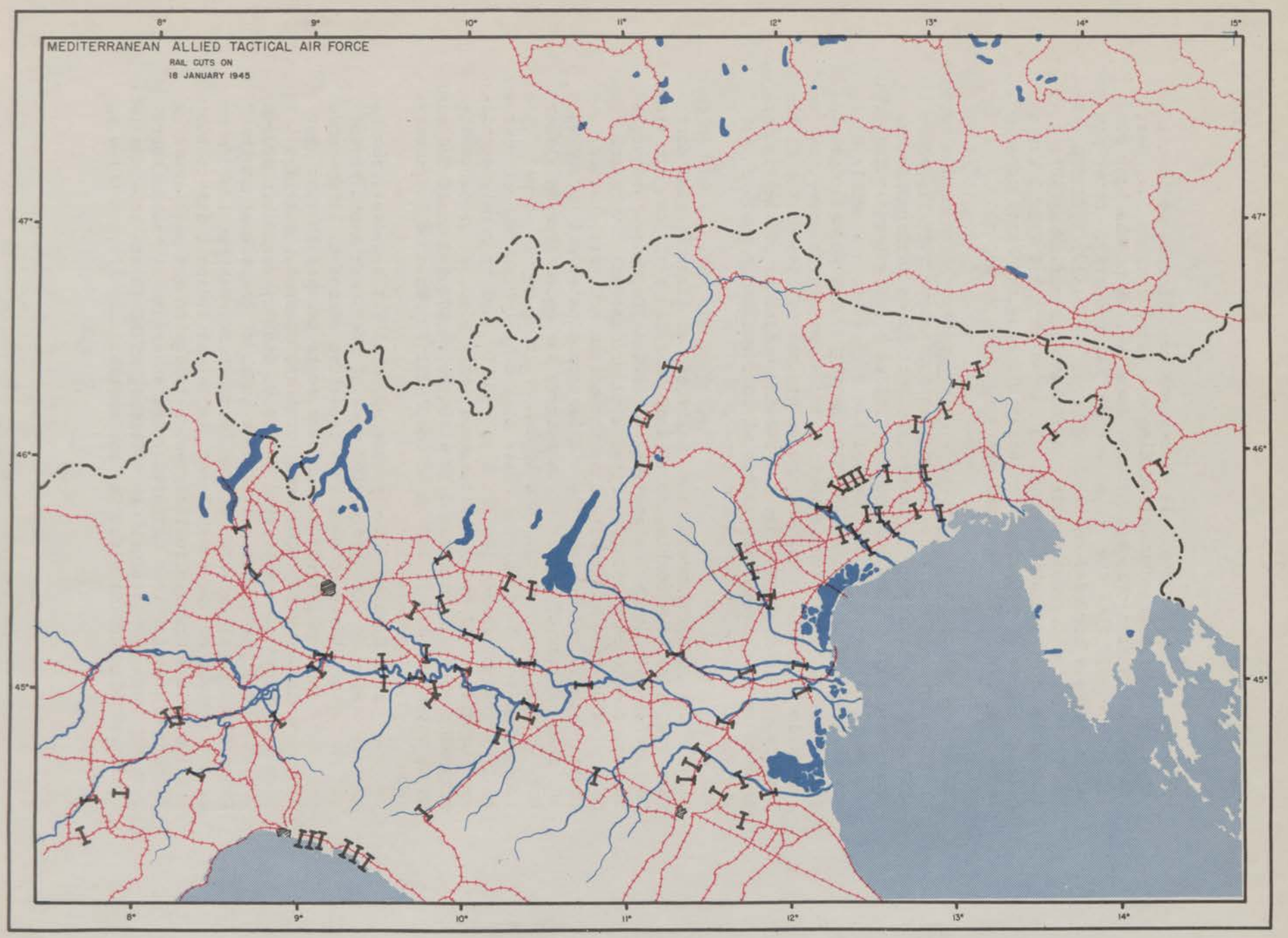
The permanent rail bridge was destroyed by the B-25's. The present photograph, taken after an attack on 13 February by P-47's of the 65th Fighter Squadron, 57th Fighter Group, shows a gap at the east end, and a pier under construction at the west end of the gap. The rail bridge, road bridge, and road diversion all remain impassable. Note the low water level of the PIAVE, which facilitated the construction of diversions.

the particular limestone hill chosen was so difficult to identify for visual attacks, "Shoran" bombing was tried against it. But the leading Shoran ship was brought down by flak on the bomb run with the result that the target was not hit properly. Other new medium targets included marshalling yards at AVISIO, ROVERETO, and TRENTO. In the largest single mission laid on during MATAF's entire program of isolating ITALY, 54 B-25's attacked TRENTO Marshalling Yard on 20 January, completely blocking the North choke point and the center of the yard and wrecking 60 to 70 wagons.

33. Developing Role of the Fighter-Bombers. The medium bombers also continued to maintain pressure on Northeastern ITALY, where 16 B-25 missions attacked the inter-Axis rail lines during January. Here the effort of the mediums was divided equally between the bridges over the rivers on the coastal plain (5 attacks at MOTTA DI LIVENZA) and those on the TARVISIO and PIEDICOLLE Routes close to the frontier. Effective as these attacks frequently were, they were overshadowed by the ceaseless and co-ordinated blows of the fighter-bombers. Indeed, it was the devastating onslaught of the fighter-bombers on bridges and diversions which furnished January's most striking development in interdiction.

34. During the month, the single engine aircraft flew more than 2500 effective bombing sorties against lines of communication in Northeastern ITALY, in contrast to 1100 in December. Emphasis shifted from open stretches of track to bridges and diversions, many of them also under attack by the medium bombers. Beside causing structural damage, these blows complicated and prolonged the enemy's task of repair by chewing up the approaches to either side of disabled crossings and by demoralizing repair crews. Then too ground reports from some areas stated that the frequent presence of fighter-bombers was itself largely sufficient to paralyze railway activity. DAF Daily Intelligence Summary No.211 recounts the following destruction wrought by a single squadron of SAAF Mustangs in an attack on a rail bridge on the TARVISIO Route on 31 January:

> As a result of their bombing, a direct hit destroyed one span of the bridge, 100 feet of the track North of the target was covered by a landslide of the hill face and the superstructure was seen to be damaged by very near misses which blew off 5 girders, damaged the bridge supports and twisted the line; the Mustangs then scored further direct hits at the mouth of the tunnel South of the bridge which partially blocked it, broke the centre span of the nearby road bridge and scored a direct hit on a smaller road diversion bridge in the same area. A loading party gathered round an engine at the Southern end of the tunnel was strafed; an MT in the area was left blazing and a further two smoking; and a truck carrying


MEDITERRANEAN ALLIED TACTICAL AIR FORCE
RAIL CUTS ON
18 JANUARY 1945
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30 bodies was overturned, with results unsatisfactory to the cargo. A loco was also damaged on the line west of the bridge.

35. In the Northeast, XXII Tactical Air Command put its heaviest effort on the main double track railroad from VICENZA to CASARSA. During the month, 174 P-47's struck at CITTADELLA's bridge and diversion, 124 at CASARSA, and 122 at NERVESA. Desert Air Force concentrated particularly on the POSTUMIA Line from LATISANA to SESANA. Neither command, however, was held rigidly to a separation of area of responsibility; together the two of them carried out 158 bridge and diversion attacks on the Northeastern Routes from their terminals at PADUA and VICENZA to the frontier. As a result, the Germans were denied through traffic in and out of Northeastern ITALY during the entire month. Although the TARVISIO Route seems to have been serviceable throughout 18 January until the end of the month, from one to three complete belts of interdiction were drawn across the VENETIAN Plain at its transverse rivers. At times each of the three railroads in this region was blocked at four points with as many as 15 bridges down between PADUA and UDINE.

36. At the same time a strong P-47 effort continued to support the mediums' campaign against the BRENNER lifeline. Here too the weight of their attack shifted to bridges and diversions. No longer confining themselves to the lower portion of the Route, the fighter-bombers now reached North to targets almost as far as BOLZANO. During January they put 34 attacks on crossings along the main BRENNER Route, most of which were also medium bomber attacks. In addition, 21 missions bombed CISMON and other bridges on the loop-line from TRENTO to BASSANO.

37. Withdrawal of German Divisions. All during January MATAF kept a sharp watch for enemy movement which might indicate the transfer of troops from this to other theaters. All flights over Northeastern ITALY were briefed to be alert for any sign of troop movements. Photo reconnaissance squadrons, in addition to the normal cover of communications, traced the movement of individual trains, seeking indications of a shift in enemy forces. At last, toward the end of the month, the anticipated redeployment of enemy forces got under way, as 356 Division, withdrawn from the line, on 23 January entrained in the PADUA area for the Northeast. During February a second formation - Himmler's own 16 SS Panzer Grenadier Division - undertook the passage of the ALPS to join in the defense of the Fatherland. Prepared and waiting for such movements, MATAF informed its command and instructed them to intensify their interdictory efforts in the first priority areas established early in January. All during February, as divisional units were making their tortuous way past the obstructions of the VENETIAN Plain and up the broken BRENNER and TARVISIO Routes, MATAF's air effort mounted in

a steady crescendo of attack which left the enemy, despite the most strenuous repair exertions, finally and permanently unable to move through traffic in or out of ITALY.

38. Prior to February, the effort expended in isolating ITALY had constituted less than half the total MATAF effort directed against enemy communications. Together, the complex road and rail network of the PO Valley, snipping along the ADRIATIC and LIGURIAN coasts, and the long tenuous lines of supply through YUGOSLAVIA had absorbed a preponderance of attention. In February the total number of medium, light, and fighter-bombers engaged in the blockade of ITALY for the first time surpassed the number employed in service of MATAF's other communications responsibilities. Indeed, the 6364 sorties bombing supply lines through the ALPS and across the VENETIAN Plain constituted two-thirds of MATAF's total bombing effort laid on communications targets during the month. Also, in the last week of February Strategic Air Force, after seven weeks of relatively small scale cooperation, returned in strength to assist MATAF's program. VERONA and other marshalling yards on the blockaded routes were pounded by the heavy bombers night and day in an effort which reached its height on 28 February, when MASAF dispatched its entire force of heavy bombers against the BRENNER Line.

39. <u>February Attacks on the BRENNER.</u> More than a thousand B-25's and an even greater number of fighter-bombers pounded the BRENNER Route in February. In the month's 21 operational days in that area, the 57th wing carried out 73 attacks on the BRENNER. Hitherto the enemy had practically continuous use of the railway North of BOLZANO, sporadic attacks by heavy bombers having been largely ineffective. On 14 February, however, the mediums entered a new stage of their campaign, when for the first time they swept past BOLZANO to cut the upper reaches of the Line at BRESSANONE in the heart of the ALPS. The bridge was not repaired for 9 days. Having proven the feasibility of operations at such distance and over such rugged country, the Mitchells chose additional objectives in this sector and steadily extended their area of operations. On 23 February B-25's struck further North than ever before, attacking a bridge near CAMPO DI TRENS, and two days later pushed still nearer the Reich to severely damage two spans of the bridge at VIPITENO, 6 miles due South of the Austrian border.

40. Meanwhile the whole length of the line South of BOLZANO was under continual bombardment. At LAVIS the effort reached its highest level. More than 500 tons were dropped on the viaduct and diversion there. Both were simultaneously blocked on all but four or five days during February, and at the end of the month 450 feet of the viaduct was missing in a series of four gaps. Although two more attempts to start slides at SAN AMBROGIO were not effective,

Photo No. 20

POIANA RAILWAY STATION

This station, on the PADUA-VICENZA line, was attacked on 17 February by P-47's of the 65th Fighter Squadron, 57th Fighter Group, dropping 16 x 500 GP bombs, cutting the rails in four places, destroying two MT, and damaging another. One through line remained passable. Note the presence of large stores of railroad ties and rails. See Photo No. 22 for detail.

Photo No. 21

CAMPOSAMPIERO RAILWAY STATION

Attacked on 2 April by the 66th Fighter Squadron, 57th Fighter Group. Only one through line remained open; the road to the north of the station was cratered in two places. For some months this was one of the loading and assembly points (northwest of VENICE) for troop movements out of ITALY. See photo No. 23 for detail.

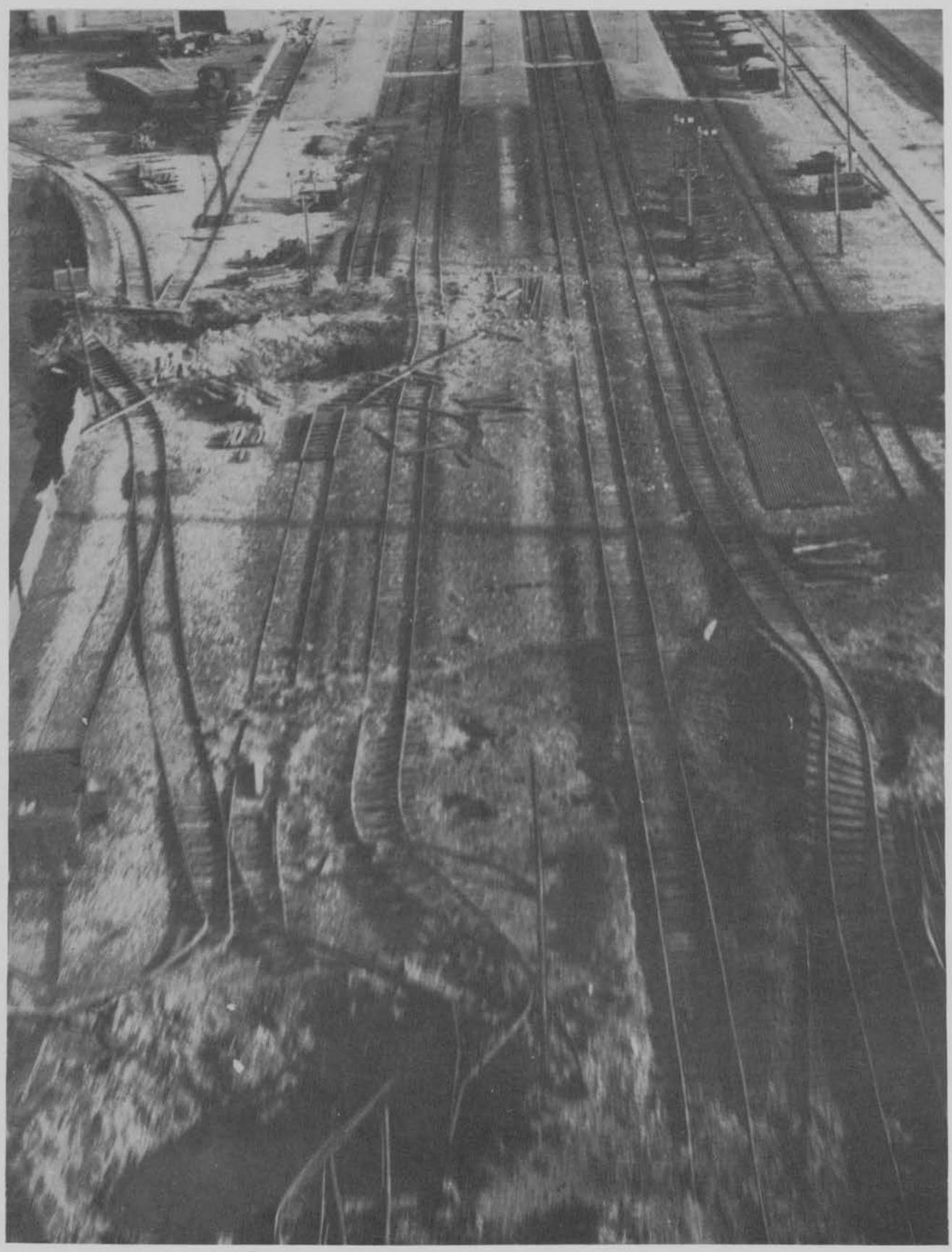


Photo No. 22

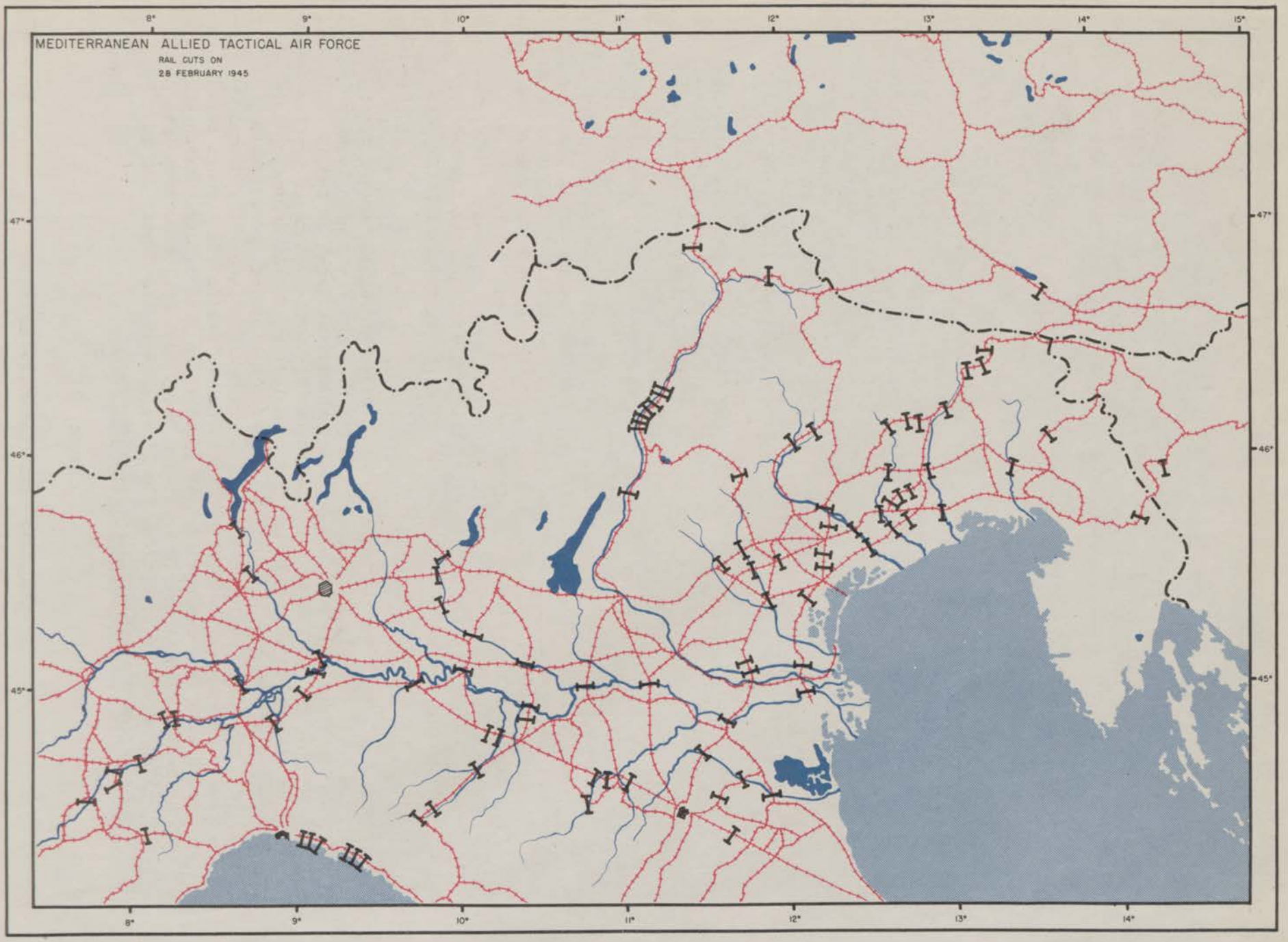
POIANA RAILWAY STATION

Detail of Photo No. 20.

Photo No. 23

CAIPOSAMPIERO RAILWAY STATION

Detail of Photo No. 21.


MEDITERRANEAN ALLIED TACTICAL AIR FORCE
RAIL CUTS ON
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substantial blocks below TRENTO were created at ROVERETO and ALA. During the entire month, and indeed since 29 January, the BRENNER Line at no time was passable throughout. From one or two at the beginning of February, the number of blocks rose to ten at the end.

41. February Attacks in Northeastern ITALY. In the Northeast it was the same story of growing paralysis. Close to 4000 MATAF aircraft bombed communications targets on the international routes leading out through Northeastern ITALY. While executing only three attacks on the bridges of the VENETIAN Plain, the B-25's struck hard at the TARVISIO and PIEDICOLLE Routes and registered conspicuous success in totally obliterating the CANALE D' ISONZO bridge on 7 February. Interdiction in the VENETIAN Plain was almost singlehandedly maintained by the fighter-bombers. Although the tempo of repair was at its height on the Northern and Central rail lines, the Germans abandoned the struggle to keep serviceable the ADRIATIC coast railway. In view of the inactive status of this and of the POSTUMIA Line, MATAF directed Desert Air Force on 30 January to discontinue their interdiction and to intensify its effort on the TARVISIO Route from UDINE to CHIUSAFORTE and on the CASARSA-UDINE sector of the northernmost coastal railway. A co-ordinated assault by every type aircraft at the command's disposal was laid on. Marauders dropped 309 tons on 7 bridge and marshalling yard objectives along the rail line from GORIZIA to NERVESA. Spitfires, too light to be effective against heavy structures, dropped their bomb loads on the tracks between the major blocks. A raid on CASARSA rail diversion on 23 February involving 33 P-47's, 13 Marauders, 12 Kittyhawks, and 10 Spitfires illustrates the combined nature of the attack. A force of Marauders and P-47's first struck at flak positions in the neighborhood. They were followed by others which bombed the bridge itself, on which the Thunderbolts claimed 10 direct hits, while the Marauders left delay action bombs in the area. The Spitfires acted as cover to the attacking aircraft, and finally the Kittyhawks cratered the tracks on either side, reporting four cuts in all.

42. Only by straining every resource and making use of diversions and "night operational" bridges, was the enemy able to open the Northern line for four days in February at least as far as CHIUSAFORTE, but it is not likely that any great volume of traffic was enabled to move Eastward. By the last week, the degree of interdiction was the highest ever heretofore achieved, more than 20 rail crossings over the coastal rivers being impassable. Ground sources reported the TARVISIO Route out of action all through the month with four rail bridges crippled and 6 road bridges destroyed. Meanwhile fighter sweeps exacted a heavy toll of locomotives and rolling stock trapped along the lines between the breaks and in the region's crippled marshalling yards.

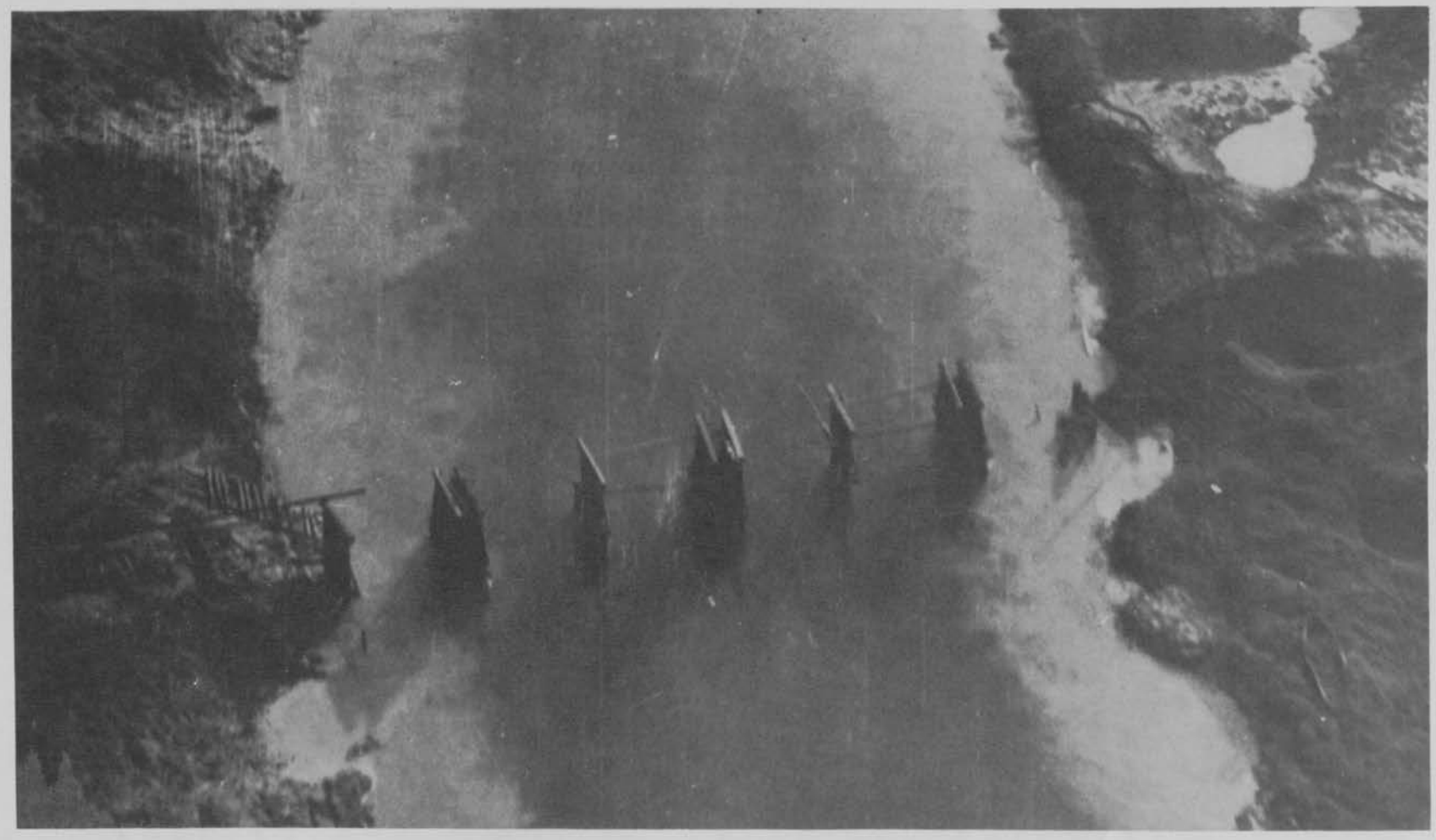


Photo No. 24

MOTTA DI LIVENZA RAIL DIVERSION

Once a strongly constructed masonry rail bridge across the LIVENZA River, northeast of VENICE, the span was an important link in the German communications system. After medium bombers knocked the bridge out, a wooden diversion bridge was hastily constructed. This was, however, completely impassable after an attack on 24 February by the 346th Squadron of the 350th Fighter Group, as the accompanying picture indicates.

43. Increase of Night Attacks. The exodus of German troops from ITALY caused MATAF also to lay on special measures to disrupt movement by night. While a large proportion of the forces involved travelled by road, others sought to use what was left of the rail net. Because of the many breaks, they were forced to make short hauls and frequent off-loadings. Consequently, as 356 Division pulled out through Northern ITALY under cover of darkness, night bomber forces were instructed to attack the points of loading and assembly of its trains. XXII Tactical Air Command was assigned the railroad yards at CITTADELLA, CASTELFRANCO and VERONA and also directed to carry out nightly armed recces of the BRENNER Line on as large a scale as possible. Desert Air Force was assigned the yards at CAMPOSAMPIERO and VIGODARZERE in addition to repeated nightly armed recces of the TARVISIO Route. On the night of 28/29 January, A-20's began dropping delay-action butterfly clusters on these assembly points, and also on damaged or destroyed bridges and diversions in Northeastern ITALY in order to hinder and demoralize repair crews. The following night Bostons opened the assault on CAMPOSAMPIERO and VIGODERZERE marshalling yards with direct hits and explosions among trains. In mid-February, as a second division started on its way, additional loading points such as CODROIPO and CORMONS in the UDINE are were discovered and a co-ordinated bombing program continued. A-20's put their strongest effort on CASTELFRANCO marshalling yard, to which the intruders returned again and again during February's nights. By the 27th, enemy movement had slackened, and MATAF cancelled further attacks on these areas.

CLIMAX: 1 MARCH - 8 APRIL

44. With the advent of spring, improving weather cast a growing benediction on air operations, while the day of decision fast approached. The time had come for MATAF to exert a last good strong heave in its program of blockade. In March 8162 aircraft bombed the international routes North of the PO Valley. This was more than four times the effort expended in November when the blockade of ITALY first became a major responsibility of Tactical Air Force. Every type of aircraft at the disposal of the Air Force put forth a maximum effort. Zones of interdiction reached their deepest extent and most dense concentration. The attack was sustained at saturation level through the early days of April to the very eve of 15th Army Group's grand offensive. By this relentless process of attrition, the enemy repair organization was left utterly incapable of coping with its multiplying tasks. According to enemy figures, by the end of March the number of cuts in the rail net of Northern ITALY had risen to the all-time high of 1165. Rail traffic on all of the international routes had virtually come to a dead halt.

Photos No. 25-26

SACILE RAIL DIVERSION

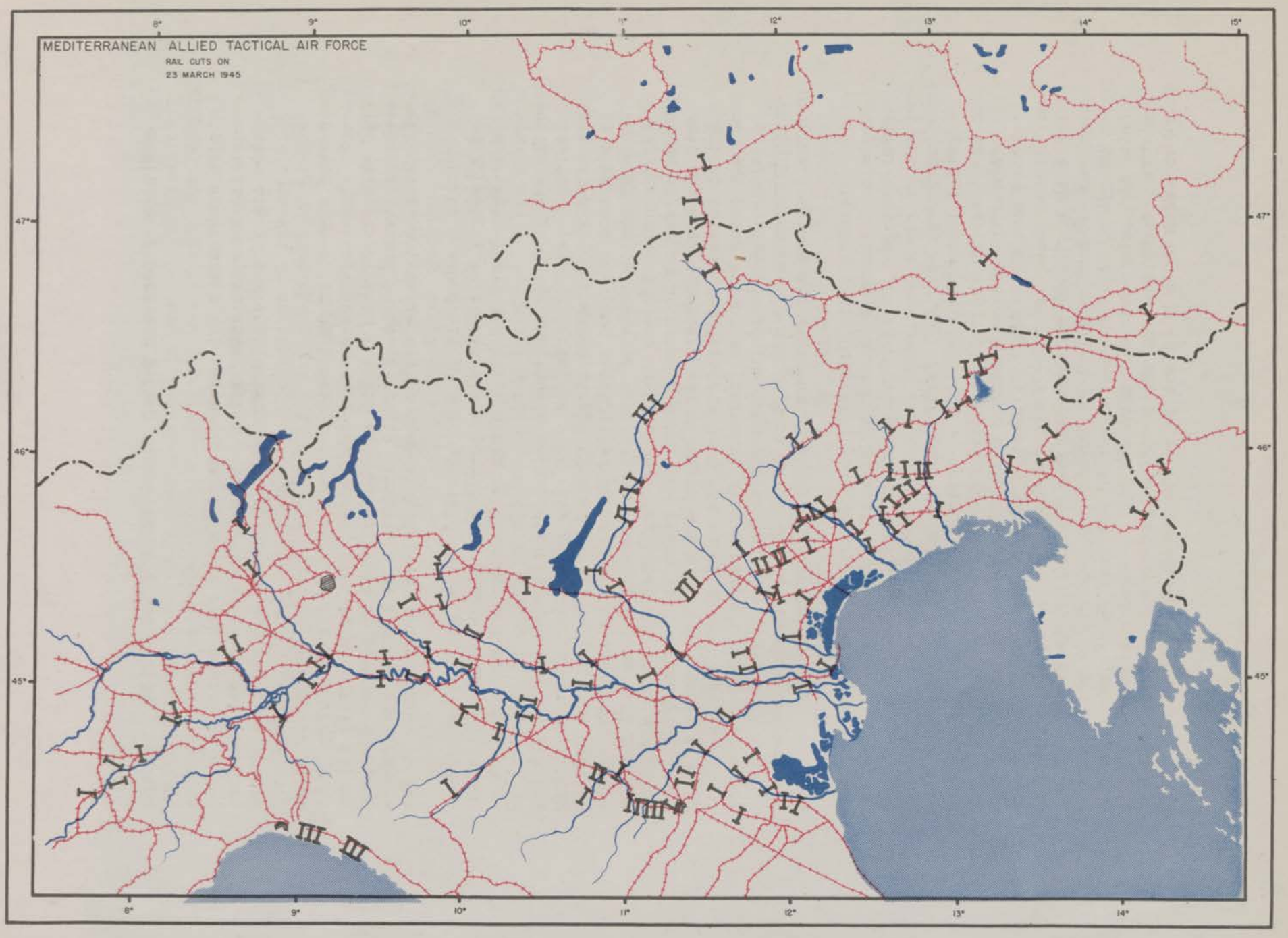
Twenty-seven B-25's of the 310th Bomb Group, 57th Bomb Wing, hit this bridge over the LIVENZA River on the main northeastern route with 96 x 1000 RDX bombs on 13 March. All bombs were dropped by Shoran equipment. There was a good concentration on the target, and the attack badly tore up both approaches, though the bridge was probably open at will.

45. BRENNER Route. On 24 out of the 25 days in March on which the B-25's were airborne they attacked the BRENNER Route. 1535 medium bombers participated in the campaign, dropping more than 2000 tons. No section of the line escaped attention. In an effort which encompassed more targets than during any previous month, the bridges and diversions at SAN MICHELE received most emphasis and were blocked throughout the period. Several times the over-taxed repair crews changed their intended methods of repair on the diversion bridge, only to be set back by the accuracy of our bombing. Culverts, fills, and prefabricated spans were all attempted without success. As our stranglehold on the lower section of the rail tightened, its use even on a shuttle basis became impossible. Anything resembling continuous rail traffic between VERONA and TRENTO had ended in the latter part of February. Early in March a handful of trains straggled through, the last of these leaving VERONA on 18 March. Thereafter the lower part of the BRENNER Line fell into total disuse.

46. Indeed, almost all enemy movement as far North as BOLZANO was now accomplished by road. MT traffic converging on BOLZANO increased up to the ADIGE Valley and through the mountain roads to the West. Troop movements were involved, as during March the enemy sought to extricate a third and last division for service on the Eastern front. 715 Infantry Division was withdrawn from the line about 25 February; not until more than a month later was it thought to have cleared the frontier. For this as well as other traffic, BOLZANO in effect had become the forward railhead on the BRENNER Line. Therefore on 13 March MATAF directed the 57th Bomb Wing to put the full weight of its BRENNER effort between BOLZANO and INNSBRUCK on the first day of favorable weather. The following day the B-25's undertook a concentrated assault on the Northern reaches of the line, which was maintained through the 25th. After a raid on BRENNERO Station Yards on 21 March which cut all through tracks, the following day the B-25's pushed still closer to INNSBRUCK to attack two bridges on the Austrian side of the Pass.

47. The light and fighter-bombers also brought their campaign against the BRENNER to a climax. While attacking the entire route South of BOLZANO in strength, P-47's exerted an unprecedented effort at LAVIS, where they dropped 209 tons during the month. Averaging four intrusions nightly against the BRENNER, A-20's concentrated particularly on SAN AMBROGIO Fill and the bridge at PARONA, just North of VERONA, which had been knocked out by the Fifteenth Air Force. Despite several days of rain at the end of the month, the Line was continually severed. Blocks ranging in number from 10 to 12 were common and upon one occasion there were 15 blocks betwen VERONA and BOLZANO.

48. Northeastern Routes. The B-25's returned in strength to


MEDITERRANEAN ALLIED TACTICAL AIR FORCE
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the VENETIAN Plain in March, where their effort was greater than it had been for any month since November. In 13 attacks, 260 Mitchells dropped their bomb loads on bridges over all four rivers of the coastal plain. Marauders of Desert Air Force joined in an equally heavy assault, their targets however, being exclusively marshalling yards. Light bombers added to the punch. With the conversion of Desert Air Force's Baltimores to a night role completed, all MATAF's light bombers were now engaged in night operations. Armed reconnaissance and attacks on marshalling yards and loading points were continued while A-20's and A-26's again and again sowed their deadly butterfly bombs at diversions such as NERVESA, SACILE, PORDENONE, and CITTADELLA.

49. Finally the fighter-bombers rounded out the March campaign in the VENETIAN Plain with a total of 3251 sorties, or as many as had bombed that area during November, December, and January combined. More than half of the effort fell on the Northern railroad from VICENZA to UDINE. The long inactive coastal railroad running from PORTOGRUARO through LATISANA to MONFALCONE also came in for attention after having been out of the picture for some time. As photo reconnaissance indicated toward the end of the month that repairs were nearing completion, DAF fighter-bombers took preventive measures, making 7 attacks on the line in a three day period beginning 24 March. Through traffic was impossible on any of the three lateral lines at any time during the month. The TAGLIAMENTO River zone was interdicted for 24 days and the LIVENZA was bridgeless for the entire month. The PIAVE could be crossed only by the NERVESA diversion at night, and although two BRENTA crossings had short periods of night serviceability, numerous fighter-bomber track cuts to the East partially cancelled their usefullness.

50. Twice B-25's attacked the PIEDICOLLE Route, and on 12 March they added another block on the POSTUMIA Line to the long standing one at BOROVNICA. Desert Air Force, however, carried the burden of keeping the frontier rail exits in the Northeast closed, and in addition to occasional attacks on the above two lines, its fighter-bombers struck repeatedly at the TARVISIO Route. A force of 1200 men were reported working at night to reopen the line, but repair of the major block at CHIUSAFORTE was not effected, probably because one or more bridges on both sides of it were also down most of the time.

51. Minor Outlets. The interdiction of the priority international routes was so satisfactory that MATAF had some effort to spare which was used to good advantage to plug minor leaks in its blockade. The very low capacity "Tourist Line" through the DOLMITES to DOBBIACO had previously been reported in use only by occasional hospital trains, but now the enemy, denied the use of the lines

Photos No. 27-28

BRIXLEGG RAIL BRIDGE

The medium's deepest penetration into AUSTRIA was on this target, thirty miles northeast of INNXBRUCK on the main INNSBRUCK-MUNICH line, feeding the BRENNER. On 16 March it was attacked by 18 B-25's of the 340th Bomb Group, 57th Bomb Wing. The eastern span of the bridge was severely damaged, the northern half being cut away. As a result, it was temporarily impassable.

through SWITZERLAND, began to ship some coal into ITALY by this route. Accordingly B-25's attacked the LONGARONE rail bridge on the DOLOMITE Railway on 7, 8, and 23 March, and fighter-bombers cratered its tracks at other times. On the lateral rail line from FORTEZZA through DOBBIACO and out of ITALY via the SAN CANDIDO Pass, a crossing fifteen miles East of its junction with the BRENNER was attacked on four occasions. Also, fighter-bombers and night intruders frequently harried motor traffic on the Alpine roads East and West of the BRENNER Line. All this accomplished, MATAF was able to extend its operations still farther afield and carry the attack deep into AUSTRIA.

52. Penetration of AUSTRIA. In scope the campaign reached its outermost limits during this period as medium and fighter-bombers, operating in force, carried the war against enemy communications into the Fatherland itself. In our opening attacks over the territory of the Reich, however, fighter-bombers of Desert Air Force beat MATAF's heavier aircraft to the punch by several months. Accomplishing Tactical Air Force's first penetration of AUSTRIA, Mustangs on three days during November - the 11th, 16th, and 18th - cut rail bridges in the KLAGENFURT-VILLACH area. These operations were not continued, however, and when the fighter-bombers resumed flights across the frontier two and a half months later they were not for the purpose of severing the rail lines but rather to destroy rolling stock backed up behind the Alpine blockade. On 31 January rocket-firing Thunderbolts struck over the Austrian border and worked down from SPITTAL to VILLACH, wrecking 7 locomotives and 71 cars. During February these sweeps along the rail lines converging on VILLACH were frequently repeated with good results. On 20 February, one squadron of P-47's, forging North above a solid overcast until the clouds broke over the far slope of the ALPS, made headlines by shooting up several rail cars and a locomotive in the Hitlerian sanctum of BERCHTESGADEN. On the same day another flight of Thunderbolts executed an equally deep excursion into the Reich by following the KLAGENFURT line half way to VIENNA. These operations were stepped up on the last two days of the month, when Desert Air Force flew 87 sorties into Southern AUSTRIA.

53. In March traffic flowed heavily through the cross-roads of Southern AUSTRIA and the fighter-bombers were quick to take advantage of it. Armed recces by the long range fighters were now regularly carried out in the area between DRAUBERG and GRAZ. On the 6th, 16 P-47's shot up 207 rail cars, 19 locomotives, and 50 MT. While the destruction of rolling stock was maintained at a high level, MT claims also became sizeable. On the afternoon of 2 April, reconnaissance flights found an estimated 1000 MT/HDV jamming the main road from LIEBNITZ (South of GRAZ) to MARIBOR. Fourteen armed recces were instantly laid on, and the claims for

Photo No. 29

SAN MICHELE RAIL BRIDGE

The most constant effort to keep the BRENNER route cut centered on the SAN MICHELE rail bridge. During February, MATAF dropped more than 500 tons on this and two other bridges in the vicinity. During a six month period, the line was open here for only 24 days. This photograph shows numerous smoke pots in an early stage of their development. They completely obscured the target a few minutes after the picture was taken.

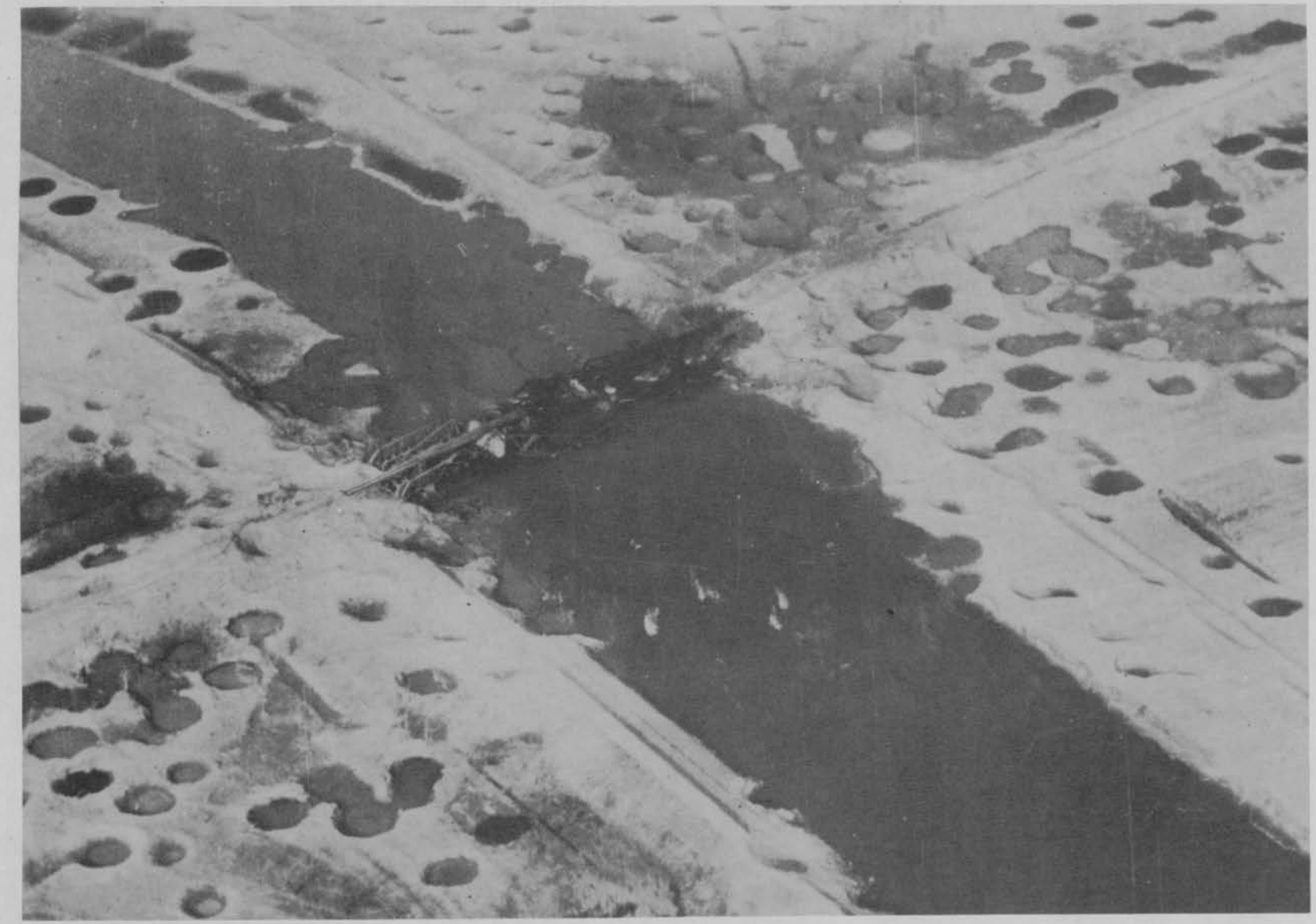

Photo No. 30

SAN MICHELE RAIL BRIDGE

The present photograph was taken after an attack on 25 March by seven P-47's of the 1st Brazilian Squadron, 350th Fighter Group, in which the center span was knocked out. A later attack destroyed two additional spans.

the day in the area totalled 31 locomotives, 76 rolling stock, 341 MT, and 98 HDV destroyed and damaged.

54. Medium bomber operations in AUSTRIA had been anticipated and planned long before their actual materialization. Although the original plans were formulated at the request of USSTAF with other ends in view, they served to call attention to the usefulness of disrupting the Austrian feedlines as a further step in the blockade of ITALY, and it was in response to this consideration that attacks were eventually laid on.*

55. By the beginning of March the interdiction of the frontier bottlenecks had become solid enough so that it would be profitable to shift some effort farther afield, and by cutting the rail lines feeding into the international routes add still another barrier to the blockade of ITALY. Earlier planning had laid the groundwork for such long range missions and had familiarized MATAF with the Austrian communications system. Accordingly, on 11 March 18 B-25's with special equipment made the first successful medium bomber strike (on 24 February an attempt to reach a bridge on the TARVISIO Route just across the frontier had failed due to weather) on the soil of Greater GERMANY. In this raid a bridge East of LIENZ on the lateral rail line connecting the BRENNER and TARVISIO Routes was put out of use for more than 10 days. An attack at MUHLDORF on the same line on 19 March knocked out 300 feet of the bridge, and by the 31st, repairs were barely under way. In addition to these raids, the B-25's also cut the two lines connecting the BRENNER Route with MUNICH. On 16 March, in their deepest penetration of AUSTRIA, the mediums severely damaged the BRIXLEGG bridge, some 30 miles Northeast of INNSBRUCK. On the 22nd they returned to destroy four spans, while another formation also cut the secondary INNSBRUCK-MUNICH line at MUHLBERG. Meanwhile, on the previous day two squadrons of South African Air Force Marauders had bombed ST. VEIT marshalling yards.

56. These attacks, especially against BRIXLEGG, caught the enemy unaware, and had very far-reaching effects. Until this time C-in-C Southwest had no jurisdiction over the railway system in AUSTRIA, either for repair or protection. Only after our intensified attacks North of the frontier had begun was he made resp-

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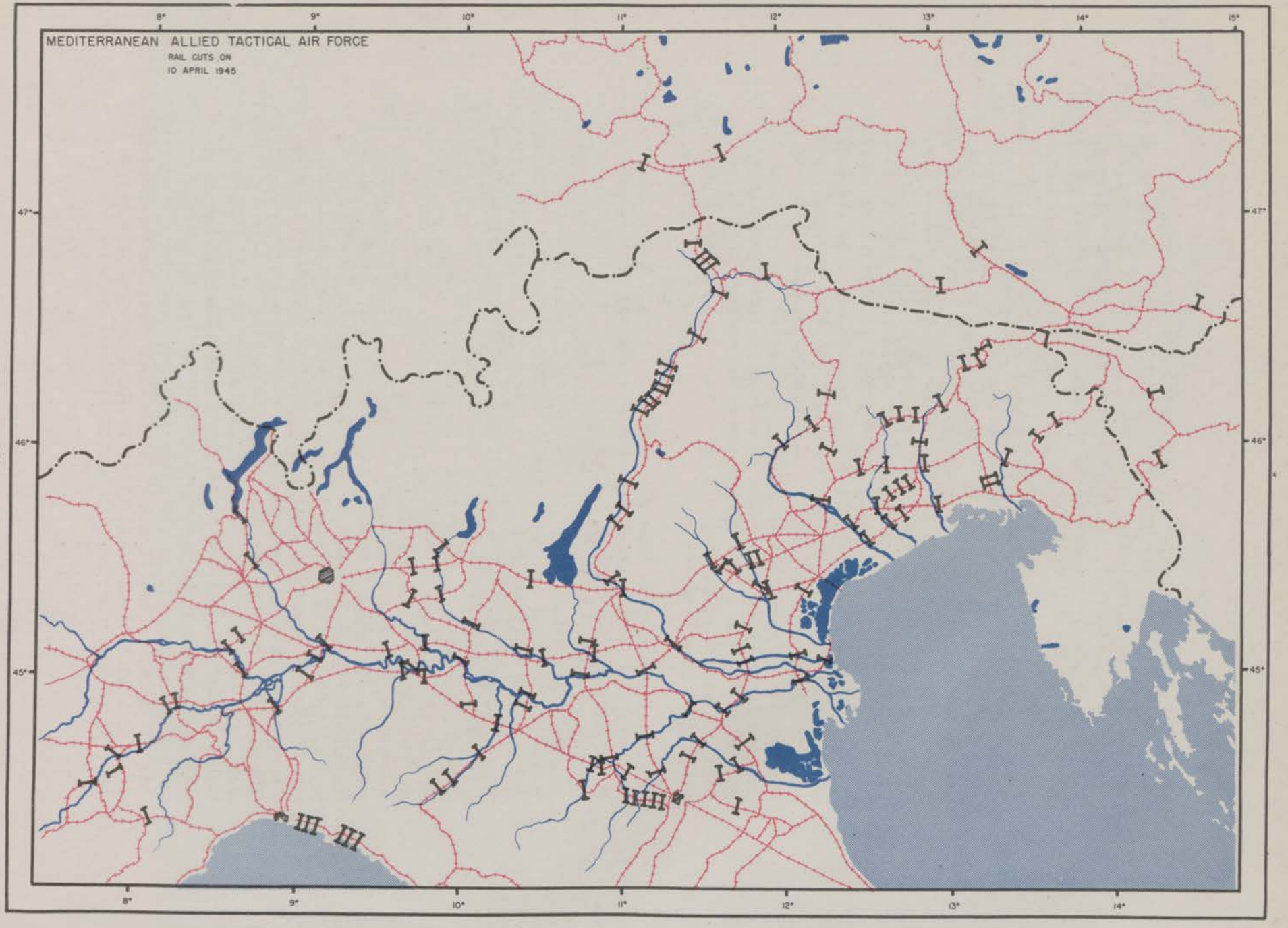
* Briefly, the first plans for MATAF operations in AUSTRIA were prepared in October 1944 to implement a combined operation involving maximum effort by all the air forces in EUROPE against widespread first priority targets within the boundaries of the Reich, in order to demonstrate to the enemy the overwhelming ability of the Allies to destroy vital target systems at will. Although under discussion throughout the winter in one form or another, this project was never carried out as planned.

onsible for repair of the railway system and its protection by flak, as far North as the line INNSBRUCK-SALZBURG. The blocks which MATAF created held up much longer than those in ITALY because of the lack of transport, material, and trained repair personnel. The assumption of this added area was done, mainly, only by draining Northern ITALY of much needed defenses.

57. Status of International Routes on D-Day. With the final offensive of the Mediterranean campaign set for 9 April, MATAF did its utmost during the first week of the month to maintain the degree of interdiction which it had built up in March. The fighter-bombers were out in force every day and the light bombers every night but one. During the first five days of the month B-25's averaged 50 effective sorties per day against the BRENNER Line, nearly half of these striking its Northern reaches above BOLZANO. On the 6th the Mitchells shifted to targets close to the battle area, but this diversion to pre-D Day objectives was amply compensated by a Strategic Air Force campaign, launched the same day, against the inter-Axis rail lines. On 8 April 305 heavy bombers pounded the BRENNER Line while 86 more struck marshalling yards in Northeastern ITALY. On the morning of D-Day the lines of communications between ITALY and the Reich were in a well-nigh hopeless state of disorganization.

58. The BRENNER Line was blocked in twelve and possibly fourteen places from PARONA at the foot all the way up to close to the BRENNER Pass. North of INNSBRUCK there were no blocks on the approches to that rail center. On the lateral line joining the BRENNER Route with VILLACH, PERCA in ITALY remained impassable with a severely damaged abutment, while at OBER DRAUBERG in AUSTRIA repairs had not yet started on the 200 foot gap in the fill approach. On the line to LEND North of SPITTAL, one span of the bridge at MUHLDORF was destroyed. On the TARVISIO Line, DOGNA, CHIUSAFORTE and RESIUTTA bridges all remained cut despite repair activity on the first two. All spans of CANALE D' ISONZO on the PIEDICOLLE Route were down. On the POSTUMIA Line, the diversion around the abandoned viaduct at BORCVNICA was only 75% complete. Beyond the frontier, GRAFENSTEIN bridge East of KLAGENFURT on the MARIBOR/VILLACH line had one span out and severe damage to three more. Connections from LJUBLJANA to TARVISIO were also disrupted. In the VENETIAN Plain, all four inner belts of interdiction were complete with every crossing on the three lateral lines impassable. The DOLOMITE Railway was cut at LONGARONE and its extensions Southward were also blocked. The CITTADELLA-TRENTO loop-line was impassable at CISMON, and due to blocks on the BRENNER North of TRENTO little value could be gained by reopening it.

59. As the battle for Northern ITALY was joined, the enemy could not look to his rail net with any degree of confidence that that it could either sustain him or evacuate him.


MEDITERRANEAN ALLIED TACTICAL AIR FORCE
RAIL CUTS ON
10 APRIL 1945
8°
9°
10°
11°
12°
13°
14°
15°
47°
46°
45°

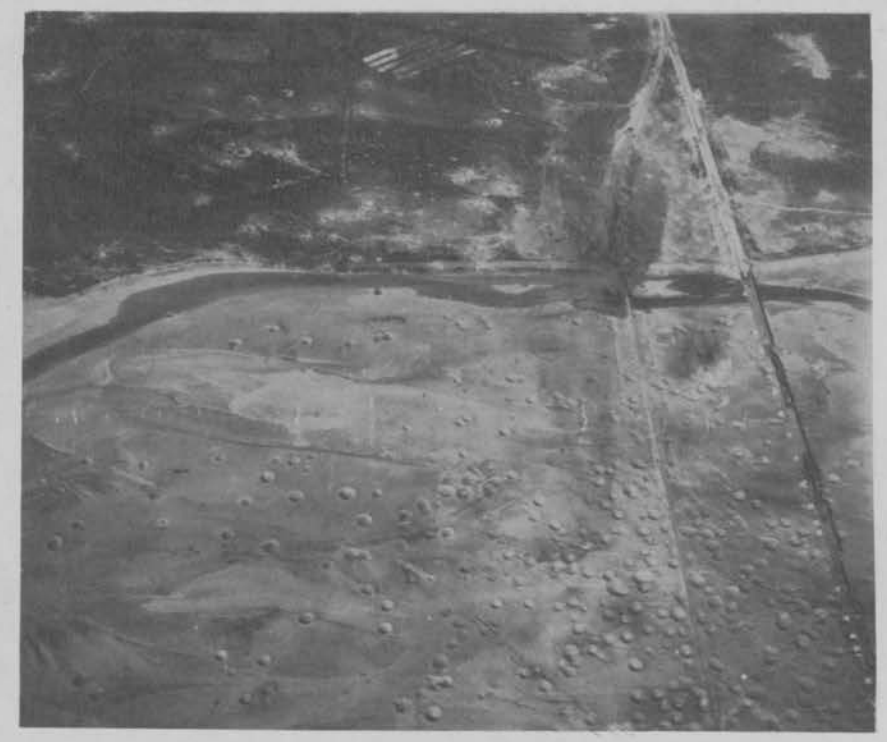
EPILOGUE: 9 APRIL - 1 MAY

60. When 15th Army Group passed to the offensive, Tactical Air Force threw the great weight of all the forces at its disposal into close support of the Allied advance. The task of interdiction, however, was not completed. As long as the enemy's resistance was unbroken, it was imperative that he be denied the slightest opportunity to reactivate his rail lines and thus replenish the dwindling supplies which were now being consumed at a prohibitive rate. Once the German armies sought to withdraw, it was vital to block the roads before them and then administer the coup de grace to their fleeing columns caught and exposed in daylight on the overburdened highways. and backed up against the bridgeless PO.

61. With MATAF committed so heavily after D Day first to direct Army support and second to preventing the escape of Army Group C across the PO Valley, much of the interdiction of the international routes was maintained by Strategic Air Force. Strategic objectives had been overrun by the Allied Armies on the Eastern and Western fronts and all of General Twining's heavy bombers were available for tactical purposes. MATAF nominated their targets and, upon approval of MAAF, fixed the priorities for their effort. First among these was the BRENNER Line, which was attacked by forces ranging from 50 up to 265 B-17's and B-24's on seven days from 9 through 24 April. Strong MASAF attacks were also carried out on the rail bridges across the rivers of the VENETIAN Plain and on the Austrian lines feeding into the frontier routes.

62. The heavy bombers were not alone. Except for five scattered days after D Day, MATAF's mediums maintained a steady offensive against the whole length of the BRENNER Route. It is a tribute to the capacity of the 57th Bomb Wing that it succeeded in putting as many as six missions of B-25's on BRENNER targets in a single day while at the same time satisfying the tremendous demands of the battle area. At the end of the month adverse weather grounded the mediums, and their long six month campaign against the BRENNER came to an end. On 25 April, B-25's, 87 strong, attacked the Route for the last time, leaving it more firmly interdicted than ever before. From PARONA, just North of VERONA, to STEINACH, nine miles within AUSTRIA, the railway was blocked at 18 places.

63. In Northeastern ITALY rail activity was almost at a standstill, and although MATAF's effort was small, neither across the VENETIAN Plain or up the frontier routes was through traffic possible at any time. Occasional B-25 and heavy bomber attacks kept the rail bridges down, while a continued Marauder effort



Photos No. 31-32

CASARSA RAIL DIVERSION

The longest and perhaps most important crossing in the Venetian Plain was at CASARSA. The original 36 span bridge over the TAGLIAMENTO River was supplemented by a diversion as early as the summer of 1944; this was kept open most of the time until March. These photographs were taken on 8 April, after an attack by the 346th Fighter Squadron, 350th Fighter Group, at which time the rail diversion remained impassable.

Photos No. 33-35

CORTE ROAD BRIDGE

Attacked by the 321st Bomb Group, 57th Bomb Wing, on 23 April. An excellent concentration of bombs destroyed 190 feet of this bridge over the BRENTA River.

against marshalling yards added to the devastation.

64. Disaster overtook the German armies so swiftly and completely that less than a handful of divisions were able to get out of the PO Valley. The mangled remnants which did found no respite from air attack in the VENETIAN Plain. As the Tenth Army, too weak to attempt the defense of the ADIGE, bolted for the ALPS, it found another line of interdiction confronting it at the BRENTA. There, from 23 to 26 April, we repeated the destruction of road bridges which had previously been carried out at the PO and ADIGE Rivers. Of the ten bridges which remained serviceable for MT traffic between BASSANO and the ADRIATIC, seven were destroyed by MATAF medium and MASAF heavy bombers. Then the enemy units which sought to ferry their way across at night found MATAF's light bombers there to greet them.

65. Finally, fighter-bombers resumed armed reconnaissance of the VENETIAN Plain, seeking out whatever was left. On the afternoon of 29 April Mustangs located more than 100 MT facing North on the road between CONEGLIANO and VITTORIO VENETO. They cratered the road ahead of the convoy and proceeded to strafe the column. While attacking, they noticed other MT parked on secondary roads and near houses, most of them camouflaged with branches of trees. All other aircraft on armed recces or offensive patrol were diverted and before night fell 10 missions of Kittyhawks and Mustangs and 23 missions of Spitbombers had flown around storms, found holes in the clouds, and attacked the area. At first count, almost 500 MT were claimed as damaged or destroyed.

66. The following day the bomb line moved up to UDINE and BELLUNO, and operations shifted into the ALPS. In spite of constantly deteriorating weather, the fighter-bombers continued to inflict heavy damage on motorized and horse-drawn transport in attacks on the TARVISIO and DOLOMITE Routes. These came to a close on 1 May. The following morning low cloud blanketed the ALPS. At mid-day, 2 May, MATAF flashed to its commands the announcement of the unconditional surrender of the German Commander in Chief Southwest.

PART IV

ENEMY REACTION

ENEMY OPPOSITION: FLAK

1. With the withdrawal and elimination of the Luftwaffe in ITALY as an effective fighting machine, the defense of targets in Northern ITALY from air attacks rested entirely with the Flak troops of the GAF, as the sporadic activities of the two Italian-manned fighter groups were never considered a threat to our air operations. To accomplish this mission of target defense, the Germans had over 1400 heavy flak guns and over 3000 light flak guns with the necessary fire control instruments, manned by approximately 45,000 troops. The majority of these guns were used in the defense of the important communication lines - along the BRENNER and in the Northeastern sector.

2. Flak Build-up. From the inauguration of our Blockade program there was a continued build-up in these areas. On 31 October 1944 there were 1258 heavy guns in ITALY of which 274 (or 22%) were situated along the BRENNER Line and 374 (or 30%) in the Northeast. As of 31 March 1945 there were 1336 heavy guns in ITALY of which 454 (or 34%) were located along the BRENNER and 465 (or 35%) in the Northeast. With these dispositions, the Germans hoped to make our attacks on communications so costly as to become prohibitive if maintained.

3. Before MATAF began its medium bomber attacks on the BRENNER, flak concentrations along the line had reached a considerable intensity in response to Strategic Air Force raids, batteries being heavily concentrated protecting the vital communication centers of VERONA, TRENTO, ORA and BOLZANO. The line from SAN AMBROGIO to TRENTO was totally undefended as was the section North between BOLZANO and the Italian-Austrian border. Our first attacks, so planned to take advantage of this situation, encountered no opposition. As MATAF's intentions became apparent and our medium bombers returned again and again to the BRENNER, the reaction of the Germans in ITALY was not slow in coming. In 72 hours, guns were moved in on the lower BRENNER, oriented and synchronized, and the flak build-up that was to make the BRENNER railway the most heavily protected communications system in the Axis world had begun. The build-up progressed rapidly and by the end of November, the line from VERONA to TRENTO was completely protected by heavy flak. In the initial installations, the batteries were hurriedly completed and placed on

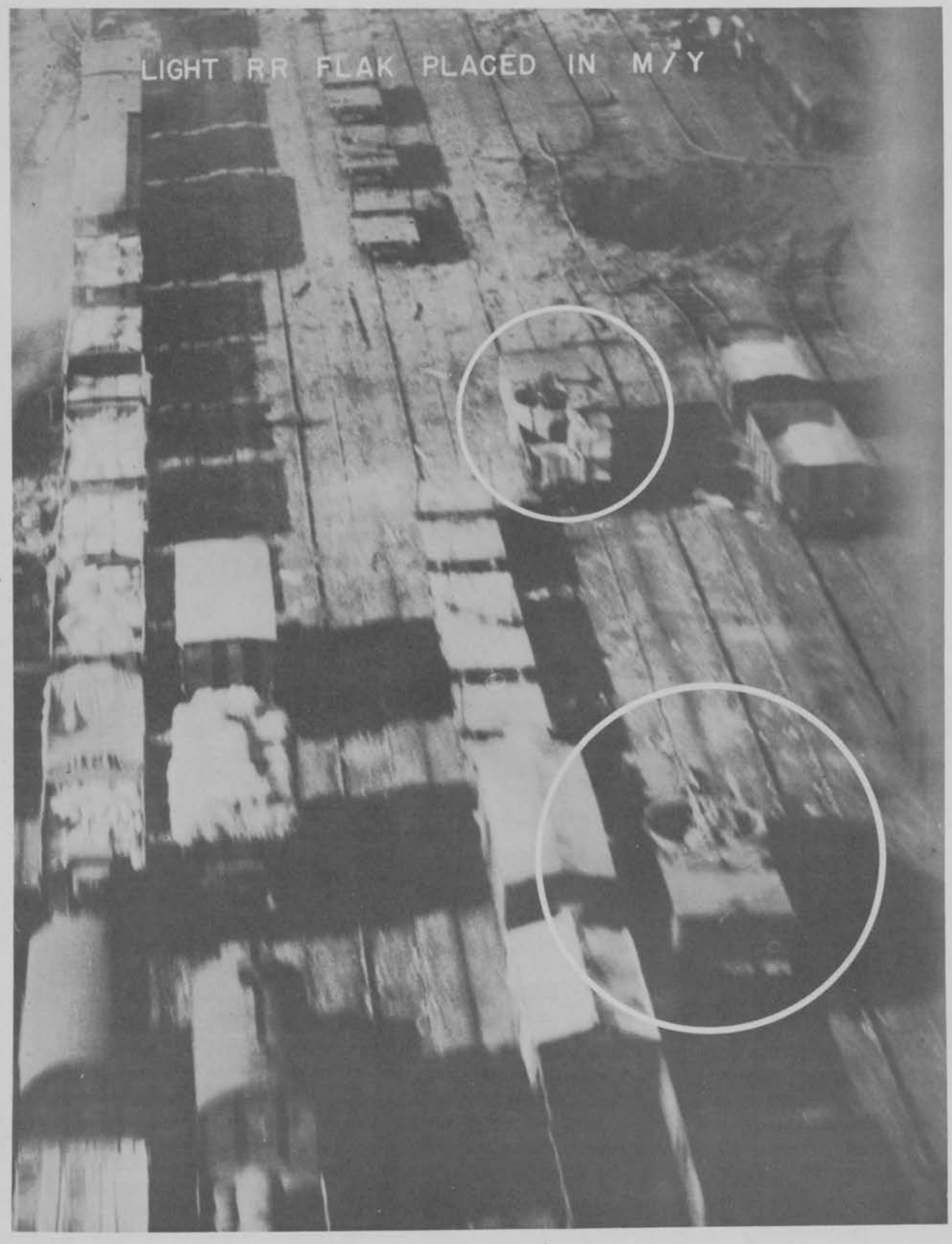


Photo No. 36

NOVARA MARSHALLING YARDS

This photograph taken during an attack by P-47's on 22 March, shows two light flak cars in the marshalling yards at NOVARA.

the floor of the valley, but in time, they were moved to mountains where they were afforded better fields of fire and observation.

4. In December another 58 light guns were added along the Southern portion of the BRENNER Line, while the heavy batteries at VERONA and BOLZANO were reduced to permit a shift Northwards and the over-all-protection of the entire Route. In January, in response to our intensified effort, particularly fighter-bomber, defenses took another spurt with an increase of more than 130 light guns. During February and March the BRENNER's cordon of steel continued to thicken.

5. The following table illustrates the build-up of flak in the BRENNER area during the months of MATAF's interdiction effort:

	Heavy	Light	Total
31 October	274	130	404
30 November	378	201	579
31 December	368	278	646
31 January	408	415	829
28 February	424	453	877
31 March	454	498	952

6. Throughout the period VERONA and BOLZANO retained their primacy as the most strongly defended points in ITALY; manned in part by Italian Fascist troops of the 1st Arco Regiment, VERONA's batteries reached a peak of more than 200 guns early in December and at no time thereafter fell below 160.

7. Although not as dense as along the BRENNER Line, flak also posed a growing hazard to attacks on communications in Northeastern ITALY. In November, the main defenses were located at VICENZA, NERVESA, CASARSA, and UDINE - all on the northernmost route over the VENETIAN Plain. As time went on, batteries were emplaced at CASTELFRANCO, CONEGLIANO, GORIZIA, TREVISO, and other localities. When MATAF first began operating against the Northeastern frontier routes, no opposition was encountered. During January, batteries were installed here too. Nevertheless, throughout the entire campaign, flak-free targets existed in Northeastern ITALY, as the enemy did not have sufficient strength to afford protection to the many targets the Northeast offered.

8. Defenses of line of communications in Northeastern ITALY from PADUA and VICENZA to the frontier were as follows:

Photo No. 37

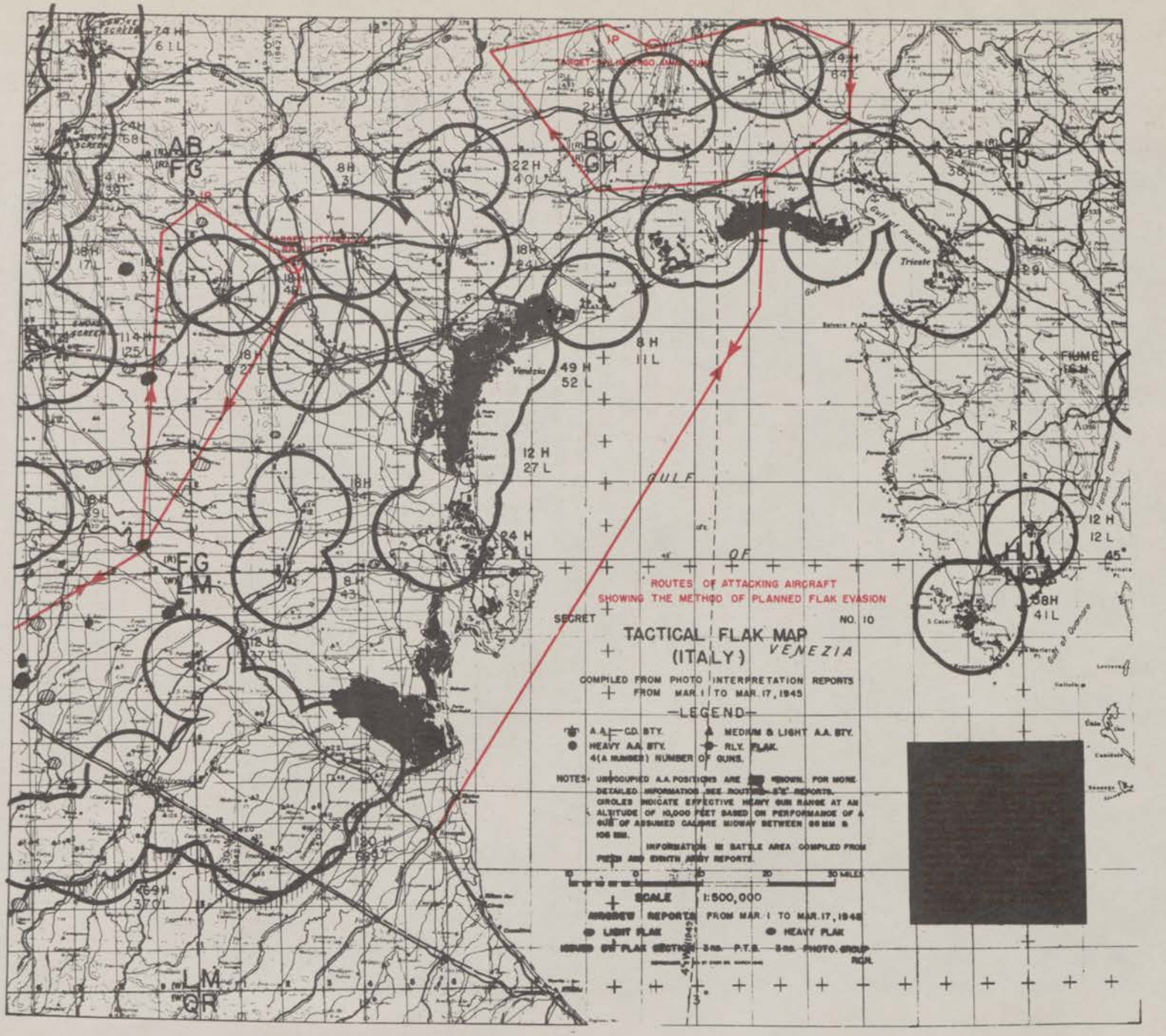
LAVIS

This battery at LAVIS on the BRENNER Line was originally emplaced without any form of camouflage. In the first week of March trees and shrubs were transplanted to provide a seemingly natural continuation of the nearby forest

Photo No. 38

BELLUNO

The above photograph displays a "grossbatterien" on the BRENNER Line at BELLUNO (North of SAN AMBROGIO). The fire control center including a Radar gun layer is located approximately the same distance from the two heavy gun batteries. The two 3 light gun positions are sited for local protection of the fire control center and the heavy guns.


ROUTES OF ATTACKING AIRCRAFT
SHOWING THE METHOD OF PLANNED FLAK EVASION
SECRET
NO. 10
TACTICAL FLAK MAP
(ITALY)
VENEZIA
COMPILED FROM PHOTO INTERPRETATION REPORTS
FROM MAR. 1 TO MAR. 17, 1945
LEGEND
A.A. G.D. BTY.
MEDIUM & LIGHT A.A. BTY.
HEAVY A.A. BTY.
R.L.Y. FLAK.
4(A NUMBER) NUMBER OF GUNS.
NOTES: UNOCCUPIED A.A. POSITIONS ARE [redacted] KNOWN. FOR MORE DETAILED INFORMATION SEE ROUTE "B" REPORTS.
CIRCLES INDICATE EFFECTIVE HEAVY GUN RANGE AT AN ALTITUDE OF 10,000 FEET BASED ON PERFORMANCE OF A GUN OF ASSUMED CALIBRE MIDWAY BETWEEN 88 MM & 105 MM.
INFORMATION IN BATTLE AREA COMPILED FROM FIFTH AND EIGHTH ARMY REPORTS.
SCALE 1:500,000
[redacted] REPORTS FROM MAR. 1 TO MAR. 17, 1945
LIGHT FLAK
HEAVY FLAK
[redacted] FLAK SECTION 3 no. P.T.S. 3 no. PHOTO. GROUP
RCAF.
Venezia
Trieste
Gulf of Venice
FIUME
GULF
AB
FG
BC
GH
CD
HJ
LM
QR

	Heavy	Light	Total*
31 October	132	154	286
30 November	161	192	353
31 December	162	228	390
31 January	234	303	537
28 February	252	389	641
31 March	254	340	594

9. In addition to fixed installations, all the international routes were defended by 20 mm. light AA guns mounted on open wagons. When attached to a train, these flak cars served to protect it from strafing, and when halted in marshalling yards added to the permanent defenses.

10. Defense Techniques and Counter-Measures. The enemy's versatility in developing new means of opposing our attacks was notable. Dummy positions were installed, but with good scale photos and careful scrutiny by our photo interpreters only a few were not detected as such. Tree camouflage was used around many positions but this also was apparent to our interpreters and means of overcoming the problem of target recognition when the battery was to be attacked were quickly effected. Smoke was used to cover certain of the the targets but was even considered a failure by the Germans during the later stages of the campaign. Heavy searchlight units were taken out of operation and the personnel that had manned them assigned to flak units. Barrage balloons were never used, as the results they would achieve were not considered worth the personnel needed for their operation and maintenance.

11. Many of the AA installations defending the BRENNER Line and Northeastern ITALY were formed into "Grossbatterien", consisting of two or more heavy batteries at one locality. Two sets of fire control instruments made it possible to track simultaneously two seperate formations of attacking aircraft permitting the fire of the guns to be transferred rapidly from one formation to another. Although this arrangement concentrated fire power, it also provided a larger target for anti-flak operations than would have existed had each battery been sited independently. To counter this, MATAF adopted the practice of making simultaneous attacks on adjacent bridges, thus splitting the "Grossebatterien"'s fire, while a single anti-flak formation was sufficient to protect both missions. In several instances following successful anti-flak operations,

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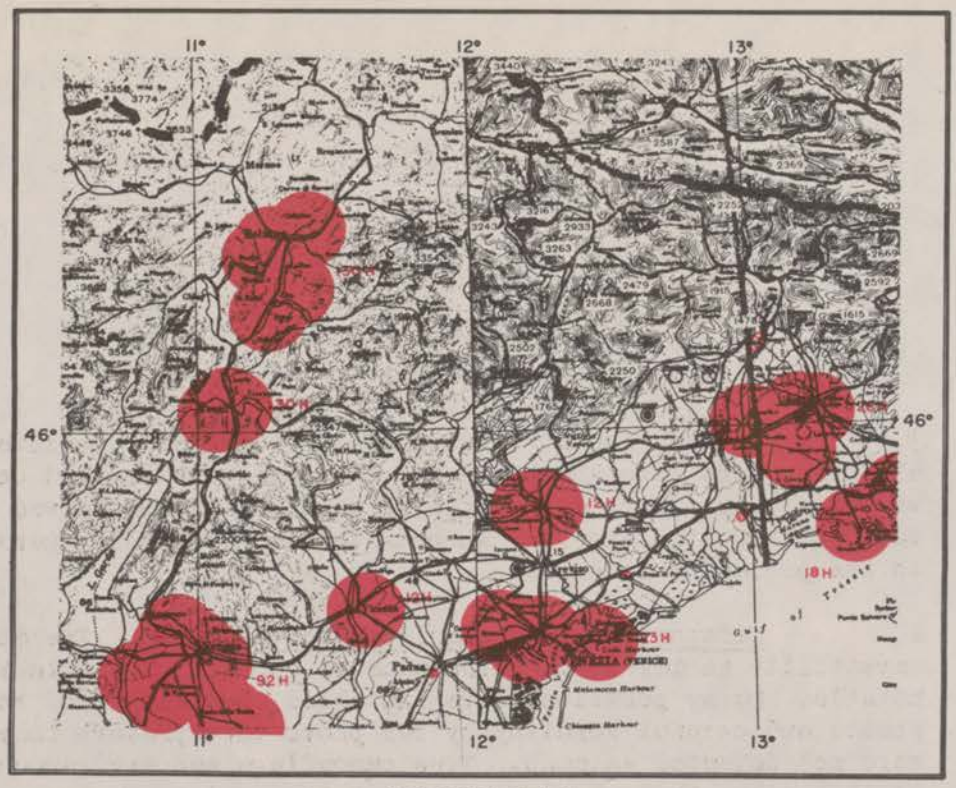
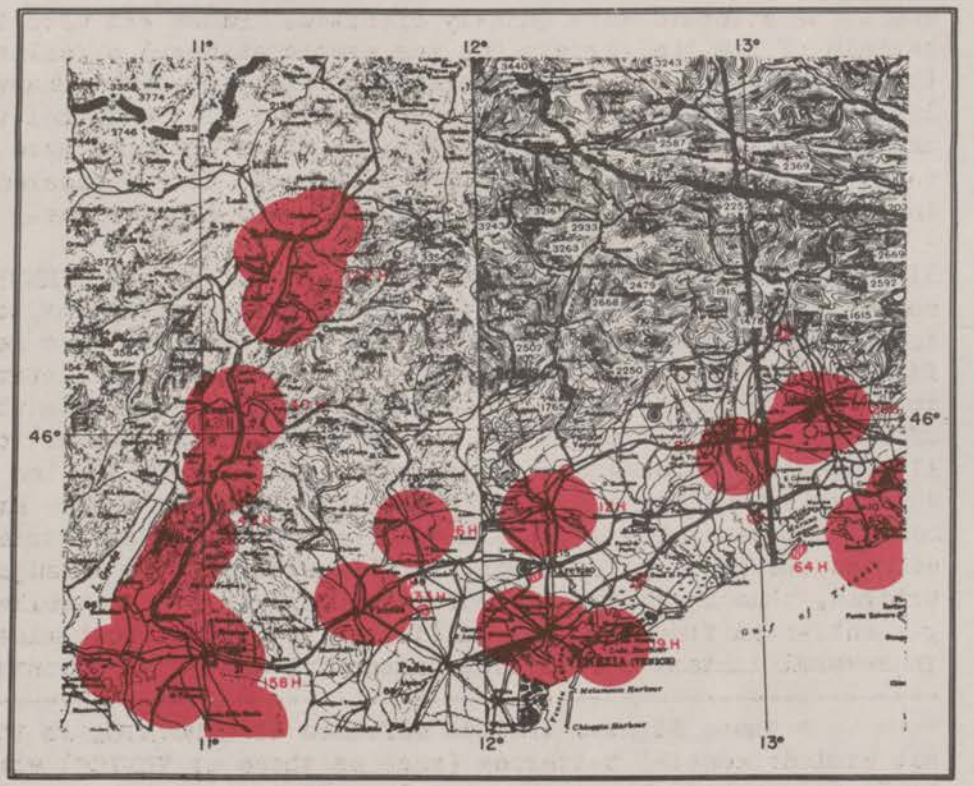
* These figures include defenses at BOROVNICA in YUGOSLAVIA but exclude coastal batteries (such as those at VENICE) where they could not be brought to bear on aircraft attacking roads and rail lines.



20 OCT. 1944

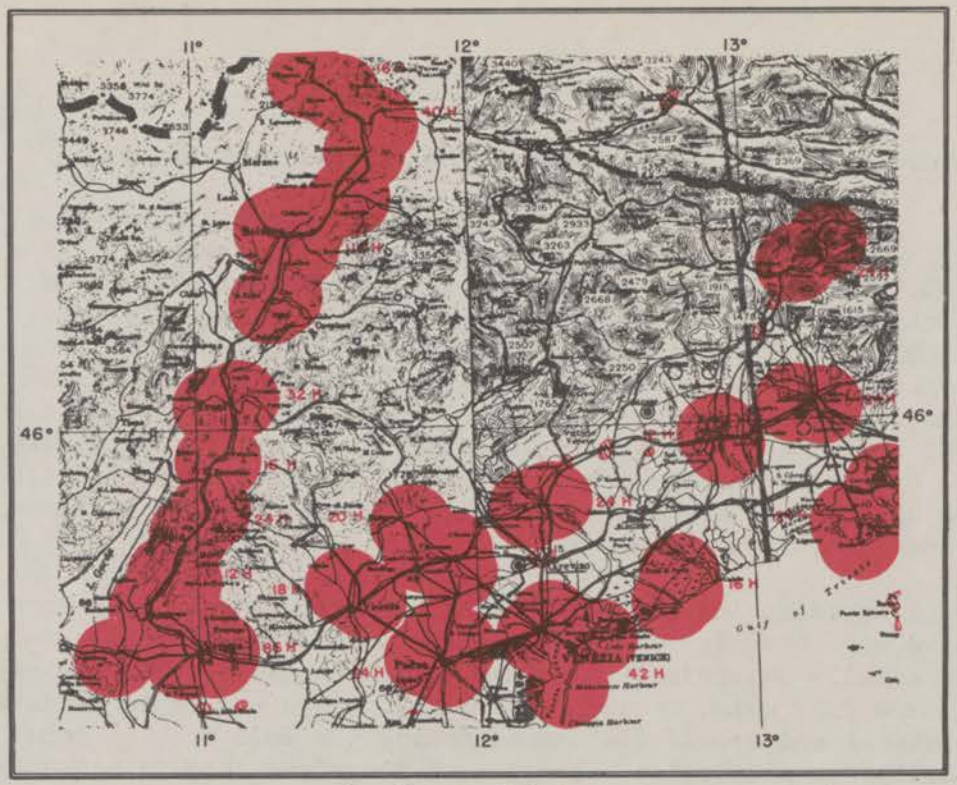


24 NOV. 1944

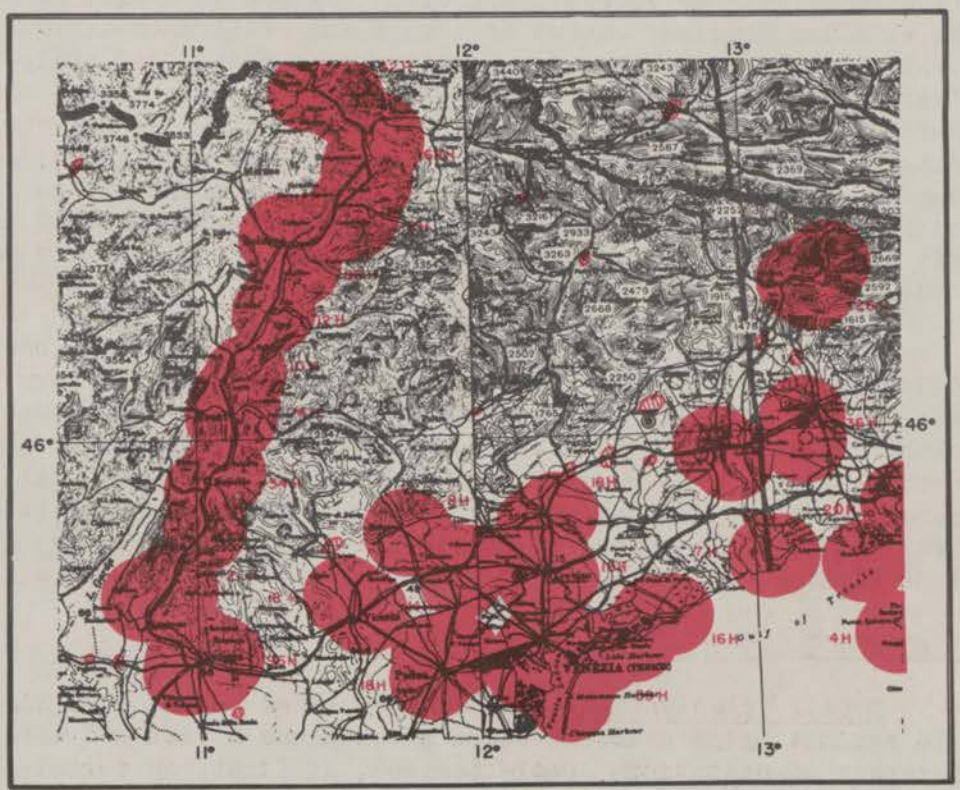
16 H - NUMBER OF HEAVY GUNS IN AREA

● - AREA OF HEAVY AND LIGHT FLAK

FLAK BUILD-UP ON BRENNER LINE



7 FEB. 1945



27 MAR. 1945

16 H-NUMBER OF HEAVY GUNS IN AREA

●-AREA OF HEAVY AND LIGHT FLAK

FLAK BUILD-UP ON BRENNER LINE

the "Grossbatterien" were split and the batteries dispersed.

12. At VERONA, ROVERETO, LAVIS, and SAN MICHELE, the enemy also employed smoke screens as a passive defense of these vital targets. The winds which prevailed in the ADIGE Valley favored this technique, while the narrowness of the Valley made it possible to blanket all distinctive landmarks. Although effective density could not be accomplished in less than twenty minutes, the enemy's complete radar coverage of Northern ITALY provided him with ample time to set the generators in operation before the arrival of the medium bombers. The use of Shoran whenever possible was our only answer to enemy smoke, and some targets out of Shoran range had to be abandoned.

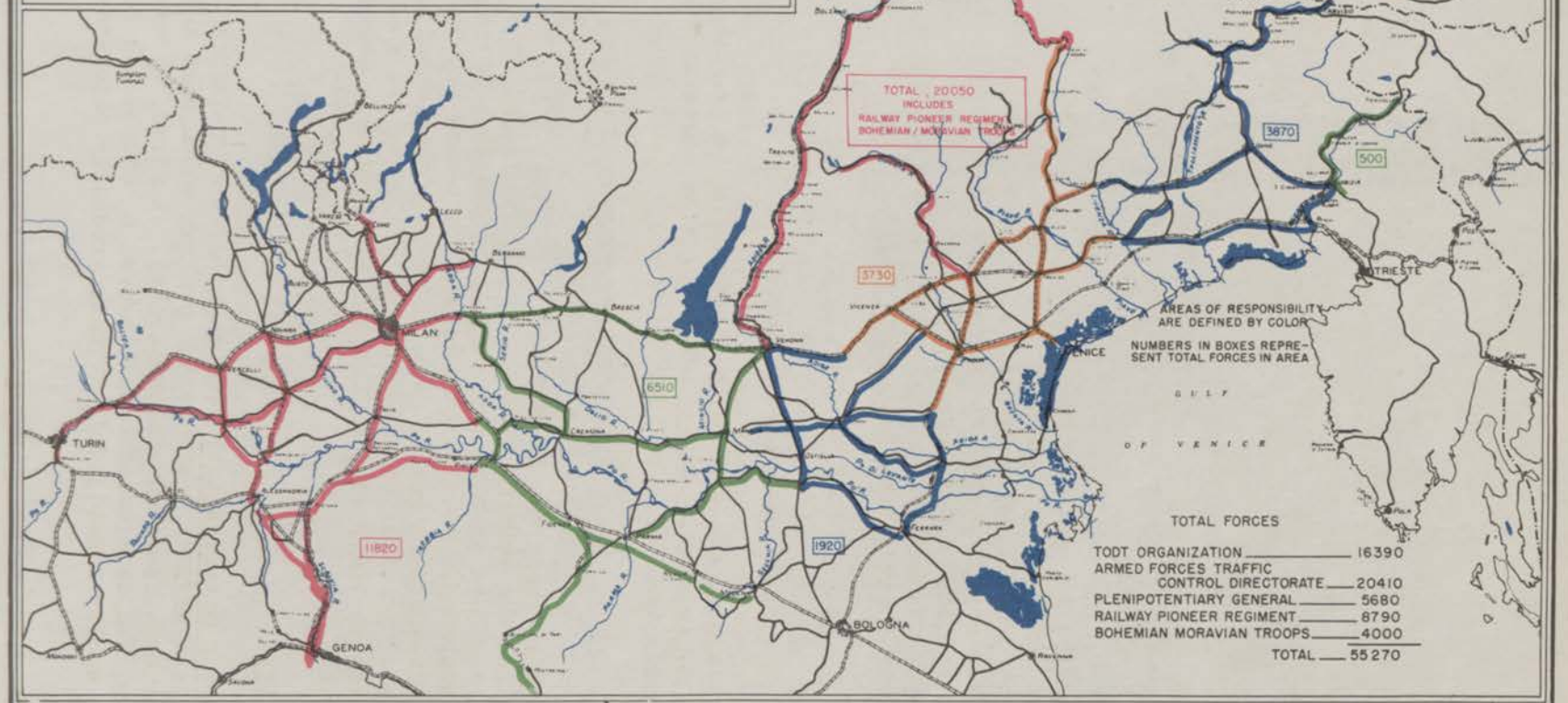
13. Opposing the Germans in their efforts to make flak more effective were our flak intelligence and combat operational personnel, equally determined to reduce these measures. With the use of air crew flak maps, revised bi-monthly, crews were able to navigate between and around flak areas making the word "route flak" practically non-existent. Selection of flak-free targets was accomplished whenever possible, but, since the vast majority of the targets were heavily defended, the problem was how to attack these targets with the smallest amount of damage and still maintain our high degree of bombing accuracy. To accomplish this, flak analysists were used in the selection of approaches and determining breaks, even for fighter-bomber operations. The use of anti-flak measures, employing both medium bombers and fighters, bombing with white phosphorous and fragmentation bombs, was definitely profitable; as tactics and techniques in anti-flak improved, a great reduction in aircraft losses and a consequent raising of morale and accuracy was realized.

14. That blockade was accomplished in spite of the very heavy opposition which the Germans offered, and accomplished at a very low rate of loss (see Statistical annex), is due in no small measure to the development of flak evasion and anti-flak tactics. Although the anti-aircraft guns of the GAF were not silenced until the cessation of hostilities, the airmen, guided by the analysists and strategists, in the preceding months had decisively won the battle of flak.

REPAIR ACTIVITY

15. Repair Organization. The enemy's chief reliance in his struggle against MATAF's interdiction program was a vast and efficient repair organization. Characterized, at first, by versatility, energy, and determination, it proved a redoubtable foe which could not be wholly immobilized but only gradually outclassed and exhausted.

DISPOSITION OF FORCES PERMANENTLY EMPLOYED ON RAILWAY REPAIR



TOTAL FORCES

TODT ORGANIZATION	16390
ARMED FORCES TRAFFIC CONTROL DIRECTORATE	20410
PLENIPOTENTIARY GENERAL	5680
RAILWAY PIONEER REGIMENT	8790
BOHEMIAN MORAVIAN TROOPS	4000
TOTAL	55270

Photo No. 39

GERMAN REPAIR TRAIN

Part of a repair train near BRIXLEGG. It consisted of two workshops cars, several flats carrying materials, and a launching nose (seen in the background) for setting girders.

Photo No. 40

VERONA/PARONA RAIL BRIDGE

Wherever possible use was made of the original piers so as to speed repairs.

16. Supreme head of all military and civilian traffic in ITALY was the Reich-Verkehrs-Direktion-Italia with headquarters in VERONA. RVD was headed by the Chef des Transportwesens for ITALY, an office directly under the Ministry of Transportation. This post was last held by Colonel Schnez. Administrative units under RVD-Italia were the Sectional Central Offices, which had jurisdiction over certain geographical areas. In addition, three operating divisions were subordinate to RVD-Italia. Two of these operated repair shops and supervised the maintenance of rolling stock and power facilities, while the third, FBA or Feld Eisenbahn Betriebs Abteilung (Field Railway Operating Division), repaired damage to the rail lines themselves. The companies under each division had a similar organization headed by a captain. Each FBA company consisted of over 200 men.

17. This basic structure was augmented from many diverse sources. The Todt organization supplied more than 16,000 workers. A Railway Pioneer Regiment and 4000 Bohemian/Moravian troops were brought in to keep the BRENNER Line serviceable. All in all, the repair organization in Northern ITALY consisted of over 55,000 men. Their disposition according to geographical areas is shown on the accompanying map. This figure is exclusive of local Italian labor, which was impressed by local levy, and troops on leave commandeered for three days' service when their trains were held up by demolitions. The latter practice was instituted on the BRENNER late in the fall of 1944.

18. When tracks or bridges were damaged, it was reported to the Sectional Central Office or one of its subordinate units (Station Control Offices) which then contacted one of the FBA units. Depending on the degree of damage, the FBA dispatched either a repair crew equipped with a hand-car and simple construction tools or a general repair train (photo No.39). Often two of these would approach a damaged area from either side. In some cases, small emergency trains carrying unskilled workers would arrive at the scene prior to the arrival of the more adequately equipped maintenance men, in which case the unskilled workers cleared the rubble, enabling the repairs to begin immediately the maintenance men arrived. The BRENNER Line was divided into five sections, on each of which at least one locomotive was permanently stationed, so that if the line was cut in two places, a locomotive would be on that section and ready to work any repair train which might otherwise have been isolated. Speed was further facilitated by storing large amounts of railroad engineering supplies along the tracks, particularly on the BRENNER Line, so as to obviate the delay of transporting them any distance once a break had occurred.

19. By committing a vast repair organization to meet our attack the enemy had engaged us in a dynamic form of battle, in

Photo No. 41

LAVIS VIADUCT

Note the use of short timbers sections based on the foundations of the original piers.

Photo No. 42

PONTE DI PIAVE DIVERSION

Timber piles were cross-braced and topped with a sill. Note pile-driver in the background.

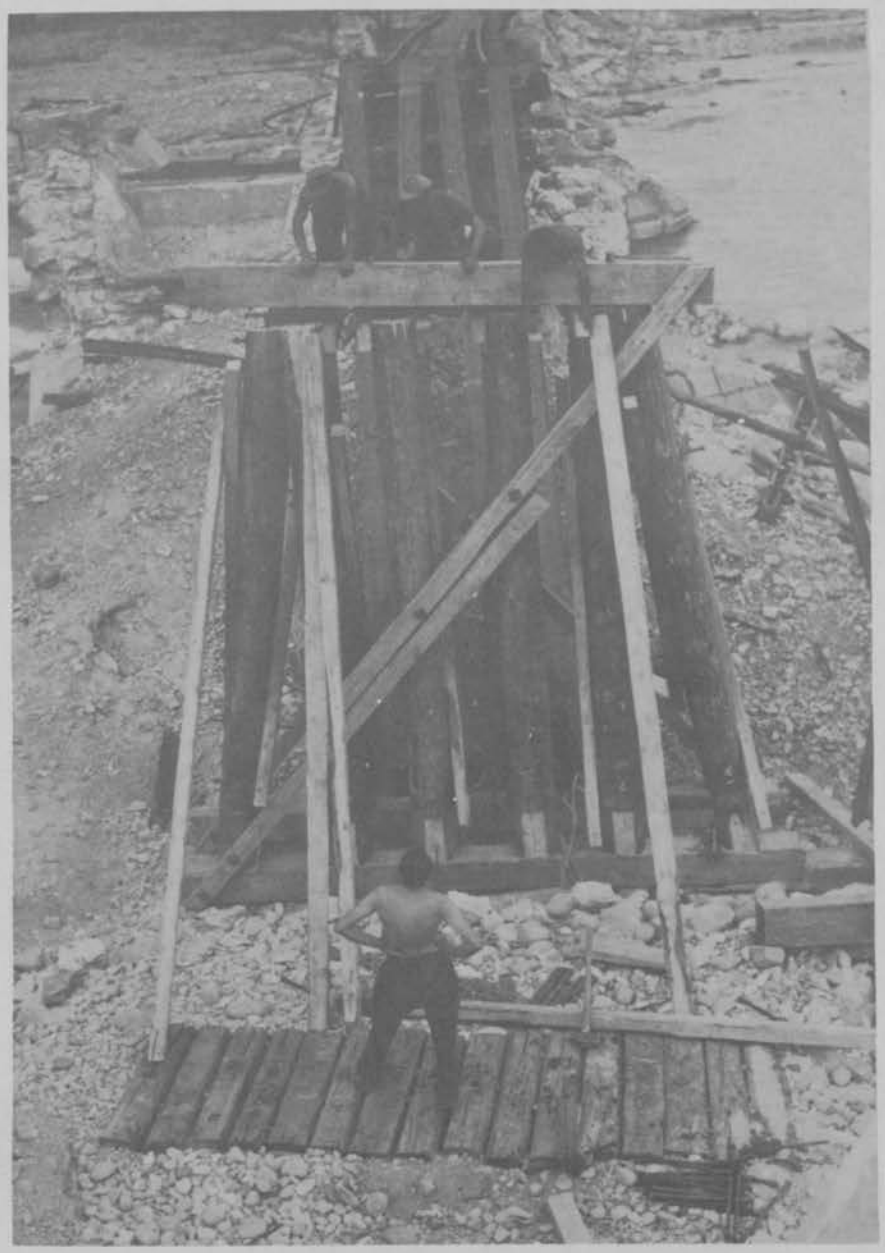


Photo No. 43

LAVIS VIADUCT

Timber trestle-bents being assembled in place by German troops

Photo No. 44

BRIXLEGG RAIL BRIDGE

A pre-assembled section of a timber trestle-bent being handled by American engineers using German materials.

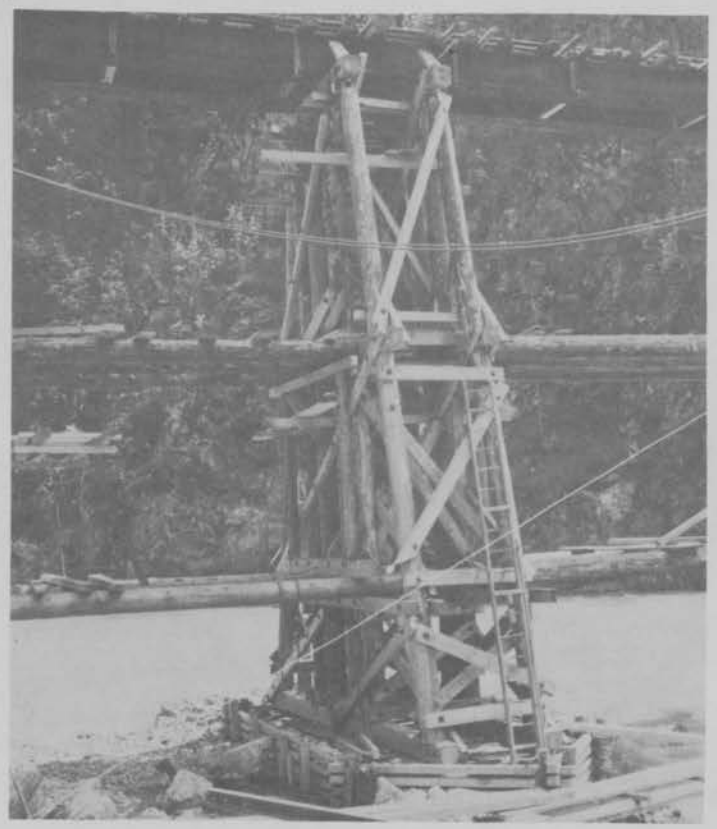


Photo No. 45

CAMPODAZZO RAIL BRIDGE

A stone box used as a base for a pier.

Photo No. 46

PESCHIERA MAIN RAIL BRIDGE

Latticed steel piers were used for high bridges. The picture is German. Troops are Railway Pioneers.

Photo No. 47

LAVIS DIVERSION

For a low pier, cribbing filled with rocks was sometimes used. Notice crane.

Photo No. 48

ORA RAIL BRIDGE

I-Beams such as these at ORA were used almost invariably as horizontal members.

Photo No. 49

BRIXIEGG RAIL BRIDGE

Four 80-foot spans were destroyed as the result of an attack on 22 March by the 57th Bomb Wing. Repairs were rapidly effected, however, by setting 80-foot girders without the use of intermediate piers.

which our mission was to destroy his rail lines, and his was to repair and rebuild them, as was necessary, and to maintain them by every trick and resource at his command. It then became of paramount importance to us that we obtain a full knowledge of his tactics of repair in order to enable us to direct the force of our attack with the utmost economy and effectiveness.

20. Thus, a sustained and thorough study of enemy repair methods and materials, of replacement bridge structures, of methods of deception, of trends in construction, and the effects of seasonal changes on repair activity, was made by our photo interpreters. Before the time that favorable weather permitted full operations, the types of repair had been classified, the limitations and advantages of the enemy repair structure had been defined, and the deception that could be attempted had been analyzed. With the assistance of a nearly complete photographic history of the more important bridge targets, it had been possible to evolve a technique for estimating the repair time required for any given type of damage to a bridge structure with a high degree of accuracy. By anticipating the date when a bridge or line could be activated, it was possible to direct an attack at the last practicable moment, and thus utilize our force with the maximum efficiency.

21. Repair Methods. In the great majority of cases, the standard structure used by the enemy for the repair and replacement of his damaged or destroyed bridges was made up of steel girders of varying lengths, supported by timber, masonry, or steel piers. To expedite constuction wherever possible, use was also made of the original piers (photo No.40), and where these were destroyed, new piers were based on the old foundation (photo No.41), or on piles of rubble.

22. In a very limited number of cases, piers were erected by driving timber piles, cross-bracing them and topping with a sill (photo No.42); these were far outnumbered, however, by timber trestle-bents (photo No.43), which were often built up from pre-assembled sections (photo No.44), and based on stone-boxes (photo No.45), or prepared masonry. On occasion, a combination of piles and trestle-bents was used. Where piers were exceptionally high, use was sometimes made of latticed steel piers (photo No.46). Where piers were very low, they were sometimes made of timber cribbing filled with rock and sunk to the river bottom, (photo No.47). On dry bases, cribbing was built up in solid courses.

23. The horizontal members of the bridge were made up, almost invariably of rolled sections of steel I-beams (photo No.48), and in a few cases, of built-up steel girders.

24. For most bridges, the use of as long a span as possible

has an obvious advantage in that it would decrease the number of necessary piers in the gap. The advantage thus gained is appreciable, since the most difficult and lengthy job in bridge repair is the erection of piers. A long span also has its limitations, however, since the weight of its structural members increases out of proportion to its length. This involves not only the factor of economy in the use of steel, but the task of setting a large, heavy span in place can become a difficult handling problem.

25. Early in the study of the enemy's repair technique, it was found that the length of span varied, in general, directly with the height of the pier, which in turn was usually dependent on the nature of the terrain at the point of crossing.

26. For bridges of medium height, the span most commonly used ranged in length from forty to sixty feet. This was the favorite length of span used on the construction of replacement bridges most of whose piers varied between ten and twenty-five feet in heighth. This was apparently the length of girder which could be readily handled with available equipment, and which reduced as much as practicable the number of piers which it was necessary to erect following a damaging attack. A typical repair job requiring the erection of a pier and the setting of two spans took from four to seven days, depending on the intensity of the repair effort.

27. In the case of bridges at wide and shallow river crossings, such as the NERVESA and CASARSA diversion bridges, where only short piers which could be more quickly erected were required, the enemy had found it advantageous to use a short span of from 15 to 18 feet. A feature of the bridges at these two locations was the use of concrete piers. This was made possible since the relatively small flow could be diverted allowing concrete piers to be poured. Most outstanding feature, however, was the use of embankments over the dry river bed, with a bridge structure being used only over the water course. This eliminated the necessity for a long bridge structure. At CASARSA, for example, a 2,750 foot river bed required only 650 feet of bridging. Cuts on the embankment could be repaired in only a few hours, and since the bridge structure was often difficult for attacking aircraft to distinguish from the embankment, hits were most frequently inflicted on the latter. The damage resulting from a direct hit on the bridge structure, however, usually took from two to four days to repair.

28. For high bridges, where considerable time would have to be expended in rebuilding the piers, the optimum size was usually the longest practicable span. This would also hold for lower bridges of single span, or where a swift current or deep river would impose additional difficulties in preparing a foundation for

Photo No. 50

CAMPODAZZO RAIL BRIDGE

During an attack on this bridge, just north of BOLZANO on 20 April by heavy bombers of MASAF, a masonry arch was destroyed, leaving a gap of just over 90 feet. This being greater than the maximum size of girder, it was necessary to build an intermediate pier, appreciably lengthening the time required for repairs.

Photo No. 51

SACILE MAIN RAIL BRIDGE

The overloaded structure failed and the test locomotive fell into the river.

Photo No. 52

PESCHIERA MAIN RAIL BRIDGE

Note use of four girders for each span.

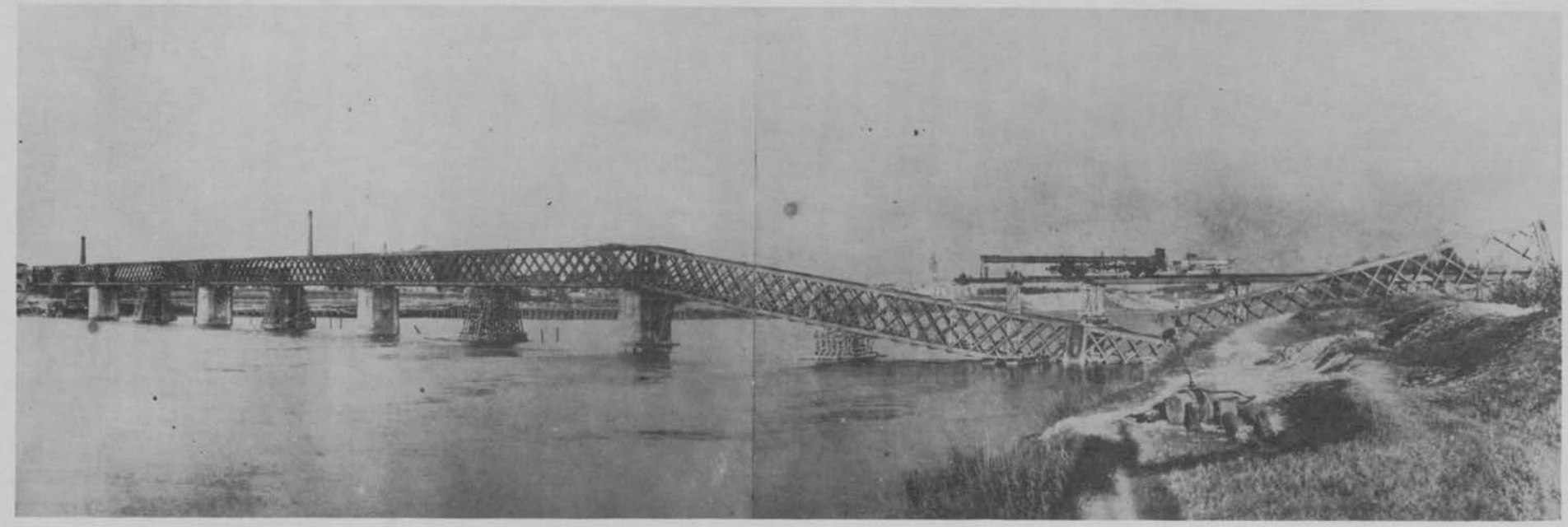


Photo No. 53

PONTELAGOSCURO RAIL BRIDGE

German picture shows the use of auxiliary piers to prevent collapse. Note in this case how new piers have been erected on the fallen truss.

the pier. The longest practicable span, in these cases, was found to be about 90 feet. This figure represents the maximum size of girder that is known to have been used in any repaired or rebuilt bridge in North ITALY.

29. The knowledge of the maximum length of span has been of considerable use in estimating the time required for repairs to a damaged bridge, and has also been a significant criterion for target selection, since the destruction of an existing span of greater than 90 feet imposes the necessity upon the enemy of building an intermediate pier, (photo No.49 & 50), thus automatically increases the length of time required for the repair of a damaged bridge. It is interesting to note that following the cessation of hostilities, interrogation of railroad officials and engineers confirmed the figure used for the maximum length of span. Interrogation also revealed the depth of girder to be 39 inches, considered by engineering standards to be a low depth to length ratio. In the interest of economy and speed of installations, German engineers designed their replacement structures using a minimum factor of safety, but by moving their trains across at a slow rate od speed, they reduced the impact load to an almost negligible amount. On two occasions however, there is known to have been a failure in the structure due to excessive loading (photo No.51). Cautious practice was the use of four girders for each span instead of two, as shown in accompanying illustration (photo No.52) of the main bridge at PESCHIERA, where the span length was about the maximum.

30. In isolated cases, when trusses of greater than 90 feet were knocked off their piers, but not seriously damaged, it was found more feasible to restore the truss by jacking it back into place and repairing or replacing the damaged members.

31. In the case of truss bridges, preliminary measures were often taken by building auxiliary piers under existing trusses to impede the fall od the superstructure during attack (photo No.53). If the truss was so seriously damaged in attack as to necessitate its being discarded, the piers often served to speed repairs.

32. Following damage to heavy masonry arch bridges, it was sometimes possible to repair the damage in a short time merely by switching the track to the undamaged portion of the arch (photo No 54). This was expedient, however, only when enough strength remained in the arch to support the load. If the arch was too severely damaged, it entailed the troublesome task of carving bridge seats in the existing masonry, and setting girders across the damaged portion, flush with the existing deck (photo No.55). In the latter case if the distance between piers was greater than 90 feet, it was necessary to demolish the remaining portion of the arch and build an intermediate pier (photo No.56).

Photo No. 54

STEINACH SOUTH RAIL BRIDGE

Enough strength remained in the arch to support single line traffic.

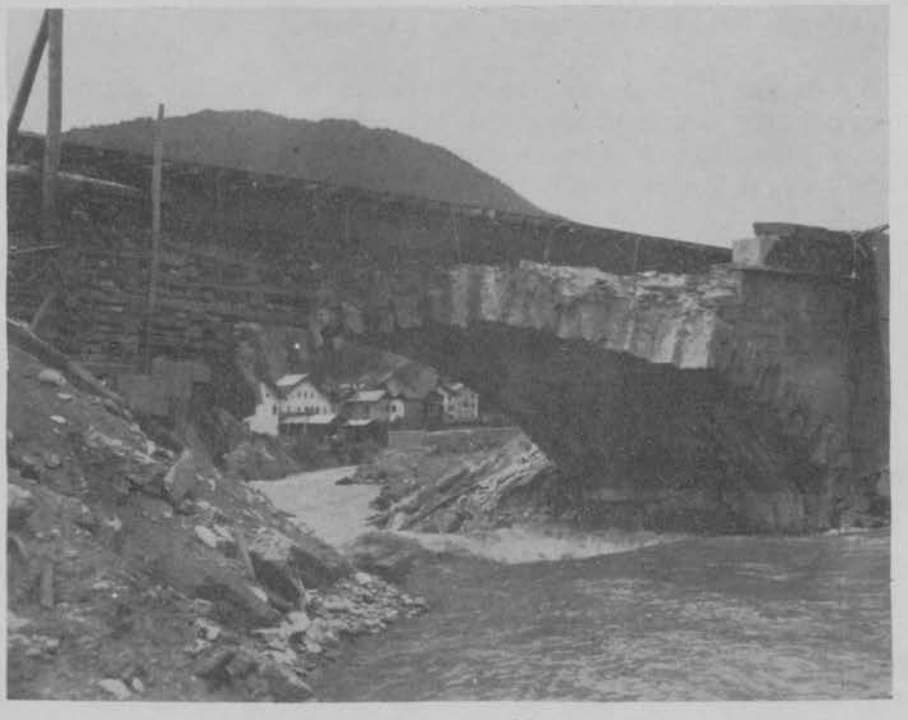


Photo No. 55

MATREI SOUTH RAIL BRIDGE

The arch was too severely damaged and required setting of girders to take the load.

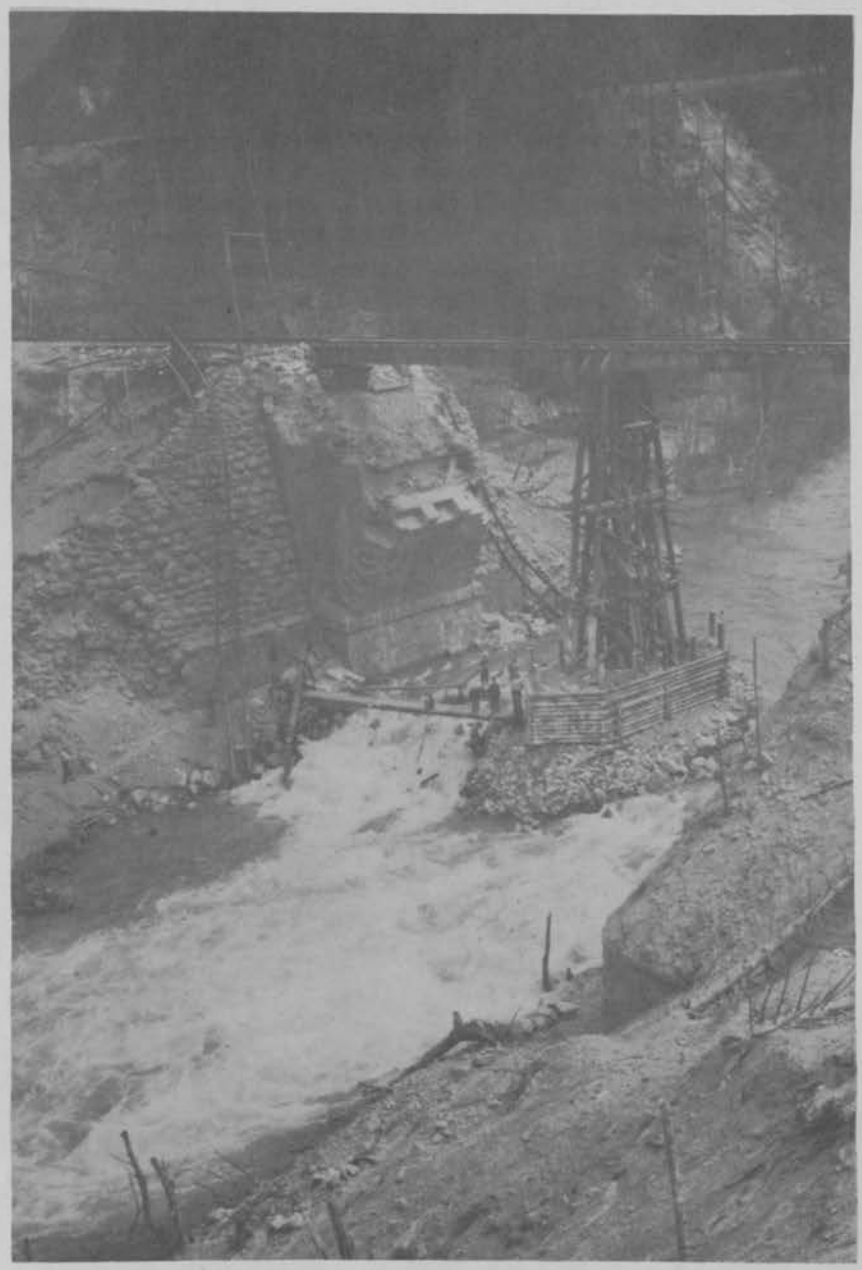


Photo No. 56

CAMPO NORTH RAIL BRIDGE

The severely damaged 110 foot arch was demolished to permit erection of the intermediate pier.

Photo No. 57

FILL BETWEEN CALLIANO AND ROVERETO

Rather than fill this crater in an embankment, it was bridged. Such practice was rare.

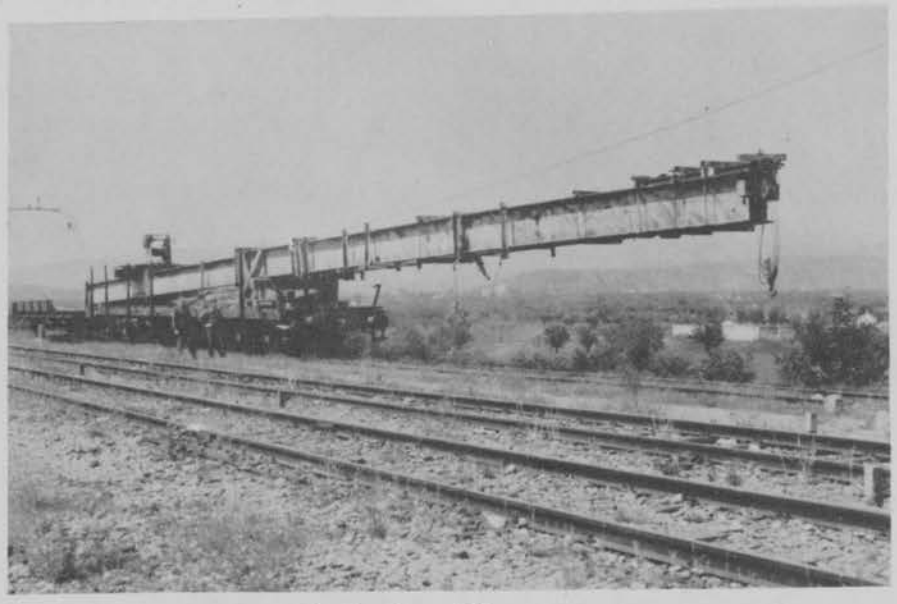


Photo No. 58

VERONA/PARONA RAIL BRIDGE

One of the two cranes at this location. Note winch, cable, and differential hoist. See also Photo No. 47.

33. A great number of cuts were in the form of cratered rail beds. Interrogation revealed that these were filled mostly by hand labor, assistance often being recruited from among the civilian population in the neighborhood. Railroad employees have given estimates ranging from two to four hours, as an average time for filling a single crater inflicted by a 500 pound bomb. The time given is for a situation where labor was immediately available. In a very few cases, where craters cut high embankments making it difficult to use the surrounding soil for fill, use was made of short sections of salvaged steel rail supported by sections of timber trestle-bent to bridge the crater. (See accompanying diagram and Photo No. 57). This took an estimated 8 to 10 hours, according to the plan, which may account for the infrequency with which the method was used.

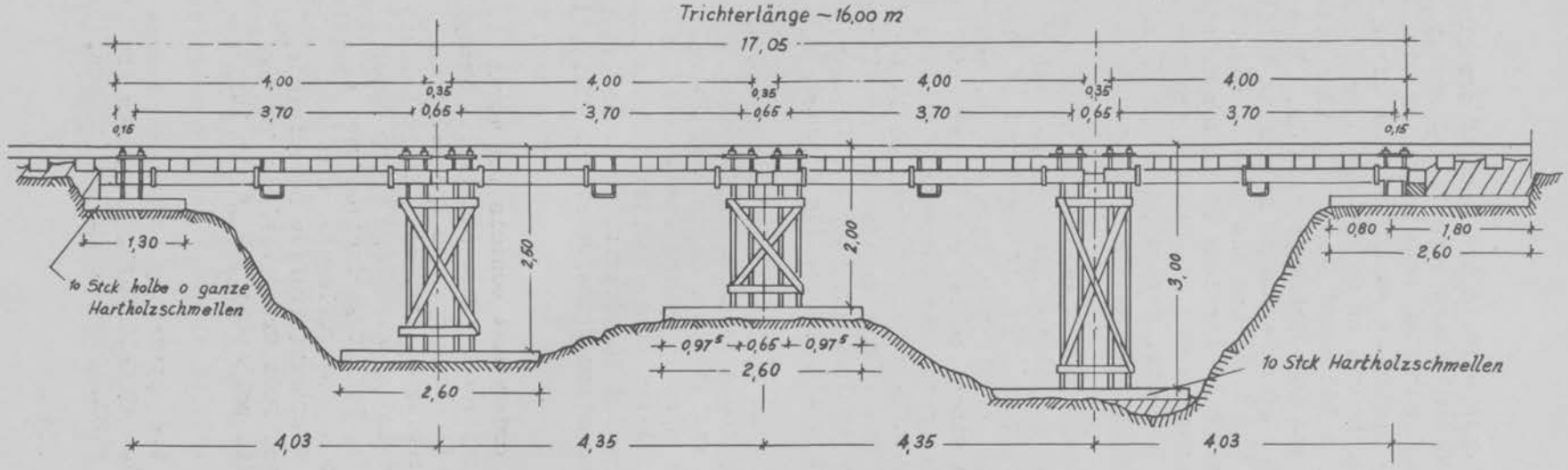
34. One of the most conspicuous items of equipment used by the enemy and which greatly facilitated his repairs, was the large improvised railway crane (photo No.58). It consisted of three or four bridge girders, bracketed together to form a boom, mounted on flat cars, and rigged with a winch, cable, and differential chain hoist. The location of these cranes was constantly checked by photo interpreters, and frequently their movement could be traced from one bridge site to another. Their arrival was usually rearded as significant, for often it meant that a skilled repair crew was present, and repairs would be speedily pressed.

35. Deception. Towards the end of 1944, to supplement direct and obvious repair, the enemy found it necessary to resort to deception, which as time went on, was utilized on an ever increasing scale. The importance placed upon it by the enemy is illustrated by the following extract translated from a captured document, dated 29 December 1944. It is addressed to Director of Transportation of Wehrmacht from General Commanding Transportation, ITALY, I Echelon/III.

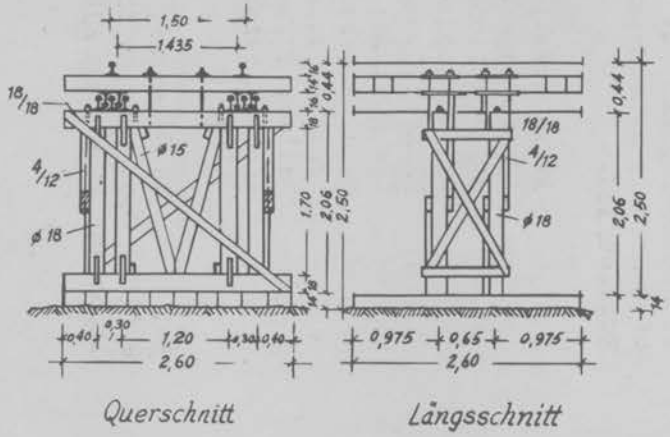
> Every construction order must contain the words 'Camouflage and Deception'. This is vital. Every Railway Pioneer Staff has a workman specializing on the subject in its establishment. Every Railway Pioneer Company has had a camouflage troop under its command; likewise Todt Organization over a special service troop, 'Camouflage'. Combined training squads of Wehrmacht Traffic Directorate, Railway Pioneers, and Todt Organization, for the special subject, with collaboration of the Luftwaffe.

36. In December, 1944, the apparently continued absence of a fifty foot span in the bridge at CALCINATO, a link in the highly important line from MILAN to VERONA, became subject to suspicion.

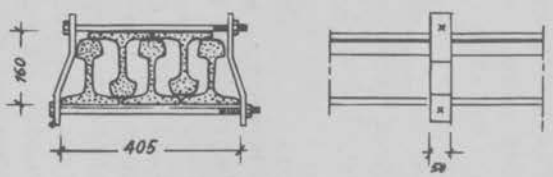
Ausführungsbeispiel



Normaljoch aus Nadelholt



Normalklammern für Schienenbündel



Although the span was consistently seen out during air reconnaissance, a thorough study by photo interpreters revealed an accumulation of evidence that proved almost conclusively that traffic was passing over the bridge at night. A night sortie was thereupon flown, which revealed the span to be in place, and thus provided confirmation. This was the first night operational bridge. The pattern of deception was analyzed at the time, and provided the basis for the detection of all the subsequent bridges in that category.

37. The bridge at PADUA/North is cited as an example to illustrate the pattern by which a night operational bridge was recognized. A span, about fifty feet long, was seen to have been removed from the bridge between covers of 31 January and 6 February; there was evidence of an intervening attack. The bridge was immediately regarded with suspicion. A search revealed that a crane, similar to that at CALCINATO, was present at the nearby station yard. Subsequent covers showed that the approaches were persistently repaired following attack. Although a certain amount of inactive rolling stock was observed, a single track was almost always kept open, and activity studies revealed turnover of rolling stock on either side. Furthermore, the bridge was of the utmost importance and a damaged span could easily have been repaired in the elapsed time. On the basis of the accumulated evidence, the bridge was reported as night operational. Confirmation was received when a night sortie, flown 26 February, revealed the span to be in place (photo No. 59B). Cover of that afternoon (photo No.59A), and the following day (photo No.59C), revealed the span to be removed.

38. A further technique of deception to which the enemy reverted from mid-December on, and which was revealed by interpreters shortly thereafter, was the practice of maintaining the unserviceability of selected bridges when there was no immediate need for their use. As with night operational bridges, the purpose was to make the structures appear damaged to our reconnaissance and to our air crews, seeking thus to protect the bridge from attack. Certain damaged bridges were repaired only up to a point, so that they remained obviously impassable, but at the same time making it possible to complete repairs in only a few hours. Other serviceable bridges would have one or more short spans removed when it was possible to replace these spans with only a short delay should the necessity arise. The enemy resorted to this practice when a by-pass route (photo No,60) or a diversion (photo No.61) was open, when other bridges on the same line were undergoing repairs (photo No.62), or when the present serviceability of a bridge was secondary to its future use (photo No.63).

39. In more recent months, our increased weight of attack brought with it a marked increase in the number of night operational

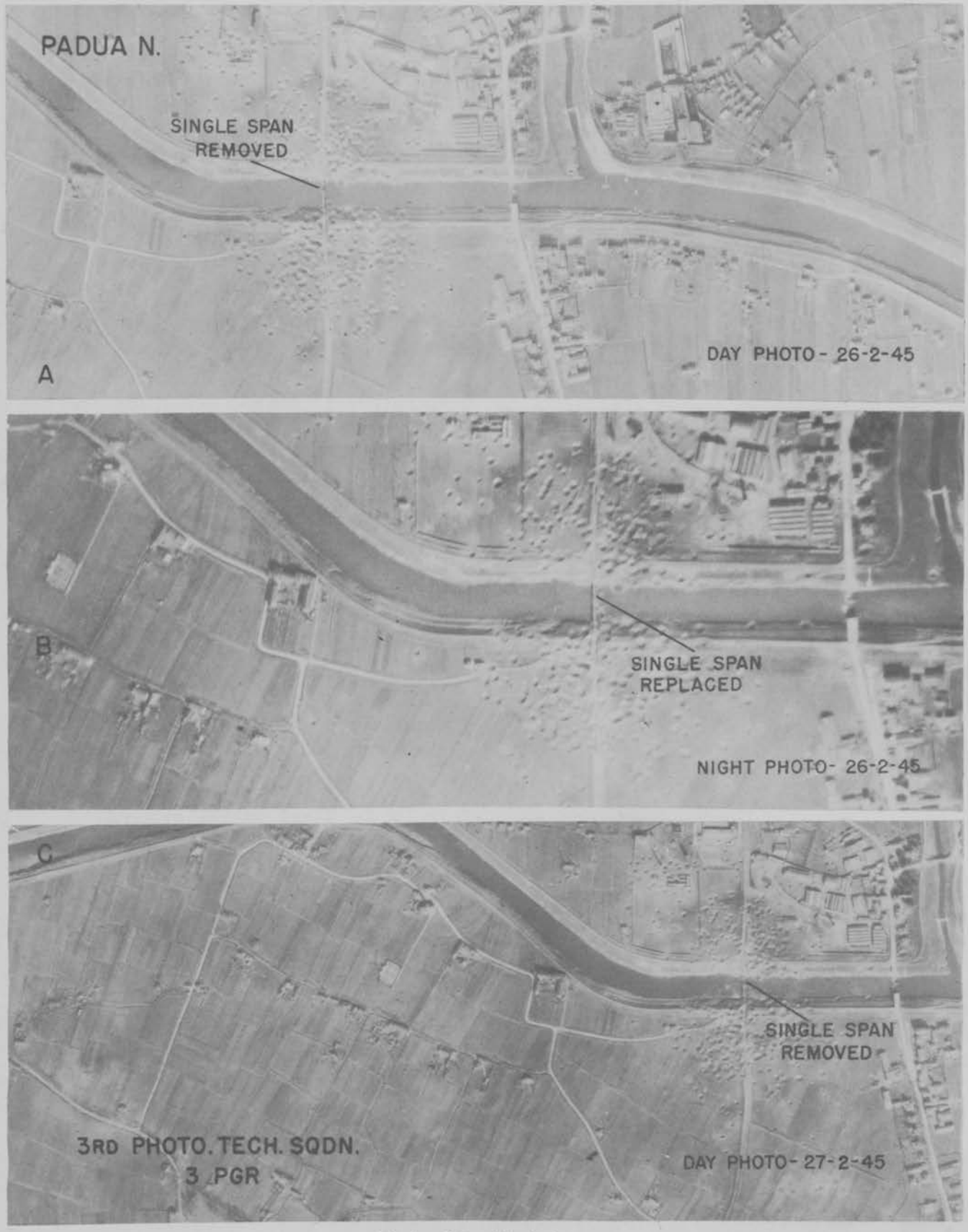


Photo No. 59 A-C

PADUA NORTH RAIL BRIDGE

This sequence shows a night operational bridge.

bridges, each of which was analyzed as it fell into the familiar pattern, and took its place on the target list. During the month of April, eleven night operational bridges were tagged, ten of which were attacked and put out of service for varying lengths of time. The sharp increase in this energetic form of deception was a gratifying reaction, since it was attempted on so extravagant a scale as to assume a note of desperation. It is even more gratifying in that it was detected at its beginning, and its development reported in detail, the accuracy of which has been well established by ground checks instigated following V-E Day.

40. Targets in Flux. Possibly the outstanding feature of rail targets during the program of interdiction has been their state of flux. The character of bridges under attack is constantly changing, not only structurally, but the conditions that surround it - seasonal changes, the demands upon stock-piles of materials, the construction of diversions, the fluctuating capacity and efficiency of repair crews in any geographical sector. All these qualities were considered an integral part of enemy repair operations, and were continually under the scrutiny of our intelligence.

41. For example, in March it first became apparent from photographs that one of the indirect results of our stepped-up attack was to impose an over-taxing demand on stock-piles of certain sizes of steel girders. This was most apparent by the widespread salvage of certain lengths of steel girder undertaken during the month (photo No.64 & 65) and though the shortage was only in its very early stages, it underlined a weakness in the enemy repair facilities that may have developed catastrophically for him, had the battle continued through the summer.

42. March, too, brought the high water level in the streams and rivers that washed out low diversion bridges at CITTADELLA, CASARSA, TORTONA, and NERVESA (photo No.66), an event which had long been anticipated from a consideration of the construction of these particular bridges.

43. At the same time, the run-off of rain water and melted snow from the slopes along the BRENNER had caused a sharp rise in the ADIGE River. In certain places, where the valley floor is flat and lacking in natural drainage, there resulted a high water table, the existence of which was clearly apparent from photographs since the bomb craters in the vicinity had all filled with water.

44. It was observed that at certain low, poorly drained areas along the line, repair crews were taking an uncommonly long time to repair cratered fills and approaches, a task that was once quickly accomplished, and it became increasengly apparent that considerable difficulty was being experienced in stabilizing rail beds.

Photo No. 60

PESCHIERA

Shown when a diversion was open.

Photo No. 61

CHIARI

Shown when a by-pass route was open.

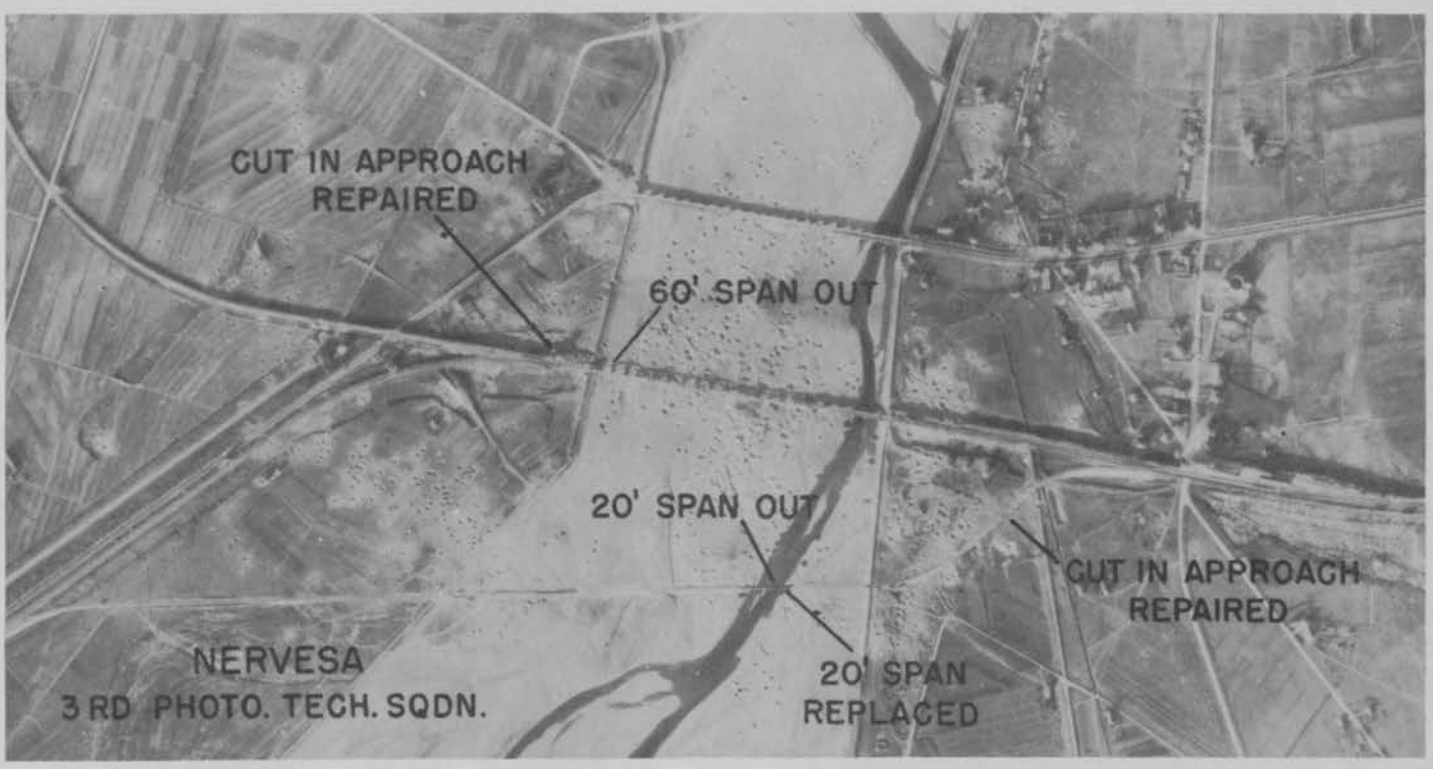


Photo No. 62

NERVESA

Shown when other bridges on the same line were undergoing repairs.

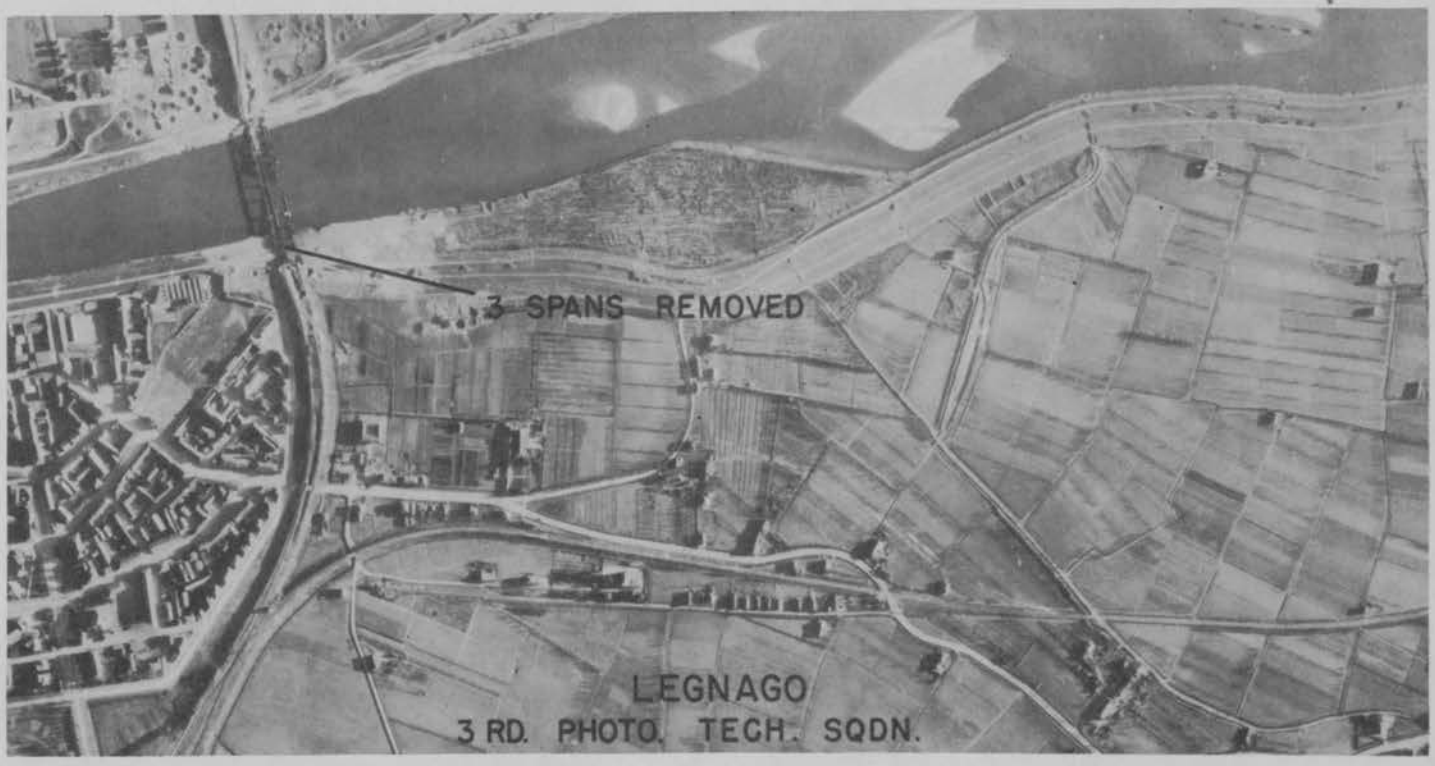


Photo No. 63

LEGNAGO

Shown when the present serviceability of a bridge was secondary to its future use.

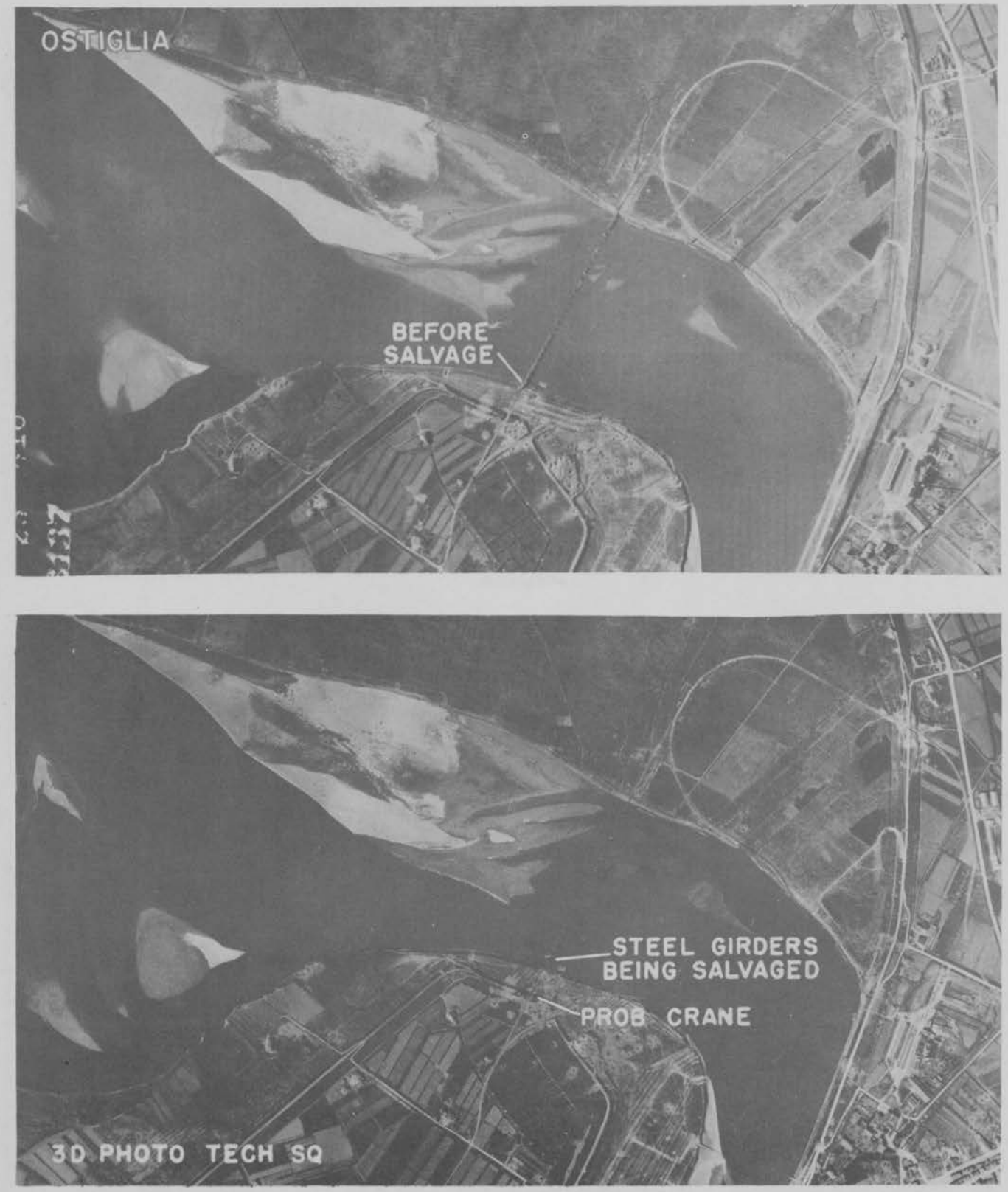


Photo No. 64

OSTIGLIA BEFORE AND AFTER SALVAGE

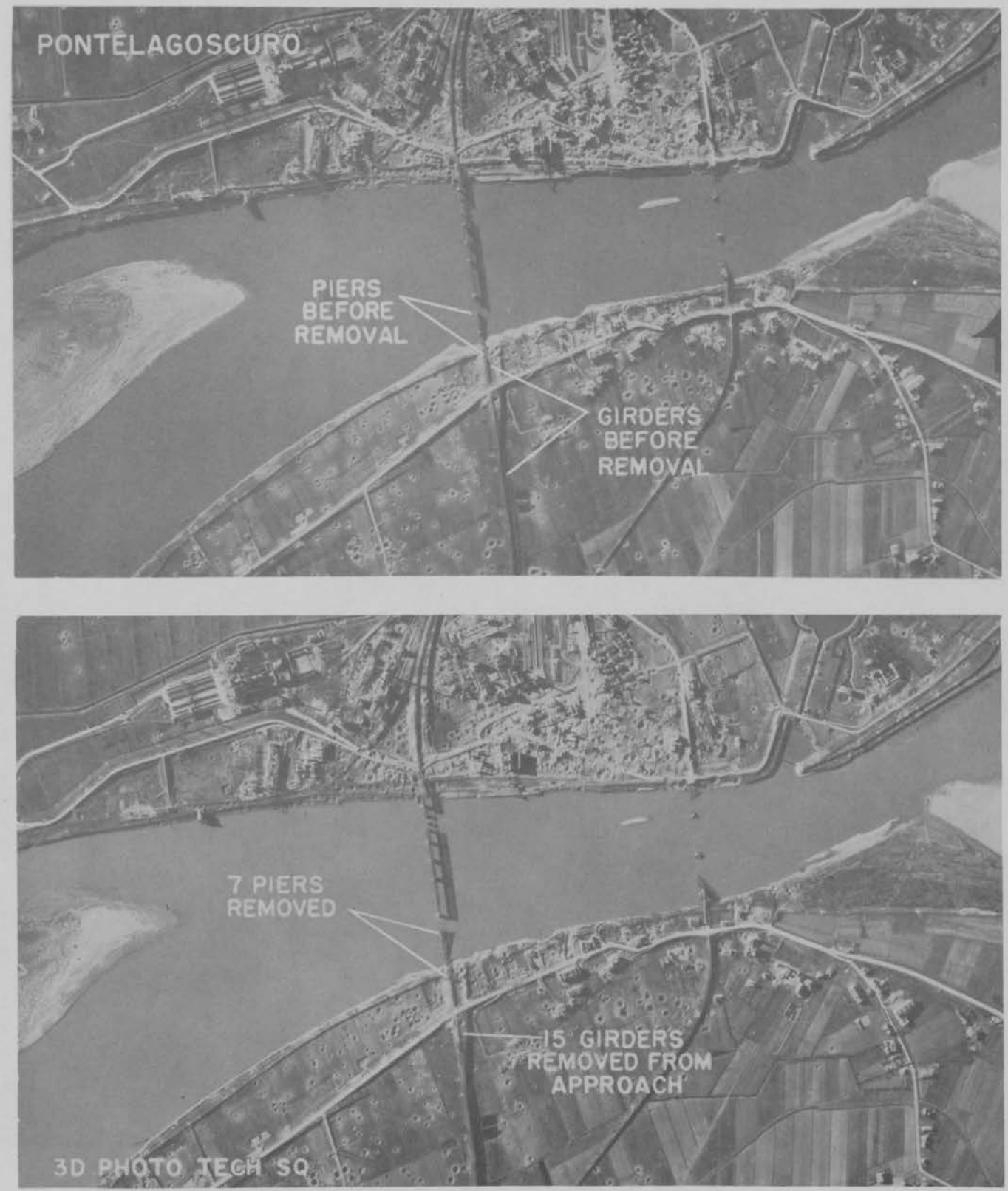


Photo No. 65

PONTELAGOSCURO BEFORE AND AFTER SALVAGE

Photo No. 66

NERVESA DIVERSION BRIDGE

Photograph taken on 29 March shows extensive damage caused by the flood waters of the PIAVE River.

45. MATAF, seeking to take advantage of the situation, directed attacks on vulnerable areas with the result that rail fills and approaches upon which blocks had heretofore been effective for at most a day or two, now held good for a week or more. Among the most effective were attacks on the SANT' MICHELE diversion.bridge and fill (photo No.67) and SANT' MICHELE North (photo No.68), each of which was kept unserviceable for well over a month. A German authority recently informed an investigating party that they had found it an almost insurmountable difficulty to stabilize the fill during the wet season, and had dumped over 6000 tons of ballast in SANT' MICHELE fill alone. By the end of April, the water had largely subsided, but by exploiting the high water in the BRENNER when it existed, MATAF was able to turn a temporary cut into a block of substantial duration.

46. Thé Diversion Program. The most ambitious device undertaken by the enemy to circumvent our program of interdiction was the construction and maintenance of a large number of rail diversions by-passing vital bridges. The optimum effect that could be obtained from such a program would be to build diversions simultaneously. By so doing they would impose upon us the necessity of cutting both in order to create a satisfactory block, and thus multiply the odds against achieving our purpose.

47. The first construction of diversions in North ITALY occured early in the summer of 1944. At CASARSA on the northernmost route across the VENETIAN Plain, a rail diversion waslaid across the TAGLIAMENTO, and on the BRENNER Line, a by-pass route was built to avoid BOLZANO's bridges and marshalling yards. By October others were in use at CITTADELLA over the BRENTA, and around AVISIO Viaduct on the BRENNER Line. During the fall and winter their numbers steadily increased until by March there were at least ten in Northeastern ITALY alone.

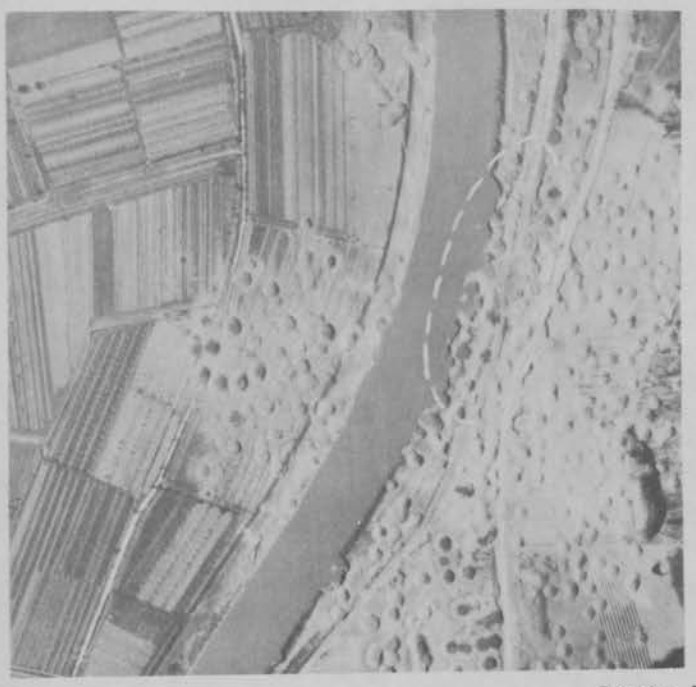
48. In addition to immediate by-passes for specific targets, the enemy endeavoured to construct entire new rail lines in cases where the need for an alternate route was great. Completed in November was the 12 mile stretch of line between ORA and SAN MICHELE, while on the Eastern frontier, a two mile diversion over the most difficult terrain was under construction, to by-pass the damaged viaduct at BOROVNICA (photo No.69).

49. The success of the diversion program, however, was completely dependent upon the ability of the enemy engineering organization to keep up with the demands of our attack. Despite the energy and determination of the enemy, his capacity was limited, and through the late winter and early spring, only in a few and ever decreasing number of cases was the enemy able to maintain both bridge and diversion simultaneously. What resulted, therefore, was that the

Photo No. 67

SAN MICHELE NORTH RAIL BRIDGE

First photo shows bridge after attack by 57th Bomb Wing on 5 April, when it was destroyed and both approaches heavily cratered. Second photo shows bridge still not repaired on 25 April. Note water-filled craters and soggy condition of the ground.



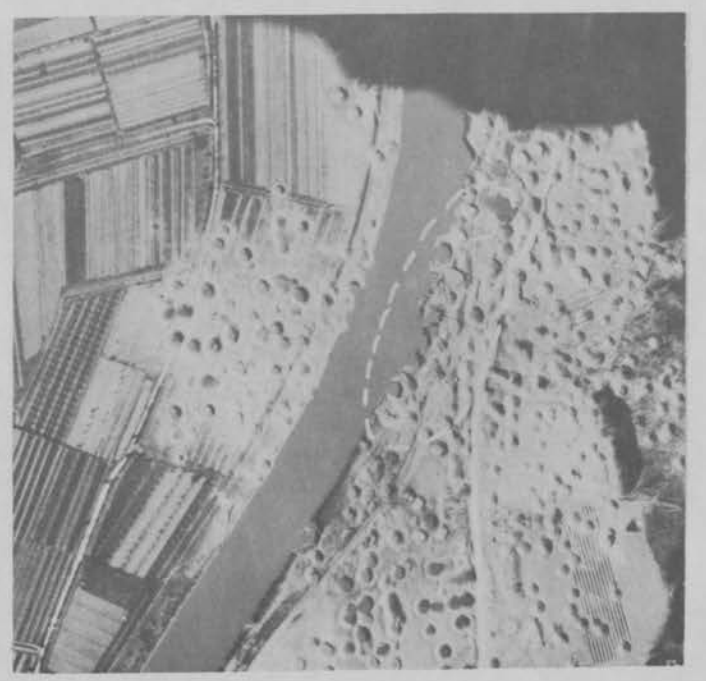


Photo No. 68

SAN MICHELE RAIL DIVERSION BRIDGE AND FILL

First photo shows condition of fill on 2 April, over two weeks after attack. The rail bed was almost repaired at this time, but was again attacked. Second photo shows same target on 9 April, after further attack. Note water-filled craters. Line was not serviceable at this point until 17 April.

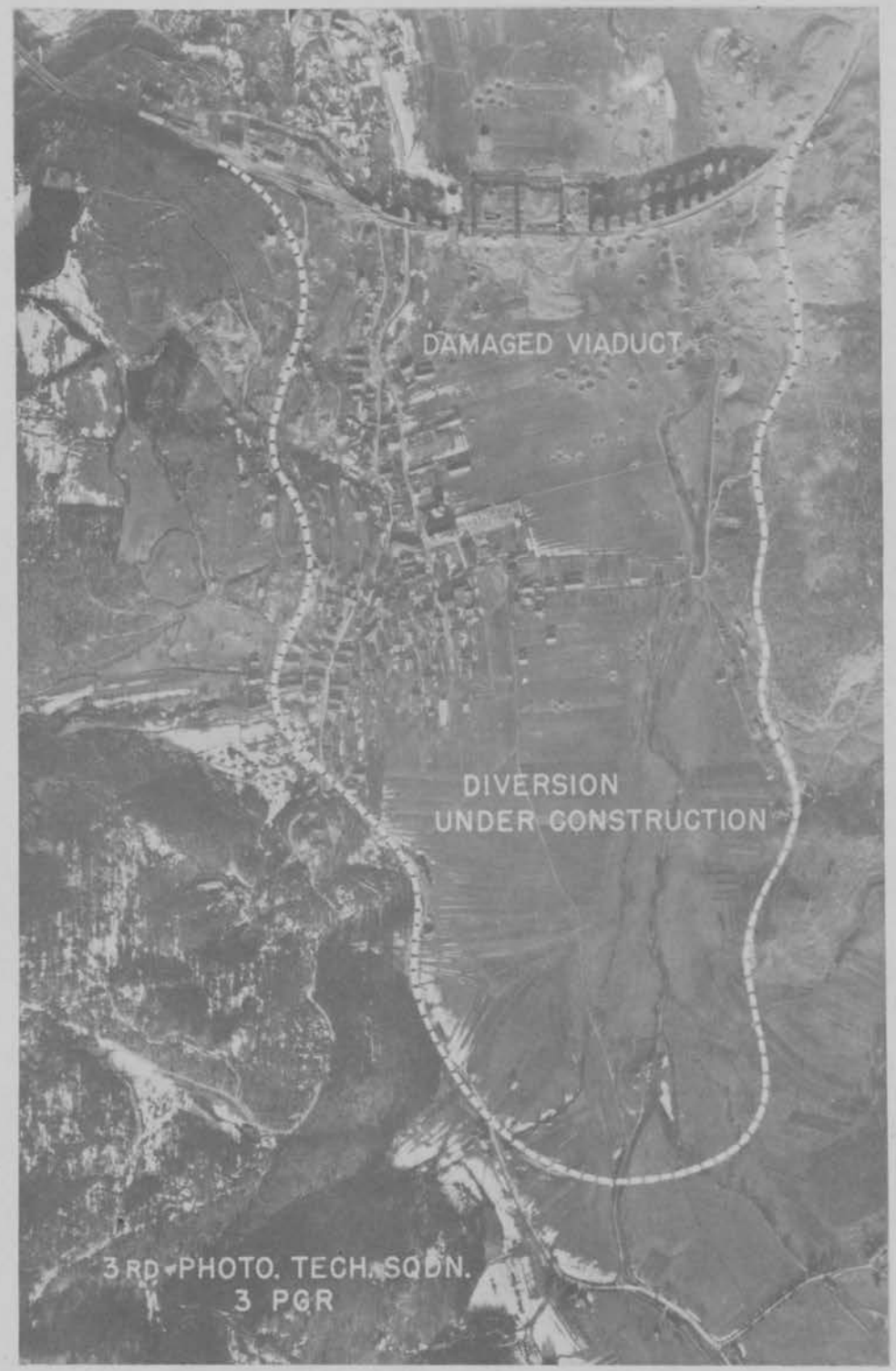


Photo No. 69

BOROVNICA

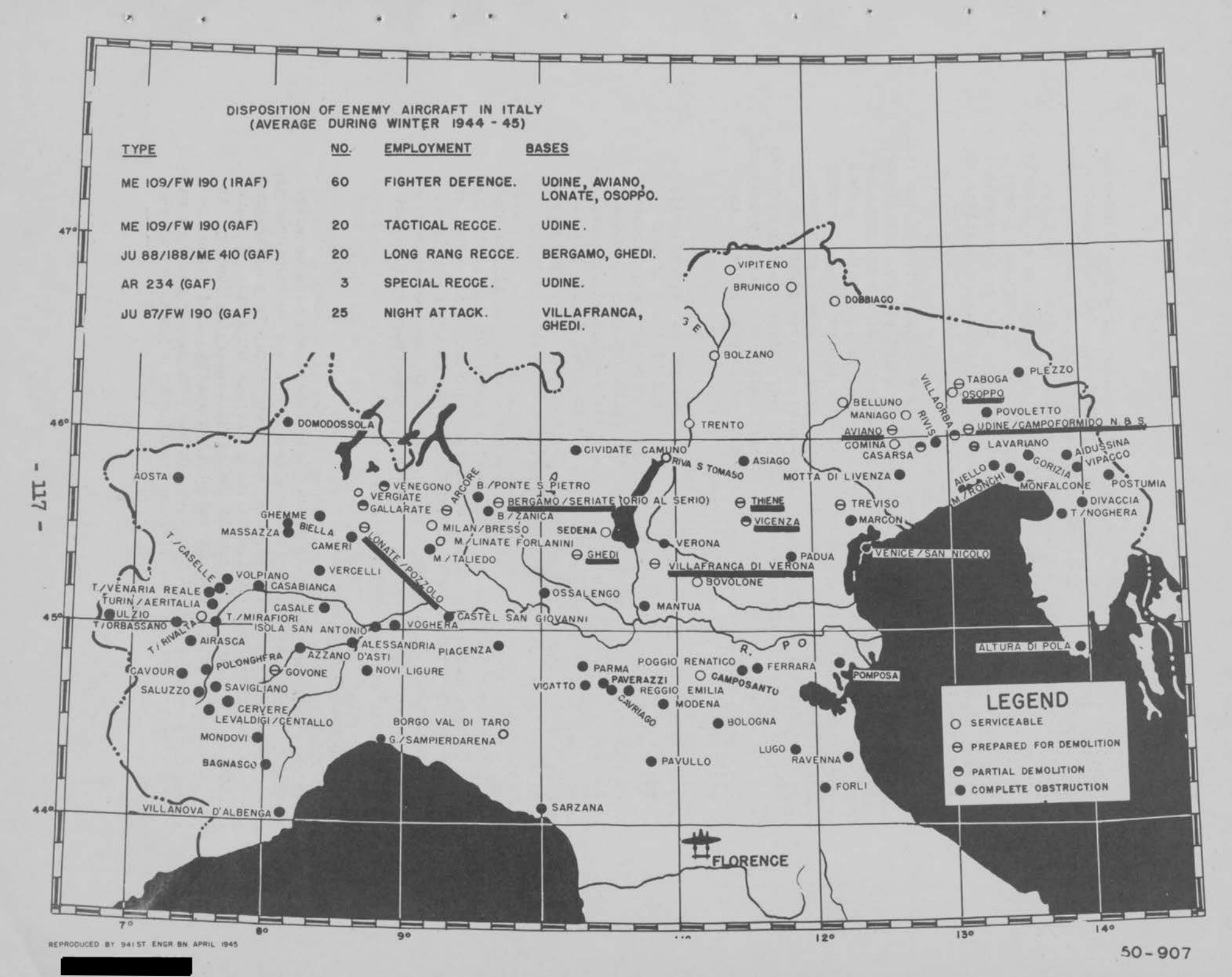
The dotted line indicates the approximate route of the diversion. Had it been completed, it would have by-passed the seriously damaged viaduct. The diversion line was about two miles long over the most difficult terrain.

diversion served only as a replacement for a damaged original bridge, and because it was easier to repair, was maintained in preference to the latter. In time, with our relentless attack reaching its crescendo in the good weather of February through April, the character of the rail network took on the aspect of steady deterioration. Except for spasmodic bursts of speed on certain sections of the BRENNER, the speed of repairs measurably slackened. The main bridges at NERVESA and CASARSA, once rigidly maintained, were allowed to accumulate damage, until their repair if undertaken would have been extensive tasks. Construction throughout the inner Northeast proceeded at a pace incomparably slower than was the normal rate of speed during the winter months. The vital frontier viaducts were either abandoned or subjected to what seemed like uncoordinated and feeble repair efforts, while on the top priority BRENNER Line, the scale of repair activity measured against the heaviest degree of interdiction that had yet been attained made it apparent that the enemy repair organization was hopelessly incapable of coping with the force of our attack. With the final offensive in the latter part of April, the greatest part of MATAF's effort was turned to direct ground support, but even so, the battle of the bridges was so thoroughly won, the enemy repair organization so completely exhausted, that the great part of the blocks that existed in the middle of the month held until the cessation of hostilities.

50. Ground check parties who have recently toured the sites of ITALY's and AUSTRIA's bridges have seen in the wreckage of the great steel trusses, and in the piles of rubble that were once masonry arches, the aftermath of one of the most unique battles in history, a battle that should stand as a classic example of the application of air power to the destruction of a communications network.

ACTIVITY AND DISPOSITION OF THE LUFTWAFFE

51. The last and weakest weapon at the enemy's disposal in combatting our bombing program was his dying air force. Following the rapid advance of Allied forces up the Italian mainland after the breakthrough of the Gothic Line and the liberation of ROME and FLORENCE during the summer of 1944, the enemy air strength in North ITALY was reduced to such a degree that it offered little opposition to the employment of our aircraft against the targets of Blockade. Dispersed over miles of country side surrounding the big airdromes of VILLAFRANCA, GHEDI, UDINE, LONATE, and BERGAMO, the 100 plus enemy aircraft presented no target suitable for strafing or pattern bombing attack and could not therefore be eliminated. Though never an actual threat, their continued presence in the theater was of considerable nuisance value. While enemy fighter attacks


DISPOSITION OF ENEMY AIRCRAFT IN ITALY
(AVERAGE DURING WINTER 1944 - 45)
TYPE | NO. | EMPLOYMENT | BASES
ME 109/FW 190 (IRAF) | 60 | FIGHTER DEFENCE. | UDINE, AVIANO, LONATE, OSOPPO.
ME 109/FW 190 (GAF) | 20 | TACTICAL RECCE. | UDINE.
JU 88/188/ME 410 (GAF) | 20 | LONG RANG RECCE. | BERGAMO, GHEDI.
AR 234 (GAF) | 3 | SPECIAL RECCE. | UDINE.
JU 87/FW 190 (GAF) | 25 | NIGHT ATTACK. | VILLAFRANCA, GHEDI.
LEGEND
SERVICEABLE
PREPARED FOR DEMOLITION
PARTIAL DEMOLITION
COMPLETE OBSTRUCTION
VIPITENO
BRUNICO
DOBBIACO
BOLZANO
TRENTO
DOMODOSSOLA
AOSTA
CIVIDATE CAMUNO
RIVA S TOMASO
ASIAGO
MOTTA DI LIVENZA
VENEGONO
VERGIATE
GALLARATE
ARCORE
B./PONTE S. PIETRO
BERGAMO/SERIATE (ORIO AL SERIO)
B./ZANICA
THIENE
VICENZA
TREVISO
MARCON
GHEMME
MASSAZZA
BIELLA
CAMERI
MILAN/BRESSO
M./LINATE FORLANINI
M./TALIEDO
SEDENA
GHEDI
VERONA
PADUA
VENICE/SAN NICOLO
LONATE/POZZOLO
VERCELLI
VILLAFRANCA DI VERONA
BOVOLONE
T./CASELLE
VOLPIANO
CASABIANCA
T./VENARIA REALE
TURIN/AERITALIA
CASALE
T./MIRAFIORI
ISOLA SAN ANTONIO
VOGHERA
CASTEL SAN GIOVANNI
OSSALENGO
MANTUA
ULZIO
T./ORBASSANO
T./RIVALTA
AIRASCA
ALESSANDRIA
PIACENZA
AZZANO D'ASTI
POLONGHERA
CAVOUR
GOVONE
NOVI LIGURE
SAVIGLIANO
SALUZZO
CERVERE
LEVALDIGI/CENTALLO
MONDOVI
BAGNASCO
BORGO VAL DI TARO
G./SAMPIERDARENA
VILLANOVA D'ALBENGA
SARZANA
PARMA
POGGIO RENATICO
FERRARA
VIGATTO
PAVERAZZI
REGGIO EMILIA
CAMPOSANTO
CAVRIAGO
MODENA
BOLOGNA
PAVULLO
LUGO
RAVENNA
FORLI
FLORENCE
R. PO
POMPOSA
ALTURA DI POLA
TABOGA
PLEZZO
OSOPPO
POVOLETTO
UDINE/CAMPOFORMIDO N.B.S.
BELLUNO
MANIAGO
AVIANO
COMINA
CASARSA
RIVIS
VILLAORBA
LAVARIANO
AIELLO
M./RONCHI
GORIZIA
AIDUSSINA
VIPACCO
MONFALCONE
POSTUMIA
DIVACCIA
T./NOGHERA
47°
46°
45°
44°
7°
8°
9°
12°
13°
14°
- 117 -
REPRODUCED BY 941ST ENGR BN APRIL 1945
50-907

against our bomber formations were few and far between, attacks on crippled aircraft could always be expected and, for this reason, it was necessary to provide area cover escort for our formations when attacks were executed against targets heavily defended by flak. During the months of Blockade, the enemy air situation was closely watched and any build up or concentration of aircraft was promptly attacked. At the end of the Italian Campaign, due to the constant losses of planes and personnel and overall shortage of gasoline the enemy air force was completely ineffective.

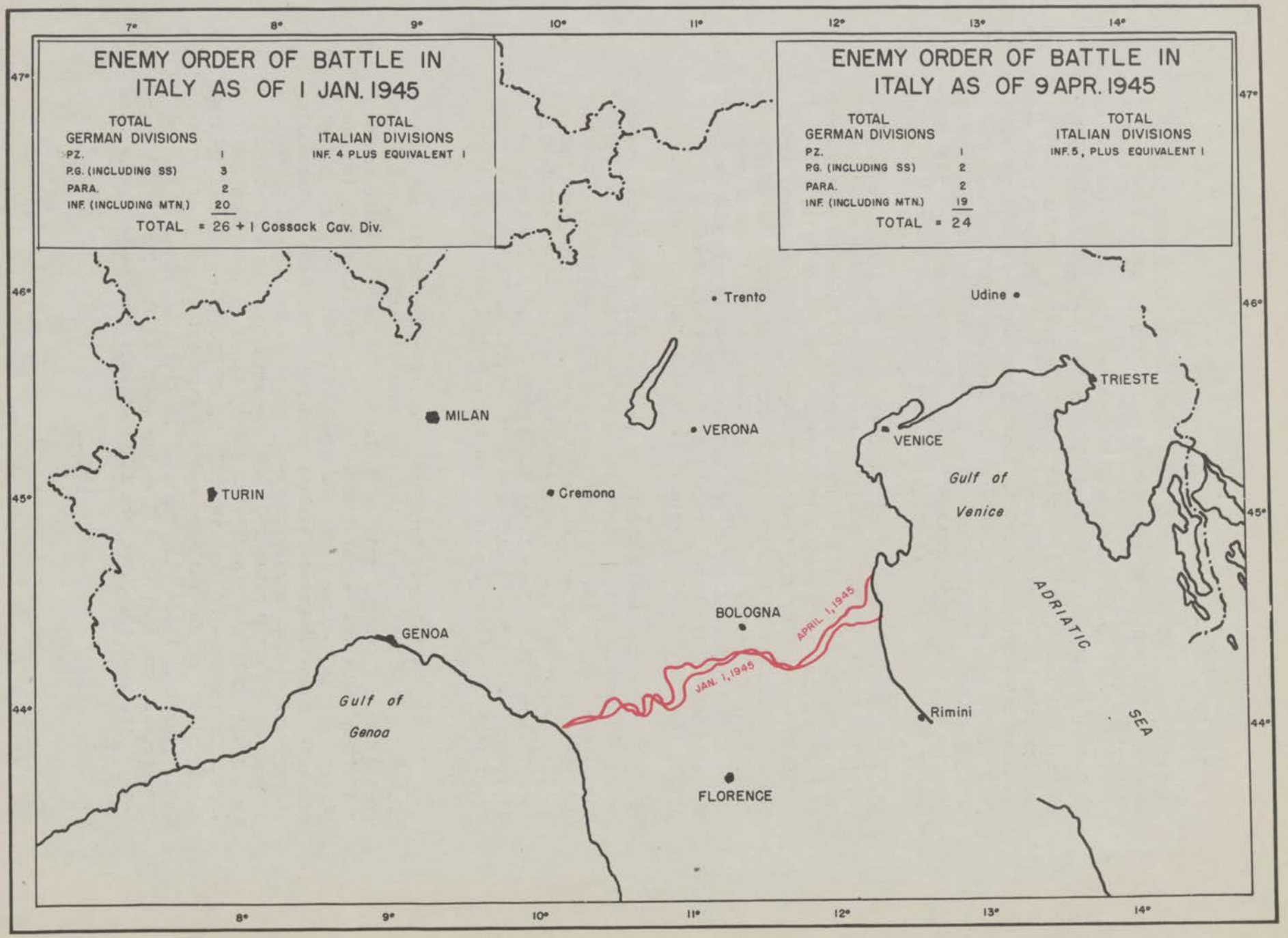
52. The German High Command delegated to the units of the Italian Fascist Republican Air Force the responsibility for the fighter defense of targets in Northern ITALY. Trained in the MUNICH area on ME 109's, the two Italian Groups that actually attained combat status paid but meager dividends. Attacks against compact bomber or fighter-bomber formations were very rare and, even when made, were seldom aggressive. When Allied aircraft were plotted in the area of the fighter bases, the fighters were scrambled and directed to the fringe of the area of our operations. From such disposition, attacks on straggling aircraft could be executed. A few of our planes were lost to these tactics.

53. Night harassing attacks were carried out sporadically during full-moon periods by the JU 87's and FW 190's of NSG 9 based at VILLAFRANCA DI VERONA. Targets were generally attacked at random in the forward areas of the Fifth and Eighth Armies. The scale of effort was low and the results obtained were negligible. Shortage of gasoline kept NSG 9 grounded during the last two months of the campaign except for a spurt of activity after Allied ground forces had broken into the PO Valley

54. Shortages of gasoline and the presence of Allied night fighters over their bases also greatly restricted the activities of the reconnaissance units, which were limited to irregular coverage of the LIGURIAN and ADRIATIC shipping lanes and harbors. The assignment of a three plane jet reconnaissance detachment at UDINE in February provided the Wehrmacht with their only effective daylight reconnaissance agency.

EFFECT ON TROOP MOVEMENTS

55. During 1945 the German High Command was able to withdraw but three divisions from ITALY, all of them to reinforce the Eastern front. The 356 Infantry Division, first to go, was gradually relieved from its front line positions beginning 18 January. Loading at various stations in the PADUA area 23/25 January, it moved North mostly by night except when weather conditions allowed for uninterrupted day time travel. The major portions were reported as clear of the Italian frontier by 7 February and the


ENEMY ORDER OF BATTLE IN ITALY AS OF 1 JAN. 1945
TOTAL GERMAN DIVISIONS
PZ. 1
PG. (INCLUDING SS) 3
PARA. 2
INF. (INCLUDING MTN.) 20
TOTAL = 26 + 1 Cossack Cav. Div.
TOTAL ITALIAN DIVISIONS
INF. 4 PLUS EQUIVALENT 1
ENEMY ORDER OF BATTLE IN ITALY AS OF 9 APR. 1945
TOTAL GERMAN DIVISIONS
PZ. 1
PG. (INCLUDING SS) 2
PARA. 2
INF. (INCLUDING MTN.) 19
TOTAL = 24
TOTAL ITALIAN DIVISIONS
INF. 5, PLUS EQUIVALENT 1
7° 8° 9° 10° 11° 12° 13° 14°
47° 46° 45° 44°
Trento
Udine
TRIESTE
MILAN
VERONA
VENICE
TURIN
Cremona
Gulf of Venice
ADRIATIC SEA
BOLOGNA
APRIL 1, 1945
JAN. 1, 1945
GENOA
Gulf of Genoa
Rimini
FLORENCE

division was next reported in action Northwest of BUDAPEST by 15 February. It had taken approximately 15 days to cross the area of MATAF's blockade.

56. 16 SS Panzer Division, according to first reports, began to pull out from front line positions 6 February. Within a few days headquarters units were noted at FERRARA. By 13 February, the entire division had withdrawn from the Tenth Army sector and troops with full equipm ent were reported passing through TREVISO and up the BRENNER Route. First contact with the 16th on the Eastern front was made on 6 March, approximately 22 days after it had begun its journey up the international routes.

57. Each division found the passage of the ALPS more difficult; the third, slowest of all, was at least a month en route. Forward elements of the 715 Infantry Division began to be relieved from front line positions 6-13 February, and by the 25th, all units had been replaced at the front. PR coverage reported heavy troop concentrations at VERONA and in a minor degree along the UDINE-TARVISIO Route during 2-5 March. Elements of the division were noted at FORTEZZA, BOLZANO, and PONTEBBA 13-20 March, and on 27 March advance units were reported at the Ukranian front. By 3 April, the major echelons were clear of the Italian frontier.

58. The increasing delays in movement were the direct result of our blockade. Prisoners of war have described the great difficulties these divisions experienced in their movement. Personnel travelled mostly by foot, while their lighter equipment was carried by M/T and train, necessitating many stops and off-loadings owing to cuts in railway lines and broken bridges. Much of the divisions' heavier equipment was left behind, as it was physically impossible to move it by train and M/T and fuel were insufficent to transport it by road.

59. The withdrawal from ITALY was of a limited nature, although this certainly was not the enemy's intention. An OSS report quotes SS General Wolf as follows: "The German High Command has often requested German troops from the Italian front, but the Command of the Italian front has always delayed carrying out these requests on the ground of transportation difficulties." Kesselring is reported to have stated, in reply to an urgent demand by the German GHQ in early February, that the withdrawal of his armies from ITALY could not possibly be accomplished in less than two months in the face of the overwhelming difficulties imposed by the interruptions of the railways and the over-all shortage of M/T and fuel. Any help Kesselring was able to give the Wehrmacht reeling backwards on the East as well as the West was "too little and too late." The fact that when the final assault was opened against the

Reich, twenty-three of the best divisions in the German Army were hopelessly pinned down South of the ALPS is a tribute to the effectiveness of "Blockade".

60. Units entering ITALY and troops travelling to and from GERMANY on furlough had no easier time of it. As early as Decemeber soldiers on leave were being forced to travel from VERONA all the way to BRENNERO and back by truck, frequently hitch-hiking their rides. An infantry battalion of 500 men which came South in December was four days en route by train from LINZ to TRENTO, a rail trip which ordinarily would have required less than 24 hours for a military train. From TRENTO the men continued by bus. Elements of the 710th Infantry Division, transferred from NORWAY to ITALY in the same month, took longer to move from the Italian frontier to the front then to cross the whole breadth of GERMANY from a Danish port. On 10 February 1200 troops crossed the BRENNER Pass and did not reach the battle area until 6 March. From BOLZANO to VERONA they travelled by M/T, and since only 5 buses and several trucks were available, several trips had to be made to carry all the men.

ROUND-THE-CLOCK OPERATIONS BREAK DOWN DURING TWILIGHT PERIODS

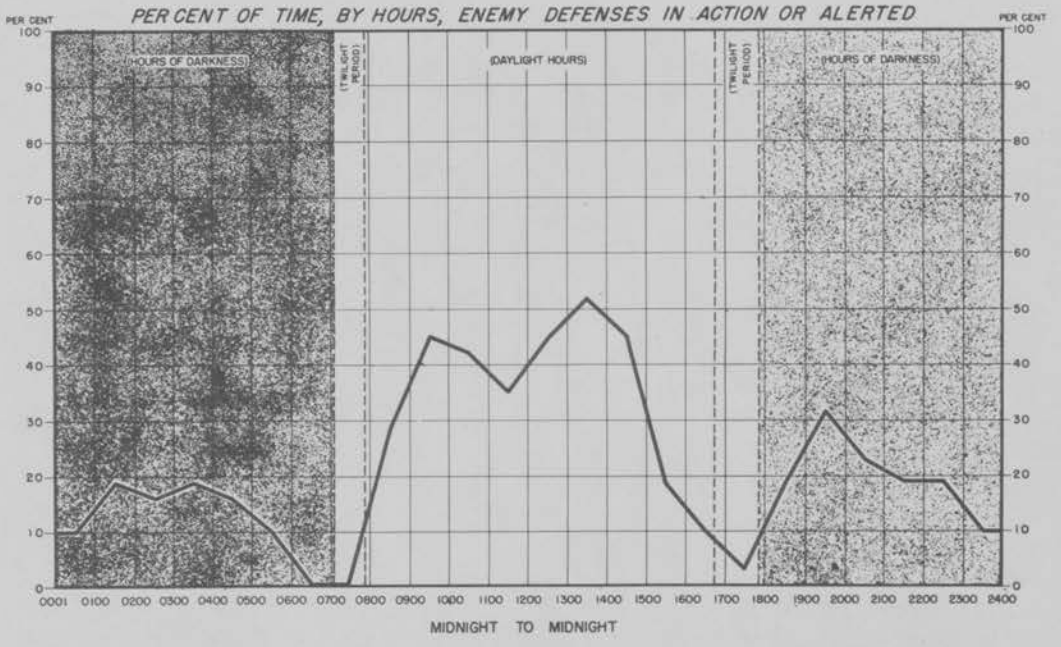
61. From the records of air raid alerts in VERONA caused by operations of our aircraft during the winter of 1945 we find an interesting break-down in the supposedly round-the-clock bombing program in which MATAF was engaged. A decrease of our operations in the interim period between day and night was something we sought seriously to avoid as we knew that the enemy would seize upon every opportunity afforded him to move when free from air attack. In spite of our efforts, the accompanying charts clearly show that during the three months of January, February, and March there was a very decided slackening in our activity in the VERONA area in the twilight periods of early morning and late afternoon.

62. The January record shows that the defenses of VERONA were alerted during 22 per cent of the time during the month. Warnings of our aircraft activities fell off very sharply between 0500 and 0600 hours with the period between 0600 and 0800 being entirely clear for the whole month. A similarly sharp decrease occurred between 1500 and 1600 hours, reaching a low point between 1700 and 1800 hours. Both low points occurred during the twilight periods.

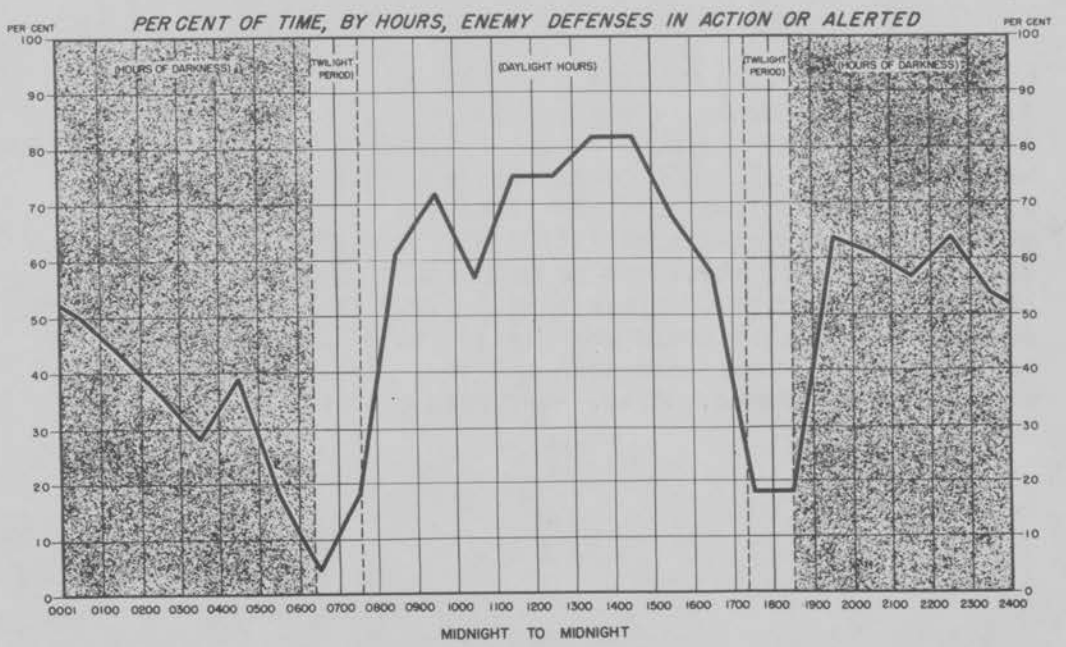
63. The record for February discloses much the same situation although no period of any day was clear for the entire month. The VERONA defenses were alerted 50 per cent of the time during the month; low points in alert status occurred between 0600 and 0700 hours and between 1700 and 1800 hours. Again the sharp decreases in our activity were apparent approximately one hour before the twilight periods. In March, the defenses were alerted 60 per cent of the time. The low points in Allied air activity followed the same pattern as in January and February, occurring between 0500 and 0700 hours and between 1800 hours and 1900 hours.

64. From these records, the Germans were able to predict the plan of our air action. That they used to full advantage the twilight periods for movement of convoys, and activity of repair crews was reported to Allied officers by representatives of the GAF quartermaster organization upon the cessation of hostilities. These stated that the pattern of Allied air operations was so obvious that they planned movements of rail and road convoys and the major large scale efforts of their repair organizations to take place during the twilight hours when there was still light enough to permit rapid movement and work and when Allied airmen would be, as one GAF spokesman put it, "changing shifts".

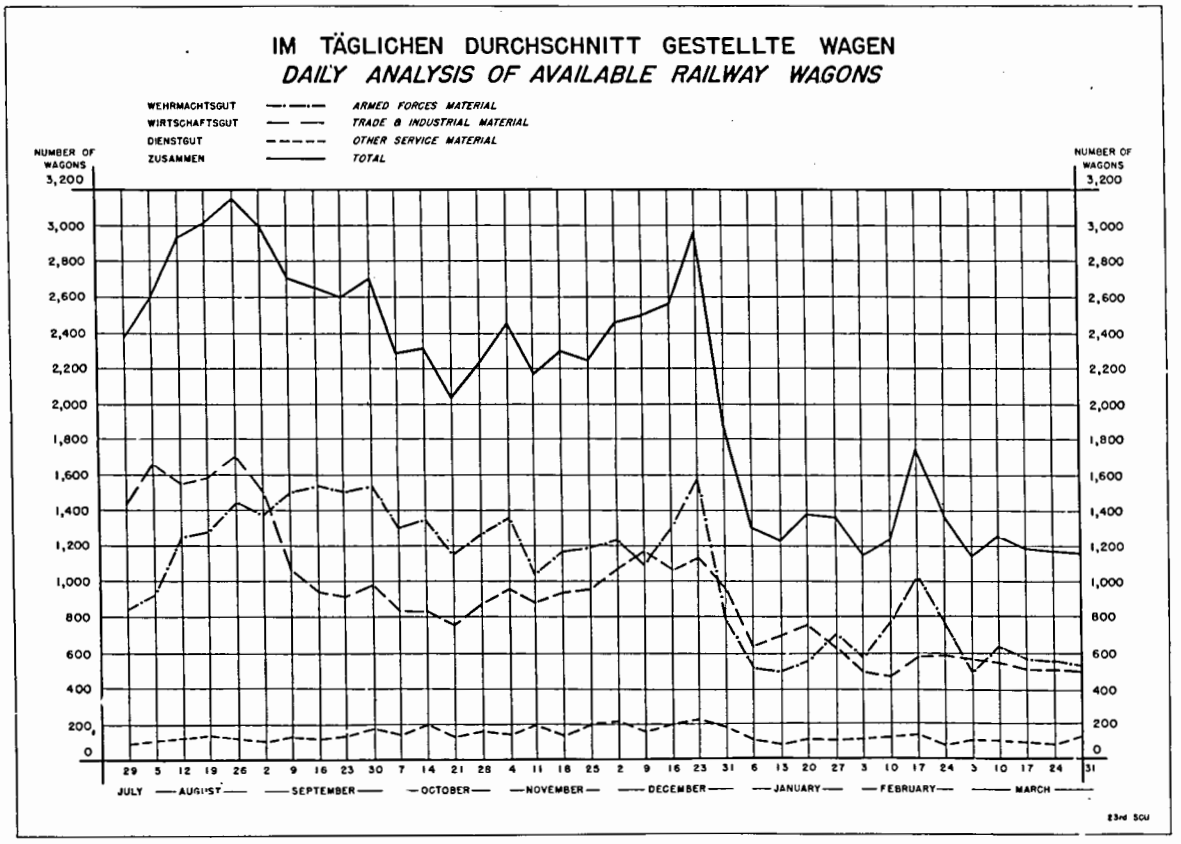
ENEMY DEFENSIVE REACTION
TO ALLIED AIRCRAFT IN THE VERONA AREA
JANUARY, 1945



ENEMY DEFENSIVE REACTION
TO ALLIED AIRCRAFT IN THE VERONA AREA
FEBRUARY, 1945



ENEMY DEFENSIVE REACTION
TO ALLIED AIRCRAFT IN THE VERONA AREA
MARCH, 1945



DAILY ANALYSIS OF RAILWAY WAGONS AVAILABLE TO GERMANS

65. The cumulative results of medium and fighter-bomber attacks on marshalling yards and rolling stock show up in the accompanying analysis of available railway wagons. The fifteen month German-maintained record discloses an overall decrease in the number of available railway wagons in German occupied Central and North ITALY to a dangerously low total during the latter months of the campaign. This decrease is undoubtedly caused by the immobilization of large numbers of wagons in blocked sections of marshalling yards and the actual destruction of trains by air attacks.

RAIL CUTS IN ITALIAN STATE RAILWAYS IN GERMAN OCCUPIED TERRITORY

66. The following charts are reproductions of similar records maintained by the rail-transportation section at the Headquarters of the Commanding General of the Wehrmacht in ITALY. They present a fifteen month record of the battle of communications in the German occupied territory of Central and Northern ITALY. The charts show clearly the increase in tempo of MATAF attacks on rail communications beginning in March 1944 with Operation "Strangle" and reaching a peak of 1042 cuts in May during Operation "Diadem", carried out in support of the Allied advance from CASSINO to the ARNO.

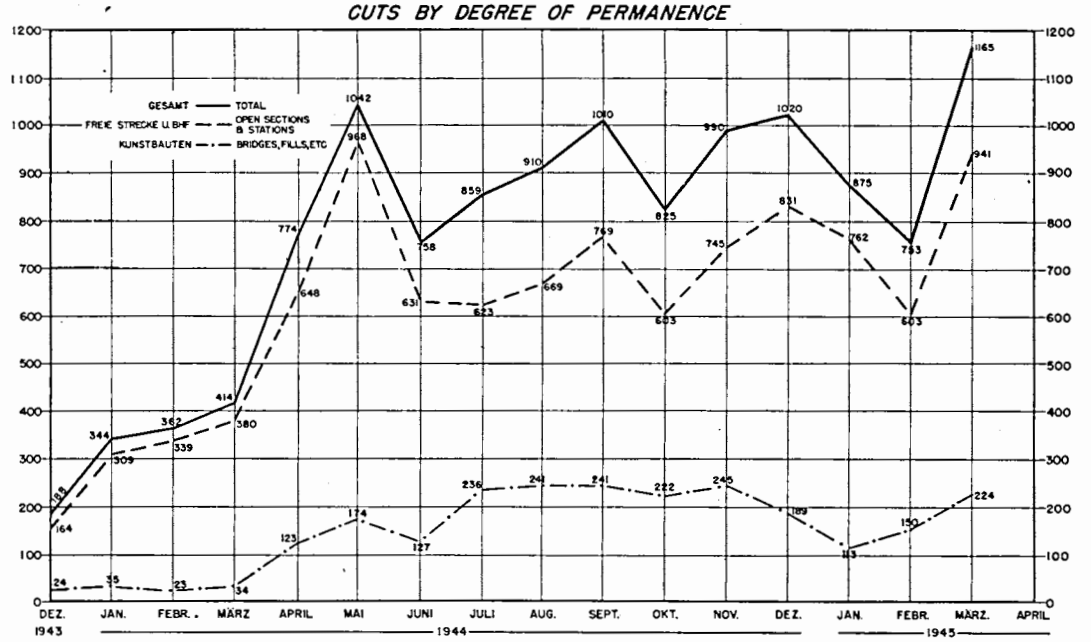
67. The first graph shows the total number of monthly cuts broken down into the more serious ones affecting the serviceability of bridges or fills, and cuts of less enduring nature occurring on open stretches of the lines and in station yards. The increase in semi-permanent blocks from an average of 29 per month prior to "Strangle" to 192 per month average from April 1944 to the end of the campaign reflects the increase in bombing accuracy of B-25 and B-26 medium bombers. This increase in efficiency made possible a change in the tactics of the employment of our medium bomber wings from attacks on rail centers which caused only temporary dislocations to pinpoint bombing of the more vulnerable bridge and fill structures.

68. The second graph shows a breakdown of the total number of cuts by various causes. Blocks caused by Partisan activity and by accidents were normally not detected by photo reconnaissance although the combination of the two represents a surprisingly large percentage of the total blocks occurring on the system.

STRECKENSTÖRUNGEN

INTERDICTION

CUTS BY DEGREE OF PERMANENCE

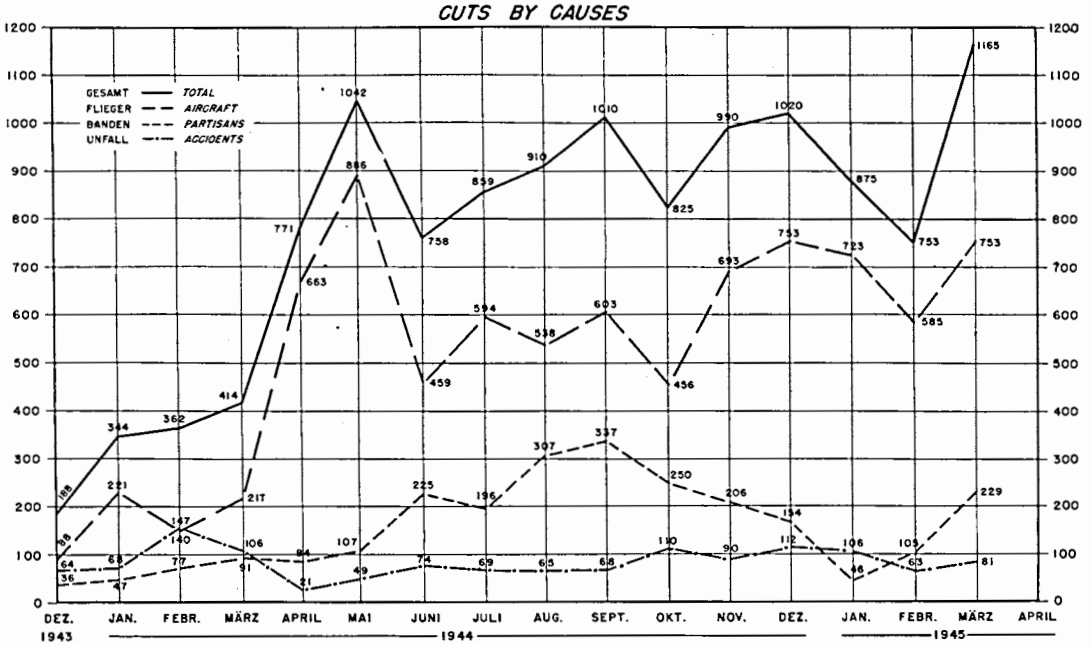


23rd SCU

STRECKENSTÖRUNGEN

INTERDICTION

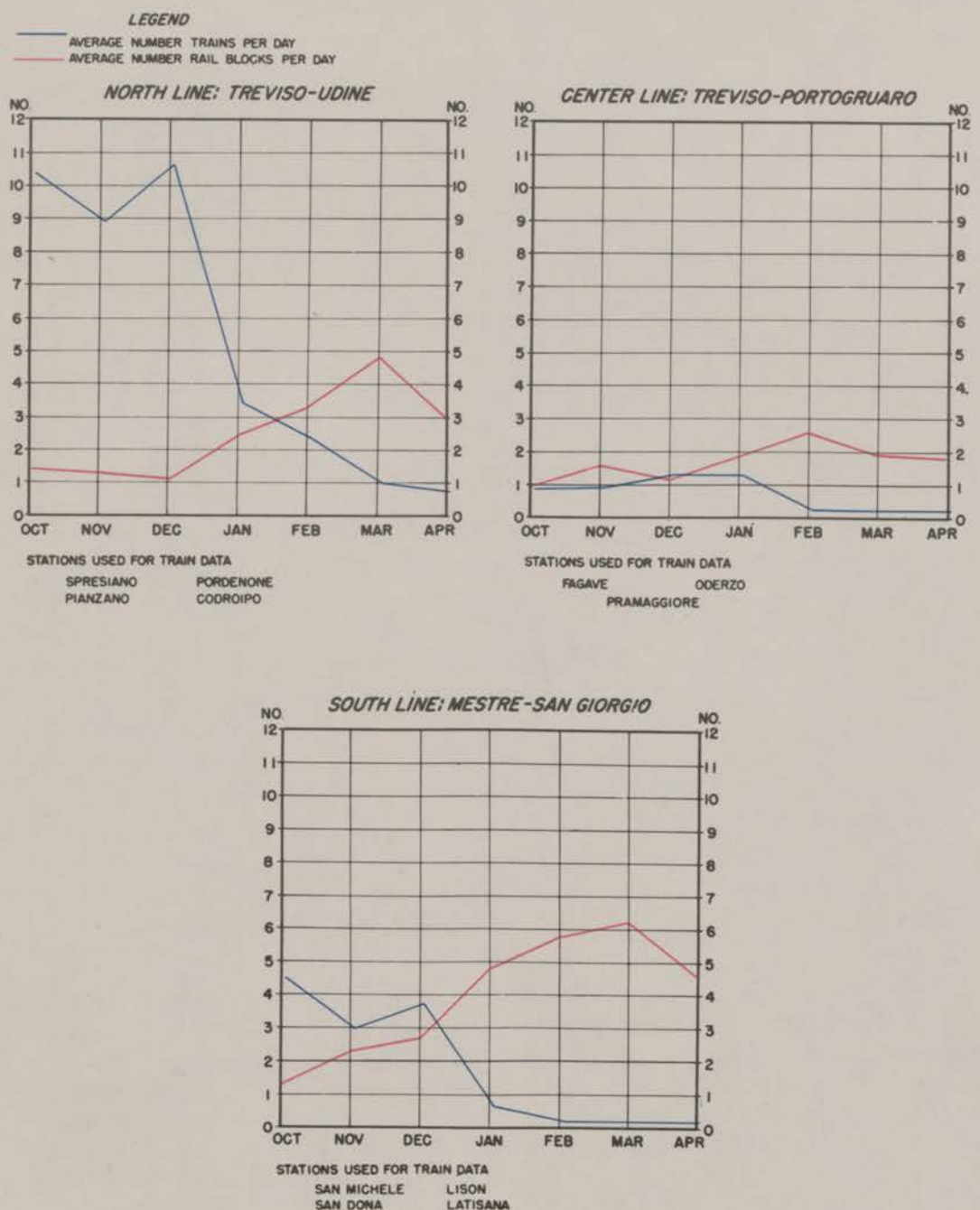
CUTS BY CAUSES



23rd SCU

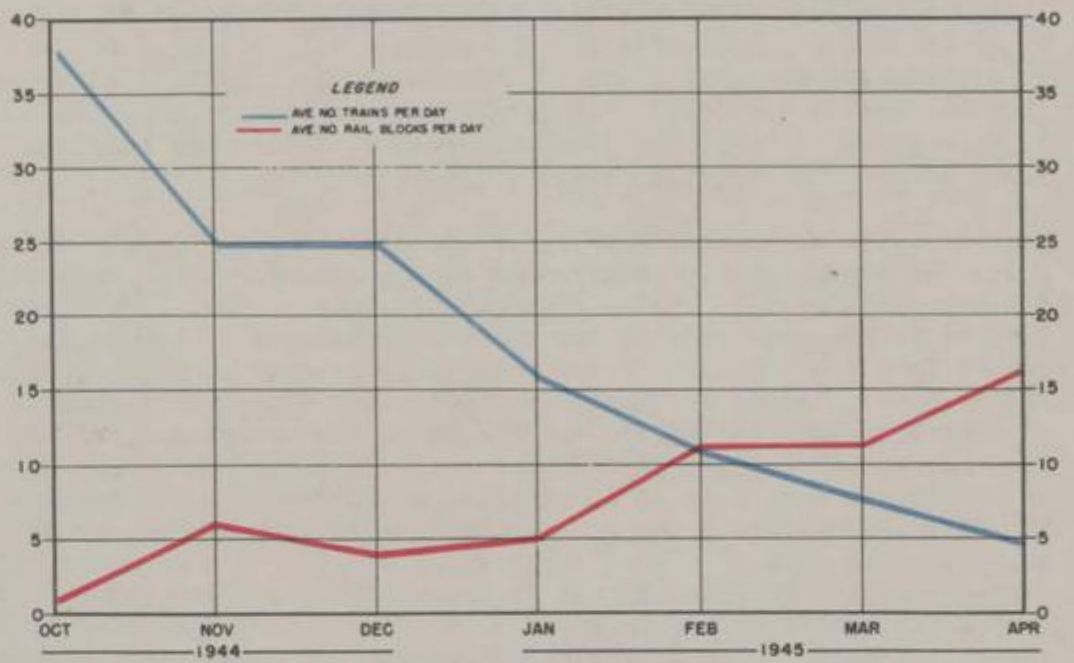
AVERAGE DAILY TRAIN TRAFFIC VS. AVERAGE DAILY RAIL BLOCKS

VENETIAN PLAIN BELT



AVERAGE DAILY TRAIN TRAFFIC VS. AVERAGE DAILY RAIL BLOCKS ON BRENNER ROUTE

DOMEGLIARA TO BOLZANO STATIONS INCLUSIVE



Stations used for Train Data:

Domegliara
Trento
Bolzano

THE EFFECT OF INTERDICTION ON THE VOLUME OF RAIL MOVEMENT

69 The interrogation of high German officials at the Headquarters of General Von Vietinghof, C-in-C Army Group "C", (OBSW) revealed that, in the opinion of those actively engaged in combatting our air "Blockade", the interdiction of the international rail routes coupled with the economic blockade by SWITZERLAND was a decisive factor in the complete, speedy collapse of the Wehrmacht in ITALY. Air attacks on the BRENNER route were the most effective in disrupting the flow of war materials to the Italian front, as the BRENNER provided the most direct route from the Reich to the well-intergrated rail net fanning out over the PO Valley from VERONA. Defense and repair of the BRENNER was always given highest priority.

and as shown later in this article, the General des Transportswesens to OBSW was always able to keep some traffic moving on sections of this most important of German supply lines. Attacks on the three very vulnerable frontier routes in Northeastern ITALY destoyed structures that were most difficult to rebuild. The Germans report that they made no serious effort after January to reopen the TARVISIO and PIEDICOLLE routes for through traffic, but had hoped to reactivate the POSTUMIA route by completing the BOROVNICA diversion in May. Repair efforts in the Northeast were concentrated instead in attempting to keep open the Northernmost of the ~~line~~ parallel lines across the VENETIAN Plain.

70. At the beginning of operation Blockade in the fall of 1944, the minimum daily requirement of supplies for Army Group "C" was reported as 8-10 trains (3000 - 4000 tons). This figure included certain requirements for Italian industries that were employed in the production of war materials, notably ammunition, for the Germans. Later, during the early days of 1945, the economic agreement between the Allies and the Swiss Government cut off the rail routes through SWITZERLAND for the transport of coal and other essential raw materials to the Italian industries, thus forcing the Germans to abandon the program of intensifying Italian production. This coupled with the disorganization of the frontier rail routes reduced the rail imports to the absolute minimum required by Army Group "C" for a static warfare period - 5 trains or 2000 tons daily. As shown below this minimum tonnage was always met, although the actual cargoes were generally off loaded many times and hauled considerable distances by means other than railway.

71. Although "through-traffic" on any of the principal rail routes leading from North ITALY to the Reich was possible, if at all, on only a very few days after the first of 1945, some traffic was always moving on sections of these main routes as the German transport service invariably made use of as much of the serviceable rail net as possible. By off-loading priority cargo or troops at breaks and shuttling around the cuts onto open sections of the line, called "islands", the Germans constantly made the maximum use of some of the rail net. This was a recognized weak link in our "blockade" and was countered by our efforts to space cuts 15 - 20 miles apart hoping thereby to force a longer M/T haul or march. Evidence is available, however, that use was made of "islands" only twelve miles in length. Only on rare occasions of prolonged good weather were we able to build up our interdictions to such a density as to offset this policy. To determine the actual amount of traffic that moved by any method around the blocks, and eventually passed through the zones of interdiction, was a difficult job. Records maintained at the office of the Italian State Railways in VERONA were found to contain many inaccuracies; critical German records of traffic movements were reported as "unavailable - destroyed by

air attack". The accompanying charts are as accurate as possible and present a reasonably true picture of traffic volume.

72. In arriving at the totals plotted in the BRENNER traffic graph, the station records at DOMEGLIARA, at the Southern extremity of the line, TRENTO, principal station between VERONA and BOLZANO, and BOLZANO were used. From these records, the number of trains, excluding single locomotives, (but unfortunately including work trains which could not be distinguished from other traffic) arriving, leaving or passing the individual stations were obtained. Numerically, these break down as follows:

	DOMEGLIARA		TRENTO		BOLZANO		
	Total	Daily Aver.	Total	Daily Aver.	Total	Daily Aver.	Daily Average Entire Line
Oct.	970	31	Records not available		1372	44	38
Nov.	355	12	"	"	1135	38	25
Dec.	475	15	"	"	1092	35	25
Jan.	290	9	65	2	1111	36	16
Feb.	167	6	18	1	756	27	11
Mar.	95	3	68	2	592	19	8
Apr.	22	1	68	2	358	12	5

73. It must be emphasized that these figures do not mean, for example, that an average of five trains moved daily between VERONA and BOLZANO during April. They show that an equivalent of five trains, including repair trains, were working either North or South over that stretch of the BRENNER rail line. It is important to note that traffic records at TRENTO, in the approximate center of the most dense interdiction belt, show that traffic here was practically negligible during the entire period of 1945. On the other hand traffic at DOMEGLIARA, South of the heavily attacked stretch, remained of considerable volume until March, and traffic at BOLZANO, North of the principal zone, was fairly heavy though greatly reduced, until the end of the war.

74. Against the average number of trains moving on the BRENNER is plotted the average number of daily cuts existing on that section of the line. The source of data for the rail cuts was obtained from records of the Italian State Railways and therefore includes cuts caused by activities other than air attacks.

75. In preparing the graphs on the three lines crossing the VENETIAN Plain zone of interdiction in Northeast ITALY the same

method was followed as on the BRENNER graph. The records of three or four small stations on each line were studied and, for each station a monthly total of the arrivals, departures, and through trains was obtained. A monthly average of the traffic on the line was determined by totalling the traffic at all stations and dividing by the number of stations studied. This was further reduced to a daily average. The tabulation of interruptions was compiled from all available records and from the monthly total, an average number of cuts existing daily was obtained.

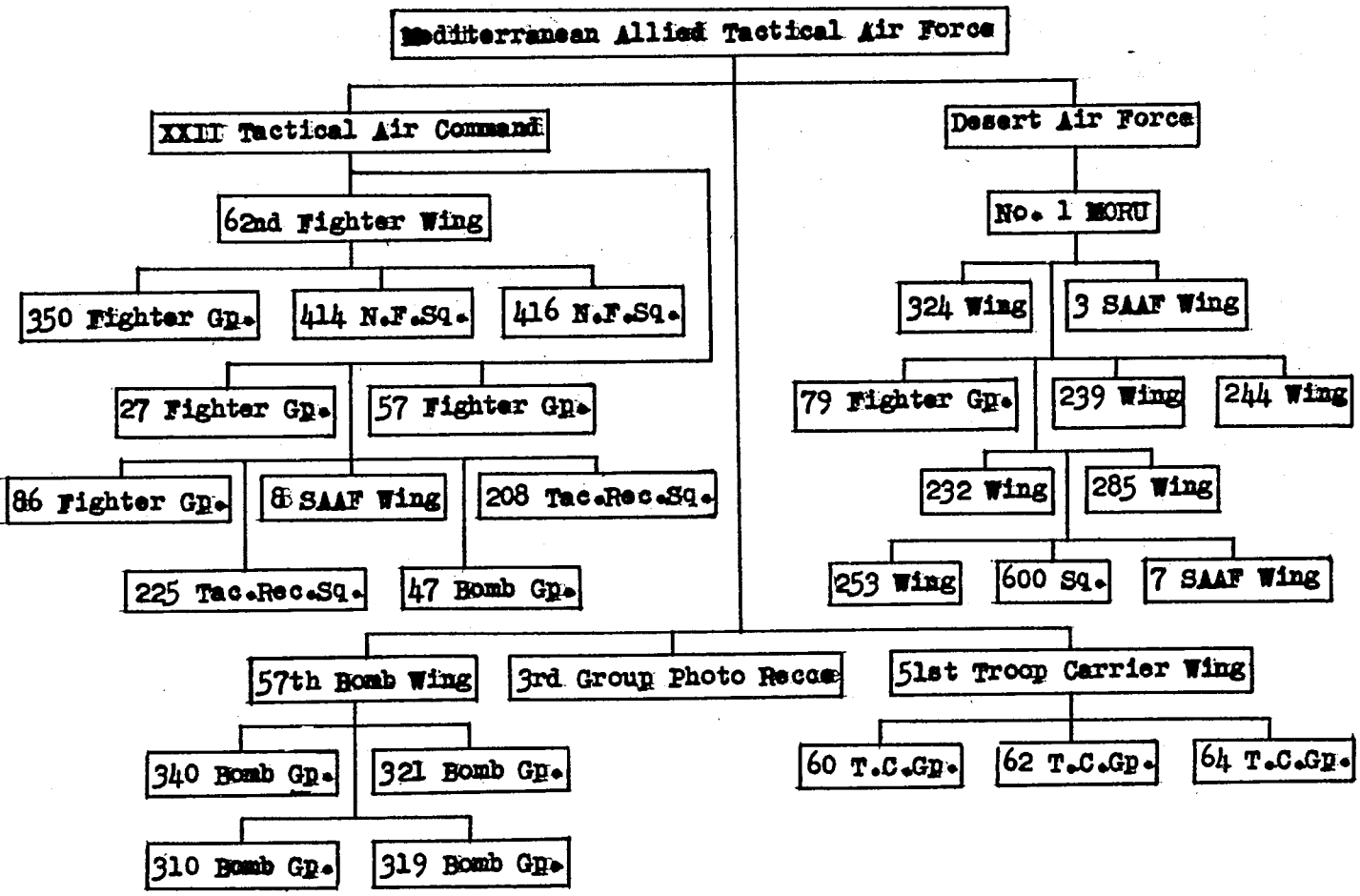
76. Due to unsettled conditions along the Yugoslav border, station records of traffic actually moving over the TARVISIO, PIEDICOLLE and POSTUMIA routes in the Northeastern Frontier zone of interdiction have not yet become available for analysis. It is reasonable to assume, however, that as all three lines suffered from heavy interdiction, the shuttle traffic across the frontier was probably similar in nature and equal in volume to the traffic movement across the VENETIAN Plain belt.

ANNEX A

MEDITERRANEAN ALLIED TACTICAL AIR FORCE

ORDER OF BATTLE AND OPERATIONAL DIRECTIVES

1 January 1945



Type of Aircraft	Squadrons
Spitfire	21
B-25	16
P-47	16
C-47	12
A-20	4
Boston	4
Marauder	4
Mustang	4
P-38	3
Baltimore	3
Kittyhawk	3
Beaufighter	2
Mosquito	1

Nationality	Squadrons
USAAF	49
RAF	25
SAAF	13
RAAF	3
RCAF	1
Brazilian	1
Polish	1

HEADQUARTERS
MEDITERRANEAN ALLIED TACTICAL AIR FORCE
APO 650 U.S.Army

3 November 1944

OPERATIONAL DIRECTIVE)
:
NUMBER 21)

1. Apart from close support of the Armies and counter air force operations, the principal task of the Tactical Air Force during the present phase of the Italian campaign is to destroy and disrupt enemy lines of communication with the object of:

a. Denying all movement by rail to and from ITALY (isolation of ITALY).

b. Reducing the flow of supplies by rail and road from existing dumps in ITALY to enemy forces on the Italian front.

c. Destroying the enemy's means of transport, including fuel supplies, wherever possible.

2. The second priority task for the Tactical Air Force is the destruction of objectives in the Balkans, with the object of creating maximum disruption and destruction of enemy forces attempting to withdraw from the Southern Balkan areas. To accomplish this task, higher authority has directed that the following effort from Desert Air Force be made available for employment against Balkan targets on first priority basis:

3 (SAAF) Wing
253 Wing
232 Wing
4 Squadrons Fighter-bombers

When the above effort cannot be utilized in the Balkans it will revert to its normal role. However, this should not be considered as a rigid allocation of the effort to be employed in the Balkans, as the weight of effort in excess of the above largely depends upon weather conditions in Northern ITALY. On days when non-operational weather prevails in Northern ITALY and suitable conditions exist in the Balkans, the entire MATAF force, in so far as it is practicable, may be utilized in this area.

3. Bomber targets will be nominated by this Headquarters based on priorities as established by the Balkan Air Force. Targets of

opportunity will be forwarded direct from Balkan Air Force to Desert Air Force and met by Desert Air Force in so far as it is practicable with the fighter-bomber force available for Balkan operations.

4. To accomplish our primary objectives, 42nd Bombardment Wing and 57th Bombardment Wing will be directed to effect and maintain lines of interdiction and to destroy specialised items of supply and transport in the following priority:

a. BRENNER Pass.

b. North-East Italian lines

(1) PIAVI River line
(2) BRENTA River line
(3) TAGLIAMENTO River line

c. PO River and ADDA River

d. Fuel, M.T. and locomotives, including repair and maintenance depots.

5. The primary task of the fighter-bomber forces of XXII Tactical Air Command and Desert Air Force in their attacks on communications in ITALY is to completely disrupt rail communications between the PO River and the battle area, extending from the Adriatic coast on the east to PIACENZA on the west, and to impose maximum interference to alternate means of enemy transport in this area, both road and water.

Commanding General, XXII Tactical Air Command, and Air Officer Commanding, Desert Air Force will be responsible for arriving at an arbitrary line of demarkation between areas of responsibility for interdiction of communications south of the PO River subject to current developments in the battle. This Headquarters is to be advised and kept up to date regarding line of demarkation as agreed between commanders.

6. Second priority task of the fighter-bomber forces of XXII TAC and DAF is to disrupt enemy movement in ITALY north of the PO River by destruction of locomotives, trains, motor transport and coastal craft; and to interdict rail lines whenever profitable targets of opportunity are not presented. Normally, XXII TAC will be responsible for the area west of a line running south from VERONA along the ADIGE River to LEGNAGO thence due south to the PO River. DAF area of responsibility will be east of this line.

This dividing line is not to be considered as a firm or rigid barrier between Commands. If weather conditions preclude operations in one area, or if more profitable targets are presented in the adjacent area, the dividing line will be disregarded. Close liaison will be maintained between Commands to meet this contingency.

7. When weather prvents medium bomber operations in ITALY, and it is considered that the BRENNER or northeastern rail routes are in danger of being repaired, fighter-bombers will be directed by this Headquarters against vulnerable targets on these routes until such time as renewed medium effort is possible.

8. ACKNOWLEDGE by signal.

By command of Major General CANNON:

RONALD B. LEES,
Air Commodore,
Senior Air Staff Officer.

OFFICIAL:

/s/ Charles H. Pottenger,
/t/ CHARLES H. POTTENGER,
Colonel, Air Corps,
A-3

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HEADQUARTERS
MEDITERRANEAN ALLIED TACTICAL AIR FORCE
APO 650 U.S.Army

9 January 1945

OPERATIONAL DIRECTIVE)
:
NUMBER 23)

1. Apart from counter air force operations, the principal task of Mediterranean Allied Tactical Air Force during the present phase of the Italian campaign will be to maintain the isolation of Northern ITALY and to disrupt the enemy supply organization, in order that his fighting capabilities may be reduced by the time our ground offensive is resumed.

2. To accomplish this aim, operations against communications will be intensified with the object of:

a. Destroying and maintaining destruction of rail communications between ITALY and the Reich.

b. Destroying the enemy's means of transport, including fuel supplies, whenever possible.

3. Since the ground forces will be engaged primarily in holding operations, there will be no requirement for air effort on the fronts of the armies, except in isolated cases when limited air assistance may be required to gain local objectives or to counter a successful thrust by the enemy.

4. The isolation of Northern ITALY has been effectively achieved from time to time, but periods of non-operational weather often permit the enemy to effect at least partial repair of his vital lines of communications. It is our intention to disrupt communications to such an extent that the enemy will find it beyond his capabilities to recover during the intervening bad weather periods. Therefore, when weather permits, the bulk of the effort of XXII Tactical Air Command and Desert Air Force (both by day and by night), with the exception of that portion of Desert Air Force effort earmarked for the Balkans, will be employed in first priority areas in ITALY. It is realised and accepted that this will permit the enemy a measure of freedom of movement in the PO Valley and a small proportion of air effort must therefore continue to be directed against this area, where, however, the emphasis will be placed on the destruction of motor transport, locomotives and trains rather than on the interdiction of the enemy's complex communication system.

XXII Tactical Air Command

5. The primary task of XXII Tactical Air Command is to destroy communications in north and northeastern ITALY and to disrupt enemy movement by the destruction of locomotives, trains (particularly repair trains) and motor transport. Priority for attack against rail communications is as follows:

a. BRENNER line
b. VICENZA - CASARSA line
c. VICENZA - TREVISO - CASARSA line
d. TRENTO - BASSANO line

6. The second priority task of XXII Tactical Air Command is to disrupt enemy movement and destroy supply dumps and installations whenever profitable targets are presented in the PO Valley.

Desert Air Force

7. Desert Air Force primary tasks are two fold. Pressure must be maintained against the enemy withdrawing thru YUGOSLAVIA, and the forces previously allocated to this task will continue to operate in the Balkans whenever weather permits. The remainder of Desert Air Force effort will be employed primarily in the destruction of rail communications in northeastern ITALY and the disruption of enemy movement by destruction of locomotives, trains (particularly repair trains) and motor transport. Priority for attacks against rail communications is as follows:

a. TARVISIO line (GEMONA - CHIUSAFORTE)
b. PIEDCOLLE line (GORIZIA - CANALE D'ISONZO)
c. POSTUMIA line (LATISANA - SESANA)
d. PADUA - LATISANA (Major part believed temporarily abandoned)

8. The second priority task of Desert Air Force in ITALY is to disrupt enemy movement and destroy supply dumps and installations whenever profitable targets are presented in the Eastern PO Valley.

9. In the attacks on rail communications, fighter-bombers of XXII Tactical Air Command and Desert Air Force will concentrate first on destruction of bridges and diversions of tracks in open country. In the latter case it is important that attacks be pressed against one particular section of line until it is rendered completely unserviceable. Crews will be briefed to be particularly on the alert for repair trains in the vicinity of destroyed or damaged bridges.

10. When weather prohibits attacks on inland targets XXII Tactical Air Command and Desert Air Force effort will be directed against shipping in the Ligurian Sea and Northern Adriatic ports. The object of these attacks will be:

a. Primarily to destroy active shipping which continues to make short runs between enemy occupied ports. (Note: The destruction of five 1000-ton KT ships in the Ligurian Sea and 10 vessels of over 1000 tons in the Northern Adriatic would seriously cripple the enemy's ability to use sea-going craft in any decisive role).

b. The destruction of small naval units, i.e. 1 or 2 man submarines, explosive motor boats, escort and mine laying vessels, thus reducing his power to escort any supply craft or carry out offensive action against our shipping or coasts.

c. A long term policy is the destruction of other ships, usually inactive vessels, which it is estimated that the enemy will employ as block ships to hinder Allied use of ports after capture.

57 Bomb Wing

11. 57th Bombardment Wing will continue to be directed against lines of communication and specialised items of supply and transport in the following general priority:

1st Priority — Blockade of ITALY

BRENNER line.
Railroad bridges over the BRENTA, PIAVE, LAVENZA, and TAGLIAMENTO Rivers.
TARVISION, PIEDCOLLE, and POSTUMIA rail lines.

2nd Priority — Communication targets on the PO and OGLIO Rivers

These targets will be nominated as weather alternates with the object of destroying ot maintaining destruction of permanent railroad bridges over the PO River in order to hamper inter-communications. Attacks on the OGLIO River line will interfere with the evacuation of industrial loot from north-western ITALY.

3rd Priority — Enemy Supplies

It is appreciated that, during recent periods of bad weather, some of the main international railroads have been open to the enemy, and he has been able to build up in ITALY sufficient supplies to carry him over for a considerable period at his present scale of activity. Such supplies are sometime supplemented by Italian industrial activity, which in general now only operates at a very low leval due to the lack of raw material. The object of attacks on 3rd priority objectives, therefore, will be a long term destruction of all known enemy dumps, including industries and storage dumps known to be active.

4th Priority — Communication targets in the Balkans

When weather prohibits attacks on Italian objectives, effort will be diverted to communication targets in YUGOSLAVIA weather permitting.

12. This Headquarters will continue to co-ordinate effort and nominate special targets in the daily bombing directive.

13. This directive supersedes MATAF Operational Directive No.21 of 3 November 1944, except for that part which refers to Balkan operations.

14. ACKNOWLEDGE by signal.

By command of Major General CANNON:

RONALD B. LEES,
Air Commodore,
Senior Air Staff Officer.

OFFICIAL:

/s/ Charles H. Pottenger,
/t/ CHARLES H. POTTENGER,
Colonel, G. S. G.,
Director of Operations.

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		12th A.F. Hist Sect	21 - 22
		AG Files	23
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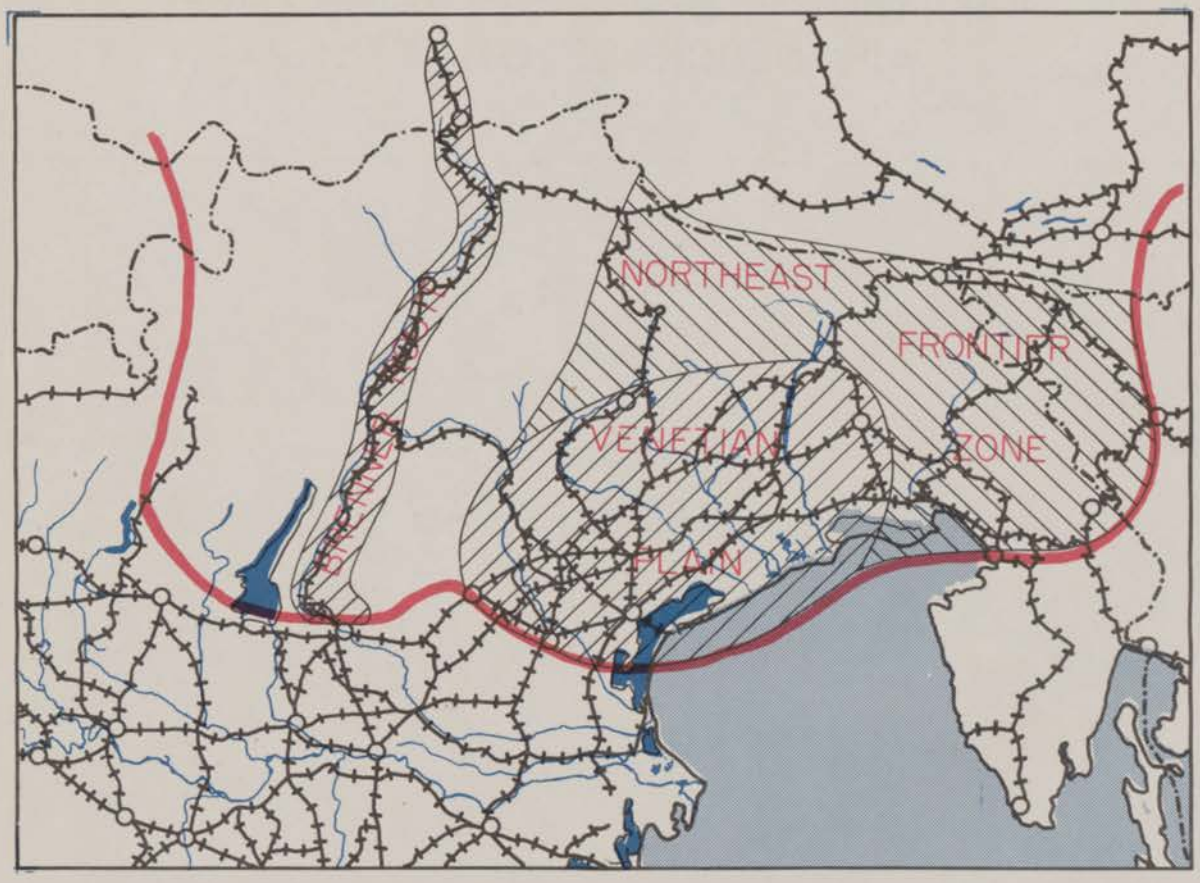
A N N E X B

STATISTICAL ANALYSIS

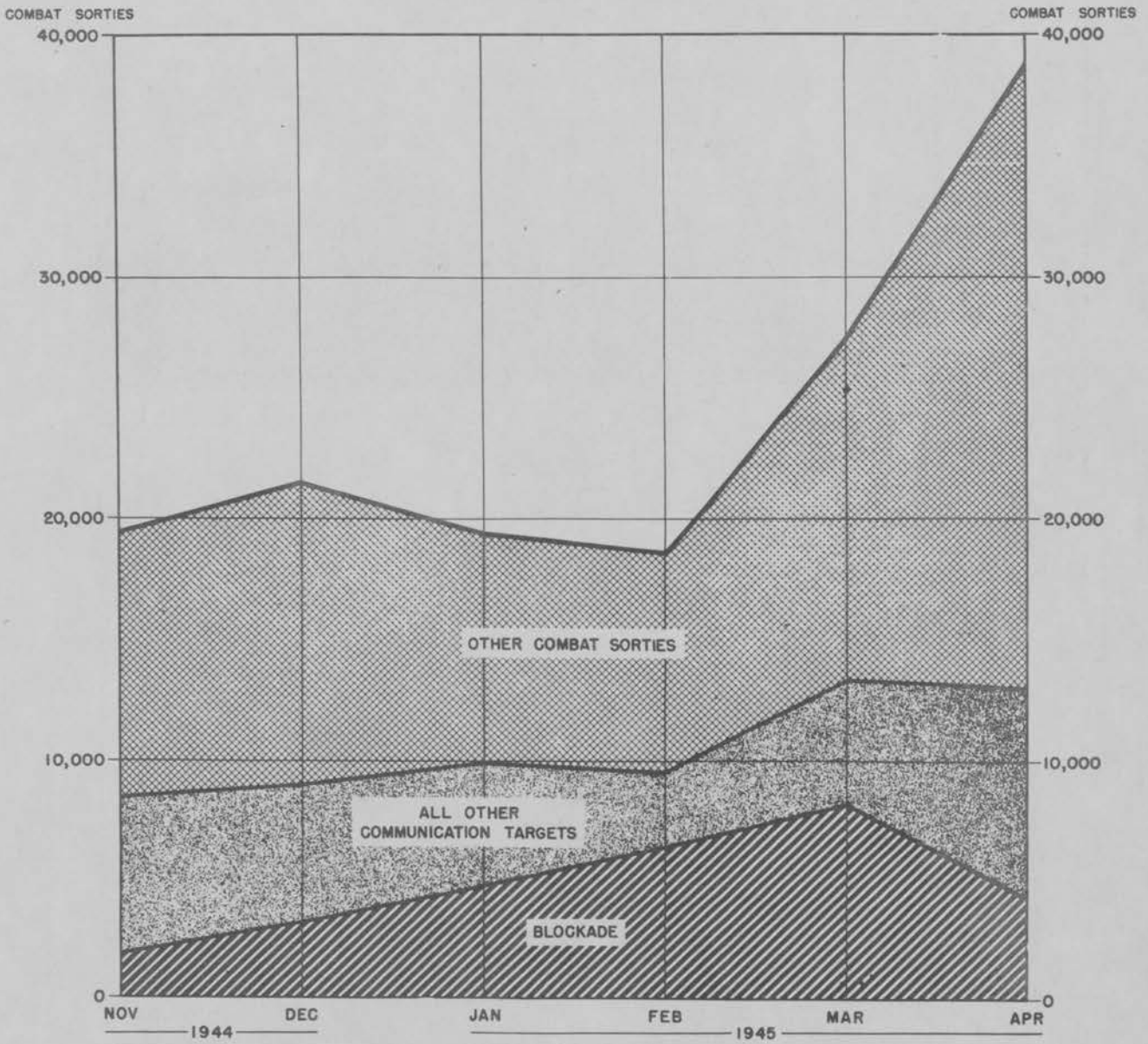


The graphs and statistics on the pages which follow afford a means of comparing the effort which MATAF expended (1) in blockading ITALY and in fulfilling its other responsibilities and (2) within the major zones of interdiction into which the program of "Blockade" logically falls. Over-all "Blockade" figures include all attacks on communications North of the red line on the above map, i.e., the area North of the PO Valley from the Southeastern corner of SWITZERLAND to LJUBLJANA in YUGOSLAVIA. In addition to the major zones of interdiction, this area takes in the secondary routes in the Central ALPS and the communications system of Southern AUSTRIA.

All statistics relating to attacks on enemy communications which are used in the following pages and throughout this report refer only to aircraft which carry out a mission against the enemy. Effective sorties are considered as those on which aircraft drop their bombs on a primary target, secondary target, or target of opportunity. Communications is defined as railroads, marshalling yards, M/T, highways, bridges, canals, and river transport. No account, however, is taken of escort, reconnaissance, fighter sweeps, and strafing attacks.

MEDITERRANEAN ALLIED TACTICAL AIR FORCE

AIR BLOCKADE OF ITALY



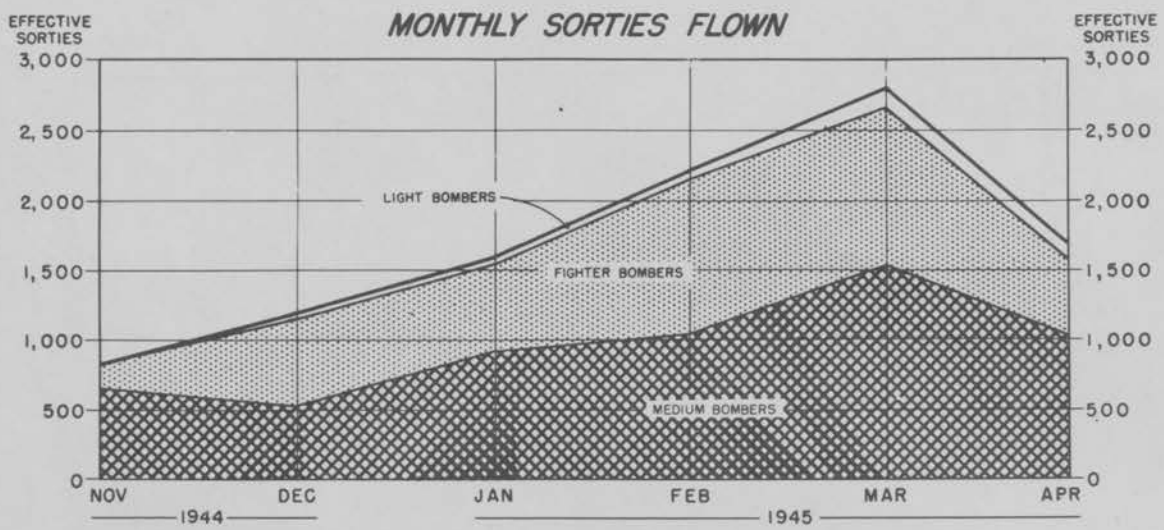
MONTH	NOV	DEC	JAN	FEB	MAR	APR
BLOCKADE	1,844	3,185	4,725	6,364	8,162	4,162
ALL OTHER COMMUNICATION TARGETS	6,624	5,788	5,220	3,148	5,220	8,746
OTHER COMBAT SORTIES	10,937	12,513	9,380	8,995	14,089	25,881
TOTAL	19,405	21,486	19,325	18,507	27,471	38,789

23rd SCU

MEDITERRANEAN ALLIED TACTICAL AIR FORCE

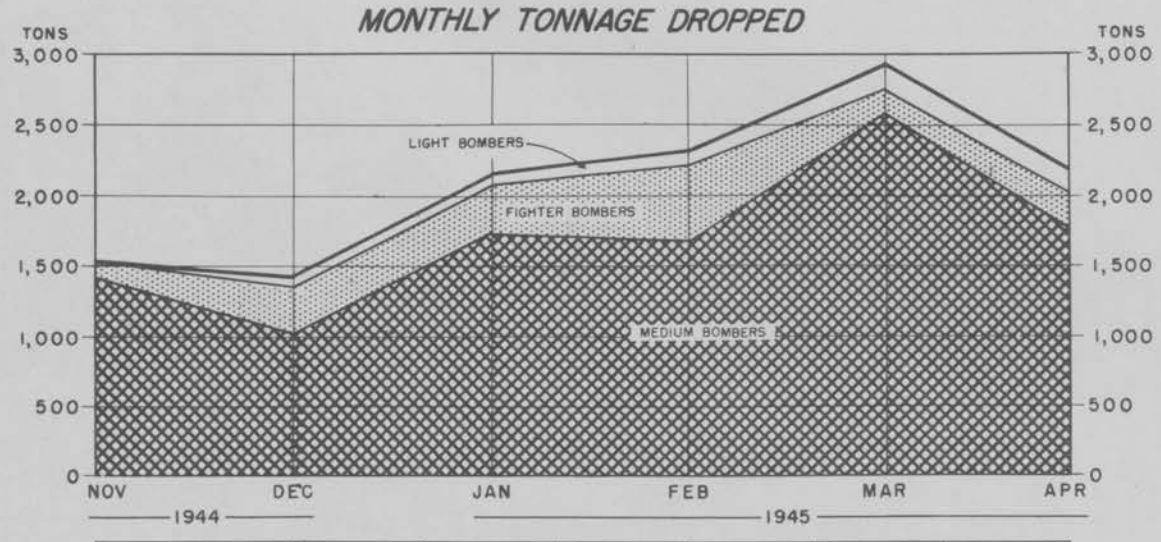
EFFORT ON BRENNER ROUTE

MONTHLY SORTIES FLOWN



MONTH	NOV	DEC	JAN	FEB	MAR	APR
MEDIUM BOMBERS	661	536	923	1,045	1,535	1,044
FIGHTER BOMBERS	168	619	639	1,117	1,148	532
LIGHT BOMBERS	-	46	55	67	121	107
TOTAL	829	1,201	1,617	2,229	2,804	1,683

MONTHLY TONNAGE DROPPED

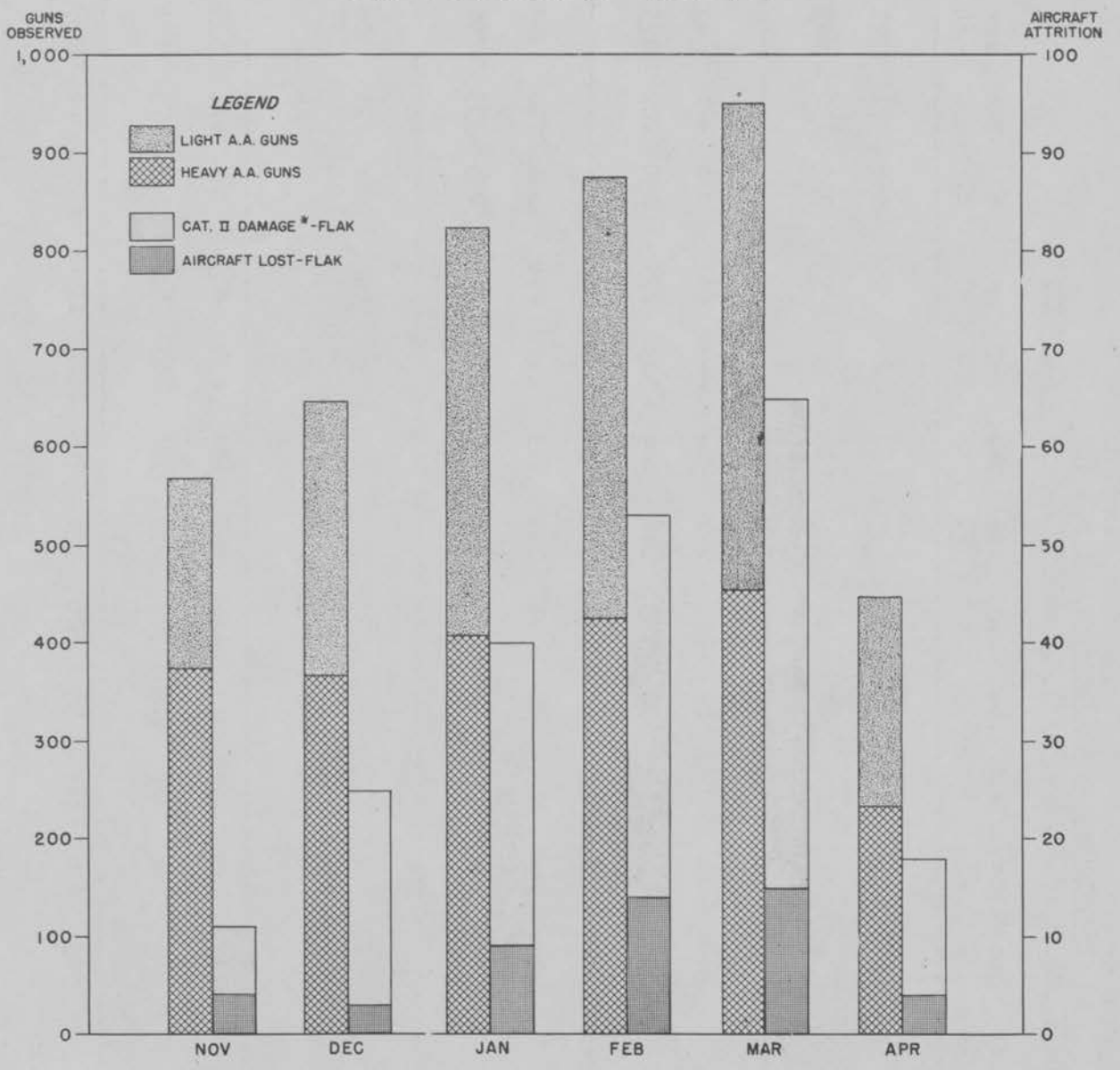


MONTH	NOV	DEC	JAN	FEB	MAR	APR
MEDIUM BOMBERS	1,425	1,026	1,725	1,661	2,095	1,779
FIGHTER BOMBERS	98	332	340	554	660	252
LIGHT BOMBERS	-	69	82	98	181	162
TOTAL	1,523	1,427	2,147	2,313	2,936	2,193

23rd SCU

MEDITERRANEAN ALLIED TACTICAL AIR FORCE

ENEMY A.A. BUILDUP *VS.* ALLIED LOSSES ON BRENNER ROUTE



MONTH		NOV	DEC	JAN	FEB	MAR	APR
A.A. GUNS OBSERVED	HEAVY	374	368	408	424	454	232
	LIGHT	195	278	415	453	498	216
	TOTAL	569	646	823	877	952	448
AIRCRAFT ATTRITION	LOST	4	3	9	14	15	4
	CAT. II DAMAGE	7	22	31	39	50	14
	TOTAL	11	25	40	53	65	18

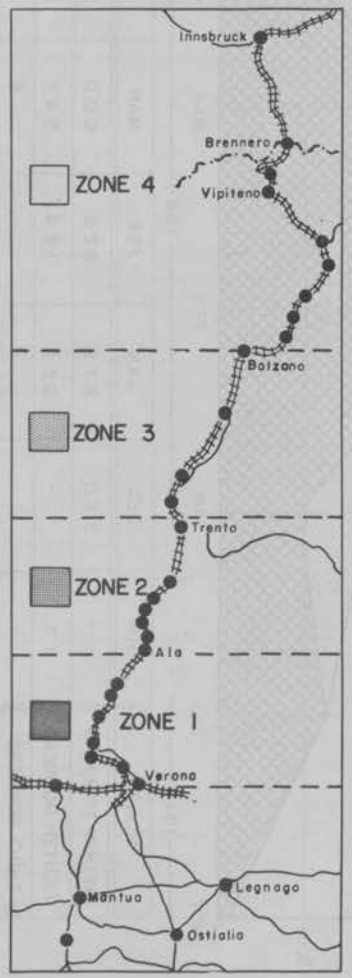
* DAMAGE REPAIRABLE OUTSIDE OF THE UNIT

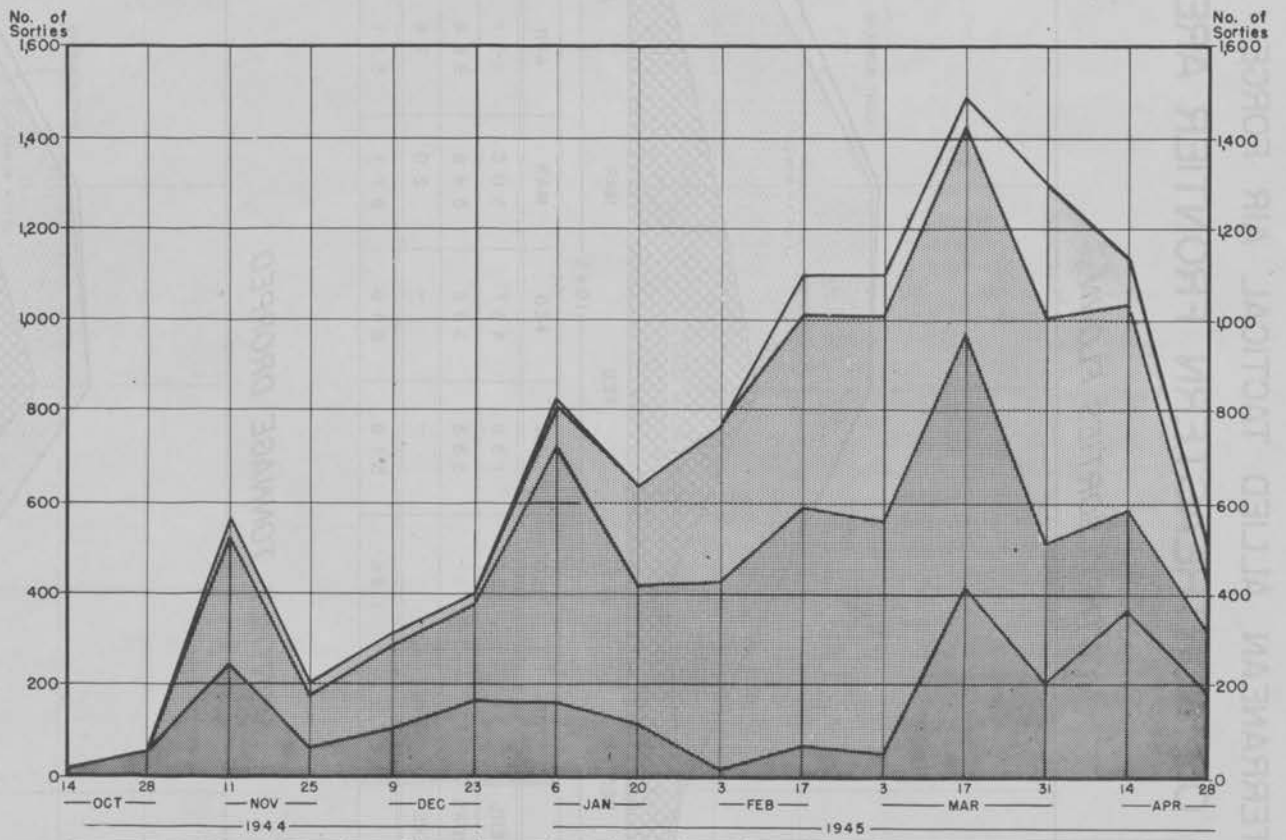
23rd SCU

MEDITERRANEAN ALLIED TACTICAL AIR FORCE
SORTIES ON BRENNER PASS ROUTE BY SECTION AND TYPE AIRCRAFT

Two Week Period Ending		Oct 14	Oct 28	Nov 11	Nov 25	Dec 9	Dec 23	Jan 6	Jan 20	Feb 3	Feb 17	Mar 3	Mar 17	Mar 31	Apr 14	Apr 28
Verona Ala Exc.	MB	18	52	210	15		82	99	35		27		256	71	221	181
	FB & IB			34	44	107	85	64	83	11	40	51	162	132	143	11
Ala - Trento Inc.	MB			248	114	30	58	263	189	230	182	243	325	109	45	132
	FB & IB			32		151	150	295	114	186	343	275	230	202	175	5
Trento - Bolzano Exc.	MB			41	33	18	16	94	173	211	194	278	218	210	163	101
	FB & IB					9	8	3	36	127	302	215	235	353	286	1
Bolzano - Innsbruck	MB										56	94	68	221	106	95
	FB & IB							8						6		
TOTAL	MB	18	52	499	162	48	156	456	397	441	459	615	867	611	535	509
	FB & IB			66	44	267	243	370	233	324	685	541	627	693	604	17
GRAND TOTAL		18	52	565	206	315	399	826	630	765	1144	1156	1494	1304	1139	526

MEDITERRANEAN ALLIED TACTICAL AIR FORCE
SORTIES ON BRENNER PASS ROUTE BY SECTION



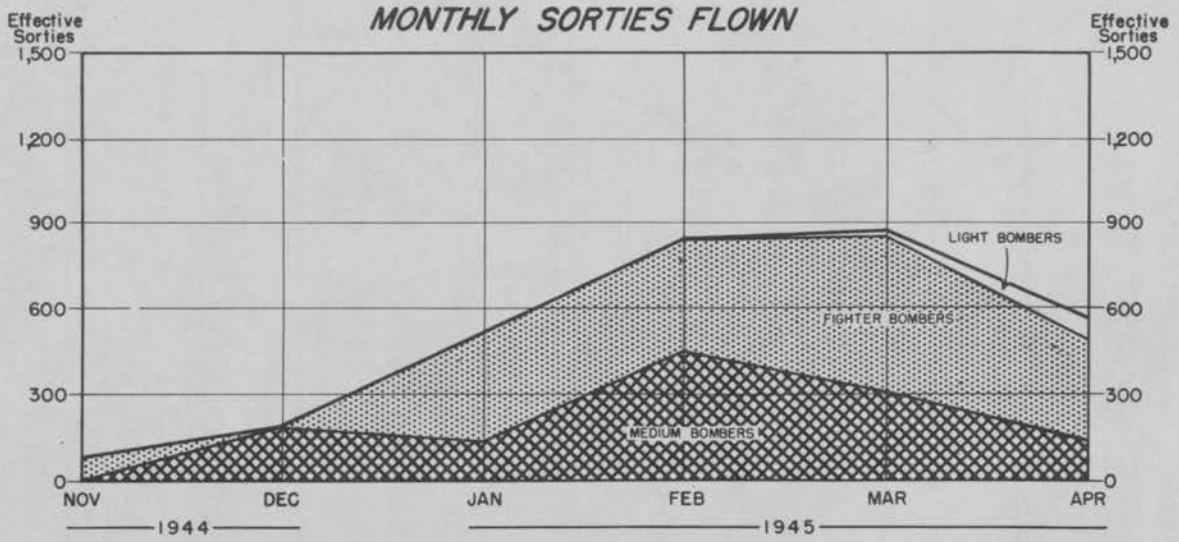


PERIOD	1-14 OCT	15-28 OCT	29 OCT 11 NOV	12-25 NOV	26 NOV 9 DEC	10-23 DEC	24 DEC 6 JAN	7-20 JAN	21 JAN 3 FEB	4-17 FEB	18 FEB 3 MAR	4-17 MAR	18-31 MAR	1-14 APR	15-28 APR
ZONE 1	18	52	244	59	107	167	163	118	11	67	51	418	203	364	192
ZONE 2	–	–	280	114	181	208	558	303	416	525	518	555	311	220	137
ZONE 3	–	–	41	33	27	24	97	209	338	496	493	453	563	449	102
ZONE 4	–	–	–	–	–	–	8	–	–	56	94	68	227	106	95
TOTAL	18	52	565	206	315	399	826	630	765	1144	1156	1494	1304	1139	526

23rd SCU

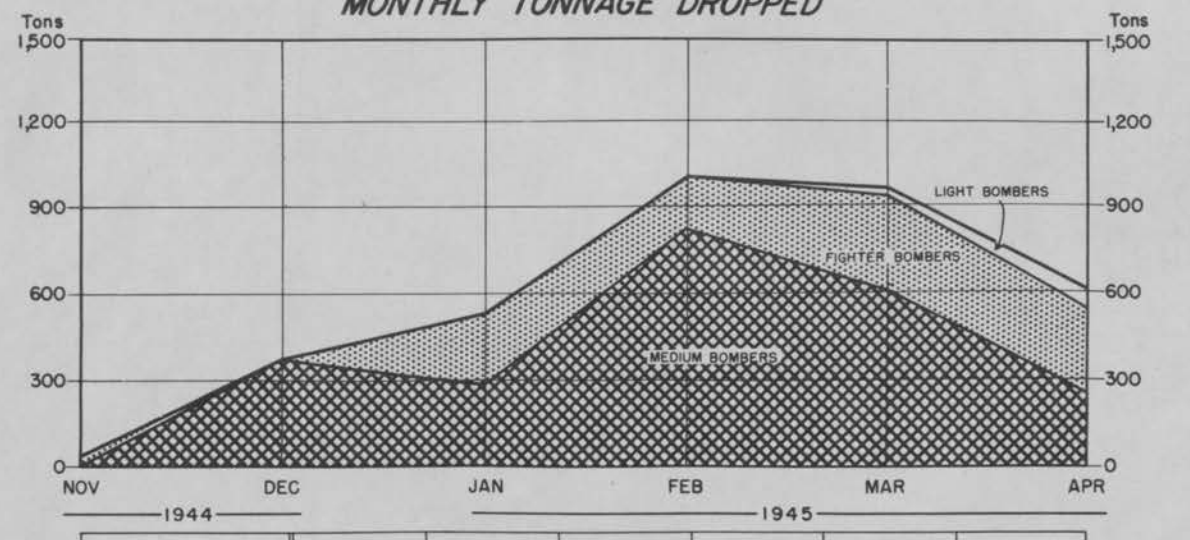
MEDITERRANEAN ALLIED TACTICAL AIR FORCE
EFFORT ON NORTHEASTERN FRONTIER AREA

MONTHLY SORTIES FLOWN



MONTH	NOV	DEC	JAN	FEB	MAR	APR
MEDIUM BOMBERS	-	186	136	457	305	131
FIGHTER BOMBERS	79	-	383	392	546	364
LIGHT BOMBERS	-	-	-	-	20	76
TOTAL	79	186	519	849	871	571

MONTHLY TONNAGE DROPPED



MONTH	NOV	DEC	JAN	FEB	MAR	APR
MEDIUM BOMBERS	-	370	272	825	600	254
FIGHTER BOMBERS	33	-	256	179	347	288
LIGHT BOMBERS	-	-	-	-	18	59
TOTAL	33	370	528	1004	965	601

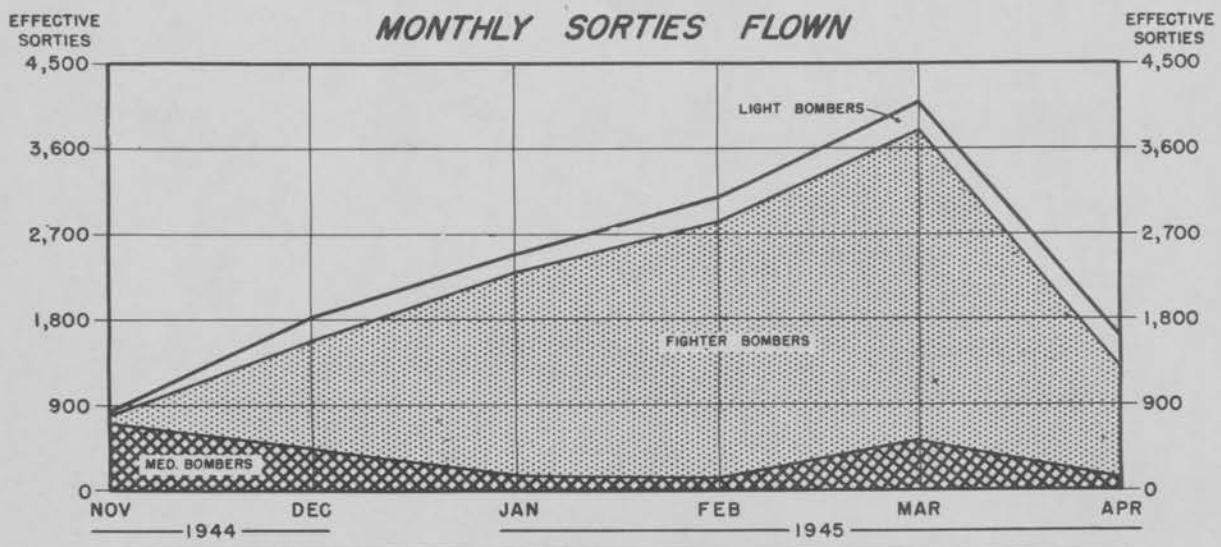
23rd SCU

MEDITERRANEAN ALLIED TACTICAL AIR FORCE EFFORT ON NORTHEASTERN FRONTIER AREA

MONTH		USAAF Sorties	USAAF Tons	RAF Sorties	RAF Tons	TOTALS Sorties	TOTALS Tons
November	Med						
	IB						
	FB			79	33	79	33
						79	33
December	Med	186	370			186	370
	IB					-	-
	FB					-	-
						186	370
January	Med	136	272			136	272
	IB					-	-
	FB	252	199	131	57	383	256
						529	528
February	Med	396	706	61	119	457	825
	IB					-	-
	FB	164	62	228	117	392	179
						849	1004
March	Med	86	171	219	429	305	600
	IB			20	18	20	18
	FB	222	174	324	173	546	347
						871	965
April	Med	33	59	98	195	131	254
	IB	10	12	66	47	76	59
	FB	151	80	213	137	364	288
						571	601

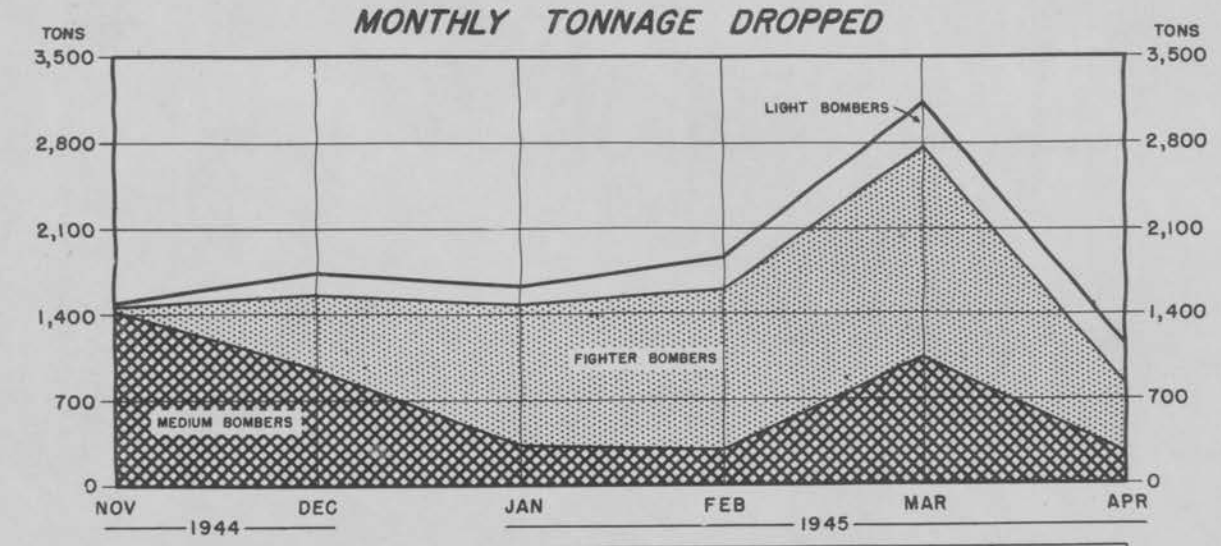
MEDITERRANEAN ALLIED TACTICAL AIR FORCE
EFFORT ON VENETIAN PLAIN

MONTHLY SORTIES FLOWN



MONTH	NOV	DEC	JAN	FEB	MAR	APR
MEDIUM BOMBERS	718	493	163	145	523	127
FIGHTER BOMBERS	68	1,088	2,143	2,691	3,251	1,155
LIGHT BOMBERS	11	222	187	253	313	346
TOTAL	797	1,803	2,493	3,089	4,087	1,628

MONTHLY TONNAGE DROPPED



MONTH	NOV	DEC	JAN	FEB	MAR	APR
MEDIUM BOMBERS	1,429	959	310	282	1,026	245
FIGHTER BOMBERS	30	591	1,159	1,313	1,754	577
LIGHT BOMBERS	15	193	159	258	336	319
TOTAL	1,464	1,743	1,628	1,853	3,116	1,141

23rd SCU

MEDITERRANEAN ALLIED TACTICAL AIR FORCE EFFORT ON VENETIAN PLAIN

MONTH		USAAF Sorties	USAAF Tons	RAF Sorties	RAF Tons	TOTALS Sorties	TOTALS Tons
November	Med	718	1429			718	1429
	IB	11	15			11	15
	FB	46	23	22	7	68	30
						797	1464
December	Med	238	454	255	505	493	959
	IB	8	9	214	184	222	193
	FB	685	371	403	220	1088	591
						1803	1743
January	Med	101	195	62	115	163	310
	IB	9	6	178	153	187	159
	FB	1426	813	717	346	2143	1159
						2493	1628
February	Med	78	148	67	134	145	282
	IB	103	120	150	138	253	258
	FB	1685	935	1006	378	2691	1313
						3089	1853
March	Med	260	510	263	516	523	1026
	IB	236	271	77	65	313	336
	FB	1318	956	1933	798	3251	1754
						4087	3116
April	Med	66	129	61	116	127	245
	IB	97	116	249	203	346	319
	FB	575	337	580	240	1155	577
						1628	1141

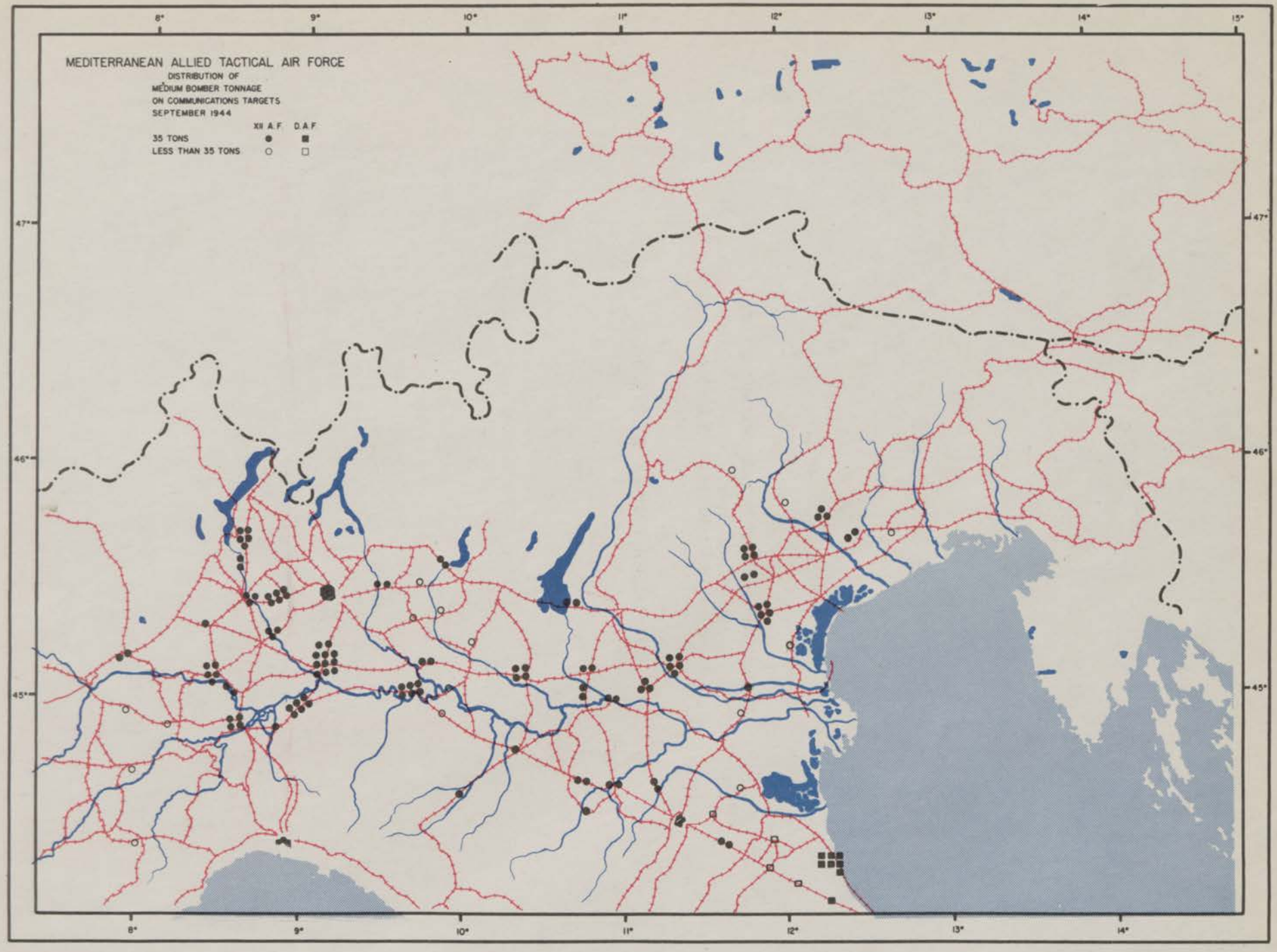
A N N E X C

BOMB TONNAGE MAPS

Distribution of Medium Bomber Effort

on Communications Targets

SEPTEMBER 1944 -- APRIL 1945

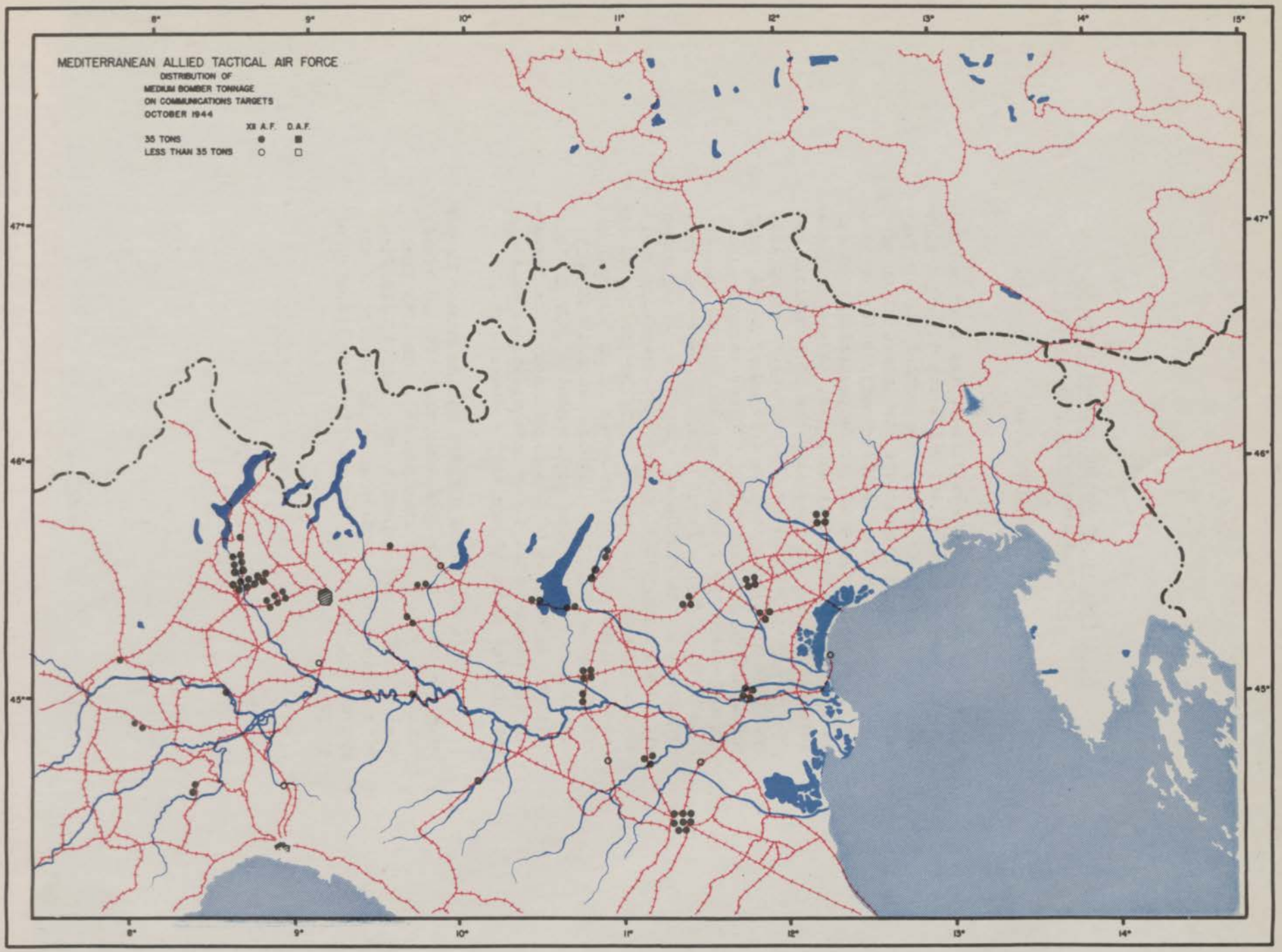

MEDITERRANEAN ALLIED TACTICAL AIR FORCE
DISTRIBUTION OF
MEDIUM BOMBER TONNAGE
ON COMMUNICATIONS TARGETS
SEPTEMBER 1944
XII A.F. D.A.F.
35 TONS
LESS THAN 35 TONS
8°
9°
10°
11°
12°
13°
14°
15°
47°
46°
45°

Distribution of Medium Bomber Tonnage on Communications Targets

SEPTEMBER 1944

September operations of the American medium bombers were characterized primarily by a widespread dispersion of effort throughout the PO Valley. The primary object was the interdiction of the forward passage of supplies across the PO River. Here the enemy repair effort on permanent road and rail bridges, previously sluggish, became active at several points. As a result, the PO crossings received a good proportion of the month's attention. Heaviest effort was laid on bridges at PAVIA, PIACENZA, and CASALE MONFERRATO. Other targets given emphasis were the bridges over the TICINO West of MILAN, the BRENTA - first of "inner belts" of interdiction in the Northeast - and to a lesser extent over the PIAVE. Still other objectives were scattered throughout the Central PO Valley either on the lateral lines North of the River or on the rail net converging on BOLOGNA. Although almost entirely committed to saturation bombardment of RIM INI's defenses in support of the Eighth Army, the Marauders spared some effort for marshalling yards and a road bridge close to the battle area.

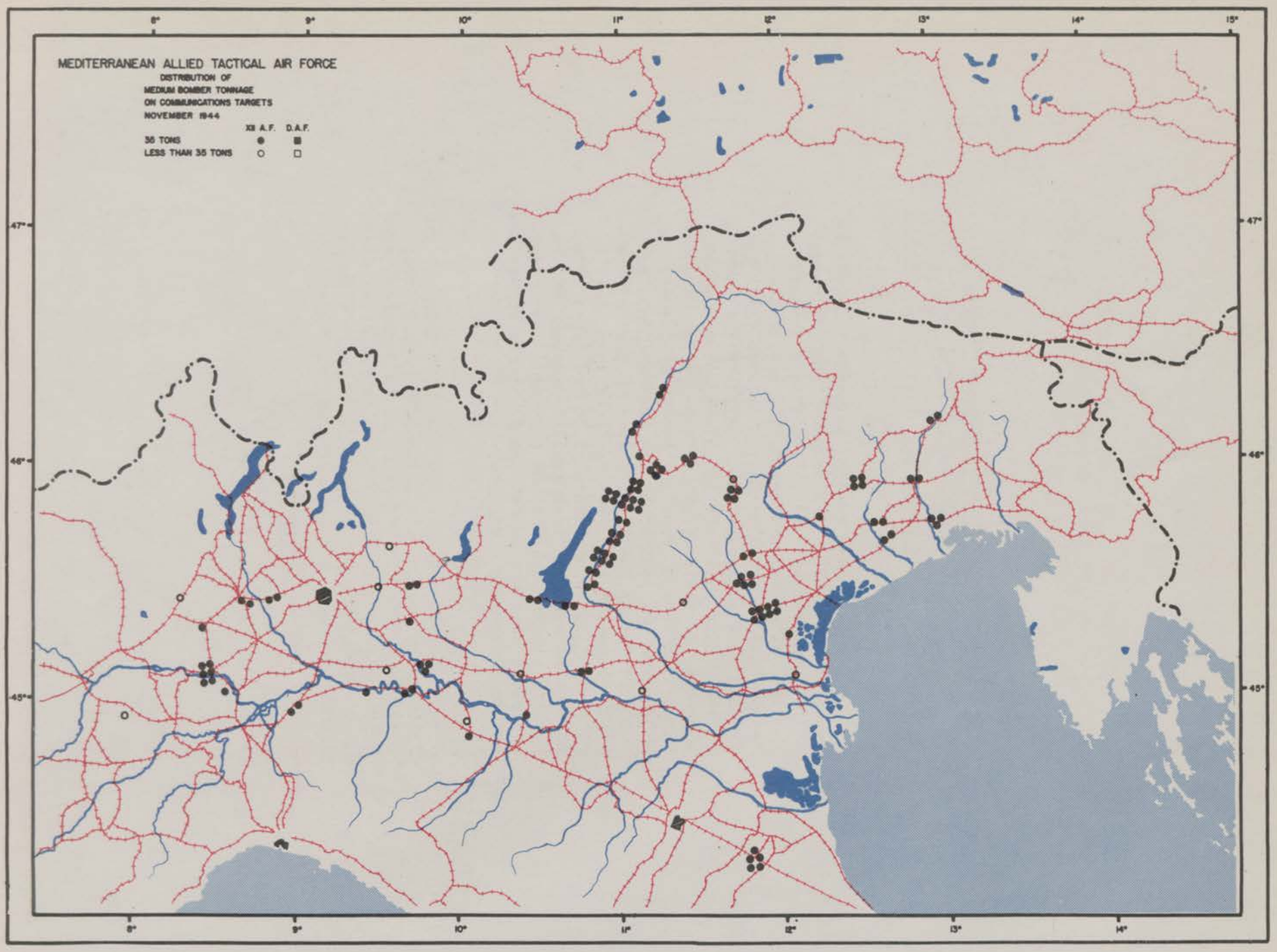
At this time MATAF's medium bomber forces were composed of the 42nd Bomb Wing with 18 squadrons of B-26's (6 of them French), the 57th Bomb Wing with 12 squadrons of B-25's, and 3 SAAF Wing with 4 squadrons of Marauders. At the end of the month, the French Air Force units were transferred to ETO.


MEDITERRANEAN ALLIED TACTICAL AIR FORCE
DISTRIBUTION OF
MEDIUM BOMBER TONNAGE
ON COMMUNICATIONS TARGETS
OCTOBER 1944
XII A.F. D.A.F.
35 TONS
LESS THAN 35 TONS
8°
9°
10°
11°
12°
13°
14°
15°
47°
46°
45°

Distribution of Medium Bomber Tonnage on Communications Targets

OCTOBER 1944

In October weather severely reduced the medium effort. The PO River continued to occupy much of the bombers' attention from 1 through 11 October, after which date all but one of the permanent road and rail crossings between TURIN and the sea were unserviceable. GALLIATE and MAGENTA on the TICINO River continued subject to repeated bombardment, while effort on the BRENTA and PIAVE Rivers slackened. From 11 through 15 October the B-25's and B-26's dropped 271 tons of bombs on road bridges in the BOLOGNA area as part of Operation "Pancake" which was designed to assist the Fifth Army in a breakthrough to the city. The month also saw the first small beginnings of MATAF's program against the BRENNER. The Marauders stood down throughout the month due to weather and unserviceable airfields.

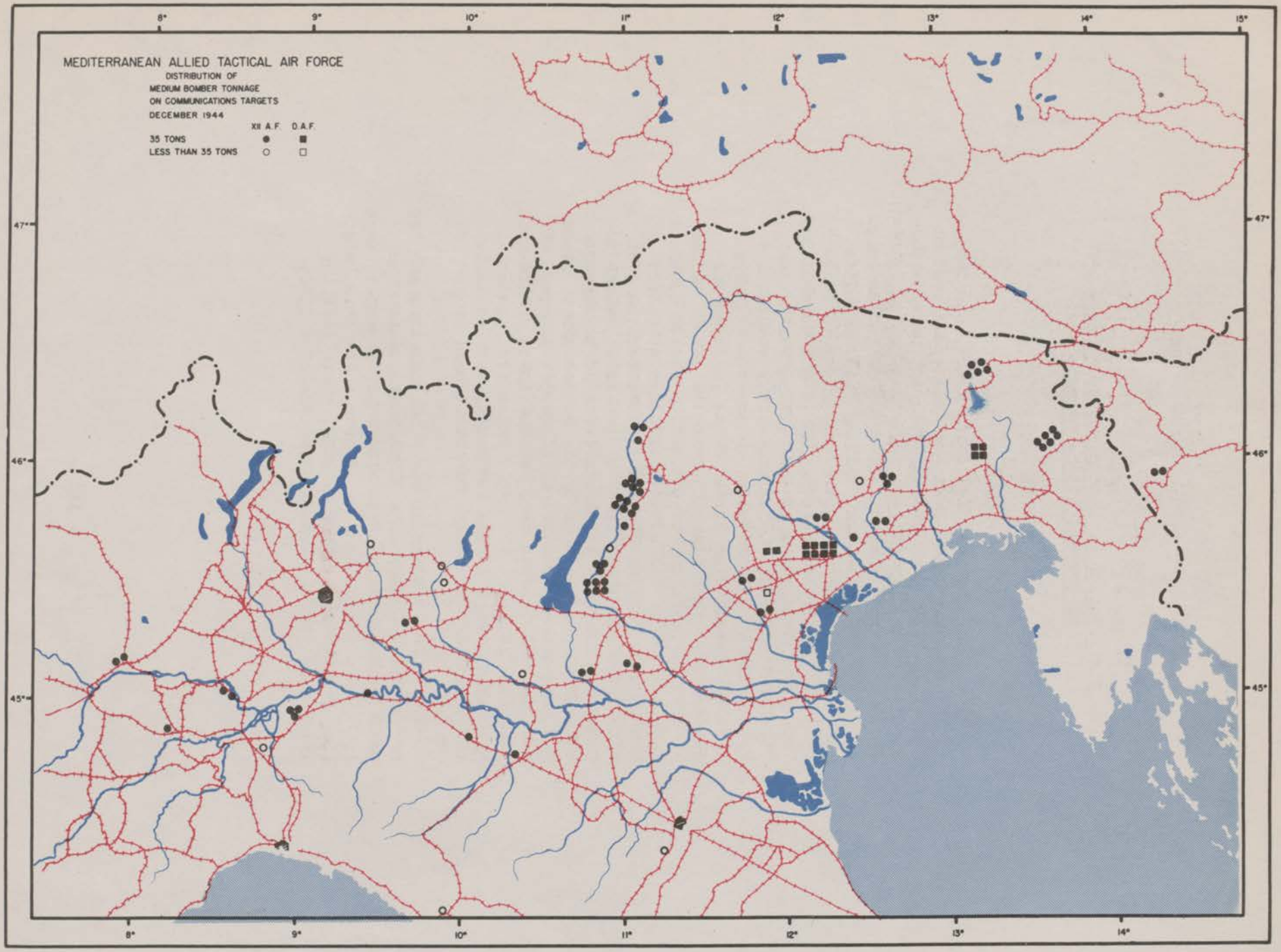

MEDITERRANEAN ALLIED TACTICAL AIR FORCE
DISTRIBUTION OF
MEDIUM BOMBER TONNAGE
ON COMMUNICATIONS TARGETS
NOVEMBER 1944
XII A.F. D.A.F.
35 TONS
LESS THAN 35 TONS
8°
9°
10°
11°
12°
13°
14°
15°
47°
46°
45°

Distribution of Medium Bomber Tonnage
on Communications Targets

NOVEMBER 1944

In November, following a complete revision of bombing priorities, the full scale medium bomber campaign to blockade ITALY got under way. The two bomb wings dropped 1425 tons on the BRENNER Railway during the month and 245 tons on the loop line from TRENTO to the VENETIAN Plain. B-25's and B-26's delivered another 1429 tons of bombs to rail bridges in Northeastern ITALY and established lines of interdiction at the BRENTA, PIAVE, and TAGLIAMENTO Rivers. A strong effort was still maintained in the PO Valley, where the principal line of interdiction North of the PO River was shifted East from the TICINO to the ADDA. On the PO itself, seven out of a total of eleven missions were devoted to the sturdy structure of CASALE MONFERRATO. On 16, 17, and 19 November the 57th Wing attacked FAENZA road bridges as a prelude to Operation "Harry", which was designed to support the assault on the town by the Eighth Army. At the same time nine missions of B-25's dropped 300 tons on rail bridges deep in YUGOSLAVIA and beyond the limits of the map. Marauders, operating on only two days during the month, were exclusively occupied with enemy concentrations.

On 15 November the 42nd Bomb Wing and two of its three groups (the 319th Bombardment Group having passed to the 57th Wing on 10 November) were transferred to control of ETO and a few days later they departed for DIJON, FRANCE. This left the Twelfth Air Force with 16 squadrons of B-25's.

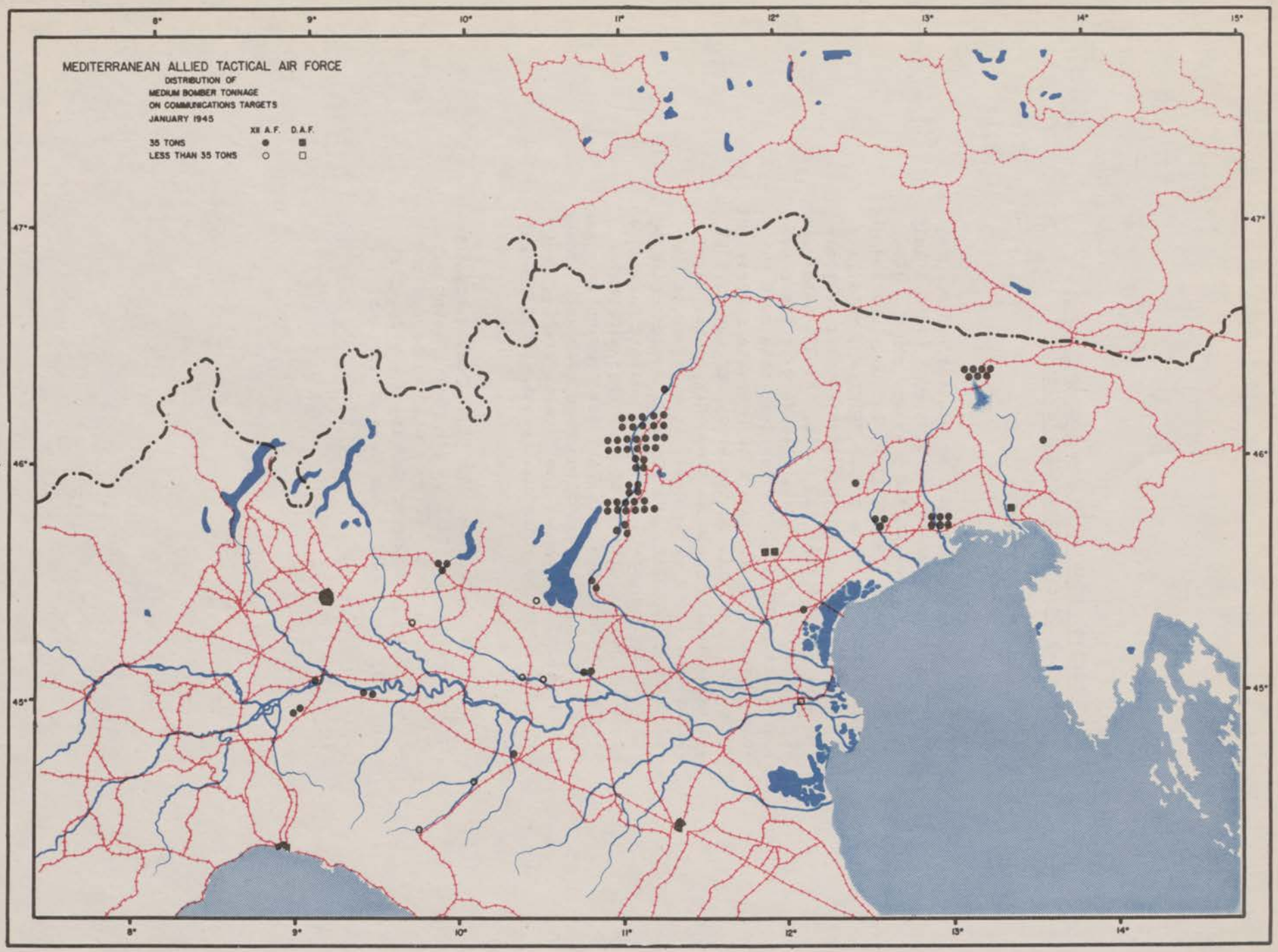

MEDITERRANEAN ALLIED TACTICAL AIR FORCE
DISTRIBUTION OF
MEDIUM BOMBER TONNAGE
ON COMMUNICATIONS TARGETS
DECEMBER 1944
XII A.F. D.A.F.
35 TONS
LESS THAN 35 TONS
8°
9°
10°
11°
12°
13°
14°
15°
47°
46°
45°

Distribution of Medium Bomber Tonnage on Communications Targets

DECEMBER 1944

In December, due to weather and reduced strength, the medium effort dropped to almost half of what it had been in the previous month. 1026 tons fell on the BRENNER Line, but only one medium bomber attack was made on the TRENTO-CITTADELLA loop-line, which became a fighter-bomber responsibility. In the VENETIAN Plain, the 238 tons which the B-25's dropped on rail bridges over the BRENTA, PIAVE, and LIVENZA Rivers was less than half the tonnage which the Marauders of Desert Air Force put on marshalling yards in the area. Of these, TREVISO was hardest hit. Late in the month, a new target system came under attack as B-25's struck at the TARVISIO, PIEDICOLLE, and POSTUMIA Routes close to the frontier. Operations in the western part of the PO Valley were primarily of a weather alternate nature, for Northwestern ITALY was frequently clear while the priority objectives were overcast. These attacks served to hamper the flow of traffic East and North from the industrial centers of TURIN and GENOA.

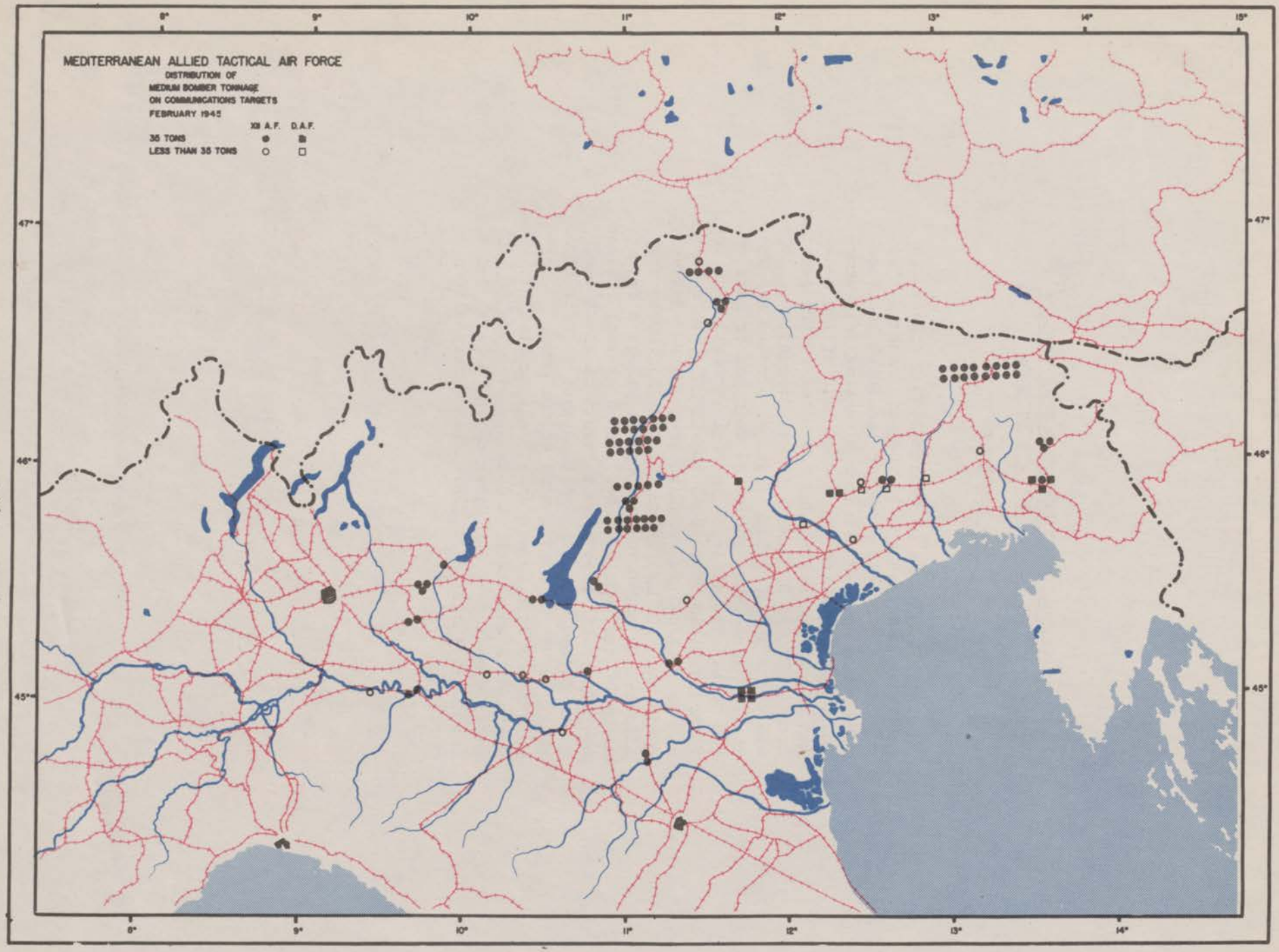
On 31 December the 319th Bomb Group flew its last mission in ITALY. Its redeployment cut MATAF's medium bomber forces to 12 squadrons of B-25's and 4 squadrons of Marauders - a level at which they remained for the rest of the war.


MEDITERRANEAN ALLIED TACTICAL AIR FORCE
DISTRIBUTION OF
MEDIUM BOMBER TONNAGE
ON COMMUNICATIONS TARGETS
JANUARY 1945
XII A.F. D.A.F.
35 TONS
LESS THAN 35 TONS
8°
9°
10°
11°
12°
13°
14°
15°
47°
46°
45°

Distribution of Medium Bomber Tonnage on Communications Targets

JANUARY 1945

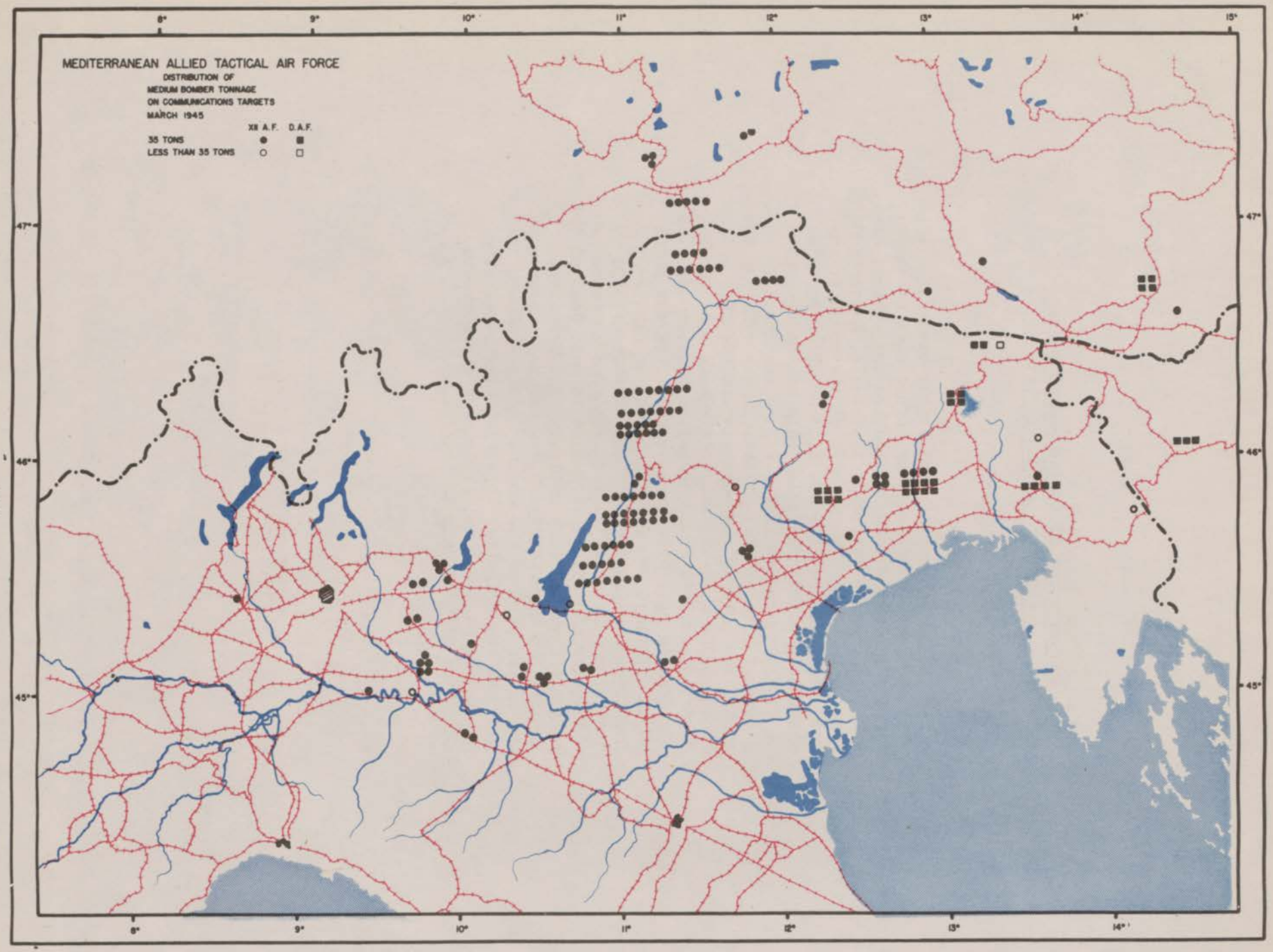
The shift of medium bomber operations North and East was accelerated in January. The BRENNER Line received 63% of the total bomb tonnage which the B-25's expended against all communications targets. More than half of the medium effort on the BRENNER was aimed at the section from TRENTO to BOLZANO. Primary target was LAVIS, where the AVISIO Viaduct, its diversion, and the station yards were subjected to a bombardment of 469 tons. The river belts of interdiction in the VENETIAN Plain, except at the LIVENZA, were left almost entirely to the fighter-bombers. Instead, DOGNA and CHIUSAFORTE on the TARVISIO Route were attacked in strength. In the PO Valley a large share of the bombing was directed at rail bridges over the OGLIA River, as a result of which the River formed a barrier to East-West traffic from MILAN to VERONA during most of the month. The Marauder effort, again drastically curtailed, was limited to an attack on a bridge over the PO, another over the ISONZO River on the coastal railroad, and a strike at CASTELFRANCO Marshalling Yard.


MEDITERRANEAN ALLIED TACTICAL AIR FORCE
DISTRIBUTION OF
MEDIUM BOMBER TONNAGE
ON COMMUNICATIONS TARGETS
FEBRUARY 1945
XII A.F. D.A.F.
35 TONS
LESS THAN 35 TONS
8°
9°
10°
11°
12°
13°
14°
15°
47°
46°
45°

Distribution of Medium Bomber Tonnage on Communications Targets

FEBRUARY 1945

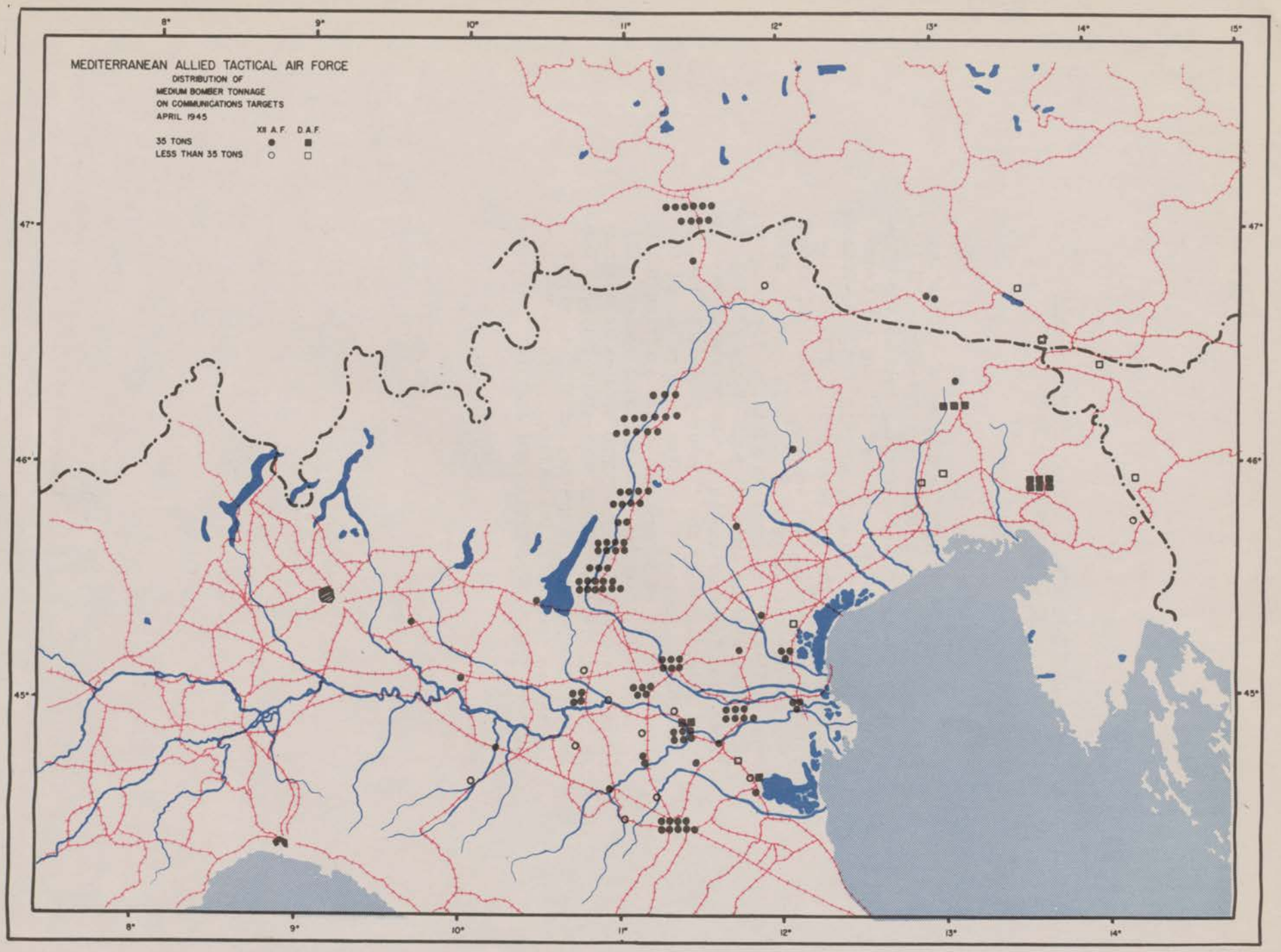
In February the Mitchells maintained approximately the same scale of effort against the BRENNER Line that they had reached in January. However the results were more impressive, as the mediums began in the second half of the month to extend their sphere of operations North of BOLZANO, ultimately reaching a point only six miles South of the Austrian frontier. B-25's continued to supplement fighter-bomber attacks in the VENETIAN Plain, but it was only on the Northeastern frontier routes that an effort at all comparable with the BRENNER Campaign was laid on. The medium bombers unloosed 557 tons on rail bridges at CHIUSAFORTE and DOGNA on the TARVISIO Route and 118 tons on CANALE D' ISONZO on the PIEDICOLLE Line. Bridges in the North Central PO Valley still received some attentio, but the number of weather alternate targets West of the ADDA River was sharply reduced. The Marauders' campaign in the VENETIAN Plain resumed momentum in the latter part of the month. GORIZIA marshalling yard was the principal objective with other blows falling on stations and bridges on the Northern rail line from NERVESA to CASARSA.


MEDITERRANEAN ALLIED TACTICAL AIR FORCE
DISTRIBUTION OF
MEDIUM BOMBER TONNAGE
ON COMMUNICATIONS TARGETS
MARCH 1945
XII A.F. D.A.F.
35 TONS
LESS THAN 35 TONS
8°
9°
10°
11°
12°
13°
14°
15°
47°
46°
45°

Distribution of Medium Bomber Tonnage on Communications Targets

MARCH 1945

In March MATAF's program of blockading ITALY built up to an impressive crescendo. B-25's sent 2095 tons of bombs crashing down on the BRENNER Route, which they attacked all the way from SAN AMBROGIO to STEINACH, AUSTRIA. Fighter-bombers had taken over the job keeping the LAVIS objectives unserviceable, and the B-25's heaviest effort was now devoted to SANT' M ICHELE. A strong effort was applied to the VENETIAN Plain, as the bombers struck at bridges over all four of the coastal rivers. The frontier routes in the Northeast were too well interdicted by the fighter-bombers to need much attention. Instead the medium bombers pushed further North to smash bridges on the Austrian rail lines feeding into the international routes. 411 tons were dropped on the OGLIO bridges in weather alternate missions in the Central PO Valley. Marauders too put out an unequalled effort, all of which was devoted to marshalling yards in Northeastern ITALY, YUGOSLAVIA, and AUSTRIA.


MEDITERRANEAN ALLIED TACTICAL AIR FORCE
DISTRIBUTION OF
MEDIUM BOMBER TONNAGE
ON COMMUNICATIONS TARGETS
APRIL 1945
XII A.F. D.A.F.
35 TONS
LESS THAN 35 TONS
8° 9° 10° 11° 12° 13° 14° 15°
47° 46° 45°

Distribution of Medium Bomber Tonnage on Communications Targets

APRIL 1945

In April, as the Allied Armies unleashed their long awaited offensive, the brunt of the bomber attack shifted back to the PO Valley. On 3 April the mediums began to attack rail bridges over the PANARO River and other streams South of the PO to effect a limited isolation of the battle area. On 16 April, two days after the Fifth Army opened its drive on BOLOGNA, B-25's struck at road and rail bridges on the city's approaches. In two days the mediums dropped 302 tons on these targets. Then, as the encircling arms of 15th Army Group reached out to engulf a broken enemy, MATAF closed the line of retreat across the PO. From 21 through 24 April, B-25's made 38 attacks on pontoon and ferry sites from CREMONA to the sea. All in all, the mediums dropped 1020 tons on PO crossings during the month. The same program, in conjunction with Strategic Air Force, was successively carried out at the ADIGE and BRENTA Rivers.

At the same time, the mediums maintained the blockade of ITALY at a high level. Effort on the BRENNER, totalling 1779 tons, exceeded that of any preceding month except March. Two attacks were carried out on rail bridges close to the Northeastern frontier. DRAUBURG in AUSTRIA, and, at the request of MAAF, MARIBOR in YUGOSLAVIA were also successfully bombed. Marauders continued their assault on marshalling yards along the inter-Axis Routes in Nortneastern ITALY and also attacked M/T parks close to the battle area.

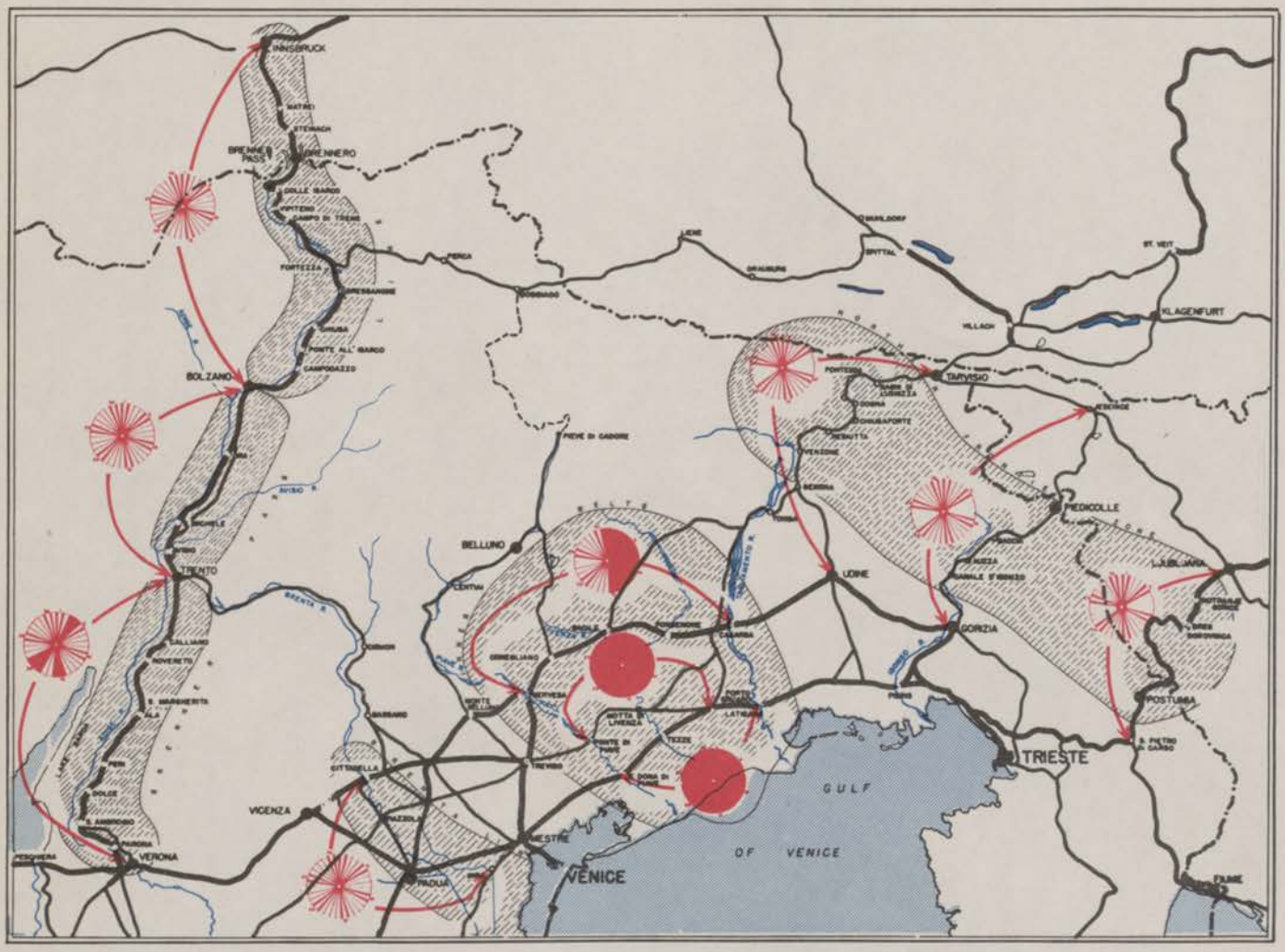
ANNEX D

STATUS MAPS

Duration of Interdiction

in the Zones of Blockade

OCTOBER 1944 -- APRIL 1945



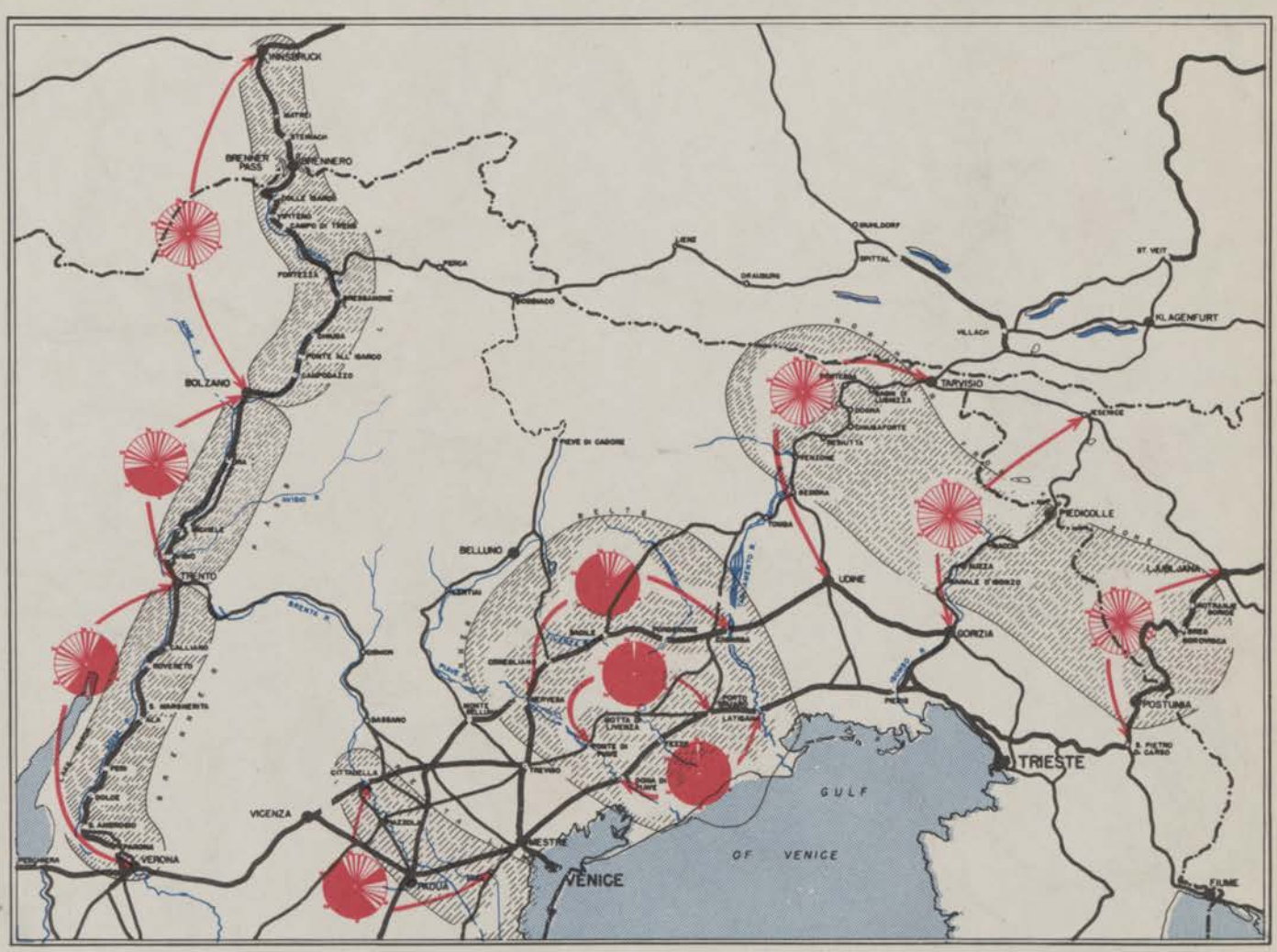
RAILWAY LINES IN NORTHEASTERN ITALY
INTERDICTION DURING OCT. 1944

DOUBLE TRACK, STANDARD GAUGE
SINGLE TRACK, STANDARD GAUGE
NARROW GAUGE
LINES OR ZONES OF INTERDICTION

THE CIRCLES, EACH OF WHICH COVERS A SECTION OF RAILWAY WITHIN A LINE OR ZONE OF INTERDICTION, ARE DIVIDED INTO SEGMENTS REPRESENTING THE DAYS OF THE MONTH. BLACKED-IN SEGMENTS INDICATE DAYS WHEN PHOTO RECONNAISSANCE SHOWED THAT PARTICULAR SECTION OF THE LINE TO BE IMPASSABLE, DUE TO INTERDICTION AT ONE OR MORE POINTS. THE DAYS WHEN THROUGH TRAFFIC WAS POSSIBLE ON A PARTICULAR SECTION OF RAILWAY ARE REPRESENTED IN WHITE.

10 5 0 10 20 30 40 50 60 70 80 90

SCALE OF MILES



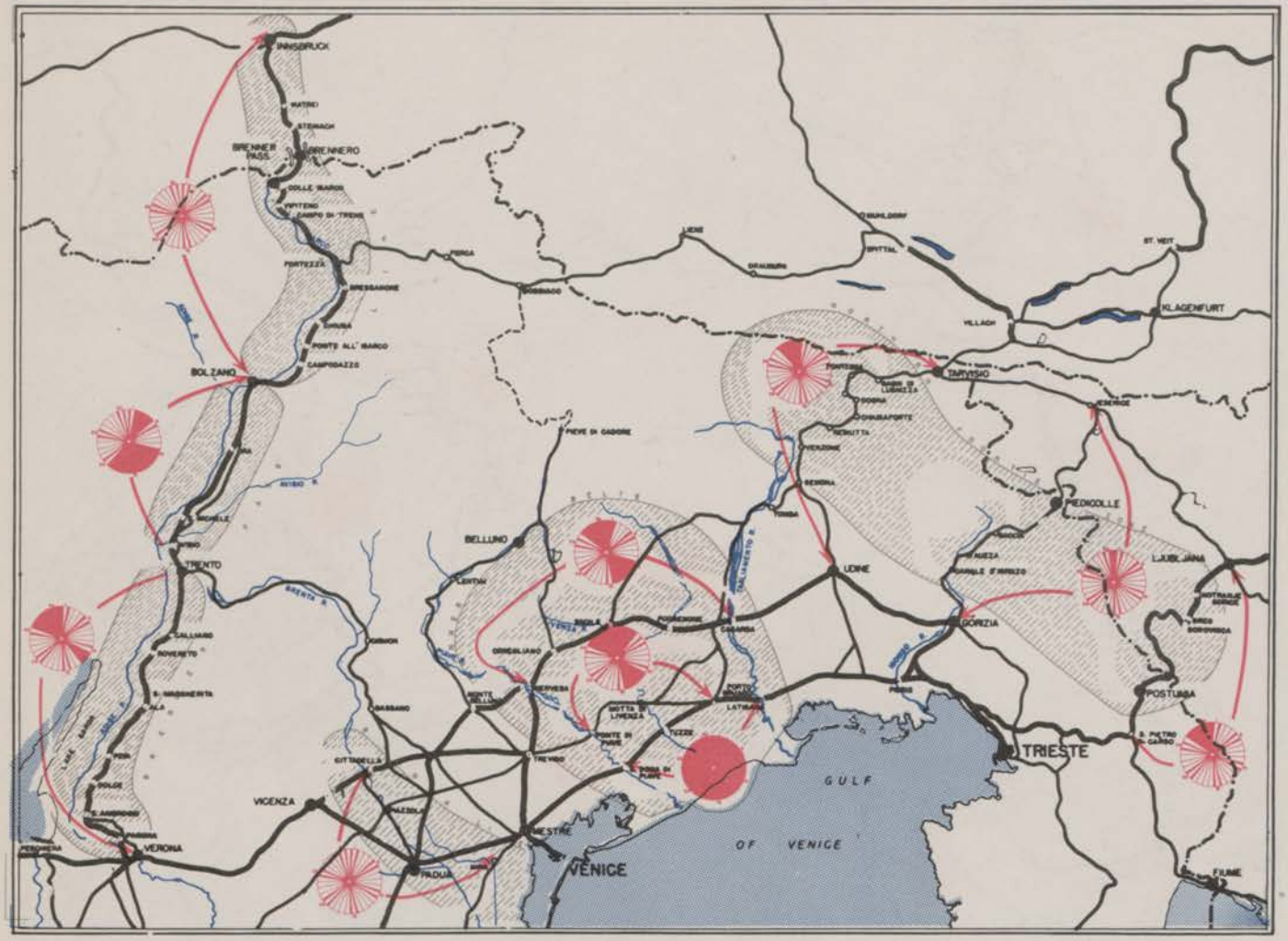
RAILWAY LINES IN NORTHEASTERN ITALY
INTERDICTION DURING NOV. 1944

DOUBLE TRACK, STANDARD GAUGE
SINGLE TRACK, STANDARD GAUGE
NARROW GAUGE
LINES OR ZONES OF INTERDICTION

THE CIRCLES, EACH OF WHICH COVERS A SECTION OF RAILWAY WITHIN A LINE OR ZONE OF INTERDICTION, ARE DIVIDED INTO SEGMENTS REPRESENTING THE DAYS OF THE MONTH. BLACKED-IN SEGMENTS INDICATE DAYS WHEN PHOTO RECONNAISSANCE SHOWED THAT PARTICULAR SECTION OF THE LINE TO BE IMPASSABLE, DUE TO INTERDICTION AT ONE OR MORE POINTS. THE DAYS WHEN THROUGH TRAFFIC WAS POSSIBLE ON A PARTICULAR SECTION OF RAILWAY ARE REPRESENTED IN WHITE.

10 5 0 10 20 30 40 50 60 70 80 90

SCALE OF MILES



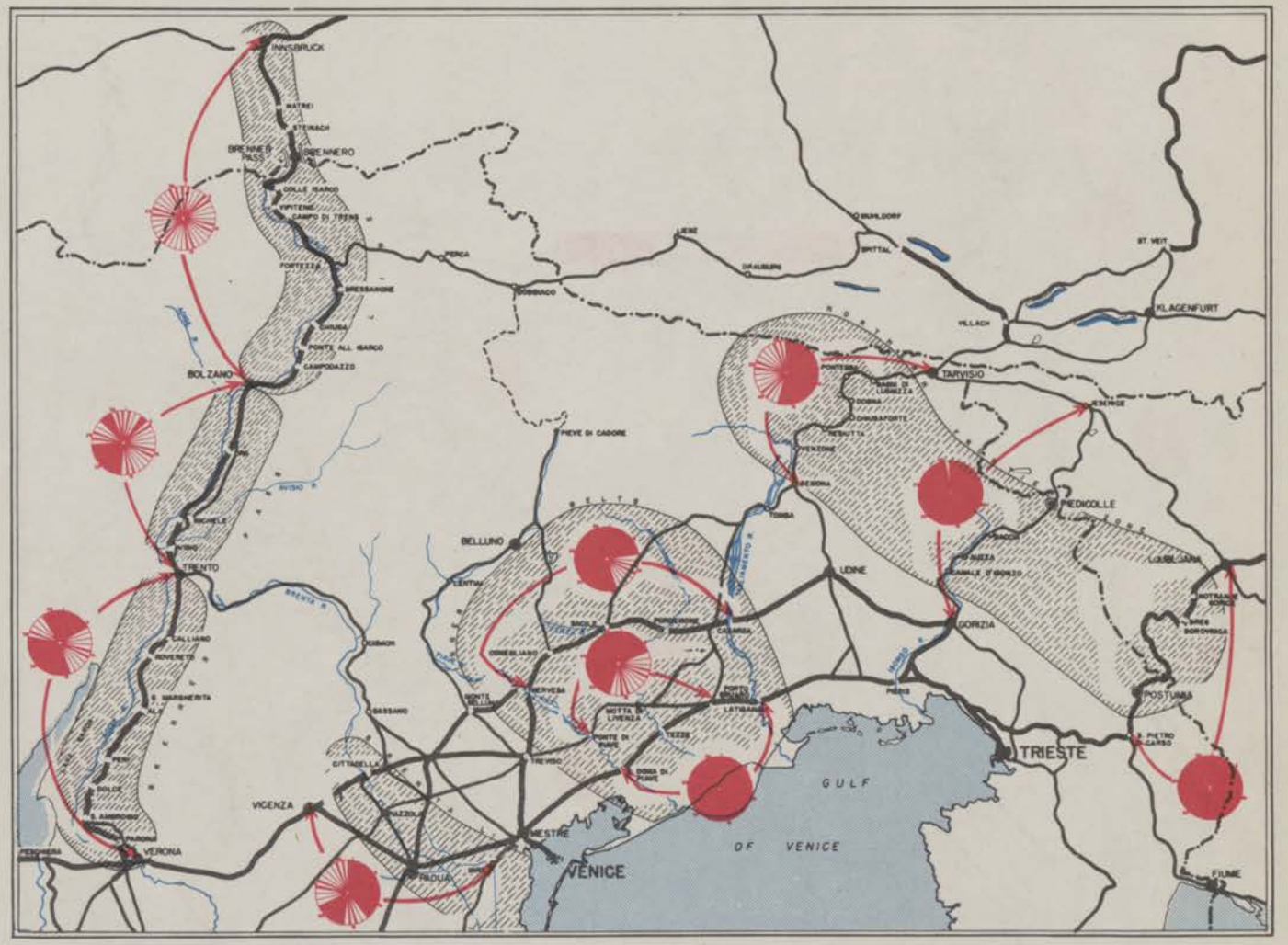
RAILWAY LINES IN NORTHEASTERN ITALY
INTERDICTION DURING DEC. 1944

DOUBLE TRACK, STANDARD GAUGE
SINGLE TRACK, STANDARD GAUGE
NARROW GAUGE
LINES OR ZONES OF INTERDICTION

THE CIRCLES, EACH OF WHICH COVERS A SECTION OF RAILWAY WITHIN A LINE OR ZONE OF INTERDICTION, ARE DIVIDED INTO SEGMENTS REPRESENTING THE DAYS OF THE MONTH. BLACKED-IN SEGMENTS INDICATE DAYS WHEN PHOTO RECONNAISSANCE SHOWED THAT PARTICULAR SECTION OF THE LINE TO BE IMPASSABLE, DUE TO INTERDICTION AT ONE OR MORE POINTS. THE DAYS WHEN THROUGH TRAFFIC WAS POSSIBLE ON A PARTICULAR SECTION OF RAILWAY ARE REPRESENTED IN WHITE.

10 5 0 10 20 30 40 50 60 70 80 90

SCALE OF MILES



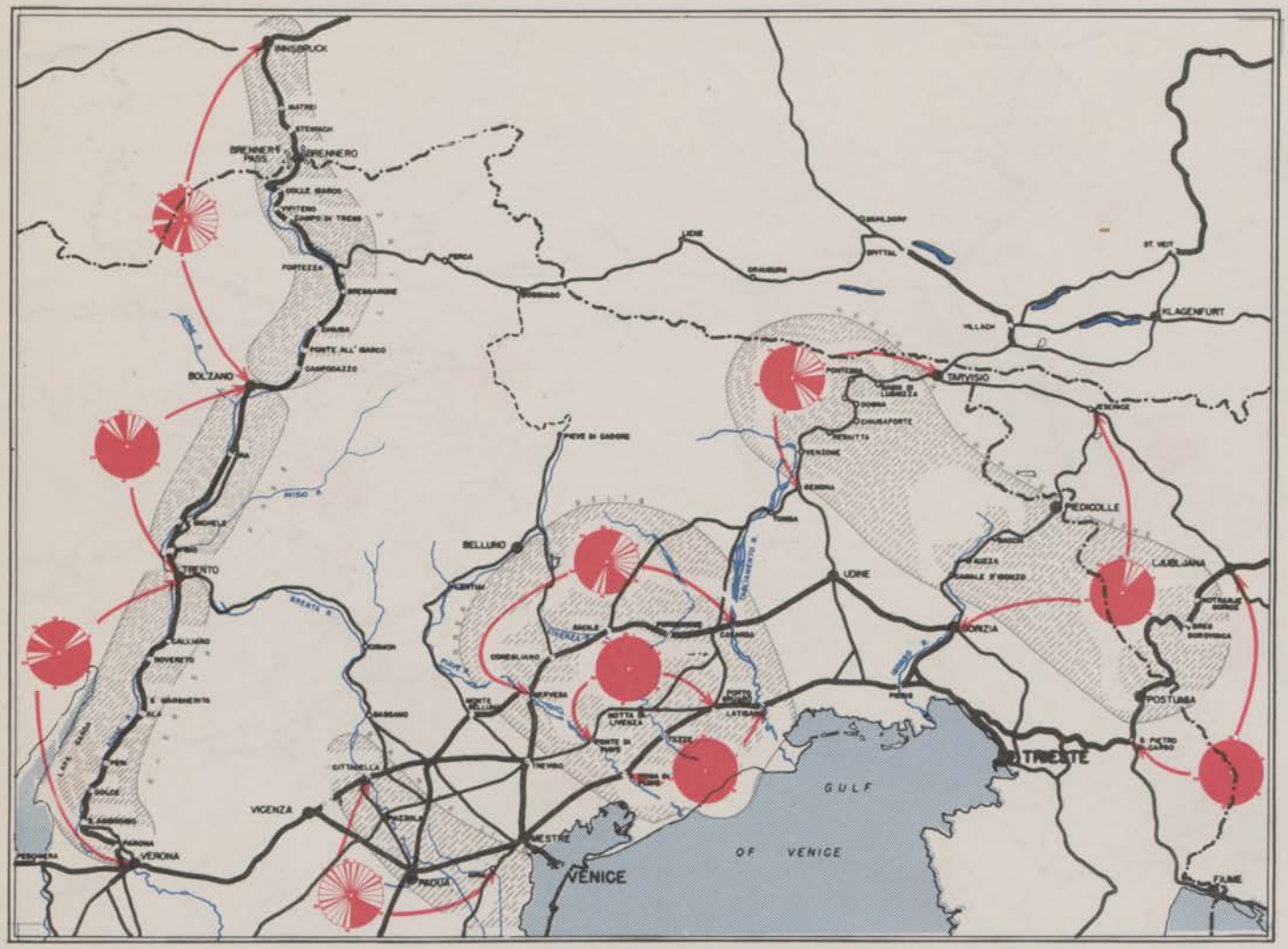
RAILWAY LINES IN NORTHEASTERN ITALY
INTERDICTION DURING JAN. 1945

DOUBLE TRACK, STANDARD GAUGE
SINGLE TRACK, STANDARD GAUGE
NARROW GAUGE
LINES OR ZONES OF INTERDICTION

THE CIRCLES, EACH OF WHICH COVERS A SECTION OF RAILWAY WITHIN A LINE OR ZONE OF INTERDICTION, ARE DIVIDED INTO SEGMENTS REPRESENTING THE DAYS OF THE MONTH. BLACKED-IN SEGMENTS INDICATE DAYS WHEN PHOTO RECONNAISSANCE SHOWED THAT PARTICULAR SECTION OF THE LINE TO BE IMPASSABLE, DUE TO INTERDICTION AT ONE OR MORE POINTS. THE DAYS WHEN THROUGH TRAFFIC WAS POSSIBLE ON A PARTICULAR SECTION OF RAILWAY ARE REPRESENTED IN WHITE.

10 5 0 10 20 30 40 50 60 70 80 90

SCALE OF MILES



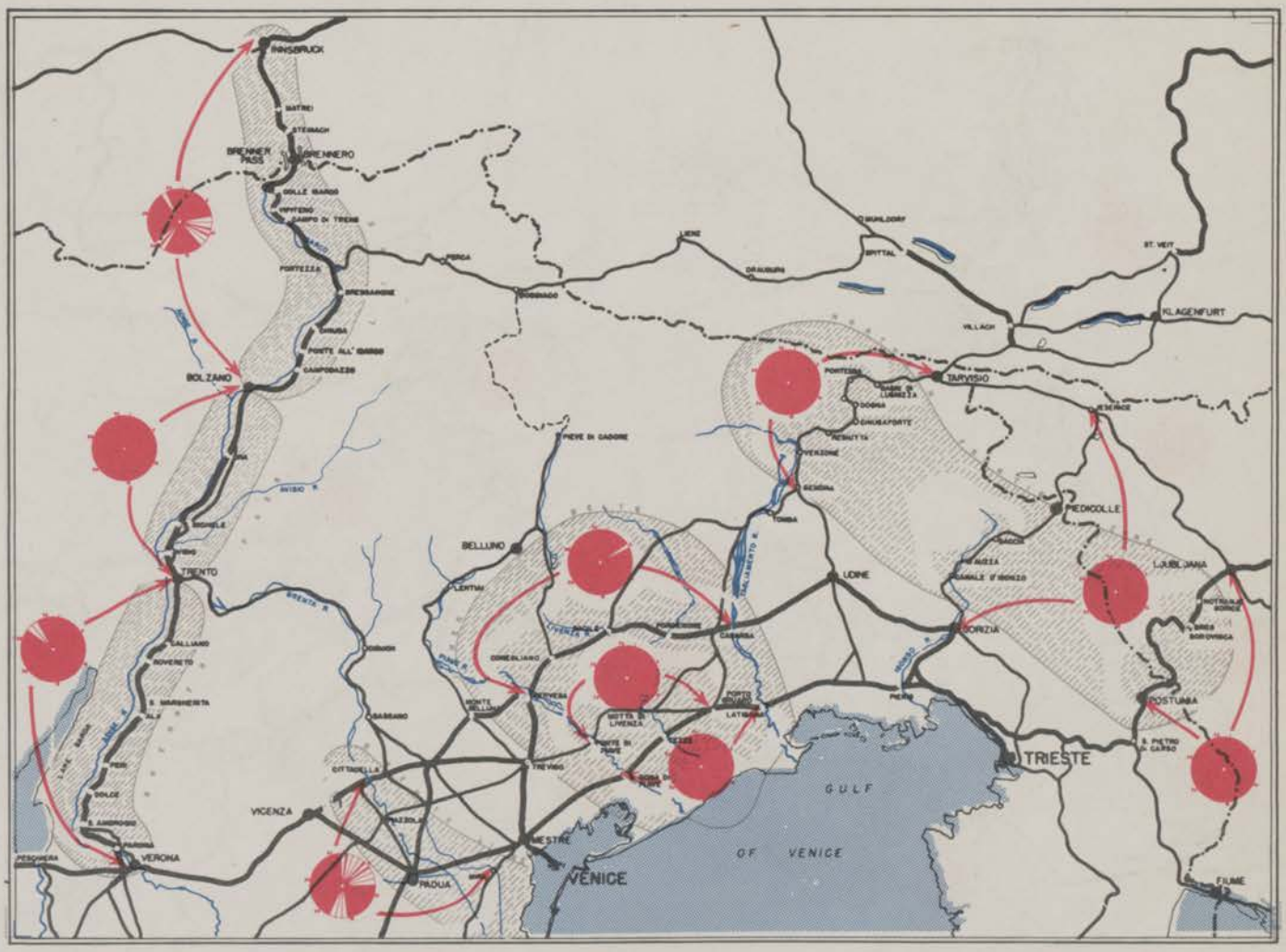
RAILWAY LINES IN NORTHEASTERN ITALY
INTERDICTION DURING FEB. 1945

DOUBLE TRACK, STANDARD GAUGE
SINGLE TRACK, STANDARD GAUGE
NARROW GAUGE
LINES OR ZONES OF INTERDICTION

THE CIRCLES, EACH OF WHICH COVERS A SECTION OF RAILWAY WITHIN A LINE OR ZONE OF INTERDICTION, ARE DIVIDED INTO SEGMENTS REPRESENTING THE DAYS OF THE MONTH. BLACKED-IN SEGMENTS INDICATE DAYS WHEN PHOTO RECONNAISSANCE SHOWED THAT PARTICULAR SECTION OF THE LINE TO BE IMPASSABLE, DUE TO INTERDICTION AT ONE OR MORE POINTS. THE DAYS WHEN THROUGH TRAFFIC WAS POSSIBLE ON A PARTICULAR SECTION OF RAILWAY ARE REPRESENTED IN WHITE.

10 5 0 10 20 30 40 50 60 70 80 90

SCALE OF MILES



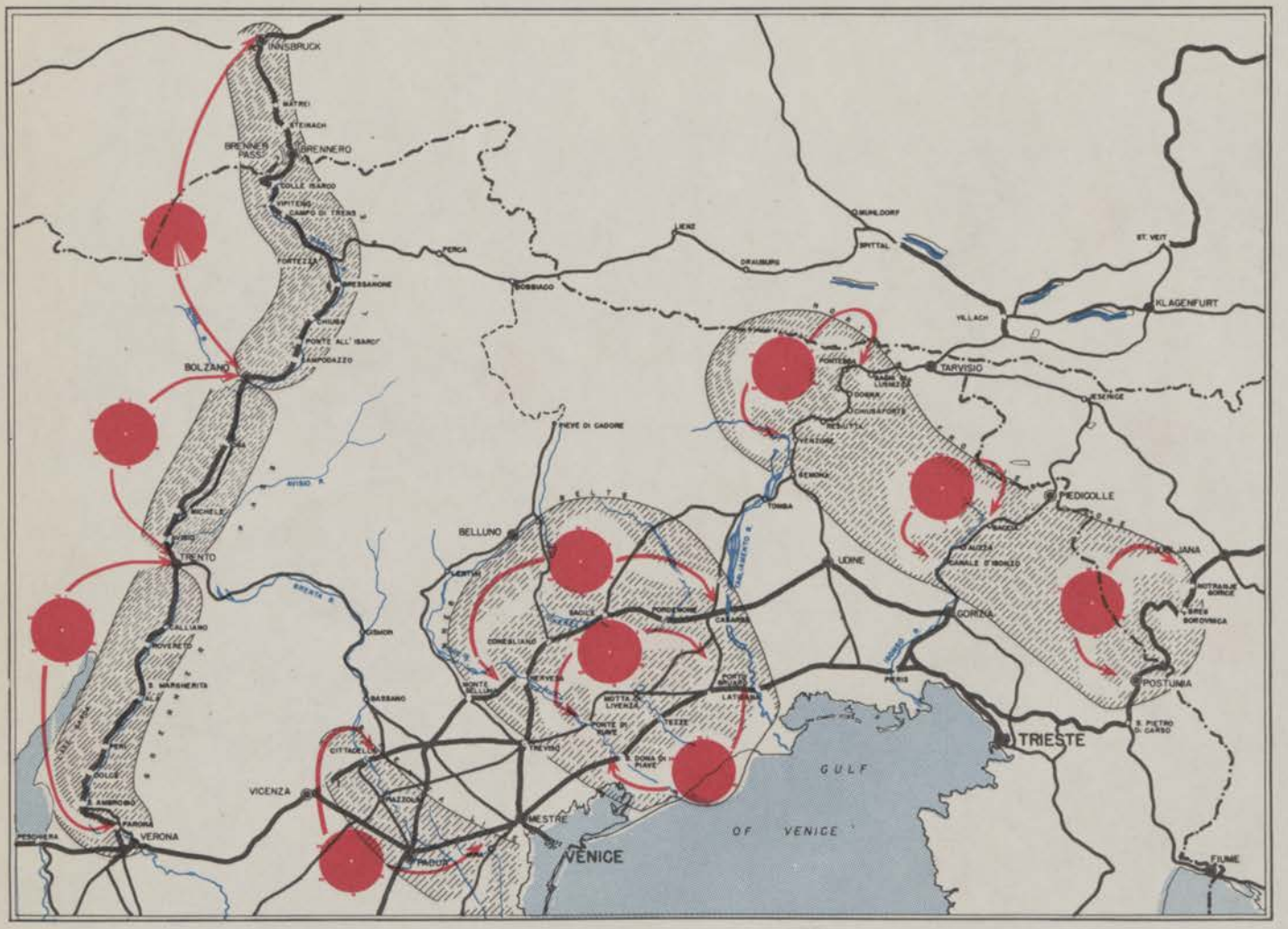
RAILWAY LINES IN NORTHEASTERN ITALY
INTERDICTION DURING MAR. 1945

DOUBLE TRACK, STANDARD GAUGE
SINGLE TRACK, STANDARD GAUGE
NARROW GAUGE
LINES OR ZONES OF INTERDICTION

THE CIRCLES, EACH OF WHICH COVERS A SECTION OF RAILWAY WITHIN A LINE OR ZONE OF INTERDICTION, ARE DIVIDED INTO SEGMENTS REPRESENTING THE DAYS OF THE MONTH. BLACKED-IN SEGMENTS INDICATE DAYS WHEN PHOTO RECONNAISSANCE SHOWED THAT PARTICULAR SECTION OF THE LINE TO BE IMPASSABLE, DUE TO INTERDICTION AT ONE OR MORE POINTS. THE DAYS WHEN THROUGH TRAFFIC WAS POSSIBLE ON A PARTICULAR SECTION OF RAILWAY ARE REPRESENTED IN WHITE.

10 5 0 10 20 30 40 50 60 70 80 90

SCALE OF MILES



RAILWAY LINES IN NORTHEASTERN ITALY
INTERDICTION DURING APRIL 1945

DOUBLE TRACK, STANDARD GAUGE

SINGLE TRACK, STANDARD GAUGE

NARROW GAUGE

LINES OR ZONES OF INTERDICTION

THE CIRCLES, EACH OF WHICH COVERS A SECTION OF RAILWAY WITHIN A LINE OR ZONE OF INTERDICTION, ARE DIVIDED INTO SEGMENTS REPRESENTING THE DAYS OF THE MONTH. BLACKED-IN SEGMENTS INDICATE DAYS WHEN PHOTO RECONNAISSANCE SHOWED THAT PARTICULAR SECTION OF THE LINE TO BE IMPASSABLE, DUE TO INTERDICTION AT ONE OR MORE POINTS. THE DAYS WHEN THROUGH TRAFFIC WAS POSSIBLE ON A PARTICULAR SECTION OF RAILWAY ARE REPRESENTED IN WHITE.

10 5 0 10 20 30 40 50 60 70 80 90

SCALE OF MILES

A N N E X E

BRIDGE-BUSTING ON THE INNER BELTS:

CASE HISTORIES

TAGLIAMENTO BELT

CASARSA BRIDGE	P.R.	
	ACT.	
CASARSA DIVERSION	P.R.	
	ACT.	
LATISANA	P.R.	
	ACT.	

LIVENZA BELT

PORDENONE DIVERSION	P.R.	Completed 8 January
	ACT.	Completed 7 January
PORDENONE BRIDGE	P.R.	
	ACT.	
SACILE	P.R.	
	ACT.	
MOTTA DI LIVENZA DIVERSION	P.R.	Completed 15 December
	ACT.	Completed 24 December
MOTTA DI LIVENZA BRIDGE	P.R.	
	ACT.	
S. ANASTASIO	P.R.	
	ACT.	

PIAVE BELT

NERVESA DIVERSION	P.R.	
	ACT.	
NERVESA BRIDGE	P.R.	
	ACT.	
PONTE DI PIAVE DIVERSION	P.R.	Completed 23 November
	ACT.	
PONTE DI PIAVE BRIDGE	P.R.	
	ACT.	
S. DONA DI PIAVE	P.R.	
	ACT.	

1 10 20 30 9 19 29 8 18 28 7 17 27 6 16 25 5 15 30

OCTOBER NOVEMBER DECEMBER JANUARY FEBRUARY MARCH APRIL

BRIDGE-BUSTING ON THE INNER BELTS:

CASE HISTORIES

Among the most interesting of the many records on the state of enemy communications that were available for study after the German capitulation are the serviceability logs of the rail bridges and diversions crossing the PIAVE, LIVENZA and TAGLIAMENTO Rivers. These logs present a day-by-day, blow-by-blow, running account of the battle fought at the individual bridge sites covering the fourteen critical targets on the "inner" or "VENETIAN Plain" belts of interdiction; they give on-the-site stories of the ceaseless efforts of Axis repair agencies to re-establish and maintain the serviceability of their rail lines in the face of overwhelming air attacks. Because each case history is complete in detail and the story told at the fourteen targets is the story of interdiction of the VENETIAN Plain zone, they are related in detail. Such a status report, based on photo reconnaissance which was obtained daily weather permitting, was issued every day on each of these fourteen targets, a comparison of the "status" of the target as carried by MATAF target intelligence and the actual status as shown by site records is also of interest. Study of the two records shows that those maintained solely from photo reconnaissance were satisfactorily accurate for operational planning; differences generally indicate a trend toward conservatism on the part of the photo interpreter.

The map reproduced on the preceding page shows the location and significance of each target while the accompanying graphs show the detailed comparison of status records of the individual targets.

CASARSA MAIN RAIL BRIDGE AT C 150084

The bridge carried the double track line over the TAGLIAMENTO River and was made up of 36 spans, each 75 feet long. The tracks were laid on top of steel plate girders, each track being carried by seperate girders. The deck of the bridge was approximately 18 feet above the river bed, the girders being supported on masonry piers.

The bridge was attacked in early May 1944 and one pier was destroyed and two spans damaged. By the end of May 1944 two

more spans had been damaged. Repair work was carried on, despite continued attacks. However, by early September 1944 severe damage had accumulated, with a least 7 spans down.

By 1 October 1944, at the beginning of the period of this report, repairs were nearing completion. Temporary piers had been erected and only the placing of 4 temporary spans remained.

Attacked 4 Oct 1944, HB. The 2 easternmost spans were destroyed and the East abutment was damaged. Repairs continued and by 19 October 1944 the temporary spans near the center of the bridge had been placed, The 2 Eastern spans were still out, but the debris had been cleared and repairs were under way.

Repaired 1 Nov. The final spans were placed and the bridge made serviceable for single line traffic.

Attacked 8 Nov, MB. One temporary span was destroyed and two were damaged near the center of the bridge.

Attacked 11 Nov, HB. Another temporary span was damaged. By 16 Nov 1944 two of the damaged spans were repaired, but the two other spans still remained out.

Attacked 18 Nov, MB. One temporary span and one temporary pier were damaged.

Repaired 10 Dec. The temporary span and pier were repaired and the two destroyed spans were replaced.

Attacked 26 Dec, DB; 26/27 Dec, HB. The West approach to the bridge was cut by 5 craters.

Attacked 27 Dec, DB; 27 Dec, HB. The 14th span from the West end was fractured by a direct hit and the two broken ends dropped to the river bed. Another crater cut the West approach.

Attacked 28/28 Dec, HB. One short temporary span near the center of the bridge was knocked out.

Attacked 31 Dec, DB. Another temporary span was knocked out. By 2 Jan four of the six craters in the West approach had been filled and one of the three destroyed spans replaced.

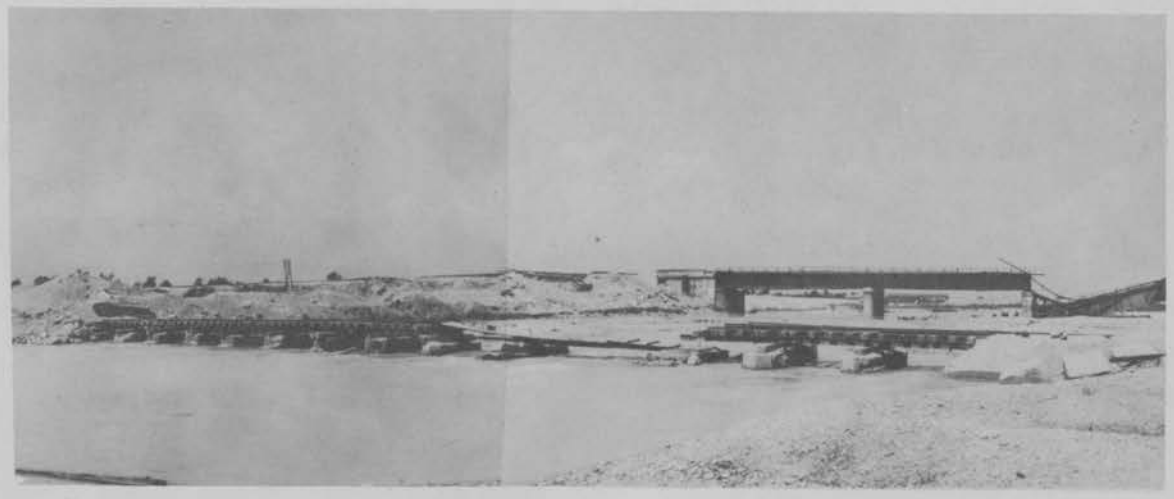
Attacked 3 Jan. 1945, DB. Another crater cut the West approach. By 10 Jan all the craters in the approach had been repaired, and by 14 Jan only one span was still out.

Attacked 15 Jan, DB. One crater cut the East approach

during an attack on the diversion.

Attacked 22 Jan, DB. Another span was knocked out during an attack on the diversion to the South. By 25 Jan the crater in the East approach had been filled, but the two spans were not yet replaced. A temporary pier was erected in one of the gaps by 31 Jan. Repair work on the bridge stopped soon after, however, and all effort was placed on the rail diversion to the South. During March and April severe damage was inflicted on the bridge during attacks on the diversion. At the end, over one half of the 36 spans of the bridge had been destroyed.

CASARSA RAIL DIVERSION AT C 150083



As early as May 1944, the time of the breakthrough at CASSINO, work was started on construction of a rail diversion approximately 100 yards South of the main rail bridge. By 1 July extensive construction had been carried out. During July and August the uncompleted diversion was damaged during attacks on the main bridge, but by late August the diversion was serviceable.

The diversion crossed the river on the wide, dry river bed and was very low. The three water gaps were crossed by bridges made of low concrete piers supporting I-beams. The West bridge was 160 feet long and consisted of 5 spans, each 32 feet long with auxiliary piers. The center bridge was 360 feet long with 10 spans of 40 feet, each with an auxiliary pier under its center. The East

bridge was 150 feet long and consisted of 5 spans, each 30 feet long with 2 auxiliary piers. The three bridges were connected by tracks laid on the river bed.

Despite some damage during September, the diversion was serviceable on 1 October, the beginning of the period of this report.

Attacked 4 Oct. 1944, HB. During the attack on the main bridge the diversion was cratered in several places.

Repaired 4 Oct. The craters were filled and the diversion made serviceable in 6 hours.

Flooded 9 Oct. High water flooded parts of the low diversion and blocked traffic.

Repaired 14 Oct. The water subsided and the diversion was repaired.

Attacked 8 Nov, M B. Four 40 foot spans were knocked out of the center bridge and the track cut at one point during an attack on the main rail bridge. By 11 Nov repairs had started and the crater had been filled and one span replaced.

Repaired 14 Nov. The three other spans were replaced.

Attacked 18 Nov, MB. The East abutment of the center bridge was damaged and the approach cut by 3 craters.

Repaired 21 Nov. The cuts were repaired and the diversion again made serviceable to single line traffic.

Attacked 25 Dec, DB. One crater cut the line on the river bed near the West end of the diversion.

Repaired 26 Dec. The single crater was filled.

Attacked 26/27 Dec, HB. The West approach to the diversion was damaged by two craters, and the center bridge was damaged by near misses. Repairs were started, but when a train of 10 wagons attempted to cross on 1 Jan, several wagons were derailed near the center of the diversion.

Repaired 3 Jan 1945. The damage was not serious. By 2 Jan the derailed wagons were replaced and the next day repairs were completed to the diversion.

Attacked 15 Jan, DB. The diversion was cut by a single crater at 1135 hours.

Repaired 15 Jan. The damage was repaired by 2230 hours the same night.

Attacked 17 Jan, DB. The diversion was cut by three craters.

Repaired 18 Jan. The craters were filled and the diversion made serviceable.

Attacked 27 Jan, DB. The East approach to the diversion was cut by one large crater.

Repaired 27 Jan. The diversion was serviceable ten hours later.

Attacked 31 Jan, DB. The West span of the East bridge was destroyed by a direct hit. The East approach to the diversion was cut by one crater and the West approach was cut by two craters.

Repaired 1 Feb. Rapid repairs were carried out, the three craters being filled and the span of the low bridge being replaced by fill as well.

Attacked 4 Feb, DB. A near miss damaged the center bridge.

Repaired 5 Feb. The slight damage was repaired.

Attacked 8 Feb, DB. Two craters slightly damaged the diversion track.

Repaired 8 Feb. The line was repaired in eleven hours.

Attacked 9 Feb, DB. Line cut by a crater at 1245 hours.

Repaired 9 Feb. Line repaired at 2000 hours.

Attacked 10 Feb, DB. Line again damaged by a single crater.

Repaired 11 Feb. Crater filled and track repaired at 1200 hours.

Attacked 11 Feb, DB. Line cratered.

Repaired 12 Feb. Line repaired at 2145 hours.

Attacked 13 Feb, DB. Line cut near center bridge.

Repaired 13 Feb. Line repaired at 2310 hours.

Attacked 17 Feb, DB. The West bridge was slightly damaged by a near miss and the track cut by one crater.

Repaired 18 Feb. The crater was filled and the slight damage to the bridge repaired.

Attacked 21 Feb, DB. Two craters cut the line and one span of the center bridge was damaged.

Repaired 25 Feb. The craters were filled and an earth fill was used to replace the single damaged span in the center bridge.

Attacked 3 Mar, DB. One crater temporarily cut the West approach to the diversion.

Repaired 3 Mar. The crater was filled in a few hours.

Attacked 4 Mar, DB; 4/5 Mar, LB. Near misses damaged the line in two places.

Attacked 7 Mar, DB; 7/8 Mar, LB. Two craters cut the West approach and another crater cut the diversion near the center.

Repaired 9 Mar. All craters were filled and the track laid.

Attacked 11 Mar, DB. A locomotive and train of 24 wagons was attacked on the West approach to the diversion. The locomotive was derailed, one wagon near the center of the train was destroyed, and the line was cut just beyond the end of the train. By 13 Mar one crater had been filled and 9 undamaged wagons had been removed.

Attacked 14 Mar, MB. Severe damage was inflicted on the diversion. The East bridge received two direct hits and three 30 foot spans were destroyed. One span of the center bridge was destroyed. The fill on the river bed was cut in 5 places. By 16 Mar the craters had been repaired but the two bridges remained cut. The destroyed wagon and 8 more undamaged wagons were removed from the West approach, the derailed locomotive and 6 wagons remaining. By 20 Mar the cuts in the two bridges had been repaired by filling. The derailed locomotives remained and continued to block traffic.

Attacked 21 Mar, MB; 21 Mar, DB. Two craters cut the line near the center of the diversion.

Attacked 25 Mar, DB. Another crater cut the line near the center of the diversion. The derailed locomotive still blocked all traffic on the diversion, although all craters were repaired by 30 Mar.

Attacked 31 Mar, DB. Three craters cut the diversion and another cut the East approach.

Attacked 1 Apr, DB. Two more craters cut the East approach to the diversion. By 3 Apr the 3 craters on the diversion had been filled, but the 3 craters on the East approach still cut the line. The derailed locomotive still blocked traffic on the West approach as well. High water had also washed out a portion of the East bridge, thus increasing the repair difficulties.

Attacked 4 Apr, DB. A direct hit destroyed one span of the center bridge. By 8 Apr the high water had receded and repair work was started on the two damaged bridges. By 10 Apr the East bridge and East approach had been repaired and by the next day the center bridge had been repaired. This left only the derailed locomotive blocking the diversion.

Repaired 17 Apr. The line between CASARSA and UDINE was repaired, equipment brought from UDINE, and the derailed locomotive removed. This permitted traffic on the diversion for the first time since 11 Mar.

Attacked 24 Apr, HB. Thefinal attack inflicted damage which kept the diversion out until the end. One 32 foot span was knocked out of the West bridge and one of its auxiliary piers was destroyed and the other damaged. The fill in the center of the diversion was cut by one crater, the West approach by three craters, and the East approach by two craters. No repairs were attempted.

LATISANA RAIL BRIDGE AT H 220873

The bridge was of 3 spans, independent steel truss construction, and carried the double track line over the TAGLIAMENTO River. Each track was carried by seperate trusses. The center span was 220 feet long and the two end spans each 175 feet long.

The bridge was damaged by several attacks, previous to the period of this report. and by 7 July 1944, only a single line remained serviceable. A direct hit had caused damage to the top chords of the center truss carrying the Northern line.

Further attacks during August and September cut the approaches at various points, but the line was open on the Southern track the major part of the time, as was the case on 1 October, the date of the start of the period of this survey. By 20 October the center truss carrying the Northern line had been repaired and the bridge was again serviceable for double line traffic.

Attacked 11 Nov. 1944, MB. The center span was destroyed, the trusses carrying each line being hit and collapsing from their piers into the river. The tops of both piers were slightly damaged. The top chord of the Western truss carrying the Northern line was slightly damaged.

Repaired 9 Dec. The collapsed truss carrying the Northern line over the center span was cleared away. Two high timber trestle bents were erected, and three girder spans, of approximately 73 feet each, placed across the gap. The top chord of the Western truss was also repaired, making the bridge serviceable for single line traffic.

Attacked 26 Dec, HB; 26 Dec, DB. Line cut on West approach in two places.

Attacked 27 Dec, HB. Line cut on West approach at one more point.

Repaired 28 Dec. Three craters on West approach repaired and line serviceable for single line traffic on North line.

Attacked 31 Dec, DB; 31/1 Jan 1945, HB. The center temporary span was damaged by a near miss and knocked slightly out of alignment.

Attacked 3 Jan, MB; 3 Jan, DB; 4/5 Jan HB. The westernmost pier and two of the three temporary girder spans were destroyed. Both the East andWest trusses were damaged and the West approach cut in two places. By 27 Jan the wreckage had been cleared and the base of a new pier set. The two 73 feet temporary spans and the pier were still out. By 17 February repairs to the rail bridge had been abandoned, and the remaining temporary span and trestle bent had been removed. About the middle of Feb the construction of a rail diversion bridge was begun approximately 50 feet North of the abandoned bridge. Work was very slow, however, and it was never made serviceable to rail traffic. By the middle of March only 3 piers had been erected. By 11 April all 5 piers had been erected and the approaches built, but no spans were ever placed.

PORDENONE RAIL BRIDGE AT B 992070

The bridge was of masonry arch construction and carried the double track line over the MEDUNA River. It was made up of 8 masonry arches, each with a span of 75 feet, and the deck of the bridge was approximately 35 feet above the river.

Attacked 4 Oct. 1944, HB. The first attack on the bridge nicked the two East arches and cut the West approach in two places and the East approach in one place.

Repaired 8 Oct. The bridge and approaches were made serviceable for single line traffic.

Attacked 26 Dec, MB. Two hits damaged the third and fourth arches from the West end, cutting the tracks. The West approach was cut by three craters.

Attacked 29 Dec, MB; 29 Dec, DB. The fourth arch from the West end was destroyed and the East approach cratered at 2 points. No repairs to the bridge were carried on from this time, and the bridge was abandoned. During later attacks on the diversion bridge to the South stray bombs inflicted further damage, destroying 3 additional arches.

PORDENONE RAIL DIVERSION AT B 988066

The diversion bridge crossed the river approximately 800 yards South of the main bridge. It was made up of timber trestle bent piers approximately 12 feet high, with the tracks carried across on steel girders. The bridge consisted of four 40 foot spans, each span having an auxiliary pier under its center.

Construction of the approaches to the diversion bridge was noted on photographs of 5 Dec 1944. By 28 December all piers had been erected, and track laid on the East approach. The diversion was completed on 7 January.

Attacked 15 Jan 1945, DB. The first attack on the rail diversion cut the East approach at one point.

Attacked 17 Jan, DB. Two 40 foot spans at the West end of the bridge were knocked out and two piers damaged. The two piers were repaired by 22 Jan.

Repaired 23 Jan. The two 40 foot spans were placed and the bridge made serviceable for single line traffic.

Attacked 30 Jan, DB. East approach cut by one crater.

Repaired 30 Jan. Crater filled in a few hours.

Attacked 4 Feb, DB. The second span from the East end was knocked out and the auxiliary pier under its center was damaged. The West approach was cut by a single crater.

Attacked 7 Feb, LB. The same auxiliary pier received still further damage from a near miss. By 8 Feb the crater in the West approach had been filled, and by 11 Feb the auxiliary pier had been repaired.

Repaired 12 Feb. The single 40 foot span was placed across the gap and the bridge made serviceable.

Attacked 17 Feb, MB; 17 Feb, DB. The span which had just been replaced was again knocked out, and the auxiliary pier under its center was destroyed. The adjacent span to the East was damaged and the West approach cut by one crater and slightly damaged by two others. By 20 Feb the damaged East span had been removed, and the craters in the approach repaired. By 25 Feb the remaining two 40 foot spans had been removed, leaving the bridge with all four spans out. However, the single auxiliary pier had been rebuilt, and the other piers were being strengthened. Work was now begun to make the bridge night operational. Auxiliary rails were laid across the piers on both sides of the main track. These rails were permanent and served to carry special handling equipment which could hoist each of the four spans and place it on a flat car for removal during the day.

Repaired 2 Mar. Work was completed and the bridge made ready for night operational use. All four spans could be set in 1½ hours.

Attacked 4 Mar, MB. The East approach was slightly damaged by two craters.

Attacked 6 Mar, MB. Night operations were stopped by hits

which destroyed the auxiliary rails on the East half of the bridge and severely damaged 3 piers. The West approach was cut by 2 large craters. The 4 pre-assembled spans remained on flat cars on the East approach, along with the special hoist car. By 11 Mar the 2 craters had been filled and work was proceeding on the rebuilding of the 3 damaged piers.

Attacked 12 Mar, MB. The East approach was cut by 3 craters. The 3 craters were filled on 18 Mar but work continued on the rebuilding and strengthening of piers. By 22 Mar the flats and equipment were still in the same position on the East approach as on 6 Mar for one auxiliary pier had been removed. By 24 Mar it had been replaced and the auxiliary rails were being set.

Attacked 25 Mar, DB. Three piers were destroyed, thus preventing any night operational use. Both approaches were cut, each by one crater. The craters were filled and work started on the piers by 4 April.

Attacked 7 Apr, DB. The easternmost pier was damaged and the West approach was cut by one crater. By 11 Apr one pier had been set and two piers remained out and another damaged. By 15 Apr pnly one pier was missing and this was set by 16 Apr.

Repaired 17 Apr. The auxiliary rails were set and the bridge ready for night operational use. The diversion was in this condition when the survey party arrived, although the hoisting equipment had been dismantled.

SACILE RAIL BRIDGE AT B 839077

The bridge was of heavy masonry arch construction and carried 4 tracks across the LIVENZA River. The one masonry arch span was 80 feet long and 40 feet wide and the over-all length of the bridge, including abutments, was 150 feet. The bridge deck is approximately 20 feet above water level.

Attacked 5 Nov 1944, MB. The first attack cut the East approach in two places.

Attacked 7 Nov, MB. The West abutment was slightly damaged and the west approach severely cratered by 5 direct hits. One new crater cut the East approach, but was filled by 9 Nov.

Attacked 10 Nov, MB. The East approach was cut by a single crater. By 15 Nov repairs to both approaches were nearing completion.

Attacked 16 Nov, MB. Direct hits destroyed the bridge,

the masonry arch collapsing to the river bed. The West approach was cut at one point. Work was quickly started. The approaches were repaired and bridge seats cut in the old masonry abutments by 22 Nov.

Repaired 23 Nov. A single 80 foot girder span was placed across the gap and the bridge made servicable to single line traffic.

Attacked 10 Dec, DB. The line on the West approach was damaged by 2 craters.

Repaired 10 Dec. Theline was repaired in a few hours.

Attacked 27 Dec, DB. The West approach was cut by two craters and the bridge span knocked out of line.

Attacked 28 Dec, DB. The bridge girders were knocked off the East abutment and the East approach cut at one point. By 2 Jan repairs to the East approach were complete and the dropped span was being raised.

Attacked 3 Jan 1945, DB. The West approach was cut by another crater.

Repaired 8 Jan. All craters in the West approach were filled and the 80 foot span replaced.

Attacked 17 Jan, MB; 17 Jan, DB. The West abutment was damaged and the 80 foot span dropped several feet. The East approach was cut by one crater. By 25 Jan the crater had been filled and the abutment was being rebuilt. By 27 Jan the span had been raised and repairs were nearing completion. On 28 Jan a locomotive was run over the bridge on a test run. The whole structure collapsed, the locomotive falling into the river. The original bridge was now abandoned and work started on the construction of a replacement bridge along the North side of the old bridge. By 4 Feb new track had been laid and work was proceeding on the abutments.

Attacked 6 Feb, DB. Work was set back by a hit on the East abutment, but by 11 Feb the West abutment had been completed and the East abutment was nearing completion.

Repaired 13 Feb. The new bridge consisted of a short span at each end, and a long 60 foot span over the water gap.

Attacked 17 Feb, MB. The line East of the bridge was cut by two craters and a direct hit cut the West approach. Near misses damaged the timber piers. By 20 Feb the center span and the two short end spans had been removed to permit repairs and both approaches had been made serviceable.

Attacked 20 Feb, DB; 21 Feb, DB. The East abutment was destroyed by a direct hit and the East approach cut by a crater.

Attacked 24 Feb, MB. The East approach was cut at another point. By 27 Feb. 45 repairs to the East approach had been completed and work was proceeding on the damaged East span and abutment.

Repaired 1 Mar. The East span was placed and the abutment repaired: The bridge was now ready for night operations. The 60' center span remained out during the day, but could be placed at night when needed.

Attacked 4 Mar, DB. East approach cut by a crater

Attacked 6 Mar, DB. A single crater cut the West approach and slightly damaged the West abutment.

Repaired 9 Mar. Both approaches were repaired and the bridge ready for night operational use with the center span still remaining out during the day.

Attacked 13 Mar, MB. The East approach was cut by 3 craters and the West approach was cut by 5 craters. By 19 Mar 45 the 5 craters on the West approach had been filled, and by 23 Mar 45 the craters on the East approach had been partially filled.

Attacked 24 Mar. DB. A direct hit destroyed the East abutment and the East span was damaged. By 4 April 45 the East abutment had been rebuilt, the pier under the East span had been repaired, and craters in the East approach filled.

Repaired 8 Apr. The East span was placed and track laid on the East approach. The bridge was again ready for night operations.

Attacked 11 Apr, DB. The West span was damaged by a near miss and the West approach was cut by one crater.

Attacked 12 Apr, DB. Two more craters cut the West approach and two craters cut the East approach. By 15 Apr 45 the craters in both approaches were filled.

Repaired 18 Apr. The West span was repaired and the bridge was serviceable for night operations, with the 60' center span still out during the day. The bridge remained in the above condition to the end.

Construction of a rail diversion, crossing the river to the South of the main bridge, was started in January, but it was never completed. Approaches were built and 3 piers erected by 1 April 45, but no tracks or spans were ever placed.

MOTTA DI LIVENZA RAIL BRIDGE AT G 928884

The bridge was double track and passed over the LIVENZA River. It was of 3 span, independent steel truss construction, supported by masonry piers and abutments. The center span was 120 feet long and the two end spans were each 100 feet long.

Attacked 5 Nov. 1944, MB. In the first attack all traffic was blocked by a hit which damaged the Eastern truss near its pier and by 3 hits which cut both tracks on the East approach.

Attacked 7 Nov, MB. Two large craters cut both tracks on the West approach. By 22 Nov 44 repairs had been started on the approaches but the truss still remained damaged.

Repaired 3 Dec. The bridge was made serviceable to single line traffic by erecting an auxiliary pier to help support the damaged East truss. All craters in the approaches were repaired.

Attacked 11 Dec, MB. The line was blocked by a hit on the East pier. The center truss was damaged and its East end dropped slightly, although it remained partially on the damaged pier. The auxiliary pier under the East truss was destroyed and the truss again damaged.

From this time on no major repairs were carried out on the bridge. During attacks on the diversion bridge to the North, the approaches to the mainbridge were cratered at various points, and some of these craters were filled. However, on30 Jan 45 the center truss collapsed into the reiver, probably from the effects of a stray bomb. After this no repairs of any kind were attempted and all effort was applied to the diversion.

MOTTA DI LIVENZA RAIL DIVERSION AT G 929888

Early in December 1944 work was begun on the construction of a rail diversion approximately 300 yards North of the main rail bridge The diversion, which was completed by 24 December, consisted of timber trestle bent piers 12 feet high, spanned by steel girders. The bridge had four spans, each 43.5 feet long with a single auxiliary pier under the center of each.

Attacked 25 Dec. 1944, MB. One locomotive crossed the bridge on a test run on 24 Dec 44. The next day the two Western spans were damaged and a main pier and an auxiliary pier damaged as well.

Repaired 6 Jan. 1945. The two damaged spans were removed and the two damaged piers repaired. The diversion was again made serviceable by the placing of two new spans.

Attacked 11 Jan, DB. Line cut by a single crater.

Repaired 11 Jan. Crater repaired in a few hours.

Attacked 17 Jan, MB. The center main pier was destroyed and the two adjacent auxiliary piers were severely damaged. The two center 43.5 foot spans dropped into the water. Two craters cut the East approach.

Attacked 18 Jan, DB. West approach cut by 2 craters. By 21 Jan 45 the craters on the approaches had been repaired and the damaged piers and girders cleared. The bases for 3 new piers were placed by 25 Jan 45. On 6 Feb 45 all piers were complete, and all that remained to make the bridge serviceable was to place the two destroyed spans.

Attacked 7 Feb. DB. The bridge was kept from opening by hits which knocked out the Eastern span, damaged one main and two auxiliary piers and cut the East approach at one point.

Attacked 8 Feb, DB. Continued attack knocked out the West span and destroyed the auxiliary pier under its center. All four 43.5 foot spans were now out and one main pier and 3 auxiliary piers destroyed.

Repairs were again undertaken, and by 20 Feb 45 one main pier and two auxiliary piers were erected. Girders were placed across the East and West spans and by 23 Feb 45 the work on all piers had been completed.

Attacked 24 Feb, DB. Again fighter-bomber attacks kept the bridge from becoming serviceable. The auxiliary pier under the center of the West span was destroyed, as well as the West abutment. The East approach was cut by one crater.

Attacked 3 Mar, DB. Direct hits destroyed the Westernmost main pier and the auxiliary pier to the East of it. Repairs now proceeded slowly. Slight clearance was carried out by 11 Mar 45 but no further repairs were completed until early April. At that time a new West abutment was constructed approximately 40 feet West of the destroyed one and an auxiliary pier erected. This lengthening of the bridge made 5 spans instead of the previous four.

Work was pressed on the three destroyed piers and by 9 Apr 45 they had been replaced, and all that remained to make the bridge serviceable was the placing of the 5 spans. They were not placed on 10 or 11 April 45.

Attacked 12 Apr, DB. Both approaches were cut, each by a single crater.

Attacked 13 Apr, DB. The center main pier and the auxiliary piers on each side of it were destroyed. No repairs were carried out from this time, and the diversion bridge remained in the same condition to the end.

SAN ANASTASIO RAIL BRIDGE AT G 968816

The bridge was of 2 span, independent steel truss construction and carried the double track line over the LIVENZA River. Each line was carried by separate trusses. The Western span was 200 feet long and was over the water. The Eastern span was 140 feet and was over the river bank.

Attacked 5 Nov. 1944, MB. The Western truss carrying the Southern line was hit near its center and collapsed into the river. Both ends remained partially on their piers. The Western approach was cratered at two points, cutting the Southern line and slightly damaging the North line.

Repaired 6 Nov. The North line was repaired on the West approach and the bridge was made serviceable for single line traffic.

Attacked 8 Nov, MB. The Western truss carrying the Northern line was hit and collapsed into the river at its center, with both ends leaning on their piers. From this time on no repair activity was seen and the bridge was abandoned. No diversion was constructed.

NERVESA RAIL BRIDGE AT G 644932

The bridge was of masonry arch construction and carried the double track line over the PIAVE River. It was made up of 20 masonry arches, each 70 feet long and approximately 25 feet above the river bed.

The bridge was attacked in early summer of 1944 but the first serious damage was inflicted on 31 August when 2 arches were destroyed and another damaged. Three more arches were destroyed soon after, but the spans were bridged and the bridge made serviceable for single line traffic by 15 September.

The attack by medium bombers on 22 September destroyed 6 arches and by the 26th four more had been destroyed. Repairs were immediately started and by 3 October all spans had been bridged, except for two at the West end of the bridge.

Attacked 3 Oct. 1944, MB. Two temporary spans and their timber piers were destroyed near the center of the bridge. By 11 Oct the piers had been repaired and girders were being placed.

Repaired 18 Oct. The 2 spans at the West end and the 2 spans near the center were placed and the bridge was serviceable for single line traffic.

Attacked 31 Oct, MB. Two spans near the center of the bridge were knocked out of alignment and their piers damaged. By 4 Nov 44 the piers had been repaired and the spans were being re-aligned.

Attacked 5 Nov, MB. Three temporary spans were destroyed and their piers severely damaged. Repairs were started by 8 Nov 44 and by 12 Nov 44 two of the spans had been replaced.

Repaired 15 Nov. The final temporary span was set.

Attacked 2 Dec, MB. Two temporary spans were badly damaged and the East approach was cut by one crater. By 5 Dec 44 the crater had been filled and one span repaired.

Attacked 10 Dec, DB. The East approach was cut by one crater.

Repaired 12 Dec. The crater was filled and the one remaining temporary span repaired.

Attacked 23 Dec, DB. One crater cut the East approach

Repaired 25 Dec. The crater was filled and the line made serviceable.

Attacked 29 Dec, DB. The Westernmost span was damaged and the West approach cut by a single crater. By 3 Jan 45 the damaged girders had been removed and the crater filled. The single span remained out. However, the rail diversion to the South was serviceable, and there was no need of the service of the main bridge.

Repaired 21 Jan. 1945. Missing span placed and bridge made serviceable.

Attacked 23 Jan, DB. Hits near the center of the bridge damaged one of the temporary spans, and a small crater cut the West approach By 28 Jan 45 the crater had been repaired, but the 5th span from the West end had been removed. The span remained out and by 3 Feb 45 the damaged span near the center of the bridge had not been repaired.

Attacked 4 Feb, DB. Another temporary span was damaged, its girders falling from the pier at one end. Damage to the main bridge now gradually accumulated and it was never serviceable after 22 Jan 45. During the attack on the rail diversion on 13 Feb 45 one of the remaining 5 masonry arches was hit. It collapsed during the attack of 14 Feb 45.

By 22 Feb 45 another masonry arch was down and all repair effort was abandoned and work concentrated on the rail diversion to the South. In early March 45 the girders of six temporary spans were stripped from the center of the bridge, and placed on the West approach. No further stripping was carried on, however, and the bridge remained in the same condition.

NERVESA RAIL DIVERSION AT G 649931

In August 1944 work was begun on the construction of a rail diversion across the river bed 300 yards South of the Main rail bridge, and by mid-September work was proceeding on the construction of the piers of the bridges across the two water gaps. High water in early October interrupted work, however, and washed out parts of the approaches.

Both of the bridges over the two water gaps were very low and consisted of I beams supported on concrete piers. The Western bridge was made up of 7 spans, each 33 feet long with an auxiliary pier under its center. The East bridge was of similar construction, and contained 9 spans. the major part of the crossing consisted of tracks laid in the river bed.

Attacked 3 Oct. 1944, MB. The diversion was not yet complete. Hits were made on the piers in the East water gap, slowing construction.

Repaired 14 Oct. The diversion was completed and made serviceable for single line traffic.

Attacked 21 Oct, MB. Two 33' spans in the East water gap were damaged, and rising water hindered repairs.

Attacked 31 Oct, MB. Two craters cut the approach to the East bridge. Large sections of the diversion were now under water or washed out. By 10 Nov 44 the water had lowered enough to permit some repairs. Work was started on the filling of the washed-out embankments and the repairing of the bridges.

Repaired 3 Dec. After being blocked for over a month, mainly because of high water, the diversion was made serviceable.

Attacked 23 Dec, DB. The piers of the West bridge were damaged by near misses. Materials were brought up and repair work immediately started.

Attacked 27 Dec, DB; 27/28 Dec, HB. The West approach to the diversion was slightly damaged by a near miss, and the East approach was cut by 2 craters.

Attacked 29 Dec, DB. Two spans were knocked out of the East bridge and a large crater cut the East approach. By 1 Jan 45 the 3 craters in the East approach had been repaired and one span replaced.

Repaired 8 Jan 1945. The remaining span was placed and the diversion made serviceable.

Attacked 17 Jan, DB. The track on the river bed was cut by a single crater.

Attacked 18 Jan, DB. The single crater was filled, but a new hit cratered the line in another place.

Repaired 19 Jan. The new crater was filled and the diversion again made serviceable.

Attacked 8 Feb, DB. Line cut by single crater.

Repaired 8 Feb. Line repaired in a few hours.

Attacked 11 Feb, DB. The track near the West end of the diversion was cut by a crater.

Repaired 12 Feb. The crater was filled and track re-laid.

Attacked 13 Feb, DB. Another crater cut the line on the river bed.

Repaired 14 Feb. The line was again quickly repaired.

Attacked 17 Feb, DB. Two craters cut the West approach to the West bridge and one slightly damaged the West abutment.

Repaired 20 Feb. The two craters and the damaged abutment were repaired. On 22 Feb 45 one 33 foot span was removed from the bridge over the West water gap. The diversion now became night operational, with an improvised crane kept on the approach to place the span at night.

Attacked 4 Mar, DB. Two craters cut the East approach to the diversion.

Repaired 5 Mar. The two craters were filled, and the diversion was again ready for night operations with the span still remaining out during the day.

Attacked 11 Mar, DB. Three craters cut the line between the two bridges.

Attacked 12 Mar, DB. A hit damaged the East bridge.

Attacked 14 Mar, DB. Two more craters cut the line.

Repaired 15 Mar. The 5 craters were filled and the East bridge repaired. The single span still remained out of the West bridge during the day.

Attacked 24 Mar, DB. A direct hit destroyed the East abutment of the East bridge, thus stopping all night operations.

Repair work and traffic was stopped by rising water at this time. By 31 Mar 45 the high water had severely damaged the diversion. At least 100 feet of fill on the river bed was washed out. Three spans of the East bridge were also washed out and two other spans severely damaged. Two spans of the West bridge were destroyed and the remainder of the bridge weakened.

By 4 Apr 45 repair work had started, and by 8 Apr 45 the diversion only lacked two spans in the East bridge. The West bridge had all piers complete but lacked 5 spans.

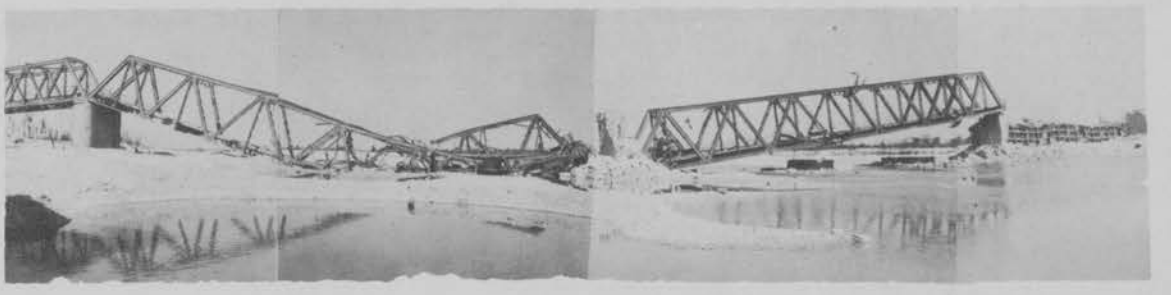
Attacked 9 Apr, DB. Hits destroyed two spans and 3 piers of the East bridge, thus appreciably setting back repairs.

Attacked 12 Apr, HB. Three new craters cut the diversion fill, further hindering repairs.

Attacked 15 Apr, HB. Severe damage was inflicted on the diversion in this attack. The East abutment of the East bridge was destroyed and two spans were knocked out. Two new piers, which had just been completed, were damaged. 180' of the fill embankment was badly mauled, and the tracks were cut in at least 4 other places.

Repairs were undertaken but the diversion was never made serviceable again, having been blocked since 24 March 1945.

PONTE DI PIAVE RAIL BRIDGE AT G 798813



The bridge consisted of 5 independent steel trusses supported on masonry piers, and carried a single track over the PIAVE River. The East span was 100 feet, the three center spans 180 feet, and the West span 100 feet long.

On 29 August 1944, before the period of this report, an attack by 24 B-26's, dropping 95 x 1000 G.P. fuzed .1/.01 destroyed the Easternmost truss. By 10 September the collapsed truss had been moved to one side, and two timber piers erected in the 110 foot gap. Steel girders were placed across one of the temporary spans on the 15th and the complete gap had been bridged by 22 September. An attack on that date, however, inflicted severe damage. 22 B-25's dropping 87 x 1000 G.P. fuzed .1/.025 scored a direct hit on the second truss and on the second pier from the West end. The truss collapsed to the river bed and the destruction of the pier allowed the center truss to drop to the river bed at one end. The West approach was severely cratered at two points.

After the attack of 22 September no further repairs were carried out on the bridge and it was abandoned. During attacks on the rail diversion which was built to the North, further damage was inflicted on the bridge, including the destruction of the West abutment, and the knocking of still another truss from its piers

By 1 October, therefore, the main rail bridge had already been abandoned and all repair efforts were being applied to the rail diversion.

PONTE DI PIAVE RAIL DIVERSION AT G 798815

In early October 1944 work was begun on the construction of a rail diversion approximately 200 yards North of the main rail bridge.

Construction was slowed somewhat by high water, but the diversion was completed by 23 November.

The diversion consisted of two bridges over water gaps, 108 feet and 360 feet long respectively, connected by an island fill of 250 feet. The small water gap was bridged by three 36 foot girder spans, each supported on timber piers and with an auxiliary pier under its center. The bridge over the large water gap was made up of nine 40 foot spans, each with two auxiliary piers under it. The piers of the diversion are about 6½ feet high.

Attacked 26 Dec. 1944, MB. After being serviceable for about a month, the diversion was cut by a direct hit on the bridge over the large water gap. One 40' span and its piers were destroyed, and another span and its piers severely damaged. The debris was cleared and bases for new piers set by 1 Jan 45.

Repaired 6 Jan 1945. Piers were erected, two spans placed, and the diversion made serviceable for single line traffic.

Attacked 15 Jan, DB. The diversion was blocked by a direct hit on the West abutment.

Attacked 17 Jan, DB. Further damage was inflicted by a near miss on the bridge over the large water gap, at least 3 piers being damaged.

Attacked 18 Jan, DB. Further attacks cratered the island fill at one point and the West approach in 3 places.

Attacked 20 Jan, DB. A direct hit knocked out one 40' span of the bridge over the large water gap.

Attacked 21 Jan, DB. Damage continued to accumulate with another crater on the island fill and a hit onthe East abutment.

By 25 Jan repairs had been started to the damaged piers in the large water gap. Craters in the island fill and on the West approach had been filled by 29 Jan 45.

Attacked 30 Jan, DB. A new hit knocked out another span of the large bridge. By 6 Feb 45 the small West bridge had been completely repaired, with the abutment rebuilt and the end span repaired. Piers had been repaired and rebuilt in the long East bridge but three 40' spans remained to be placed.

Attacked 7 Feb, DB. The attack kept the bridge from becoming

serviceable by knocking out another span with its piers. The island fill was also cratered.

Attacked 10 Feb, DB. Further severe damage was inflicted by knocking out two more 40' spans of the long bridge and again cratering the island fill. The East approach was cut at one point.

Repairs were started and by 19 Feb 45 the island fill and East approach had been repaired. Most of the damaged piers of the long bridge had been rebuilt. To make the diversion serviceable required the completion of 2 piers and the setting of 5 spans.

Attacked 20 Feb, DB. Repairs were set back by a hit on the long bridge, one 40' span and its piers being knocked out. Work was again started and by 27 Feb 45 was nearing completion with only four spans, totaling 160', to be placed.

Attacked 28 Feb, MB. Extensive damage was inflicted on the diversion. Direct hits destroyed three spans at the East end of the long bridge. The East abutment was destroyed, and the East approach cut by a crater. Repair work still continued with the bases for 3 new piers set by 3 March 45.

Attacked 4 Mar, MB. The attack completely destroyed the 108 foot bridge over the West water gap. The West end of the long bridge was damaged and knocked out of alignment. By 10 Mar 45 the bases for 3 piers of the small bridge had been laid.

Attacked 11 Mar, DB. Another pier of the long bridge was destroyed. Repairs now proceeded slowly and by 1 April 1945 no spans had yet been laid. All craters had been filled and all piers restored, however. Planking was laid across the piers of the long bridge to make a foot bridge for pedestrian traffic.

Attacked 4 Apr, DB. The West approach was cut by a crater. By 9 April 1945 the crater had been filled and spans laid on the small bridge. The long bridge of the diversion remained with the planking across for foot traffic.

Attacked 12 Apr, MB. The diversion was severely damaged. One span and 2 piers were knocked out of the small West bridge. Two direct hits and two near misses destroyed or severely damaged 10 piers at the East end of the long bridge. The West approach was cut by 10 craters and the East approach by 7 craters.

After this heavy attack little repair work was carried out. Some clearance and filling of craters was done, but the diversion remained severely damaged to the end, having been effectively blocked since 15 Jan 1945.

SAN DONA DI PIAVE RAIL BRIDGE AT G 865725

The bridge was of 3 span, independent steel truss construction, and carried the double track line over the PIAVE River. Each line was carried by separate trusses, the center span being 180' long, and the two end spans each 150' long.

On 29 August 1944, before the period of this report, the bridge was cut. In this attack, 27 B-26's dropped 108 x 1000 G.P. fuzed .1/.01. Both trusses carrying the lines across the center span were knocked from their piers and fell to the river bed. From 29 August no repair activity was carried on, and the bridge was abandoned.

Further attacks inflicted serious damage to the bridge. By 30 September the Eastern pier had been one half destroyed, permitting the two eastern trusses to fall to the river bed at that point. An attack on 10 October by 15th Air Force (296 x 500 #RDX) inflicted no new damage. Except for the clearing of the collapsed center trusses to permit river traffic, no further change was seen, and the bridge remained blocked for the entire period of the report. No diversion was constructed at this location.

A N N E X F

THE USE OF PHOTO INTERPRETATION IN ESTIMATING RAIL BRIDGE REPAIR TIME

THE USE OF PHOTO INTERPRETATION IN ESTIMATING RAIL BRIDGE REPAIR TIME

1. Early in MATAF's program of interdiction it became apparent that the recuperative quality of certain of the enemy's important bridges was great, that damaged bridges were quickly repaired and destroyed bridges rebuilt. Since the purpose of any single attack on a bridge is to make it unserviceable for as long a period as possible, targets were selected not alone for their location in the network, but also for their length of span and heighth of pier, constructional features which were directly related to the length of time required for repair or reconstruction.

2. As the intensity of attack mounted through the winter and the spring, MATAF endeavoured to block rail traffic not only over a line, but on segments of that line as well. One of the immediate difficulties encountered in such an effort was that there was but a limited number of highly vulnerable targets on any one segment. Thus it became necessary to select the best available targets, and because these bridges were persistently repaired following attack, it was necessary in most cases to attack them not once, but repeatedly.

3. Normally, the ideal time to inflict new damage on a bridge that is undergoing repair would be as close to the scheduled completion of repairs as possible, without actually allowing the bridge to have been put in use. This was always considered in operational planning, but there are many considerations that bear upon the practicability of such a maneuver. Nevertheless, it was of the utmost importance to our intelligence to know as closely as possible what the date might be. To determine that date became the task of photo interpreters.

4. Developing a Basis. In developing a basis for estimating repair time, use was made of a running photographic history of the important rail bridges in North ITALY and South AUSTRIA. Combining day to day coverage with a backlog of cover from existing libraries, photo interpreters undertook a detailed study of types of structures, of the nature of bomb damage, and of repair methods practiced by the enemy (see pp. 95-116).

5. In the course of the study it was found possible to classify both types of structures and damage to them; it was also found that the method of repair applied to any given combination of structure and damage was so standardized as to permit a ready analysis of the required repairs immediately after a bomb damage assessment. By observing many instances of damage and repair to each classification of structure, it was found that there was an almost consistent range of repair time required for the repair of a certain type of damage to a certain type of bridge. For example, erecting a pier and setting two spans for a standard German replacement structure of medium heighth took from four to seven days. If several piers were destroyed in the attack, the total repair time obviously depended on the scale of the effort applied. Therefore the range, four to seven days, was set up as a minimum. By maintaining complete dossiers on each important bridge, the minimum range could be further refined in specific cases from a consideration of past experience with the bridge in question. The following table provides a partial list of minimum ranges

TABLE OF MINIMUM RANGES (PARTIAL LIST)

Type of Structure	Required Repair	Minimum Range
a. Standard, low pier	Erect one pier, set two spans	2-4 days
b. Standard, Medium pier	Erect one pier, set two spans	4-7 days
c. Standard, high pier	Erect one pier, set two spans	10-14 days
d. Steel truss, greater than 90 ft. length, medium or high pier	Restore truss, repair damaged members	Over 14 days
e. Steel truss, 90'-180'	Discard truss, erect pier and set two spans	See a,b,c
f. Masonry arch, span less than 90 ft.	Set girders in place over weakened arch	3-5 days
g. Masonry arch, 90'-180'	Erect pier and set two spans	See a,b,c

Note: Time is estimated from actual beginning of repairs.

6. Technique of Reporting. Following attack, a detailed assessment and an analysis of necessary repairs was made. A preliminary estimate was then given which, when damage was slight, was usually based on the minumum range of repair, modified when thought advisable by previous experience with the same bridge. Where damage was extensive, that is when many piers and spans were destroyed, in order not to distort the picture by citing a minimum repair time, the estimate was based on time previously required for similar repairs of comparable magnitude.

7. In the case of important bridges, frequent, ofter daily coverage was obtained. Photographs were carefully examined for first indications that repairs were underway. Such indications were usually in the form of clearance, filling of craters, the arrival of repair trains, or the erection of scaffolding. If a lapse of cover of more than a day or two existed, it was sometimes necessary to approximate the date that repairs had begun. The beginning of repairs was reported and the time of serviceability could then be expressed as a date if so desired.

8. As successive covers were obtained the actual progress of repairs was reported in detail, and from the amount of work that had been accomplished since last reported the speed of repairs could be gauged. If necessary, the preliminary estimate was revised. If the tempo of repairs was speeded up or slowed down as seen on subsequent cover, estimates were revised accordingly. Except in cases where repairs were of long duration, however, revisions were seldom necessary.

9. Reliability. It was not always possible to check the reliability of estimates, since in exploiting the advantage gained by their use, bridges were often attacked just prior to their activation. In the many cases that could be checked, however, a large percentage were found to be correct within the range cited in the preliminary estimate, and of the balance not more than a few were over a day off. Where revised estimates were made based on a series of covers, the date of serviceability could almost always be determined to within 24 hours at least two to three days in advance. (See accompanying charts).

10. The technique of estimating and repaorting length of repair time was one that was developed through the winter and was not put into practice, at least in routine reportage, until the end of February. At that time it became customary to provide an estimate wherever sufficient material was available to provide a valid basis. Through March and April, the technique has so proved itself, and such a considerable amount of information had been gained upon which an estimate could be based, that the practice was warranted in the case of almost every damaged bridge.

11. In all, the general results of the system indicated such a high degree of reliability that when a bridge had not been made serviceable on or about the date estimated, that too was regarded as intelligence of primary importance. It was the unexplained delays in the activation of bridges that were under repair that first indicated the various methods of deception, the developing materials shortage, the soil condition on the BRENNER, and which provided a barometer of the flunctuating capacity and efficiency of enemy repair crews in any geographical sector. The use of this intelligence thus acquired is described in the section on Repair Activity.

12. The use of photo interpretation to provide an estimate of the time required to repair a bridge is a unique departure from the conventional practice of reporting only what can be seen on the photograph. Its successful adaptation to the demands of a high-speed program of interdiction, however, is more than a justification of its use. It is a singular illustration of the versatility of photo interpretation, a form of intelligence that has been brought to full maturity under the intense battle requirements of a tactical air force.

ESTIMATES OF DATES OF SERVICEABILITY

Date of Attack	Date of Photo Coverage	Estimate of Days Needed For Repair	Estimate of Date of Serviceability	Date of Actual Serviceability	Remarks
CASARSA Rail Diversion					
4 Apr, DB	4 Apr	5 to 7 days	9 to 11 Apr		One span, 2 piers dest.
	8 Apr	4 to 6 days	12 to 14 Apr		Slight clearance seen.
	9 Apr	3 or 4 days	12 or 13 Apr		New pier erected.
	10 Apr	1 or 2 days	11 or 12 Apr		Repairs accelerated
				11 Apr	Diversion repaired
PORDENONE Rail Diversion					
7 Feb, LB	7 Feb	No estimate			One span out. One pier destroyed.
	11 Feb	1 or 2 days	12 or 13 Feb	12 Feb	Pier repaired
17 Feb, MB 17 Feb, DB	17 Feb	7 or 8 days	24 or 25 Feb		One span, 1 pier dest.
	20 Feb	5 or 6 days	25 or 26 Feb		Repairs now started.
	25 Feb	3 or 4 days	26 Feb, 1 Mar		Pier erected.
	27 Feb	1 or 2 days	28 Feb, 1 Mar		Special equipment being set.
				2 Mar	Night operational

25 Mar, DB	1 Apr	No estimate			Three piers dest.
	4 Apr	7 to 9 days	11 to 13 Apr		Repairs started
7 Apr, DB	8 Apr	7 to 9 days	15 to 17 Apr		Another pier dam.
	11 Apr	5 to 6 days	16 or 17 Apr		One span set
	15 Apr	3 or 4 days	18 or 19 Apr		Another pier set
	17 Apr		17 Apr		All piers set, Reported night operational.
				17 Apr	Night operational

SACILE Rail Bridge

6 Feb, DB	7 Feb	No estimate			E. abutment dam.
	11 Feb	1 or 2 days	12 or 13 Feb		Bridge nearing completion.
				13 Feb	Serviceable
17 Feb, MB	20 Feb	5 or 6 days	25 or 26 Feb		Two piers dam.
20 & 21 Feb, DB	25 Feb	2 to 4 days	27 Feb to 1 Mar		Abutment damaged, repairs underway.
				1 Mar	Night operational

Date of Attack	Date of Photo Coverage	Estimate of Days Needed For Repair	Estimate of Date of Serviceability	Date of Actual Serviceability	Remarks
SACILE Rail Bridge (cont'd)					
24 Mar, DB	25 Mar	No estimate			E. abutment destroyed.
	1 Apr	3 or 4 days	4 or 5 Apr		Repairs started.
	4 Apr	1 day	5 Apr		Repairs nearing completion.
				8 Apr	Night operational
12 Apr, DB	12 Apr	3 or 4 days	15 or 16 Apr		W. span damaged. Both approaches cut.
				18 Apr	Night operational

The above chart shows the estimates and dates of actual serviceability of three bridges on the Northern line in the VENETIAN Plain zone of interdiction. They include every case where an estimate was made, following ehich the bridge actually did become serviceable, thus permitting an exact check. The date of actual serviceability has been obtained from the records of stations on the rail line and also from the daily reports prepared by the Italians on the status of all North Italian rail lines.

ESTIMATE AND REPAIR HISTORY AT MOTTA DI LIVENZA RAIL DIVERSION

Date of Attack	Date of Photo Coverage	Estimate of Days Needed For Repair	Estimate of Date of Serviceability	Remarks
17 Jan, DB	17 Jan	8 or 9 days	25 or 26 Jan	One pier, 3 spans destroyed. Two auxiliary piers damaged.
18 Jan, DF	18 Jan	8 or 9 days	26 or 27 Jan	Repairs delayed by cuts on West approach.
	25 Jan	5 or 6 days	30 or 31 Jan	Bases for 3 piers set.
	31 Jan	No estimate		Repairs slow. One pier set.
	6 Feb	1 or 2 days	7 or 8 Feb	All piers set. Spans being placed.
7 Feb, DB	8 Feb	7 or 8 days	15 or 16 Feb	Three piers damaged. East span knocked out.
8 Feb, DB	11 Feb	14 or 15 days	25 or 26 Feb	West span knocked out. All spans now out and 4 piers now destroyed.
	20 Feb	3 or 4 days	23 or 24 Feb	Three piers erected and one span placed.
	23 Feb	1 or 2 days	24 or 25 Feb	Final pier set.
24 Feb, DB	25 Feb	4 or 5 days	1 or 2 Mar	One pier and West abutment destroyed.
	27 Feb	No estimate		Repairs not started

Date of Attack	Date of Photo Coverage	Estimate of Days Needed For Repair	Estimate of Date of Serviceability	Remarks
3 Mar, DB	4 Mar	7 or 8 days	11 or 12 Mar	Two more piers destroyed.
	11 Mar	No estimate		Slight clearance.
	15 Mar	No estimate		Repairs not started.
	22 Mar	No estimate		Repairs not started.
	1 Apr	No estimate		Repairs not started.
	6 Apr	7 or 8 days	13 or 14 Apr	West abutment rebuilt.
	9 Apr	2 or 3 days	11 or 12 Apr	Three piers erected. No spans placed.
12&13 Apr, DB	14 Apr			Final attacks destroyed 3 piers. No more repairs.

The above chart provides a complete record of all the estimated dates of serviceability on the MOTTA DI LIVENZA Rail Diversion. After 17 January 1945 the enemy never succeeded in again opening the bridge, so no dates of actual serviceability are possible. However, the chart shows that when estimates revealed that repairs were nearing completion, the target was attacked and thus kept continually blocked.

A N N E X G

EFFECTS OF THE AIR OFFENSIVE

ON GERMAN COMMUNICATIONS

EFFECTS OF THE AIR OFFENSIVE ON GERMAN COMMUNICATIONS:

PW AND AGENTS' REPORTS

The question of the effectiveness of the Allied interdiction of enemy communications from the Reich border to the Italian battlefront can be answered partially from sources within that area. A perusal of PW interrogation reports and Allied agents' reports gives a first hand account of the actual difficulties caused by this "blockade" and the many time-consuming, costly counter-measures the Germans were forced to adopt in order to supply their troops with even the minimum of equipment needed to continue the fight on the static Italian front.

TROOP MOVEMENTS

The following excerpts from Fifth and Eighth Army interrogation reports as well as from various OSS sources illustrate the hardships of moving troops through occupied ITALY. It must be remembered that under normal conditions the trip from the Austrian border to the battle area of BOLOGNA, a distance of 330 miles, lasted only 12 hours.

28 September. Two Allied fighter planes circled over the train and then strafed it. The men left the cars to seek cover in a nearby field. Thirteen casualties resulted and the locomotive was damaged. (5th Army PW, 5-1-45)

2 November. This bridge (ADIGE River) had been destoyed in a recent Allied bombing attack. All troops detrained at this point, boarded Army trucks, and continued their journey to VERONA. (5th Army PW, 31-1-45)

13 November. A PW on furlough . . . travelled by truck from TRENTO to BOLZANO because all RR traffic between the two cities was stopped. (5th Army PW, 25-2-45)

Early December. In ITALY the train moved only during night. The train journey lasted six days . . . after several minor moves by train and by foot the unit was dispersed. (8th Army PW, 9-1-45)

Early December. The only layover on the trip was made 5 kms South of BOLZANO when the locomotive was loaned to other by-passing trains

. . . PW's train was delayed for more than 24 hours. (5th Army PW, 1-1-45)

10 December. Personnel detrained . . . in area TREVISO. The march was continued on foot during three successive nights to an unidentified area 15 kms North and Northwest of OSTELLATO. (8th Army PW, 12-1-45)

10 December. The journey was then continued by rail via TREVISO, CASTELFRANCO, and PADUA to ROVIGO. This part of the move lasted no less than three days, mainly because the bridge over the river BRENTA North of PADUA had been destroyed which caused a 24 hour delay at an unidentified railway station. (8th Army PW, 12-1-45)

12 December. 776 March Bn left SAGAN and travelled via CHEMNITZ-HOFREGENSBURG- MUNICH-KUFSTEIN-INNSBRUCK to the BRENNER where they arrived on 24 December. From a small station below the BRENNER, they were transported in buses to the BUDRIO area. (8th Army PW, 20-2-45)

13 December. It appeared that the move through GERMANY was executed in three days without a hitch. Against that, it took the train nearly two weeks to move from VILLACH to ROVIGO. It was constantly side-tracked and had to wait "interminably" at various RR stations. (8th Army PW, 12-1-45)

13 December. The unit set off again on foot . . . and, after one day of waiting at an unidentified PO crossing, three night marches and an intermediary stay at MIGLIARINO, settled down in localities Northwest of the VALLI DI COMACCHIO. (8th Army PW, 12-1-45)

18 December. At BOLZANO, PW detrained and was taken by a German diesel bus to TRENTO, and from TRENTO by an Organization Todt truck to VERONA. From VERONA, PW hitch-hiked to BRESCIA. (5th Army PW, 11-2-45)

25 December. After some delay at VILLACH due to bomb damage in the M/Y the train continued via TARVISIO and GEMONA to MONTE BELLUNA where it was attacked by Alled planes. The locomotive was damaged, the first car carrying mail and documents was burned, and 3 vehicles on the freight cars were destroyed, 1 man was killed and 5 were wounded. The men were instructed to march to another station further West but were picked up by passing trucks. (5th Army PW, 20-2-45)

Early January. Very few trains are camouflaged since most of them travel only during the night time. During the day they remain in tunnels. (5th Army PW, 3-2-45)

1 January. The plane scored no hits on its first strafing attempt. It returned a few minutes later and strafed the halted vehicles again, this time it set two autobuses and one truck on fire. The troops in the autobuses had dismounted in time but the mules in the truck were destroyed. (5th Army PW, 16-2-45)

12 January. Since Allied planes bombed and destroyed the RR station in TARVISIO, the train could not continue, and returned to VILLACH. From VILLACH the train detoured via SPITTAL, LIENZ, FRANZENSPESTE, BRIXEN and INNICHEN to BOLZANO. PW continued from BOLZANO to VERONA by truck. (5th Army PW, 7-3-45)

16 January. Engineers were operating a pontoon bridge in the vicinity of FERRARA during the night and on days when visibility is poor. (5th Army PW, 5-2-45)

20 January. They preceeded to a point about 60 Kms North of VERONA where their train was forced to stop because the rails were damaged. . . . After waiting 11½ hours for the tracks to be repaired, they continued their trip to the VERONA station. After several halts their train arrived at the VERONA station. PW claims that the German Reichbahn issued a directive in the fall of 1943 that 4 empty freight cars are to be attached directly behind the locomotives on both passenger and freight trains. These four empty cars, which are placed between the locomotives and the freight or passenger cars are to lessen the possibility of the locomotive and the cars transporting freight or passengers from being hit when strafed. (5th Army PW, 16-2-45)

20 January. As of 20 January 1945, the road connecting FORNOVO with AULLA was described by PWs as a cemetery for motor vehicles. On both sides of this road there remained the debris of an estimated 50 destroyed vehicles and carts. (5th Army PW, 31-1-45)

25 January. The 130 replacements were forced to leave the freight train in which they were riding and to continue their trip to VERONA by truck the following day. (5th Army PW, 13-2-45)

30 January. PW on the trip from VILLACH to VERONA: During this part of the trip all passengers were compelled to leave the train twice to cross rivers on foot bridges or temporary trestles, the regular bridges having been destroyed by air attack. (5th Army PW, 25-1-45)

31 January. Between PIACENZA and MODENA there is no RR service, partly due that some of the line from FIORESZNOLA to PARMA is endangered by Partisans, partly because of constant air attacks. (CX Report #5438.

January. Most of these ferries (PO River) consist of assault boats which are assembled and which operate only at night . . . These ferries do not operate in the same place every night. (5th Army PW, 13-2-45)

Early February. It took them 3 weeks to travel from the DRESDEN Replacement Bn to the regimental area (FERRARA). (5th Army PW, 23-2-45)

Early February.. At beginning of February there was much overnight movement of German troops, on the march, or in HDVs along UDINE/TARVISIO/BELLUNO/DOBBIACO towards frontier. 300 HDVs count-in one night G-4889. (Furrow 10/3)

6 February. Approximately 500 yards South of VIPITENO, the RR tracks were destroyed. The passengers of the furlough train were required to walk approximately 200 yards, where a freight train was waiting for them. (5th Army PW, 10-3-45)

7 February. From BOLZANO the Bn proceeded by bus to VERONA and thence by RR to a point approximately 1 km North of the PO, which they crossed by ferry at night, arriving in FINALE on 7 February 1945. (8th Army PW, 23-2-45)

8 February. The transport had to wait 5 days at the BRENNER because there was no engines available. . . the March Coy proceeded by truck to TRENTO and VERONA . . . the March Coy then continued by train from VERONA to MANTOVA and BORGOFORTE. The Coy crossed the PO on a footbridge at night and continued to march overland to BRUGNATO arriving on 8 March one m onth after leaving GERMANY. (5th Army PW, 14-4-45)

8 February. Approximately 1200 troops departed from HALBERSTADT by train enroute to AULLA. They arrived at the BREENER on 11 February and were forced to stay in a tunnel 7 km North of BOLZANO for 3 days. On the 3rd day the train pulled into BOLZANO where the troops detrained. They stayed overnight in BOLZANO and then proceeded the following evening to VERONA via TRENTO by M/T. There were 5 buses and several trucks for transportation which had to make several trips in order to carry all the men. They then took a train from VERONA to MANTOVA taking 8 hours to complete the trip. To cross the PO River the troops walked about 1½ hours and crossed at BORGOFORTE on a make-shift bridge, partly supported by the former RR bridge . . . Two days later they proceeded by foot to PARMA, travelling only by night . . . The trip was completed on 6 March 1945. (5th Army PW, 18-4-45)

6 February. During week of 4-10 February, SS Division with artillery and tanks passed along BRENNER Road. Forced to halt in TRENTO-

MEZZOCORONA zone due lack of fuel. (CX, Wilkinson, 15-2-45)

8 February. The passengers were collected by civilian motor vehicles about 500 yards East of ROSENHEIM and taken 3 kms outside ROSENHEIM where another train was waiting. . . they had to bypass a destroyed RR bridge on foot, board another train and continued on to BOLZANO where they again were stopped by a destroyed bridge. (5th Army PW, 10-3-45)

9 February. HALL-BRENNER Line was operative as far as FORTEZZA on 9/2. S. of FORTEZZA 4 regiments of SS Engineers and teams of specialists were working day and night on reconstruction, following IKW order that BRENNER Rail traffic must be opened up at all costs. (OSS #1640/13, 9-2-45)

11 February. Kesselring, urgently recalled to GHQ, was requested to withdraw Army from ITALY, replied that due scarcity of M/T and RR interruption it would take two months. (CX Furrow, 11-2-45)

15 February. Germans passed through TREVISO area on foot on Route #53, carrying equipment. They are worn out and ragged, stop at populated places during day. (Nelson 9/2, Int & Ops Bulletin #177)

15 February. No further transfers ordered in view of road-rail conditions. (Angelo from KDVO Informant)

20 February. In night attack on an enemy column of horse drawn vehicles and marching troops proceeding towards PIACENZA, Allied aircraft killed about 75 men and 25 mules. (Rossi, 27-2-45)

22 February. Informant returning to VERONA via BRENNER on 22/2 gives following account of his journey: (a) By train from BRENNER to BRESANONE where changed trains, due destruction of bridge over ISARCO at B-188907. (b) Both banks of river collapsed here and large scale repair work greatly interrupted by air raid alarms. (c) Passengers transported across river on wooden bridges, capable of carrying light lorries. (d) Tram continued to BOLZANO, from where passengers had to hitchhike. (e) Even Germans barred from travelling on line from BOLZANO to TRENTO. (Rye, 27-2-45)

22 February. The train stopped about 300 metres North of the ADIGE River, North of BADIA where all passengers detrained, crossed the river over a foot bridge and walked to BADIA. (5th Army PW, 13-3-45)

28 February. All German rail traffic through the VERONA region is passing over the large bridge to the Northwest of the city. The use of secondary lines is of minor importance. The enemy is using the connecting lines which avoid the station which has been

the object of large scale bombings and is now of little use. Almost all trains stop at secondary stations. (Kankakee, 28-2-45)

Late February. Crossing the PO has many difficulties, PW reports. 3 large ferries operate South of CREMONA. He claims that a ferry never operates for a long period at the same spot and that no vehicles or persons are allowed to assemble within 40 metres of the embarking points. For personnel waiting to cross the river, large bunkers or subterranean shelters have been built into the slopes of the river bank . . . PW was told that an average of one ferry is damaged or destroyed per day.

Early March. HD Infantry convoys attempted to proceed along BRENNER Road during 1st week in March were forced to return. (Rye #301, 10-3-45)

11-20 March. From 11 to 20 March, 4500 Germans passed PONTEBBA going North in lorries, carts, and on foot. On 16 March, 3000 Germans passed TARVISIO going North. Mass movements North are reported, all appear disorganized, e.g. one lorry pulling 3 others.

12 March. 3000 Volkssturm arrived from GERMANY to endeavor to repair BRENNER by 20/3. (Turnpike, no date)

13 March. EMILA Section: (1) On 13/3, 400 ragged poorly equipped German troops were seen proceeding North in VICENZA area, staying in the fields in order to avoid Allied Strafing. (46) Four dumps of explosives were hit by Allied aircraft along the banks of the TORRENTI CAPRIO (P-7536). VENETO Section: (3) Allied aircraft hit the bridge South of SPILIMBERGO at PROVESANO 21/3. (4) During the first week of March, 1500 Germans arrived on foot from the South in the LAZISE zone (F-4563) (Int & Ops Bulletin #212)

Late March. About 100 RR workers from BADEN who were sent to the BRENNER Line several weeks ago have just returned to their post, traffic on the BRENNER having been almost completely stopped as of 15/3/45 by heavy bombings. Material is transported by mule back and animal-drawn convoys, which are harassed daily by bombings. On the whole traffic on the BRENNER Line has been reduced to 50% of it's volume at the beginning of the year. (OSS #B2188/41 (Cezanne/Fr, Intell) 15-3-45)

10 April. He quotes Wolf as follows: "The German High Command has often requested German troops from the Italian Front, but the command of the Italian Front has always delayed carrying out these requests on the grounds of transportation difficulties. (OSS, Johnny, 10-4-45)

11 April. M ost of troop movements in these areas (SAN VITO, MOTTA, PORTOGRUARO, PALAZZOLA, CODROIPO and CERVIGNANO) are on foot, general trend toward UDINE. (OSS, Acre, 11-4-45)

SUPPLY

While the above sources present a picture of the problems facing the GERMANS in moving troops in and out of the area, equally impressive reports show how the interdiction program seriously handicapped not only all movement in ITALY but also deprived the enemy of most of the benifit of Italian industrial production. Fuel and electric power were the most critical shortage items. Then too, aside from the direct results of Allied bombings of communications lines, the tie-up of transportation had many indirect reprecussions on the whole economic set-up in Northern ITALY.

October. Condition of Italian Industry at end of October 1944:. . . Production was at its lowest level, shortage of raw material, destruction by Allied air attacks is the greatest obstacle to continued production. Every attack slows down and disturbs the industrial program although routes are generally restored within a short time . . . Finished products amounted to 70,000 tons in September of which amount only 20,000 tons could be shipped to GERM ANY due communication difficulties. . . More working time has been lost due air raid alerts than by actual bomb damage. . . Liquid fuel is disappearing from the market entirely. (CX YO 993, 10/4)

30 December. As a result of the Allied air attack on SARZANA, the entire ration dump there burned down. (5th Army PW, 22-1-45)

8-14 January. The VERONA-BRESCIA-MILAN Line is not operating. . . The line is crowded with freight trains that have been blocked near the stations. (OSS, 14-1-45)

11 January. PIACENZA was bombed. . . the manufacturing departments of the arsenal were destroyed. . . sugar factory near town set on fire. On 31 December a troop train carrying 35 cars of Wehrmacht materials was destroyed on the ALESSANDRIA-PAVIA RR line. (OSS, Bern, 1-45)

12 January. Allied planes attacked VERONA. One bomb hit the supply depot of the FRONTLEITSTELLE. . .leaving the FRONTLEISTELLE without food for three days. (5th Army PW, 13-3-45)

16 January. Allied planes attacked the oil field at VALLEZZA. . . after the raid on 16 January, the oil storage tanks burned through

out the night. When FW left the area on 5 February production had not been resumed, but 200 to 300 Italian civilians were repairing the damage. (5th Army FW, 2-3-45)

31 January. Production at more important factories in SESTO S. GIOVANNI started decreasing in 3-44 and diminished still further in autumn. At present is paralyzed by following factors: lack of raw materials aggravated by transport difficulties; lack of coal; lack of electric power; lack of personnel, due rarity and irregularity of communications, as majority live in BRIANZA, LECCO and BERGAMO areas; almost complete lack of key materials; difficulties in transporting finished goods which are accumulating in depots and hampering production. (General Industrial No. 5568A. 31-1-45)

January. All work on the Fiat aircraft engines 474 RC 38 stopped. The 150 new engines in the factory at BRESCIA were destroyed so as to salvage the materials. These materials are still in the factory because of lack of transport facilities. (OSS, 1-45)

January. During the month of December it was estimated that 150 trucks would be built. The trucks are now being equipped with gasogenes for burning wood, because of lack of fuel. (OSS,1-45)

January. Almost all the wine production of North ITALY will be at the disposal of the German Army in order to be distilled and transformed into fuel. (OSS, 1-45)

5 February. During earlier months a considerable quantity of materials was taken by the Germans from the Fiat warehouse at TURIN and sent to GERMANY. During December however transfer of materials was completely stopped for lack of transportation. Up to November last, the Fiat steel factory was producing only parts for damaged bridges. Production stopped last December for lack of fuel. (OSS Bern, 5-2-45)

5 February. The factories (Falk, MILAN) normally employed 25,000 men. 10,000 of them however have been dismissed. Lack of raw materials, formerly imported from GERMANY, has greatly reduced production. (OSS, Bern, 5-2-45)

5 February. Bicycle tires are being produced by the Michelin factory in TURIN. The output however is very limited, as the quality of coal supplied to the factory by the Germans is very poor. (OSS, Bern, 5-2-45)

7 February. There were 3 trains with locos, loaded with coal. All are awaiting reactivation of TORINO-MILANO RR line in order to be moved across the TICINO River. (OSS Int & Ops Bulletin #172)

15 February. Steam engine position very serious owing to coal shortage. (OSS, Rye, 15-2-45)

17 February. PIACENZA srea: In order to overcome shortage of labor for repairing bomb damage, Germans offer 1000 lire per hour for work during bomb raids. . .Work has been totally suspended due to continuous strafing attacks, and evacuated workers don't get back. (OSS Int & Ops Bulletin #179)

17 February. Because of gasoline and diesel oil shortage, Methane gas is widely used as motor fuel. (CX Percy, 17-2-45)

18 February. In view of impossibility keeping line open, orders (German) have been given to unload all trains carrying military supplies at PORTA NUOVA Station, (VERONA). (CX Rye, 18-2-45)

19 February. Owing to lack of rails and building materials, repairs to UDINE-TARVISIO line proceeding slowly. (OSS YC 513)

19 February. Great shortage of Flak ammo at UDINE, orders received to fire only in case of direct attack on city. (OSS Truculent, 19-2-45)

20 February. Lack of coal andshortage of electric power mainly account for collapse of TURIN industry. Men work 3 days per week, firms subsidised by state through special fund for purchase of goods for workmen. (CX Steadfast, 20-2-45)

21 February. Germans have ordered various RR tracks be taken up and sleepers salvaged and cut up at PORTO VESCOVO workshops, for steam engine fuel. (OSS Rye, 21-2-45)

21 February. On 21 February the 60th Artillery Division passed through CONEGLIANO toward UDINE on foot heading for AUSTRIA. At SUSEGANO anti-aircraft guns calibre 88 remain with very little ammunition. (Tacoma, 24-2-45)

22 February. Hitler' s order to the Division is to hold hard to give Germans time to take out of ITALY maximum quantity of foodstuffs. Malcontent reigns among the troops who are demoralised because of clothing and rations shortages. (Velis, 22-2-45)

22 February. Withdrawing German units are forbidden to use trucks for ration supply and must live on the land. (OSS, Twinbrook, 22-2-45)

23 February. An artillery group of the 147th Division en route to the MASSA front, out of three motorized batteries they had to leave part of their vehicles due to lack of gasoline. (Pietro,

23-2-45)

Early March. At COLOGNA bombing destroyed the dumps of materials waiting to be ferried across the PO but the ferry itself was hidden 300 metres West of the point and is still functioning. Railroad carloading and discharging in general takes place outside of stations at varying points. (Percy, 4-3-45)

Early March. A few days ago Allied aircraft near MODENA hit 2 trucks loaded with ammunition en route to VIGNOLA. As a result the AA guns were without ammunition for 3 days. (Percy, 11-3-45)

2 March. The steel works of the Falk Plants at SESTO SAN GIOVANNI have stopped production. . . the Martin ovens have ceased operating because they lack coal. (OSS Wilkinson, 2-3-45)

3 March. Water tank used to replenish steam locos was hit on 3/3 raid, caused great inconvience due previous destruction of tank at PORTA NUOVA Station. (OSS Rye, 4-3-45)

5 March. Coal supplies in TURIN very low. . .trains running almost entirely by burning wood or coke. (OSS Spring, 5-3-45)

6 March. Motor trucks are loaded on frieght cars at SARZANA, go by rail to PONTREMOI. (OSS Paradiso, 6-3-45)

7 March. Gasoline is almost non existant. It has been observed that many M/T vehicles are drawn by horses or mules. (OSS Melette, 7-3-45)

7 March. The Germans have almost no coal at all. . . are trying to use the electrified lines as much as possible. (OSS Kankakee, 7-3-45)

7 March. Source recommends a concentration of fighter-bombers on the tracks TREVISO-SACILE, TREVISO-CASTELFRANCO and TREVISO-MONTEBELLUNA since the damages already caused on these tracks are greater than the preperations for repairs made by the Germans. (OSS Hollis, 7-3-45).

7 March. About 1,000 laborers and German engineer troops are working to put FERRARA RRyards in commission. . .RR are becoming increasingly important to enemy because of his fuel and vehicle shortage. (OSS Percy, 7-3-45)

8 March. At VALVASONE there are tank drivers with unkown number of tanks hidden and camouflaged. . .Undamaged tanks can't be used for lack of gasoline. (OSS Styx, 8-3-45)

9 March. As a result of bombing of LECCO on 9 March 22 cars loaded with material and one electric locomotive were destroyed. (Mecury, 11-3-45)

10 March. One train with food supplies which had just arrived in CREMONA was destroyed. The supplies were originally destined for front line troops. (5th Army PW, 10-3-45)

10 March. To counteract losses in RR material around BRENNER Pass, Germans since early March have been bringing to INNSBRUCK large numbers of horses, mules, and Jacks together with HTV's and sleights, from BAVARIA, S. BODEN, and HUNGARY. Sufficient fodder already provided, barracks, barns, and vehicle parks are being organized every 4 or 5 kms along the road, INNSBRUCK, BRENNER, BOLZANO. (OSS #B-2038/2, 10-3-45)

11 March. There is a bridge which permits the passage of heavy vehicles at BORGOFORTE. It is reserved for military traffic. The bridge is placed in position at 1900 hours and dismatled at 0500 hours. During the day half of the bridge is hidden on either side of the river, but in a different position every day. Civilians are forbidden to approach within 4 km of the bridge. (OSS Rocket, 11-3-45)

11 March. All the railroad coal dumps are empty. It has been ascertained that the Germans use coal mixed with wood for locos. The coal reserve is said to last about 15 days. (OSS Kankakee, 11-3-45)

12 March. The RR of the CUNEO and COLLE DI TENDA zone are in great difficulties owing to the lack of coal. Locos are being supplied with wood and the Germans have ordered the dismantling of the square of TORINO SMISTANMENTO so as to recover the wooden beams. (Oneonta, 12-3-45)

13 March. TURIN area: RR Sleepers being used as fuel owing to coal shortage. (OSS Leaf, 13-2-45)

14 March. LECCO-BERGAMO RR line has suspended operations due to lack of fuel. (OSS, Bulletin 205, 14-3-45)

20 March. Wehrmacht has closed down military rail transport office to make personnel available for other duties, due lack of rail communications. (OSS Rye, 20-3-45)

22 March. Order for 1000 flatcars placed with factory at SAVIGLIANO on 25 March 1942. To date 119 have been delivered. Plant lacks timber, brake materials and coal for the forges. Present delivery is seven cars per month. (Spring, 22-3-45)

23 March. It is reported that 90% of the autos operated on Methane and the other 10% on charcoal. . .all drivers have received strict orders against wasting fuel particularly Methane. (OSS Wilkinson, 23-3-45)

25 March. Shortage of fuel becoming critical. Believed German Air Force grounded for want of petrol, not aircraft or crews. (Furrow, 23-3-45)

25 March. Considerable increase in number of dumps and storage depots for various goods and materials requisitioned by Germans, in N. ITALY, in area between VERONA and BRENNER. Material cannot be sent to GERMANY due transport difficulties. (Furrow, 23-3-45, #458)

27 March. The PW reports the 1057th Recn Bn. . .was partly motorized, but due to the shortage of fuel it now makes use of its horse drawn vehicles only. (5th Army PW, 27-3-45)

28 March. The RIV employs a total of 8100 in all factories. Production decrease is caused by shortage of material, transportation. (OSS Wilkinson, 28-3-45)

29 March. According to an employee of the RR station of NOVARA, the locos which are at present in depot are all out of order because of the Allied bombings and the subsequent sabotage carried out by Italian RR workers. (OSS, Saturn, 29-3-45)

31 March. The Requisition Commission has been ordered to find 300 M/T per day to make up for loss by continuous raids on VIA EMILIA. (CX 6176/A, 31-3-45)

31 March. The following information is given to show the gasoline and general M/T situation: "Because of the gasoline shortage, motor vehicles have often waited as long as 2 to 3 weeks to make necessary trips from LA SPEZIA to LEVICO. A soldier was arrested and sentenced to confinement for taking one liter of gasoline to do his laundry. Vehicles must travel 8000 kms instead of the former 3000 kms before oil change. Special permission must be obtained from the CO before changing the oil." Informant estimates that with the disruption of rail traffic as a result of Allied air attacks, M/T traffic in ITALY has increased almost 30% since October 1944. (5th Army PW, 31-3-45)

March. 80% of Diesel locos rendered unserviceable due lack of fuel on UDINE-TARVISIO line. (OSS YO 709)

2 April. In the whole RR department of ALESSANDRIA only 15 locos have been left, eight of which are operating. The other locos

are stationed in the end tracks because of damage. (OSS Kanakee, 2-4-45)

6 April. RR line BRONZOLO to ORA running on steam due many interruptions caused by air attacks and destruction of station above ORA by bombing 2 months ago. .MONZA-LECCO RR line works on electricity only, due complete lack of coal. (CX, Rye, 6-4-45)

9 April. Germans are using Methane gas almost exclusively. Every 3 days truck with 200 empty cylinders leaves SPILIMBERGO for PADOVA and returns with loaded cylinders. (OSS, Agre, 9-4-45)

11 April. It appears that the enemy possesses small amounts of ammunition for artillery. . .many batteries possess less than 100 rounds. (OSS, Melette, 11-4-45)

12 April. 90th P.G. was to return to GERMANY but it has been sent back to the Italian front. It is mediocrely equipped with numerous M/T but lacks fuel. (OSS Report 233, 12-4-45)

13 April. As a result of interruptions only parts of the TARVISIO-UDINE Railway are serviceable. Goods traffic from UDINE is unloaded on the sidings at LA CARNIA Station. Part is then dispatched all the way to TARVISIO and beyond by M/T and the remainder is carried by M/t as far as PONTEBBA and is there reloaded on to trains for TARVISIO. Troops are transported by M/T to the stations at MOGGIO and RESIUTTA and from there are taken by rail to TARVISIO. (OSS, Acre, 13-4-45)

15 April. The German shortage of petrol is becoming even more noticeable, all the transport attached to German Headquarters are being run on producer gas. (OSS Sand, 15-4-45)

Mid-April. "Your air attacks cut off our line of communications and supplies. Our troops had nothing to eat for several days. We sent several men back to the rear to bring back supplies, but they never returned. There was utter disorganization in our rear areas. No one knew where the other units were, some units disapeared completely and must have been taken prisoners. We were taken prisoners by complete suprise and did not fire a shot. After strafing attack we were suddenly suprised by your men who stood in front of our bunkers with fixed bayonets. (5th Army PW, 26-4-45)

16 April. Owing to the impossibility of transporting stocks away, the Germans have blown up the Ammo Dumps at SAN NICOLO and RIVIRGARO. (CX Oat, 16-4-45)

22 April. "I was caught cleaning my trousers with gasoline in July 1943. A Court Martial conducted by 2 GAF Majors sentenced me to

4 years imprisonment for sabotaging the war effort. I served about one third of my time in the penetentiary, and then was transferred to the Punishment Company of the 4 Para Div. I, a Czech, am proud to have sabotaged the German war effort, even if only in a small way." (8th Army PW, 22-4-45)

April. At point C-329425 on the UDINE-VENZONE RR line, fifty box-cars loaded with explosives were immobilized due to bomb damage to tracks. (Battle, 15-4-45)

EFFECTS OF THE AIR OFFENSIVE ON GERMAN COMMUNICATIONS:

OPINIONS OF GERMAN MILITARY LEADERS

Col. General Von Vietinghoff
Commander-in-Chief, Southwest

The most serious difficulties for the railways were due to the destruction of bridges. Repair of bridges required a great deal of time and large bridges could not be repaired at all. As an emergency measure, diversions were built frequently at bridge points, or goods were trans-shipped at the point of break. With the increasing number of air attacks, particularly on the BRENNER section, damage became so big and so frequent that traffic on this section dropped off more and more despite the very best repair organisation and the use of a very large number of building personnel, and it could only be used temporarily andlocally for short periods. However, a few days of bad weather in which the Allied Air Force could not fly frequently were sufficient to bring traffic up to the full again. Even in February and March it was frequently possible to travel by rail right through from the BRENNER to BOLOGNA.*

Field Marshal Albert Kesselring
Former Commander-in-Chief, Southwest

Allied bombing behind the German lines was the main factor in GERMANY's defeat.

Field Marshal Gerhardt Von Rundstedt
Former Commander-in-Chief, West

Air power was the first decisive factor in GERMANY's defeat. Lack of petrol and oil was the second, and destruction of railways third.

Former General of Transport Service, Southwest
(July 1943 - January 1944)

In ITALY both coastal railways were almost unusable; in

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* General Von Veitinghoff's statement does not meam that one train would get completely through the line, but that traffic would be moving along the whole line by shuttle service between breaks.

particular the western line was never used. An important contributory cause of this was the continued presence of fighter-bombers which stopped all possibilities of repair work on the line. (Stated further that bombing of communications had certainly contributed to collapse of Germans in Central ITALY. . . .Capacity of whole railway network. . .diminished by bombing of railroad centers. . .caused congestion of urgent traffic. . .unloaded and dispatched by road.)

General Von Senger
Commanding General, XIV Panzer Corps

The Allied bombings of the PO River crossings finished the Germans in ITALY. The attacks with fragmentation bombs by fighter-bombers thoroughly demoralized the troops, who, toward the end, would not fight. Even so, we could have withdrawan successfully with normal rearguard actions despite heavy pressure, but, due to destruction of the ferries and crossings of the PO we lost all our equipment. North of the PO, we were no longer an army.

Major Budelmann
Commandant, Air Base E 230

Strategic bombing of German industry and transportation is, in my opinion, the one paramount reason for GERMANY's defeat. As the aircraft industry was largely dispersed in various sections, attacks on a few important departments could hold up production all down the line. Attacks on the transportation system furthermore, held up production by delaying the delivery of vital material.

Major Gallenkamp
Intelligence Staff 9

The greatest single cause of the German collapse was Allied strategic bombing of the German transportation system.... By the beginning of 1945, air attacks had reduced railroad traffic in North ITALY to an insignificant trickle of supplies. The effectiveness of these attacks depended largely on whether the target was a railroad bridge or simply a section of the line. When anti-personnel "butterfly bombs" were dropped on a bombed-out bridge, the difficulty of repair was increased tremendously. As a certain number of these bombs were fused to explode within a half-hour after striking the ground, our repair crews were compelled to wait a half-hour before attempting reconstruction. The remaining "butterfly bombs", fused to explode on contact, then had to be set off. A gunner, protected by a shield, fired at the individual bombs from a distance of 50 to 60 metres. By this method 6 hours were required to explode 110 bombs. Though our personnel losses were quite

small, the time lost was tremendous.

The air war against railroad communications was a greater factor in the German defeat than the raids against industrial targets.

General Hartmann
Chief of the "Hartmann" Special Staff

Allied air power was the most outstanding cause of GERMANY's defeat. . .the Allied landings in EUROPE could never have been effectual without Allied air superiority. . .the beachheads could have been isolated and later wiped out if we had been able to rush reserves immediately to the front, that is, if our transportation system had been intact. Allied air attacks against our communications network prior to and following the actual invasions were thus directly responsible for our defeat.

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