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World War II Airborne Warfare Tactics



Gordon L Rottman • Illustrated by Peter Dennis



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Abbreviations used in this text:

AA	anti-aircraft
Abn Div	Airborne Division (US & British)
A/L	air-landing
AT	anti-tank
Bde	brigade
DZ	drop zone (paratroopers)
FJD	Fallschirmjäger Division (German)
FJR	Fallschirmjäger Regiment (German)
HMG	heavy machine gun
HQ	headquarters
Inf Div	Infantry Division
LMG	light machine gun
LZ	landing zone (gliders)
pdr	pounder (British artillery designation)
PIR	Parachute Infantry Regiment (US)
SNLF	Special Naval Landing Force (Japanese)

WORLD WAR II AIRBORNE WARFARE TACTICS

INTRODUCTION

World War II saw the introduction of a new means of warfare, providing an army with a capability to exploit the enemy's 'vertical flank'. Large combat units could be inserted behind enemy lines in a short time via parachute, glider and transport aircraft. As with any new form of warfare, there were tragic mistakes as well as resounding successes. There was much to learn, and new capabilities continued to be introduced throughout the war.

Airborne operations offer a number of advantages to the army employing them. They enable the attacker to carry out a vertical envelopment, by-passing the front line or positions with protected flanks. In the same manner he can surmount major obstacles by 'bounding' over rivers, mountains and even oceans. Airborne forces cannot always accomplish these missions unless supported by a conventional ground force; but a supporting airborne operation can reduce the size of the necessary ground assault force, and distract the defenders enough to reduce the resistance it will encounter.

Airborne operations can be launched from within the depth of the attacker's zone, providing extraordinary speed and offering opportunities for surprise attacks throughout the enemy's rear areas. There are so many possible objectives and scenarios for airborne attacks that no defender can effectively forestall them all. An assessment of the enemy's positioning of reserves, air defences, anti-airborne reaction forces, and dispersal of rear service organizations and headquarters provides the airborne force with numerous options to counter the enemy's defensive plans. Airborne units can support the attack by deploying as reinforcements, whether parachuted or air-landed, without the need for slow sea or road-bound truck transport.

The psychological effects of airborne operations, both small and large, cannot be discounted. At all levels of command consideration must be given to the airborne threat and measures to counter it. The menace of airborne raiders or a full invasion affects commanders and troops alike. Resources are expended on defences for rear area installations, units are assigned to secure possible airborne objectives, and counter-airborne reaction forces are deployed. These all detract from the reserves available to back front-line units under direct assault from the sea or land. One of the arguments against airborne operations is the possibility that airborne forces may be widely scattered in small elements under limited tactical control; but this can just as often be a benefit. The night drops in Sicily and Normandy were characterized by wide scattering; small groups of airborne soldiers collected together from different units and marched towards the sound of the guns, and



Germany was the first nation to make significant use of air-delivered paratroopers in combat, and their success in the Low Countries in May 1940 rapidly led other armies to form experimental units. Ironically, in this striking studio portrait of a young Fallschirmjäger proudly displaying his jump badge, his combat decorations are not for airborne missions – they are the ribbon for the winter campaign 1941/42 in Russia, and the Luftwaffe's Ground Combat Badge. After the heavy losses on Crete in May 1941 the Fallschirmjäger never again mounted an assault landing in more than battalion strength. (Private collection)

while initially disorganized, most missions and objectives were achieved. This scattering created a greater problem for the Germans than had been anticipated. Their rear service and command and control networks were disrupted at the most critical time – when the amphibious assault came ashore – and reports of paratroop landings from widely dispersed areas persuaded them that the airborne landings were in greater strength than they actually were; they felt that they were under attack everywhere. The mere threat of paratroopers has often led to extended alerts and the establishment of unnecessary defences; this occurred in the Philippines, Hawaii, Burma and elsewhere in response to fears of Japanese paratroopers who never materialized.

Obviously, airborne forces are primarily an offensive asset, but they can also be used defensively. They can reinforce cut-off ground units, conduct diversionary and harassing raids in the enemy's rear, and aid counter-attacks by attacking objectives immediately behind enemy lines.

However, despite their great versatility, for airborne operations to achieve success a number of requirements have to be met.

The airborne force has to be highly trained, to a level beyond that of the usual conscripted troops. They have to be well equipped, and led by competent, aggressive leaders. Planning requires much time-consuming work, and a great deal of intelligence on enemy forces and capabilities, on objectives, terrain and weather. The attacker's air force has to be able to achieve at least local air superiority, not just for the delivery of the

airborne force but for some days afterwards, providing close air support, resupply and reinforcement. Airlift crews have to be highly trained, disciplined and integrated into the plan. The validity of night or day drops and air-landings must be realistically appraised and the complications of the former considered. Favourable weather and terrain conditions are critical, as are the relationships and distances between drop zones/landing zones (DZ/LZ) and the objectives.

Designation of airborne forces

Different countries used different designations for the various categories of airborne forces. 'Airborne' itself is generally an umbrella term for all categories of ground forces delivered by air.

In the **United States Army** 'airborne' was a collective term for air-delivered forces as well as identifying a certain category of troops. The airborne division contained 'parachute', 'glider' and 'airborne' units. The first two were restricted to infantry and field artillery trained for either parachute or glider delivery. Units designated 'airborne' included all other units assigned to airborne divisions. For the most part



General Dwight D. Eisenhower, Supreme Commander Allied Expeditionary Forces, visits paratroopers of the US 101st Abn Div at Greenham Common airfield just hours before their take-off on the night of 5 June 1944 – the eve of D-Day.

these combat support and service support units were deliverable by glider and transport aircraft. Some component elements might be parachute-trained, e.g. one or two companies in the airborne engineer battalion which would be detailed to the parachute regiments. Non-divisional units designated 'airborne' included airborne aviation engineer and AA artillery battalions; these were not parachute-trained as is sometimes assumed, but were air-deliverable by transports and, in theory, gliders. The term 'air-transportable' referred to conventional units trained for mass movement by transport aircraft. Such units were not designated as such but merely received the training, and if so deployed would leave heavy equipment behind. **US Marine Corps** parachute units were designated, for example, 1st Parachute Battalion. (The term 'paramarine' was not official and was frowned upon, as it implied to the pedantic that such troops were only 'half-marines'.)

The **British Army** used 'airborne' as an umbrella term, in practice embracing all the units of what became the 1st and 6th Airborne Divisions and some separate units. However, all units assigned to those divisions were designated either 'parachute' or 'air-landing', the latter being glider-trained. Within the division only the two parachute brigade headquarters, six infantry battalions, and later the brigade engineer squadrons and field ambulances, were designated 'parachute'; other divisional units were designated 'airborne division' or 'air-landing'.

In **Germany**, Wehrmacht airborne units were collectively known as *Fallschirm- und Luftlandetruppen* (parachute and air-landing troops); the Fallschirmtruppen were assigned to the Luftwaffe (Air Force) and the Luftlandetruppen to the Heer (Army).¹ Within the Fallschirmjäger Division (parachute rifle division) only the three parachute infantry regiments were designated Fallschirmjäger; all other units were prefixed

¹ The Army organized the *schwere Fallschirm Infanterie Kompanie* in 1937, and expanded it into the *Fallschirm Infanterie Bataillon* in 1938, but it was reassigned to the Luftwaffe in 1939.

Operation 'Varsity', 24 March 1945: sporting the Airborne Forces' distinctive red beret and camouflaged Denison smocks, British glider soldiers of 1st Bn, Royal Ulster Rifles pose by the nameboard of their objective, a German village captured by 1100 hrs that morning. 1st RUR were one of the three battalions of 6th Abn Div's 6th Air-Landing Bde. (Imperial War Museum)



with Fallschirm- (parachute-). All units were parachute-trained and could also be landed by glider if necessary. One German unit was specifically glider-trained – Luftlandesturm Regiment 1 (1st Air-Landing Assault Regt), but it was also parachute-trained. The Army converted two infantry divisions into air-landing units, 22. and 91. Infanterie (Luftland) Divisionen. Later in the war numerous Luftwaffe ground combat units were designated 'Fallschirm-' for reasons of prestige, but few of the troops were in fact parachute-trained.

The Red Army of the **Soviet Union** categorized its various airborne units as *Vozdushno Desantnye* (air-landing forces), such troops being known popularly as *desantniki*. From 1936 some units received additional glider or transport air-landing training; by 1941 all units were considered parachute-, glider- and transport-capable, although they may not have received specialized training in the latter two roles. The airborne corps were designated *vozdushno-desantnyi korpusa* and the brigades as *vozdushno-desantnyi brigady*.

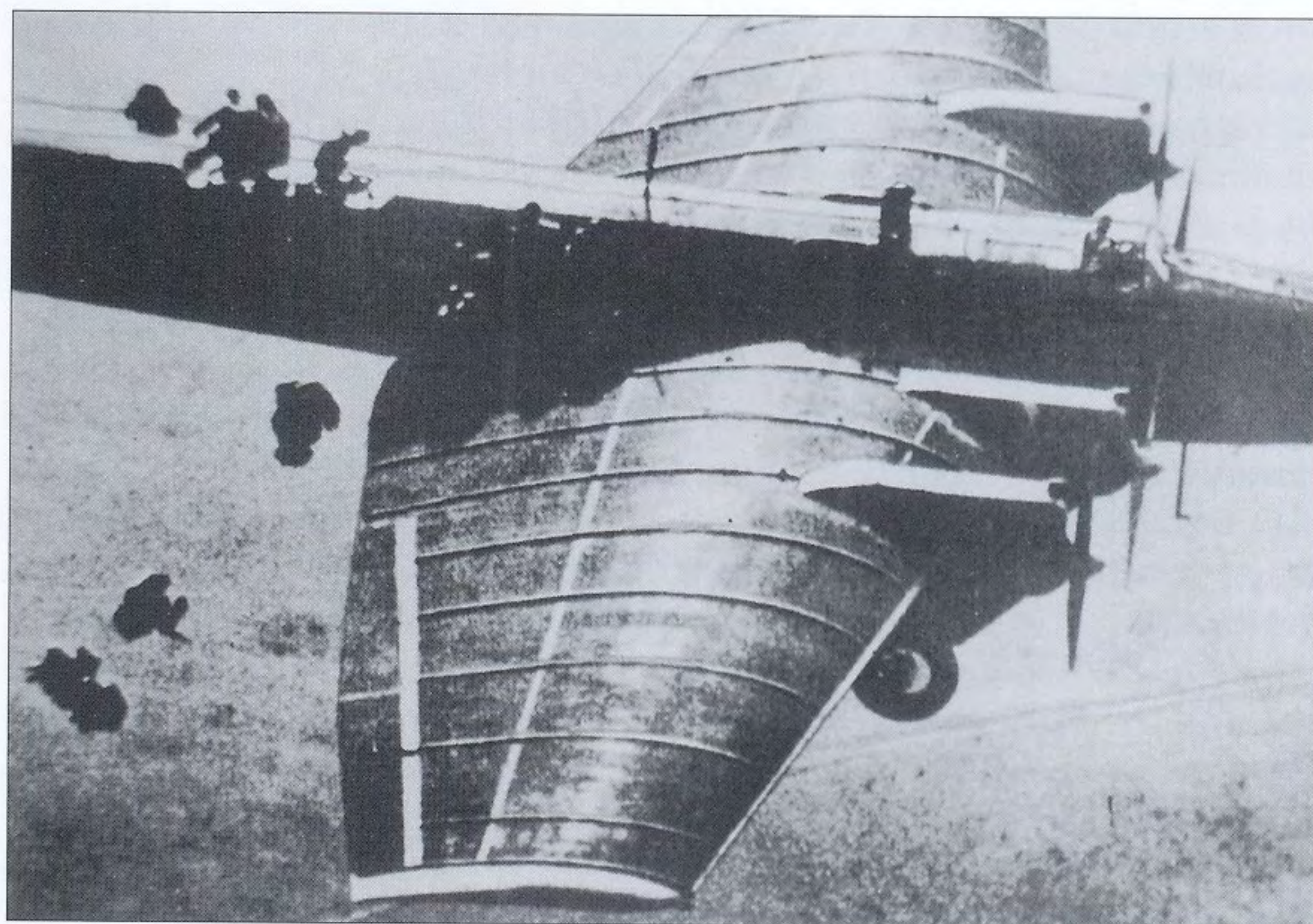
The **Imperial Japanese Army** collectively called airborne units *teishin*, literally meaning 'dash forward' or 'dangerous advance' – a term used for cavalry raiders during the 1904–05 Russo-Japanese War. *Teishin* is generally translated as 'raiding', and in World War II the term *Kuchu Teishin Batai* (air raiding units) collectively designated Japanese parachute, glider, and dedicated air force transport units. Raiding (parachute) regiments were designated *Teishin Rentai* and glider infantry regiments as *Kakku Hohei Rentai*. The **Imperial Japanese Navy's** two parachute units were identified no differently from any of the other *Tokubetsu Rikusentai* (Special Naval Landing Forces), sometimes but quite incorrectly called in the West 'Imperial Marines'.²

² See Elite 127, *Japanese Paratroop Forces of World War II*

ORIGINS

Fantasies of airborne troops descending on the enemy date back to the 18th century. In World War I, the US considered a proposal to drop an infantry division from bombers behind German lines if the war had continued. In the 1920s and early 1930s several experiments were undertaken dropping small groups of parachutists, but these were mere demonstrations of the potential for exploiting an enemy's 'aerial flank'. Many officers were excited by the emerging possibilities of airpower as new aircraft were developed and flying records were constantly broken. Several factors delayed the development of airborne forces, however, both practical and cultural: the limited capabilities of aircraft and parachutes, and the lack of funding and vision.

The true dawn of airborne warfare came with the first large-scale movements of troops by transport aircraft in the 1930s. This less radical means of rapidly deploying troops – when compared to dropping them by parachute or crash-landing them in gliders – allowed a more widespread recognition of its potential. In 1931 the US Army airlifted an artillery battery coast to coast across the isthmus of Panama; two years later this exercise was repeated with an artillery battalion. The following year a small infantry force was air-landed behind 'enemy' lines during an exercise in Delaware. In 1923 Britain had airlifted troops in Iraq to put down a tribal rebellion, and in 1932 flew a battalion from Egypt to Iraq when trouble broke out again. The 1932–35 Gran Chaco War between Bolivia and Paraguay saw German Junkers Ju 52 airliners used as military transports by the former; and France and Italy also experimented with airlifting troops. The Soviets experimented on a much larger scale: they formed small motorized air-landing test units in 1931/32, and in 1933 two parachute and two air-landed regiments were employed during the Kiev manoeuvres. In the 1935 manoeuvres more than 8,000 troops were air-landed, with light tanks and trucks, and 3,000 paratroopers were dropped.



Many of the early experimental units used modified aircrew emergency parachutes, which involved making a free fall and pulling a ripcord. Here Soviet *desantniki* in the 1930s clamber out of the dorsal gun position and down on to the wing of a Tupolev TB-3 (aka ANT-6) heavy bomber, before tumbling off. For lack of specialist transport aircraft, several countries initially used converted bombers for paratroop drops; they were never satisfactory.

At the beginning of August 1936, early in the Spanish Civil War, an airlift occurred that had genuine strategic implications. The rebel Nationalist forces in Spain were reinforced by flying 800 men of Gen Franco's African Army from Morocco across the Straits of Gibraltar aboard German-provided Junkers transports, as the spearhead for some 20,000 reinforcements who had arrived by mid-September; about 9,000 of these were flown across (packed as many as 40 men to an aircraft with an official capacity of 17), and the rest came by sea.

The delivery of combat troops by glider was a technique little considered before the eve of the war. Many countries – especially Germany, the USSR and Japan – sponsored extensive sport glider programmes, mainly to develop future aircraft pilots. The Germans were the first to form glider-delivered infantry units in 1938, followed by the Soviets in 1940. Britain and Japan established glider units in late 1941 and the US in 1942.

Parachute troops

The development of parachute units ran an uneven course, and the **Soviet Union** was the leader in this field. Trial exercises were conducted by Marshal M.N. Tukhachevsky in 1928, and while testing continued the inclusion of the growing airborne forces in manoeuvres increased during the 1930s, with the first provisionally organized detachments and battalions growing into regiments. By 1932 training was being conducted in parachute, air-landing and glider tactics, as well as joint operations with ground forces. Parallel efforts were made in the development of parachutes, gliders, drop platforms for artillery, and bombers modified as transports. Still larger airborne forces were envisioned, and doctrine was developed for operational-level drops to be made deep behind enemy lines to disrupt the deployment of reserves. The establishment of a separate airborne force under the highest command was suggested in order to make maximum use of this valuable asset; in 1933 special instructions were issued for the employment of air-landing forces, and manoeuvres became more elaborate. Foreign observers reported on these, and by 1935 the Soviet air-landing force was attracting considerable attention. A single Soviet air-landing brigade existed in 1933, two more in 1936, and six, plus smaller units, by 1939. In 1939–40 the airborne forces gained combat experience as ground troops in Finland and against the Japanese in Mongolia, and units were dropped and air-landed during the unopposed occupation of Romanian Bessarabia. By the eve of the 1941 German invasion the Soviets had organized five divisional-sized airborne corps.

Germany's parachute troops originated in the Landespolizei, a paramilitary police force formed in 1933 at the orders of Hermann Göring; the future head of the Luftwaffe was at that time Minister of the Interior with command over the police forces. While Germany is credited as a leader in the acceptance and growth of the airborne concept, Göring's initial efforts to establish such a force met with a good deal of resistance, especially from tradition-bound Army officers. Göring established the first parachute unit – IV Bataillon/Landespolizei Regiment 'Hermann Göring' – in 1935. In July 1938 the battalion was redesignated I Btl/ Fallschirmjäger Regiment 1, and in January 1939 the regiment's second battalion was provided by the



German Fallschirmjäger prepare for a practice jump; note the pale rope static lines stowed on their packs, and the early jump smocks in uncamouflaged drab green (see Plate B). The use of national decals on the M1938 helmet probably dates this picture to before April 1940. There were many similarities between the parachuting equipment of different countries, with the emphasis on streamlining the jumper's silhouette to avoid snagging or tangling in the deploying suspension lines, and on securing equipment during the shocks of parachute opening and landing. Special helmets, smocks and boots were prized by the troops as marks of their elite status.

Army's Fallschirm Infanterie Bataillon; FJR 2 was organized in August 1939, and FJR 3 in July 1940.

No more regiments were to be raised until 1942, but in the meantime the Army's four-battalion Luftlandesturm Regiment 1 was raised in 1940 as both a glider and parachute unit. The first parachute division was organized within the Luftwaffe as 7.Flieger Division on 1 July 1938; at the outbreak of the war the division's two regiments possessed only four battalions between them, and there were only the bare minimum of support units. In the meantime the Army converted a standard infantry division into an air-transportable formation, and grudgingly assigned it to the Luftwaffe's Luftlandekorps commanded by GenMaj Kurt Student, to whose corps Luftwaffe glider and selected transport units were assigned. This 22.(Luftlande) Inf Div was partly converted to the air-landing role in 1938, and its Inf Regt 16 was airlifted into the Sudetenland during the bloodless takeover of that territory. Göring sought the division's formal transfer to the Luftwaffe, but the Army resisted.

The Fallschirmjäger and the Luftlande Division saw little use in the first stages of World War II. Only Inf Regt 16 saw action in Poland in September 1939 while the Fallschirmjäger were held in reserve, and the remainder of the Luftlande Division served in the Westwall facing France. In Denmark and Norway in April 1940 only a few companies were dropped; it was not until the May 1940 invasion of the Low Countries that the Fallschirmjäger revealed their full capabilities, in a demonstration that spurred the British and Americans into rapid and serious consideration of this unorthodox asset. The Luftwaffe activated FJR 3 in July, and the regiment was assigned to 7.Flieger Division.



Chatting to visiting senior Army and RAF officers before a jump, LtCol Eric 'Dracula' Down, CO of the British Army's 1st Parachute Bn – renamed from 11th SAS Bn in September 1941 – wears the rubber-padded training helmet; this was not used on operations. (Private collection)

Britain's effort to form an airborne force began in June 1940 when the RAF established a parachutist school, even before Prime Minister Winston Churchill's ambitious demand to the War Cabinet that 'We ought to have a corps of 5,000 parachute troops...'.³ He envisioned a force drawn from the British and Commonwealth armies as well as refugee French and Norwegians, to be employed alongside the newly established amphibious Commandos in raids to keep the Germans off balance while Britain rebuilt its weakened forces after Dunkirk. The badly strained RAF was less than enthusiastic, providing only the bare minimum of facilities and aircraft for this distraction; at the time Britain had no real transports, but a few

modified Whitley bombers were made available. In July 1940 the battalion-sized No.2 Commando was selected as the first airborne unit; training began, and in November the unit was redesignated 11th Special Air Service Battalion, divided into parachute and glider wings. In September 1941 the 11th SAS Bn was redesignated 1st Parachute Bn, and the 1st Parachute Brigade was activated. The 2nd and 3rd Para Bns quickly followed, drawing volunteers from throughout the British Army. The 4th Bn was organized at the beginning of 1942.

In late 1941 the 31st Independent Inf Bde was converted into the 1st Air-Landing Bde with three battalions. The parachute and air-landing brigades, along with the glider flying units, were assigned to the new 1st Airborne Division in November 1941 under command of Brig Frederick Browning, who doubled as Commander, Paratroops and Airborne Troops. The parachute battalions were made a part of the new Parachute Regiment, and it and the new Glider Pilot Regt were consolidated into the new Army Air Corps in August 1942. The 2nd Para Bde was activated in July 1942, with the 4th Bn from the 1st Para Bde and 5th and 6th Bns converted from existing infantry battalions.

The **United States'** massive airborne effort began modestly in April 1940 with authorization to form the Parachute Test Platoon.⁴ Bureaucratic battles over control of the paratroopers soon broke out between the infantry and the Army Air Corps, but it was quickly decided that they were an infantry force delivered by aircraft. The 1st Parachute Battalion was activated in September, and almost immediately redesignated 501st Parachute Bn; the Provisional Parachute Group was formed in February 1941 as an administrative headquarters, and in July the 502nd Parachute Bn was activated. The 503rd and 504th Parachute

³ See Elite 1, *The Paras: British Airborne Forces 1940-84*

⁴ See Elite 31, *US Army Airborne 1940-90*



Infantry Battalions were raised later in 1941. The 550th Airborne Inf Bn was activated as a transport-landed unit, to be followed by the 88th Abn Inf Bn, an experimental agency for testing equipment, load plans, tactics and techniques. The Army Air Corps had begun experimenting with gliders in July 1941.

British paras preparing to undertake a training jump. The British did not use a reserve parachute, reckoning that its £60 cost would be wasted; the small pack being rigged to these soldiers' harness is the gas respirator satchel. Note the early British jump smock, a direct copy of the first German 'step-in' design; the paratroopers of both nations called them 'bone-sacks'.



Members of the US Army's Parachute Test Platoon – all volunteers from the 29th Inf Regt – prepare for a jump at Ft Benning, GA, in 1940. They wear flying helmets and the T-4 parachute, whose reserve was attached vertically with the ripcord handle on the right. The early test units usually required parachutists to meet the same high physical standards as aircrew, in addition to being extremely fit for ground action.

When the US entered the war in December 1941 the development of its airborne force was well underway, though no tactical units larger than battalions existed; like the Luftwaffe, the Army Air Corps was forming air transport units. The existing parachute battalions were soon expanded to regiments. The Airborne Command was established in March 1942 to oversee the activation, equipping, and training of airborne units and to co-ordinate with the Army Air Forces' Troop Carrier Command over transports and gliders. It would not be long before airborne divisions were organized. Also in 1942, the 2nd Inf Div underwent air transport training. The Marine Corps had begun training parachutists in late 1940, and its 1st and 2nd Parachute Bns were activated in August and October 1942.

The **Imperial Japanese Army's** modest airborne activity began in December 1940 as directed by Gen Hideki Tojo.⁵ Impressed by German airborne operations, he foresaw their utility in the coming conquest of the Pacific. Training and development lasted throughout the year, with the battalion-size 1st Raiding Regt activated a week before the Pearl Harbor attack, followed by the 1st Raiding Bde and 2nd Raiding Regiment. The Japanese placed dedicated transport and glider units under the brigade's direct control. The **Imperial Japanese Navy's** experimental parachute unit was raised before the Army's, in November 1940, and two parachute-trained SNLF units of battalion size were organized 12 months later. The IJN units made their first combat jumps in the Netherlands East Indies in January and February 1942, and the IJA's 2nd Raiding Regt also jumped on Sumatra in February.

Because of **Italy's** lack of actual airborne operations in World War II, her nominally airborne force is mentioned here only briefly. Italian observers of the 1930s Soviet manoeuvres recommended that such a force be developed, but no action was taken. In March 1938 the first Italian parachute unit was raised in Libya – the Libyan Air Infantry Bn, formed from Army and Air Force volunteers, with the latter providing the parachute school. This unit was formed by the military governor, Gen Italo Balbo, without approval from Rome, and most of the troops were Libyans. This was also the case in the 1st National Parachute Bn of Libya, formed in 1940. In January 1941 these units, with a combined strength of about 850, were deployed as infantry in the defence of Derna, which fell to the British. The Army did not raise regular parachute units until July 1940, when it drew recruits from the Carabinieri; one battalion fought in North Africa in July 1941. Growth was rapid, and in February 1942 three regiments formed the backbone of the 1st 'Folgore' Parachute Div, intended for an airborne invasion of Malta. When this was cancelled the 5,000-odd paratroopers were deployed to North Africa as élite light infantry, and were almost destroyed at El Alamein in October. A second division ('Nembo') was formed, but saw service only on anti-partisan duties in the Balkans. The Italians also developed a modest glider capability, but this too was never actually employed.⁶

⁵ See Elite 127, *Japanese Paratroop Forces of World War II*

⁶ See MAA 349, *The Italian Army 1940–45* (2): *Africa 1940–43*, and MAA 353... (3): *Italy 1943–45*

EARLY DOCTRINE

With the exception of the Soviets, most nations viewed parachutists as raiders and saboteurs employed in small units. This short-sightedness is understandable given the limited capabilities of aircraft, and the many command, control and logistical complexities of operating larger units behind enemy lines. The capability did exist to insert small groups of raiders, who could carry sufficient ammunition and rations to make themselves a nuisance for a few days; but the value of such missions was questionable – the comparatively light damage inflicted on the enemy might not be worth the effort. However, sustaining a larger unit through aerial resupply would be difficult, especially if they were to become engaged in direct combat – as opposed to guerrilla-type harassing attacks – and were surrounded by the enemy. Parachute units were also envisaged as conducting behind-the-lines reconnaissance, but reliable long-range radio communications to report timely intelligence information would be the key to this mission.

Other concepts were somewhat more ambitious. They saw battalions delivered by parachute or glider immediately behind enemy lines to seize key features – bridges, airfields, highway intersections, etc. – in order to block enemy reinforcement or to aid the advance of the main ground attack. The air-delivered force would have to be self-sufficient for three to five days, and capable of holding out against whatever the enemy threw at them until relieved by ground forces. Such a force would rely heavily on aviation for fire support in lieu of artillery, as well as for resupply drops; even air evacuation of wounded might be possible.

By 1940, for those with a little vision, a number of ways of employing paratroopers were understood:

1. Severing lines of communication and supply.
2. Opening or closing defiles and crossings and seizing dominating terrain features.
3. Cutting off enemy reserves.
4. Attacking the ground organizations and facilities of enemy air forces.
5. Envelopment from above.
6. Reinforcement of own troops.



German paratroopers from III/FJR 1 link up with infantry near Waalhaven airfield, Rotterdam, which they captured on 10 May 1940 so that troops of the Army's 22.Luftlande Div could be airlifted in. (Private collection)

Early operations

It is interesting to note how the Germans employed parachute units in their 1940 operations. In Norway in April 1940 a single company was dropped to establish a road block. In the same month in Denmark, three company drops were executed, to secure two airfields and a bridge. In May a company was dropped piecemeal into far northern Norway over 11 days to reinforce beleaguered mountain troops. On 10 May 1940, in Belgium and the Netherlands, much more ambitious operations were undertaken: two regiments conducted multiple jumps ranging from platoon to battalion size. All of these operations – conducted in concert with the Luftlande Division air-landing troops by transports, and even by seaplanes landing on a river – had the aim of seizing bridges and airfields. All were successful, and consequently the Allies received an abrupt lesson in the viability of airborne troops. One of the smaller operations, the seizure of the Belgian fortress of Eben Emael by glider-delivered troops (see Plate B), probably did more to capture the imagination of strategists than the larger parachute drops near Rotterdam.

Interestingly, though little notice was taken of it in a world mesmerized by the huge operations in Russia, in July 1941 the Peru–Ecuador Border War broke out. Using Italian-trained paratroopers, Peru secured two airfields by air-landed paratroopers, while others jumped on to and seized a supply base behind Ecuadorian lines, resulting in the rout of Ecuador's border forces.

A Fallschirmjäger demonstrates the correct exit position in the door of a Junkers Ju 52; and – on the cover of the June 1941 Dutch language edition of the propaganda magazine *Signal* – another makes the leap. These photos are clearly posed on the ground, but show the authentic drill. A hard, vigorous exit was required to clear the door, especially given the weight of the parachute and equipment. (Private collection)





Fallschirmjäger boarding a Ju 52 for a training jump. Note that they wear rubber kneepads; Germany was the only country to make wide use of these, due to the forward-leaning landing enforced by the RZ parachute harness. Some countries developed all sorts of protective gear, but a well-secured helmet and good supportive boots were the only things a jumper really needed.

The first two British parachute operations were raids. One, a platoon-size operation in Italy to destroy the Tragino aqueduct providing water to three seaports, was largely a failure. The other, a company-size operation to obtain technical intelligence on a radar system on the French coast, was a complete success (see Plate C). The first Soviet operational use of paratroopers was in 1939 at the opening of the Winter War against Finland; small diversionary and raiding detachments were dropped behind Finnish lines, but all were quickly wiped out.

Besides the German Luftlande Division, other countries planned to airlift conventional infantry units either to exploit the lodgement of paratroopers or to shift forces rapidly within a theatre of operations. The US planned to train several infantry divisions in this role; they would not be re-organized or receive special equipment, but would simply leave behind all heavy weapons, vehicles and equipment that could not be loaded aboard transports – although the option was available to replace their 105mm howitzers with 75mm weapons. The Soviets planned to airlift parachute units, rather than conventional infantry, as follow-on troops.

It was felt that extremely favourable conditions had to be met for an airborne operation to succeed:

1. Absence of or poorly organized ground defence.
2. Landing in territory where a friendly population would provide information, food and transport.
3. Landing in the rear of a defeated enemy.
4. Good ground and weather conditions.

In reality most later successful airborne operations met few if any of these criteria, although the last factors were highly desirable for success. The shortcomings of airborne forces were recognized. No new concept is without its limitations, but conventional commanders tended to decry airborne operations because on the surface the shortcomings seemed highly detrimental to what was necessary for successful combat operations of any kind. These shortcomings were:

1. The vulnerability of descending jumpers to enemy ground forces.
2. Initial disorganization after landing.
3. Lack of mobility after landing other than by foot.
4. Lack of supporting firepower other than by aircraft.
5. Difficulty of resupply.

It was soon realized that success depended on a number of factors. As already mentioned, the essentials for success included sufficient time for planning, and for marshalling airborne and airlift units; intense co-ordination with airlift units; and good information on enemy forces in the operational area, terrain and weather conditions, and the details of the objective area. Airborne units could not be committed to ground operations in the meantime, or they simply would not be available when emerging situations demanded their use. Complete surprise was critical, and at least local air superiority was necessary.

Only the Soviets had developed an advanced doctrine to introduce substantial airborne forces into the enemy's rear to support the main ground assault, disrupt his withdrawal, or threaten his open flank. The concept was ambitious, but the limited air transport and other capabilities of the era hampered its implementation. The 1933 special instructions specified that airborne regiments and brigades would be employed against the operational depth of the enemy defence and that tactical airborne operations would be conducted by battalions or companies. Why the Soviets did not employ larger airborne forces from among their 60,000 paratroopers to interdict Finnish supply lines and hamper reinforcement in 1939 is unknown, though it is apparent that they lacked intelligence on enemy dispositions and terrain, and their missions were inappropriate. The principal lesson learned was that airborne units could not be detailed out to conventional tactical commands with the expectation that they would be effectively employed; they needed to be held under the control of the highest echelon of command.

Regardless of the failure of the modest Soviet airborne efforts in Finland, the 1941 Soviet field service regulations for the employment of airborne forces provide a good doctrinal view of their use in the near future:

1. Disruption of enemy command and control and rear area activities by attacking staff organizations.
2. Destruction of communications and blocking the approaches to the front by enemy forces, munitions and supplies.
3. Seizure and destruction of enemy airfields.
4. Securing areas to facilitate the arrival of air-landing troops.
5. Reinforcing encircling forces and mobile formations, and accomplishing missions in the enemy's operational depth.
6. Combat against enemy airborne forces (counter-airborne operations).



British paras aboard a converted Stirling Mk IV four-engine bomber, still in use as a drop aircraft as late as 1944. Transports converted from bombers often lacked amenities such as seats; while uncomfortable on a long flight, at least the uncluttered fuselage did not impede movement by the heavily encumbered jumpers. The type first provided by the RAF, the obsolete Whitley, required paratroopers to drop through a hole in the floor; a frequent exit mishap called 'ringing the bell' accounted for the number of paras with broken noses.

EARLY ORGANIZATION

In the infancy of airborne warfare most nations envisioned airborne units of no more than a battalion or regiment in size – lean, lightly equipped, and provided with minimal service elements. As with any radical concept, traditional military leaders – especially since they were beset by pre-war budget constraints – were reluctant to put much faith in vertical envelopment; few could see the potential for large formations and operations having a strategic influence.

Initially only small experimental units were formed to test existing aircrew emergency parachutes, invariably leading to the development of dedicated troop parachutes, different transport aircraft models, jump procedures, drop altitudes, jumping weapons and equipment and safety procedures. Little effort was made to develop tactical concepts. Once it was decided to field larger units, officer and NCO cadres were first trained and then recruits accepted. Part of the cadre manned the new units and others operated the new parachute school.

Most countries first fielded one or two units based on conventional light infantry battalions. They continued developing jump procedures and multiple aircraft mass jumps, tested the dropping of heavier arms and equipment, and began to look at simple tactical aspects such as DZ assembly and conducting raids. Demolitions and sabotage training was common. As they struggled to acquire more transports, some higher commanders began to see the possibilities, and larger units were raised.

Depending on the country, airborne units could be army or air force, or in Germany's case, both. Some airborne army units were initially under air force control. The US Marines and Japanese Navy established their own parachute units. There was nearly always some dispute over who should control them: air forces argued that they were dependent on air for delivery, resupply and fire support, and armies argued that they needed to be trained infantrymen, that aircraft were merely a means of delivery, and that their ground operations were in support of advancing ground forces.

These early units were light and compact; only limited manpower resources were allotted, because of the expansion of pre-war armies, transport limitations, and in order to ease assembly and control on the ground. Supporting crew-served weapons were minimal and service support almost non-existent, so these specialized units relied greatly on outside support. It was also envisioned that during an operation the entire unit would deploy; there was then no concept of a rear base or support echelon that would link up later and reinforce the unit's capabilities.

The airborne regiment or brigade

When regiments were organized – at least initially – they had only two battalions. Even companies might have only two platoons, and platoons only two squads/sections rather than the normal three subunits. It was desirable to limit the size of squads/sections so that each would fit into a single transport or glider. Subunits were later expanded as more manpower and airlift resources became available and transport capacities increased. The traditional three subunits at any given level was preferred because of tactical flexibility, the need for a reserve subunit ('two up, one back'), and the need for commonality of tactics



US paratroopers of the 2nd Bn, 509th PIR in North Africa prepare for a jump. The rest of the regiment was never activated, and the unit was redesignated the 509th PI Battalion; it conducted the first American combat jumps in Algeria and Tunisia. Note the stowed web strap static line.

with the conventional infantry in which officers and NCOs were trained. Most countries eventually adopted organizations with three subunits. The US was one of the last to accept this; parachute rifle companies had only two platoons until late 1944, and glider infantry regiments had only two battalions until mid-1944.

The Soviets fielded airborne brigades in 1936 divided into three two-battalion groups – one parachute, one glider and one air-landing. In 1941 the brigades were streamlined, with four parachute battalions also capable of delivery by glider or transports, to provide a more flexible organization. The US considered calling multi-battalion groupings either ‘regiments’ or ‘groups’; the former term was selected rather than the more nebulous group, as it was the traditional infantry tactical unit, and for every three battalions raised it almost guaranteed that a regimental headquarters would be activated. The Germans also termed multi-battalion units regiments, while the British used brigades, their traditional grouping for infantry battalions.⁷

Japanese battalion-size parachute and glider units were designated regiments and grouped into two-regiment brigades.

Early units might possess minimal organic signal, engineer, and light crew-served weapons subunits. The first non-infantry support units formed were engineers (sappers), with a mainly demolition mission. Small signal and heavy weapons units were also raised, including light artillery, mortar, AT and AA.

The airborne division

Higher commands were reluctant to organize larger airborne formations than regiments, even when it was recognized that higher command and control headquarters were necessary for training, planning, staging, supporting and sustaining operations. The US at first suggested that parachute and glider regiments could be formed into temporary task forces tailored for specific missions, but such ad hoc formations were ineffectual and failed to provide operational continuity.

The first airborne divisions were reluctantly raised, usually with only minimal combat support and service assets; what support units were provided could, in theory, be augmented by additional conventional units. These early divisions were small, frequently only half to two-thirds the strength of an infantry division. The mix of parachute and glider units varied. The Germans, who formed the first airborne division in 1938, employed divisions of three parachute regiments, which could

⁷ In British & Commonwealth armies, ‘regiments’ in non-infantry arms are battalion-sized units. Infantry ‘regiments’ provide traditional designations but have no tactical role; any number of tactical battalions are numbered as part of the traditional regiment, but are tactically grouped into numbered brigades. For instance, 1st Abn Div’s 1st Air-Landing Bde in 1944–45 comprised 1st Bn Border Regt, 2nd Bn South Staffordshire Regt, & 7th Bn King’s Own Scottish Borderers; while the 6th Abn Div’s 6th A/L Bde had the 2nd Bn Oxfordshire & Buckinghamshire Light Infantry (‘2nd Ox & Bucks’), 12th Bn Devonshire Regt, & 1st Bn Royal Ulster Rifles.

land by glider if necessary. The British established their first division at the end of 1941, with one air-landing and two parachute brigades. The US organized its first two divisions in early 1942, each with one parachute and two glider regiments. In any of these divisions the mix of regiments/brigades could be changed or additional units attached. The first Soviet division-level airborne formations, which they called 'corps', were raised in the spring of 1941, though an air motorized division had been proposed as far back as 1930. The five airborne corps each consisted of three brigades and a light tank battalion, with virtually no support or service units.

The battalion was the most important tactical echelon at this time. A comparison of the different countries' 1940/41 parachute battalions shows similarities and differences, including wide differences in troop strength (parenthesized below):

British Parachute Battalion, 1940 (530 all ranks)

Battalion HQ

HQ Company:

Company HQ

Mortar Platoon (4× 3in mtr)

Signals Platoon

Administrative Platoon

Intelligence Section

Rifle Company (×3):

Company HQ

Rifle Platoon (×3) (each 3× LMG, 1× 2in mtr)

German Parachute Infantry Battalion, 1940 (705)

Battalion HQ

Signal Troop

Rifle Company (×3):

Company Troop (HQ)

Rifle Platoon (×3) (each 3× LMG)

Mortar Troop (5cm)

Machine Gun Company:

Company Troop (HQ)

Machine Gun Platoon (×2) (each 3× HMG)

Mortar Platoon (6× 8cm)

Soviet Parachute Battalion, 1940 (546)

Battalion HQ

Parachute Rifle Company (×3):

Company HQ

Rifle Platoon (×3) (each 3× LMG)

Mortar Platoon (6× 50mm mtr)

Reconnaissance Platoon

Sapper Platoon

Signal Platoon

Supply Platoon

Control Squad

Medical Squad

US Army Parachute Infantry Battalion, 1941 (518)

Battalion HQ & HQ Company:

Company HQ Platoon

Communications Platoon

Supply Platoon

Medical Detachment

Rifle Company (×3):

Company HQ

Rifle Platoon (×2) (each 2× LMG, 1× 60mm mtr)

US Marine Parachute Battalion, 1941 (620)

HQ Company:

Company HQ

Battalion HQ

Demolition Platoon

Rifle Company (×3):

Company HQ

Rifle Platoon (×3) (each 3× LMG, 1× 60mm mtr)

Japanese Army Raiding Regiment, 1941 (816)

Regimental HQ

Raiding Company (×3):

Company HQ

Rifle Platoon (×3) (each 3× LMG, 3× 5cm discharger)

Engineer Company:

Company HQ

Engineer Platoon (×2)

Heavy Weapons Company:

Company HQ

AT Gun Platoon (4× 3.7cm gun/8cm mtr)

Infantry Gun Platoon (4× 7cm guns)

MG Platoon (2× HMG)

Japanese Special Naval Landing Force, 1941 (750)

HQ Company:

- Company HQ
- Supply Unit
- Signal Unit
- Transport Unit
- Demolition Unit
- Medical Unit
- Repair Unit
- Command Platoon

Rifle Company (×3):

- Company HQ
- Rifle Platoon (×3) (each 3× LMG, 4× 5cm discharger)
- HMG Platoon (2× HMG)

Glider units were organized along the lines of conventional infantry units, but with strength reduced, lighter weapons provided, and subunits sized to accommodate glider capacity. The US glider regiment had only two battalions of three companies each, and companies had only two rifle platoons. British air-landing battalions were more robust, having four rifle companies with four rifle platoons each. Soviet glider and air-landing battalions were organized identically to the parachute battalions and were soon converted to the former. The Japanese battalion-size glider infantry regiment was similar to the parachute regiment, but instead of a weapons company it had AT and mountain gun companies.



Generaloberst Kurt Student commanded the Fallschirmtruppen from their inception until the end of the war. As a young Reichswehr captain Student began running glider courses in 1924 (although it may surprise some to learn that he himself was never parachute-qualified). During Operation 'Merkur' on Crete he was forbidden to fly there himself, and had to run the battle from a distance when the commander of 7.Flieger Div and several other senior officers became casualties. In Holland in autumn 1944 he commanded the so-called 1st Parachute Army with energy and skill. He was remembered as combining a calm and thoughtful approach with openness to new ideas, though his slow manner of speech fooled many into underestimating him.

DELIVERY TO THE BATTLEFIELD

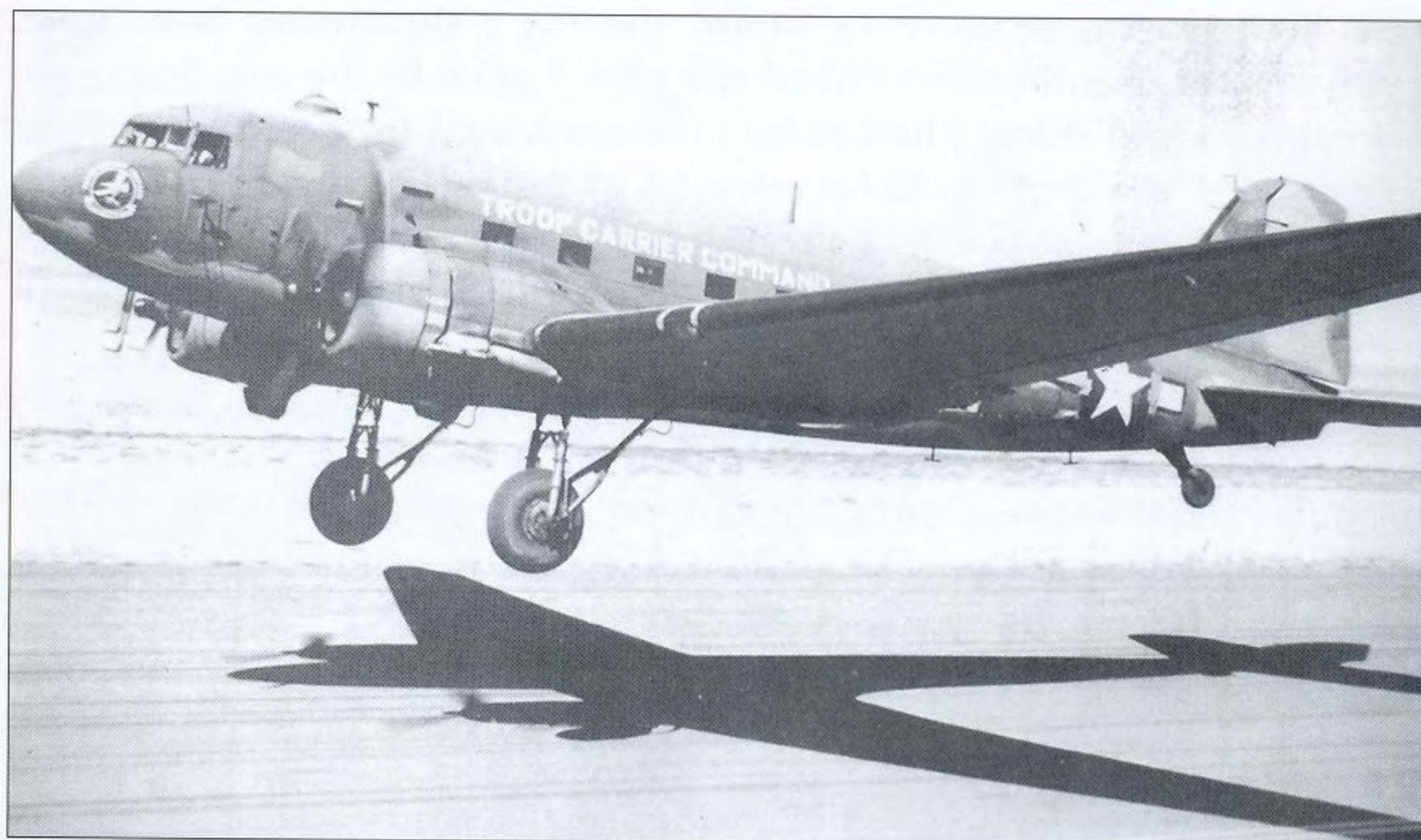
Transport aircraft served the airborne troops in a number of distinct roles: dropping paratroopers, supplies and equipment; towing gliders; and air-landing troops and cargo.

Transport aircraft

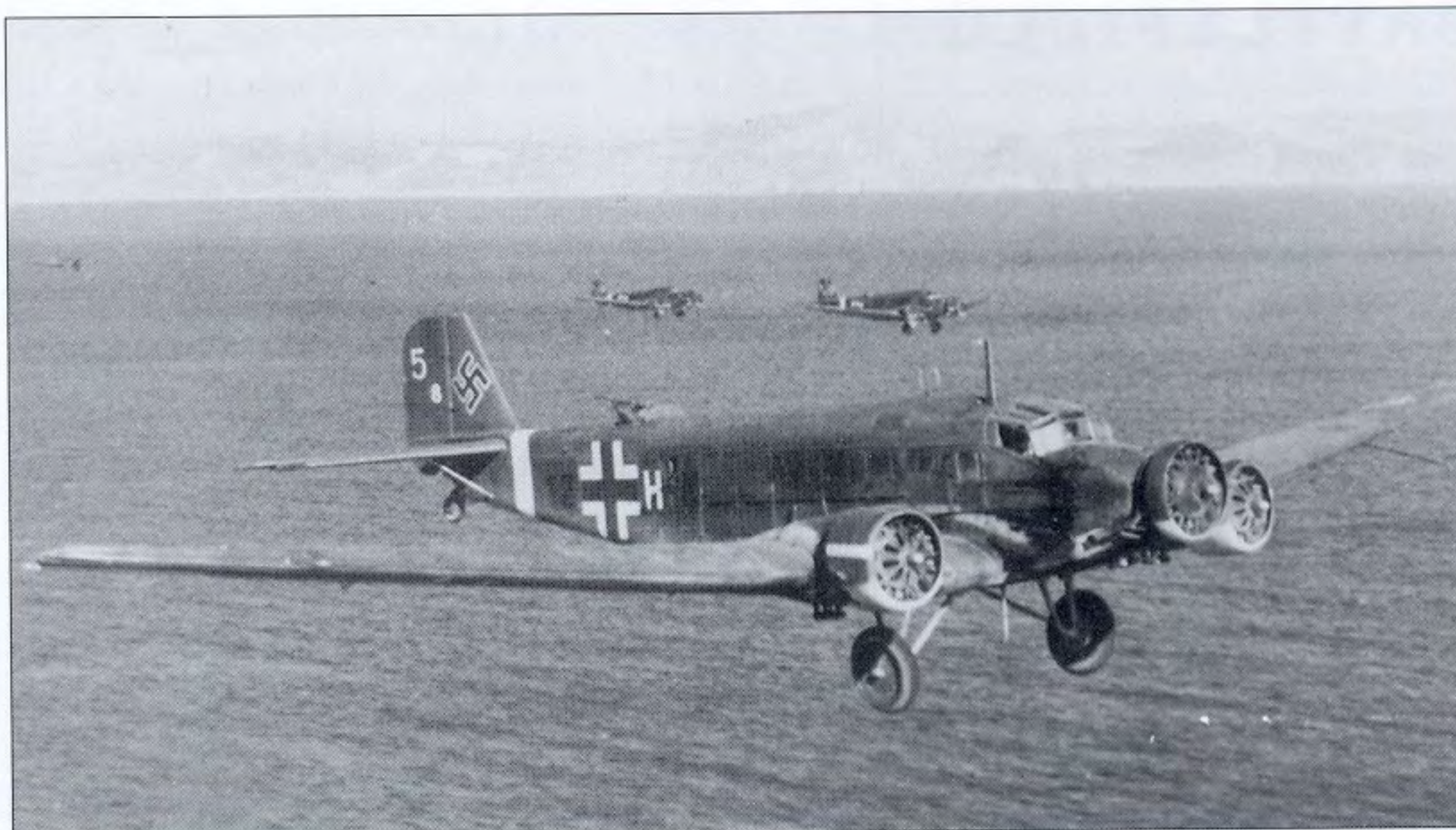
Little development of troop transport aircraft had been undertaken prior to World War II. Only the US, with its long internal distances, had looked deeply into the question. What few transports were available originated from three sources: the conversion of existing bombers, the modification of what was originally a bomber design into a dedicated transport, and the adaptation of commercial airliners. Those based on bombers typically lacked adequate troop accommodation and appropriate exit doors; they could not accommodate bulk cargo, nor had sufficiently large doors to allow it to be loaded. The small doors also prevented large cargo loads from being dropped by parachute, unless, for example, a crew-served weapon could be broken down into smaller packages. Adapted airliners could carry troops, but they too usually had only small doors, thus hampering paratrooper exit and the loading/dropping of cargo. Intended for civilian service on improved runways, they often lacked robustness.

The numbers of transports necessary to deliver an airborne force was considerable. The British required 12 old Whitley bombers, and the Germans 13 Junkers Ju 52 transports, to drop one company. The US Marines required six transport squadrons each with 12 R4D (C-47) transports to drop a parachute battalion. A Japanese raiding company needed 12 Type 1 or Type 100 transports. A US parachute company needed nine or ten C-47 transports, but when rifle platoons received a third squad in 1944 this increased to thirteen. (The British also used the C-47 as soon as enough were available, naming it the Dakota).

Bombers were employed by many countries to partly alleviate transport shortages. While seldom effective for troop dropping unless modified, they were used to drop cargo bundles from bomb bays or under-wing racks, and as glider tugs; some were also used to air-land



The American C-47 Skytrain (aka 'Gooney Bird'), a modification of the pre-war Douglas DC-3 airliner, was the workhorse of the World War II Allied air transport effort, and made an enormous world-wide contribution to eventual victory. It served the airborne forces as a paratroop and supply drop aircraft and glider tug, and air-landed troops, equipment and supplies. To the British it was known as the Dakota, to the US Marines as the R4D; the Soviets built a licensed copy, the Ilyushin Il-2, as well as using Lend-Lease C-47s for most of their jumps from 1942. It could carry 28 troops or 19-25 jumpers.



The Junkers Ju 52/3m trimotor – commonly known as *Tante Ju* ('Aunt Judy'), *Alte eisener Tante* ('Old Iron Aunt'), or *Judula* – was the primary German jump aircraft, glider tug and airlift transport; it could carry 12–13 jumpers or 17 troops. Dating from 1930 as an airliner, it was modified for the then-secret Luftwaffe in 1934 as a bomber. It was up-graded in 1935 with more powerful engines and a strengthened undercarriage, and served as Germany's all-purpose military transport throughout the war. Transport units were designated 'Bomber Groups on Special Employment' – KGrzbV – until gathered in five Transport Geschwader in May 1943. (Private collection)

Gliders

Sport and training gliders were small, sleek, and constructed of light, fragile materials; they carried only one or two persons, and were not expected to endure rough treatment. Troop/cargo gliders, on the other hand, had to carry at least a squad of combat-loaded infantrymen or heavy weapons with their ammunition, or even a light vehicle and cargo, plus one or two crewmen. They had to be lightly constructed so as to allow the maximum passenger/cargo capacity, but robust enough to carry the heavy loads and survive a landing on less than ideal LZs, whose rough ground might be obstructed by trees, hedges, and even man-made obstacles. They needed to be constructed cheaply, because they were unlikely to survive an operational flight in recoverable condition. They also competed for production line space and materials with higher priority combat aircraft and the very transports necessary to tow gliders. Their need to be light, cheap, robust, survivable, and capable of carrying heavy loads presented a difficult design challenge. Most troop/cargo gliders were constructed of wood framing or aluminium tubing, plywood sheet and fabric, using ingenious design features to provide the necessary strength. They were generally boxy designs or long cylindrical tubes with wide, thick wings, and weighed from 3 to 8 tons.

Gliders under tow gave a rough ride owing to turbulence, and had to ride high or low – above or below the tug's slipstream. Sometimes intercom communications linked the glider pilot to the tug, but often instructions and release had to be communicated by arm, flag or light signals. The tow line could be released by either the tug or the glider. The tug aircraft determined the release location, but it was still up to glider pilots to find the LZ and to choose a precise landing point on an LZ rapidly becoming filled with gliders.

Besides delivering assault troops, gliders were employed to land heavy weapons, light vehicles, ammunition, rations, water and medical supplies. Tests were conducted dropping paratroopers from gliders followed by more jumping from the towing transport, in order to partly make up for scarce transports; while successful, this was never undertaken operationally. Also to save on tugs, two and even three gliders were sometimes towed in tandem by a single transport or bomber. This reduced the range of the tug, however, and was not without danger of mid-air collisions. In most cases gliders were not used as much as

troops. They had the advantage of longer range than some transports. Most armament and gunners were removed when they were employed as troop carriers.

Troop transport units had to be specially trained to conduct parachute-dropping and glider-towing missions; it was soon found that air forces could not task just any transport unit with this mission without substantial instruction and rehearsal.



The British Airspeed Horsa glider was designed so that the rear fuselage and tail section could be removed behind the wings for loading and unloading large cargoes. Even when gliders were damaged on landing, equipment could still be salvaged from them. This Horsa, photographed near Arnhem in September 1944, has the tail assembly removed to drive off a jeep and trailer; troops and cargo off-loaded through the drop side door aft of the cockpit (seen here above the jeep windscreen). A Horsa could alternatively carry 25 passengers or an AT gun.

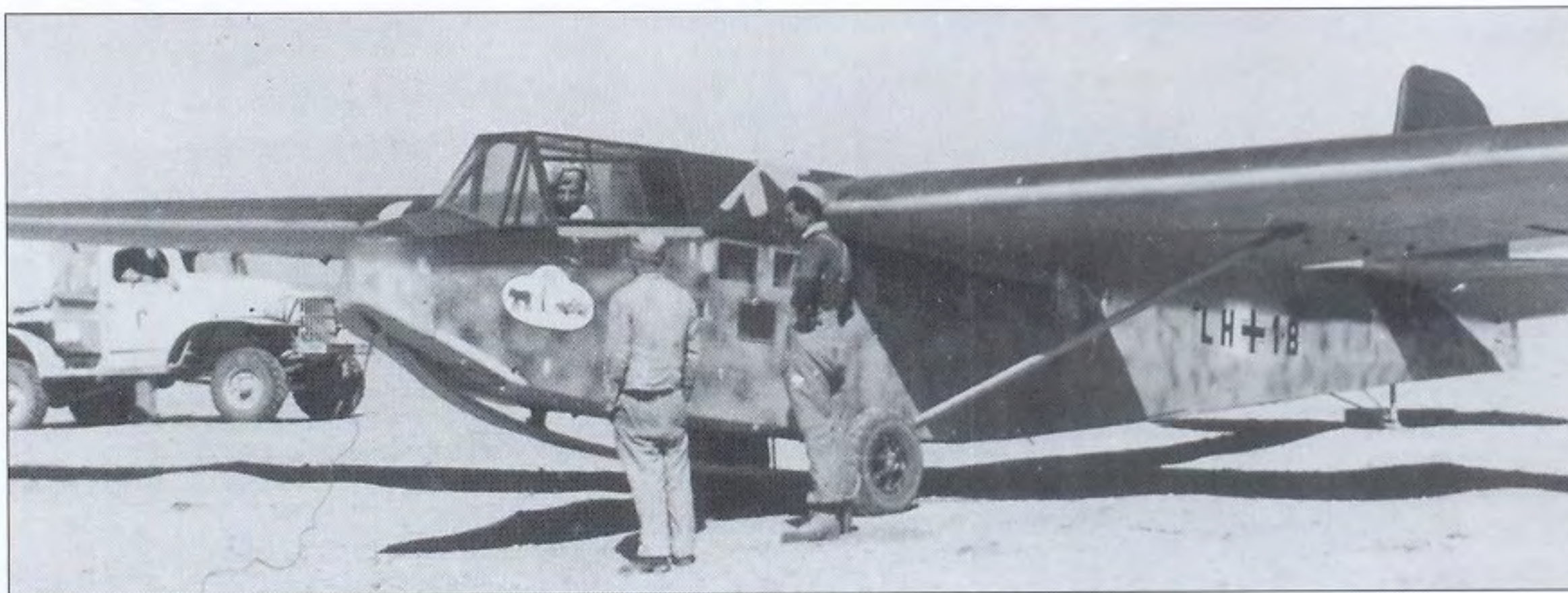
originally anticipated. Adequate numbers were often unavailable in the right place at the right time, and it was no simple matter to ferry gliders to the operational area for use. The available gliders were also sometimes found to be damaged from hard training use.

The typical troop/cargo glider carried a single squad, 8–14 men, though in some instances double that number. Efforts were made to develop larger cargo gliders to deliver artillery, vehicles and other heavy equipment, even light tanks. While some were employed, they were difficult to fly and dangerous to land on rough LZs. Some extremely heavy gliders were developed, requiring two and even three tug aircraft, but this was inviting disaster; multiple aircraft are extremely difficult to fly when closely tethered.

The Germans and Japanese employed glider units with their own pilots, which would be attached to special transport units for towing. The US augmented transport units with gliders, and their pilots became part of the unit. The British attached glider pilot units to the airborne divisions, and they operated with the transport units detailed for towing;



The inherent dangers of glider transport took their share of lives; here dead troopers of the US 101st Abn Div lie by a flipped-over Waco CG-4A. Gliders could be wrecked on landing by natural or man-made obstacles, or by flipping if the wheels jammed into soft ground (many gliders jettisoned their take-off wheels and landed on skids). The Waco could carry 15 men; the US Army also used a number of Horsas for their larger capacity.



The glider used for German assault landings, as at Eben Emael and on Crete, was the DFS 230. This small aircraft could accommodate only eight fully equipped troops and the pilot, and its payload of less than 4,500lb and restricted loading door made it inadequate for landing heavy equipment. (Private collection)

* * *

There were seemingly never enough transports and gliders to support airborne operations. Even the major, long-planned operations experienced shortfalls. Production lines simply could not keep pace with demand, especially since the need for transports was much higher than anticipated – as were losses. Combat aircraft and even trainers had priority over the production of transports and gliders. To make matters worse, during a given operation some transports would suffer mechanical failures or accidents, or were downed by enemy fire, thus reducing those available to deliver follow-on waves of jumpers, resupply drops, and air-landing reinforcements and heavy equipment. Indeed, it was not uncommon for insufficient transports to be available to deliver a first-wave force of the desired size, and the same aircraft had to make a quick turnaround, refuelling and loading the second lift while the initial assault force fought to retain its shaky hold.

Parachutes

Early parachute units at first used standard aircrew emergency parachutes of the back- or seat-pack types. These were activated by the jumper pulling a ripcord while in free fall, which required additional training, a higher jump altitude, and a high degree of jumper stability – difficult to achieve with a heavy burden of combat equipment. The Soviets retained ripcord-activated parachutes until the late 1930s, and observers reported another oddity of Soviet jumping practices: jumpers opening their reserve to descend beneath two canopies. This gives stability but prevents directional control, and can cause fatal mishaps if the canopies entangle during deployment; the practice appears to have been adopted for 'show' purposes only during exercises.

All countries developed purpose-made troop parachutes. These typically consisted of a back-mounted main parachute and usually a chest-mounted reserve (smaller in diameter than the main), the latter activated by ripcord. The main canopy was activated by a static line: i.e., it was attached to a web strap or rope approximately 15ft long, the other end being clipped to a steel cable

The Gotha Go 242 glider introduced in the mid-war years could carry 21 passengers; but with a tailgate between the twin booms and a payload of almost 5,600lb, it was used almost exclusively for cargo transport. The Germans often used gliders for rear area freight hauling; the Japanese, too, used Kokusai Ku-8 gliders to carry critical equipment and parts from Japan to the Philippines. (Private collection)





US paratroopers helping one another load up before emplaning for a jump; the M1943 combat uniforms date this scene to post-June 1944. A tightly packed M1936 musette bag, and a .45cal Thompson M1 sub-machine gun with taped-on magazine, are being attached across the stomach before the chest reserve pack of the T-5 parachute system is clipped to the chest D-rings above. Note (left) the holster for the .30cal M1A1 folding-stock carbine, and the M3 trench knife on the ankle; and (right) the .45cal Colt M1911A1 pistol in a shoulder holster.

running the length of the troop compartment. As the jumper exited the door the static line pulled the canopy out of the backpack, and after it inflated a light connecting cord snapped, separating the static line from the canopy – a sequence of events requiring only seconds.

Germany, Italy and Britain did not use reserve packs, and troops of other armies sometimes made combat jumps without reserves. Owing to the low jump altitudes, in the event of a main pack malfunction



German Fallschirmjäger don their RZ parachutes. The RZ series chutes opened quickly – on Crete one lift jumped without harm from only 250 feet. However, the harness and suspension were inferior to Allied patterns. Based on the early Italian Salvatore, the RZs all had the rigging lines attached not to a pair of shoulder risers but to two points low behind the back. This robbed the jumper of any directional control in the air, and made for a challenging face-first landing. Since the visored field caps date this scene to mid-1943 at the earliest, this must presumably be a training exercise – and note (bottom left) the rubber knee-pads. By this time it was common to jump with rifles and sub-machine guns.

Small arms and crew-served weapons

Airborne forces were comparatively small, and it was not cost- or resource-effective to develop overly specialized weapons for them unless absolutely necessary. Existing conventional weapons were used whenever possible, to reduce the burden on the supply system, make training easier, keep production lines open for standard rather than specialized weapons, and eliminate the need for additional repair parts. If more compact weapons were necessary then conventional weapons might be modified, e.g. with folding stocks, rather than developing new weapons (see Plate A). With regard to crew-served weapons, older, and therefore lighter, though less capable models were sometimes substituted for current standard models. In other instances currently available weapons already built for specialized purposes were used, such as mountain guns or pack artillery, as well as infantry guns.⁸ Such weapons were already designed to be lighter, more compact, and capable of being broken down into smaller components for man- or animal-packing.

Initially it was felt that rifles and other individual weapons were too bulky to attach to paratroopers when jumping. They posed a safety hazard, as the weapon might become entangled in the deploying parachute, or injure the jumper as he carried out the hard, rolling landing imposed by parachutes of that period. Individual weapons would be dropped in separate containers along with ammunition and supplies; for this reason early paratroopers often jumped armed only with a pistol and a few hand grenades. Sub-machine guns were already more compact, though often heavier than rifles, and folding-stock types such as the German MP38/40 series could be carried on the jump. Some had detachable stocks, such as the British Sten, allowing them to be partly disassembled for the jump. The US M1 rifle could easily be broken down into two components and jumped in a padded container (though see comment under Plate A). The standard bolt-action rifles used by most countries could not so easily be broken down, having one-piece stocks almost as long as the assembled weapons; nonetheless, rifles were sometimes jumped in combat, with varying degrees of success. Disassembled weapons were usually secured to the torso above the reserve, which provided more protection to the jumper and weapon. It was found to be ill-advised to secure the weapon under the parachute harness, as the opening shock jammed it into the jumper's chest.



⁸ Infantry guns were light, compact, simplified artillery pieces operated by infantrymen rather than artillerymen, and organic to infantry units in some armies.

The Japanese developed a take-down version of their standard Type 99 rifle, after a hinged folding wooden stock proved insufficiently rigid. The US fielded a metal folding stock for the M1 carbine. These were about the only such individual weapons fielded for paratroopers, other than sub-machine guns. Others simply used standard rifles, and developed jump containers that were fastened to the jumper's side and dropped on a short lowering line once the parachute opened, to protect the jumper from injury by the weapon when landing. The containers were usually padded to protect both the jumper and weapon.



Machine guns and automatic rifles were a different matter. These weapons might be capable of being broken down, but they were heavy and bulky, and had to be dropped in separate containers, along with mortars. Machine guns with detachable quick-change barrels such as the British Bren and German MG34 could be jumped in compact containers, and the Japanese developed a take-down version of their standard Type 99 LMG.

Anti-tank weapons were a major problem. Early in the war most countries used an AT rifle; these were heavy, unwieldy, unable to be broken down, and unsuited for jumping even in drop containers. American bazookas were bulky, but light enough to be jumped, albeit with difficulty until a take-down version was developed.

Because airborne units, especially paratroopers, were so lightly armed (and in part as a legacy of the original concept of their employment as commandos), they were allocated a high proportion of sub-machine guns and light machine guns. This was particularly helpful, since they were often forced to fight in small, scattered groups. They were also amply provided with hand and rifle grenades and demolition charges. Anti-tank grenades and mines were widely issued in an effort to make up for the dearth of AT weapons, but were poor substitutes. A knife or bayonet was essential. Paratroopers were habitually trained to use all weapons assigned to their unit, as well as enemy types.

Support weapons

In theory heavier weapons such as AT guns, light artillery, and recoilless guns could be dropped by parachute. This required considerable aircraft space, and the weapons had to be broken down into numerous components – transport aircraft with tailgate doors were not yet available. The several components of a disassembled crew-served weapon were dropped in special containers or bundles. Ammunition and gun equipment had to be dropped as well, which resulted in a considerable number of containers to locate, move and assemble on the DZ – always assuming that all components could be found and were undamaged. Usually only a small number of such crew-served weapons were dropped, if any, the bulk being flown in by glider or transport.

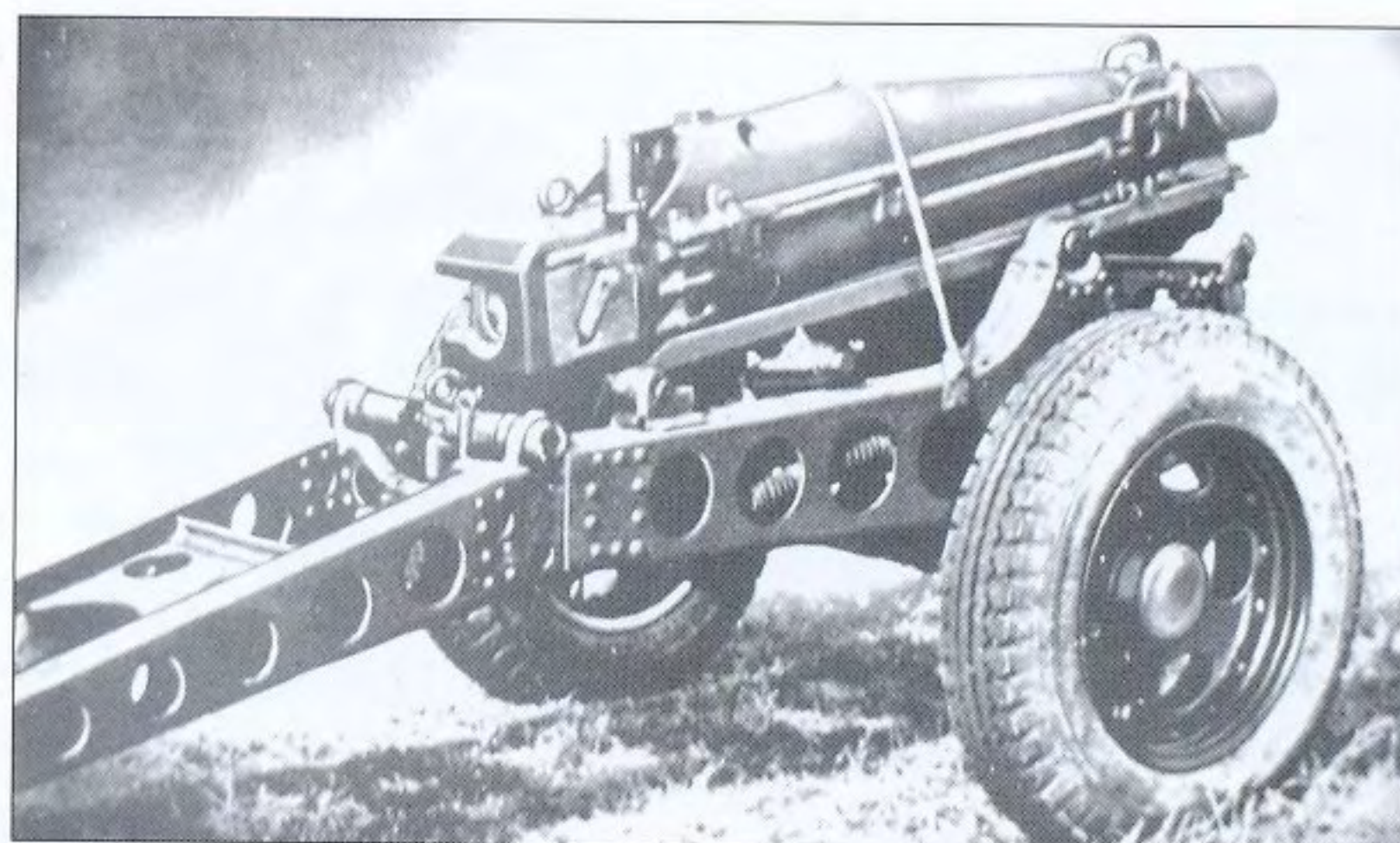
The limited availability of artillery and heavy mortars not only restricted the amount of fire support for ground assaults, but limited defensive fires and counterbattery/ counter mortar capabilities. The US and British used the 75mm pack howitzer, compact and easily broken

Anti-tank protection was a key concern of paratroopers; the nightmare was that a still disorganized unit, assembling but without its heavy weapons, would be caught by a sweeping armoured attack. Luckily, during World War II this never occurred. The American 2.36in M9 bazooka – here fired by a trooper of the 503rd PIR on Corregidor in February 1945 – was a valuable addition to airborne armament.

down into seven components. The Germans used mountain and infantry guns, both compact weapons, as did the Japanese. The Germans also made limited use of recoilless guns, which they called 'light guns'. Small (50/60mm) and medium (81/82mm) mortars were also widely used by airborne troops, since they too could be broken down into compact loads for dropping and man-packing.

The air-dropped equipment containers were usually slung on under-wing shackles or dropped from bombers' bays. While they might also be pushed out the door with the jumpers following, this resulted in more dispersion. It was more efficient to drop the containers from external racks at the same time as the troops jumped, despite the danger of jumpers and equipment colliding. Containers were usually constructed of combinations of aluminium, plywood, wicker and padded canvas. They might be externally coloured or coded to identify their contents – camouflaging colours hampered recovery. The contents had to be padded, and a padded or collapsing shock-absorbing cushion was provided on the bottom end of containers. Besides the size and weight limitations imposed by shackles and parachute capabilities, it was preferable for a container to be carriable on the ground by two men, certainly no more than four, to ease recovery. Some were fitted with small detachable wheels to allow them to be pulled off the DZ, but even moderate vegetation and rough ground made this impractical. In addition to door bundles, jumpers themselves were sometimes fitted with drop containers for crew-served weapons or supplies. The heavily loaded jumper would be the first man in the door, since it was extremely difficult to move rapidly in a bouncing, crowded aircraft; he would 'fall' out rather than jump, and release the container on a lowering line once his canopy deployed.

Anti-aircraft weapons were especially important, as deployed airborne troops were vulnerable to air attack. Such weapons are heavy, bulky, and require a great deal of ammunition. This limited them to small calibre automatic cannons and heavy machine guns on AA mounts, delivered by gliders or transports. Efforts were made to make the AA weapons capable of anti-tank use as well, though their small calibre was a limitation in this role. The US divisional 'anti-aircraft battalion' in fact had two AA batteries with .50cal M2 machine guns (and later, 40mm cannon); and two AT batteries, with the 57mm M1 AT gun. (The US 57mm was a licensed copy of the British 6pdr AT gun; it was found that slight differences in design allowed the British version to fit into gliders better, and the British guns were issued to US airborne divisions.)



The US 75mm M1A1 pack howitzer on the M8 carriage was the standard parachute artillery piece for both the US and British armies. US parachute field artillery battalions had three batteries of four guns each, while the glider field artillery battalion had two six-gun batteries. In either case a battalion could support an infantry regiment – parachute infantry regiments having three battalions and glider regiments two.

US parachute artillerymen prepare 75mm pack howitzer component containers before attaching them to under-wing shackles. Usually the containers would be dropped first and the paratroopers would follow, the theory being that they could observe where the containers landed. These are, of course, larger than the typical supply drop containers.





A British Tetrarch light tank of 6th Abn Div's armoured reconnaissance regiment is unloaded from a Hamilcar glider. Tailored especially for the Tetrarch, this was the largest glider built by the Allies, with a wingspan of 150ft, an unloaded weight of 16 tons, and a payload of 7.8 tons GB (8.75 tons US): a light tank, or two Bren carriers, or a 25pdr gun-howitzer. The British employed some of these 2pdr-gun tanks in Normandy, and those that survived the perilous landings near Ranville provided some support until replaced by sea-landed 75mm Cromwell medium tanks. (A few Tetrarchs, and similar US-made 37mm-gun M22 Locust tanks, were inserted during the Rhine crossing in March 1945.) The dangers of flying and landing such heavy and skittish loads by glider were considerable, and their combat capability was really too limited to be worth the effort.

and hardly worth the developmental and heavy airlift resources they demanded, since they were extremely vulnerable to enemy tanks and AT weapons. In the very few instances where glider-delivered tanks were employed, their contribution was short-lived. On the evening of D-Day, 6 June 1944, the British 6th Abn Div in Normandy received eight Tetrarch Mk VII light tanks of the divisional reconnaissance regiment, delivered by Hamilcar heavy gliders. Some use was also made of light armoured cars and tracked carriers by airborne forces.

In all categories of weapons available to airborne troops, limited numbers and light weight were a given, and this posed a problem when it was necessary for airborne forces to fight as conventional infantry. In such cases it was necessary to attach additional combat support units such as AT, AA and armour. The 82nd Abn Div in Normandy deployed with 75mm pack howitzers, but once the sea-delivered echelon arrived these were replaced with 105mm howitzers. As time went on many airborne forces were provided with heavier and more abundant weapons, in recognition that in all probability they would remain on the ground to fight conventionally.

Equipment

In the realm of unit equipment airborne forces were provided with even more specialized matériel than with weapons.

Communications was an especially important area. Period radios were heavy, bulky, temperamental, fragile, and often short-ranged. Long-range radios capable of Morse code transmissions were even heavier; they needed heavy batteries (for which replacements had to be carried) or power generators and erection of long wire antennae, and they could not be operated on the move – in other words, exactly the opposite characteristics to what was needed. Efforts to develop suitable radios did not bear fruit until late in the war, and most airborne forces had few. Intra-unit radio communication was also essential for command and control, as elements were so widely scattered that good communications were necessary to co-ordinate their assembly. Field telephones were of little use until the unit assembled and established defensive positions. An especially important need for radios existed in air-to-ground communications, to request and co-ordinate close air support and resupply/reinforcement drops.

Marker panel codes to mark the airborne force's locations and convey simple messages were of limited use in fast-moving situations, at night, or poor weather conditions (rain, fog, mist, snow or dust). Some forces devised a means of using parachute canopies as signal panels, and

national flags or colour-coded panels were used to mark unit positions to prevent their being attacked by friendly aircraft. Signal flares and coloured smoke were widely used, but had their own limitations in communicating information. Various types of signal lamps were used to transmit rudimentary information or Morse code; even carrier pigeons were tried. The limited and unreliable communications available often meant that higher headquarters were largely in the dark as to the situation on the ground, be it success, failure or need for resupply. It was not uncommon for liaison/spotter aircraft to fly into airheads, landing on a crude airstrip or clearing and flying messages back to headquarters.

Various means were used by early-arriving pathfinders to mark DZs, or by the first waves to mark DZ/LZs for subsequent lifts (see Plate G): special radio beacons, code-flashing signal lamps, coloured flares and smoke signals, fire pots, and coloured marker panels arranged in predetermined shapes or letters to identify specific DZ/LZs. Even buildings might be set alight to mark DZ/LZs, or bombers might drop incendiary bombs at predetermined points as guide markers. Signals were also arranged to warn off aircraft, cancel lifts, or direct them to alternate DZ/LZs.

Another major weakness of airborne forces was **mobility**. While their air-deliverable capability gave them an unprecedentedly rapid strategic reach, once on the ground they were reduced to foot infantry. While popularly viewed as 'light, swift and deadly', the reality was that individual paratroopers often jumped in more heavily burdened than their conventional counterparts. Conventional infantry were supported by a logistical tail from nearby supply points and had some degree of tactical transport. Paratroopers had to carry everything they needed, at least for the first few days: ammunition, including a share of the large amounts needed for crew-served weapons; mines, demolitions, rations, medical supplies, water, radio batteries, and every other necessity. Part of the training of a paratrooper was to teach him to commandeer anything of use.

As with artillery, even light trucks could not be dropped, being delivered by gliders or transports, and even then nothing much bigger than a jeep could be flown in. The few vehicles available were essential for towing artillery and AT guns along with ammunition; often they might have to shuttle several weapons in turn, as there were not enough for one to be dedicated to each piece. This greatly limited the ability to displace weapons forward during the advance, or to reposition them quickly to where they were needed. This was a severe liability with AT weapons, which had to be positioned rapidly to meet the threat and displaced to alternate firing positions in order to survive. To make matters worse, only the heaviest cargo gliders could carry both a gun and its prime mover, most only accommodating a single heavy weapon or a vehicle. A small number of vehicles might be used to carry long-range and air-to-ground radios for the command group.

Captured military and commandeered civilian vehicles and even horses and wagons were valuable assets and their acquisition was considered in planning, although it could never be expected that

The American $\frac{1}{4}$ -ton jeep was the main prime mover for both US and British airborne artillery and anti-tank guns – and indeed, would provide the great majority of the airborne division's mobility, such as it was. Here a jeep is off-loaded from a US-operated British Horsa glider. Even though the Horsa was not designed with the jeep in mind, it was found that it just fitted.





This diminutive bulldozer could be loaded in a transport or heavy glider, but it offered engineers only the barest of earthmoving capabilities for repairing captured airfields. The marking above the grill identifies it as belonging to the 101st Abn Div's 326th Airborne Engineer Battalion.

sufficient numbers would fall into the hands of paratroopers. Motorcycles, motor-scooters and bicycles were occasionally dropped or glider-landed; some were made collapsible to pack into equipment containers. These had some utility for messengers and scouts, but did not improve overall mobility. Collapsible push-carts were also tried, but, like wheeled drop containers, they were of limited effectiveness.

Engineer equipment was another deficiency experienced by airborne forces. Airborne engineers had limited capabilities for breaching obstacles, supporting assaults or any type of construction. A key role would be repairing captured airfields, but they had little powered equipment to accomplish this, even if a suitable airstrip existed to allow landing them. Light bulldozers and some power tools could be delivered by airlift, but heavier equipment such as graders, rollers, dump trucks, power shovels etc. had to arrive overland.

LATER DOCTRINE

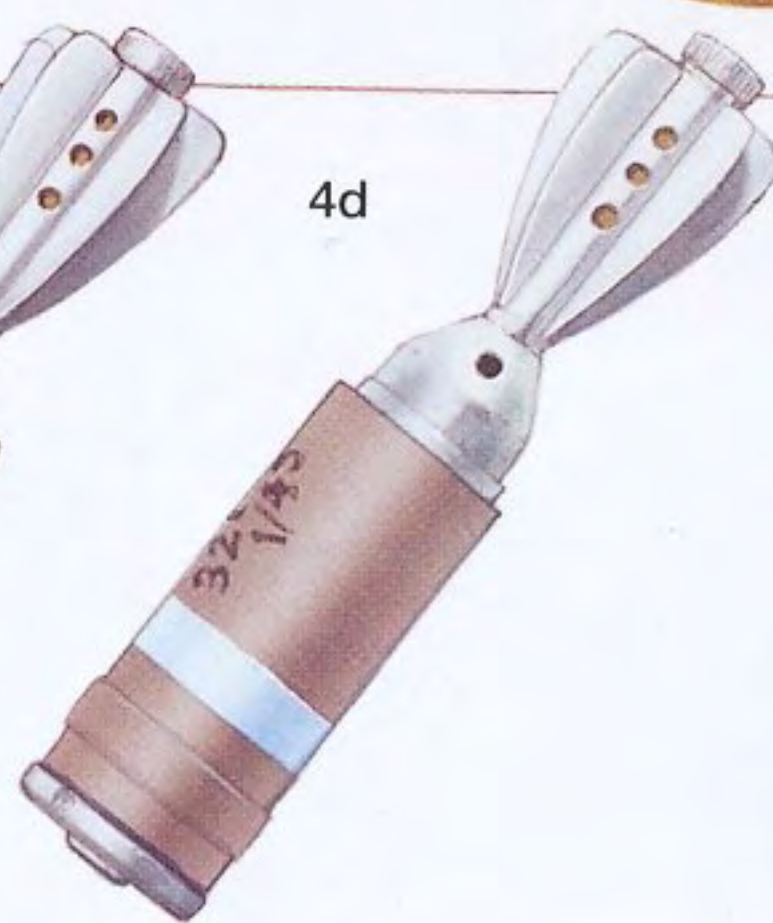
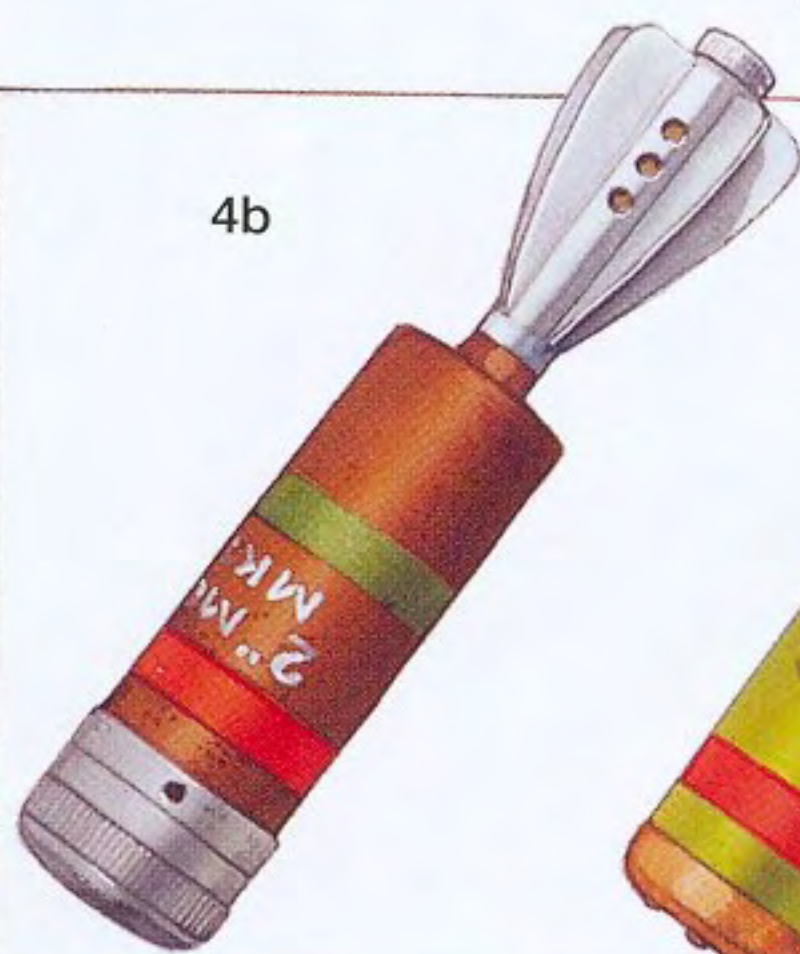
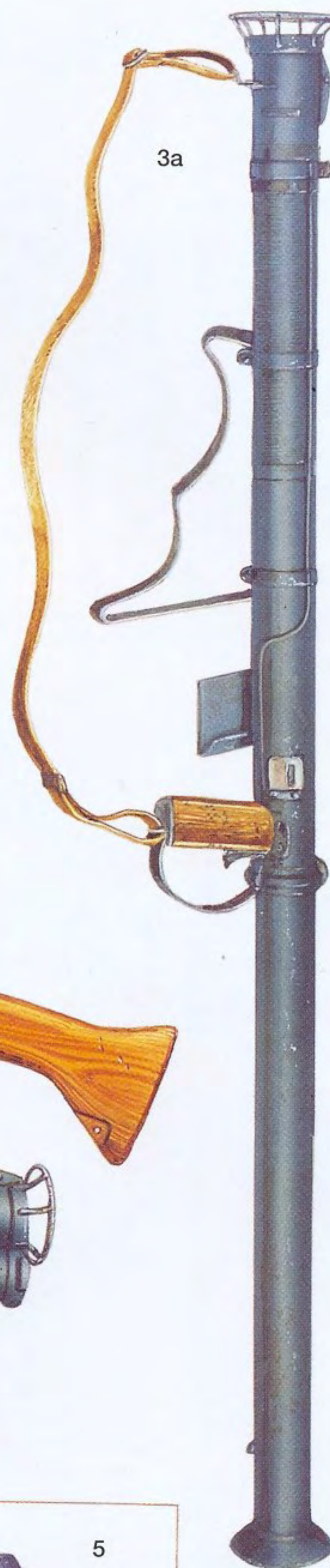
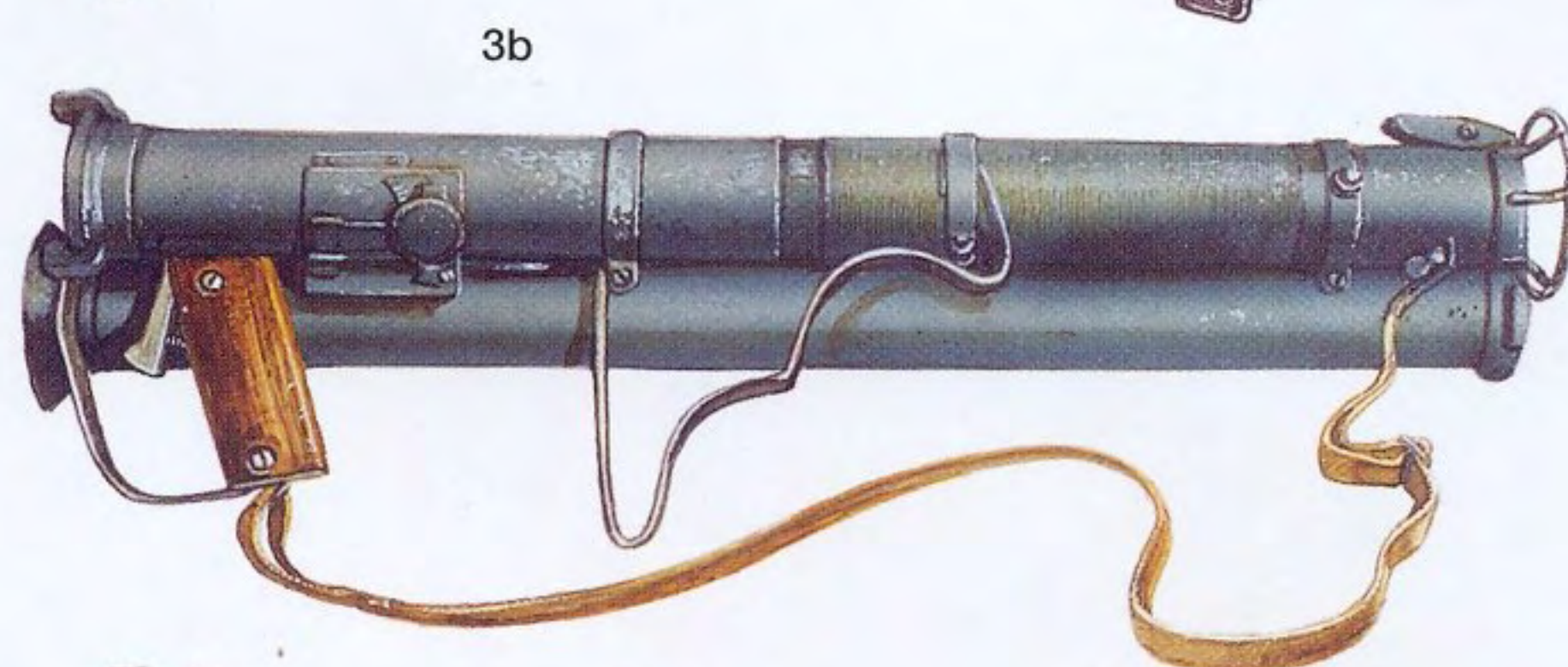
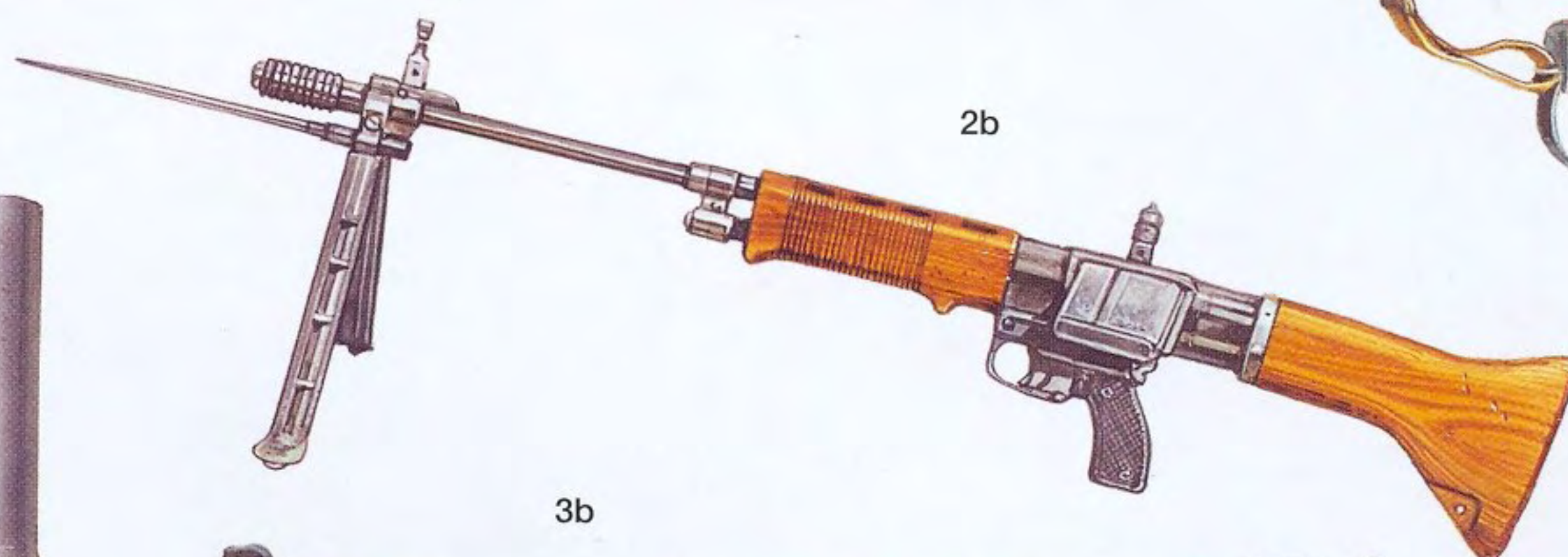
The Germans showed the way to more ambitious airborne operations with the 1941 invasion of **Crete**, which involved – effectively – a division of four regiments. However, the Germans used the ‘ink spot’ concept of dropping numerous small units – battalions, companies, and even platoons – over a large area to seize several objectives. In contrast to normal German military doctrine, which emphasized the concentration of forces for the main effort (*Schwerpunkt*), this concept was more akin to Napoleon’s ‘engage the enemy everywhere and then decide what to do.’ In Holland and Belgium this had been successful, since resistance was light and disorganized. It was another matter on Crete, where it cost the Fallschirmjäger dearly. Although the British Commonwealth defences were neither strong nor well organized, the Germans lost some 6,000 men, including aircrews and the attempted seaborne phase intercepted by the Royal Navy. One out of five of the Fallschirmtruppen committed were killed – 3,764 – and some 350 aircraft were lost, including 152 valuable transports.

The envisaged airborne assault on Malta was cancelled because of fears of a repeat (a decision which had dire consequences for Axis logistics in North Africa, ravaged by British submarines and aircraft from that island). After Crete the Germans executed six parachute operations, but only one in more than battalion strength. The exception was on Sicily in July 1943, when FJR 3 and 4, a machine gun battalion and a pioneer battalion were dropped in over four days as reinforcements. The other drops were essentially special operations: an attack on a now opposing Italian headquarters, seizures of two small islands, a raid on a Yugoslavian partisan headquarters, and a diversionary operation during the Ardennes offensive – of which the last two failed.

The Western Allies

It was now recognized that commando-type units were more effective for conducting the rare small-scale raids, and that parachute and glider troops were best committed in significant, concentrated numbers for larger-scale decisive operations. Allied operations thereafter were

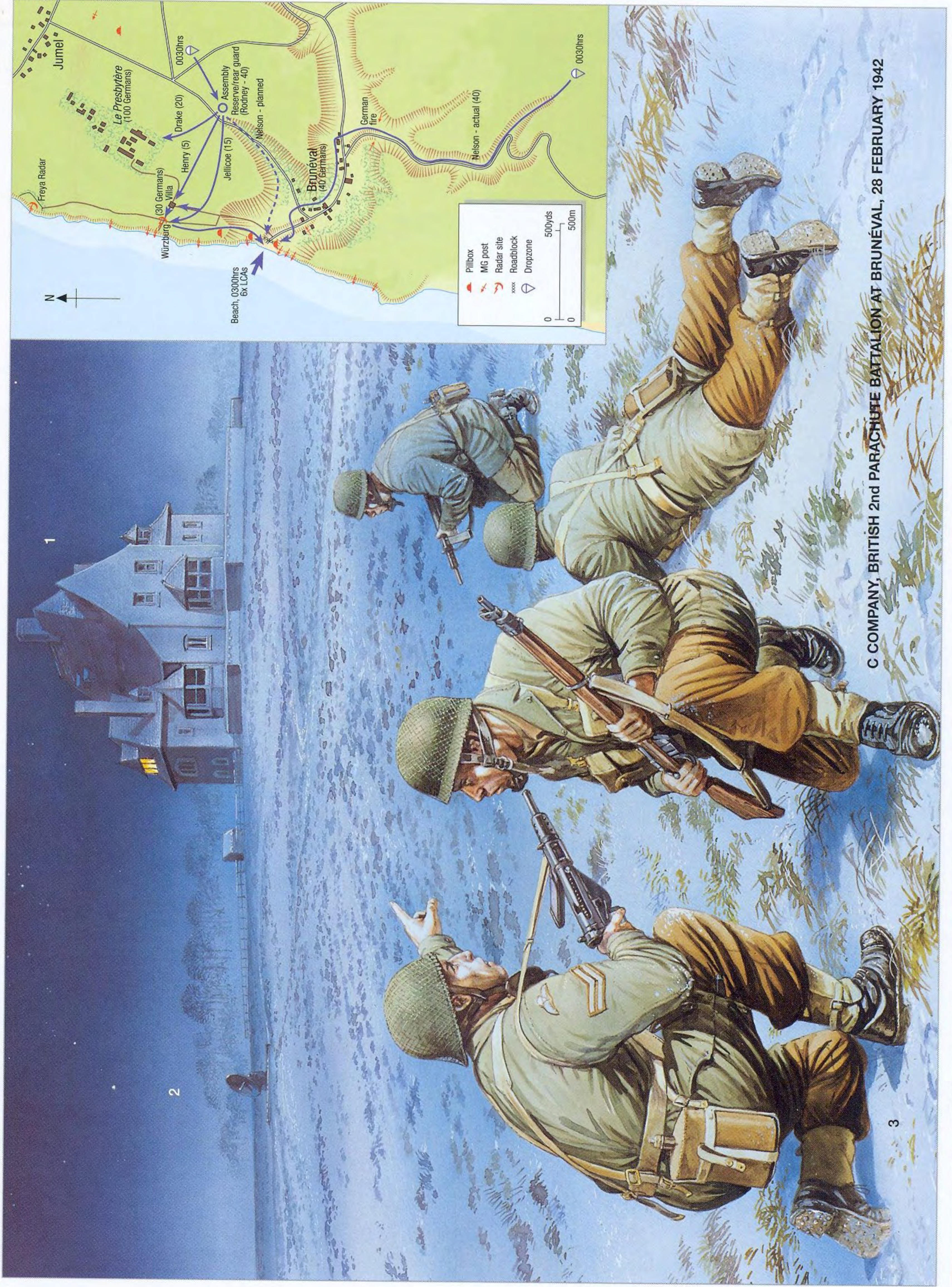
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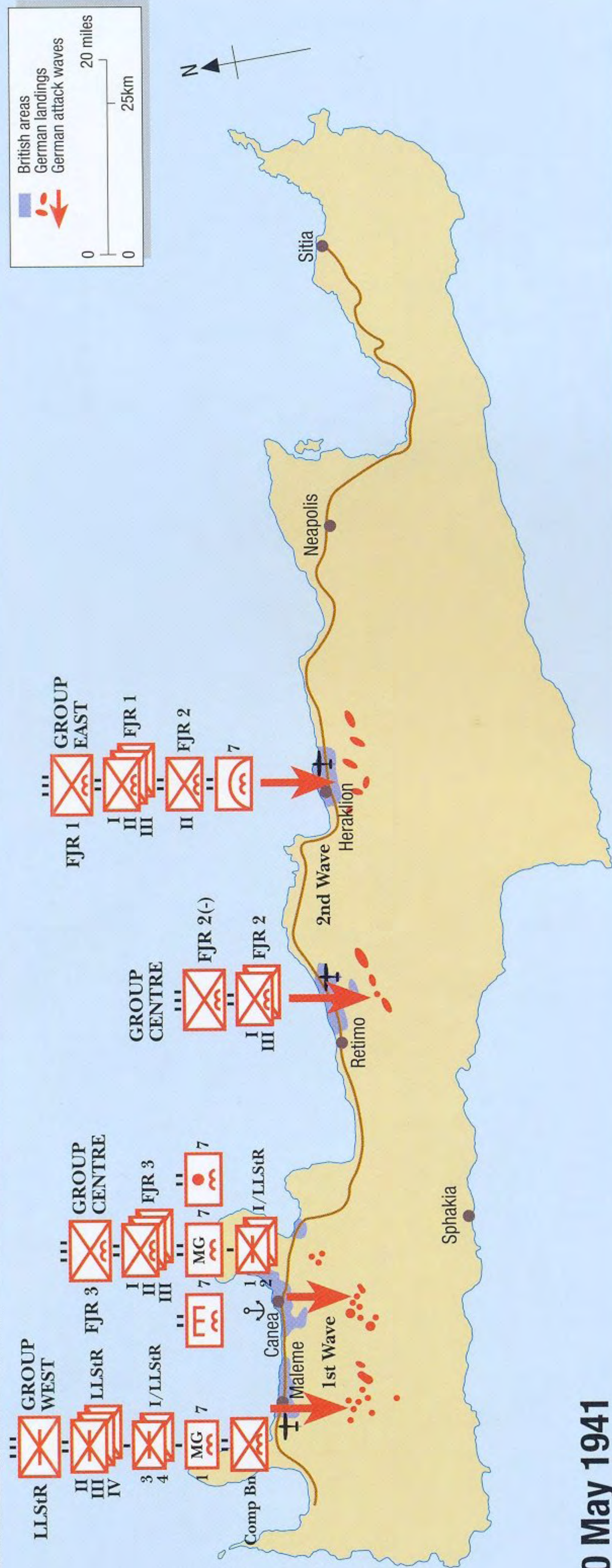
SPECIALIZED AIRBORNE WEAPONS
See text commentary for details

STURMGRUPPE 'GRANIT' AT FORT EBEN EMAEL, 10 MAY 1940





C COMPANY, BRITISH 2nd PARACHUTE BATTALION AT BRUNÉVAL, 28 FEBRUARY 1942

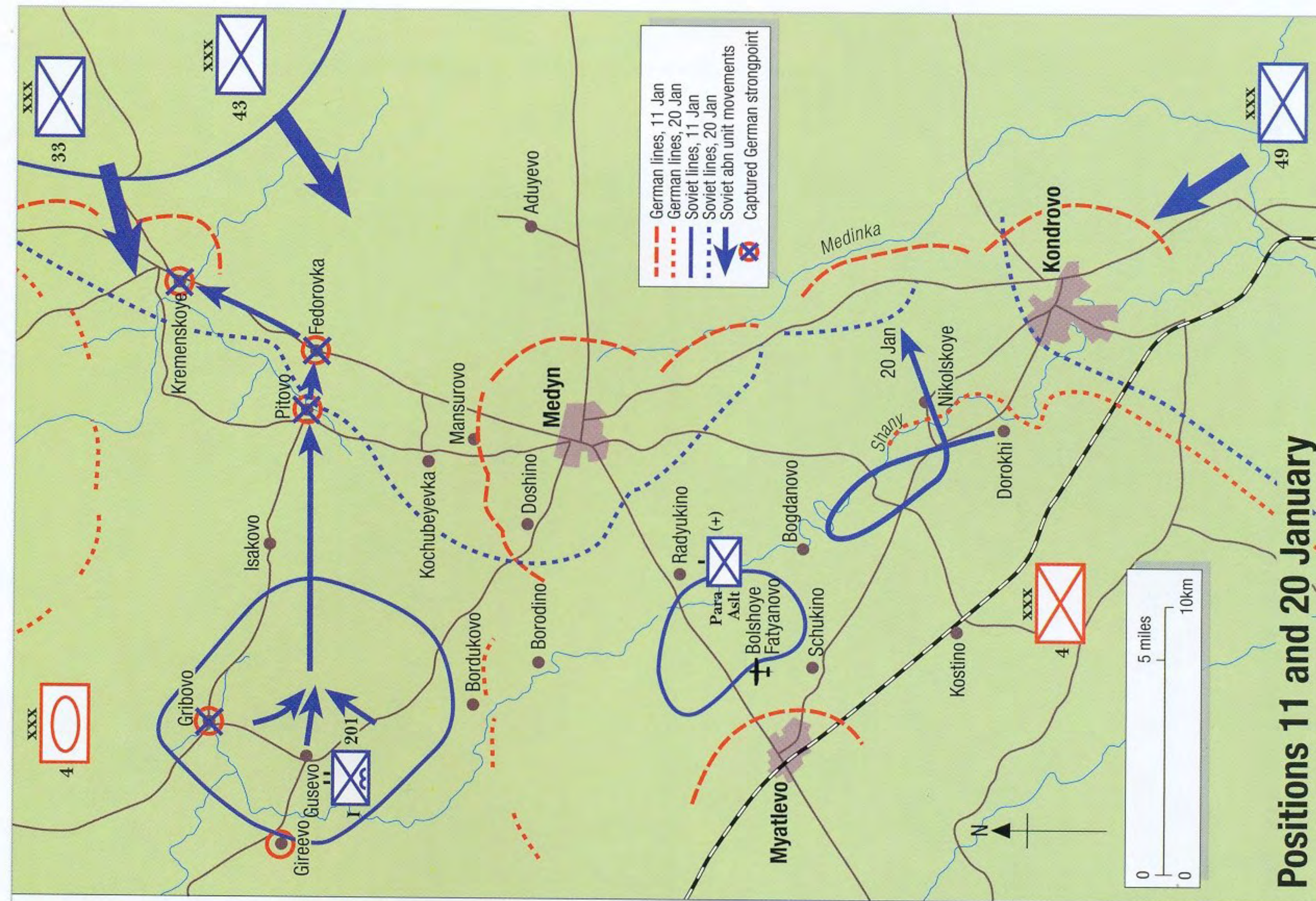
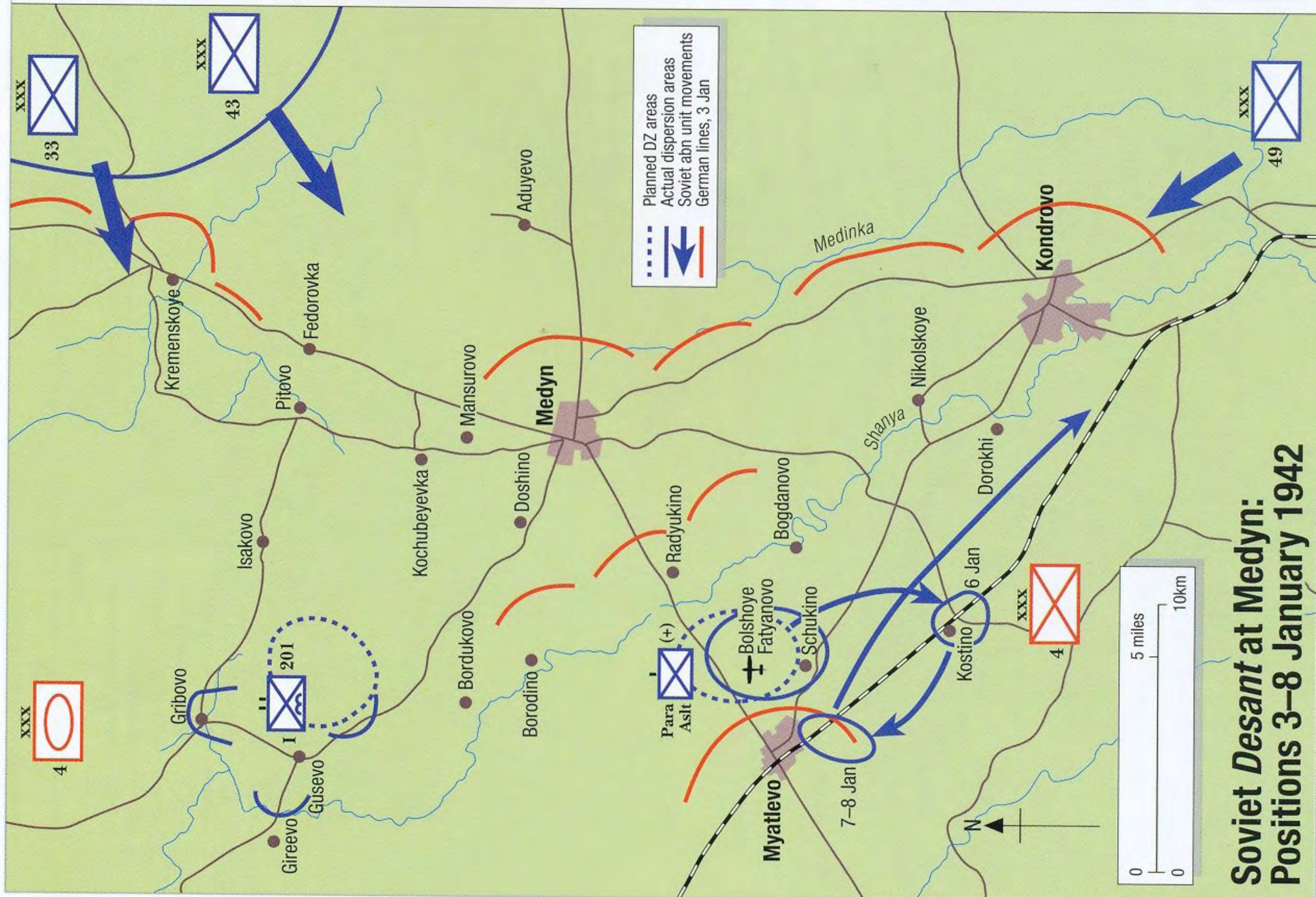


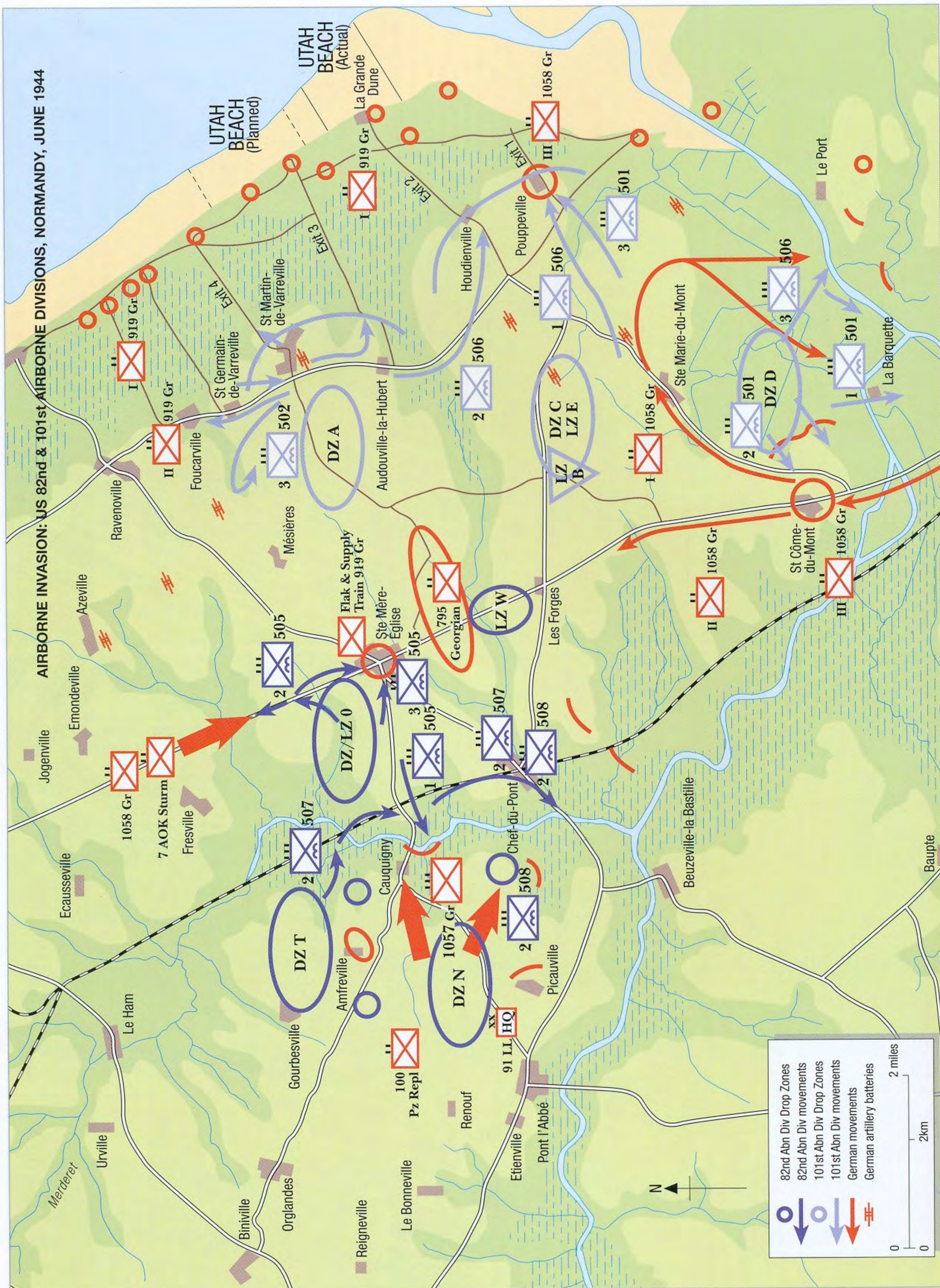
Crete, 20 May 1941



Crete, 21 May 1941 and later

GERMAN AIRBORNE INVASION OF CRETE, MAY 1941



F

US PATHFINDERS, NORMANDY, JUNE 1944. See text commentary for details





AIRBORNE REINFORCEMENT:
US 503rd PARACHUTE INFANTRY
ON NOEMFOOR ISLAND, 3 JULY 1944

seldom smaller than regimental size and more frequently of divisional or even multi-divisional size. Such forces were better suited for seizing key objectives in the enemy's rear and holding them until relieved by ground forces; small units could not accomplish this – it was a mission demanding staying power.

US and British operations also had their initial problems. The smaller drops in North Africa met with mixed success. In July 1943 Operation 'Husky' on **Sicily** involved two airborne divisions, US 82nd and British 1st, but led many to question the concept of airborne divisions attempting large-scale operations, citing parallels with Crete. The parachute troops were very widely scattered and few managed to reach their objective areas. Panicky Allied naval AA fire downed 40 per cent of one regiment's transports, and over half of the British air-landing brigade's gliders went down offshore. Casualties were high, and in most instances the amphibious landing forces did not receive the expected support of the airborne troops. A major problem was the poor training and co-ordination of airlift crews. The operation was not without its benefits, however, as the widely scattered paratroopers created a great deal of confusion and damage in the German rear area. Many lessons were learned, but since no US gliders had been available for 'Husky' no experience was gained in that area.

A major revelation of early operations was the importance of airlift transport squadrons being fully and specifically trained for airborne operations, working in very close co-operation with the troops. Such operations required a high degree of navigation skills and training in the identification of landmarks. The crews needed the discipline to maintain formation in poor visibility and when receiving AA fire, and the skill to maintain the necessary drop altitude and air speed. Glider tug crews needed additional skills in formation flying and determining release points.

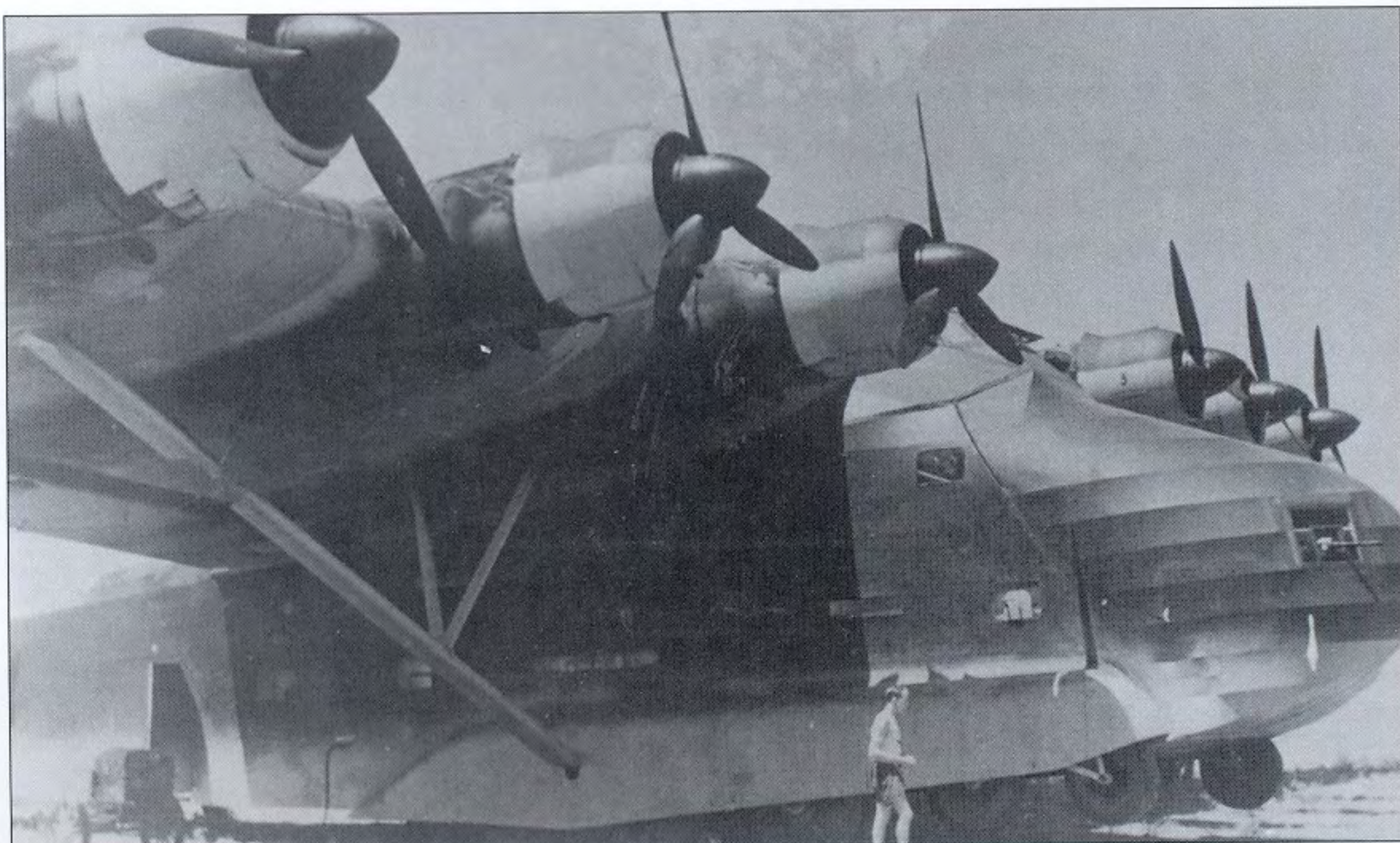
Because airborne units were viewed as fast-moving, hard-hitting strike units with plentiful close-combat weapons, there was a mistaken impression that they would perform well in the conventional ground role. In fact they were too lightly armed, and too small to man the frontages of an infantry division; they lacked sufficient transport, and did not possess the necessary support units to sustain them. Most armies held to the concept that airborne units would be relieved within a matter of days after link-up with ground forces, and would return to their base for reconstitution and preparation for the next mission. More often than not, this did not in fact occur; when more troops than had been anticipated were found necessary to develop the offensive, airborne units were retained in the line to fight on in conventional ground operations (and some even conducted amphibious assaults). It also proved difficult to disengage a committed airborne division and move a relieving division forward on congested lines-of-communication.

Allied airborne operations in **Italy** were limited. British paras conducted an unopposed amphibious landing at Taranto and fought as infantry. Several US plans were made to parachute regiments behind beachheads, and one to seize airfields outside Rome; but the rugged terrain and air defences made the former plan unfeasible, and the latter was cancelled when the promised Italian support was judged shaky. Instead, two regiments were parachuted into the Salerno beachhead. A



Although they made no major airborne assaults after Crete, the Fallschirmjäger fought on all Germany's fronts. Here a member of Fallschirmjäger Brigade Ramcke, in tropical uniform, prepares to probe a minefield in the North African desert; from his binoculars and signal pistol he would seem to be an NCO. The brigade was commanded by GenMaj Bernhard Ramcke, who had successfully taken over command of Group West on Crete when GenMaj Eugen Meindl was wounded at Maleme. It was formed in Greece for the planned invasion of Malta, but in July–August 1942 was airlifted to Libya as infantry reinforcements, with four rifle battalions, an artillery battalion, an AT company and a pioneer (assault engineer) company. Heavily engaged at the southern end of the El Alamein line in October 1942, the brigade retreated successfully, capturing a British supply convoy on the way. The remnants were captured in Tunisia in May 1943.

In May 1941 the Luftwaffe received the huge Me 321 *Gigant* glider, first conceived for the planned invasion of Britain. With a payload of 22 tons, it could carry 120 fully equipped troops (up to 200, in emergency evacuations) or an 8.8cm gun; but it was not available for the Crete operation that month. In November 1942 this six-engine powered version, the Me 323D *Gigant*, came into service with I/KGzbV 323 as a strategic transport, capable of lifting about 15 tons. The unit operated from Pomigliano in Italy during the attempts to resupply Axis forces in Tunisia in April 1943, but suffered appalling losses to fighters of the British Commonwealth air forces. The Me 323E of 1944 could lift nearly 30 tons; but although it was used on the Mediterranean and Russian fronts throughout the war, it was never deployed as a dedicated asset for airborne forces. (Private collection)



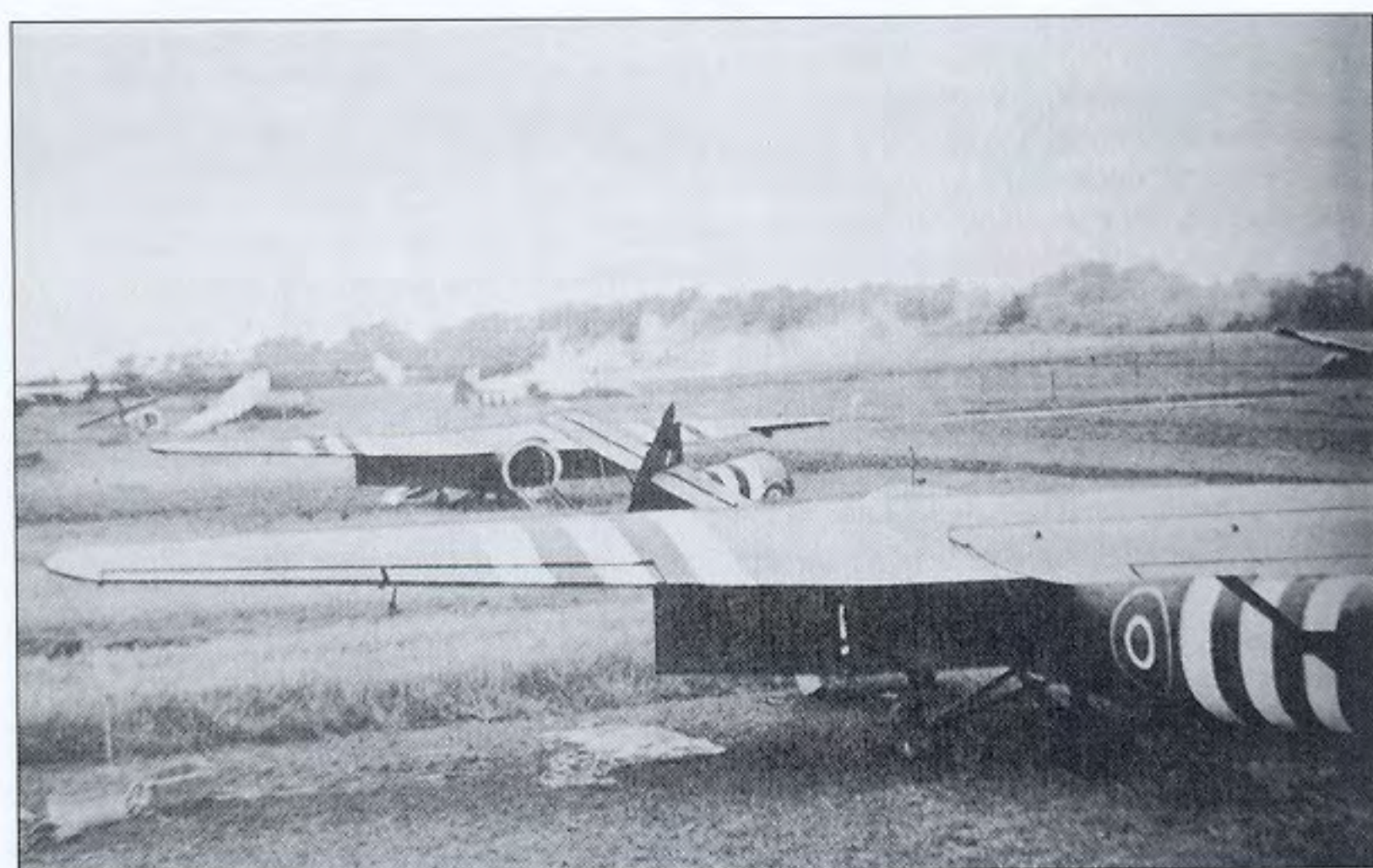
single battalion jumped near a mountain village 20 miles inland and was scattered over 100 square miles; it created a great deal of havoc with German reinforcements, and most of the paratroopers made it back to the beachhead weeks later. The 82nd continued to fight as infantry, and one regiment landed by sea at Anzio. The German 1., 2. and 4.FJD fought effectively in Italy, but here, as elsewhere, strictly as ground troops.

An important lesson was learned in Sicily and Italy: rather than teaching scattered paratroopers to attack any enemy they encountered, they were henceforth trained to avoid contact with large enemy elements and move toward their objectives where they would link up with comrades. Once their strength was gathered they could accomplish their primary mission, rather than be wasted away piecemeal while making nuisances of themselves. Nevertheless, individuals and small groups were still encouraged to attack equally small enemy elements to create confusion, cut telephone lines, and ambush couriers to disrupt enemy communications.

The June 1944 **Normandy** invasion (Operation 'Overlord'/'Neptune') saw the US 82nd and 101st Abn Divs each go in with three parachute regiments and a glider regiment reinforced by a third battalion – 12 battalions each, rather than the standard eight. The British 6th Abn Div employed an air-landing and two parachute brigades with a total of nine battalions. The three divisions' transports flew a roundabout

route across the Channel, to the west of the Cotentin Peninsula and then east 30 miles across the peninsula to drop 4–6 miles behind the landing beaches. The American divisions were tasked with securing the northern and southern inland flanks of the US landing beaches, and selected bridges and causeways leading inland from them (see Plate F). The British would secure the eastern flank of their beachhead, destroy an important coast defence battery, and secure or destroy certain river and canal bridges to allow the amphibious troops to move inland and to deny the bridges to German reinforcements. Landing five

These British Horsa gliders lying apparently wrecked in a Normandy field have the appearance of a disaster, but they are in fact disassembled for unloading jeeps and guns. It would seem that the glider men cleared the LZ so quickly that the pathfinders' smoke pots are still burning.



hours ahead of the amphibious assault, they effectively accomplished all these missions, though in many instances success was due to the initiative and aggression of troops whose operation plans had to be discarded from the moment they landed.

The US airborne had a rough time with heavy fog, some flak, and the loss of pathfinders; their transports became scattered and most units were badly dispersed, especially the 101st. A great deal of equipment was lost, and unit missions were only partly accomplished by the time of the amphibious landing, although all were eventually achieved. The widely scattered paratroopers and glider men created extensive confusion and harassed German units, hindering the attempted German reaction. The British division fared better with its more modest objectives, and most troops had the good fortune to land where they were meant to. The glider landing to seize bridges near Benouville reproduced – and by night – the success of the German 1940 Eben Emael operation; and the capture of the Merville battery was achieved although only some 25 per cent of the scattered 9th Para Bn arrived in time for the attack.

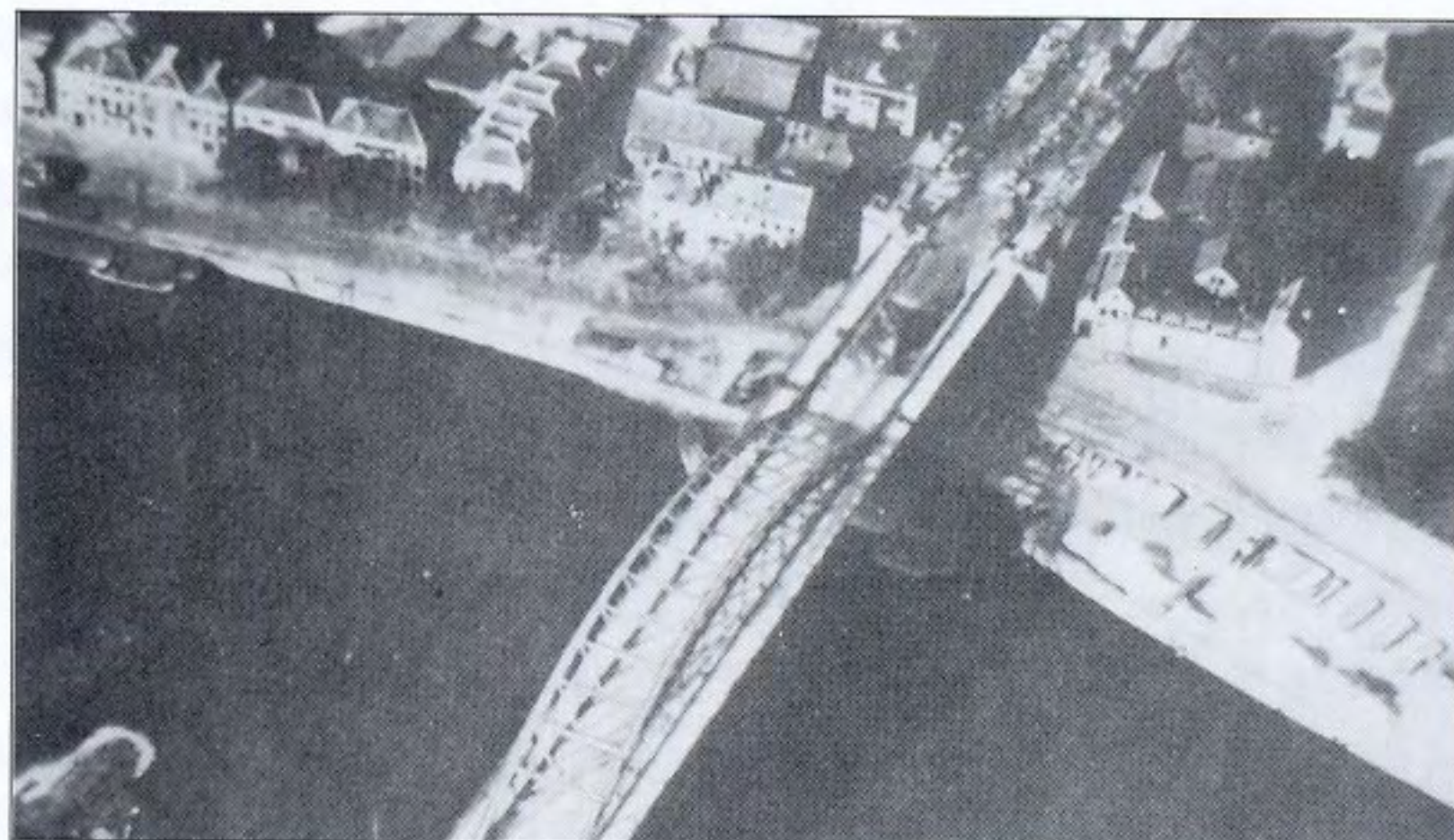
Again, further training was proved necessary for airlift units, and more effective means were needed for marking DZ/LZs. Normandy would also be the final large-scale night drop; the risks of daylight operations were more acceptable, and daylight was necessary for the transports and gliders to locate their DZ/LZs. It would also reduce the number of glider crashes.

The August 1944 invasion of **Southern France** (Operation 'Dragoon'/'Anvil') saw the formation of a provisional inter-Allied airborne division which included US and British units. In an early dawn drop 90 per cent of the paratroopers and glider men landed dead-on their planned zones; resistance was light, as were casualties. The operation had similar goals to that in Normandy, to secure inland objectives and block German reinforcements.

The September 1944 **Netherlands** operation (Operation 'Market'/'Garden') was a mixture of success and failure. The US 82nd and 101st Abn Divs were to secure a series of bridges leading into Holland to open a path for the British XXX Corps to slice through the country, flank the Westwall defences, and force an entry into Germany. All bridges were secured on D-Day except the northernmost, which required three more days. In the meantime the British 1st Abn Div and the Polish Parachute Bde dropped around Arnhem to secure the far end of the corridor. The distance between the target bridge over the Rhine and the DZ/LZs, chosen because of woodland and built-up areas, proved too great when the unexpected presence of Waffen-SS armoured units was revealed. By day the location of DZ/LZs was successful, and glider landing casualties were light; but there were many failures and mishaps both on the ground and in the air. A single battalion was cut off at the bridge, and the remainder of the division was left without many of its heavy weapons, vehicles or working radios. The airborne force was cut off, and eventually defeated after holding out for nine days.

The final large-scale airborne operation was the March 1945 **Rhine crossing** (Operation

The bridge too far... the bridge over the Rhine at Arnhem, Holland, photographed on 18 September 1944, the second day of the operation. The north ramp between the buildings is littered with the wreckage of an attacking German column from the south bank destroyed on the first day. The perimeter held by Maj John Frost's isolated force – A & C Cos of 2nd Para Bn, C Co 3rd Para Bn, with a few reconnaissance, AT, engineer and service personnel – was in the houses and public buildings either side of the bridge on the north bank.



'Varsity'). A new American airborne division, the 17th, accomplished the mission alongside the proven British 6th. Some 1,600 transports and over 1,300 gliders put 17,000 troops on the ground inside Germany in under three hours. The mission was to secure commanding terrain, road intersections and bridges beyond the river; the paratroopers also neutralized much of the German artillery.

On the other side of the world in the **Pacific** theatre more modest airborne operations were conducted, none being larger than regimental size, and no glider operations were accomplished. The distances involved, fast-changing situations, and difficulties in assembling sufficient airlift were obstacles. Typical airborne missions included raids, blocking enemy reinforcements or withdrawals, seizing small islands, and reinforcement of ground forces.

By the end of the war the US and Britain had developed a sound airborne doctrine. The US had specified the following missions for airborne units in *Field Manual 31-30, Tactics and Techniques of Air-Borne Troops*, in May 1942. Regardless of the many lessons learned and new developments in organization and tactics, it remained the main US doctrinal guide throughout the war:

Primary missions

1. Seize, hold, or otherwise exploit important tactical localities in conjunction with or pending the arrival of other forces.
2. Attack the enemy rear and assist a breakthrough or landing by the main force.
3. Block or delay enemy reserves by capturing and holding critical terrain features.
4. Delay a retreating enemy until the main forces can overtake and destroy him.

Secondary missions

1. Capture enemy airfields.
2. Create diversions.
3. Reinforce threatened or surrounded units.
4. Seize islands or areas not accessible to other ground forces.
5. Capture or destroy vital enemy installations, thereby disrupting his system of command, communications, and supply.
6. As a constant threat by their mere presence in the theater of operations thereby causing the enemy to disperse his forces over a wide area in order to protect vital installations.

A division or even units within a division could be assigned any combination of the above missions. These basic mission concepts were generally adopted by other nations, whose limited airborne forces undertook various raids, diversions, and reconnaissance missions. Even rescue missions were accomplished, along with counter-landings into enemy beachheads.

Soviet Union

The Soviets were unable to implement their airborne deep battle concept. One reason was the resilience of German defences and their



One of the most perilous jumps in World War II was the 503rd PIR's assault on Corregidor in the Philippines on 16 February 1945. The DZ was extremely small, covered with trees and ruined buildings, and bordered on one side by 550ft cliffs dropping into Manila Bay – a particular hazard in the very high 25mph winds. Nevertheless, the operation was a successful example of a parachute unit seizing an island.



Soviet *desantniki* clamber into an ANT-6. Interestingly, by 1940 they were widely equipped with square-canopy parachutes, which gave a very steady descent but little directional control; they had a slight forward speed, so downwind landings were inadvisable. Even after the Red Army introduced static-line opening this parachute still needed plenty of altitude to open, and most drops were made from at least 1,000 feet. This is a wartime photo; the paratroopers carry a mix of PPD-34/38 and PPSH-41 sub-machine guns (with no indication of how they will be secured for the jump), and the latter did not appear until mid-1942. Note also the 'cloud' pattern camouflaged overalls. (Private collection)

employment of mobile reserves. If airborne units had been dropped deep behind German lines to seize, for example, river crossings, the chances of a timely link-up with ground forces were slim; German defences were such that the ground attack was often slowed or forced in another direction. Even though the penetration may have been tactically successful, its subsequent re-direction and failure to link up with the airborne force ensured the latter's destruction. The Red Army also lacked the necessary transports and ground attack aircraft to sustain behind-the-line units. For these reasons the Soviets were unable to insert major airborne

units deep behind the lines. What airborne operations were conducted were often piecemeal insertions, shallow enough that ground forces could link up with them in a short time, and could provide them artillery support. Airborne troops were also used to reinforce ground units that had broken through.

Airborne units were under the control of the high command and would be allocated to Front (army group) commanders as necessary. The 1943 *Instructions on the Combat Employment of Red Army Airborne Forces* outlined airborne missions:

1. Co-operate with ground forces to encircle and destroy the enemy by actions against his withdrawal routes and attacking his reserves.
2. Secure and hold critical areas, points, crossings, and boundaries in the enemy rear.
3. Co-operate with ground forces in the enemy's operational depth.
4. Destroy critical objectives in the enemy's rear.
5. Disrupt command and control facilities in the enemy's rear.
6. Support naval assault landings by securing coastal areas and isolating them from approaching enemy forces.
7. Reinforce and expand areas under partisan control.

The instructions also specified that airborne troops would not be employed to attack fortified lines or major strongpoints, or committed to lengthy defensive battles.

The Soviets conducted numerous airborne operations, with varied success; some were carried out in a piecemeal manner that greatly reduced their effectiveness. One of these was in the Vyazma region, where some 10,000 4th Airborne Corps paratroopers were inserted between January and May 1942. After conducting harassing actions they concentrated and attacked throughout the German rear in support of a major offensive. The maps on Plate E show the January 1942 Medyn operation, which was typical of a smaller Soviet operation in support of an army group offensive. In September 1943, 4,500 paratroopers of the 3rd and 4th Abn Bdes jumped in to support an offensive north of Kavev. In June 1944 the 201st and 204th Abn Bdes conducted an operation in Romania to prevent withdrawing Romanian forces from destroying facilities.

EVOLVING ORGANIZATION

The value of airborne units, demonstrated by German successes in the Low Countries and the (albeit costly) victory on Crete, led to an expansion of airborne forces. To Hitler, victory on Crete had been achieved at far too high a price, and he vowed never to use such a valuable asset again in a similar manner; but to the Allies it heralded another means of defeating Hitler. Larger airborne formations began to appear from 1942 – divisions, corps and even armies. There was also a trend to arm airborne units more heavily and to strengthen them to levels similar to conventional infantry units, to allow them to be employed in prolonged combat operations.

The creation of such large airborne formations was sometimes controversial. Some felt that too many resources were being committed, and others that airborne forces should be kept small and without permanent divisional or higher headquarters. In the long run it proved to be more effective to form permanent headquarters rather than ad hoc task forces, so as to supervise training and planning and to control operations, as well as to ensure continuity of effort and unit cohesion.

Germany

Although the first parachute division, 7.Flieger Div, was formed in July 1938, when first established it was hardly a tactical formation but rather a collection of experimental units and schools. It was not elevated to a tactical division until the eve of the war, and possessed only minimal support troops. In 1940, XI Fliegerkorps was formed to control the various parachute and air-landing units:

XI Flying Corps:

- Flying Leader XI (Corps HQ)

- Large Glider Command 1

- Air-Landing Squadrons 1 & 2

- Bomber Group for Special Employment 9 (transports)

- Supplementary Groups 1 & 2

- Parachute Schools I–III

- 7th Flying Division

- 22nd (Air-landing) Infantry Division

- Air-Landing Assault Regiment 1

Regardless of Hitler's dictate that the parachute troops would not again be employed in large scale airborne operations, 7.Flieger Div was converted into 1.Fallschirmjäger Div in May 1943, and 2.FJD had been activated in February. In October and November 1943 the 3. and 4.FJD were raised, to be followed by the 5., 6. and 7. in March, June, and October 1944 respectively. The 7.FJD was formed from FJD Erdmann, an ad hoc formation of 'alarm' and training units. The original 2.FJD was destroyed in France in September 1944, and a new 2.Division was raised that December.

The German 1.Fallschirm Armee was largely composed of non-parachute-qualified troops, and fought as a conventional ground force in France, the Netherlands and Germany. The 'parachute' designation was for prestige and morale purposes, and the units were still issued Fallschirmjäger uniforms, smocks and helmets.



Also in 1944, the headquarters of a 1st Parachute Army (1. Fallschirm Armee) was organized, to control I and II Fallschirm Armeekorps. This 'parachute' army and its subordinate corps were by no means true parachute formations, and neither was the so-called Fallschirm Panzerkorps 'Hermann Göring'; none of these resoundingly titled formations had any parachute-trained units, and the 'Fallschirm' designation was given purely for morale purposes. By this time even the parachute divisions were seriously short of qualified parachutists; of the 160,000 troops assigned to 1. Fallschirm Armee, in two corps and six divisions, only 30,000 were parachutists. Newly raised divisions were normally assigned a regiment, or one or two veteran battalions, from an existing division plus some school and demonstration troops as a cadre; the rest were non-parachute-trained recruits. Only a percentage of the men in even the cadre units were themselves parachute-qualified, and these were scattered throughout the formation rather than retained as a cohesive unit. It was for this reason that a partly parachute-qualified ad hoc battle group had to be assembled from both 1.FJD and FJR 6 for the 1944 Ardennes jump.

The new Fallschirmjäger Divisions were heavier, well supplied with support units, and better suited for the conventional ground combat to which they were committed. The 3. and 5.-8. FJD fought on the Western Front, 4. on the Southern, 9. on the Eastern, 1. on the Eastern and Southern, and 2. on all three fronts. From February 1942 to May 1943 Fallschirmjäger Brigade Ramcke, comprising battalions drawn from other formations, served in North Africa. As the war progressed the divisions were provided still heavier weapons, approaching those of an Army infantry division. For example, the original Fallschirm Artillerie Regiment possessed only one light battalion, but in May 1944 another light and a medium battalion were added, along with a heavy mortar battalion – although many such regiments remained understrength in practice. AT weapons were also increased. The 1944 Fallschirmjäger Regiment establishment demonstrates the extent of this upgrading:

German Parachute Rifle Regiment, 1944 (3,206 all ranks)

Regimental Staff

Infantry Battalion (×3):

Battalion Staff

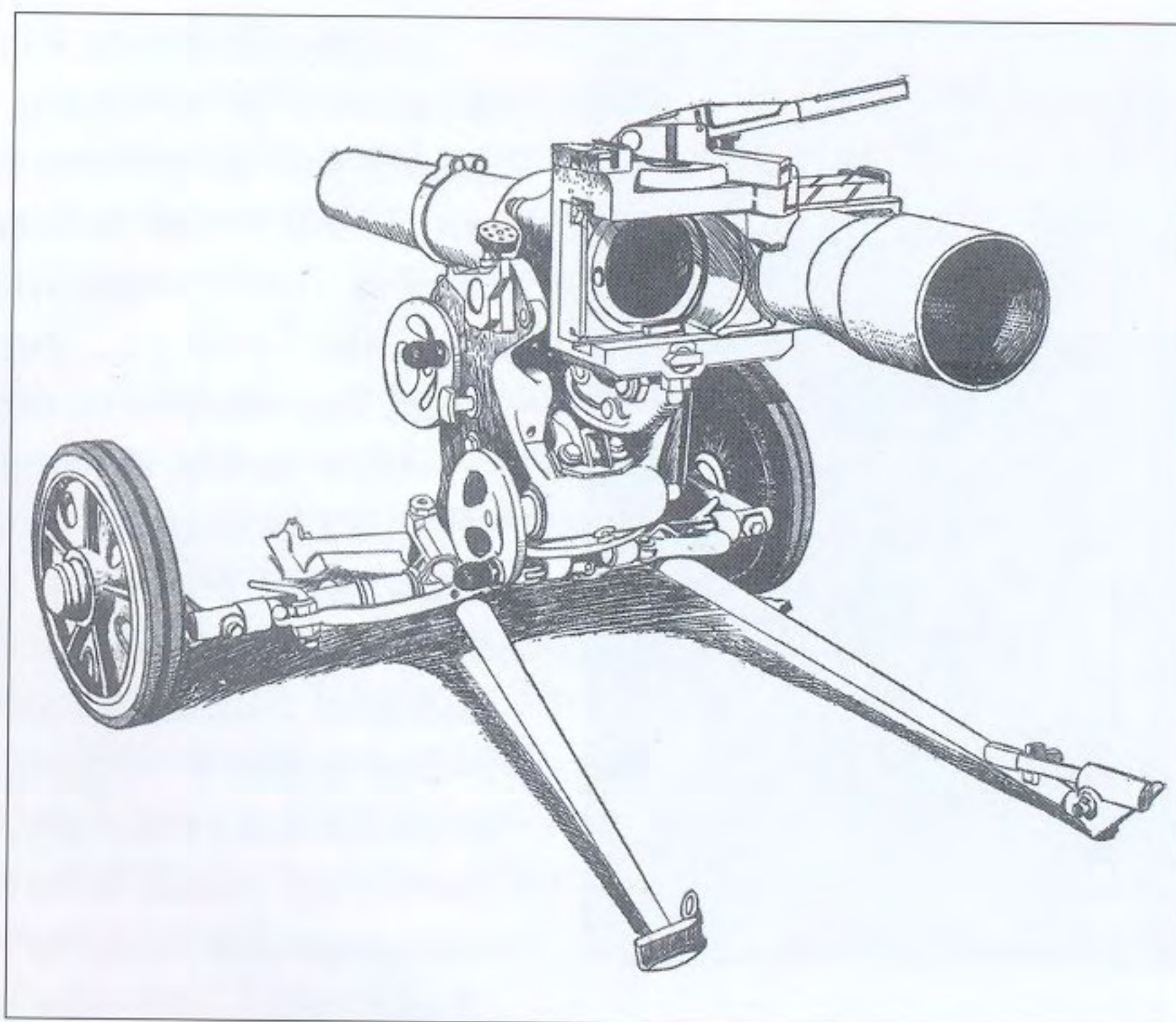
Rifle Company (×3) (each 9× LMG, 3× 8cm mtr)

Machine Gun Company (8× HMG, 4× 8cm mtr, 2× 7.5cm gun⁹)

Anti-Tank Company (3× 7.5cm AT gun, 27× 8.8cm bazooka)¹⁰

Mortar Company (12× 12cm hvy mtr)¹¹

Pioneer Company¹²



The Germans provided some recoilless 'light guns' to Fallschirmjäger divisions. While light and compact, they lacked the range of conventional howitzers and infantry guns; their back blast prevented them from being sufficiently elevated to achieve longer ranges, and gave away their position. This is a 7.5cm LG40, which could be dropped in two parachute loads; there was also a 10.5cm version.

⁹ Infantry guns passed down when regimental infantry gun company was replaced by mortar company.

¹⁰ 9× 3.7cm AT gun prior to 1944; 'bazooka' = *Panzerschreck*.

¹¹ Replaced infantry gun company (6× 7.5cm guns) in 1944.

¹² i.e. Assault Engineers; added in 1944 by consolidating battalion platoons.



Before the Allied landings, German paratroops in Normandy photographed manning a quad-20mm AA mounting; they thus belong to the light battery of the divisional Fallschirm Flak Abteilung of either 3. or 5.FJD. (Private collection)

Luftlandesturm Regiment 1 was absorbed into other units in 1943. Numbers of separate Fallschirmjäger regiments and battalions were raised, but they were eventually absorbed into new divisions. The 8., 9., and 10.FJD were ordered formed in September 1944, but were cancelled during their organization and their personnel transferred to other divisions. The 11., 20. and 21.FJD began to form in March and April 1945, but were very far from complete by the end of the war in May.

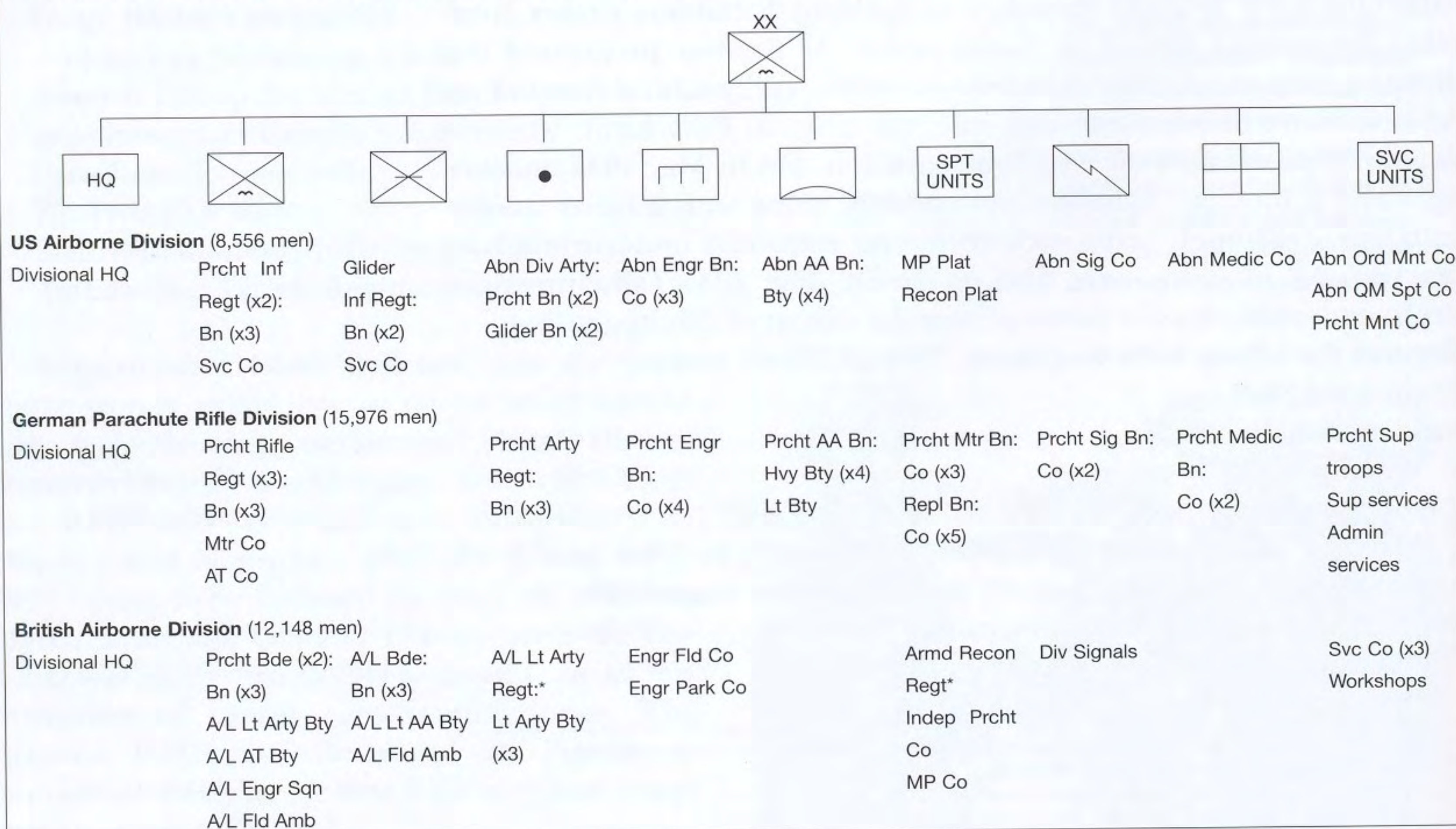
After being deployed in its air-landing role in the Netherlands in 1940, 22.Infanterie (Luftlande) Div was needed for the Crete invasion as a follow-on force for the Fallschirmjäger. However, the Germans made the mistake of previously committing it to ground combat elsewhere, and had to find a substitute. The mountain-trained 5.Gebirgsjäger Div, being lightly equipped, was committed to Crete by air and sea (resulting in its soldiers jokingly referring to themselves as the '5th Mountain/ Air-Landing/ Naval Infantry Division'). The 22.Luftlande Div reverted to a conventional infantry role. Regardless, in March 1944 the 91.Inf (Luftlande) Div was reorganized in Normandy as a counter-invasion reaction force, and FJR 6 was attached as its third regiment. The division was never employed in this role, and was reorganized as 344.Inf Div in November, with FJR 6 becoming an army-level asset.

Great Britain

The 1st Abn Div, established in late 1941, was joined by the 6th in May 1943. The 1st had fought in Africa, Sicily, and Italy, but the new division would not see combat until the Normandy jump. The 1st had to be rebuilt after infantry service in the Mediterranean, and then carried out the

Organization of the Airborne Division, 1944

Abbreviations: A/L = air-landing, Amb = ambulance, Bty = battery, Engr = engineer, Ind = independent, Mnt = maintenance, Mtr = mortar, Ord = ordnance, Prcht = parachute, Repl = replacement, Sig = signals, Sup = supply, Svc = service, Spt = support. Note: * = battalion-size





British paras manning a Vickers .303in Mk I medium machine gun. Extended ground combat required parachute units to be provided with heavier weapons. From 1943 a British parachute battalion had two 3in mortar platoons, of which one was provided with four Vickers guns to use as alternate weapons.

Arnhem assault. The 6th later took part in the Rhine crossing operation. On paper the divisions each possessed one air-landing and two parachute brigades, but in practice might have a third parachute brigade attached.

The British brigade organization was different from that in most armies. The division held only minimal support units plus battalion-size artillery, AT, and reconnaissance regiments, and a single engineer company. However, each parachute brigade had assigned support units. The air-landing brigade lacked the AT battery and engineer squadron, but eight AT guns were

organic to each air-landing battalion's AA and AT company. The strength of the air-landing brigade was almost equal to that of the two parachute brigades combined:

British Parachute Brigade, 1944

Brigade HQ

HQ Defence Platoon

Parachute Battalion (×3):

Battalion HQ

HQ Company (8× 3in mtr, 4× MMG, 10× PIAT anti-tank projector)

Rifle Company (×3) (9× LMG, 9× 2in mtr)

Light Artillery Battery (6× 75mm pack howitzers)

AT Battery (12× 6pdr AT gun)

Engineer Field Squadron

Field Ambulance

The British 1st Airborne Corps and Troop Carrier Command were formed in 1943 to control the 1st and 6th Abn Divs and the new 1st Polish Independent Para Bde, and served under the 1st Allied Airborne Army.

United States

In August 1942 the US Army organized the 82nd and 101st Abn Divs by splitting the 82nd Inf Division. The three existing infantry regiments were converted to glider, with one transferred to the 101st and a new regiment activated; two existing parachute regiments were assigned, one to each division. The balance of glider and parachute regiments was thus the opposite of that in the British division. The Americans had brushed off British recommendations to follow their example, for which they could see no good reason; in fact this response was probably due to a more conservative reluctance to rely on a division predominantly of untried paratroopers. The airborne division roughly mirrored the infantry division, but its units had less strength, equipment and capabilities; an airborne division numbered 8,400 troops and 650 vehicles compared to the infantry division's 15,000 men and 2,000 vehicles. In 1944 a parachute regiment had 2,025 troops, against 3,258 in an infantry regiment. The new divisions were very much formed with economy in mind.

When committed, the divisions were provided with one or two more parachute regiments and artillery battalions, and lost a glider regiment, while the remaining one received a third battalion. At the end of 1943 it was recommended that the airborne division be increased in strength

and equipment to almost that of an infantry division. Although this was opposed in some circles, new organization tables were approved at the end of 1944; the divisions were up-graded, and the ratio of parachute and glider regiments was officially reversed. A parachute regiment now had over 2,300 men, the glider regiment almost 3,000, and the division almost 13,000. The 17th and 13th Abn Divs were reorganized under this structure. The 11th Abn Div in the Pacific retained the one parachute and two glider regiments, although the glider regiments had largely been parachute-trained. There was also a separate parachute regiment in the Pacific theatre, the 503rd PIR.

US Parachute Infantry Regiment, 1944 (2,025)

Regimental HQ

Infantry Battalion (×3):

HQ & HQ Company (8× LMG, 4× 81mm mtr, 9× bazooka)

Rife Company (×3) (12× LMG, 3× 60mm mtr, 4× bazooka)

Service Company

Medical Detachment

After the poor performance of US airborne units in North Africa and Sicily, some opponents called for them to be converted to infantry, and a study was undertaken to decide their fate. It was determined that poor planning, weak troop carrier training, and the piecemeal employment of paratroopers had been the problems, rather than any fundamental flaw. An exercise was conducted in the USA pitting the 11th and 17th Abn Divs against one another, and this proved the validity of the units if properly trained and employed.

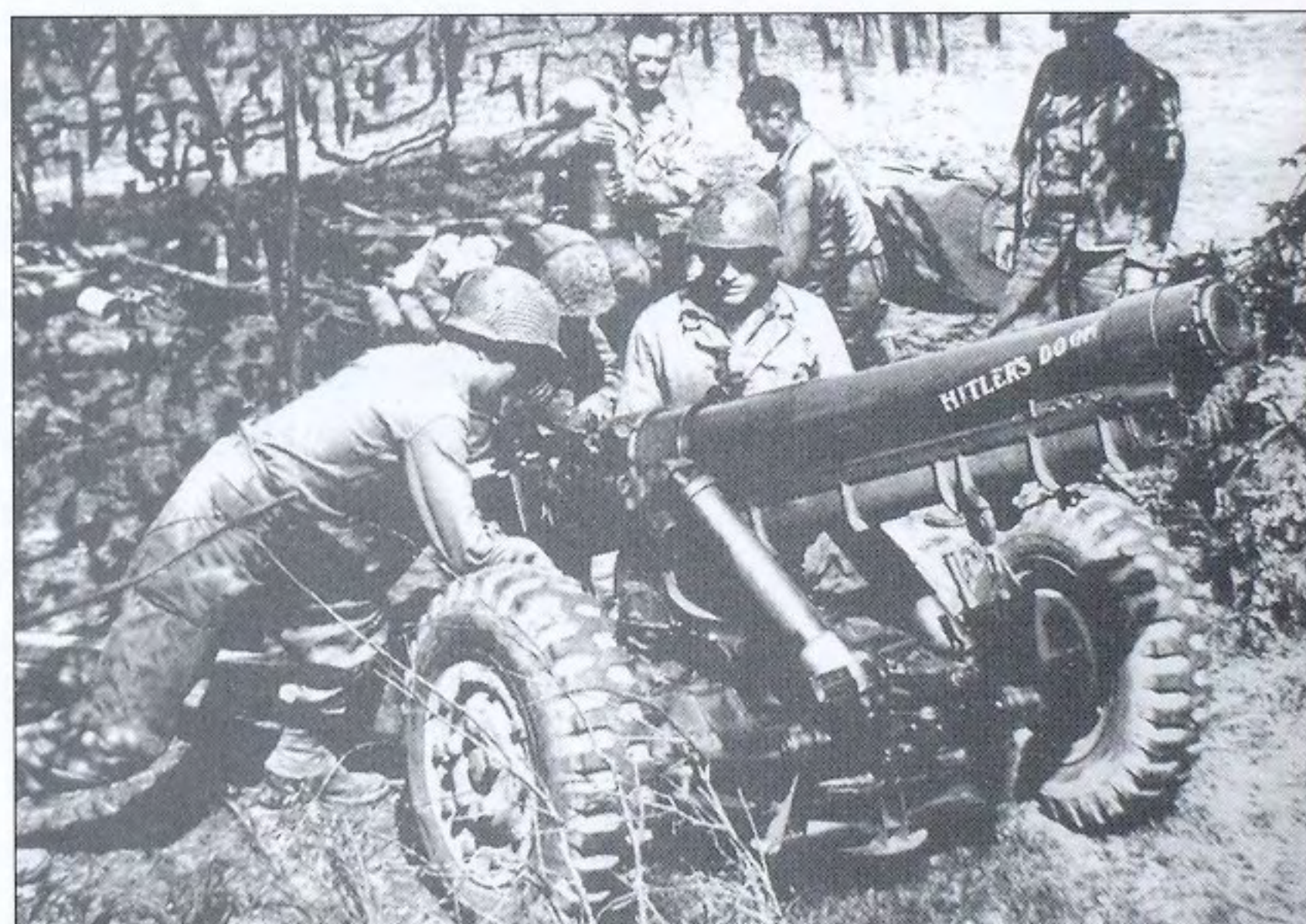
The US formed XVIII Airborne Corps in 1944; this and the IX Troop Carrier Command were under the 1st Allied Airborne Army. In 1944 a provisional airborne division was formed for the invasion of Southern France – 1st Airborne Task Force; this included five US parachute battalions, one glider regiment and a British parachute brigade.

The four Marine parachute battalions never had the opportunity to conduct a combat jump. Operations were planned, but air distances, lack of sufficient aircraft, and changing tactical situations led to all being cancelled. Instead they conducted amphibious raids and diversionary operations, and fought as infantry. They were dissolved in February 1944, the troops being reassigned to new infantry regiments.

Some US glider field artillery battalions had the more potent 105mm M3 howitzer in place of the 75mm M1A1 pack howitzer; this was a considerably more compact and lighter-weight weapon than the 105mm M2A1 howitzer used by infantry divisions.

Soviet Union

The USSR constantly raised new airborne units in substantial numbers, but routinely converted them to rifle (infantry) units after the 1941 German invasion. They were followed by newly raised airborne units, but these too were quickly converted to infantry – an inefficient, resource-draining process characteristic of the Soviet system. The five existing airborne ‘corps’ were joined by five more after the German invasion. These three-brigade, division-size formations, with a strength of only about 10,000 men each, mainly fought as conventional infantry.



In June 1942 the airborne corps were reorganized as Guards Rifle divisions, and the few independent brigades as rifle brigades, to fight at Stalingrad. In autumn 1942 eight new Guards Airborne corps were organized, along with some independent brigades; in December these were reorganized into the Guards Airborne divisions, and in September the remaining independent brigades were reorganized into six more airborne divisions.

In January 1944 all the Guards Airborne divisions were converted into rifle divisions – yet that summer three new Guards Airborne corps were raised under the Airborne Army. In September 1944 these were redesignated divisions, but in December the Airborne Army and its divisions became the 9th Guards Army to fight as infantry. A few Guards Airborne brigades and divisions were retained until 1945.

Soviet Airborne Brigade, 1942

Brigade HQ

Parachute Battalion (x4):

Battalion HQ

Rifle Company (x3)

Artillery Battalion:

Battalion HQ

Gun Battery (6x 76mm)

AT Company (x2) (each 6x 45mm)

Mortar Company (6x 82mm)

Reconnaissance Company

Sapper Company

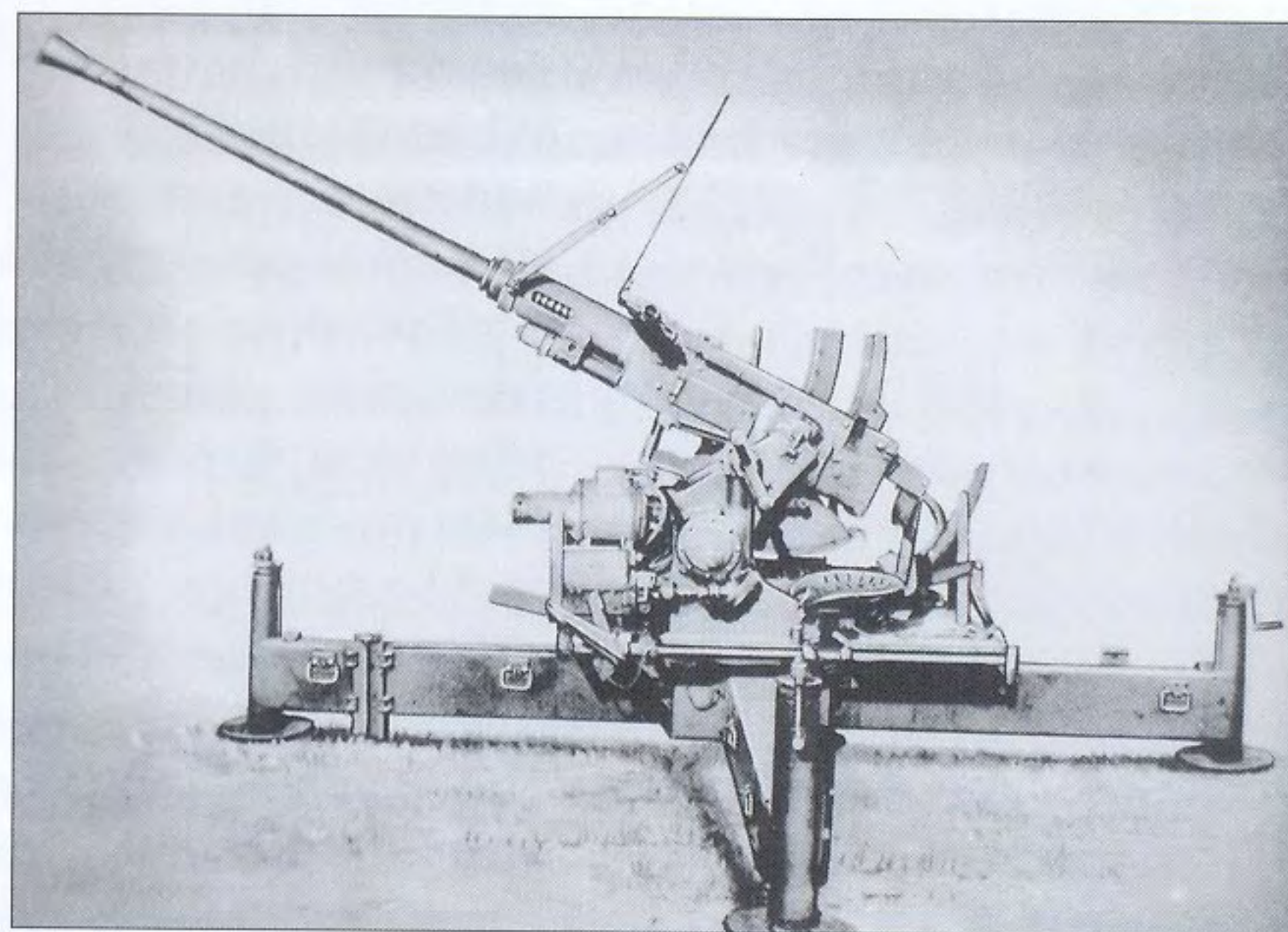
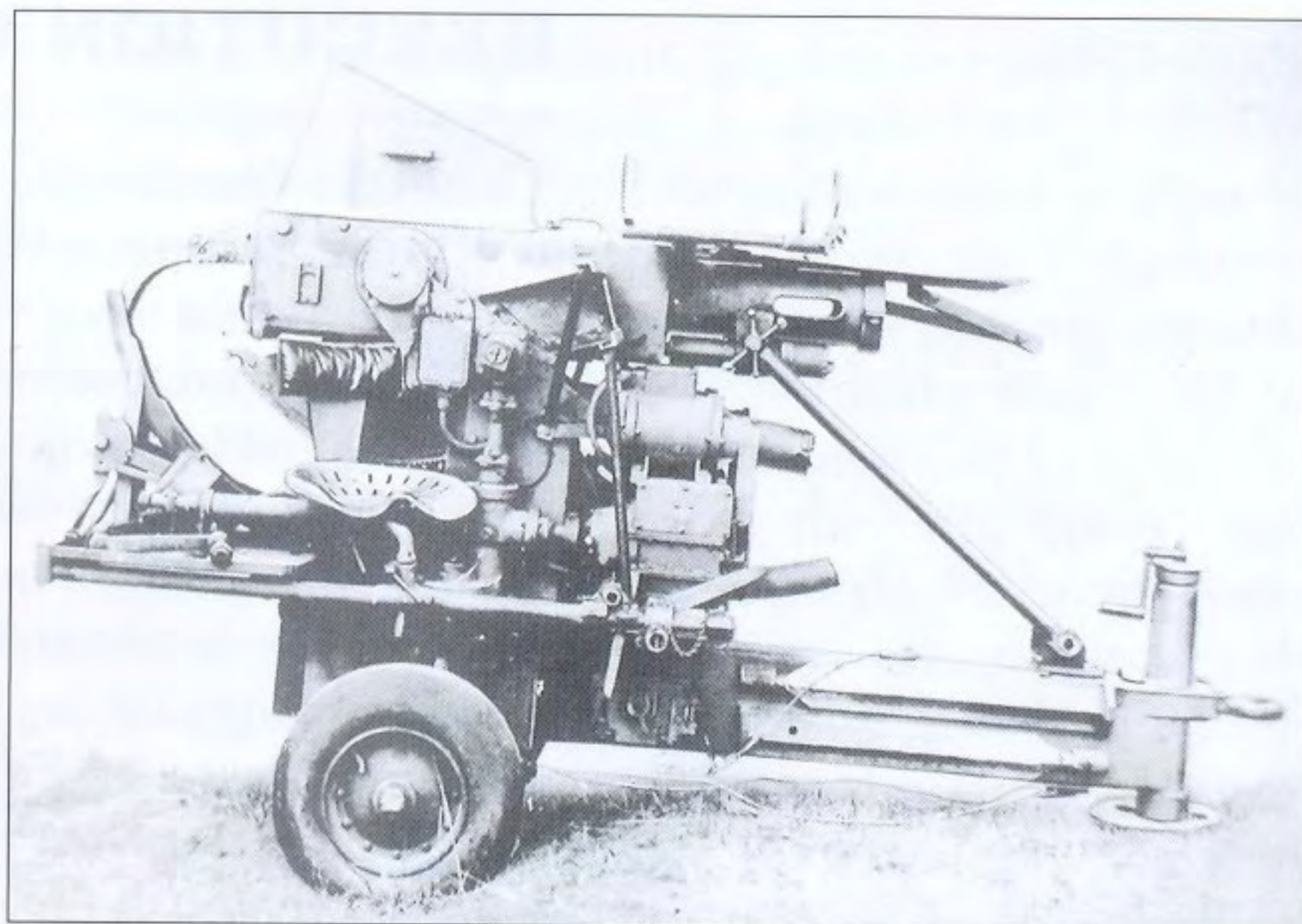
AA Machine Gun Company

Signal Company

Transport Company

Japan

Even though Japan was forced on to the defensive by late 1942, its modest Army airborne force grew. Three more parachute regiments were organized, but one was later transformed into two glider regiments. Regimental organization changed little. The final aborted parachute operation was attempted in Burma in April 1942. In November 1944 the 1st Raiding Group (*Dai 1 Teishin Shudan*) was organized, essentially a compact 12,000-man division. It consisted of the 1st and 2nd Raiding Bdes, each with two battalion-size parachute regiments; 1st Raiding Flying Bde with three transport aircraft regiments; two glider infantry regiments, and minimal support units. A few small-scale parachute and air-landing raids were attempted, but all ended in disaster. The IJN's two SNLF parachute units were disbanded in December 1942.



The 40mm M1 AA gun on the M5 carriage specially made for airborne units, in both travelling and firing configurations. This is an example of the effort taken to provide airborne units with AA protection. The gun barrel and outriggers were transported separately; the gun could be carried in any US transport aircraft.

EXECUTION OF AIRBORNE OPERATIONS

The execution of even a small airborne operation was a complex affair. It required training, rehearsals, practice jumps, extensive co-ordination with airlift units, air route planning, intelligence collection, selection of DZ/LZs and assembly areas, tactical plans, assembly and packing of supplies and equipment, movement to the departure airfields, deception efforts, weather considerations, constant changes and situational up-dates, marshalling area activities, and loading up.

While each country had its own procedures, military planning and operational principles are reasonably similar and based on logical steps, and there were many similarities. As the war progressed lessons were learned, refinements made, and more detailed and in-depth planning was undertaken as higher airborne command echelons were established. A misconception held by many is that a smaller airborne operation is comparatively quicker and easier to plan than a divisional operation. While there are fewer troops and aircraft, all the same planning details and steps are required, whether for a company executing a raid or a division supporting the amphibious invasion of a continent.

The division's parent command directed the division staff to commence planning for a specific operation in the form of an operation plan or a directive message. Basic guidance and known information were provided, with additional instructions and intelligence information as it became available. Often multiple or alternative plans were ordered to be developed. Planning might be halted as operations were deemed unfeasible due to insufficient resources, expected opposition, terrain and weather limitations, or rapidly changing situations. Typically, an airborne division might be directed to develop dozens of plans before one was actually executed. Projected dates would be provided, and it was the higher headquarters that dictated whether it would be a day or night operation, and allocated airlift assets. This latter had a central influence on how an operation was conducted: the numbers and types of transports and gliders completely governed delivery to the battlefield, sustainment and support.

Weather was extremely critical: rain or fog can hide landmarks and DZ/LZs; winds over 15mph prevent parachute drops, even moderate winds can seriously affect gliders, and higher altitude winds can blow transports off course. Weather conditions were monitored up to drop time, but it was difficult to determine conditions in drop areas behind enemy lines. While favourable conditions might exist for the drop, the extended forecast following it was critical to resupply and reinforcement drops and air support.

Selecting DZ/LZs

The general objectives and targets were specified by higher commands, but it was normally left to the airborne and airlift units to determine the exact DZ/LZs. These were selected based on the size of available clear areas, and extent of natural and man-made obstacles; proximity of enemy

British paras apply face camouflage before donning their parachutes for the Normandy jump. The 'red beret' (actually maroon) of British Airborne Forces would eventually become a near-worldwide distinguishing headgear for parachute troops.





Here a ground crewman double-checks the towrope release on a Waco CG-4A glider. The ropes are laid out in a 'S'- pattern to pay out smoothly as the tug takes off. The telephone intercom wire linking the pilots of the glider and its C-47 tug can be seen taped to the towrope in a manner that allowed for rope stretch.

forces and installations, air defence and airfields; location of civilian communities; ease of identification of DZ/LZs and en route landmarks from the air; distance from the objective; proximity to cover and concealment; suitable assembly areas, and road networks that could be used by the force once on the ground.

The distance from the objectives and intervening terrain, obstacles and roads were critical, since airborne troops are mostly heavily loaded foot-sloggers. In some instances it might be desirable to land directly on the target, but this was usually only suitable for raids against lightly defended sites. A DZ/LZ a short distance from an objective was more practical, as it was out of range of infantry weapons and might not be observable depending on terrain and vegetation. It had the advantage of allowing the unit to assemble, collect supply containers, organize, assess the situation, and move only a short distance to begin its mission. Due to the extent of defences, other enemy units and installations in the surrounding area, terrain, built-up areas, and the need to select

a central DZ/LZ for multiple objectives lying in different directions, a unit might have to be inserted a considerable distance from the objectives. Notoriously, in September 1944 the British 1st Abn Div at Arnhem was forced to use DZ/LZs on heathland 4–6 miles from the objective bridge because of built-up areas and woodland. The alerted Germans had time to respond, blocking movement to the objective. They were later able to block the 2-mile route between the supply drop point and what became the main airborne perimeter around Oosterbeek.

When the Japanese Yokosuka 1st SNLF was dropped directly on the Dutch-held Langoan airfield on Celebes in January 1942, the defenders fired on the descending paratroopers and pinned down others on the airfield. While casualties were light and the area was soon secured, the Japanese decided that dropping directly on the objective was unwise. A month later Yokosuka 3rd SNLF was tasked with seizing Penfui airfield on Dutch Timor; instead of dropping on the objective, a DZ was selected more than ten miles away, as there was no closer suitable terrain. This distance – along roads contested by Australian and Dutch troops, through an area of dense hilly jungle, in high temperatures – proved too much for the *Rakkasan*. Delayed by en route engagements and obliged to march at night – almost impossible in the jungle – they eventually reached the airfield only to find that it had been occupied by amphibious troops the day before.

Planning and marshalling

In most cases airborne units were allowed to plan their own actions once on the ground, although these obviously had to be co-ordinated to achieve the link-up with the advancing ground force. (Paratroopers could not go about simply blowing up at random bridges that the ground force might need for its advance.)

One of the major benefits enjoyed by airborne forces was the element of surprise. There were simply far too many ways and places they could be employed for the enemy to be able to plan effective countermeasures and defences for them all. To preserve this vital advantage the planning of airborne operations and the marshalling of units and aircraft were kept secret. Deception operations were also mounted, with air attacks on adjacent areas, bombers splitting off from troop-carrier formations to follow misleading routes, dropping 'chaff' to confuse radar and even dummy paratroopers. Troops would not be told what the objective was until just before the operation, in some cases not until they took off.

Even though the troops might not know the exact objective, extensive training and rehearsals were usually conducted. Because paratroopers can lose their leaders on the drop, or simply fail to link up, each man had not only to know his own job but also to have a clear picture of his subunit's role.

A short time before the operation commenced airborne units were moved to the departure airfields and detailed co-ordination was conducted between the jumpmasters and aircrew, between glider pilots and tug pilots. Security had to be maintained at the airfields, while messing and quartering were arranged. Parachutes, drop containers and other special equipment were issued along with ammunition, rations and medical supplies. Containers and individual equipment were packed, and equipment secured in gliders. Last-minute briefings were conducted and the most recent aerial photos of the target area distributed.

Pathfinders

A critical feature of the plan was the marking of DZ/LZs. After Sicily the Americans and British used pathfinders – small teams of specially trained paratroopers who would jump in early to mark DZ/LZs. They had little time to find the correct zones and mark them while avoiding enemy

This view is a reminder of the massive resources needed to mount major airborne assaults. For the Normandy operation the British division needed some 450 paratroop transports and glider tugs, the two US divisions about 820. Painted with D-Day recognition stripes, these British Horsa and Hamilcar gliders are lined up with their Halifax Mk V four-engine bomber tugs parked on either side. These Hamilcars delivered Tetrarch light tanks, 75mm pack howitzers and 17pdr AT guns of 6th Abn Div to Ranville on the evening of 6 June 1944.



contact. US pathfinders were small provisional teams formed from men drawn from parachute regiments; British airborne divisions had an organic 'independent company' with assigned pathfinders. They would be dropped by specially trained pathfinder transport crews with skilled navigators.

The Russians sometimes had partisans mark DZs, but with mixed results; the Germans and Japanese dropped 'blind'. The Japanese, conducting small-scale daylight operations, generally found their DZs located adjacent to easily locatable objectives or landmarks; a reconnaissance plane with an expert navigator aboard would lead the formation to the DZ. The Germans used similar methods, and also tried using the same technique as for night bombing: the lead aircraft would signal by radio for all transports to drop their troops, but this gave unsatisfactory levels of accuracy. In 1943 they tested a radio buoy (*Funkboje*), a short-range radio packed in a shockproof container which was dropped on the DZ by the reconnaissance aircraft; transports were to drop when they over-flew the signal, but the project was never fully developed. During the Ardennes drop preceding bombers dropped incendiary bombs on either side of the DZ to create two incendiary bomb fields (*Brandbombenfeld*) between which the transports were to drop; this, too, proved unsuccessful, due to US air defences and poorly trained aircrews.



Pathfinders of the 101st Abn Div before boarding for Operation 'Market', their jump north of Eindhoven in the Netherlands on 17 September 1944. Most have equipment bags or packs suspended beneath their reserve parachutes, and are armed with Thompson sub-machine guns (see Plate G).

The drop

As mentioned, transport crews needed high levels of skill in navigation and tight formation flying, to ensure that jumpers landed in relatively close proximity of one another. Pilots had to achieve the required jump altitude at the necessary time (depending on the situation, transports might approach the DZ higher or lower than the jump altitude), before throttling back to the slower drop speed (100–120mph). They had to co-ordinate effectively with the jumpmaster, signal the exit at the proper time, maintain straight and level flight while the paratroopers jumped, and drop external equipment containers.

The transport formation depended on the size of the DZ. Aircraft might travel in single file, up to five abreast, or in a 'V' formation. The interval between each aircraft or 'V' was at least 100–200 yards, allowing jumpers in the leading aircraft to fall low enough to avoid the following aircraft. In tight formations in order to place as many troops on the ground in the shortest possible time, each following 'V' might be about 50ft higher than the preceding one. Squads/ sections/ groups were kept together aboard a transport or glider, but unit headquarters personnel and crew-served weapons were split and cross-loaded aboard different craft so that not all would be lost if an aircraft was shot down. A machine gun crew or a few men from the company headquarters might jump in the same stick as a rifle squad.



C-47s release their Waco gliders over Normandy hedgerow country. Regardless of the hedgerows, flooding, and 10ft poles planted in fields, there were still enough clear LZs for most glider landings to succeed.

The 8 to 18 paratroopers generally carried by most period transports were alerted some minutes out from the DZ. They stood, checked each others' equipment and parachutes, hooked up their static lines to the anchor cable, manoeuvred drop containers into the door, and stood by. The pilot signalled the jump with a coloured light. In the early days jumps were conducted at up to 1,000ft, but 450–600ft altitudes were soon adopted to reduce the amount of dispersal and limit exposure time to ground fire. While there were instances of descending paratroopers being hit by such fire, this was actually rare, and significant casualties were uncommon – a man falling (and swinging) at about 16ft a second is a very difficult target, and from 400–500ft he is only in the air for between 20 and 30 seconds.

Paratroopers were more concerned about trees, power lines and buildings (though trees are not necessarily as dangerous as sometimes assumed; paratroopers are taught how to prepare for tree landings, and are fairly well protected by their harness, parachute packs and equipment). Deep water obstacles are always a concern for heavily loaded jumpers; although they were issued inflatable life jackets, if a man came down in deep water he had virtually no chance of freeing himself from his harness in time to use it. While there were drownings among paratroopers in the shallowly flooded areas of Normandy, the real problem with these was that they hindered ground movement, although a great deal of equipment and many crew-served weapons were lost in the water.

Speed is essential when exiting the aircraft; a rate of one man per second is normal, and there is certainly no time for the hesitations or final encouraging words seen in Hollywood movies. The DZs were typically small; an aircraft would be across it and beyond in seconds. Rapid exits also ensured tighter landing of sticks for rapid assembly; ideally a plane-load landed over a spread of about 200–300 yards.

A parachute jump is an experience of wild contrasts. One moment the heavily burdened jumper is inside a noisy, crowded aircraft under intense pressure; he makes an adrenalin-charged leap, welcomes the uncomfortable but reassuring opening shock, and then experiences a pleasant floating sensation, in a silence broken only by the quiet receding drone of aircraft. His view is grand and all-encompassing. He checks his canopy, looks around to ensure that he will not collide with other jumpers, tries to orient himself, perhaps releases a leg-bag of equipment on the lowering line – and then the earth rushes up towards his eyes, and knocks him over into an often-rehearsed tumbling roll. Landing with a full load of equipment can be a bruising experience, but not overly so.

Assuming he was not injured, the paratrooper collapsed the canopy (to drag it out of sight, time permitting); unclipped the chest pack, and released the harness buckles to struggle free; collected his gear in the drop bag; and went in search of the rest of his stick and the separately dropped containers. His training had emphasized making his way to the assembly area as rapidly as possible. A few seconds after enjoying a bird's-eye panorama of the surrounding area, the paratrooper was now among confusing trees and hills, unable to make out landmarks. Soldiers eventually learned to select routes and assembly areas based on the natural flow of terrain.

Well-trained paratroopers knew to go toward the 'sound of the guns', collecting together in groups irrespective of what subunit they belonged to, and following whoever was senior even if he was an officer or NCO they had never seen before. That is why training, rehearsals, and the full knowledge of unit plans were so critical for paratroopers. Units could not afford the time to collect all personnel and equipment; they went into action with whatever they had and whoever they met.

It was originally envisioned that most parachute operations would be at night. This was an obvious necessity for raids, but for larger operations it was not always practical. Darkness made it difficult for the enemy to detect aircraft, the jump's location and its strength, and almost impossible to fire at men while they were descending; it also covered their movement on the ground and subsequent operations. However, night operations virtually ensured that DZ/LZs were missed; they were especially dangerous for gliders, and made assembly and movement to objectives extremely difficult. Paratroopers conducting subsequent ground operations were just as handicapped at night as other troops. Daylight operations ensured location of DZ/LZs and greatly eased assembly and movement.

Engagement

Once on the ground, airborne units used standard infantry tactics, allowing for differences in organization and available weapons, and compensating for their lack of heavy weapons support with aggressiveness. They also expected to fight outnumbered and possibly encircled; while it was seldom that they were completely surrounded, paratroopers did have to consider their exposed flanks and rear more than line infantry. They often had little if any reserve because of scattered and missing elements. What reserves there were had to secure the flanks and rear, tasks which were also given to headquarters and service elements. Assembled though understrength units would press on to their objectives and engage the enemy. Casualties would be suffered, but the engaged units would be reinforced steadily by a trickle of stragglers coming in. Once their objective was secured, paratroopers would proceed to other objectives, or establish a defence and await relief by ground forces. They tended to protect their lodgement with aggressive patrols, a legacy of the old raider doctrine. Rear detachments and support units would eventually arrive by ground or sea transport to augment the air-delivered units.

Once relieved by the ground force, the paratroopers (in theory) would be withdrawn and returned to base for rebuilding and preparation for the next mission. This sometimes occurred; Japanese and early German operations were so conducted. More often than not, however, US, British and Soviet paratroopers continued to fight for prolonged periods.



An airborne assault as seen from below, with three-plane 'V' of C-47s spewing out paratroopers. It is extremely difficult for marksmen on the ground to hit paratroopers in mid-air, as their parachutes drift as an angle while descending, and oscillate from side to side; it is also hard to estimate range. A greater danger to jumpers in this kind of crowded sky is collision – a falling leg bag or another paratrooper landing on top of a canopy can collapse the upper canopy, probably with fatal consequences.

AN ASSESSMENT OF AIRBORNE OPERATIONS

The many airborne operations executed by the principal belligerents were of mixed success, from failures to highly successful. Detractors can easily find faults to criticize; but it can be demonstrated that when properly organized, equipped and trained, supported by adequate aviation assets, intelligence and mission planning, and employed realistically, airborne forces had a major impact on overall operations.

They were seldom misused, with the exception of units sometimes wasted away by being kept in prolonged ground combat. However, they did on occasion suffer excessive casualties; fail to completely accomplish all their missions, or require additional time to complete them; and – on a small number of occasions – they simply failed in their mission. While enemy action was of course responsible for high casualty rates, the very nature of airborne operations – their reliance on the timely and closely concentrated landing of troops and on weather conditions, and their landing scattered among the enemy – contributed to the sometimes high losses. Lack of solid intelligence, difficult to obtain from behind enemy lines, was another contributor.

The scattered landings of paratroopers and glider men in some early operations, especially at night, were a main source of criticism. While this did hamper mission accomplishment, it also proved to be valuable in confusing and disorganizing the enemy. It was not so much a flaw in airborne tactics, but simply reflected the limitations of period aircraft capacity, navigation capabilities and aircrew training. The problem was countered by conducting daylight operations, and by improved aircrew training.

The limited feasible depth and duration of airborne operations behind enemy lines was another unavoidable factor due to constraints on manpower, firepower and resupply capabilities. Airborne troops could only operate effectively behind enemy lines for three to five days without substantial support and resupply. Eventually this limitation was fully appreciated, and more realistic goals and missions were assigned.

Most capabilities improved throughout the war, but one on which a high reliance had been placed proved more or less unimprovable: the glider. There were a number of successful glider operations at both small and large scale; but gliders were not utilized to the extent originally anticipated, and glider training dwindled after the war. The US Army redesignated and reorganized the distinct parachute and glider infantry regiments as 'airborne' infantry regiments in 1947/48, requiring

An airborne assault as seen from above. The interval between each 'V' of aircraft can be seen, during this jump by the 1st Airborne Task Force over the South of France in August 1944.





Ground combat: US paratroopers take cover in a ditch at St Sauver-le-Vicomte in Normandy, with a shot-up German truck in the background. This photo was taken on 11 July 1944 – D plus 35. Holding airborne units in the line to fight as conventional infantry, long after they had completed the assault for which they were configured and equipped, was a wasteful use of this special asset.

them to be dual-capable, but little actual glider training was undertaken; it ceased altogether in 1949, and was officially dropped as a requirement on 1 January 1953. The British retained gliders on a limited scale until 1957, and the Soviets ceased their use in about 1959. None were employed operationally after World War II, and in time helicopters took over their role. Some have suggested that parachute troops too are unnecessary today; but a helicopter cannot fly half way around the world and insert large numbers of troops in an enemy-controlled area.

The legacy left by World War II airborne forces provides another viable capability to exploit the enemy's weaknesses. Most of the limitations experienced by World War II airborne forces have been eliminated or greatly reduced by long-range, high-capacity transports; the capability to airdrop heavy loads of equipment and supplies; improved intelligence collection capabilities; and advanced navigation and communications. These advances have so drastically increased the capabilities of airborne forces that the study of their World War II predecessors, while still important, has only a limited relevance to today's forces. However, the traditions of daring and self-reliance established by World War II airborne forces have undoubtedly helped make today's airborne units what they are.

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THE PLATES

A: SPECIALIZED AIRBORNE WEAPONS

(Note: Items A1 to A4a are painted to constant scale, and A4b to A5 to a larger scale.) While most airborne forces used standard infantry weapons, some more compact specialized weapons were devised to enable the paratrooper to carry them during the jump. This was achieved by providing either a folding stock, the capability for easy disassembly into two components ('take-down' weapons), or simply by shortening the barrel. These specialized weapons were often not fielded until later in the war, when Axis airborne forces no longer had the opportunity to conduct significant operations, and usually had to be satisfied with conventional weapons.

US paratroopers were initially issued with a padded 'Griswold bag', which hooked to a buckle on the right shoulder of the parachute harness and accommodated the standard Garand M1 rifle stripped down. However, the complexity of this semi-automatic weapon made it impractical for the rifleman to re-assemble it quickly on the DZ, and many bags were modified at unit level to take the unstripped weapon. The folding-stock .30cal **M1A1 carbine (A1a)** saw limited use, but many units received the conventional M1 with fixed wooden stock. A canvas holster (**A1b**) was produced for carrying the M1A1 on the jump, looped to the right side of the waist belt; this was made with tie-down tapes at the tip, but since these tied below the knee they were positively dangerous, and were usually either repositioned above the knee or simply removed.

The Japanese developed a take-down rifle, but this 7.7mm Type 2 was issued too late for their 1942 airborne operations. They also developed a version of their standard light machine gun with a detachable stock and folding pistol grip, and a folding-stock sub-machine gun.¹³

Some standard weapons were ideal for paratroopers, such as the folding-stock German 9mm MP40 machine pistol, and in several armies it became common for newly designed sub-machine guns to be provided with folding or telescoping stocks. One rare example of a weapon developed specifically for paratroops, to cover the roles of the rifle, sub-machine gun and to some extent the light machine gun, was the German 7.92mm **FG42 (A2a)**. This selective fire Fallschirmgewehr ('parachute rifle'), feeding from a 20-round left-mounted box magazine, was innovative but flawed; for one thing, the combination of full-size rifle ammunition and a short barrel gave a massive muzzle flash. Initially made with a stamped metal butt and swept-back pistol grip and a rear-set bipod, it was later modified with a wooden butt and pistol grip and the bipod moved to the muzzle (**A2b**). Captured French MAS 36 needle-bayonets were fitted reversibly under the barrel.

The US 2.36in M1 and M1A1 rocket launchers ('bazookas') were too long to be easily jumped attached to a paratrooper; and at the request of the Airborne Command the **M9 & M9A1 (A3a)** were developed. These were capable of being broken down into two 31½in sections (**A3b**) to be carried by a paratrooper in a special bag.



The inevitably light armament of airborne troops was always a handicap; these British paratroopers, draped in their camouflaged face veils, man a PIAT anti-tank projector in Tunisia. 1st Para Bde (1st, 2nd & 3rd Para Bns) were landed by sea and airlift in early November 1942. Each battalion made a drop before the end of November; but they were then committed as infantry over six months, losing a total of some 1,700 casualties by the Axis surrender of Tunisia in May 1943. (IWM)

The British 2in infantry platoon mortar was 27in long; a special airborne **2in mortar Mk VIII (A4a)** was issued, cut down to 19 inches. Like the basic models, this fired 9.6in long HE (**A4b**) and smoke (**A4c**), and 9in parachute flare (**A4d**) rounds.

While not produced specifically for paratroopers, the British **No 82 'Gammon grenade' (A5)** was designed by Capt Arthur Gammon of 1st Para Bn, and was so widely used by British and American airborne troops that it is popularly associated with them. The black stockinette bag could be filled with varied amounts of plastic explosive, as required to defeat the target; it was used both against armour and in house-to-house fighting. The fuse was the 'Allways', ignited by the unwinding in flight of a weighted tape which pulled out a safety pin; the original 4in tape was found to be too short for even minimal user safety, and was replaced by one of 11½ inches.

B: STURMGRUPPE 'GRANIT' AT FORT EBEN EMAEL, 10 MAY 1940

The German airborne attack on the Belgian Fort Eben Emael – guarding the junction of the Albert Canal and River Meuse – was a classic example of employing airborne troops in an economy-of-force operation to seize a critical objective, and of the surprise factor introduced by this new form of warfare. Theoretically the strongest fortification in the world, Eben Emael might have cost a conventional ground assault enormous casualties; the Army was reluctant to rely upon the fledgling paratroopers, but GenMaj Student persuaded the General Staff of the operation's validity. While the assault on the main fortress is the best-known phase of the operation, other glider and parachute assault groups were tasked with seizing nearby bridges. Hauptmann Walter Koch's Sturmabteilung (Assault Detachment) numbered 437 volunteers, mostly from I/FJR 1, of whom 362 (including



This British para has the cut-down Mk VIII version of the 2in mortar stowed under the flap of his small pack (see Plate A4a). (IWM)

glider pilots) would actually participate. The mission exemplified the extensive assets required by airborne operations. Each of the four 90-plus-man assault groups would be delivered by nine to 12 DFS 230 gliders, totalling 42, plus 58 Ju 52 tugs/ transports. Six of the latter would drop about 24 paratroopers at each of the three bridges. Fighters and dive-bombers suppressed Belgian air defences and hampered troop movement, while a bomber dropped ammunition to the assault detachment.

While the Belgian defenders suffered from many failures of planning, command and control, the success of the operation was largely due to the meticulous rehearsal of all German personnel, and the high motivation of the glider-borne paratroopers. Of the 11 gliders of Assault Group Granite destined to land on the fortress itself, two parted their tow cables; so only nine landed, with 61 men, to face some 650 defenders.

Here half of Fw Wenzel's Trupp 4 are attacking an embrasure of the Mi-Nord machine gun casemate; they have already blinded the Eben 2 armoured cupola on the roof (B1) with a 1kg charge jammed into a periscope housing, and have killed its crew with a 50kg hollow charge – the first-ever combat use of such a weapon. They proceeded to blow one embrasure with a 12.5kg charge (B2); now Wenzel (B3) and one of his men have rigged another (roughly hemispherical) 50kg charge over a second embrasure, while another paratrooper (B4) sticks a smoke candle into a third. 'Granit' knocked out the fort's key weapons within half an hour, and bottled up the rest of the defenders impotently, for a loss of only six Germans killed and 18 wounded.

Photos of this squad on 10 May show the mud-camouflaged helmets, and the first 'step-in' Luftwaffe pattern jump smock without thigh pockets, and still with Army right breast insignia. The first pattern 'side-lacing' jump boots are worn.

C: C COMPANY, BRITISH 2nd PARACHUTE BATTALION AT BRUNÉVAL, 28 FEBRUARY 1942

Men from 'Jellicoe' group of Maj John Frost's company are seen as they are about to assault the villa (C1) and the Würzburg radar installation (C2) on the clifftop from the south in the early hours of the 28th. Photographs taken during training and after the withdrawal by sea show all personnel wearing the drab green first pattern gabardine 'jump jacket' directly copied from the German smock. Some men wore their parachute qualification 'wings' at the top of the right sleeve, and NCOs their badges of rank on the right arm only. A mixture of first (C3) and second pattern parachutist's steel helmets were worn, both with a hard rubber moulded rim, and the former with a protruding rear neck piece; all were covered with string netting, and had black leather Y-shaped straps with chin 'cups'. Basic 37 pattern web equipment fighting order was worn under the jacket for the jump, and replaced on top of it after landing. Battledress and boots were conventional, but the Fairbairn Sykes fighting knife was carried by many with its steel-tipped leather scabbard sewn to the outside of the right trouser leg. A generous scale of Mk II Sten guns seem to have been issued to Maj Frost's company for this operation.

(Inset) Map showing movements of the different groups during the attack. They were successfully extracted by sea, with their six wounded, vital parts of the radar equipment, and prisoners. Losses were two killed and six missing.

D: GERMAN AIRBORNE INVASION OF CRETE, MAY 1941

The only truly strategic German airborne operation conducted during the war almost failed, and paid a high price. The airlift force showed insufficient training and co-ordination. Airborne troops landed both too close to or actually on defended objectives, or – by accident or plan – too widely scattered. British Commonwealth resistance was much heavier, and the vulnerability of daylight airborne operations much greater, than had been expected; and the seaborne follow-on force was intercepted by the Royal Navy, suffering heavy losses.

The parachute and glider troops were launched in two waves: the first on the morning of 20 May, with Group West aimed at Maleme and most of Group Centre at Canea. In the afternoon the second wave arrived, with the rest of Group Centre landing around Retimo and Group East at Heraklion. The only three airfields were at Maleme, Retimo and Heraklion; Canea was the island's capital and naval base; and it was essential that the airfields and port be secured to receive further air-landed and seaborne forces. The original plan called for Gebirgsjäger Regt 100 from 5.Gebirgs Div to be air-landed in the west, and for the rest of the reinforced division, along with 7.Flieger Div support units, to be landed by sea and air at Heraklion. With the situation in doubt at Canea, Retimo and Heraklion, GenLt Student wisely shifted the main effort to capturing Maleme airfield, where the

Fallschirmjäger were having more success; the tide of battle turned as they attacked Maleme from the west, rolling up the defences. The Commonwealth command decided on 24 May to evacuate from the south coast at Sphakia; this operation commenced on the 27th and ended on the 31st, although some 12,000 British, Australian, New Zealand, Greek and Cretan soldiers were left behind. The Royal Navy also lost a number of warships to Luftwaffe attack in the waters around Crete.

E: SOVIET DESANT AT MEDYN, JANUARY 1942

Earlier attacks had split the German forces of Army Group Centre; and on the night of 2/3 January 1942 two co-ordinated airborne operations were executed, on drop zones 7½ miles apart, to assist the advance of the Soviet 33rd, 43rd and 49th Armies. Only 31 aircraft were available to support both operations and subsequent drops, and to fly in air-landing elements. Extremely cold weather and deep snow would hamper both operations.

To the north, the 380-man 1st Bn, 201st Abn Bde would seize villages in the vicinity of Gusevo, destroy the Shanya river bridge between Gusevo and Gireevo and close the road to Medyn, and then strike east to attack German positions at Pitovo and Fedorovka facing the 43rd Army. This battalion linked up with 43rd Army elements on 11 January.

In the south, near Myatlevo, the 200-man Western Front Parachute Assault Detachment plus another 200 from the 250th Independent Rifle Regt (Abn) would seize the airfield at Bolshoye Fatyanovo, and wait for the rest of the regiment to be airlifted in. Here some of the drop aircraft were driven off by AA fire, and German resistance proved too strong; this, and deep snow on the runway, prevented the airlift elements from landing. Despite this the air-dropped elements continued to knock out German airfield defences; they then conducted diversionary attacks throughout the area, ambushing convoys and destroying bridges; only 87 survivors finally linked up with 43rd Army on 20 January. While the operation was unable to achieve all its goals, a small number of paratroopers were able to hamper severely German movement and supplies, and helped keep open the gap between two German armies.

F: AIRBORNE INVASION: US 82nd AND 101st AIRBORNE DIVISIONS, NORMANDY, JUNE 1944

The Allied airborne invasion of Normandy, which commenced on the night of 5/6 June 1944, was the largest operation of its kind to date, and involved three airborne divisions. The British 6th Abn Div landed at the eastern edge of the planned bridgehead; this map depicts the D-Day movements and dispositions of the US 82nd and 101st Airborne Divisions further west. Their mission was to block the routes of German reinforcements approaching the

beachheads, and to secure routes inland from the beaches. The 82nd jumped in to the north-west and west of Ste Mère Eglise, further inland than the 101st, to seal off the Cotentin Peninsula from the north and to secure bridges over the Merderet river. The 101st jumped in just to the west and south-west of Utah Beach and north of Carentan, to secure the western ends of four causeways through the vast flooded areas, to seize bridges over the Douve river and seal off the southern flank of the beachhead. While the parachute and glider-landed units were widely scattered, these missions were accomplished; though unintentional, the wide dispersal completely confused the Germans, who sent units rushing in different directions in response to reports of multiple air-delivered threats over a wide area.

G: US PATHFINDERS, NORMANDY, JUNE 1944

Most nations dropped paratroopers and released gliders 'blind', relying on the ability of aircrew to navigate accurately, identify landmarks, and maintain formation even under fire – none of which could be predicted with confidence. Only the US and Britain made wide use of pathfinders; there were tactical situations where their insertion was not possible, but when they were employed they had a good chance of accurately identifying the DZ/LZs to the transport aircraft, using a number of means.

The PPN-1 and PPN-2 radio beacon or 'Eureka' transmitter sent a signal to the 'Rebecca' receiver carried aboard lead transports. **(G1)** shows a rigger-made harness attachment for the PPN-1; **(G2)** illustrates the very similar PPN-2 being unpacked and set up (note the trooper's improvised ten-pouch rig for Thompson magazines). **(G3)** holds the standard SCR-536 'handie-talkie' radio modified to take the BC-619 antenna so as to function as a homing transmitter; and at his feet note also the M227 signal lamp, which could be used from the shoulder or set up on a tripod. **(G4)** shows pathfinders unrolling an AL-140 high visibility cerise-red signal panel; 12ft x 30½ in panels in red, orange and yellow, reversing to white, were arranged in code letters to mark specific DZ/LZs and to signal other messages. Side tapes allowed the panel to be pegged down. Flashing beacon lights, coloured smoke grenades and fire pots were also used by pathfinders.



This Fallschirmjäger on Crete (see Plate D) was probably killed by ground fire. This was much more common during Operation 'Merkur' than in most airborne operations, since many of the paratroopers fell right on top of Commonwealth positions, or – like this unlucky soldier – were shot as they hung in olive trees. Note the printed camouflage pattern of the canopy.

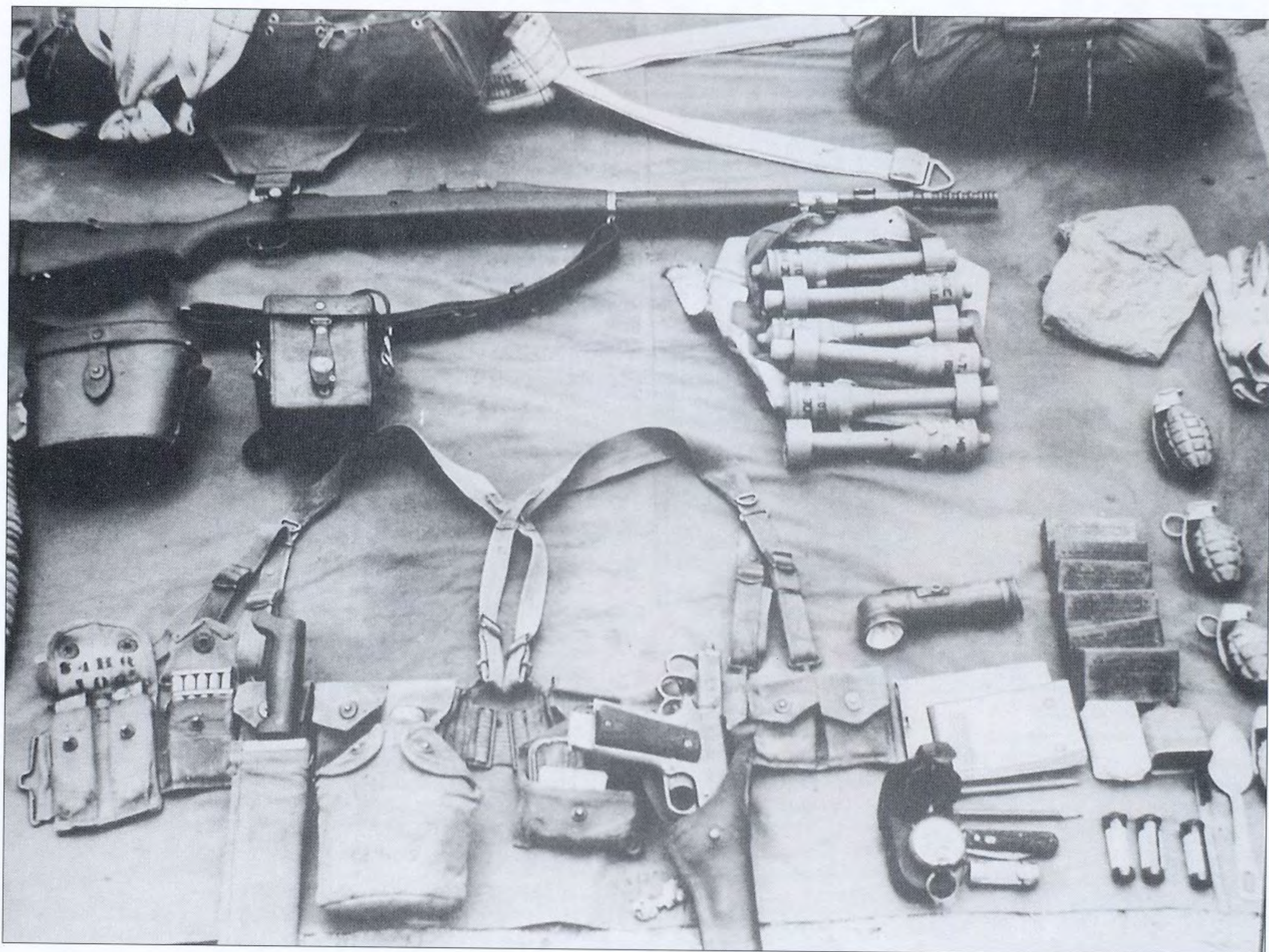
H: US 503rd PARACHUTE INFANTRY ON NOEMFOOR ISLAND, 3 JULY 1944

While airborne reinforcement was far from 'glamorous' compared to combat jumps, and was not envisaged by early developers, it was nonetheless an important capability. When the 158th Inf Regt (Separate) conducted an amphibious landing on Noemfoor off north-western New Guinea on 2 July 1944, the strength and morale of the Japanese defenders were unknown, and it was important to secure the three Japanese airstrips rapidly for future operations. It was therefore planned to drop the 503rd PIR (Sep) over the next three days (Operation 'Table Tennis'). This was a viable option; shipping them in by several trips on the limited available landing craft would have taken too long, and the congestion of the usable area of the cratered and mud-covered runway also made flying them in impractical. In such situations parachute delivery of reinforcements got large numbers of men on to the ground quickly.

The drop, staging from Hollandia, New Guinea, was not without its hazards. The 250ft x 5,000ft Kamiri airstrip was very close to the island's north-west coast; tall forest grew up to its edges, which were crammed with wrecked Japanese aircraft and US trucks, amtracs, bulldozers, tents and supply dumps. The jump height was only 400ft, and the crews of the two lead C-47s (notoriously) failed to reset their altimeters, dropping their sticks at only 175 feet. Beneath its covering of mud the airstrip was rock-hard coral, and the

1st Bn's jump on 3 July resulted in 72 casualties among the 739 paratroopers. Efforts were made to clear away obstacles from the edges of the airstrip, but when the 3rd Bn jumped the next day its 685 men had 56 injuries; all told, 59 men suffered multiple fractures, and many leaders throughout the chain of command were injured. The 2nd Bn's jump was cancelled, and instead it was airlifted to nearby Biak Island and shipped the last 60 miles from there. While the two battalions suffered 9 per cent casualties on their jumps, their timely arrival speeded up the capture of Noemfoor.

This display of a US 503rd PIR rifle grenadier's equipment in the Pacific is lighter than that typically carried, but demonstrates the bare necessities. Below the T-5 main and reserve packs are (top) a .30cal M1903 rifle with M1 grenade launcher; (right) six M9 AT rifle grenades, canteen and gloves; (below, left to right) utility rope, binoculars, mortar sight (for the platoon's 60mm mortar), above a belt and suspenders with .45cal pistol clips, rifle charger clips, M1942 machete, canteen, first aid packet, .45cal M1911A1 pistol and M1918 Mk I trench knife; a TL-122 flashlight, message and note pads, compass, pocketknife, matches, six D-ration bars, foot powder, camouflage sticks and spoon; and four Mk II fragmentation grenades. For a reinforcement jump (see Plate H) only minimal equipment was carried, though including the machete.



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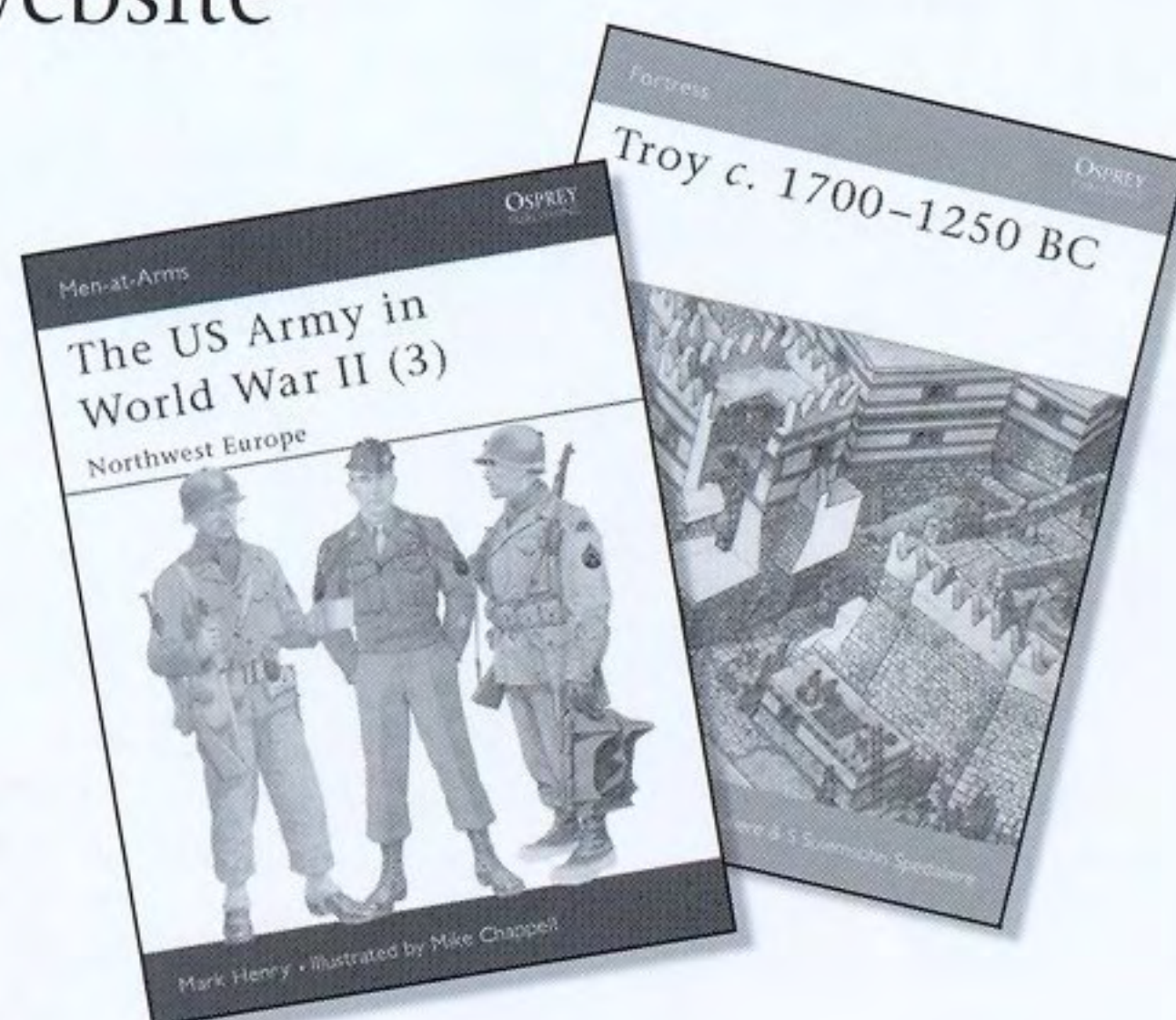
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