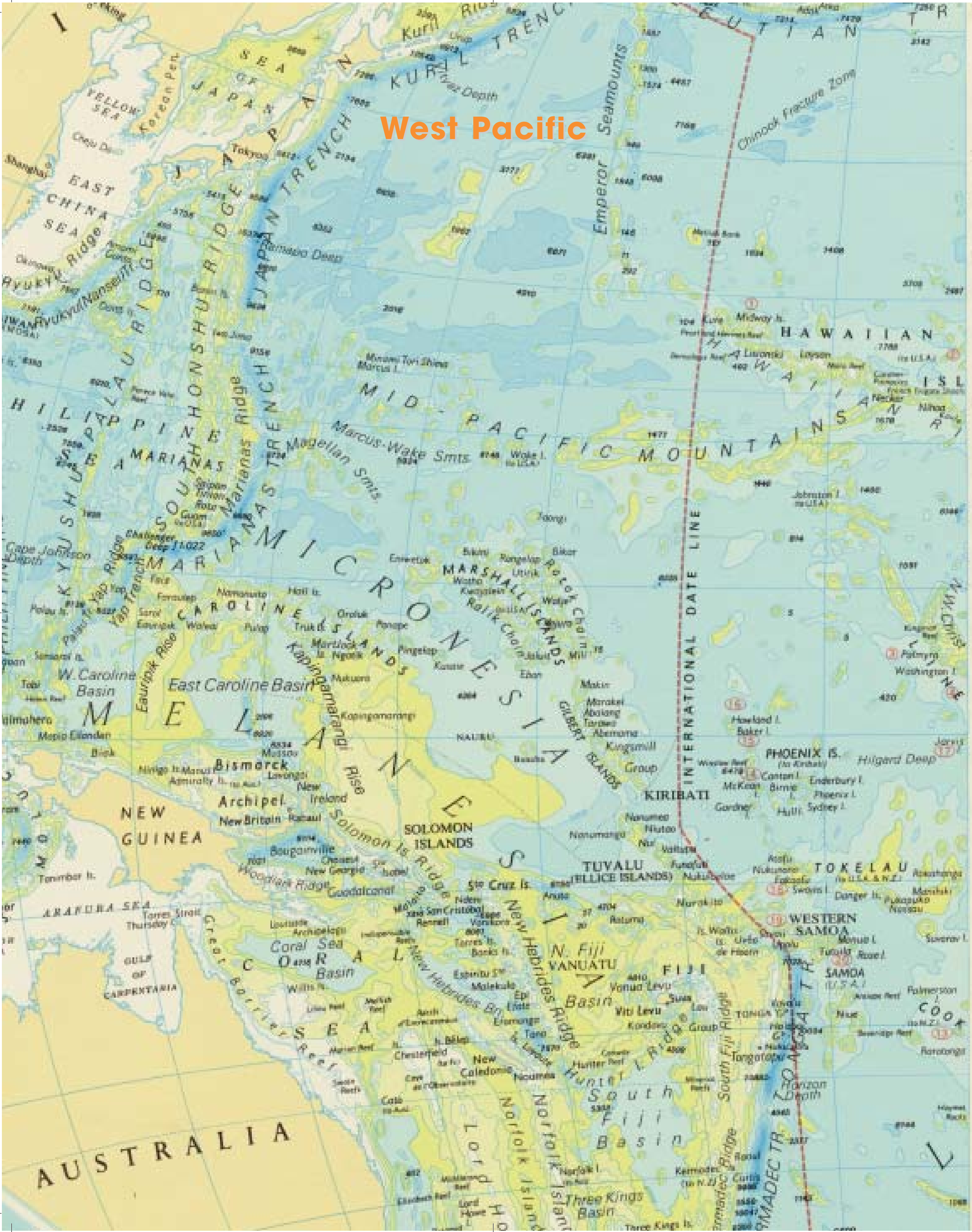
West Pacific
SEA OF JAPAN
YELLOW SEA
EAST CHINA SEA
JAPAN
Tokyo
Shanghai
KURIL TRENCH
JAPAN TRENCH
Emperor Seamounts
Chinook Fracture Zone
ALEUTIAN
Ryukyu Ridge
Ramapo Deep
IZU-BONIN TRENCH
SOUTH HONSHU RIDGE
PALAU-KYUSHU RIDGE
PHILIPPINE SEA
MARIANAS
Marianas Ridge
MARIANAS TRENCH
Saipan
Tinian
Rota
Guam
Challenger Deep 11,022
Cape Johnson Depth
Minami Tori Shima
Marcus I.
MID-PACIFIC MOUNTAINS
Marcus-Wake Smts
Magellan Smts
Wake I.
Midway Is.
Kure
Lisianski
Laysan
HAWAIIAN
Necker
Nihoa
Johnston I.
INTERNATIONAL DATE LINE
MICRONESIA
MARSHALL ISLANDS
Ratak Chain
Ralik Chain
Bikini
Rongelap
Utirik
Wotho
Kwajalein
Enewetak
Jaluit
Ebon
Mili
CAROLINE ISLANDS
Namonuito
Hall Is.
Truk
Oroluk
Ponape
Mortlock Is.
Pingelap
Kusaie
Mukuoro
Yap
Yap Trench
Palau Is.
Sonsorol Is.
Tobi
Helen Reef
W. Caroline Basin
East Caroline Basin
Eauripik Rise
Kapingamarangi Rise
Kapingamarangi
NAURU
Banaba
GILBERT ISLANDS
Makin
Marakei
Abaiang
Tarawa
Abemama
Kingsmill Group
KIRIBATI
Howland I.
Baker I.
PHOENIX IS.
(to Kiribati)
Canton I.
Enderbury I.
Birnie
Phoenix I.
McKean
Gardner
Hull I.
Sydney I.
Hilgard Deep
Palmyra
Washington I.
Jarvis
Halmahera
Mapia Eilanden
MELANESIA
Biak
Ninigo Is.
Manus I.
Admiralty Is.
Bismarck Archipel.
Lavongai
New Ireland
New Britain
Rabaul
NEW GUINEA
Bougainville
Choiseul
New Georgia
Sta. Isabel
Guadalcanal
Malaita
San Cristobal
Rennell
SOLOMON ISLANDS
Solomon Is. Ridge
Woodlark Ridge
Sta. Cruz Is.
Ndeni
Vanikoro
Torres Is.
Banks Is.
Espiritu Santo
Malekula
Epi
Efate
Erromanga
Tana
New Hebrides Ridge
N. Fiji Basin
VANUATU
Nanumea
Niutao
Nui
Vaitupu
Funafuti
Nukulaelae
TUVALU
(ELLICE ISLANDS)
Nurakita
Rotuma
Is. Wallis
Is. Uvea
de Horn
FIJI
Vanua Levu
Viti Levu
Kandavu
Suva
Lau Group
TOKELAU
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Swains I.
Danger Is.
Pukapuka
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WESTERN SAMOA
Savai
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Rose I.
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Suvarov I.
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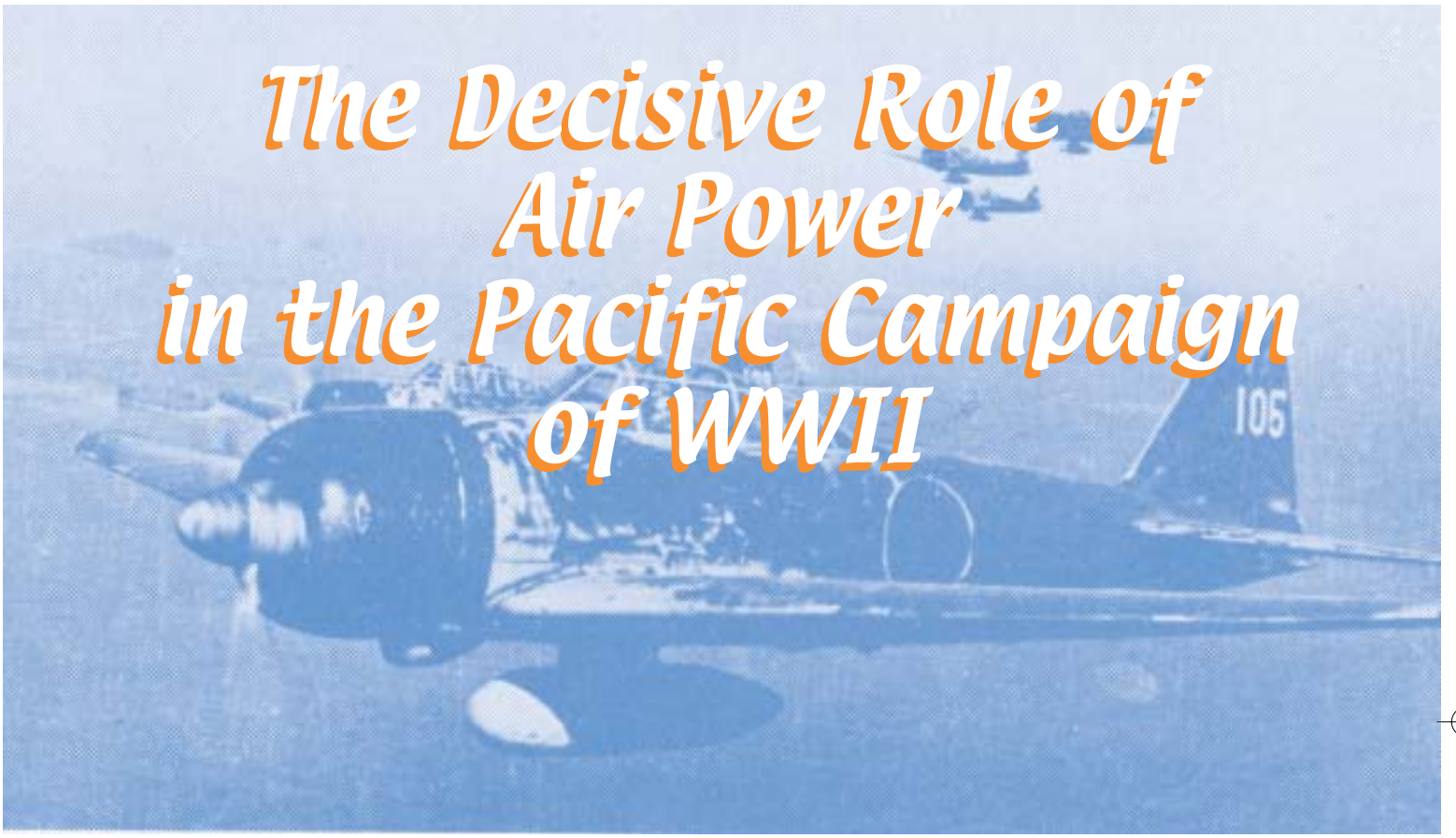
Rakahanga
South Fiji Ridge
Horizon Depth
TONGA TR.
KERMADEC TR.
Kermadec Ridge
Kermadec Is.
(to N.Z.)
Raoul
Curtis
South Fiji Basin
Hunter
Tanimbar Is.
ARAFURA SEA
Torres Strait
Thursday I.
GULF OF CARPENTARIA
Coral Sea Basin
CORAL SEA
Louisiade Archipelago
Willis Is.
Great Barrier Reef
Chesterfield Is.
Bellona
New Caledonia
Noumea
Loyalty Is.
Norfolk I.
Norfolk Island Ridge
Lord Howe I.
Three Kings Basin
Three Kings Is.
AUSTRALIA

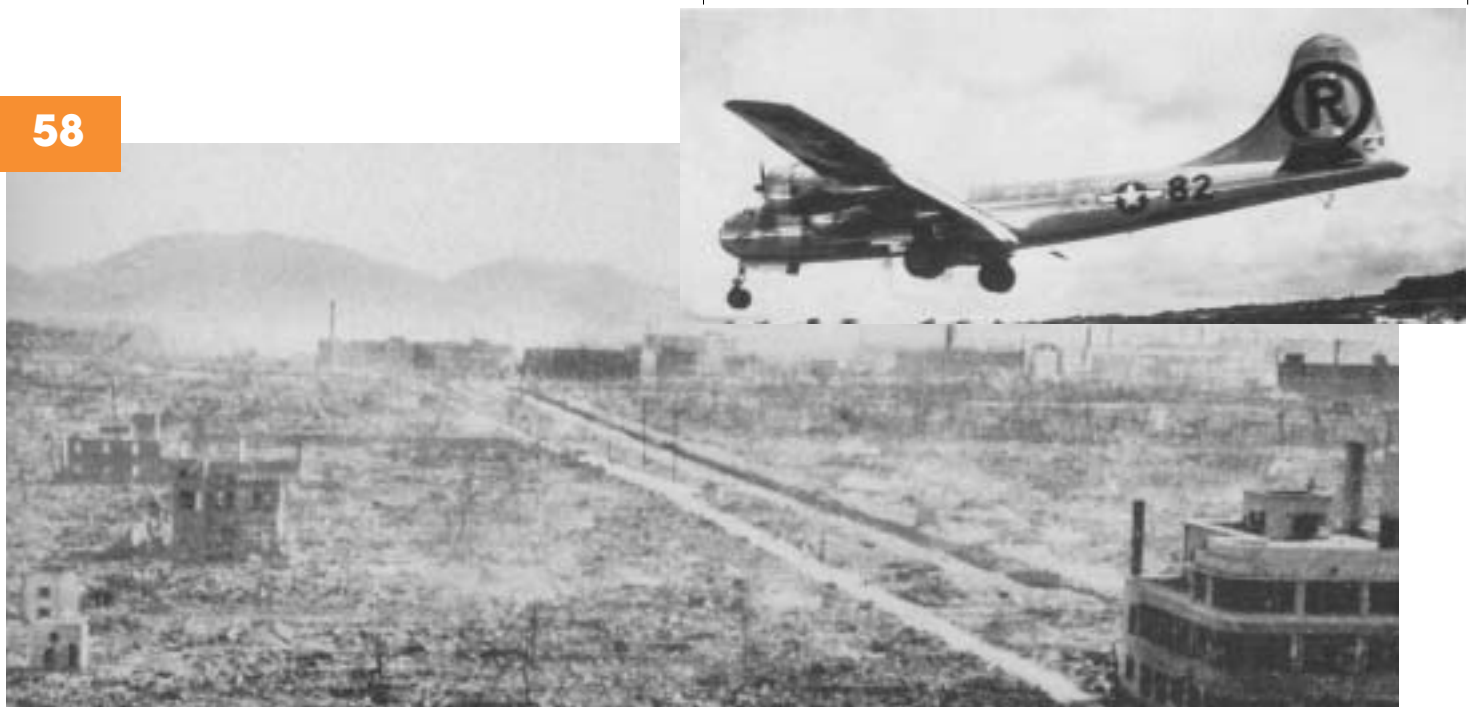


The Decisive Role of Air Power in the Pacific Campaign of WWII

By Wing Commander S Richards

'In my view, air power is an immense entity in itself, but it is interlocked with sea and land power, and all three are interdependent.'
Lord Tedder.[1]

When the Japanese opened the war in the Pacific on 7 December 1941, they did so with a dramatic and shocking display of air power. Within a matter of minutes, Japanese naval aircraft had struck a mortal blow to US naval strength in the Pacific. In the days and months that followed, Japanese forces were to advance in an all-conquering swathe of success, each time employing air power in pre-emptive operations that left the ill-prepared defenders reeling and exposed. The Allies heeded these lessons well, as they began their equally dramatic path to victory during 1942. With the vast distances involved in the Pacific theatre and with the omnipotence of the Japanese forces, air power was a vital arm of Allied fighting power. Faced with a fanatical enemy, Allied forces soon learnt that without air power, they could be left critically exposed, with ensuing loss of materiel and lives. As the Japanese weakened, the full might of US industrial effort and manpower reserves began to show, as vast numbers of men, together with new and improved equipment, were able to shape the campaign towards victory. Not least in this effort was the introduction of new and more capable aircraft, particularly the B-29 heavy bomber. It was from this aircraft that the final acts of the war were carried out: the dropping of two atomic bombs on the Japanese Home Islands.



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This article will analyse the contribution that air power made to Allied success in the Pacific, set against contemporary doctrinal attributes and principles concerning air power. These essential components, together with the influence of technology, will be examined within selected phases and campaigns of the Pacific theatre. Flexibility, which allowed the ubiquitous nature of air power to be fully realized, will be argued as the key enabler of success, within this campaign. Never standing still, the aggression and inventiveness of Allied air power, coupled with technological innovation, allowed it to be employed at all levels of war, across the campaign. Space precludes a detailed analysis of the weaknesses of Japanese air power, but some specific points will be brought out. An examination of the strategic bombing of the Japanese Home Islands, including the dropping of the first atomic bomb, will show how arguments over suitable target sets were as prevalent in the Pacific theatre as they had been in the European theatre of WWII. Equally, the continuing belief that air power alone could 'win the war' will be highlighted; an expectation that can still plague airmen today. Finally, this article will conclude that air power was the decisive, dominant factor in the Pacific theatre of WWII, illustrating how key attributes and enablers contribute to the ubiquitous nature of air power, with its all-encompassing ability to operate at all levels of war, in support, in joint operations, or as lead arm.

Surprise

Contemporary historians have argued that the Japanese attack on Pearl Harbor was not a surprise at all.[2] At the operational level, their arguments are irrelevant – whatever the degree of expectation, preparations to meet any attack were woefully inadequate.[3] The Japanese commander, Vice-Admiral Nagumo, sailed to a point 200 miles to the north of Oahu, before launching two strike waves at Pearl Harbor on the morning of 7 December 1941. Over 350 bomber and fighter aircraft achieved complete tactical surprise.[4] Japanese torpedoes were able to cope with the shallow waters of Pearl Harbor's Battleship Row, in an early demonstration of the importance of technological innovation in relation to air power.[5] As a result, the American Pacific Fleet was effectively neutralized, though crucially, the US carriers were not at Pearl Harbor that day and escaped destruction.

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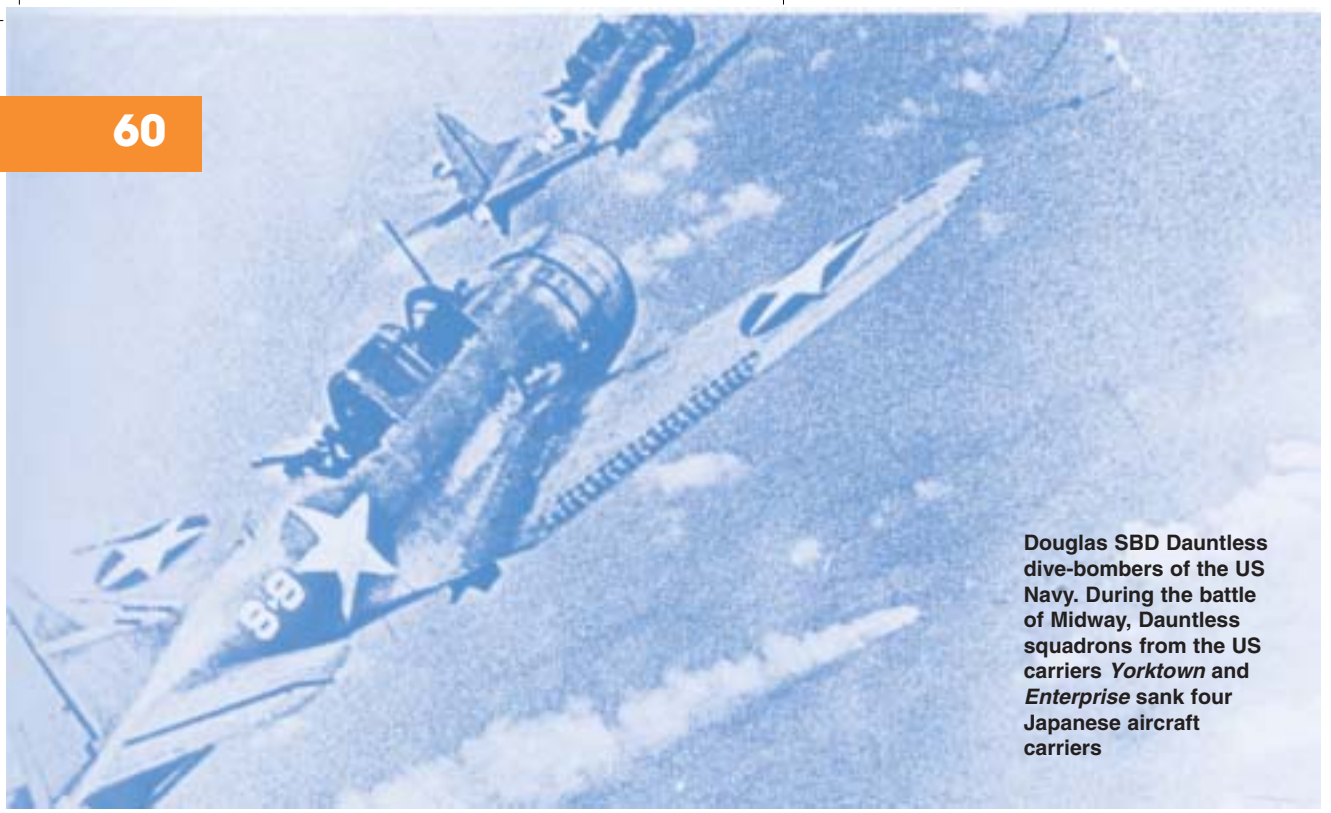


Douglas SBD Dauntless dive-bombers of the US Navy. During the battle of Midway, Dauntless squadrons from the US carriers *Yorktown* and *Enterprise* sank four Japanese aircraft carriers

The Japanese carrier forces had received a deadly blow, from which they never recovered. All this had been achieved through the medium of air power

On the morning of 8 December 1941, aircraft of the Imperial Japanese Navy (IJN) and Japanese Army Air Force (JAAF) struck at targets in the Philippines from the carrier Ryujo and from forward operating bases on Formosa. Surprise was a key factor, in part enabled by the extended range of the Japanese Zero fighter. Experimentation with fuel mixes had yielded the potential to improve the fighter's range out to about 1,000 miles – where it was least expected – in another demonstration of the important marriage of technical innovation and air power.[6] By the close of the day 'half the heavy bombers and one third of the fighters of the United States Far East Air Force had been destroyed and many of the remainder were heavily damaged'.[7] Within a few days, the Japanese were 'in complete control of the air over the Philippines at very small cost'.[8] Once again, the shocking and overwhelming application of air power had triumphed through the simple application of surprise. This ability of air power to act as a force multiplier, to deliver a crippling blow, in a short space of time and for relatively little effort, was to be dramatically demonstrated by the US Navy at the Battle of Midway in June 1942.

The Japanese devised an elaborate plan to both capture the island of Midway and to destroy the remaining capital ships of the US Navy.[9] Cognisant of these plans (through signals intelligence), the US bolstered the defences of Midway and positioned three carriers to the north of the islands. US carrier aircraft eventually attacked the enemy carriers, catching the Japanese off-guard. Despite horrendous losses, due to outclassed aircraft, slow torpedoes and uncoordinated attacks, 3 Japanese carriers were destroyed in the space of 5 minutes by 37 US dive-bombers.[10] Fighting continued throughout the day, resulting in the loss of the fourth Japanese carrier, and the US carrier Yorktown. The results of this surprise attack on the Japanese forces had far-reaching strategic importance. The invasion of Midway was abandoned, thus halting Japanese expansion across the Pacific. The Japanese carrier forces had received a deadly blow, from which they never recovered. All this had been achieved through the medium of air power, which had shown that a handful of aircraft, despite

desperate odds, could achieve a surprise victory out of all proportion to their weight of effort. Thus were air power and the attribute of surprise united in the early days of the Pacific War. Without doubt, air power had demonstrated its potential as a force multiplier, with its ability to strike decisively and overwhelmingly. The role of technology was also evident; Japanese success was mirrored by early US failure, with the US Navy Torpedo and its delivery aircraft committing scores of US airmen to an early grave. The vulnerability of both land and surface forces to air attack was now obvious and the first lessons in the requirement for air superiority had been learnt.

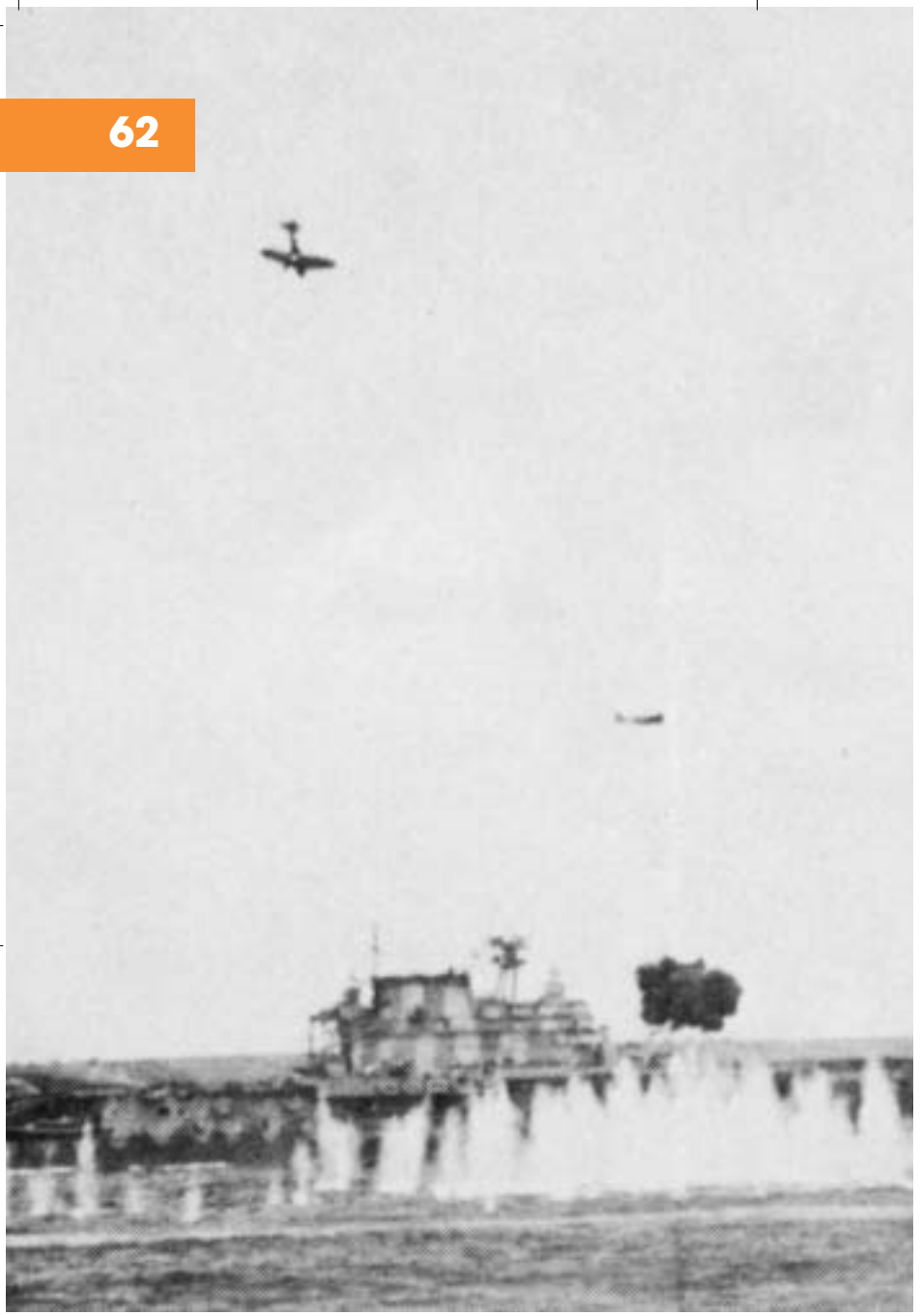
Pace, Tempo and Concentration of Effort

In early August 1942, US Marines landed on Guadalcanal in the Solomons and occupied the newly constructed Japanese airfield. By late August, small detachments of carrier aircraft and US Army Air Force (USAAF) aircraft were operating from the newly named Henderson Field on Guadalcanal. Thus began a desperate holding action, which hinged upon possession of Henderson and the continued success of Allied air power in the region. B-17 bombers from the New Hebrides Islands (now Vanuato)

In 2 days, air power had completely wrecked the last Japanese hopes of retaking Guadalcanal, through its ability to concentrate its effort on a single objective and to maintain a high tempo of operations

ranged far and wide, carrying out harassment raids on Japanese shipping and forces across the Solomons, as well as providing long range reconnaissance information. The most desperate struggle occurred at Henderson itself. Bombed daily from the air, attacked on the ground by Japanese troops and shelled at night by Japanese naval forces, the airfield was constantly under threat of being lost. Neither side could claim air superiority; the US forces were too small and disparate, whilst the Japanese air bases were too far away and the Japanese dared not risk their carrier forces in the area on a permanent basis. Somehow the field was kept open and US aircraft flew daily, able to inflict damage to Japanese forces in the air, on the ground and at sea. It was this tempo of operations, this persistence, that began to wear down the Japanese. Both sides recognized the vulnerability of their naval assets and despite strong naval presences leading to several surface battles, neither side was able to dominate the area from the sea. But air power was able to deliver constant effect, thus keeping the Japanese attempts to dislodge the US from Guadalcanal at bay. A powerful example of this is revealed during the period 14 to 15 November 1943, with the last Japanese attempt to re-take Guadalcanal. An invasion force of 12 troop transporters with warship escorts, estimated to be carrying up to 35,000 troops, was discovered by a reconnaissance B-17. Concentrated attacks by US aircraft throughout the day left only 4 transporters able to continue to Guadalcanal – the Japanese abandoned these on the beach as aircraft from Henderson Field destroyed them on the morning of 15 November. Thus in 2 days, air power had completely wrecked the last Japanese hopes of retaking Guadalcanal[11], through its ability to concentrate its effort on a single objective and to maintain a high tempo of operations.

This pace of operations had another telling effect upon the Japanese air arms. They began to lose the war of attrition, despite having aircraft, such as the famous Zero, which could out-perform their US equivalents. There was however, a flaw in Japanese thinking. Whilst the Zero was a highly manoeuvrable aircraft, capable of long-range flight, it achieved these results through its lightweight



Bushido. According to this culture, death was preferable to surrender. It was a harsh discipline that pervaded all aspects of military thinking

build. Thus it proved vulnerable in combat, a problem compounded by its lack of self-sealing fuel tanks.[12] Allied pilots found that by careful tactics, they were able to survive longer than their Japanese opponents, helped by more robust aircraft. It was a slight technological advantage, but it furnished the high attrition rates meted out against the Japanese. The results were at times spectacular; on a raid against Henderson on 23 October 1943, the US fielded 28 fighters against a Japanese force of 16 bombers and 25 fighters. In the ensuing fight, 22 Japanese aircraft were destroyed, for no Allied loss.[13]

The Japanese willingness to commit to such losses and to fritter away their best pilots was in part a reflection of their strict military code – Bushido. According to this culture, death was preferable to surrender. It was a harsh discipline that pervaded all aspects of military thinking.[14] In particular, the Solomons and New Guinea became the bleeding ground of Japanese air power. After Bougainville, experienced IJN pilots were thrown into the defence of Rabaul, such that final losses amounted to 70%

of the Navy's most valuable pilots. By the time the Allies had destroyed the Hollandia base on New Guinea, the 'JAAF had been eliminated as an effective fighting force with 90% of its pilots with 300-600 hours flying experience lost.'[15]

There were many other examples of tempo, persistence and concentration of effort across the Pacific campaign. Despite harrowing odds, air power could still bring effective firepower to bear and hold the enemy at bay, through its ability to regenerate and reappear, to survive and re-attack, and to move swiftly from one task to another across the spectrum of offensive and defensive tasks required. Although land forces held the bases, and naval forces battled for supremacy, it was air power that time and again reached out and struck the enemy, concentrating sufficient firepower to achieve decisive results.

REACH

'Air vehicles can project military power over great distances, unconstrained by the physical barriers of topography.'
AP 3000[16]

Reach is a key enabler of air power. The Japanese attack on Pearl Harbor opened the Pacific war with a classic display of the joint effect of naval and air power reach. Thereafter, the ability of air power to be the decisive arm, through the attribute of reach, was proven repeatedly. Reach enabled aircraft to seek out and engage opposing forces, and to observe and report from far and wide, often unchallenged and undetected. Reach enabled the carrier aircraft of both sides to rove across the oceans seeking out targets, whilst the carriers themselves stood-off under the protective screens of fighters and surface units. Finally, in the latter part of the war, the impressive range of the B-29 bomber allowed this new and untried aircraft to reach out and rain destruction upon the Japanese Home Islands. This was raw air power.

Moving on from the obvious example of Pearl Harbor, the battles of the Coral Sea in May 1942, and of Midway, give further proof of how the quality of reach can enable air power to deliver a decisive result. In both cases it was aircraft that located each side's opposing force and it was aircraft, not surface vessels, that carried out the attacks. Opposing sailors never sighted each other, but they were vulnerable to attack nevertheless.[17] In the Solomons and Papua New Guinea, aircraft from both sides used the attribute of reach to enable long-range strikes and reconnaissance. Japanese floatplanes and specially adapted bombers carried out reconnaissance; their efforts were mirrored by Allied PBY Catalina flying boats and B-17 bombers. Despite being stationed over 500 miles away, Japanese bombers from Rabual regularly attacked Henderson Field on Guadalcanal, often augmented with aircraft from Japanese carrier forces. They came close to rendering Henderson unusable. US B-17

The whole purpose of the invasion of the islands of Saipan, Tinian and Guam, was to establish air bases from which B-29 bombers could strike at Japan. The fall of these islands was regarded as so serious by the Japanese Government that the Premier, Gen Hideki Tojo, resigned

bombers similarly ranged up and down the Solomons, constantly harrying the Japanese. As the Pacific campaign unfolded, it became a battle for the next suitable airfield. With each step forward, air power was able to reach out further and further. This was typified during the fighting for the Solomons in 1943, and for the Marianas during the summer of 1944. In the former campaign, Allied forces made deliberate progress up the Solomons, capturing and repairing enemy air bases, before springing forward from these bases with ever increasing air cover. The further the Allies advanced, the further was the reach of their air power. In the Marianas, the whole purpose of the invasion of the islands of Saipan, Tinian and Guam, was to establish air bases from which B-29 bombers could strike at Japan. The fall of these islands was regarded as so serious by the Japanese Government that the Premier, Gen Hideki Tojo, resigned.[18] On November 24 1944, the first B-29 bomber raid to strike at the Japanese Home Islands from the Marianas was launched. With such strikes representing a round trip of 3,000 miles[19], the strategic reach of air power would now be employed in earnest.

The enabling concept of reach was therefore another vital contribution that air power made to the Pacific campaign. Reach enabled air power to search out and attack the enemy, to bring to bear the attributes of surprise, tempo and concentration of effort already mentioned. Boosted by the projection of naval carrier power at times, it was still air power that played the dominant role – so much so that the whole construct of the advance towards Japan, was one of advancement from airfield to airfield, until at last US bombers could strike at the Japanese Home Islands direct.

STRATEGIC EFFECT

'So we had won after all!…As for the Japanese, they would be ground to powder.'
Winston S Churchill.[20]

When writing his celebrated memoirs: The Second World War, Churchill clearly recalled the strategic importance that the Japanese attack on Pearl Harbor signified. Setting aside the afterglow of victory, it is a clear statement of the global consequences of that one precipitous act. A few hundred aircraft, with one bold stroke, had tipped the military balance of the war by bringing the US into the conflict. The very decisiveness that air power could deliver was to continue to alter the strategic balance in the Pacific, throughout the length and breadth of the conflict.

Stung by the Japanese success at Pearl Harbor, President Roosevelt sought to strike at the Japanese homeland and boost the morale of an outraged American society. A daring one-way raid against Japan was executed on 18 April 1942, led by a USAAF pilot, Lt Cdr James Doolittle. Sixteen B-25 medium bombers were launched from the carrier Hornet, at a point 800 miles from Tokyo, in a unique combination of maritime and air power strategic reach. Bombs were dropped on Tokyo, and other Japanese cities.[21] Whilst the damage inflicted by the bombing was minor, the raid yielded important strategic results: the Japanese immediately diverted aircraft into a home defence force; they felt even more persuaded to attack Midway – a disastrous action from a strategic viewpoint; and they overran the airfields in China where the American B-25s had planned to land (but had not been able to reach). Again air power had precipitated events of far-reaching strategic consequence, despite, on this occasion, having delivered little military effect.[22]

Admiral Isoroku Yamamoto, Commander of the Japanese Combined Fleet, was widely known to have masterminded, at least in part, the successful Japanese advances across the Pacific. He was viewed as a strong and resourceful leader. On 18 April 1943, following signals intelligence, a flight of P-38 Lightnings flew over 400 miles from Henderson Field to shoot down and kill Yamamoto. Air power alone was able to strike such a strategic blow.[23] It is difficult to quantify what effects the loss of Yamamoto

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brought about, but the morale of the IJN suffered a 'significant' blow.[24] That it was the P-38 Lightning that achieved this success was not insignificant – this fighter had recently been introduced into the Pacific theatre. With the ruggedness, range and firepower to survive in the demanding environment of the South Pacific, this aircraft was another example of successful Allied technological innovation – adapting air power to the needs of the battle in order to gain important advantage.

As the strength of the US Navy carrier forces grew, their striking power and air dominance increased. Through 1944, both sides recognized that a culminating fleet action would have to be attempted at some point. When the US began the invasion of the Marianas, Japanese Admiral Ozawa knew that the time had come. On 19 June 1944, in an action that became known as the 'Great Marianas Turkey Shoot', US carrier aircraft destroyed approximately 300 attacking Japanese aircraft, at a loss to themselves of 26 aircraft, with insignificant bomb damage to one US battleship.[25] On this and the following day, US aircraft and submarines sank 3 Japanese carriers.[26] It was a strategic blow to the IJN from which it could not recover. The battle marked the 'destruction of Japanese carrier air groups as a conventional air force…'[27]

From Japan's opening gambit onwards, air power was crucial to the delivery of strategic effect in the Pacific campaign. The battles at the Coral Sea and Midway relied on air power to halt Japanese territorial expansion. Small isolated acts such as the Doolittle raid produced strategic consequences out of all proportion to their military effect – effects that were only possible through the flexibility and reach of air power. Finally, it was chiefly air power that left the Japanese carrier forces impotent, robbed of their strategic potential in the face of overwhelming US air power.

Flexibility and Versatility

On 3 June 1942, a Catalina flying boat on a maritime patrol mission located the Japanese transport group heading for Midway. That same day, 4 Catalinas completed the 9-hour flight from Pearl Harbor to Midway. The newly arrived aircraft were immediately tasked with attacking the Japanese ships – all the more remarkable since Catalinas did not, at that time, carry torpedoes. Nevertheless, within a few hours of landing, the Catalinas were heading out towards the Japanese with one torpedo loaded to

From late November 1944 onwards, with secure bases in the Marianas, the USAAF's B-29 bombers began the systematic bombing of the Japanese Home Islands, in a true display of the flexibility of air power

each aircraft.[28] This innovative and flexible outlook, which resulted in the sinking of one of the transport group[29] (or possibly just damage[30]), revealed the flexible nature of air power to the Americans. It also affected Japanese tactical thinking during the ensuing battle, causing them to put too much emphasis on the destruction of Midway, and thus to be caught unprepared by US carrier aircraft.[31] The strategic consequences of the Midway battle have already been noted; how the flexibility of air power contributed from the very start is highlighted by the Catalina attack.

Flexibility and versatility were key ingredients of Allied success at Guadalcanal. USAAF P-400 fighters began operating from Henderson Field in late August 1942. Their performance as fighter aircraft was soon in question – the Japanese Zeros easily out-manoeuvred them from above. The solution was to reverse the roles of the aircraft at Henderson: Marine F4F aircraft assumed more fighter responsibilities, whilst USAAF pilots learned how to bomb and strafe with the P-400 – a role at which they soon proved very useful, in both anti-ship and Close Air Support tasks.[32]

This versatility was mirrored in the employment of Allied light and medium bombers across the breadth of the Solomons campaign. B-17s reconnoitred far and wide, staging through Henderson to increase the range of their cover. This had not been a role envisioned for this medium bomber, but it was to provide a vital service, keeping Allied forces constantly informed, and thus ready to counter Japanese attempts to overrun Henderson. As the Allies advanced across the Solomons and New Guinea, air

power assets increased in numbers and strength. Skip-bombing of Japanese ships was introduced by the B-25 force and proved to be a deadly form of attack. B-25s and A-20s were fitted with extra forward firing guns, making them fearful ship-strafing assets. The USAAF developed a blind radar bombing aircraft, the SB-24. First appearing in August 1943 in the Solomons theatre, these aircraft contributed greatly to the overwhelming attrition of Japanese surface vessels around the Solomons. By October 1943, 'the enemy could no longer sustain his barge losses.'[33] Equally able to bomb ground targets with new parachute retarded bombs, the versatility of Allied air power in the South West Pacific, often enabled through technological innovation, became its strongest quality, as highlighted by the historian Rohfleisch, in Craven and Cate's The Army Air Forces in World War II:

By mid-December [1943]…Allied air forces so completely dominated the entire area that enemy commanders could scarcely risk daylight movement of their troops in any manner of surface craft ...No aircraft could be left on bases outside of Rabaul and Kavieng, nor could air installations be repaired, without continuous fear of surprise air attacks.[34]

Air power flexibility was key to the Allied invasion of the Marianas. The operation began with a massive fighter sweep by US carrier aircraft. The total Japanese air strength was reduced by about a third and before the battle proper, the carriers 'had won control of the air'.[35] Air superiority was now seen as an essential prerequisite to amphibious operations. Subsequently, prior to the landings on Saipan, carrier aircraft bombed and strafed Japanese defensive positions. During the landings themselves, combined surface shelling, aerial bombing and strafing reduced the ferocity of the Japanese defences. Carrier aircraft acted as spotters, directing naval gunfire onto appropriate targets. When the IJN sought to engage the invasion forces, a massive defensive effort, the 'Marianas Turkey Shoot', took place. At the same time, carrier aircraft bombed and destroyed Japanese aircraft that had landed at Guam.[36] Without the presence of air assets and the variety of tasks that they could perform, the Saipan and subsequent Marianas landings could not have gone ahead without prohibitive losses. The importance that the US Navy attached to the provision of air power at this stage of the war, may be judged by the fact that no less than 15 fleet and escort carriers were assigned to the Marianas operation.[37]

From late November 1944 onwards, with secure bases in the Marianas, the USAAF's B-29 bombers began the systematic bombing of the Japanese Home Islands, in a true display of the flexibility of air power. No other force had the reach, tempo, or concentration of effect, to carry out such a campaign at this stage of the war. In March 1945, B-29s began the aerial mining of Japanese waters, contributing to the maritime blockade of Japan. Such operations were not regarded as orthodox strategic missions; however, the USAAF commander, General Curtis E LeMay, a strong proponent of aerial strategic bombardment, supported the mining operations as a further demonstration of the versatility of air power.[38]

With vast distances separating Allied forces across the theatre, and with hostile jungle terrain serving to isolate various fighting elements, re-supply became a vital role of air power in the Pacific. The epic struggle over Henderson Field on Guadalcanal would have been lost but for air re-supply.[39] Across in Papua New Guinea, Allied troops fought a difficult holding action against Japanese ground forces heading for Port Moresby, and relied upon aerial re-supply, reinforcement and medical evacuation as they progressed.[40] A year later, on 5 September 1943, the Allied airborne assault against Nadzab, in New Guinea, demonstrated the extent of the Allied effort, and of the versatility of air power. Over 300 aircraft took part in the assault, including 96 C-47 transport aircraft, carrying paratroops, supplies and some artillery.[41]

Flexibility and versatility were therefore crucial attributes of air power, which allowed it to contribute so emphatically to the Pacific campaign. Air power was vital across the theatre – it allowed Allied

commanders to maintain the initiative and apply constant pressure on the Japanese, aided by the ability of their air power assets to switch roles rapidly and to be used for a variety of tasks at all levels of the conflict. Finally, the ability of individual commanders and of the Allies in general, to innovate, improvise and invent solutions to maximise the versatility of those assets, proved to be a key factor in the drive towards Japan.

THE STRATEGIC BOMBING OF JAPAN

'Without strategic bombing, a landing on Japanese shores would have been costly, in spite of all the weaknesses of the defending forces.'
United States Strategic Bombing Survey.[42]

With B-29s becoming available for use in 1943, the only viable choice of base at that time was central China.[43] Eventually, sixty-three B-29s raided Japanese steel works on Kyushu on 15 June 1944, marking the beginning of the strategic bombing campaign against Japan.[44] But, according to the United States Strategic Bombing Survey (USSBS), these operations proved to be 'not decisive'.[45] Technical problems bedevilled the new aircraft, crews were inexperienced and the technique of high level bombing remained difficult to implement accurately, exacerbated by the effects of winds at high altitudes. Senior commanders had not yet adjusted to the balance of expectation versus reality and continued to wrangle over the best targets to strike and methods to use – an enduring conundrum for air power commanders.[46] Worst of all was the logistic burden of operating from China, resulting in an average of about one sortie per month per aircraft.[47] The important attributes of pace, tempo and concentration of effort could not be applied. The B-29s were withdrawn from China in January 1945, as operations from the Marianas gathered pace.

As the number of B-29s increased, new techniques were introduced along with improved incendiary devices. This flexibility, so crucial to air power, yielded dramatic results, helped by the wooden construction of much of Japan's urban dwellings

Despite equally poor results at first, the strategic message conveyed by the first B-29 sortie from the Marianas was powerful and prophetic – the US was now in a position to launch attacks against Japan, and in particular Tokyo, with 'relative impunity'.[48] As the number of B-29s increased, new techniques were introduced along with improved incendiary devices. This flexibility, so crucial to air power, yielded dramatic results, helped by the wooden construction of much of Japan's urban dwellings. The prime example was a raid against Tokyo on 10 March 1945. The resultant firestorm burnt out 63% of the city's commercial zone, destroyed 18% of the industrial area, killed over 83,000 people and left over 1 million homeless. By the end of the war, US attacks had caused significant levels of destruction to a total of 66 Japanese cities. In parallel to the firebomb attacks, precision attacks by day against industrial, oil and infrastructure targets were carried out, though the weather significantly hampered the missions.[49] Finally, it should not be forgotten that the bombing complemented the maritime blockade of

The atomic bombs dropped on Japan, fearful though they were, caused less damage than the previous firebombing campaign

Japan that was already in progress. With the shortages in raw materials that this blockade produced, the industrial destruction wrought by the bombing campaign was made more potent. The mining operations conducted by the B-29s in 1945 simply added to the Japanese woes. In the last 12 months of the war, 49.7% of all Japanese merchant-shipping losses were due to aircraft attack, and a further 12.7% were due to aerial mining.[50]

The results of the bombing surpassed all expectations – air power alone had delivered such a devastating blow. Destruction and dispersal of the aircraft industry reduced output by 57% in the last 10 months of the war and worker absenteeism was between 40% and 52% in July 1945 across key production facilities.[51] The results were compelling at the time, and with loss rates, for example, in the order of 2%, LeMay began to believe that an invasion of the Home Islands could be avoided – that air power could end the war by October 1945.[52] The post-war USSBS lends credence to this view, stating that:

The bombing offensive was the major factor which secured agreement to unconditional surrender without an invasion of the home islands…..The atomic bomb and Russia's entry into the war speeded the process of surrender already realized as the only possible outcome.[53]

The atomic bombs dropped on Japan, fearful though they were, caused less damage than the previous firebombing campaign. However, their terror stemmed from the fact that only one or two aircraft were needed to deliver such effects and Japan had no idea how much more instant destruction was about to be meted out – she had had enough already. Coupled with the Russian invasion of Manchuria and Korea on 8 August 1945, the Japanese finally yielded to the inevitable, surrendering despite the presence of 2.5 million undefeated troops on the Home Islands and 9,000 Kamikaze airframes still available.[54]

US airmen had wrangled over target selection throughout the bombing campaign. With cool hindsight, the USSBS stated that 'a concentration of air attacks exclusively on railroads and urban areas…would in all probability have led to an earlier surrender…'[55] This statement highlights the difficult choices facing a commander who seeks to employ strategic air power. However, the B-29 campaign undoubtedly contributed towards the ending of the war; there can be few other explanations for the final capitulation of Japan. The bombing formed a powerful adjunct to the economic blockade of Japan, delivering the coup de grâce, which finally tipped the balance. The atomic bombs simply reinforced the hopelessness of Japan's situation to her ruling bodies. The bombing campaign highlights many of the areas already considered in this paper and shows how the attributes of reach, strategic effect, tempo, concentration of effort, flexibility and technological innovation are all crucial to the proper delivery of strategic bombing and strategic air power. It also illuminates the key dilemmas that face the air commander: those of matching expectation with results and of selecting those targets that are likely to yield the most telling strategic effect upon the enemy.

CONCLUSIONS: LESSONS IN AIR POWER

'If I were to give you one factor as the leading one that led to your victory, I would give you the air force.'
Japanese Fleet Admiral Osami Nagano.[56]

This article has argued that air power did indeed play a decisive role in the Pacific campaign of WWII – that it was a vital force multiplier, crucial to the success of the war. From the tactical to the strategic, air power was the driving force behind the Allies' eventual victory, so much so that the whole campaign was driven by the need to spread the influence of air power back across the Pacific towards Japan.

With the help of air power, the enduring principle of surprise yielded spectacular results from the start. Pearl Harbor and Midway showed that results of far-reaching strategic importance could be achieved through carefully planned surprise attack. Air power was able to deliver this through its unique qualities of speed and reach; neither result would have been possible without air power. The key attributes of pace and tempo, together with the principle of concentration of effort, allowed Allied air power to begin the war of attrition in the Solomons and beyond. Day after day, Allied aircraft ranged across the Southwest Pacific, aggressively searching out and engaging the Japanese, on the sea, on land and in the air. Surface forces proved too vulnerable; it was air power that dashed in and dashed out, continuously pushing the enemy back. When the bombing of Japan began, it was concentration of effort that yielded the terrifying results.

Tactical and strategic reach were enduring attributes of air power throughout the war. From the assassination of Yamamoto to the B-29 bombing campaign, the reach of air power proved crucial, allowing pre invasion strikes, blockade and mining operations to succeed. Submarines also had reach, and the provision of tactical air assets was repeatedly, though not exclusively, delivered through naval carrier power in the central Pacific. Nonetheless, these latter points emphasize the joint nature of air power; it was the maritime blockade and air power which brought Japan to her knees, enabled in no small way through the attribute of reach. This attribute is so fundamental to air power that it will always have a part to play. Strategic effect is often associated with reach and it was air power that delivered strategic effect most obviously in the Pacific, from Pearl Harbor and Midway to the bombing campaign against Japan. The capture of the Marianas was made possible by air power and it was from there that the bombing campaign began. Invasion of the islands without comprehensive air operations would have been unthinkable. The strategic bombing of Japan was clearly an air power preserve. The submarine blockade was the only operation that might be said to challenge the assertion that it was air power that ended the war. This article has argued that both campaigns contributed to the final surrender, but that it was air power that delivered the most shocking blows, and that accelerated the final outcome. Strategic bombing remains a valid consideration today, given the clinical precision that can be achieved with modern technology, but airmen must be careful not to promise what they cannot deliver, and they must be clear in their selection of target and expected strategic effect. These are not easy challenges, as General LeMay discovered in 1945, and they remain a challenge for the future employment of air power.

Finally, it was the flexibility and versatility of air power, coupled with the application of technology, which gave the allies a vital lead in the Pacific campaign. Innovative and aggressive, the fighting spirit of the air power arms in the Pacific meant that even inferior equipment found a use and that no platform stood idle for want of a role. The Japanese could never rest; the ability of air power to operate at all levels of war, from the tactical to the strategic, harnessing technology in increasingly effective ways as it did so, meant that air power proved to be a ubiquitous enemy to the Japanese. The conservative outlook of the Japanese air arms, their lack of strategic vision, their slow rate of technological advance, and their adherence to the Bushido ethos, meant that the Japanese simply lost the technological race and that Japanese air power was eventually outclassed. Backed by superior economic strength, Allied air power dominated the skies over the Central Pacific and Japan in the latter stages of the conflict. Flexibility and versatility are unique attributes of air power; in the Pacific they were the dominant qualities that provided air power with its decisive edge – decisive over the Japanese forces and decisive as the leading arm in the campaign. The ubiquity of air power must be recognised as its greatest strength – its ability to operate across the disciplines and layers of war with technology as its shield. Thus was air power the decisive weapon of defeat for the Japanese in the Pacific. That it was air power that began and ended the conflict is no insignificant fact. Our understanding and application today, of the enduring principles of air power, owes much to the courage and innovative fighting spirit of the Allied air arms in the Pacific campaign.

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