



WAR! JAPS BOMB U.S. BASES

Tokyo Declares War; Raid Hawaii; 350 Americans Killed; Warship Hit

HONOLULU, Dec. 7. (U.P.) — Parachute troops were sighted off Harbor Point today.

HONOLULU, Dec. 7. (A.P.) — Japanese bombs killed at least five persons and injured many others, three seriously, in a surprise morning aerial attack on Honolulu today.

TOKYO, Dec. 8. (Monday.) (A.P.) — Japanese imperial headquarters announced at 1 p.m. (Pacific standard time Sunday) that Japan had entered a state of war with the United States and Britain in the Western Pacific today.

WASHINGTON, Dec. 7. (A.P.) — The White House today said...

NEW YORK, Dec. 7. (A.P.) — Japanese warplanes killed 350 men at Hickam Field and set fire to the United States battleship Oklahoma today in a sudden raid on Pearl Harbor and Honolulu, an N.B.C. observer dined direct from the scene today.

WASHINGTON, Dec. 7. (A.P.) — Japanese airplanes...

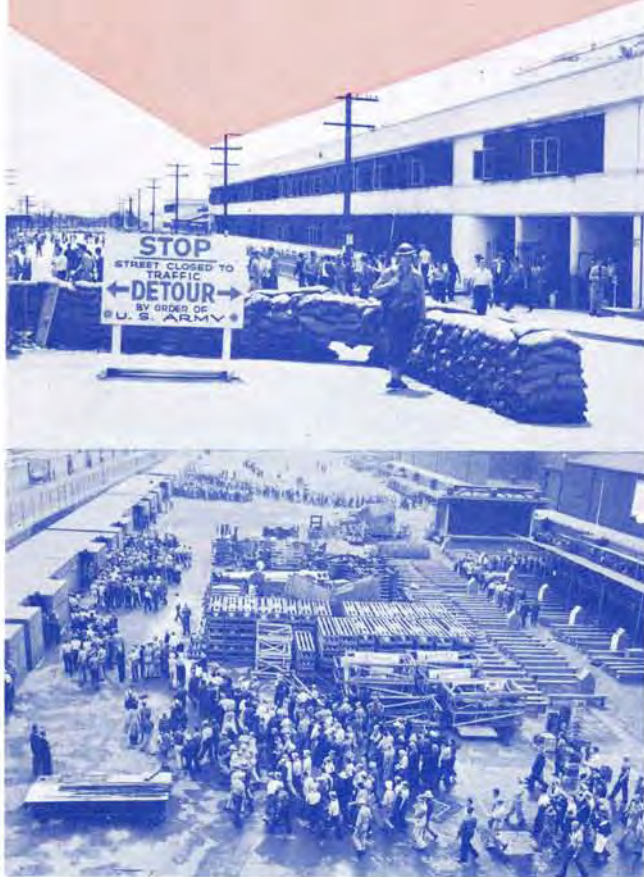
Chapter VI * * * LOCKHEED AT WAR

A History of Lockheed Aircraft Corporation

**OF
MEN
AND
STARS**

August—
September, 1957

Days after Pearl Harbor, Lockheed windows were blacked out, streets were barricaded. Below: Vega workers in air raid drill tried out hastily built concrete bomb shelters.



To Lockheed's tens of thousands of employees, just as to the rest of the nation and the free world, Pearl Harbor was a stunning shock.

True, by the mid-1930s British, French, and Dutch orders had begun to build production capacity of U.S. aviation. But the aircraft industry of the late 1930s had attained the size of the automobile industry of 1910 or 1911. In 1939 the nation's aircraft output, even with growing foreign military business, totaled only \$225 million—less than a third of Lockheed's sales last year. And when President Roosevelt called for 50,000 planes in May 1940, U.S. combat plane strength and production rates were only a fraction of those needed for victory through air power.

Month after month of war headlines from Europe had failed to arouse Americans from their apathy. General George C. Marshall testified later that the "few partially equipped squadrons" of the Air Forces "could hardly have survived a single day of modern aerial combat." Even after the fall of France, divided public opinion and prolonged debate in Congress slowed industrial preparedness and defense build-up.

The carnage and destruction that Japanese carrier planes reaped on December 7, 1941 at Pearl Harbor brought sudden, solid support for national defense. It brought home with brutal impact the bitter truth: the nation that controls the air also controls land and sea.

That fateful Sunday began typically for 53,000 Lockheed and Vega employees in their homes scattered through 150 Southern California communities. Tired from their steady six-day work weeks to speed airplane deliveries, most of them slept late. They awoke to read Sunday morning newspapers with their "Dick Tracy" and "Blondie" comic strips and casual news reports on the visit of a Japanese "peace" ambassador to Washington with no hint of the impending attack. Other employees went to church, began Sunday drives into the foothills or along the beach, or took advantage of the warm winter sunshine to cultivate their geraniums.

Not until late morning did radio newscasts report the fantastic attack. Not until midafternoon did the first newspaper extras appear, with screaming headlines but little in the way of facts about the extent of the disaster. Not until President Roosevelt's dramatic reports to Congress and his first wartime "fire-side chat" did the full depth of the tragedy become apparent.

Uneasy Days

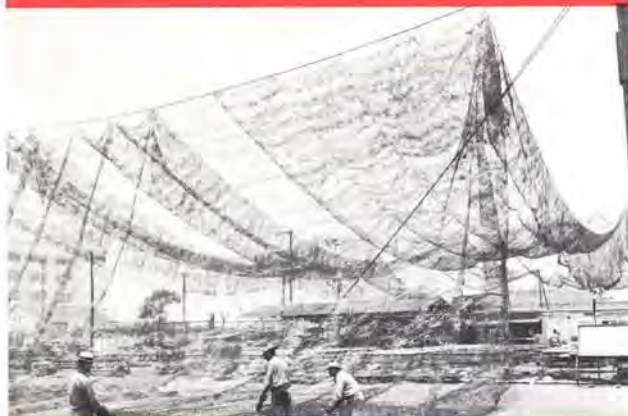
Key personnel rushed to the Burbank plants for planning conferences that lasted late into the night. Lockheed President Robert Gross, Vega President Courtlandt Gross, and their associates analyzed their companies' positions. As best they could they took steps to readjust already humming factories to a war footing.

"As far as production was concerned we already had a full head of steam up," Corporation Secretary Cyril Chappellet said. "Our primary task was to build up more pressure and turn out more planes without blowing the lid off."

From the short range view the imperative problem was that of vulnerability. No one knew where or when the enemy might strike next. Rumors spread that Japanese carriers were hiding in fog banks off California, that submarines had sunk American ships at entrances to Los Angeles and San Francisco harbors, that the uncamouflaged, unprotected aircraft plants only a few miles inland would be prime targets for the enemy.

A handful of jittery employees failed to report for work during those first few days. They had packed up and returned with their families to former homes away from the coast. Other employees gazed apprehensively at every airplane that passed overhead. Blackouts and dimouts of electric lights raised fears.

A Factory Disappears



Acres of overhead chicken wire with glued-on feathers concealed Lockheed's factories and adjacent lots, cost Army millions of dollars.



Hundreds of gallons of brown and green paint blended the camouflage into Verdugo hills. Its removal after V-J Day cost over \$200,000.

Only the dawn patrols of P-38s and B-14 Hudson-type bombers along the Pacific Coast restored a feeling of security.

Until war came Lockheed and Vega had run production flight tests of completed planes at Lockheed Air Terminal and the old flying strip flanking what is now California Division's factory B-1. From these exposed positions pilots ferried them out for delivery. Within hours after Pearl Harbor came orders from the military:

"Get every ship into the air that can possibly fly."

Tony LeVier, then a production test pilot, now California Division director of flying operations, recalled his assignment in those hectic early days was to herd Hudsons to Ontario, California, about 40 miles inland and safer from enemy strafing.

"Our pilots took off for destinations in all directions," he said, "many of them just landing strips out in the desert."



Burlap bungalows, feather trees, and painted streets covered rooftops and hid Vega plant so completely pilots often missed air fields.

Scores of Hudsons and P-38s moved out without customary preflight checks. Crews serviced them with gas, oil, and hydraulic fluid. After a quick glance at the gauges, flyers took them right off production lines. "It was a real test of efficient manufacturing," LeVier declared. "Not one cracked up."

Plant protection was already well organized. Security officers intensified screening activities, and throughout the war not a single instance of attempted sabotage was discovered.

Ink had hardly dried on the U.S. declaration of war on Japan when the Grosses issued a joint message:

"Your companies have absolute confidence," they said, "that every one of us will do credit to the cause and country which our Commander-in-Chief, the President of the United States, has called upon us to defend." They appealed to personnel to stand behind America's military forces "with every ounce of effort, devotion, and loyalty."

Next day—December 10, one day before the U.S. formally declared war on Germany and its Axis partner, Italy—the Army set up highway barricades to keep out all but company employees from factory areas. Lockheed's management stressed employees' responsibility not to spread or listen to rumors, and to maintain utmost secrecy regarding all activities. And it outlined procedures to follow in case of black-outs, possible air raids, fire, or accidents.

Never was the importance of air superiority more obvious than in the war's early days. Japan's conquest

Management at Work



Robert Gross frequently inspected production, told about need for more P-38s on war fronts.



Courtlandt Gross toured Vega assembly areas. Company won praise for B-17 production job.

in the Far East moved forward smoothly. Hong Kong, Wake Island, Manila, Corregidor all fell. So did Singapore. The Dutch lost Java, the British abandoned Rangoon.

Almost immediately Lockheed found an Air Force man parked on its doorstep. He was General George Kenney, and he needed P-38s—fast. The Japanese were probing toward the Aleutians, and Kenney wanted every available fighter to ward off the invasion threat. One of Lockheed's first modification battles was the "Snowman Project"—winterization of Lightnings in a few frantic days of around-the-clock work.

"These ships will be fighting within 36 hours after they leave the line," said Kenney, "so get 'em out of here."

Lockheed got 'em out—one reason why the Japanese never reached Dutch Harbor, Alaska.

After those frenzied days Lockheed took the war in stride. Early in 1942 construction of bomb shelters began. Military camouflage experts, using acres of



Now Lockheed executive vice-president, D. J. Haughton (left) was Vega works manager in early war years.



Henry A. Wallace, then U.S. vice president, walked through factory with Gross in 1944.

chicken wire and canvas, transformed the plants into what, from the air, were scenic vistas studded with ersatz trees, cottages, and streets.

The Lockheed-Vega assets were many. At that time their work force was the largest of any U.S. airframe manufacturer. The companies occupied nearly 3.5 million square feet in floor area. Their reputation for efficiency had spread.

Since its British order for Hudson bombers in the summer of 1938 Lockheed had built more than 2000 combat planes, including 250 of the fastest fighter in the skies, the twin-engine P-38. Vega was beginning to roll out the Ventura, military version of the Lockheed Model 18 transport, in its new \$8 million factory. And it was tooling up to turn out the Boeing-designed B-17 Flying Fortress as part of a three-way Boeing-Vega-Douglas pool.

One Goal: Production

Robert Gross later said that just one word, production, characterized the war period. "The air industry," he declared, "was called upon to build thousands of something it had built only dozens of before. It was like a youth who is suddenly expected to go to college before he has graduated from primary school."

"Lockheed was lucky to have Bob Gross running the show," one member of management said. "It's hard to change from planning small to planning big. That's where Gross was at his best."

Immediately Lockheed began to plan big. With the rest of America it quickly girded for the mightiest struggle in history. The government completely re-

organized the national economy for an unparalleled output of arms and other vital materiel. National defense erupted into global war fought in equatorial jungles, sun-scorched deserts, glacial icefields, and tropical oceans.

As war began Lockheed was less than 10 years old. The other nine leading airframe manufacturers had been in existence an average of only 16 years. Despite their inexperience they were able to expand aircraft production faster in World War II than any other industry. Employment, a mere 30,000 in 1937, soared to more than 2.1 million. At peak the industry occupied more than 175 million square feet of floor space. It reached its wartime maximum in 1944 by sending into the skies an armada of 96,000 planes. Altogether from 1940 through 1945 it built 303,000 aircraft. It was the most tremendous productive effort the world had yet seen.

Production: Keynote to Victory



B-17 inner wing (above) emerged from three-level jig. Lockheed pioneered in photographing part instructions directly on metal.

Three weeks after Pearl Harbor the Vega Airplane Company reorganized as Vega Aircraft Corporation and became a wholly-owned Lockheed subsidiary. At the end of 1943 Lockheed completely absorbed the unit and the Vega name.

Robert Gross continued as Lockheed president and board chairman. Courtlandt Gross became vice president and general manager. At the same time Chappell also became a vice president, and Louis W. Wulfekuhler succeeded him as corporate secretary. Lockheed created the office of comptroller filled by Dudley E. Browne, chief accountant. L. M. (Mort) Bach succeeded R. A. Von Hake as manufacturing manager and also became a vice president.

Pre-Pearl Harbor output for the U.S. had produced hundreds of trainers, light bombers like Hudsons and Douglas A-20s, and low-altitude fighters like the Curtiss P-40 and Bell P-39 that were not effective against Japanese Zeros and German Messerschmitts. Only 346 of the high altitude P-38 and North American P-51 fighters and only 373 four-engine Boeing B-17 and Consolidated B-24 bombers came from assembly lines in 1940 and 1941.

In the design competition won by Lockheed with the P-38, no one in the company expected the Army to order more than 50 planes. Outstanding performance rather than ease of production was the goal. By crowding interior of the plane, Engineers Hall Hibbard and Clarence Johnson kept external dimensions small.

By midsummer 1940 U.S. and British P-38 orders had risen to 1300. Pressure for deliveries mounted, but extensive redesign for large-scale fabrication and assembly was impossible. Wherever practical, engineers broke assemblies into sections to allow more people to work on them and to simplify jobs for less skilled workers then available. But the P-38 never was an easy plane to build.

Lockheed contributed importantly in the race against time that characterized a gradual shift to mass production. Men within the factory devised new machinery, new tools, and new methods of achieving uninterrupted flow of raw material from receiving docks through the plants to emerge as completed airplanes.

5



Snake-like lines of P-38 fighters got preflight check at Lockheed Terminal.



Courtlandt Gross turned over 1000th PV-1 Ventura to Navy captain in 1943.



Moving conveyor line mechanized P-38 assembly, boosted output 72 per cent.

A Lockheed-patented magnetic riveting device reduced the riveting time on the P-38 by half. Equipment engineers redesigned hydro presses and more than tripled their output. Standardization and interchangeability became "musts" wherever possible.

Of tremendous value, too, was the help received from subcontractors and suppliers. When Lockheed received its first big contract to build Hudson bombers for the British, it called upon other firms to share in the job. Rohr Aircraft of San Diego, for example, packaged the 1100 hp Wright engines, complete with hydraulic and electrical equipment, ready to install.

That set a pattern for huge subcontracting activity during World War II. Within eight months after Pearl Harbor Lockheed's subcontracting program increased 250 per cent. Early in 1943 another major airframe manufacturer, Consolidated Vultee, began building P-38 subassemblies for shipment to Burbank. Later it assembled complete Lightnings under license in the Convair plant at Nashville. A long list of subcontractors put together components and sections for P-38s, Hudsons, Venturas, B-17s, and other craft.

The war's early months brought establishment of the Aircraft War Production Council to help member companies solve the sudden problems the conflict thrust upon them. Originally AWPC comprised Consolidated, Douglas, Lockheed, Vega, North American, Ryan, Vultee, and Northrop. Later Boeing became a member. This system of tossing secrets into a pool for the emergency and jointly attacking specific industry

But he admitted that eight months of actual war-time operation had created "many confusing influences" in relationships with government agencies, the armed services, the public, stockholders, and labor. It had become "difficult," he declared, "to get the job done fully and at the same time protect as much of the interests of all these groups as possible." And, he added, planes so desperately needed by the U. S. and her allies "do not build themselves."

By midyear 1943 employment skyrocketed to its all-time high of 94,329, a production army working around the clock in more than 100 plants and bases in 18 nations on five continents. Plane-making efforts spread over 7.7 million square feet—and still there wasn't enough. P-38 assembly finally ran right out



After Lockheed-Vega merger, H. E. Ryker (left) was materiel vice president. L. M. Bach, shown with R. E. Gross, was manufacturing vice president.

headaches worked so well that a few months later east coast aircraft firms organized a similar enterprise. Members shared aerodynamic discoveries and engineering data, improvements in tooling and equipment, and a \$250 million stockpile of material piped wherever it was needed most.

Lockheed's backlog of military orders increased spectacularly in June 1942 with orders for 1800 P-38s that brought the total to a record \$600 million. Gross reported sales for the half year almost equaled deliveries for the entire previous two years. For July 1942 alone they "greatly" exceeded all of 1940.

Victory!

Only mild enthusiasm was shown by employees on anticlimactic V-J Day in September 1945 that followed atom bombing and long Japanese surrender negotiation. Below: deserted parking lot two hours after victory announcement.



of the shops in an S curve, and Lightnings came boiling from these outdoor assembly stations at a fantastic peak rate of 15 a day. In one month, November 1943, Lockheed delivered a record 608 airplanes, 387 of them P-38s.

In 1943 Lockheed, with a longing look toward the day when peace would return, purchased a majority interest in Pacific Finance Corporation, an automobile and personal loan company. It was a step toward diversification and, Gross explained, in normal times would make it possible to finance "sound customer purchases" such as private airplanes on an installment basis. The move also was a hedge against manufacturing cutbacks after the war ended.

"We should see a large demand for consumer goods and consumer financing," Gross said. Lockheed still has a substantial ownership in PFC, today one of the largest firms of its type in the nation.

Production volume and backlog rose steadily as the allies pushed back the Germans and Italians in North Africa and stopped the Japanese advance in New Guinea and at Guadalcanal. Deliveries in 1942 totaled 3521 planes—one-third of them P-38s—and backlog climbed for the first time above \$1 billion. Next year deliveries increased to 5235 and backlog to \$1.3 billion. During 1944 Lockheed delivered

5850 aircraft, more than 112 a week, but new military orders had begun to drop. By year-end the backlog dropped to \$909 million.

Sales in the three years 1942 through 1944 totaled \$1.7 billion. But net earnings averaged only one and a half per cent. Contributing factors to that low profit were fixed-fee contracts, excess profits taxes, and establishment of post war reserve funds. Too, the low profits reflected the position the company took just after Pearl Harbor.

Lockheed, Gross said then, "has the responsibility, along with all private American industry, to produce the tools with which to win the war at the lowest possible cost to the people." It was, he declared, "directly counter to the highest conception of service to try to make profits just for the sake of making the money."

By early 1945 Allied victory appeared assured. American troops reentered Manila. Mussolini died violently at the hands of Italian partisans. Berlin fell in May, and Hitler with it. Five days later Germany surrendered unconditionally. Three months after V-E Day Colonel Paul Tibbetts guided the *Enola Gay*, a B-29 Superfortress, over Hiroshima and a stunned world learned of the devastating power of the atom bomb.

The Winged Star in Combat

Lockheed's management and work force had reason to be proud of the airplanes that flowed from the company's assembly lines during the war. The P-38 Lightning, the Hudson, Ventura, and Harpoon patrol bombers, and the B-17 Flying Fortress all blazed across the skytrails to immortality as they fought on the side of the free world. Lockheed cargo transports and general utility ships of the Electra-Lodestar series ran up records of unflagging service.

Most renowned was the P-38.

In Italy and the Mediterranean, New Guinea and the South Pacific, North Africa and the Aleutians this two-engine, twin-tailed terror of the skies wrote aviation history—with a turbo-supercharger whine that made it whistle while it worked. The P-38 was the most versatile fighter of World War II—the only one that served continuously in steadily improved versions from start to finish.

P-38s flew across the North and South Atlantic.



They winged over the hump to join General Chennault's Flying Tigers in China. They fought island-to-island across the Pacific.

The "Fork-Tailed Devil"

"Except for 'Der Gabelschwanz Teufel,' we might hold the air," German pilots complained when Lightnings brought them down in the Mediterranean and North Africa. In the Pacific, Japanese airmen called the P-38 "two airplanes with one pilot." American flyers swore by its two-engine safety and affectionately dubbed it "round-trip ticket." One Lightning returned to base on a single engine five times.

It was the world's most easily recognized airplane. To Axis flyers it became a symbol of death. To General Jimmy Doolittle's young airmen it was the wonder plane of the African campaign. In actual tests against fighters of all nations it proved itself beyond

doubt the fastest aircraft of the early war years.

The P-38's true worth in the eyes of the men who took it into combat is documented in hundreds of reports. "With a P-38 I would go into battle anywhere," said one flyer, "under any conditions, with complete confidence that the government has given me the best fighting equipment the world has to offer." "We wouldn't trade our P-38s for anything we've seen in the air," said another. "P-38s alone could win the war," declared a third. "They have the range and the power. They can carry bombs—and they can dive."

Before the U.S. entered the war the British bought P-38s. After Pearl Harbor the U.S. Army Air Force ordered, reordered, and ordered again. Altogether Lockheed built 9924 of them at Burbank, and under a pooling arrangement Consolidated Vultee built another 113.

Lightnings Blast the Enemy

The P-38 was the first American plane to shoot down a Nazi aircraft after the U.S. declared war. A Lightning knocked down a heavily armed Focke-Wulf Condor patrol bomber near Iceland. The Lightning encountered the foe earlier, however, over New Guinea. An unarmed P-38 carrying only cameras suddenly found a dozen Japanese Zeros on its twin tails. The enemy shot out one engine. But the P-38 quickly outclimbed its pursuers on its remaining "lung" and scurried home. Its photographs won official credit for helping the U.S. Navy win the Battle of the Coral Sea.



Der Gabelschwanz Teufel

"Fork-tailed devil," it was called by Germans lucky enough to escape wrath of P-38. "Two airplanes and one pilot," said the Japanese who lost more planes to the P-38 than to any other Allied fighter. Photo shows P-38J, one of last and most formidable of 18 distinct versions.



The P-38: Ver



"Ambulance" P-38 provided cramped quarters but rapid transportation for men in need of emergency treatment.



"Droopsnoot" version had elongated nose for bombardier, Norden bombsight, bombing and navigating instruments.



Night fighter P-38 provided cockpit for radar operator, mounted small pod below nose to house radar equipment.

Test Pilots Jimmy Mattern (at controls), Milo Burcham devised "Piggyback" P-38 to reduce training accidents.

Fiercest fighter of them all, the P-38 performed a score of wartime jobs. It carried rockets, bombs, torpedoes, served as night fighter, glider tow plane, smoke screen layer, photo reconnaissance plane, pathfinder — always with deadly efficiency.



On emergency landing strips hastily hacked out in South Pacific islands, P-38s skimmed down to rousing welcome.



P-38s, hauled to Guadalcanal on Navy's "baby" carriers, were feared by Japan, pushed back South Pacific drive.



Fourteen rockets slung under Lightning's wing provided firepower equal to Navy cruiser's six-inch broadside.



Dealing death blows to Nazi communications, Lightnings bombed, strafed freight trains in occupied countries.

[illegible]

One P-38 squadron kept swastika-starred "kill" record, showed plane's high score against German war machine.



Now a Convair executive, P-38 pilot Tom Lanphier downed Japanese Admiral Yamamoto in battle near Bougainville in Pacific. Below, mechanics worked on plane flown by Major Richard Bong, war hero.



A P-38 brought to a dramatic end the career of Admiral Isoroku Yamamoto, commander in chief of the combined Japanese fleet. Yamamoto was bound for Bougainville in a Betty bomber on a survey of South Pacific bases. As related in the diary of Vice Admiral Matome Ugaki, P-38s broke through escorting Zeros, attacked the Yamamoto bomber, and sent it down in flames. Another P-38 inflicted such heavy damage on Ugaki's bomber that it crash-landed in the sea.

Three of the top 10 World War II aces flew P-38s. Major Richard Bong pasted a picture of his girl friend

Marge on the nose of his Lightning and ran up a 40-plane kill, largest in the South Pacific. The last P-38 now rests in Superior, Wisconsin, as a permanent memorial to Bong, who lost his life in 1945 when a jet fighter crashed on a routine flight.

Scores of P-38s with droppable fuel tanks under their bellies made the world's first transatlantic ferry flight by fighters in 1942. Their speed, stamina, and durability were phenomenal. With the concentrated fire of five guns in the nose, Lightnings punched holes in the sides of Japanese destroyers. "Photo Joe" photo-reconnaissance versions went deep into German and Japanese territory, relying solely on speed and altitude.

More P-38 Accomplishments

One P-38 pilot brought his craft back to base on one engine after a head-on collision with a German ME-109 that tore the Lightning's twin tails apart and shredded one boom. Another returned from an escort mission over Nazi territory with one engine shot out and the airframe riddled with five 20mm cannon shells and 100 machine gun bullets. Still another, Lieutenant Tom Harmon—the former football hero—graphically described his first flight:

"I taxied out, checked all the instruments as instructed, and let go," he said. "It was like being hit in the fanny with a snow shovel."

Quickly the Air Force discovered the P-38 could exceed by a wide margin the 360 mph top speed called for in the original design competition. But it also found that at high altitude and high speed—as

The Competition

Friend and foe were P-38's competitors. Upper left, German Messerschmitt could equal speed, lacked P-38's fire power. Upper right, British Spitfire with P-38. At lower left, P-51 Mustang (center) and P-47 Thunderbolt in air with P-38. Lower right, Japanese Zero.



Oil painting at right showed Hudson feat of 1942 when craft captured Nazi U-boat. A. B. Vosseller, now assistant director of development planning, headed squadron of flying boats that helped surface vessels and Hudson bring prize and crew to port.

The Hudson: It Did Everything

First American airplane to fight in World War II, rough, rugged Hudson bombers served on every continent, performed variety of wartime jobs. Last ones rolled off our assembly lines in 1943.



With minimum maintenance, lend-lease Hudsons flew bombing missions in Asia for Chinese government.



Under desert sun and Nazi attacks, Hudsons brought up ammunition for British campaign in Middle East.

much as 500 mph in a dive—the Lightning behaved strangely. This was the first manifestation of compressibility, explained in Chapter V—a phenomenon that found air piling up in front of the wing like fresh bread under a dull knife. The faster the P-38 went—and it could travel at better than 400 mph in level flight—the worse its tendency to nose down. Dive brakes on the wing licked the trouble.

The compressibility problem led to derogatory rumors. To combat them Lockheed engineers, developing an idea conceived by Test Pilots Milo Burcham and Jimmy Mattern, built a "piggy-back" version for training military flyers at bases through the U.S. and



abroad. Colonel Charles A. Lindbergh, sent to the Pacific to demonstrate P-38 performance, shot down a Japanese plane while so doing. Newspaper and magazine writers went up for hops in the "rumble seat," and these flights precipitated front-page praise. The gossip soon subsided.

Among those who had heard some of the stories about the Lightning was General Carl Spaatz. But P-38s were a welcome sight to him in Africa.

"I'd rather have an airplane that goes like hell and has a few things wrong with it," he declared, "than one that won't go like hell and has a few things wrong with it." General Doolittle pronounced the P-38 "one of the sweetest flying planes in the air." And General H. H. (Hap) Arnold acclaimed it as "a headache to the enemy and a source of pride and confidence to our own forces."

Conceived in 1937 as a high altitude fighter, the P-38 underwent continual improvements in speed, rate of climb, ceiling, range, endurance, and fire-power to keep abreast of combat requirements. Lockheed built 18 distinct versions to serve dozens of missions at all altitudes, among them:

"Droopsnoot," with an elongated nose that carried

a bombardier and Norden bombsight. A torpedo-carrying fighter. A rocket-firing model. A night fighter. A smoke screen layer. A glider tow plane. An ambulance ship. And a "pathfinder" that housed radar equipment in its modified snout.

Hudsons Make History

Of all Lockheed's combat aircraft none served the free world more ably than the Hudson. A medium reconnaissance bomber, "Old Boomerang" carried a crew of four and attained a reasonably fast 246 mph. The Hudson with its British bull's-eye insignie was the first American warplane to fight in World War II. It was the mainstay of the Royal Air Force Coastal Command, which declared Hudsons had "been everywhere, seen everything, and done everything."

Truly Hudsons "did everything." They distinguished themselves as dive bombers, mast-high sea raiders, skip-bombers, escort fighters, ambulance ships, and submarine busters. They worked doggedly during the British retreat at Dunkirk. King George VI used one as a personal transport. In the North African campaign they flew out wounded troops. They flew "Ice-Pack Patrol" in the North Atlantic. They operated on every continent in service with American, British, Canadian, Australian, Dutch, and other Allied forces. They sank German submarines by the dozens. Of 259 U-boats sent to the bottom by the RAF, Hudsons destroyed the bulk.

And a Hudson was the first aircraft in history to capture a submarine. That occurred in 1942 when one bombed and strafed a U-boat into submission and circled it until surface craft came along to take the sub and its astonished crew in tow.

Right after Pearl Harbor the Air Force needed 150 Hudson types for offshore patrol—at a time when normal output was two to three a day. Lockheed worked 24 hours a day seven days a week, and delivered the 150 in less than three weeks.

Bombers Go to Chinese

The Chinese government acquired Hudsons under lend-lease, and a Lockheed service representative went along to instruct crews. Only one man in the squadron spoke English. The Chinese had never seen aircraft with hydraulic systems and automatic pilots. They had no hangars, no machine shops, no electrical equipment. But the sturdy Hudsons needed little attention.

"We'd crank 'em up day after day," the service representative reported later, "and they'd run as sweet as ever."

In all, Lockheed built nearly 3000 Hudsons, including several hundred that the Air Force used as AT-18 trainers for navigations and gunnery. The last one rolled off the line in 1943, but not before it had spawned an even deadlier successor.

Service Unlimited

Vega Ventura (top) resembled Hudson, but was faster, packed more armament. Hard-hitting bomber spread wings over Europe and as Navy PV-1 flew missions in South Pacific (center). Successor was PV-2 Harpoon, shown in Aleutians loading rockets for attack on Kuriles.



This was the Vega Ventura, a modification of the Hudson and Lodestar. As a combat aircraft it was bigger, faster, more heavily armed, and packed a more explosive wallop. Built for British use before America entered the war, the Ventura had its maiden flight in July 1940. It delighted the British and attracted attention of the U.S. Army Air Corps, which ordered 200 called the B-34.

Eloquent evidence of the Ventura's worth came in carrying the Allied offensive to nerve centers of the Axis powers. On a daylight attack over Holland one wave of Venturas carried incendiaries and went in at low altitude—so low that one Australian pilot, "porpoising" his craft up and down to avoid enemy flak, collected mud from a field on his Ventura's belly.

"Even a Ventura couldn't go lower than that," he commented. "Not with real safety."

Another flyer herded his Ventura safely back to base from a mission over Europe with seven feet of the wing missing. And at a South Pacific island base a Royal New Zealand Air Force crew brought in a Ventura that had been jumped by nine bullet-spitting Zeros. The Ventura turned and fought. In a 20-minute battle it downed three Zeros, crippled two more, dispersed the rest, and—its rudder controls shot away, its fuselage ripped and shredded—made it home.

"She handled perfectly," said the pilot.

The PV-1: Pride of the Navy

By early 1942 German submarine packs were roaming off the east coast. Sub-chasers couldn't be thrown together fast enough to combat them. The Navy, analyzing the RAF's success against the same threat, decided to battle the subs from the air with land-based patrol bombers, first ever employed by the Navy.

Out of the Ventura came the Navy's PV-1, carrying a greater bomb load and ammunition capacity, and packed with more radio.

The PV-1 had something else as well—the almost incredible toughness that characterized the Hudson and Ventura. It went on day and night raids, long overwater patrols, strafing missions, and played a major role in halting Nazi undersea attacks. It was fast enough, at more than 300 mph top near sea level, to outdistance enemy fighters. It could fly more than 2000 miles carrying bombs, depth charges, rockets, or torpedoes. And it proved an essential factor in the Navy's Pacific campaign as the fleet chipped away fragments of the empire so tenuously held by the Japanese.

From its appearance early in 1943 until war's end the PV-1 served in air combat from the Kuriles in the Arctic to the Marianas and the Philippines. It took part in almost every offensive action in that vast area.

Final evolution of the Lodestar was the Navy's PV-2 Harpoon, ultimate stretch of the long series that had begun with the Model 14. Major changes included a longer wing that increased fuel capacity and reduced landing speed, and a redesigned tail that gave better stability. The five-place ship had a 75-foot wing span and hit 301 mph.

Design work on the Harpoon began in July 1942, and the first plane flew late in 1943. Navy flyers liked it, and production started promptly. But wartime bugs, tooling troubles, and subcontracting bottlenecks slowed it down. The Navy didn't get the first until March 1944, and Lockheed made only 69 that year.

Those early Harpoons ran into trouble. Based in the Aleutians, they pounded Japanese bases—and in the process weaknesses in wing design came to light. Quickly modification work began, and reworked PV-2s proved so successful that the Navy boosted its order. Production continued even after war ended, and Lockheed built a total of 535.

Three-Way Pool Produces B-17s

First of America's four-engine bombers was the B-17 Flying Fortress, which Boeing designed in 1935 as a hemisphere defense weapon. The B-17 carried as much as 10 tons of bombs. Military experts regard it as the principal means by which Germany's power to wage war was destroyed. Flying Fortresses slugged it out with the Luftwaffe and carried the fight to the Mediterranean and the Pacific.

The smooth-functioning Boeing-Vega-Douglas "B. V. D." pool turned them out by the thousands. The three companies joined technical skills and produc-

Sky Giant

Month ahead of schedule, Vega's first B-17 Flying Fortress flew in April 1942. Company built 2750 of bombers in production miracle.



tive capacities in July 1941 to build the Fort in huge numbers. For the Vega company the B-17 contract meant abandonment of other plans. President Courtlandt Gross never hesitated.

"We'll build anybody's ship," he said. "We only want to be useful in the most effective way."

He sent many of Vega's top technical experts, headed by Mac Short, vice president-engineering, to Boeing headquarters in Seattle to master the Boeing program.

They mastered it so well, in fact, that Vega was the first of the other two "pool" factories to get one of the giant bombers into the air. That was April 1942.

"We did it about a month ahead of our own ideas," Courtlandt Gross declared. "We did it because every man and woman in the plant was determined to do it, and nobody was licked for a moment."

In all, the "B. V. D." pool built 12,731 B-17s. Lockheed and Vega accounted for 2750 of them, including the last one in July 1945.

Lodestars, Connies Do Their Bit

Lodestar transports served the Air Force in four transport versions, the C-57, C-58, C-59, and C-60, with a variety of engines and equipment. The Navy used them as high speed personnel carriers. They were the first U.S. planes adapted for paratrooper training. And for the British Model 18s flew regular schedules into battered Malta, bringing in supplies and carrying out wounded. Although production ceased entirely in 1943, Lodestars still serve many airlines today, and used models are in demand as corporate executive aircraft.

The C-69 Constellation first took to the air in January 1943 and demonstrated the outstanding performance that made it an undisputed leader in the postwar commercial field. But during the war the military had more pressing need for such vaunted craft as the P-38 and B-17. Lockheed could spare only a skeleton work force to the C-69 project, and only 20 of them came off the lines. The Air Force used them as personnel transports and cargo carriers.

Like other airplane companies, Lockheed devoted what time it could spare during the crowded war years to designing experimental "just in case" models

As Air Force C-69, huge Constellations carried as many as 100 soldiers.



Just in Case....

Changing patterns of air war in early days of conflict sparked development of experimental aircraft like XP-58, shown (right) in flight, XP-49 (left below), XB-38 version of B-17 with 4 liquid cooled engines. But Air Force after evaluation decided against use.



geared to meet changes in military requirements.

One such was the XP-49, closely resembling the Lightning. Built for high altitude work, the XP-49 featured a pressurized cabin, two 1540 hp Continental engines, and heavier armament than the P-38. But by the time the prototype flew in November 1942 changes in the war eliminated need for craft of its category. The Air Force accepted the XP-49 and flew it to Wright Field, but no more were built.

Vega carried out contracts for two B-17 modifications. It adapted four 1450 hp Allison V1710 liquid cooled engines for one version, the XB-38. This one crashed and burned on an early flight in June 1943.

Another modification, the XB-40, was an escort bomber designed to protect bomb-carrying B-17s on long raids over Europe. It had a chin turret, rear dorsal turret, increased ammunition capacity, and additional armor. Higher horsepower in the regular B-17 engines eliminated the need for the XB-38, and gun turrets added to B-17s did away with the requirement for an escort bomber.

Another just-in-case airplane was the XP-58. Conceived in 1940, it was a big brother to the P-38 and aimed at performing a night fighter mission. It boasted one of the first advanced aircraft fire control systems. But an unceasing flow of design changes, including five different engines, slowed development. The XP-58 finally flew in June 1944 and showed a top speed of 430 mph with two 2600 hp Allison X-shaped power plants.

It proved itself a good airplane, but not good enough soon enough. Five months earlier Lockheed had sent its XP-80 rocketing into the skies, and the jet age had arrived.

Fighters for Freedom.....



"Men are the guts and brains of this company."

Robert Gross said that once about Lockheed. And the war proved its truth. Men and women of Lockheed rose to the common peril and during almost four years of unrelenting drive devoted their guts and brains to turning out fighting planes.

Three weeks after Pearl Harbor, Lockheed-Vega was the U.S. aircraft industry's biggest employer with 54,000 men and women. But these weren't enough to build the aircraft the military so desperately needed. The work force grew to a peak of 93,000. About 250,000 people, old and young, skilled and unskilled, at one time or another during the war forsook peaceful pursuits and joined production lines to serve their country.

Luckily Lockheed had prepared for that tremendous growth. For two years before the Japanese attack, the company had been virtually on a war program. In the late 1930s it developed the industry's most effective general training program. It evolved selective hiring techniques. It concentrated on work simplification and streamlined manufacturing processes so thousands of the lesser skilled could become productive members of the team.

Orders and Employment Increase

The payroll mounted during 1942 as Lockheed and Vega received huge orders. Recruiting efforts turned up unexpected talent. Violinists and paperhangers, morticians and midgets, schoolboys and housewives, Hollywood extras and shoe clerks worked side by side.

Lockheed overlooked nobody in its nationwide search for willing hands. The war was only weeks old when the company dramatized the need for more volunteers by hiring a score of "Pearl Harbor Widows" who lost husbands or sons when the Japanese bombed Hawaii.

To aircraft manufacturers the draft was a constant problem. Bright young men who in peacetime learned the knowhow of building airplanes were just the kind Uncle Sam needed in uniform. Altogether almost 24,000 Lockheed and Vega employees entered military service before V-J Day. And 394 of them died for their flag.

It took at least two untrained persons to replace each one who left for service. Despite every effort to

keep skilled workers at their posts as long as possible, men still donned uniforms faster than substitutes could be found and trained.

Recruiting sources included the visually handicapped, the elderly, and disabled veterans. Lockheed pioneered in hiring them. And it found their employment stability high, accident frequency rate low, and morale and efficiency surprisingly good. One man with no hands was a tool dispatcher—and a capable one—although he had to keep track of things in his head. Numerous "seeing eye" dogs guided their masters through the maze of corridors to their work benches.

With These Hands.....

Big wartime orders sent employment skyrocketing. Among recruiting sources were handicapped such as one-armed man at right.



Blind workers with guide dogs (above) showed skill and good morale. And schoolboys (below) worked split shifts, did well.



The Ladies... Bless 'Em

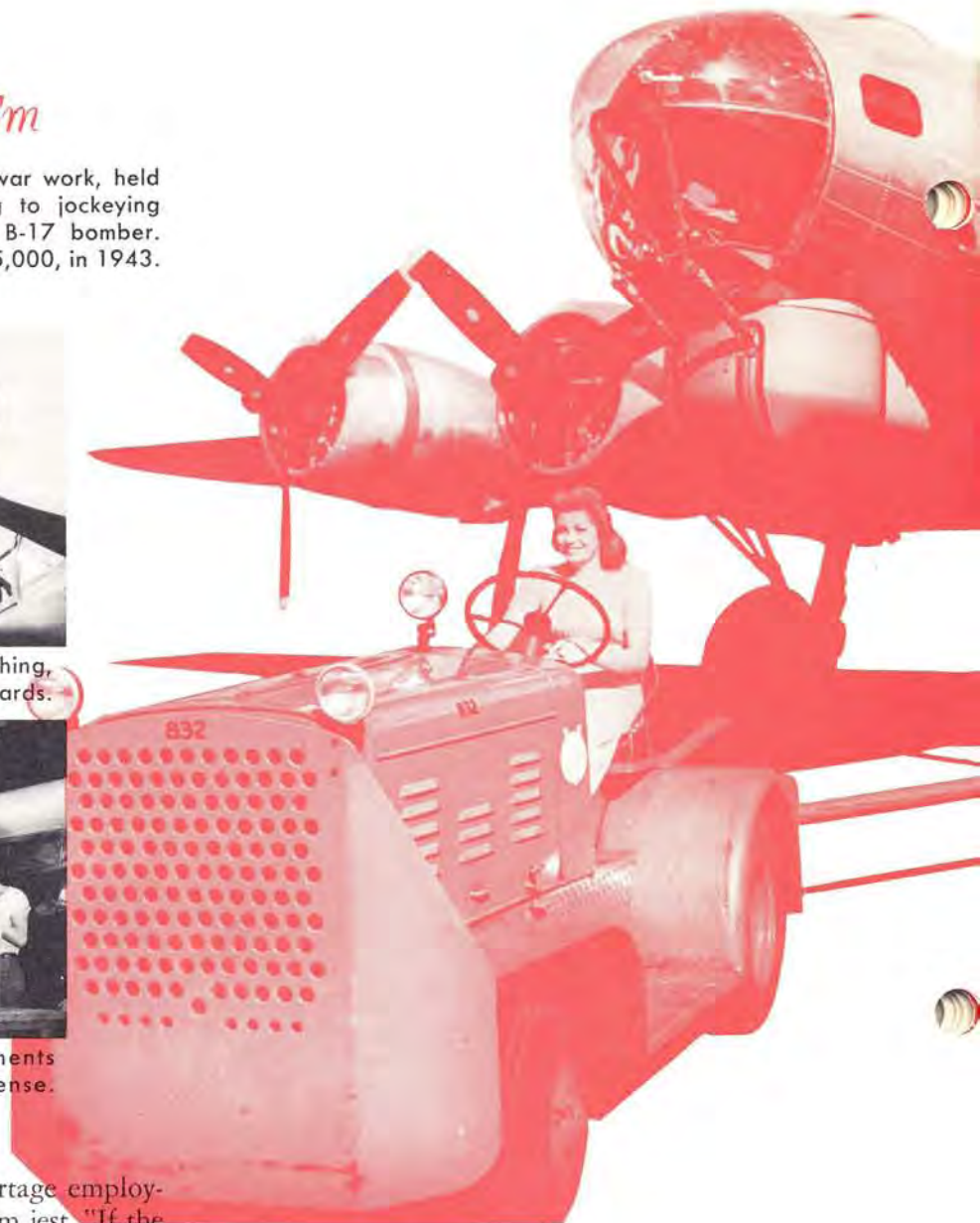
By tens of thousands women surged into war work, held wide range of jobs—from tool planning to jockeying tractors, like girl at right shown towing B-17 bomber. Feminine employment hit Lockheed peak, 35,000, in 1943.



Willing women workers tackled everything, including even P-38's complicated innards.



Experience evolved clothing requirements that stressed safety at fashion's expense.



At the height of the manpower shortage employment interviewers used a somewhat grim jest. "If the applicants are warm," they said, "we'll hire them. We've even come close to hiring a few that were cold."

One answer to the problem was youth. Lockheed initiated a plan whereby more than 4000 high school boys came to work in shifts—four hours of school, four in the factory, or four weeks of normal schooling, four full-time weeks on the job.

It's a Woman's World

But by far the greatest source was women.

"Big airplanes are made up of small parts," Courtlandt Gross declared when Vega was achieving its record production of B-17s. "And women build small parts to perfection."

They did much more than build small parts. Lockheed hired them by the thousands—when employment reached its 94,000 maximum in June 1943, nearly 35,000 were women, about 40 per cent of the total. It was the era of "Rosie the Riveter."

But handling riveting guns was only one of the

hundreds of jobs the "weaker" sex did—and did well. Housewives, war widows, grandmothers became stress analysts, expeditors, production engineers, tool planners, inspectors, turret lathe operators, and office workers.

Such widespread employment of women increased problems of absenteeism, health, safety, production scheduling, and job re-engineering. "Almost all of the women now hired lack industrial experience," an industrial relations survey reported in 1943, "and are not physically conditioned to factory work."

To help remedy such difficulties Lockheed established a women's clinic. A group of feminine counselors served as trouble shooters. They provided answers to emotional and domestic worries, arranged child care, and lent assistance in complex orientation problems that attended the huge influx of women workers in wartime.

Lockheed undertook many other services to keep its working family healthy and content. It cooperated

with federal agencies to solve housing problems. It took drastic measures to alleviate transportation bottlenecks arising out of gasoline and tire rationing. It set up "share the ride" pools, sold rationed bicycles at low cost, and formed its own bus service, operating or chartering as many as 117 vehicles that made nearly 500 daily trips and covered 12,000 miles a day to keep employees on the job.

Morale Builders

By providing entertainment and service the Lockheed and Vega Employees Recreation Clubs helped morale. In February 1942 the two clubs and Aeronautical Lodge 727 conceived and launched the industry's first Buck of the Month Club. Through this organization, on a voluntary basis, workers contributed \$1 a month to a giant pool that supported dozens of war-connected charities and activities including Community War Chests, USO, and American Red Cross. During the war years, appeals for blood resulted in a total of more than 100,000 pints voluntarily donated.

The Recreation Clubs also operated a \$1 million hot food system. It included two cafeterias that Lockheed built and gave to the clubs and a fleet of trucks that rushed meals to canteens in outlying factories. Commissaries served up to 60,000 hot meals a day.

By fall 1942 both Lockheed and Vega flew the Treasury Department's Minute Man flags after campaigns enlisted 96 per cent of employees to invest in war savings bonds. Unions representing Lockheed people joined their national organizations in "no strike" pledges and worked shoulder to shoulder to keep the airplanes coming.

Lockheed in 1942 inaugurated a unique retirement plan for employees. In addition to providing retirement benefits the plan accumulated cash bene-

fits available to terminating workers. Thus it served to supplement, in some measure, earnings that were strictly controlled under the government's wage and salary stabilization acts.

After midyear 1943 employment began a gradual decline. Liquidation of Vega at the end of that year and its full absorption by Lockheed consolidated operations and resulted in lessened requirements that cut payrolls by 14,000. Better utilization of manpower, space, and equipment, improved skills and experience, and decreases in absenteeism and turnover resulted in an upsurge in pounds of airframe delivered—14 per cent more in 1944 than in 1943.

That increased efficiency reflected itself in many ways. For example, the first production P-38 required 360,000 man hours to build. The 500th required less than 17,000. And the last P-38 to leave the line, nearly 10,000 airplanes later, represented only 3800.

Employment Continues Drop

By the end of 1944 employment declined to 60,000. The decrease continued slowly but steadily in 1945's early months. The payroll sank to 45,000 at V-E Day, and declined by another 10,000—through layoffs and voluntary quits—in the three months preceding Japan's surrender in August.

Throughout 44 months of war the Lockheed family achieved what Gross hailed as "a great and wonderful work—a magnificent work."

It took a lot of doing to win the war. It took long hours, hard work, disappointments, inconveniences, and personal sacrifices to bring victory and peace.

"You have done a good job," Courtlandt Gross told the work force after the Japanese capitulated. "And you have earned the lasting gratitude of every man and woman in America and the millions of freedom-loving people around the world."

Reservoirs for Peace.....

By the time Pearl Harbor plunged the U.S. abruptly into war, Lockheed already enjoyed a reputation for getting more pounds of good airplane out of fewer square feet of floor area than any other company.

It demonstrated such ability as early as 1939 when—with a rare combination of luck, knowhow, and downright hard work—it rolled 250 Hudson bombers off crowded production lines and delivered them to

Britain in less than a year's time. That order and reorders launched the company on its first major expansion program. At the end of 1941 Lockheed and Vega floor space had grown to 3.5 million square feet.

With the nation at war management of the two companies realized that they would be called upon to flood the skies around the world with combat planes. So they drew a deep breath and advanced into an era of unparalleled growth.



Desperate efforts to keep abreast of the swelling volume of orders for more combat aircraft added nearly 1.3 million square feet in 1942's first six months. By August the total stood at almost 6.5 million square feet. But that still wasn't enough.

So early in 1943 Robert and Courtlandt Gross agreed that a partial solution to lack of manufacturing space might lie in the establishment of small feeder plants in outlying areas.

Surveys revealed a number of potential advantages. Plants so located would avert further congestion in metropolitan Los Angeles, already critically short of housing and transportation. They could draw on a pool of unskilled and semi-skilled workers, in con-



Transportation was major problem in era of gasoline, tire rationing. Lockheed helped solve it by forming its own bus service (left) that carried thousands a day. Company also sold its employees rationed bikes.

trast to the acute labor shortage plaguing Los Angeles. And subassembly plants in warehouses, garages, store buildings, and bowling alleys would bring the war to the people—permitting housewives, mechanics, clerks, small businessmen, and the elderly to live at home and still be active in warplane production.

Feeder Plant Network

The plan proved successful. By the end of 1944 Lockheed operated 10 feeder plants—two each in Bakersfield, Fresno, Santa Barbara, and East Los Angeles, one in Taft and one in Pomona, employing a total of about 4000. Lockheed's phenomenal wartime expansion centered principally in California. But there were two notable exceptions.

One was Project Magnet, a huge overseas base in Ireland, born while the bombing was still going on in Hawaii. The other was a wartime modification and service center, first in the U.S., established in Dallas in March 1942.

Just four days before Pearl Harbor the Air Force asked Lockheed—which had had experience in overseas reassembly work since 1939—to establish a maintenance and overhaul base in the British Isles



C. S. Gross, then vice president, manned tractor at 1944 groundbreaking ceremonies for cafeteria built by Lockheed, donated to LERC. Right, President R. E. Gross, LERC's Hal Davis (seated left), Lodge 727's Dale Reed at Buck of Month Club formation in 1942.

with repair shops and accessories for 33 types of planes.

Over that weekend five men went to Dayton to work out a contract with the Air Service Command. They were still feverishly compiling masses of figures and layouts on Sunday, December 7, when a radio announcer's voice excitedly boomed out the news of what was happening in Honolulu.

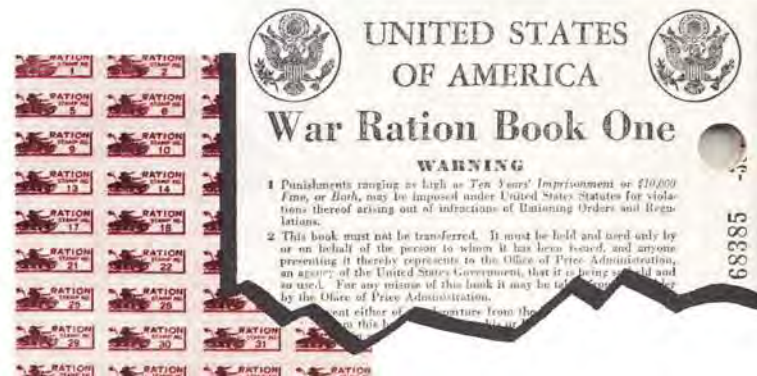
Lockheed Overseas Corporation Formed

Next day Lockheed submitted its proposal. The Air Force awarded a contract in February, and the company immediately formed Lockheed Overseas Corporation to build and operate the base. It named Carl B. Squier, Lockheed-Vega vice president for sales and service, as LOC's executive vice president, and Reagan Stunkel, Lockheed-Vega service manager, as general manager. Henry Ogden, now Lockheed Aircraft Service vice president, transferred from Liverpool—where he was head of Lockheed's British reassembly division—as LOC base manager. J. Kenneth Hull, now LAS president, became assistant manager. Roscoe Behan, now a member of the California Division sales staff, maintained the liaison office in Burbank.

Three months after the go-ahead, Lockheed transported hundreds of men and tons of material and supplies overseas. Their destination 20 miles west of

Remember?

Ration books and stamps (below) were familiar to Americans in war years. Lockheed inaugurated a cigarette rationing plan (right) to ease shortage.



Project Magnet: A City Overseas

Langford Lodge (right), Irish family estate, served as LOC headquarters, became center of vast modification, reassembly base employing over 6000.



From left, Ken Hull, Henry Ogden of LOC met with Architect George Russell in conference trailer LOC designed and built for General Eisenhower's use.



Belfast was Langford Lodge, the family estate of Sir Edward Pakenham, British general defeated in the Battle of New Orleans by Andrew Jackson's forces.

"When they arrived at their destination," Squier recalled, "the buildings that were supposed to have been erected and ready for occupancy didn't exist. So our boys, with help of any labor that could be rounded up, pitched in. They fought the North Ireland weather, mud, and discomfort with such determination and spirit that four months later they had built a modern industrial city through whose shops 500 aircraft already had been passed for repair."

Langford Lodge was indeed a city. It had its own telephone system, fire department, pharmacy, laundry, movie theater, bowling alleys, and library. In its first year it patched up 800 damaged planes and processed 50,000 accessories for the U.S. Eighth Air Force. At peak in late 1943 it employed about 6000. Before it closed in July 1944 it reassembled and modified 3250 planes, serviced 11,000 more, and overhauled 450,000 components.

Project Proves Successful

Operations at Langford Lodge constituted a tremendous accomplishment under adverse conditions in a foreign land 8000 miles from Burbank. But in 1944 Ogden, reporting on achievements, made use of the British flair for understatement.

"The results," he said, "have not been inconsiderable."

Wartime work at Langford Lodge was in addition to activities of reassembly divisions in Liverpool, Abbotsinch and Renfrew in Scotland, and Australia. At peak in 1944—when Dan Gribbon, now assistant to D. J. Haughton, Lockheed executive vice president—was Liverpool manager, these bases employed 2700. Throughout the war they reassembled, modified, and repaired 22,500 aircraft.

Because of heavy war production, plane builders found it difficult to make model changes on assembly lines without costly delays or confusion. To cope with the problem, Lockheed came up with another first when in March 1942 it set up a modification and service center at Dallas. This facility handled 2500 planes, including quantities of P-38s, and employment reached 2700 before it ceased operations late in 1945.

Training Division Established


Early in 1942 Lockheed also formed an aircraft maintenance and operation training division in Burbank—first in the U.S.—to help keep warplanes in the air. To it came U.S. Army Air Force and Royal Air Force flight crews, enlisted mechanics, and service representatives from commercial airlines. Altogether Lockheed trained 40,000 of them in an intensive 28-day course.

A major addition to Lockheed's facilities began operations early in 1944 with formation of a \$3.5 million Navy-Lockheed service center on a 77-acre tract at Van Nuys, California. The unit performed modification work on PV-2 Harpoons and other Navy craft destined for Pacific service. Before it closed in 1946 the Van Nuys facility employed as high as 2300

The Feeder Plants

Feeder plants eased manufacturing space, manpower problems. Lockheed operated 10 such plants at end of 1944, hired about 4000 for California feeder activities. Top right, mission style distinguished Santa Barbara plant. Lower photo depicts Bakersfield plant, converted from old ice skating arena.





Just three days before
A bomb ended global war
Lockheed factories still
buzzed with activity in
August 1945. Harbinger
of new age of jets, F-80
Shooting Star was poised
behind trio of P-38s in
lower center of picture.

and modified 670 airplanes. Subsequently the hangars, offices, and other buildings became a production flight base for Lockheed jet planes and later an early home of the Missile Systems Division.

Lockheed's physical growth did not slacken even in the war's later years. In September 1944 Gross announced a \$13.6 million construction program including a \$1 million hangar to replace the old pilot house at Lockheed Air Terminal. Floor area reached a peak 7.6 million square feet that year. In Southern California alone the company operated 18 manufacturing facilities. It had service bases and modification centers in California, Texas, England, Scotland, and Northern Ireland, and it maintained liaison offices in Washington, D. C., New York, Cleveland, Detroit, Chicago, and Rio de Janeiro.

Those facilities, Gross said at the time, were "vital to the war that still faces us." And, looking to the future, he stressed company planning would not only go through to the last day of battle but "far beyond into the peace we must win."

Victory—and Peace

Lockheed heard the news of Japan's surrender at 4:05 p.m. August 14, 1945. The mighty war was over.

From Pearl Harbor through V-J Day Lockheed built 19,297 Winged Stars—over 200 million pounds of aircraft and nine per cent of all U. S. production. The total included nearly 10,000 P-38s, about 5600 patrol bombers, and 2750 four-engine B-17s.

Company heads already had a taste of what the future held in store. From 1944 to V-J Day Lockheed received nearly 600 notices canceling commitments of more than \$1 billion. In turn the company terminated 42,000 purchase orders and settled some 7500 claims from subcontractors. A management committee for several months had been planning for conversion to peacetime operations.

In January 1945 employment stood at 60,000. By September it dropped to 35,000, about one-third of the 94,000 maximum reached in 1943. Deliveries during 1945 totaled 2821 airplanes, half the previous year's output.

With the rest of the world Lockheed and its people shared a fervent hope for years of peace. But accompanying those dreams was an immediate and sobering question. What lay ahead for Lockheed—a company formed to build civilian craft that had become the world's fifth largest producer of warplanes?

One man hoped he had the answer.

"We pass with determination and confidence from war to peace," Gross declared. With the "team effort" developed during the war, he said, "we do not fear the future."

Coming Next Month / FROM WAR TO PEACE

World War II brought new meaning to air power. The initial attack on the U.S. came by air. Airplanes saved freedom for the world when they alone held off the overwhelming land armies of the Nazis across the channel. Planes spearheaded every offense. An airplane opened the atomic era for mankind.

Within 24 hours after V-J Day work on 30,000 U.S. planes came to a halt. The Air Force canceled 18,000 contracts, declared \$10 billion worth of property surplus. It released men as rapidly as 11,000 a day. Early in 1946 General Ira Eaker admitted the Air Force did not have even one operational group ready to defend the country. Aircraft output slumped in 1946 to the equivalent of four days' output at the peak war rate.

Production fell so low that aircraft companies turned to designing washing machines and metal coffins and to stamping out automobile fenders. One company's employment dropped from 53,200 to 8300 in a few weeks. Another, from 37,000 to 5300; still another, from 41,400 to 4500.

Only Lockheed, almost alone in the industry, survived the abrupt cancelations and cutbacks without big layoffs. Virtually all the 35,000 people on the payroll on V-J Day returned to their jobs the following Monday.

How we did this makes another interesting chapter in our *Of Men and Stars* series. Watch for it at your gate boxes. And if you're missing one of the earlier chapters, call your division public relations office.