LIFE

JET PLANE

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P-80 SHOOTING STAR HAS FUSELAGE LIKE ROCKET BOMB AND BUCK ROGERISH FUEL TANKS AT WING TIPS. HEAT FROM JET ENGINE BLURS GROUND AT TAIL

SHOOTING STAR

JET-PROPELLED P-80, THE WORLD'S FASTEST PLANE, MAY SOON COME CLOSE TO THE SPEED OF SOUND

By JAMES FELTON

The speed dream of American airmen has always been the plane that could match the sun in flight across the continent—that would take off from New York City at 9 a.m. and arrive in Los Angeles at 9 a.m. Last week, to celebrate the 38th anniversary of the Army Air Forces, the War Department disclosed details of a new airplane which may yet win the solar race and even now lags only slightly behind.

The jet-propelled Lockheed P-80 Shooting Star is not only the fastest airplane in the world, it is also the most exciting aircraft development since Kitty Hawk. It has smashed all speed records, more nearly approaching the velocity of sound than any other plane. The Army conservatively defines its top speed as "in excess of 550 mph." It has banked and rolled more sharply than any other plane. For fuel it uses the same kerosene Grandma burned in her table lamp. It requires a minimum of 30 seconds for warm-up and prepares for flight more quickly in cold weather than in warm. It has no vibration and the pilot flying it hears no louder sound than the whir of a household vacuum cleaner. Its engine can be removed and replaced within 15 minutes, as against 16 manhours required to remove one engine of a P-38 Lightning. It is the simplest American fight-

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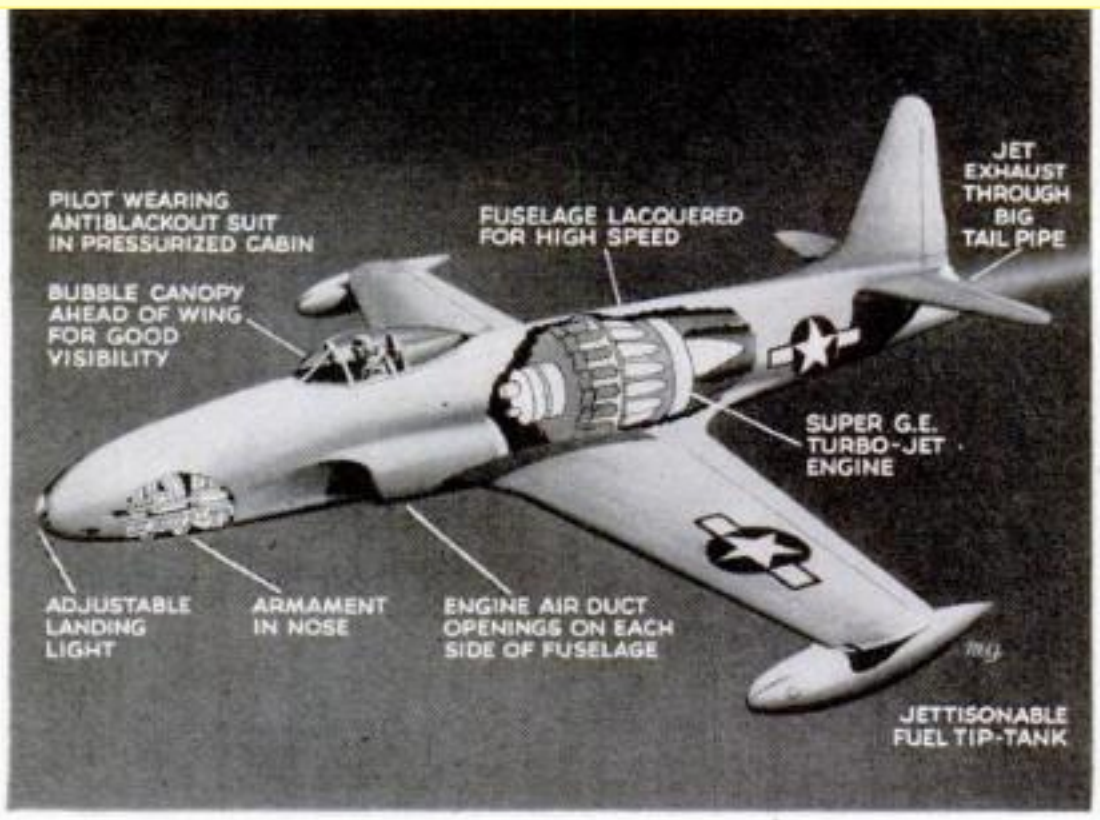

The super jet turbine, built by General Electric for the Shooting Star, is the most powerful airplane engine in the world and one of the simplest. Air is inhaled in huge quantities through fuselage ducts. In whirling front section of engine it is compressed, flows into combustion chambers where it mixes with burning fuel. Heated to high temperature, it expands tremendously in chamber behind engine and rushes through tail exhaust. Reaction to rearward thrust produces forward thrust which propels plane.

ing plane to fly. Without propeller or radiator or reciprocating motor, the P-80 requires only four engine instruments, in contrast to the Argus-eyed panels in conventional aircraft.

From the ground the roar of the plane's jet sounds like the screaming duet of a gigantic blow torch and summer thunder. But despite this blast of sound, few people, even in Los Angeles where P-80s recurrently streak the sky, have seen them overhead. By the time a spectator on the ground turns toward the sound, the plane has vanished in the opposite direction.

In appearance the Shooting Star proves that simplicity is beauty. Unlike most fighter craft, which park on the runway with nose high, the P-80 sits on a tricycle landing gear low and horizontal, small, squat wheels hugging its belly. Its fuselage resembles a torpedo, tapering back from a sharp, smooth, round nose housing six .50-cal. guns. The cockpit is slightly forward of the wings, giving pilots clear visibility down either side and ahead. Recently, Lockheed began building the P-80 with two graceful, jettisonable wing-tip fuel tanks. Electrically controlled, they feed simultaneously into the engine and can be dropped at the same time to preserve the plane's lateral stability.

So great is the P-80's speed that the slightest factor affects its flight. Consequently, Lockheed has developed a new lacquer finish, applied slowly, baked on and hand-buffed to a slickness that makes a newly polished automobile seem rough by comparison. The effect on the plane's appearance is dazzling. Its silvery gray flashes through the sky as brilliantly as glass.

A star is born

The story of the conception and construction of the P-80 is as dramatic as its performance is exciting. Back in the spring of 1941, when Lockheed's chief research engineer, Clarence L. ("Kelly") Johnson, sought Army funds with which to build an experimental jet-propulsion plane, the War Department turned him down. For Johnson's design required an entirely new type engine and the Air Forces were more eager to obtain multitudes of existing reciprocating-engine planes than to experiment with new kinds.

Johnson filed away his design. Then on June 17, 1943, while at Eglin Field, Fla. watching a new version of the P-38 perform, he met Colonel M. S. Roth of the Air Force at Wright Field. Roth told him of flight tests on the new Bell jet plane, which had speeds only slightly higher than standard fighters and certainly was no match for reported German jet craft.

"Kelly, why can't you design a jet plane around the British turbine?" Roth asked him.

Roth gave Johnson specifications of the British engine and described the type of jet plane the Army wanted to combat Nazi fighters. "And hurry," Roth added.

Johnson boarded a commercial airliner back to Los Angeles. Enroute he made sketches on the back of an envelope. The next day he went to work on foolscap, then on the drawing board. A week after

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he had talked to Roth, Johnson was at Wright Field with a sketch of the P-80 and a dozen pages of detailed specifications.

"We'll build it in 180 days," he told the War Department. The high command, desperate enough to believe him, handed him a "letter of intent" two hours later.

"Get busy, then," a general said. "This is day No. 1."

Johnson telephoned Burbank. By the time he returned next day, workmen were throwing up an old shed near the Lockheed wind tunnel. Since building materials were virtually unobtainable at that time, Johnson's workshop was constructed of old engine crates, scrap lumber and canvas.

The Army and Lockheed's President Robert E. Gross gave Johnson a free hand and complete supervision over construction—a radical departure from traditional aircraft-manufacturing procedures in which an engineer's job ends at the drawing board. So Johnson put on overalls, enlisted a staff of three assistants, 23 engineers and 105 shop mechanics. The engineers knew only that an urgent plant prototype was being built. Only five knew it was to be a jet-propelled plane.

This small crew worked ten hours a day every day of the week. The War Department gave top priority to all parts required. Six days after Johnson returned from Washington, Army trucks brought him wheels, tires, air-speed indicators, guns and radio equipment. A large red sign, "Our days are numbered," was attached to the back wall. Each day the wording was changed, *e.g.*, "This is day No. 14: 166 to go." When Johnson found that the drawing-board design did not work in fact, he changed design on the spot. At the end of the 19th day a wooden mockup of the plane was completed and Air Force men from Washington looked it over.

Construction of the plane was so well guarded that on one occasion their precautions proved embarrassing to Lockheed officials. Seven days before completion of the plane, Johnson and his aides were fretting because they still had no engine. The Army Transport Command had promised to fly one British engine from London to Burbank. At length the transport arrived, carrying the engine and with it a British civilian air technician. Exhausted by his 6,000-mile trip, the Englishman asked to be taken to his hotel in Hollywood for a brief respite before Lockheed workmen fitted the engine to the plane.

Lost: one technician

Hours later he had not returned to the factory. Anxious now to complete the plane, Johnson called the hotel and was informed that no such guest had checked in. He then dispatched Lockheed employes on a man-hunt through Hollywood. Finally, in desperation, he checked the police missing-persons bureau and found his expert in police custody. The arresting officer had asked for his draft card and, of course, the Englishman could not produce one. Asked where he was from, he said London but could show no passport. When he referred the police to Lockheed, the officers spoke to company attorneys who knew nothing of any British technician or any Shooting Star. By the time Johnson located his man, the latter was so embroiled in the law it was impossible to win his release that night. He spent the night in a cell. It was only through the combined efforts of Lockheed's President Gross, and War Department officials that he was set free next day.

On the 139th day the Shooting Star was completed and ready for an engine run. But in the haste of constructing the packing-crate shed, geometry had been overlooked and it was found necessary to tear down the building to get the plane out. Four days later the plane was put aboard an Army truck trailer, surrounded by heavy guard. The caravan began moving onto the highway at 1 a.m. Sunday, Jan. 9, 1944. They reached the Army's experimental field in the Mojave Desert about dawn. It was a bitterly cold and damp morning on the desert. Recent rains had left a covering of water on the landing strip. But one small stretch of dry ground was found. Ace Test Pilot Milo Burcham, who had test-flown the P-38 Lightning and the Constellation, climbed into the new plane, fastened on a brightly painted football helmet, snapped down the bubble canopy and started the engine. The roar boomed across the desert. Burcham waved, taxied down the strip, took off smoothly. He circled the field slowly. Then, as he started to gain altitude, the plane wobbled as if about to go out of control. Burcham turned back and landed.

Lockheed executives and engineers, remembering the early jinx on the P-38 Lightning, dug their hands into their heavy overcoats, swore, kicked angrily at puddles of rain water. Johnson ran over to the plane and talked anxiously with Burcham. Finally the two concluded that the pilot had been overcontrolling the plane with its extremely sensitive aileron boosters. Burcham decided to try it again. He took off, buzzed the field once and angrily roared out of

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After P-80's maiden flight in January 1944, congratulations are exchanged by the late Milo Burcham (*left*), pilot, and Lockheed's C. L. ("Kelly") Johnson, plane's designer.

sight. Then the show began. From a great altitude he dived toward the field, so fast that no one knew he was coming until he had passed overhead and the roar hit the crowd. "It was a blast of sound that surrounded us without seeming to originate anywhere," Johnson recalled later. After an hour of aerial gymnastics and high power dives, Burcham headed back for the landing strip.

He came in hot and, almost before he had stopped taxiing, he tore the bubble canopy back, jumped to the ground, threw his helmet down and shouted, "Jesus Chee-rist, what a plane." That was just 143 days after the War Department told Johnson to go ahead.

Lockheed immediately built a second experimental model. But when the Army, planning to put the P-80 in immediate production, tried to contract for more British engines, they found the manufacturers were unable to keep up with the projected output of planes. About this time General Electric came up with its super jet engine. So, using the G-E unit, Lockheed built 15 more prototypes. The engine change required extensive alteration in design but resulted in an even faster, more maneuverable plane. These models cost approximately $286,000 each. After they had been tested and improved the Army gave Lockheed a contract for full production. The first 500 Shooting Stars to be produced for combat are costing an average of $100,000 each. Lockheed estimates that before its second 50c contract is filled, the cost will be reduced by at least one third.

Jet propulsion is 265 years old

G-E engineers have kept pace with Lockheed, improving their product in step with advanced air-frame design, so that today it is the most powerful airplane engine in the world, especially at altitudes above 25,000 feet. Difficult as it may be for the man in the street to understand jet propulsion, the principle of the G-E engine and the Lockheed plane is actually very simple. Sir Isaac Newton first propounded it in 1680 when he built a jet-propelled horseless carriage to prove his third law of motion—to any action, there is an equal and opposite reaction. In the case of the P-80, the action consists of heating air, thus forcing it to expand and roar out the tail pipe. The reaction derives from the pressure of the expanded air against the interior of the plane, forcing it away from the jet blast.

Air enters through two vents that look like the gills of some swamp monster. It is whipped into an air-compression chamber by a rapidly whirling impeller driven by a shaft from the turbine wheel. The air is then heated to exceedingly high temperatures, producing terrific and immediate expansion which provides the thrust. Since the primary objective is to expand air, any low combustible will serve as fuel to heat the air. The irony of jet propulsion is that after spending billions to develop high-octane gas, America's aviation scientists discovered in old-fashioned kerosene a source of power that threatens to make gasoline-cracking plants obsolete. Because of the engine's location, the sound of combustion blasting out the tail pipe never reaches the pilot's ears. All he hears is the quiet whirring of the impeller. The comparative quiet of the Shooting Star is one of many comforts its design affords the pilot. The small cockpit is pressurized, air-cooled and cushioned against high-altitude thermal bumps.

Veteran test pilots and combat fliers are genuinely bewildered after their first flight in a Shooting Star. They can't comprehend the speeds they attain for, without the usual engine racket and without

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ground perspective at high altitudes, they have no way of judging speed save by the air-speed indicator. One pilot coming in for a landing at Burbank suddenly zoomed back into the sky instead of settling down. Afterward he explained, "I wouldn't believe my indicator. I was sure I wasn't traveling more than about 125. Then the airport disappeared under me and I knew damn well how fast I was going." Herman N. ("Fish") Salmon, one of Lockheed's best test pilots, had a similar experience on take-off. On his first flight he sped almost the length of the strip while observers shouted, "Pull back, pull back." With only a little runway left he took off, explaining later that he couldn't believe he was rolling fast enough to be airborne until he looked at his instrument panel.

"When a plane fools you like that on the ground, you can imagine what it does to you in the air," Tony Le Vier, another Lockheed test pilot, declared.

Colonel Bruce Holloway, one of the first Army pilots to fly the P-80, said it was more maneuverable than any existing conventional plane. "I have tested the P-80 in simulated combat against our P-51, P-47 and P-38 and have felt a complete mastery of the situation at all times."

The worst accident involving a P-80 to date occurred in December 1944 over the Mojave Desert and proved that "Shooting Star" is a misnomer: the plane leaves absolutely no tell-tale exhaust trail by day or by night. Lockheed had boasted that the P-80, unlike the Nazi jet fighter, emitted no comet-like streamer. The Army wanted proof. So a pilot was sent up at night in a Shooting Star. The point was made—tragically. So clean, so devoid of any exhaust trail or sparks was its flight that an Army bomber collided head-on with the jet fighter. All occupants of both planes were killed.

For Johnson, who was nicknamed "Kelly" because he wore green ties to school, the P-80 climaxes a career that began when, as the 12-year-old son of Swedish immigrant parents in Ishpeming, Mich., he designed his first plane in an aviation scrapbook. He called his plane the "Merlin," after the magician, and forecast it would do all the impossible things defined by its name—like fly to the moon and travel 300 miles an hour. The years have not dissipated Kelly Johnson's imagination, but they have superimposed engineering skills upon youthful dreams and the result is the Shooting Star.

Johnson still does a little bit of dreaming about the P-80. He believes that some day he or another engineer will whip compressibility, the phenomenon which prevents planes from exceeding the speed of sound, so that some day a man may leave New York after breakfast and arrive in Los Angeles in time for dinner the night before—or like the whiffle-diffle bird, overtake himself from the rear. Of more immediate significance is the fact that the Air Forces like Johnson's plane. A great, new training program is currently rushing out pilots to fly jet fighters. The P-80 shares the nation's highest materials priority with the B-29, a hint to the assignment it awaits. Kelly Johnson's Shooting Star may never reach the moon, but it may well help to eclipse the Rising Sun.

Nazi jet planes like these HE-162s were being built at the rate of six a day in underground salt mine when Americans captured it in April. By October, production would have been 500 a month. Said the U. S. Air Intelligence Chief, "We stopped the Germans in the nick of time." Production of the P-80s, which are not yet battle-tested, was considerably behind production of Nazi jets, which were in combat last summer.