

Perhaps it was already obsolete. But to those who built it and to those who risked their lives to test-fly it, the first flight of the world's most powerful jet engine was the tense climax to four years of dreams and drama



**HOW IT FLEW:** Fastened to the tail of a B-47 bomber, the Iroquois engine is test-flown near Toronto. Some experts believe, full out, its scream could kill.

## THE DAY THE IROQUOIS FLEW

By June Callwood

PHOTOGRAPHY BY JOHN SEBERT

**T**he big plane hung low under listless cloud, a freak aircraft that induced pity for its awkwardness. Basically it was still a medium bomber, the B-47, with six jet engines streaming black smoke, but aeronautical engineers had warped its shark outline. Clamped to one side of its tail was a seventh engine, the two-ton Iroquois, which has been called the most powerful jet engine in the world. Canadian-designed and built, its four-year development program had cost at least thirty million dollars. On November 13 around noon on a day that threatened rain, the Iroquois was lugged into the sky for the first time by the B-47 and started. Some felt that the resultant roar was only simulated life; with Sputniks racing overhead it may yet be decided that the Iroquois was born dead.

In spite of the sense of doom that rolled around the horizon, few mechanical births have been so joyously received. The Iroquois is being built by Orenda Engines Limited, a subsidiary of A. V. Roe Canada Ltd., at Malton, near Toronto, and the company was anxious to see the engine airborne in order to soothe government sponsors grown restive. The company had taken only three years to put into production its first jet engine,

called the Orenda, now flying in Sabres and CF-100s on four continents. The Iroquois flight tests, however, had been notably laced with delays. For almost a year before it was actually airborne the company periodically predicted that the engine would fly "in a few weeks."

While the company took four years to bring the Iroquois from the drawing board to the moment of flight, its officials say the performance was far from slow, considering the difficulties. Had it followed the general practice of aircraft-engine companies the next engine built after the Orenda would have been only slightly more powerful. It was decided in 1953 to leap-frog this logical step, and the next, and build the strongest engine in the world. The company was then just seven years old; some felt the project was brave impudence.

The hitches were just as massive as the dream. Orenda needed a huge airplane to support its baby brute through flying tests. Several were considered and the B-47, ninety-ton jet successor of the "Flying Fortress," was determined to be best. Torrential paper work ensued but eventually the United States Air Force "lent" a B-47 to the Royal Canadian Air **continued over page** →

"As clouds rolled over the  
airfield, apprehension  
was pitched so high it was  
inaudible. Miles away  
a child looked skyward and  
a wife waited in fear"



#### THE MAN WHO FLEW IT

Chief test pilot Michael Cooper-Slipper eases last-minute tension with a smoke as he awaits take-off clearance from tower.



#### HE HELPED DESIGN IT

Tense and weary, Burt Avery waits it out.



#### ANOTHER GIANT WAITS ITS CUE

As one Iroquois is about to be flown, another (mounted on platform) is checked in test vault by engineer Harry Keast.



#### THE MEN WHO MADE IT READY

With co-pilot Len Hobbs peering over their shoulders, ground crewmen make a final inspection of the Iroquois. The engine, which may sell at a hundred thousand dollars, will power Canada's new fighter-interceptor, the Arrow.



#### HE RAN IT IN THE AIR

Flight engineer was John McLachlan. Idling, jet uses 600 gallons an hour.



Force, which "lent" it to Orenda. Canadair, an aircraft company near Montreal, needed more than a year to fit the plane with the lopsided pod that houses the engine and equip it with almost twenty tons of ballast and instrumentation.

The engine itself contains a great deal of a new metal called titanium, as strong as steel with little more than half its weight. Orenda had to pioneer in the use of titanium, a metal so tricky that it must be welded in a bubble chamber from which all oxygen has been removed. The inventors discovered, when they placed their twenty-foot offspring on a test bed for the first time, that they had created simultaneously the world's most powerful engine and one of the world's loudest noises. When the Iroquois is running full throttle its noise is sufficient to deafen a man permanently; in fact, some even believe it is possible the noise will kill a man standing a hundred feet away. New test cells, two-story vaults where the engines can be mounted on concrete blocks and run for days in order to test component parts, had to be built with extraordinary sound-swallowing capabilities that cost about eight million dollars. The problem of protecting the hearing of ground crews is a matter of continuing research and will still be under study and refinement when the Iroquois is finally wedded to Canada's fighter, the Arrow.

As the summer of 1957 turned languidly into late-arriving fall, the time was reached when the Iroquois had to be flown. The government was impatient, critics had a satisfyingly large target for harpoons, one of the payments on the RCAF contract was hanging on the event. The company itself was suffering from a mass case of nerves. Tempers were waspish and irritation became almost constant.

Discussing the possibility of a titanium fire in the engine, which can only be extinguished by smothering, an engineer one day asked one of the test pilots what procedure he was considering.

"Well," the pilot began lazily, "first I'd jump out..."

"THAT'S NOT FUNNY!" shouted the engineer, furiously.

On the morning of the flight the B-47 was parked in a corner of Malton Airport, where airline captains, to the despair of the tower control, veered from normal taxiing areas to trundle pas-

sengers past for a closer look. The B-47 seemed dispirited. Its flexible wings, which can flap as much as seventeen feet in stormy flight, drooped. Its bands of fluorescent red paint, required by experimental aircraft as a warning to curious sky sightseers, had peeled and blistered. The USAF markings had been removed but the ghosts of the letters showed through. The former bomber hadn't left the ground for five months and to the casual observer had acquired a rooted look, as though geraniums might soon be planted around the undercarriage and washing strung from the two-story-high tail fin.

A small knot of men was gathered around its tail, huddled in turned-up coat collars and peering with cautious faces into the blackened tail-pipe of the Iroquois. The inert metal slug of an engine, which one day may have an estimated hundred-thousand-dollar price tag, gave back no hint of its present mood.

The two pilots, in dull-blue flying suits, stood aside, glowering indiscriminately at the thing they were asked to fly, at representatives of a management that required them to fly it and at the weather, which threatened to impede a flight they didn't want to postpone again. They were no longer discussing the issue of two days ago, when they had first expected to test the engine. A snag had been discovered in the Iroquois, with one and possibly two oil leaks. The inspection crew, in spite of awareness of high-level urgency, had refused to certify it ready for flight.

Nevertheless, a compromise was reached. Changing engines with one of the others available might have meant a month's delay, so it was decided to test the engine anyway, but only at idling speed.

The inspection crew then described the plane suitable for flight "under limited conditions" and the pilots agreed. It wasn't the happiest arrangement, but it would have to do.

Now, with apprehension pitched so high it was inaudible, clouds rolled over the airfield and rain was forecast. No test flight can be carried out until visibility is better than three miles. A light going out at Malton's control tower would give the signal when conditions cleared. The flying crew, two pilots and a flight engineer, watched the weak sun working through the murk and waited. To avoid the subject at hand, they talked about Wichita, Kansas.

This crew, Michael Cooper-Slipper, chief test pilot, Leonard Hobbs, the other test pilot, and John McLachlan, flight engineer, had been the first civilians from an outside country to train on the USAF's B-47. Exactly a year before, they had spent six weeks at the Strategic Air Command's training base, McConnell, outside Wichita. Skipping only the lectures on bomb-aiming and nuclear devices, they took the stiff SAC training that begins with 6-a.m. briefings.

They discovered what they had gloomily suspected, since they have long maintained that modern pilots are no longer fliers, but airplane drivers. The B-47, more so than any of the fifty planes Cooper-Slipper and Hobbs have flown, is operated mathematically. Pilots carry a briefcase into their cockpits and require a slide rule.

"The B-47," their instructor told them, "is critical on fuel. In fact, the B-47 is critical all around."

It is the fuel problem that makes the slide rule necessary. The basic weight of the B-47 is about forty tons and it can take on up to fifty tons more of bombs and fuel. Its varying weight, however, determines its take-off speed and its landing speed. Pilots must know, to the pound, how much the plane weighs.

"I've got a very funny idea," Hobbs murmured dreamily one day. "I think I'll take an abacus

into the cockpit. Can't you see the instructor's face?"

The calculations in the cockpit are continuous. For example, the B-47 uses two pounds of extra fuel per degree of a turn sharper than thirty degrees. Nothing is casual—"The B-47 is a very unforgiving aircraft," someone commented—and each man sits at the centre of more than a hundred dials and instruments. "Remembering that there is fuel all around you, in the body, even under your seat, helps to keep your mind on your work," observes Hobbs.

The two pilots became celebrated honorary members of the officers' club at the Kansas base. "Do you mean," asked a Texan incredulously, "that you little old Canadians have got the biggest engine in the world? And you're going to put it in the tail of a B-47? Man, you're crazier than we are."

Strategic Air Command stopped buying B-47s in 1956 and switched to the longer-range eight-engine B-52s. By that time SAC had about three thousand B-47s scattered all over the world. Every one of them could **continued on page 43**



#### THE PLANE THAT FLEW IT

Rising to 14,000 feet on its own six smoky engines, the B-47 levels out and the Iroquois is "lighted."



#### THEY PRAYED IT WOULD COME HOME

Mrs. Cooper-Slipper and son Christopher watch. For the first time in 16 years she knew the ache of fear.





**"There's the light! We can go!" called the pilot. Crews hustled, engineers stepped back. Take off . . .**

carry a single bomb that had more explosive power than all the bombs dropped by all the combatants in World War II, and SAC made certain that this information was general knowledge. Of its insignia, a mailed glove holding lightning and an olive branch, its former chief once said, "You takes your pick."

The USAF pilots training at Wichita were under a strain, not only because they were aware they might be required to push a bomb-release button some day, but because the course was ruthlessly tough and many of the students were high-ranking officers past youth who had known their own commands. Much dignity was lost. "I saw a major with eighteen years of flying experience being chewed out by a kid," Cooper-Slipper reported one morning. Hobbs pointed, "Look over there, a full colonel is getting it."

The refuge was humor in the cocktail-lounge environment of the officers' club. They swapped shop talk. Korean veterans spoke of jet-fighter dogfights with the Russian MIGs, considered by most pilots to be the last dogfights war will know because modern fighters are so fast no flier will see his enemy. They discovered that Cooper-Slipper, thirty-seven, a mild green-eyed man, had fought Germans in the Battle of Britain, in which he won a Distinguished Flying Cross, and Japanese over Singapore, where he was briefly captured in a jungle and escaped by Chinese river boat to India.

Cooper-Slipper, now a Canadian citizen, received his DFC for ramming a German bomber. The impact sent both planes screaming down in flames and Cooper-Slipper recovered consciousness hanging from his parachute with some of his fingernails ripped away.

"Why did you ram it?" someone asked.

"I was out of ammunition."

"I said, why did you ram it?"

Cooper-Slipper considered. "Everyone was doing that sort of thing at the time. It seemed, well, stylish."

"C'est la cotton-pickin' guerre," nodded a southerner. "I remember one time I was taking off and I looked below and saw this buddy who was right behind me go crashing into the end of the runway. The student says to me, 'What'll I do?' and I said, 'Be quiet, I'm thinking.'"

There was an uproarious laugh in which the pilots' wives shared only thinly. "Well, there were flames everywhere so I figured he had bought the farm. A few days later I saw him again. 'Not you!' I said. 'Sure,' he says. 'That fighter isn't much of an aircraft, but they sure build the cockpit strong!'" The men around the table laughed again, but the women were quiet.

The B-47 bred its own jokes. "If an engine starts to burn," an instructor said one day, "let it burn. No sweat. You've got five more."

Noticing trouble with an engine during a flight, another instructor ordered his student, "Shut down Four!" "Sure," replied the student cheerfully. "Which four?"

"No sweat," recalled Hobbs lightly, as he surveyed the B-47 waiting for him at Malton a year later. "If we lose an engine, Mike, we've got six more." Cooper-Slipper smiled without mirth and Hobbs squinted in the direction of the control tower. Hobbs, thirty-seven, is the father of four small girls. English-born, he spent

most of the war impatiently instructing in Canada and later saw action over Sumatra and Malaya. He looked away from the tower and looked back again hastily, "Mike, there's the light! We can go!"

Where there had been apathy, there

now was hustling, ordered confusion. Ground crews pulled the covers off the six slender engines and engineers stepped away from the humping bulk of the Iroquois. McLachlan, the Scottish-born flight engineer, climbed the ladder into the

plane first, edging along the narrow aisle to the nose of the B-47, where he sat almost in darkness, except for three small portholes almost above him. "The mole-hole," crews call the engineer's cockpit. He checked over again the extra instru-



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ments that would give him readings on the behavior of the Iroquois. Many of the readings would be done automatically, recorded on film and tape. Central Records Room, near the ponderous earth-bound test cells, would also be receiving information, which could be fed into an electronic computer, assayed and typed into a full report before the aircraft landed. Aero-dynamicists have developed a cavalier attitude toward the importance of human judgment. "The pilot is still useful," one of Orenda's engineers explained benignly. "For example our instruments don't tell us if the engine gets wet. A pilot can report back if it is raining."

The pilots, at this point, were climbing into the B-47. The pre-flight check of two hundred bits of equipment and instruments, which takes better than two hours, had been completed long before but some final calculations and checks had to be made. They fastened their parachute harnesses, cramped in the confines of a cockpit so narrow that they sit one behind the other. They plugged in the cord for the wireless, settling gold plastic helmets on their heads. The earphones are in the helmet and the speaker in the mouthpiece of the oxygen mask. They connected their oxygen outlets but let the rubber-smelling masks hang free.

Cooper-Slipper was rechecking his fuel. He had started with thirty-six thousand pounds of good-grade kerosene, which jet engines burn. Pounds are used as a fuel measure, rather than gallons, because they are more reliable. A gallon of kerosene weighs about seven and a half pounds.

The Iroquois engine had been run two days before for a few minutes to determine whether the oil leak was still present—it was—and in the process about four hundred pounds of fuel were used. It would take twenty-five hundred pounds of fuel to start the six regular B-47 engines and taxi the aircraft to the runway, and another six hundred pounds to get the plane into the air. The Iroquois at idling speed would need about forty-five hundred pounds of fuel an hour, better than six hundred gallons. Take-off speed, Cooper-Slipper computed, would be a hundred and thirty-three knots. The plane began to move.

"Do you smell fuel?" Cooper-Slipper asked Hobbs over the intercom. Hobbs sniffed the fumes of kerosene seeping into the cockpits, made a decision that it was unimportant and said firmly, "No."

"We're off then," said Cooper-Slipper. Lumbering with a sense of protest, the heavy plane lurched along the runway, pivoted clumsily and paused, waiting for clearance from the tower to take off. The six engines fouled the air behind with towering black smoke. Charles Grinyer, engineering vice-president of Orenda who all but broke his health on the Iroquois project, was startled the first time he saw the B-47 rolling by. For a moment he thought it was on fire. Its capacity to create more smoke than a coal-run locomotive is not considered the B-47's proudest achievement.

Burt Avery, at thirty-five a deputy chief engineer and one of Iroquois' principal designers, stepped out of his office to watch the B-47. Designing jet engines is a young industry, only fourteen years old, so Avery's youth is not considered extraordinary at Orenda. With Harry Keast, the chief engineer, he had been present at the moment the Iroquois ran for the first time in a test cell and both men considered this the most exultant few minutes of the entire project.

When the first engine was put into a test cell several years ago Charles Grinyer was there along with Keast and the

## We asked....

"Would you approve of a woman serving as prime minister of Canada?"

## They answered....



**Byrne Hope Sanders**, vice-president, Gruneau Research Ltd.—"I most certainly do! My conviction is based on the obvious fact that before a woman could have the chance to be PM she would have had to possess unique qualities. None of the traditional fears of ineffectiveness applied to women would exist. This established, with a majority of Canadian MPs at her side, and Canada's sound bureaucracy behind her, she would stand in her sphere as the Queen does in hers—a skillful, experienced, perhaps brilliant leader."



**Dr. Malcolm Ross**, head of the English Department, Queen's University—"We are a prudent people. We watch and wait. It would be against the grain of our character and our tradition to elect a woman as prime minister now. But our day will come—when there is a woman in the White House, a woman in the Vatican, and a woman in centre field for the New York Yankees."



**Anne Francis**, journalist—"Why not? I have no prejudice against people on grounds of race, religion or sex. For example, I have no prejudice against the Queen. I would not vote for a woman who ran for PM unless she were better qualified than the other candidates in the field: I don't approve of voting for people just because they are women any more than I approve of voting against them just because they are women. At the moment, I can't think of any female who has the necessary political experience (although many women are quite good at baby kissing), the Amazonian physique, the tact and charm required to keep all those men in the House of Commons in order. When such a woman does run for office, I will be out there shouting for her in my high squeaky voice because, no doubt, I'll be a very, very old person by then."

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volatile, intense Polish-born Alex Mura-szew, now a deputy chief engineer. They worked through the day preparing for the first start, stayed in the factory into the night. Around two or three in the morning they started the starting motor to spin the Iroquois' compression blades. The Iroquois ran, with flames pouring through its turbine, but quit when the starting motor quit. The men went home too defeated to speak much and returned the next day.

Grinyer had to catch a plane to Ottawa. He waited as long as he could and then, throwing a few agonized suggestions over his shoulder, hurriedly left for the airport. A few minutes later the Iro-

quois ran by itself, without the support of the starting motor, and sucked a snow-storm of insulation material out of the walls of the cell. The engineers hugged one another and got the message to Grinyer just before he climbed in his plane. He reported later he grinned all the way to Ottawa.

"That was the best moment, the first time it goes," recalls Keast. "The best moment."

Avery agreed, but on the momentous day of the flight test he watched the B-47 just the same. Earlier in the test program, an Iroquois had partially exploded in a test cell, spraying shrapnel-like pieces of metal all over the room, which providen-

tially now is sheathed in steel. This had happened more than once during tests and, in a sense, was to be expected. He was as certain as an engineer can be that the Iroquois in the B-47 would not explode, but he nevertheless was uneasy.

"What's there to worry about?" Hobbs had said on this point the day before. "The worst thing that can happen is an explosion that blows off the tail. Right? Well, we've got ejection seats and we'll have plenty of altitude. Just a bit chilly on the way down, that's all."

The plane left the ground at five minutes after twelve, climbing eastward over Toronto. Christopher Cooper-Slipper, eleven-year-old son of the pilot, looked up on his way home from school and recognized the B-47. When he saw his mother a few minutes later, he wore a look of delight and thumbed in the direction of the sky. She knew, with a sinking heart, what he meant. Though her husband has been a pilot for all the sixteen years of the marriage, this was the first time she had been afraid. The night before, she had cried.

"What's wrong?" Mike had asked. Her sobs increased. "What do you think?" she wailed. Len Hobbs' wife felt equal dread. "I hate that plane," she had said on the phone to Rita Cooper-Slipper that day. "I wish they could test that engine on the ground."

In a small control tower on the roof of a building of Avro Aircraft, a sister company to Orenda, an operator was informing the B-47 that a toy-appearing CF-100 was following as a chase plane to observe it through the test.

"Reg is air-borne right behind you," said the operator, referring to Reg Kersey, an RCAF acceptance pilot who tests CF-100s off the A. V. Roe assembly line.

"Hi, Reg," said Cooper-Slipper, amiably.

"Do you mind if I tag along?" asked Kersey, politely. "I'll stay wide of you."

"Appreciate having you along," replied Cooper-Slipper, formally.

A moment later he reported casually, "I had a momentary fire warning on Number Three just at take-off, but it's all right now."

"Both Three and Four looked hot on take-off," the operator in a mobile radio truck announced. There was no reply.

In the dim noise of the plane, McLachlan was scribbling reports, his eyes flying over the confusion of dials and indicators. Hobbs was fingering the red lonely throttle of the Iroquois, located near the cozy row of six throttles for the other six engines. Cooper-Slipper watched the sky, keeping away from cloud as test-flying regulations demand. At his signal, Hobbs moved the switch that opened the superbly machined round door covering the opening of the Iroquois. Air rushing through the engine started the hundreds of compressor blades spinning. The process is called windmilling; the Iroquois cannot be started by itself, it requires either a portable ground-starting motor or fast-flowing air.

"I'm going to level off at fourteen thousand, increase the speed to three-ten (three hundred and ten knots) and try to light," Cooper-Slipper announced to the control tower.

McLachlan moaned, watching the indicators. "It won't light. We need twenty-five to light," he complained. Flying crews always speak of "lighting" a jet machine, rather than starting it. When McLachlan spoke of "twenty-five" he was reminding Cooper-Slipper of the estimate of engineers that the Iroquois wouldn't start until the rushing air windmilled its blades at twenty-five percent of their potential revolutions per minute.

"It'll light," said Cooper-Slipper grim-



ly, edging the speed of the flying test bed up to three hundred and twenty knots.

At eighteen minutes past twelve he advised the tower, "We're setting up now. Getting ready for a light."

"Mike," protested McLachlan. "It won't light. We're only getting eighteen-point-eight!"

"Listen to ole misery," chided Cooper-Slipper, fondly. "Light it, Lennie." He inched the throttles open, and the speed indicator read three hundred and twenty-eight knots.

Hobbs pushed the red button and pulled the red throttle. All three watched the instrument panels, and the moment hung. On the third time Hobbs tried it, all the indicators jumped. A shout tinged with awe filled the aircraft. There was no sound from the giant on the tail, and no sensation at all. Cooper-Slipper moved the other six throttles back imperceptibly, so the forward speed of the plane was unchanged. The ungainly B-47 glided silently through space on seven engines. As with all jet aircraft, the only noise was the wind whistling over the canopy.

McLachlan, feeling an elation that brought him close to tears, made rapid notes and kept watch on temperature indicators. If the Iroquois registered too much heat, he had a switch to shut it down immediately. Both pilots have such switches as well and jovially call them panic buttons.

"Don't get too close"

At twenty-seven minutes after twelve, Cooper-Slipper laconically announced, "Okay, Reg. We're lit."

The small audience in the control tower tensed. "I don't see a thing," Kersey reported, sounding disappointed. Listening in the tower, the flight-test supervisor, Jack Jones, mopped his forehead and, muttered, "You're not supposed to see anything."

Six minutes later Cooper-Slipper announced, "I'm throttling back now, Reg, to descend and shut it down during the descent." This was a precaution, agreed upon before the flight, to ensure that loose oil from the oil leak would circulate all through the down-tipped engine instead of collecting in a highly inflammable puddle. In the tower Jones said abruptly, "Tell Reg to drop back and see if there is any flame in the back. Tell him not to go too close."

Kersey received this and a moment later reported, "I'm seventy-five yards behind you and I can't see a thing. It's all dark."

With heartfelt emphasis that made the control-tower operator grin, Cooper-Slipper replied, "Thank you very much." Only half an hour had elapsed from the time of take-off; it seemed much longer.

All three said afterward that they had not been afraid and it seems likely, in view of the harassing detail of their responsibilities, that this might have been true.

It had occurred to the ground crew to study the emergency-procedure manual only that morning, when the chief complained that he hadn't been informed where in the fuselage it was safe to sink a rescuing axe "in case you fellows pack up." The B-47 leaves nothing to chance; there is a thick text for ground crews in such an emergency. Hobbs and Cooper-Slipper, thus reminded, opened their own manuals.

"I love this, Mike," observed Hobbs easily. "Everything ends with 'abandon aircraft and assemble upwind!'"

"Wonder what it says if we have to ditch in Lake Ontario," murmured Cooper-Slipper. "Probably 'abandon aircraft and assemble upstream.'"

Both men are on friendly terms with fear and have made the valuable discovery that panic doesn't congeal their reflexes. Cooper-Slipper found in the Battle of Britain that terrible danger turned everything around him into slow motion; the enemy on his tail flew sluggishly and lazy-moving bullets gave him an infinity of time to elude. In a slit trench in Singapore he got a good look at courage, watching a handful of survivors of a Highland regiment lacerated by Japanese machine-gun fire rise and march, in formal parade order, across a causeway

through cross fire that missed every man.

Hobbs had been terrified only once, on his first mission, a ground-strafting one over a Sumatra airfield. The RAF plane in front of him suddenly turned into a bonfire and plunged down. He was next through a lacy cascade of tracer bullets. The thought of death, which had never occurred to him before, turned his bones to water. He continued steadily on, through the tracers. He later recalled an air-force saying: "Flying is sheer boredom, punctuated by moments of stark terror."

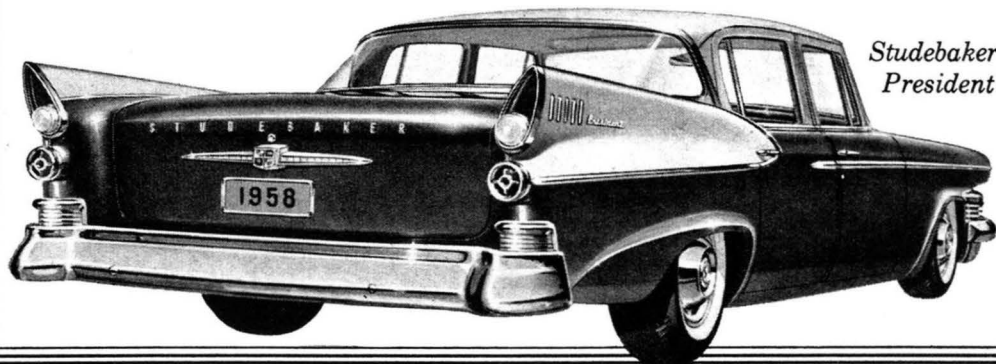
Both men are among some thirty test pilots who make a high-salaried living in Canada's young aircraft industry. Most of them are production-line test pilots, checking new aircraft off assembly lines. Only a few are experimental test pilots. All are meticulous, controlled men with watchful eyes and the faculty for patience. The noble test pilot Clark Gable used to portray, a jaunty rake in a leather jacket, goggles and a scarf fluttering from his throat, either was killed twenty years ago or left flying through sheer unemployment. Modern test pilots often cali-

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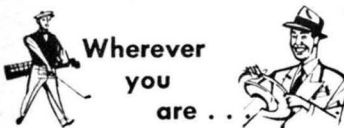
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brate into the sky an aircraft worth more in dollars than many a small town. Their chief value to their employers is in keeping the risk factor at a calculated minimum.

Insurance companies don't agree with the pilots, who like to protest that their occupation is safer than driving a bus. Premiums on twenty thousand dollars' worth of insurance are more than fifteen hundred dollars a year and few companies will accept the risk. The aircraft and engine companies pay pilots' coverage.

Rather weirdly, pilots describe other pilots who have died in accidents as having killed themselves. "He killed himself in a CF-100," a test pilot will remark idly. "The thing caught fire and the ejection seat jammed. Just wasn't his day." Some people suspect that the expression is meant to convey that death by flying isn't involuntary; pilots are reluctant to admit they have lost any measure of control over their own destiny. As a protective device, however, they rarely make a close friend of another pilot.

As they turned the B-47 back to Malton, Cooper-Slipper and Hobbs were aware that the passenger on the tail had just taken a giant step closer to making them obsolete. The Iroquois can provide more power than any present airplane can use without melting. (It is normal for modern engines to have outstripped planes: even the outmoded B-47 has never been able to use the full power of its engines.) An Arrow will not dare use all the speed that its two Iroquois could provide. At twice the speed of sound, which is well under the Iroquois' capabilities, air friction raises the temperature of the plane's outside skin to better than 250 degrees F. At three times the speed of sound the outside temperature goes to 600 F. Refrigeration equipment, to keep the pilot from cooking, is bulky. Manufacturers all over the world are balancing costs. Is it cheaper to keep the man in the plane and spend a fortune on machinery to keep him alive, or is it cheaper to put in a robot pilot and risk losing the aircraft?

"An automatic pilot is a moron," Burt Avery, one of Iroquois' designers, once commented. "We have to decide, how much is the human ability to make a decision worth?"

Many experts feel that military aviation has reached its final manned stage, that such engines as the Iroquois will never reach their highest potential with a living hand on the throttle. The Arrow, the fighter-interceptor for which the Iroquois was designed, may be among the last of the manned fighters.

Symptoms of the brink flying now teeters on appear daily in newspapers. A U.S. Navy fighter, diving at about eight hundred and eighty miles an hour, overtook its own cannon shells and shot itself down. Jet pilots, flying toward one another and a mile apart, would not have time for the signal of danger to reach their brains before the collision occurred. The fire control of modern fighters is steadily becoming more complicated because pilots will never see the enemy, only an after-image that is approximately eighty-eight feet behind the real plane. Fighters, such as recent versions of the CF-100, are mainly portable launching platforms for air-to-air missiles.

"The speed of aircraft has almost exceeded the capability of the human to react quickly enough to carry out necessary motions," the former chief of air staff, Air Marshal Roy Slemon, said a year ago. "It is necessary for the air force to get into automation."

Said Nikita Khrushchev a few months ago: "We are standing at this moment at

a turning point regarding the use of airplanes in a future war. They are in decline."

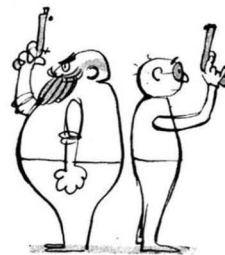
Even the greatest supporters believe the manned aircraft faces extinction. Many estimates give it less than eight years' existence and the most optimistic figure no more than twenty years.

"We are not yet obsolete," Cooper-Slipper once observed somberly, "only obsolescent."

Preparing to land the B-47, Cooper-Slipper was receiving orders from Malton tower, which referred to his aircraft variously as "X-Zero-Five-Nine," its serial number, and "Baker-Forty-Seven."

"Are we going to stream the approach chute?" asked Hobbs.

The B-47 is equipped with two parachutes to slow its landing speed, which would otherwise threaten to take the plane off the end of a two-mile runway. One, an approach chute, can be stream-



MACLEAN'S

ed on approach and the other, a brake chute, on landing. When the B-47 landed in Cartierville, near Montreal, for its installation work at Canadair, the tower was deluged with more than a hundred calls, wildly warning that the plane about to land had a man with a parachute clinging to its tail.

With his eye on the airliner drifting on his left, Cooper-Slipper replied to Hobbs, "No, I don't think we'll need the approach chute."

Hobbs sighed softly. "Oh dear," he said jocularly, almost to himself, "it looks so lovely."

Cooper-Slipper grinned and began, as is his custom, taking his plane into landing with a mixture of endearments and blue profanity. As the big plane hovered over the landing strip for a thousand feet and then a few hundred more, he coaxed and swore steadily. It touched down at two minutes after one, rolled a distance and then blossomed a brake chute from its tail.

In the Avro tower the operator switch-

ed on a radio and heard a news commentator say, "It is clear that the Russians do not visualize a short war." He turned it off hastily. The bomber had turned with the whiteness of the parachute billowing behind and was taxiing toward Avro. It moved rather gaily and the down-sloping wings were preening. "You're a good bitch," Cooper-Slipper was crooning ecstatically.

As the crew climbed out stiffly, with the bone weariness that even unsuspected tension leaves behind, the ground crew and some engineers collected around.

"She wouldn't start for about four seconds," Hobbs began explaining to Jack Jones, "and then she went as smooth as a bird."

"It's probably the easiest test flight we'll ever have," agreed Cooper-Slipper, lighting his cigarette with a steady hand.

McLachlan, the sleepy-faced, sad-eyed flight engineer, looked jubilant. "It lit at eighteen-point-eight power," he reported, exchanging a look with Cooper-Slipper. "I didn't think it would. Everything went beautifully."

In the still-warm tailpipe of the Iroquois a large black velvet pool of oil had already collected. The faces of the men watching it were carefully expressionless. Turning away, Jones observed lightly, "It keeps down squeaks."

It had started to spit rain. In his subdued, deep-rugged office, Walter R. McLachlan, president and general manager of Orenda, surveyed news of the test with relish. Only he knew the temper of an impatient government, but it was apparent to most observers that there had been considerable waspish comment. The company had decided it was more politic not to publicize the first flight; too many people were under the happy misconception that the Iroquois had flown long before.

The next step would be to fly the B-47 to North Bay, where the Iroquois could be run on an open runway to get exact measurements of its staggering sound. It had already been run, with a muffler as big as a boxcar, on a runway at Malton. The noise, a roar with a high penetrating scream threaded through, could be heard ten miles. Observers in the immediate area had reported after-effects: dullness of hearing, nausea, over-all aching sensation, deep exhaustion. Orenda needed to know the dimension of its problem. One thing was certain: the engine was designed for war and no sound-smothering equipment would ever be built into it, since its efficiency would then be cut down.

The engine still has even greater problems than these. It needs markets. With emphasis switched from planes to guided missiles, the demand for a hand-operated plane is diminishing. At the time the Iroquois flew, the Royal Canadian Air Force had ordered a few of them, but recently had been demonstrating a facility for canceling orders. If any powerful airplane engine was going to be saleable, Iroquois had a good chance. The best-known production engine in the United States now is the J75, which weighs nearly three tons; the Iroquois, which potentially is twice as powerful as the J75, weighs little over two tons. Success in the aircraft-engine business is based on the best combination of lightness and performance. Walter McLachlan glared at the misting rain outside his window and wondered, as he had many times before, what would become of the Iroquois.

Burt Avery, of the engineering team that designed the engine, who had also been told that the B-47 was safely down, was wondering the same thing. With him that day were some men from Curtiss-Wright Corporation, a colossus that builds



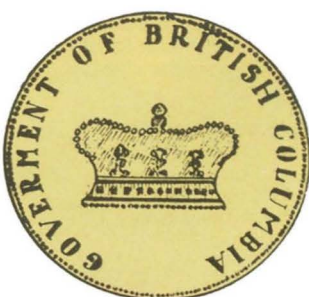
airplane engines in the United States and had cut its development budget in half and gained a year on its two nearest competitors by obtaining the rights to manufacture and sell the Iroquois in the U.S. They wanted to know, among other details, when the Iroquois would be in production. No one will say officially but educated guesses place it about autumn 1958.

Harry Keast, true to his earlier observation that the best moment had been when the engine was first lit in the test cell, had gone casually off for lunch. Charles Grinyer, attempting to repair his

health, was south on a vacation. Alex Muraszew waited restlessly in his office for the crew. When they arrived, still in their flying clothes, there was a moment when no one said anything. They just stood, smiling blissfully at one another.

Leaning on the framework of the doorway, the flight-test supervisor, Jack Jones, remarked idly, "I just happened to think of a line from a song." He paused. "It goes, I think, 'We'll just lie down and bleed awhile, and then we'll get up and fight again.'" He looked around at the faces measuring this. "Pretty good, eh?" he asked gently. ★

## CANADIANECDOTE



This \$20 coin was superb art—but it took \$28 worth of gold to cast it.

### The mystery of the overweight B.C. coins in the King of Egypt's coffers

During the great British Columbia gold rush Sir James Douglas, who was more or less the official government of the colony, decided to strike Canada's first gold coins. They were to be in denominations of ten and twenty dollars. He sent down to San Francisco and had dies prepared by a Bavarian cameo cutter named Kunz, who was a wonderful artist but apparently had no head for mathematics. Kunz cut the dies much too large. As a result it took almost twenty-eight dollars' worth of gold to strike the twenty-dollar coin and the ten-dollar coin required almost fourteen dollars' worth of gold.

The placer miners soon discovered this error, and as fast as the coins appeared they were melted down and sold back to the government. When Sir James sent two specimens to the Colonial Office in London the reply reminded him that issuing of gold coins was a privilege reserved for the sovereign. Douglas was ordered to stop minting them, and very few survived the remelting when they were taken out of circulation.

The late Sir Edmund Walker, who purchased one in London fifty years ago, prepared a report. He was satisfied that no more than

four of the twenty-dollar coins and six of the ten-dollar coins had survived. Furthermore, the dies they were struck from had disappeared—when the B.C. Mint was moved to Victoria, many years ago, they could not be found. It was presumed they had either been destroyed or stolen.

This closed the file on the overweight gold pieces until a few years ago, when the effects of former King Farouk of Egypt were being auctioned off. Among his rare coins there were found six or eight specimens of the B.C. gold piece. An examination suggested they had not been struck from British Columbia gold, but there was no question about the dies; the Farouk coins had been struck from the original Kunz dies. A Vancouver newspaper raised the question: could the supposedly destroyed dies be in Europe? The B.C. archivist replied that the idea was sheer nonsense. He claimed the dies had never been stolen and said he knew exactly where they were. The newspaper challenged him to produce them. Under heavy pressure he finally admitted that he was unable to do so. No more is known about where and when the Farouk coins were cast. — PAUL MONTGOMERY

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# THE DAY THE IROQUOIS FLEW

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