TEST CREW. Ready for another air test of what may be the world's most powerful jet engine is the crew of the specially modified Boeing B-47 which carries Orenda's Iroquois. Left to right are L. G. Hobbs, experimental test pilot, Michael Cooper-Slipper, chief experimental test pilot, and flight engineer J. Maclachlan, at Malton.

Flying the B-47 Iroquois Test Bed

Hybrid with Seven Can Cruise on One

By S/L L. G. Hobbs
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During the past 18 years I've flown many aircraft, varying from the wood and fabric Tiger Moth to the mighty Vickers Valiant of the RAF "V" Force. But strangest of all is the seven-engined Boeing B-47, operated these past few months by Orenda Engines Limited.

Not only is it unique in its seven-engined configuration, but in common with all B-47s it has its highly flexible wings and bicycle-type undercarriage to confound the uninitiated. Flight-planning—at least in the early stages—is highly detailed and time-consuming. A slide-rule is normal aircraft equipment.

Small wonder that other aircraft at Malton have a tendency to veer away from their normal taxi-route to take a quick peek at the "Beast." It's a queer hybrid and has some peculiar characteristics, among them the ability to "cruise on one!"

We learned to fly the standard Strategic Air Command bomber courtesy of the United States Air Force, on the B-47 Transition Course down in Wichita, Kansas. It all started many months ago.

Orenda Engines Limited moved along rapidly on development of the Iroquois engine to be used in the new Avro Arrow delta-wing fighter. This engine, of the phenomenal power/weight ratio of around 5 to 1, was approaching the test flight stage. After much discussion the B-47 strato-jet bomber was selected as being the best compromise for use as a preliminary flying test-bed.

The USAF generously loaned one to the Royal Canadian Air Force who in turn placed it at the disposal of Orenda Engines Limited. Mike Cooper-Slipper, the chief test pilot, and myself, were cleared by Washington and allocated a training course.

Training With SAC

As the first two "civilian aliens" to be allowed to train for Strategic Air Command we looked forward to the 10-week course with keen anticipation. We were not disappointed.

McConnell Air Force Base is a few miles from Wichita itself, which is a typical mid-West, oil-rich American town, complete with bright lights, tall buildings and generously sprinkled with shops, liquor stores, finance companies, night clubs, restaurants and used car lots.

Kansas was in the grip of its usual drought, some of the oldest inhabitants recounting vivid memories of heavy rainstorms and adding that the last time it rained the bull-frog community had been decimated, being drowned after getting out of their depth. It added up to an ideal climate for flying with a reputed 350 clear days in a year.

At the base we were allocated quarters, filled in numerous forms and were divided into classes for the first phase of the course — six weeks in ground school. We joined the Officers' Club at a purely nominal monthly fee and thereby opened the door to many pleasurable hours. A palatial building, replete with soft lights and sweet music, it had eating facilities available on a 24-hour basis.

At the first opportunity we visited the flight line. Although there were up to a hundred sitting there, the droop-wing B-47 was an impressive sight. The flexible wing moves upward in flight and can flex up to 11

ft. at the wing-tip. In destruction tests Boeing have moved them 22 ft. before any major damage and after watching them waggling like pieces of wet spaghetti during heavy turbulence, I can well believe it.

The ground school was extremely efficient and well run. Within a few days we were deep into the mysteries of engines, systems, high altitude weather, performance and so on.

The instructors were all active B-47 pilots; well-spoken, interesting and genuinely concerned in getting their classes through with not just a passing grade but with 100 percent. They knew all the tricks in engaging and reviving attention. On the screen flashes a full-color slide of a beauteous female clad in a fetching smile, enough to make anyone sit up and take notice.

It was not long before we interspersed the lectures with periods on the Flight Simulator. This contraption is a complete reproduction of a B-47 flight deck. In them can be reproduced all flight procedures from chock to chock plus all the emergencies that may be devised by an imaginative and sadistic Command Pilot.

On our first trip, pulling out of a dive too abruptly, we hit a high speed stall. Bells rang, the instruments froze and the seats thumped up and down. Much chastened, we climbed out for coffee and a cigarette. Twelve of these million-dollar trainers were in constant use from 6 a.m. to 9 p.m.

Inevitably, examination time came around. We found the questions were of the multiple choice variety. Each alternative answer had a modicum of truth in it, but only one answer was completely correct. There was much head-scratching and hard thinking going on.

S/L Hobbs joined the Royal Air Force at the outbreak of the Second World War. Following hostilities he remained in service, logging flight time on many of Britain's post-war jet aircraft, including the well-known V-Bombers. He retired voluntarily and has been with Orenda for the past two years as Experimental Test Pilot specializing in engine development.

Our answer papers were marked immediately on handing them in by laying on a template and checking how many ticks were in the right places. Evidently at some time, some bright soul had earlier tried to hedge his bets by marking all the vacant squares to ensure 100 percent, because the correcting template was transparent.

Surprisingly enough, despite the convivial evenings in the Officers' Club, we did well on the exams and were moved on to the Training Squadron where we met our instructor pilot.

Captain "Slim" Dew was a tall (are there any other varieties) Texan, a veteran of several thousand hours flying and a very charming character. Apart from wearing cowboy boots for flying, he had no idiosyncrasies. We got along together very well from our first meeting.

Our first briefing was at six a.m. After a comprehensive met. forecast, specific flying areas were allocated to the various crews, flight plans drawn up and we had a chat about the proposed four-hour flight.

Following a chilly ride to the flight line, we had a small conference with the crew chief and started our preflight checks. The checks before starting engines cover some 200 items, leaving absolutely nothing to chance.

Done conscientiously it assures the pilots everything works and everything is serviceable. Although much of it is necessarily double-checking, this meticulous attention to detail has helped SAC reduce its accident rate to a very low figure.

After the checks we adjourned to the nearest coffee-shop for a quick warmup and were back in time to start engines some 30 minutes before ETD. Starting was quick and easy with the crew chief on interphone to assist. A check with the tower and we were on our way.

The B-47 is highly manoeuvrable on the ground, with a variable ratio steering gear. When taxi-ing, the front gear can be moved through 120 degrees. As the pilot sits well ahead of the wheels it results in some uneasy moments until one becomes accustomed to it. It is possible to taxi directly toward a wall and when only a few feet away, apply full rudder and still clear the wing tip. Most corners are cut square with the cockpit projecting well out over the grass before the turn starts.

A minute at full power on the end of the runway and we were away.

"Slim" called out "Line Speed"—a check for normal acceleration—"Refusal Speed" and "Take-off." With just a suggestion of backward movement on the control column, the B-47 lifted cleanly and still in a typical Boeing level flight position climbed rapidly.

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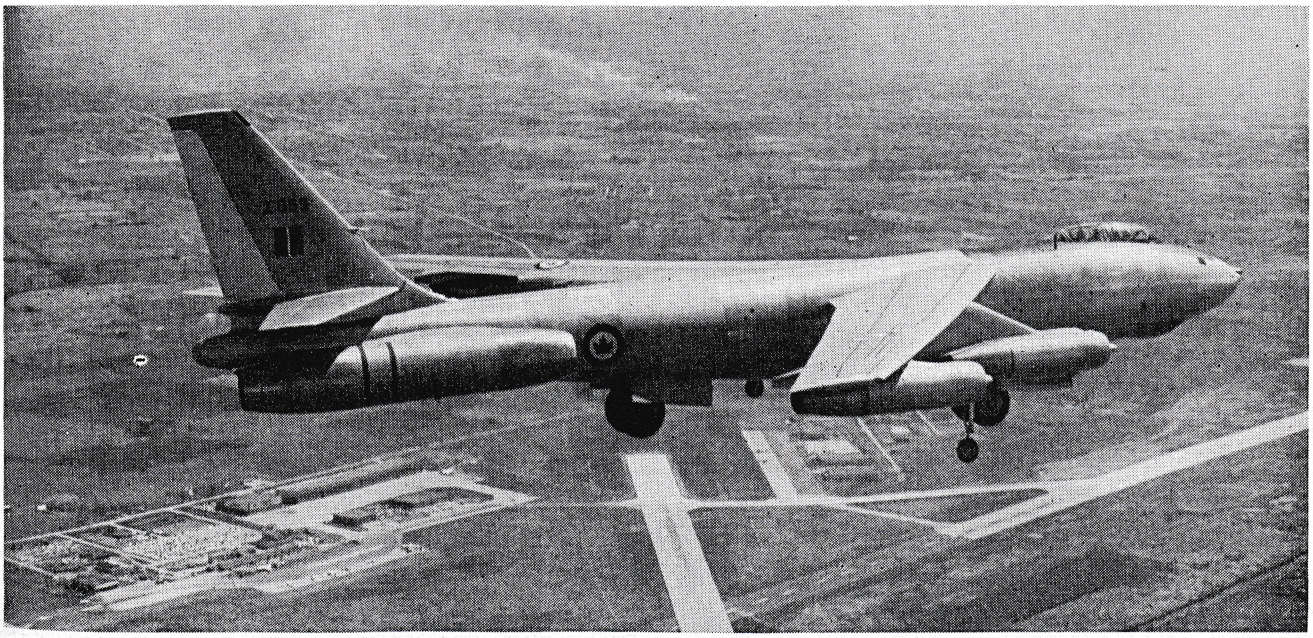

BEAST WITH SEVEN. The huge nacelle starboard on the rear fuselage gives a weird configuration to the B-47 which is becoming a familiar sight to Toronto skywatchers. It carries Orenda's supersonic Iroquois turbojet engine.

Flying The B-47 Iroquois

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The unique bicycle-type gear and swept-back wings have some interesting characteristics. On take-off and landing with a cross-wind, the upwind wing generates more lift, giving the aircraft a tilt which, if uncorrected, will "bicycle" toward the lower wing. Any attempt to straighten the path of the aircraft with the steering gear only results in some violent scrubbing action. Correction is obtained by using aileron to level the aircraft.

As far as I can remember, the B-47 is the only aircraft I've ever flown down a runway during a take-off using full aileron, with the control yoke completely reversed!

In flight the B-47 is a sweet aircraft.

Quiet, smooth, it is surprisingly manoeuvrable. Being pressurized for normal flights to around 5,000 ft., it is possible to enjoy a smoke and a drink (soft, naturally) and generally relax to a degree not normally associated with high performance aircraft.

It's a good aircraft on instruments and has the ability to maintain a selected airspeed over a very wide range with an 80 percent power setting. So marked is this characteristic that in some circles it was known unofficially as the B-80.

No air brakes are fitted, but rapid descents may be made by using the aft main undercarriage and the outriggers as drag gear.

The aircraft is not difficult to land, although an enormous kangaroo hop is possible by touching the nose wheel first. Particular attention is paid to the approach speed. Each circuit and approach is based on the best flare speed—or speed over the threshold—which is 14 knots over the stall. This BFS is based on the weight of the aircraft at the time. The centre of gravity and all-up weight are computed when joining the circuit. If the wind is gusting, a "gust-factor" is added for the approach, but every effort is made to be right "on the button" over the threshold.

Because of its clean lines and the fact that it is literally flown onto the ground, adding five knots for the family is not advised—just a few knots too fast resulting in an appreciably longer landing-run.

As the B-47 can add a load of more than 120,000 lb. to its basic weight, it is obvious that speeds vary considerably under differing conditions. This attention to air speed is stressed continuously.

All too soon we finished the course, had a glorious party in the Officers' Club and were off back to Toronto for our normal work on CF-100s and Sabres.

A few months later we flew our own test-bed X-059 from Canadair Ltd.'s Montreal plant where it had been extensively modified to take the Iroquois.

Performance had not been affected noticeably. After a great deal of further work, including adding a bomb-bay full of instrumentation, we finally made ready for the maiden voyage of the engine. First light-up in the air was highly successful.

Since then we have been gradually acquiring more data on both the engine and the aircraft. Trim requirements vary according to the amount of push from the Iroquois and the airspeed, but seem well within the capabilities of the aircratf utilizing offset thrust from the six J-47s as well as the normal trimmers and the drag gear.

It's a strange aircraft all right. But familiarity breeds contempt. Contempt, that is, for anything with less than around 60,000 lb. thrust!