

Tanker shopping for the CF-5

By John Gellner

● There were two reasons for a recent visit to the Lockheed-Georgia plant in Marietta, Ga. First, to fly in the C-141 Starlifter and generally assess its potentialities in terms of Canadian requirements, and second to see the full-scale mockup of the biggest aeroplane in the world, the C-5A, under construction.

The C-141 is of interest because the Canadian Forces need a tanker for the CF-5 tactical aircraft. The latter could be refuelled in the air by a C-130 Hercules of Air Transport Command, but the C-130 could not accompany CF-5s on ferry flights at an economical height or speed; it would have to rendezvous with them en route in order to transfer fuel. This would mean putting a sophisticated, electronic navigation system on the CF-5, and this would detract from its principal advantage of being comparatively simple and thus easy to maintain.

What is needed is an aerial tanker which will fly with the CF-5s, acting as a kind of mothership on ferry trips.

The aircraft available for this role is limited: either the Boeing KC-135 (no longer in production but perhaps available from U.S. stocks) or the C-141. The advantage of the KC-135 is that it would likely be cheaper; the disadvantage, that it is a specialized tanker with a limited range of possible duties.

The C-141, on the other hand, can do anything required in the transport business; it can be used as a tanker, or as a cargo- and troop-carrier. With

a lounge pak that can be quickly inserted, it can even serve as a VIP aircraft.

Lockheed-Georgia produced a study on the use of the C-141 as a CF-5 tanker recently; here is one of the eventualities that were considered:

The task is to support CF-5s being ferried from Chatham, N.B. to Prestwick, Scotland, a distance of 2,256 naut. miles. This might be done with a single, mid-ocean aerial refuelling, in which case one C-141, carrying additional fuel tanks in the cargo compartment, could look after as many as ten CF-5s. This would not be prudent, however. If refuelling failed, there would not be enough fuel left in the CF-5s to reach an intermediate airfield. In short, too many eggs would have to go into one basket.

A better proposal is that one C-141 should escort only four CF-5s, refuelling them twice; the first time between 604 and 730 miles from the starting point, when they would be able to reach Gander safely on their own if need be; the second time 1,344 to 1,580 miles out, when they could reach Keflavik. The C-141 would issue fuel only from its wing tanks. Thirty tons of cargo could then be carried inside the fuselage (twice the load a C-130 can lift across the Atlantic acting as cargo-carrier only). It sounds like an economical and sensible scheme. Similar plans have been devised for trans-Pacific ferries.

Refuelling is done at normal cruising speed and cruising altitude by the drogue method, superior when it comes to servicing fighter type aircraft to the flying boom used in the

KC-135. One reel in the tail of the C-141 pays out the hose, with another available as stand-by. Including positioning and break-off, refuelling one aircraft should not take more than five minutes.

The C-141 in which I rode was assigned to an automatic landing test program. It carried 102,000 lb of fuel — two thirds of total capacity — and the take-off weight was 233,000 lb, or 85,000 lb below full load.

Lifting off after what I would judge by the runway markers to have been a run of about 3,300 ft, the C-141 climbed at about 4,000 ft/min to 10,000 ft.

Throttled back to best climbing speed, 280 knots or so, it rose more gently, but still rapidly. In level flight, cruising at Mach .75, the aircraft was light on the controls, and very responsive to trim. In descent, with spoilers extended, speed fell off quickly to 200 knots, at which point 75% flap was lowered. At 180 knots the landing gear went down. Speeds thereafter were 150 knots in the downwind leg, and after application of full flap at the final turn, 130 knots on approach.

There was hardly any flare-out. The aircraft was flown onto the runway, touching down at 115 knots, well above stalling speed. The roll was reduced by the use of reverse thrust to about 2,500 ft. Brakes were not used until just before turning off the runway. Altogether, the C-141, despite its size, seemed to be an entirely conservative, old-fashionedly mild-mannered aircraft. I was very impressed by the way it handled.

Two criticisms of the C-141 have been voiced: low speed as jets go, and high internal noise levels.

The second criticism is certainly unjustified. The aircraft I flew in was an ordinary military production model, without any extra sound-proofing, and while degrees of noise are difficult to judge, the C-141's cockpit did not seem any noisier than the C-130's. From the right-hand seat, I could converse quite easily with the pilot without using the intercom.

The economical cruising speed is 440 knots. Speed was in fact partially sacrificed for a wing that would enhance short take-off and landing, and this is a trade-off which is acceptable in a military transport.

Being around the C-141 Starfighter for a while makes one accustomed to king-sized airplanes. But everything

COMPARISON OF SIZE AND PERFORMANCE OF

	C-130 E	C-141	C-5A
Length (ft)	97/9	145	245/9
Wing span (ft)	132/7	160	222/7
Maximum take-off weight (lb) .	155,000	318,000	764,000
Maximum payload (lb)	45,000	71,000	323,000
Volume cargo compartment (cu ft)	4,300	7,340	34,730
Personnel capacity (troops) ..	92	154	355
Engine power (total 4 in lb thrust)	16,200	44,000	164,000
Economical cruising (kts)	280	440	440
Fuel capacity (gal)	8,035	19,580	40,670
Practical maximum range (miles)	3,750	5,500	5,500



LOCKHEED'S C-141 STARLIFTER—potential air-refuelling tanker for the RCAF's CF-5s.

is relative and when one moves from alongside the C-141 into the hangar where the Lockheed C-5A mock-up is located, the eyes just pop!

The mock-up at Marietta is of the standard military freighter, of which the USAF has ordered 58, with an option on another 57. To get an idea of its size, the tip of the tail fin is 65 ft above the ground, and the total length is about 246 ft. By comparison, the Hercules is 98 ft long. The C-5A cargo compartment is, in all three dimensions, about twice as big as the C-141's, and the resulting payload more than four times greater.

Another big advantage of the C-5A

is straight-through loading and unloading. The whole nose-section lifts, somewhat like the visor on a welder's helmet, above the cockpit (so that vision is maintained). A loaded truck can be driven in over the rear ramp and then out over the front ramp.

Innovations that have been incorporated in the C-5A include:

- A cross-wing landing system which allows pre-setting the landing gear in the direction of the runway in use, however much one may be "crabbing". This will be important with the high inertial forces in an aircraft of that size and weight.
- The MADAR control panel which

provides the flight engineer with instantaneous identification and diagnosis of failures in any of the aircraft's systems, and EMAS which gives continuous computer readings of the best cruising procedures.

- A Peripheral Vision Indicator, substantially an easy-reference monitor of ILS at front window level, will make the transition from instruments to visual flying, mainly during the landing pattern, easier for the pilot.

The C-5A is projected also in a greatly modified, airliner version, the L-500. This will seat 844 passengers on three decks, and promises to open up new vistas in air travel. **END**