

LABOURS OF HERCULES

The “J” model



Amid the heartbreaking scenes of the recent tsunami disaster were shots of Royal Australian Air Force C-130s being unloaded. Haiti, Turkey, Kosovo, Latin America.... anytime there is a conflict, a natural disaster, or situation where significant quantities of people, supplies, or equipment have to be on-scene quickly, anywhere in the world, Hercules crews have been, and will be, flying them there.

The freighter entered operational service in 1956 and since then, aircrews have, quite literally, been everywhere and done everything.

The C-130 has flown from both poles; landed or airdropped cargo at every hot spot from the Congo to Vietnam to Kosovo to Afghanistan and Iraq; and hauled relief supplies to every outpost on the globe. It is used to track icebergs in the North Atlantic and drug traffickers in the Caribbean and Pacific. The Hercules has flown into hurricanes to obtain wind and rain data; has dropped retardant on forest fires and insecticide on mosquito infestations. A modern-day Noah's ark, the C-130 has hauled whales, camels, horses, and cows. It has been used to medevac thousands of casualties to hospitals.

The latest model is the C-130J, and it represents a nearly complete reinvention of the “Herc.” First flown in 1996, it has a wingspan of 132 feet, a height of 38 feet, and comes in two lengths. The short fuselage aircraft is 97 ft long (the same as previous models); the longer version is 112 ft. and can carry a maximum payload of 47,812 pounds. Maximum range with a

25,000 pound payload is more than 3,700 nautical miles without external fuel tanks.

For an in-depth view, I interviewed **Arlen D. Rens**, Lead Production Test Pilot at Lockheed Martin for the C-130J.

The J looks like every other Herc. What's so special about it?

A perception problem with the C-130J is that we called it a C-130. It does look like every other C-130, but the C-130J actually brings a completely new capability to the tactical airlift market. It is essentially a new aircraft.

There are many differences, for example it has truly the most modern cockpit in aviation today. When I started flying in the late 1960s, 50% of my time was spent monitoring the machine and what it was doing. Today, all of the “housekeeping” functions are handled the mission computer. A number of the critical emergency procedures that before would have taken crew intervention, now only require crew advisement – essentially, the computer says “I fixed this, but wanted to let you know.” You continue to fly your aircraft

and the management of its systems is turned over to mission computer.

Is that good? Pilots, in general, are among the world's worst for trusting technology. But over the last eight years with the maturation of the system, we have demonstrated that there are no single-point failures – everything has built-in redundancy. Sometimes there are even triple redundant systems. We are an FAA-certified aircraft and the FAA accepts no single-point failures.

The J's competitors are the A400 and the Boeing C-17. Here is an aircraft that is not only bigger and but it also has jet engines. To the taxpaying public, jet engines win out over propellers any day.

Propellers bring tremendous capability — the ability to land on short, unprepared fields and they offer wonderful fuel efficiency. A jet engine acts like a vacuum cleaner that will suck up everything on a rough field. You can land a turboprop aircraft on an unprepared field, but it's not advisable, and you can't do it all that many times without having to change the engine. Big aircraft with big engines like to land on concrete. There are a lot more dirt strips near the front lines than there are airports with concrete runways. Landing in the dirt and getting out again has never been a problem for the C-130. You need to get the right load in the right place at the right time and that is exactly what the C-130 was designed to do.

<< *Hercules C-130H aircraft, carrying much needed humanitarian aid, is unloaded by ground crew at Banda Aceh airport. Following the Boxing Day tsunami, Australian Defence Force (ADF) personnel had been assisting Indonesian Government authorities in support of tsunami disaster relief in the North Sumatra and Aceh provinces since 28 December 2004. Relief assistance provided by Australia is part of a cooperative effort involving the ADF, DFAT (AusAID), and Emergency Management Australia. Water, tentage, medical supplies, blankets, other emergency provisions and logistical support have been provided. In the tsunami-devastated provincial capital of Banda Aceh, the ADF set up a water purification plant and established a Field Hospital (operated jointly by medical personnel of the ADF and the New Zealand Defence Force). The Australian Navy amphibious transport ship, HMAS Kanimbla, delivered a detachment of Australian Army engineers on 13 January and has taken up station as a floating support and logistics base for relief and reconstruction work.*

What about the capability?

The C-130J has a greater capability than the legacy Hercules. The U.S. Air Force's Air Mobility Command's numbers show the older aircraft (such as the C-130E) can carry 6,000 lbs of cargo 2900 nautical miles. The J can move 30,000 lbs at 2,800nm, and this is with the USAF constraints. Without those constraints, I can take the 30,000 pounds of cargo and fly 3100nm. That is a huge change. In addition to carrying five times the cargo, you burn 1/3 less fuel, which has an obvious positive effect on the environment.

That's the airplane as it sits today – within four years, it will have a greater capability. We can probably increase range an additional 12 or 13%.

We have a different market share than Boeing. The C-17 carries a large load a long distance at a relatively high speed. While we have increased the capability of the C-130, we cannot compete in wide body.

However, when it comes to flying that 50% load into what the Army calls "multiple points of entry" (showing up at five or six different points in the area), landing on dirt roads, one after the other – the J shows that it has tactical and strate-

gic capability: multiple points entry; strategic operational capability; ability to show up. Normally you would want to operate on a runway that has a surveyed approach, but for the challenges of operating in Canada's far north, we have designed a system – IPRA (Integrated Position Radar Approach) – which is designed to operate with a beacon on the ground, or no beacon at all.

But it is still the classic Herc. Aren't you competing against yourself?

We have changed the paradigm so tremendously with an infusion of modern technology on an airframe that is tried and tested. If the Canadian Armed Forces said 'we need an airplane that can operate off 3,000 ft of dirt, day in day out, in all kinds of weather, and you've got to be able to carry this amount of weight,' we would design an airframe that looks pretty much like the 130. The Hercules has a classic form and function shape – back in 1952, the designers didn't realize that the Hercules was going to be the DC-3 of our generation.

The difference today is that in 1989, General Duane Cassidy, the commander of what was then known as Military Airlift Command, said that if you want me to continue buying C-130s you've got to do something for us: you've got to reduce life-cycle costs, you've got to make it cheaper to operate, you've got to bring her into the 21st century, and you've got to reduce my manpower costs. And we did.

In Canada, the existing H models require 25 to 29 maintenance hours per hour of flight time. That is a fact of life. Now with the J, the USAF, US Marine Corps, RAF, RAAF, the Italians, and the Danes are enjoying on average 6.5 to 7.5 maintenance man hours per flight hour rate – a tremendous reduction. We are warranted to customers like the RAF to give them better than a 90% mission availability. We succeeded at 93%. This was not just flying out of RAF Lyneham, but in hostile environments like Iraq. We met and exceeded our pre-delivery contract requirements.

There have been reported problems with the J. Can you expand on this?

Any pilot who has flown a Herc, especially the E model, knows that we have an issue with maximum continuous power. We know that high temperatures shorten engine life. On the J, we have a detent on the throttle that's called the maximum power detent. It is an actual click, and you feel it. The RAF came to us about this and we took it to Rolls Royce – we are fixing this on our dime. But we, along with Rolls-Royce, are taking the responsibility. On the normal overhaul we are going to different turbine blades that will increase cooling air in there. And now you are going to have an engine that can max. Ever since the Wright Brothers, aviation has been nothing but discovery. In the US Marine corps I accepted planes that had squawks. Now I'm on the other side of the desk and when a customer comes to me and says we have problem, I say "No, we have a discovery." It is only a problem when we cannot offer a fix equal to or better than the original design. And to date, every solution has resulted in a safer aircraft for the crews to operate.

People ask me about this all the time. I reply, "Guys, that problem was solved five years ago. All I ask is that you bring me the problem first. To me, the C-130J is a magic machine. The imaginations of the young men and women who will operate the aircraft are the most limiting factor of the aircraft. The first question is: 'Can you do this?' It's mostly a matter of writing software code. The aircraft can do the rest.

Arlen, one final question: What about offsets? Will part of the J be built here in Canada?

Business is always business – and it's international – there are always offsets. When the RAF purchased the first 25 Js, they were the launch customer. There were 52 British companies signed up as subcontractors. There will be offsets – whether it is rework facilities or something else. Business these days is like that. It can't be a one way street. **FL**

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