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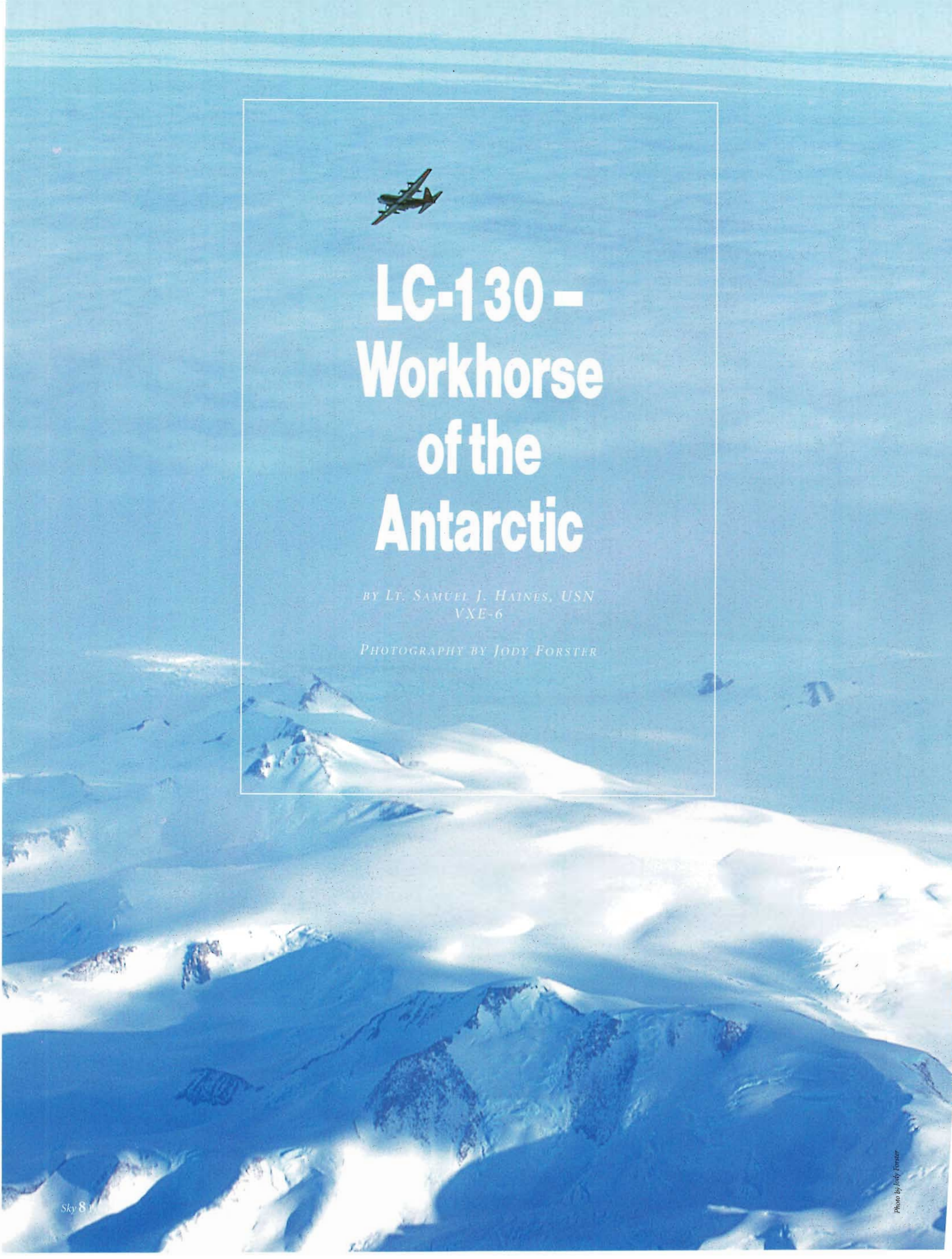
FALL 1996 LOCKHEED MARTIN AERONAUTICAL SYSTEMS

Testing the C-130J

Antarctic Operations

Notes from Bosnia

Norway Does NATO



LC-130 – Workhorse of the Antarctic

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VXE-6

PHOTOGRAPHY BY JODY FORSTER

Photo by Jody Forster

Taxiing in at the South Pole, the LC-130 "Ski-Hercules" slides to a gentle stop. A fine fog of snow and ice crystals whipped up by the propellers nearly obscures the lineman who is wrapped in a heavy hooded parka.

The ramp and cargo door are opened, and the air at -60 degrees Centigrade quickly rushes in and nearly takes your breath away. The pilot checks his watch. It's midnight, but the sun is shining brightly as though it is midday. The cold temperatures and the thin air, due to the nearly 10,000 foot elevation make physical activity particularly exhausting. As fuel and cargo are off-loaded, another resupply mission to "the Pole" is nearly complete.

Photo by Judy Forster

The U.S. Navy's Antarctic Development Squadron Six (VXE-6) completed its 40th year providing logistical support for the scientific research and exploration being carried out on the world's southernmost continent. The workhorse of the squadron is the LC-130. This versatile aircraft has served VXE-6 well for over 35 years. The squadron's mission in Antarctica is to support the scientific efforts of the National Science Foundation (NSF). Each year the NSF sponsors 110 Antarctic research projects including: ultraviolet solar radiation, ozone depletion, atmospheric chemistry, glacier dynamics and wildlife studies. The Hercules is used to shuttle equipment and personnel to at least a dozen research camps on the continent. "Our scientists can virtually come and go as the science dictates, rather than suffer the enormous periods of time needed to transit to and from the continent by ship," says Eric Chiang, NSF director of Operations for the Office of Polar Programs. "This mobility has made the U.S. Antarctic Program (USAP) foremost in Antarctic research among the 26 nations that support a program on the continent," Chiang states.

The initial preparation for the annual deployment begins in August. VXE-6 crews preposition aircraft, supplies and squadron personnel to Christchurch, New Zealand. From there, a number of flights are conducted to McMurdo Station, Antarctica, the logistical hub of the U.S. Antarctic program. LC-130s transport supplies and personnel who begin start-up operations for the coming season. Each year from October thru March the population of McMurdo Station swells from a small contingent of "winter-over" personnel to more than a thousand U.S. Navy and civilian personnel. Operations go into full swing during these months which coincide with the Southern Hemisphere's austral summer, to take advantage of the more agreeable weather that prevails.

Many procedures unique to flying ski-equipped aircraft have been developed and refined over the years. Pilots go through rigorous training to ensure proficiency. Hazards include avoiding treacherous crevasses during open field work, minimizing the high drag effects of soft snow in getting airborne, and "zero-zero" whiteout landings.

Open field landings are a hallmark of the LC-130s versatility. The aircraft can essentially land anywhere on the continent, facilitating the movement of scientists and their equipment to and from remote locations. Scientific outcamps can be established and resupplied easily . Procedures require several flyovers at various altitudes to determine the presence of crevasses.

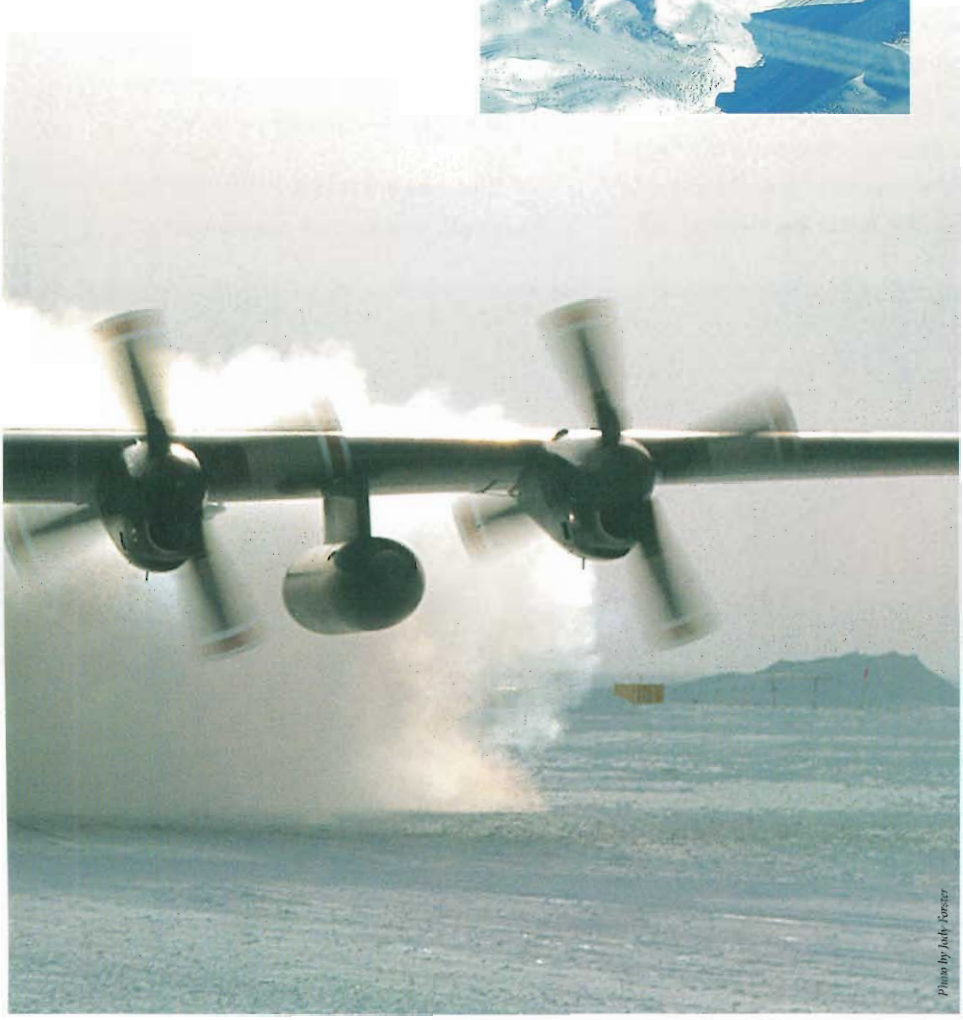
Crevasses are large fissures in the ice caused by glacial movement. The treacherous gaps can be 50 feet wide and hundreds of feet deep. Often, blowing snow causes the crevasse to bridge over making their presence difficult to discern. The consequences of landing, taking off or taxiing over these formations can be catastrophic.

Once the area is visually determined crevasse free, the crew performs "ski drags" to open any hidden crevasses, investigate snow conditions, and prepare the landing area. The pilot makes a normal approach and touchdown. While the aircraft's main skis maintain contact, the pilot holds the nose ski off the snow. Power on, the aircraft maintains this attitude and slides for one minute. The crew conducts two drags adjacent to each other in a straight line. After each drag the crew performs an additional visual survey of the area. If crevasse-free and snow conditions are favorable, the crew makes a full-stop landing.

Taking off is a unique evolution as

well. The pilot taxis onto the skyway and continues aircraft movement until takeoff power is applied. If the aircraft stops, it freezes fast to the surface, and the evolution to break the aircraft free by cycling the skis must be repeated. The pilot eases the throttles forward, and the aircraft begins to accelerate. Taking off from an ice covered runway or skyway, the pilot must add power carefully and make adjustments as needed to keep the aircraft on centerline. Once the rudder becomes effective, the pilot calls for the copilot to set final power. At the "60 knots" call, the pilot fully compresses or "pumps" the yoke forward. The nose lurches downward, and with a forceful yank the pilot brings the yoke full back. The nose slowly rises and is adjusted. The slide continues. As the speed builds and reaches takeoff velocity, the aircraft slowly floats skyward.

Getting airborne is not always easy. The nose attitude during the slide is critical. Too much nose high and the aerodynamic drag may prevent the aircraft from reaching takeoff speed. Care also must be taken to prevent the nose ski from settling back down on the snow. If the snow is soft/wet, it acts like glue. It may require a series of pumps to break the nose free. Several takeoff runs may be required to pack down and harden the snow. Shifting the center of gravity further aft and selecting 100 percent flaps are additional techniques. It is not uncommon for a crew to make several unsuccessful takeoff attempts prior to finding the right combination to get airborne.



The weather in Antarctica sometimes proves too unpredictable for even the latest weather forecasting technology. The LC-130 crews face thick fog banks and blinding snow storms which can quickly turn a bright clear day into a very hazardous environment for an aviator.

With the dynamic weather and remoteness of the continent, "Ski-Herc" crews are trained to fly approaches independent of ground based navigation equipment. The LC-130s employ an onboard radar and ground based radar reflectors to paint an image of the runway environment on the radar's screen. A skilled navigator interprets the image and provides vectors to the pilot in what is termed an "internal approach."

An Antarctic weather phenomenon nicknamed "Herbies," snow storms with associated strong winds, quickly drive the visibility to zero and cause wind

SKI-EQUIPPED HERCULES

BY DAVID READE

Ski-equipped C-130 Hercules have been around a long time and were the very first variant model aircraft considered when Lockheed introduced the C-130A.

The teflon-coated skis are attached to the conventional landing gear of the Hercules and can be raised and lowered over the wheels when the gear is down. When the gear is up, the skis are drawn up against streamlined fairings on the bottom of the fuselage. The skis on the main landing gear are 20.5' long and 5.5' wide and weigh 2,100 lbs. The nose gear ski is 10.3' long and 5.5' feet wide weigh 800 lbs.

The US Air Force was the first to acquire these Hercs, having originally placed an order for 12 in 1959. Lockheed reorganized the production line to accommodate the order and delivered the planes with the designation of C-130D. The Air Force used the ski-equipped transports during the initial construction of Distant Early Warning (DEW line) radar installations located in remote areas of Alaska, Northern Canada, and The Greenland Ice Cap.

Once completed, the aircraft continued operation, providing resupply to the remote defense radar sites. Subsequently, two existing C-130A aircraft were modified with skis and redesignat-

chills to plummet. "Herbies" are a dangerous weather condition for personnel on the ground as well as in the air. Without a nearby alternate, the LC-130 crew must be trained to land in these conditions. In the beginning of the season, a large area on the Ross ice shelf called the "white-out area" is surveyed for hazards. If unable to land at the skyway due to weather, the crew has the option of utilizing the white-out area for landing down to zero visibility conditions. Each crew member carries out a specific task to back up the pilot during this critical evolution. The pilot sets up a shallow rate of descent, on airspeed, until ground contact is felt. After landing the crew must taxi the aircraft back to the runway using the radar.

The LC-130s operate out of three airfields at McMurdo Station. In the beginning of the season an area off McMurdo is prepared on top of ten to twenty-five feet of sea ice. Called the "ice runway," takeoff and landings on wheels are allowed. As the season progresses the sea ice thins causing the ice runway to become unsafe. Flight operations are moved further up the ice shelf to a snow covered area on top of the permanent sea ice. At Williams Field, as it is named, only ski takeoff and landings are possible.

Toward season's end, Pegasus Airfield is opened. Adopting the nickname of a

ed as C-130Ds. The Air Force operated the aircraft until 1975 when six were turned over to the 109th Airlift Group at Schenectady County Airport, Scotia, NY who had been selected to take over the polar transport support mission. Six were "de-skied" and utilized to resupply remote military sites in Alaska via gravel landing strips.

The next ski-equipped Hercules to be developed was the LC-130F. These were an updated version of the C-130D built from production C-130B airframes for the US Navy. They replaced aging Douglas R4D-5L and R4D-RL trans-

Lockheed C-121 Constellation that crashed in the vicinity in 1970, Pegasus Airfield is an ice runway located approximately eight miles from the original "ice runway." Pegasus again allows for wheel operations, which is important due to the increased airlift requirements as the season begins to wind down. Wheel operations allow for higher takeoff weights than are allowed on skis, increasing the cargo carrying capacity.

This past deployment, Operation Deep Freeze 95/96, marked the 40th year of Antarctic support for VXE-6. During early Deep Freeze seasons the squadron operated a variety of aircraft including the P2V Neptune, DeHavilland Otter, C-47 Dakota, C-54 Skymaster, C-117 Skytrain, C-121 Super Constellation, Sikorsky LH-34 and CH-19 helicopters, and the HH-1N Twin Huey helicopter. The first LC-130 was accepted in August 1960. Today the squadron operates seven "Ski-Hercs." Last season the LC-130s logged more than 3,000 hours, transporting more than 4,000 passengers and more than 3 million tons of cargo.

VXE-6 is proud of its contribution to the legacy of Antarctic exploration. Thanks to the LC-130, its versatility and durability, the squadron is able to meet the unique airlift requirements of the National Science Foundation. No doubt the LC-130 has played a major role in advancing science and exploration in the region. ☆

ports operated by the Navy's Antarctic Development Squadron Six (VXE-6) to provide logistical support to Antarctic operations.

The aircraft were originally called C-130BLs by the USAF and UL-1Ls by the Navy. But in September 1962, the four ski-equipped Hercs were officially designated "LC-130F".

The most notable improvement to the LC-130F was the addition of Rocket Assist Take Off capability to augment the Herc's Allison T56-A-7 turboprop engines. Operation of the RATO rockets to assist in take-offs was tricky at

best and more than once caused accidents. On one occasion, a rocket broke loose and went through a wing. The plane was abandoned for over 16 years, until recent efforts freed it from the ice. It has now been put back in operation!

Next came the LC-130H(2) Hercules. These are ski-equipped Hercs based on the C-130C airframe with Allison T56-A-15 turboprop engines built for the New York Air National Guard's 109th Tactical Airlift Group in 1985. The new Hercules replaced aging C-130Ds that the Air Guard inherited 10 years earlier. The aircraft are used to provide air transport support of NSF polar science projects at remote, hostile sites in Greenland. The airlift mission includes transportation of food, fuel, personnel, spare parts and equipment to the science foundation's Greenland Ice Sheet Project. The GISP project collects deep ice core samples of Greenland's glacial ice sheet down to the bedrock of the continent below, seeking to understand rapid climatic shifts over the millennia.

The next Hercules with skis, the LC-130R, is basically a C-130H airframe with Allison T56-A-16 turboprop engines. The aircraft were built for the National Science Foundation and were delivered to VXE-6 to supplement their LC-130F Hercs. The LC-130Fs are equipped with research instruments for detecting and monitoring pollution in Antarctica.

In recent years the LC-130Rs have been undergoing an upgrade program known as the LC-130 Improvement Program. This program is actually made up of a series of improvement projects that encompass standardizing avionics and improving aircraft supportability.

One project reduces the gross

weight and updates the avionics, improving supportability of all LC-130Fs and Rs. It addresses safety of flight concerns by replacing unreliable or obsolete avionics. This includes replacing and/or upgrading the aircraft's search radar, weather radar, navigation systems, true airspeed indicator, HF/VHF radios and VHF NAV/ILS/ Marker Beacon systems as well as the airplane's TACAN set and radio-radar altimeter flight control system. A new altitude alert system, a C-12 compass with enhanced switching capability and a new ground proximity warning device will also be added.

Another project called the R2 MOD, replaces existing gas turbine

compressors aided by air turbine motors, with new auxiliary power units. This modification also includes a slight change to the nose landing gear, correcting how the gear/ski is suspended in the up-lock position.

The latest version of the skied C-130 Hercules is the LC-130H(3) operated by the 109th Airlift Group, New York Air National Guard. This aircraft, like the LC-130R, is based on the C-130H airframe with T16 engines and is equipped with upgraded avionics such as GPS navigation. The 109th was in need of additional ski-equipped aircraft for the addition of the NSF science support mission in the Arctic and their continued support of the Navy in the Antarctic. ☆