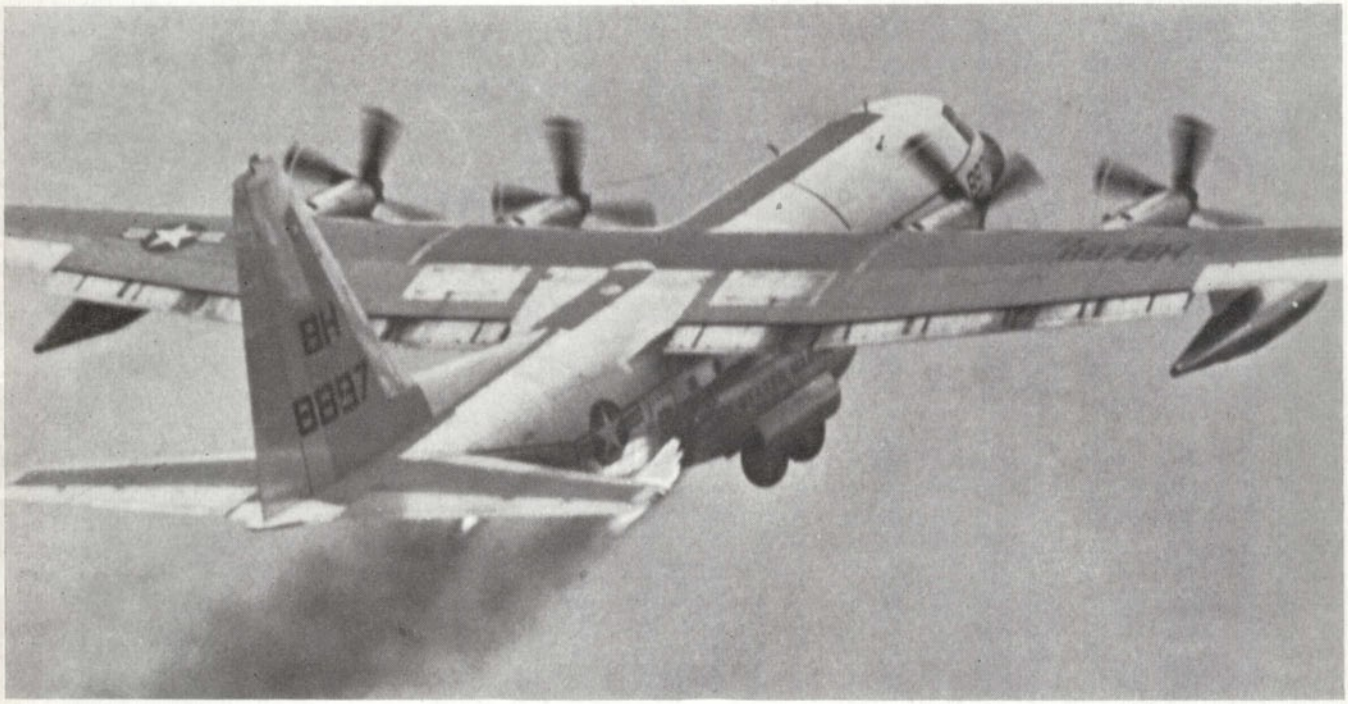
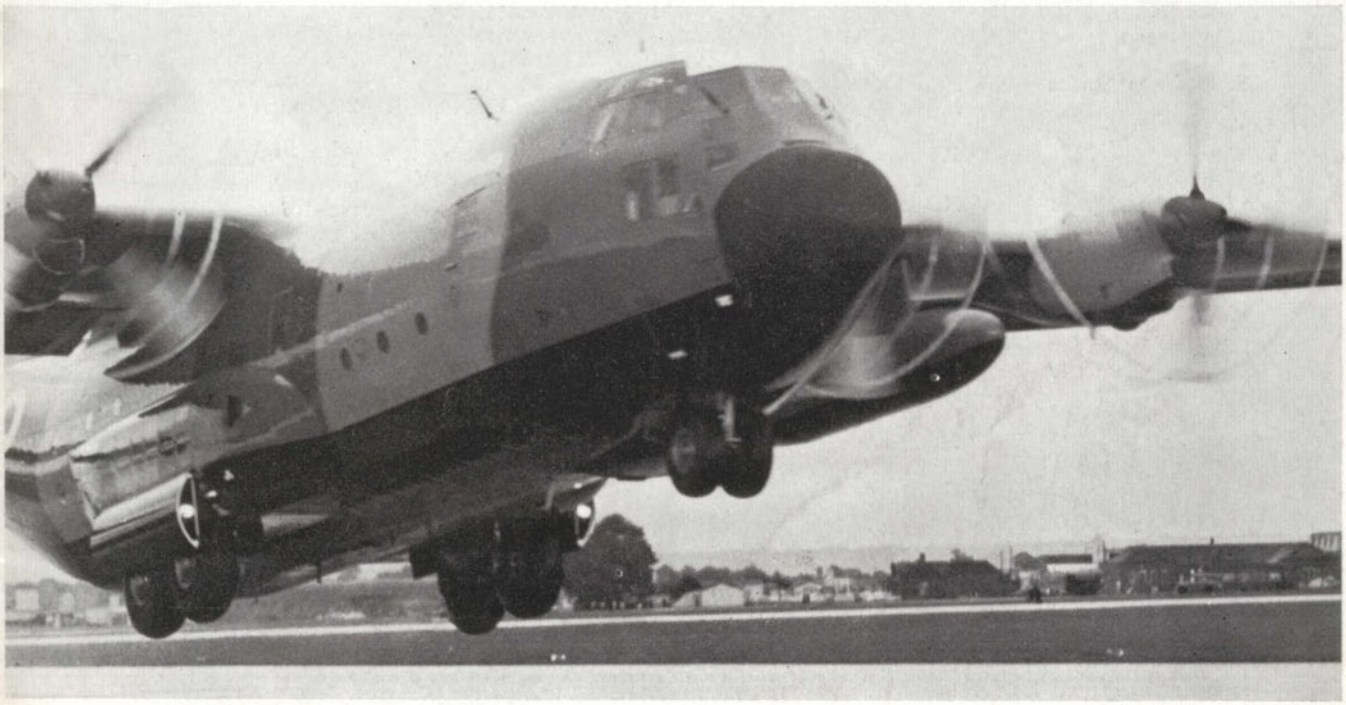
PROFILE 223

LOCKHEED C-130 HERCULES





Setting the scene. Two Lockheed Hercules C. Mk. Is (C-130Ks) of Royal Air Force Support Command flying in familiar British weather conditions of more cloud than sky. (Photo: M.o.D. Air)

Lockheed C-130 Hercules

by Paul St. John Turner

LUMBERING giants of the sky—the aesthetic appeal of military transports seems very limited and although in general other classes of aircraft earn their keep equally well one is hard put to find more flattering compliments to this species of flying machine than that of "workhorse". In fact the Lockheed C-130 Hercules is not gigantic by modern standards, and it can maintain a very respectable clip of 365 m.p.h. in a cruising altitude band extending up to at least 35,000 ft. This turbo-prop transport is remarkable for the wide range of heavy duties it can take in its stride with a handsome performance, if necessary under poor conditions, and at low cost. Since entering United States Air Force (U.S.A.F.) service in December 1956 the Hercules has been in demand for many rôles and by some 17 countries, more recently including commercial cargo operations too. As one of the first modern purpose-built military transports it has also been the most successful.

TAILORING FOR THE JOB

Early in 1951, the Tactical Air Command (T.A.C.) of U.S.A.F. issued a specification for a new medium cargo transport to the U.S. aircraft manufacturing industry. In particular, this aircraft was to be suited for assault transport operations, capable of dropping heavy loads by parachute, or landing on short, ill-prepared forward zone airstrips. As such, it was envisaged as a replacement for the two-motor, twin-boom Fairchild C-119/R4Q Flying Boxcar cargo/troop transport (manufactured 1948–53), giving added mobility to combat resources for the U.S.A.F., U.S. Navy and the U.S. Marine Corps. The T.A.C. specification for an ability to carry soldiers, paratroops, casualties and ground force equipment including single items weighing up to 30,000 lb. was coupled with inter-services' Military Air Transport Service requirements for an aircraft to carry some 90 troops over 2,000 mile stages. By the middle of 1951, Lockheed had received a contract to move ahead with their Model 382 proposal, and on September 19, 1952 were awarded a second for the manufacture of two prototypes for evaluation.

Determining features of the U.S.A.F. specification included dramatic advances over the performance of existing piston-engined types. One of the chief limitations of these latter was payload/range, so that for the new project this performance item was to be multiplied by a factor of eight. Considerable improvements were also looked for in engine-out capabilities, dictating a four-engine layout. Another major feature was to be exceptional field performance, bearing in mind the size of the aircraft, and this has since proved a significant factor in the C-130's success. The undercarriage needed to

The two gleaming YC–130 Hercules prototypes, heading Lockheed's final assembly plant at Marietta, Georgia, shortly before roll-out in July 1954. On the left and to the rear are B–47 six-jet bombers. (Photo: Lockheed)

permit high weight operations from soft, rough-surfaced airstrips. Operational flexibility and the use of turbine power made full cargo compartment and flight deck pressurisation essential, the relatively high maximum cabin differential of 7·5 lb. per sq. in. being selected. Useful cargo space needed to be at least 40 ft. long, 10 ft. constant width and 9 ft. high, corresponding to the dimensions of an American railroad boxcar. Ease of loading predicated a cargo hold floor height above the ground of only 45 in., matching that of the standard American truck. Finally, excellent all-round cockpit visibility had to be provided, especially to give a clear view of the ground immediately ahead and below, and thus facilitate precision supply dropping.

Lockheed's task was now to provide the most efficient answer to these comprehensive requirements. The loading specification clearly demanded a high wing, permitting the fuselage to sit close to the ground. At the same time a wing-mounted undercarriage would be awkward in view of the lengthy undercarriage legs dictated by large fuselage diameter and corresponding wing height, and the limited stowage space afforded by the turboprop engine nacelles. More satisfactory solution on grounds of weight and drag was to locate the main undercarriage units within fairings mounted on the lower fuselage sides, in this case the fuselage width being an asset since it ensured adequate wheel track. An unorthodox arrangement was to place the two main wheels on each side in tandem, one behind the other, both to minimise the size of the fairing bulge and to reduce resistance in moving over soft ground. Most promising powerplant available was the T56 turboprop being developed by the Allison division of General Motors—a constant-speed unit delivering 3,750 equivalent shaft horsepower (e.s.h.p.) in initial production guise.

One of the YC–130A prototypes demonstrates its ability to take off from a soft, rough airstrip, merely a sod stretch hastily cleared of the scrub vegetation. (Photo: Lockheed)

As for all transports of this nature, a relatively impressive performance could not be allowed to compromise the design philosophies of simplicity, reliability and rugged construction, nor those of economy of maintenance, operation and manufacture. However, a number of new constructional techniques were drawn upon, especially that of machined skinning with integral stiffening, at this time also being introduced by Lockheed on their Super Constellation airliner. From the beginning, the upper and lower wing surfaces on the Hercules comprised machined panels with integral stiffeners, including a single section 48ft in length. This process eliminates much riveting and, together with metal bonding (for certain flat panel areas on the Hercules), cuts out peak stress concentrations allowing lighter metal gauges to be used.

HARDWARE, AND INTO SERVICE

Manufacture of the first two Hercules prototypes took place at Burbank, California, all subsequent production transferring to the Lockheed plant at Marietta, Georgia. The type was allotted the U.S.A.F. military designation *C-130,* and again in accordance with U.S.A.F. practice the prototypes were designated *YC-130*. Design all-up weight crept up from 108,000 lb. to 124,200 lb. by the time the first prototype was well advanced. With its four 3,250 e.s.h.p. Allison T56-A-1 turboprops, each driving a 15 ft.-diameter three-blade propeller, the first Hercules was rolled out at Burbank in the early Summer of 1954. It bore U.S.A.F. markings and was allocated the military serial 53-3396. Distinctive features were the broad, capacious fuselage cylindrical for most of its length, bluff nose, relatively high aspect ratio wing, compact engine nacelles, sharply upswept rear fuselage and prominent tail unit. The large tail surfaces made for easier controllability at low speeds. Access to the cavernous main hold, 10 ft. 3 in. wide at floor level and with an unobstructed length and height of 41 ft. 5 in. and 9 ft. 1 in. respectively, was provided by a 7 ft. 3 in. by

An early USAF C–130A. Note the extensive cockpit glazing, with windows extending down to floor level, and the enlarged nose radome which distinguishes production aircraft from the prototypes. (Photo: Lockheed)

6 ft. door in the forward port side, together with a two-section rear door opening up to expose the full cross-section of the hold. One segment, like its complement forming part of the lower fuselage, drops down to form a loading ramp, whilst the other is hinged at its aft end and raised up within the fuselage for opening. These basic loading arrangements became the standard for production Hercules, with the addition of smaller doors for paratroop dropping and flight deck access.

For its initial flight, on 27 August 1954, the first YC-130 prototype flew from the Lockheed Air Terminal at Burbank to Edwards Air Force Base, where it was to undergo U.S.A.F. evaluation, remaining airborne for 61 minutes. Early trials proved more than encouraging and on almost all points the C-130 exceeded the original U.S.A.F. requirements, especially in regard to climb and field performance. A welcome feature, too, was its ease of handling, thanks to the very light control forces afforded by the hydraulic power-boost systems. Even before the first prototype flew, an initial order for production aircraft had been placed by the U.S.A.F., and this was followed up by a second in October 1954.

Completion of further C-130s and test and evaluation work proceeded rapidly. It soon became quite obvious that, with its four advanced turbo-props, the Hercules' performance matched up to the best of any propeller-driven transports then available, coupled with a flexibility which placed it second to none. By the summer of 1955 at least five C-130s, including the two prototypes, were flying. That July the third production C-130

This USAF C–130A, depicted off the coast of South Vietnam in December 1966, sports full camouflage and two 450 U.S. gal unde ving tanks mounted on pylons. (Photo: U.S.A.F.)

Another USAF C–130A, paradropping supplies into a Vietnam combat zone during an early stage of the war, for U.S. Army ground forces. As can be seen, the fuselage is of constant width right up to the point where it meets the tailplane. (Photo: U.S.A.F.)

demonstrated a remarkable ability to take-off with a ground roll of only 900 ft. and land in a run of just 600 ft., at maximum landing weight and with a payload in excess of 16,000 lb. As part of the low temperature trials, a C-130 was sent to Eglin Air Force Base, Florida, and there placed in a special refrigerated hangar for a period of several months, to determine the effect of extreme cold on the functional and operational components and systems. Another C-130A was subjected to a two-year period of static stress trials, including submersion in an open-air water tank for simulation of fuselage pressurisation. These static tests ended in the late summer of 1956, and shortly afterwards Lockheed were rewarded by a further U.S.A.F. order for C-130As. The Hercules represented the first production application of the Allison T56 engine.

In 1956, also, there was intensive in-service U.S.A.F. evaluation of the C-130, undertaken by the 3245th Test Group (Bombardment), at Eglin A.F.B. A salient feature of the aircraft was to be rapid convertability between contrasting types of loads, demanding speedy on/off-loading and ease of change from one configuration to another. Typical of the "quick-change" characteristics demonstrated was a conversion from 30 troop seats to all-heavy cargo in 20 minutes, or from 40-seat troop transport to carrier of loaded platform, for parachute dropping of heavy items, in 40 minutes. The C-130 also proved its ability to carry 40,000 lb. of equipment, 92 combat-equipped troops or 70 stretcher patients with six attendants. One or two snags did arise, but part of the purpose of evaluation is to unearth these and in general the Hercules showed itself to be a very satisfactory and versatile worker.

As the first production variant for the U.S.A.F., the *C-130A* was basically similar to the two prototypes but featured revised nose, and more powerful Allison T56-A-1A engines delivering 3,750 e.s.h.p. and driving Aeroproducts three-blade reversible propellers of 15 ft. diameter. The enlarged nose radome added several inches to the aircraft's length. Maiden flight of the first C-130A, serialled 53-312G, took place on 7 April 1955. First unit to take delivery of this variant was the 463rd Troop Carrier Wing of the 18th Air Force, T.A.C., at Ardmore A.F.B., Oklahoma. Their Hercules were to replace C-119s and at a spectacular delivery ceremony at Ardmore on 9 December 1956, four C-130As arrived together, each disgorging a full load of vehicles and other equipment.

NEW VERSIONS FOR NEW NEEDS

Even before the first C-130A entered full service, work was already active on five further Hercules variants. Some were designed to perform specialist tasks or operate under particular conditions, whilst others were

Seen over Florida on October 19 1962 is this uncamouflaged USAF C–130A, with auxiliary wing-mounted 450 U.S. gal fuel tanks. Prominent in this view are the large main undercarriage blisters, and the parallel cross-section of the single cargo hold. (Photo: U.S.A.F.)

The SC-130B Hercules, seen here in its striking red, blue and white livery, was the first turbine-engined aircraft to equip the US Coast Guard when introduced in early 1960. Note the 4-bladed propellers. (Photo: U.S.C.G.)

A USAF C–130A takes its rest at a base in Southeast Asia, in 1965. Note the three-bladed propellers which distinguish this series from later variants, and the slight wing anhedral. (Photo: U.S.A.F.)

Another US Coast Guard SC–130B, featuring a different colour scheme, just landing after a spell of search duty. This one is serialled 1348.
(Photo: Lockheed)

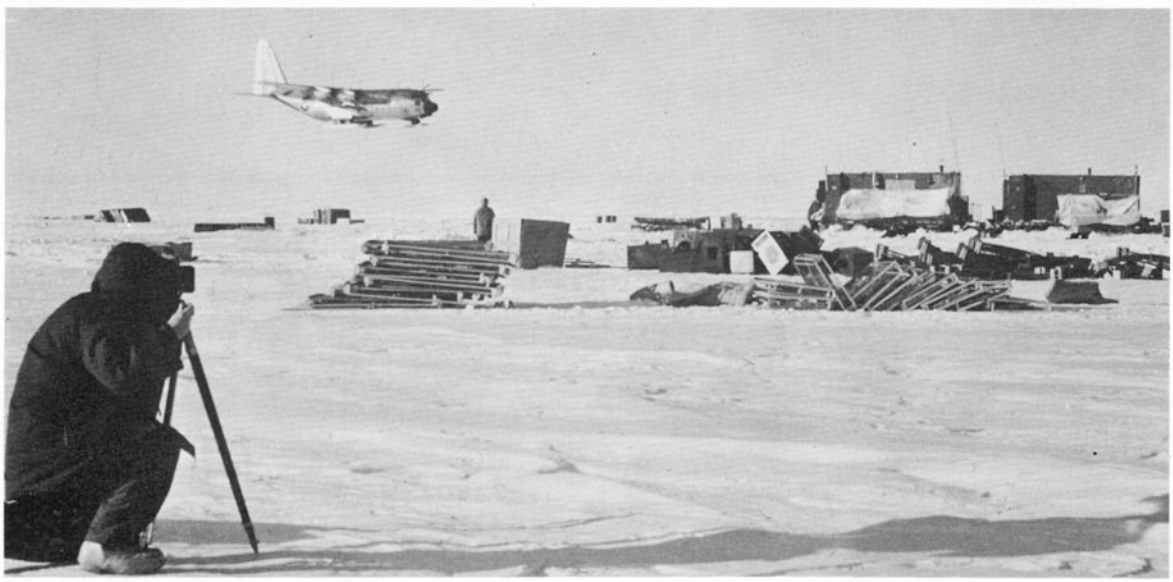
to incorporate more fundamental developments. Indeed, the total number of Hercules versions was eventually to pass the forty mark, but some of these were conversions of existing aircraft and none strayed far from the basic design. On 29 January, 1957, a C-130A flew with a combination wheel/ski undercarriage for the first time. This new development was intended to bring the Hercules transport capabilities to polar and similar regions with only snow and ice to offer as airstrips. Where the surface was soft or rough, skis would be used, but a better prepared airstrip of this type could be suitable for wheel operation. By the Spring of 1957 Hercules trials on snow and ice were well under way, at operating weights much in excess of those associated with earlier skiplanes. A take-off weight of 92,976 lb. achieved in April 1957, on a surface comprising 24 in. thick ice topped by 12 in. of snow, was acclaimed as a world skiplane record. Still more remarkable was the mere 985 ft. take-off run. Subsequently, a skiplane derivative of the *C-130A* entered U.S.A.F. service as the *C-130D*, and this is described in more detail in a later paragraph.

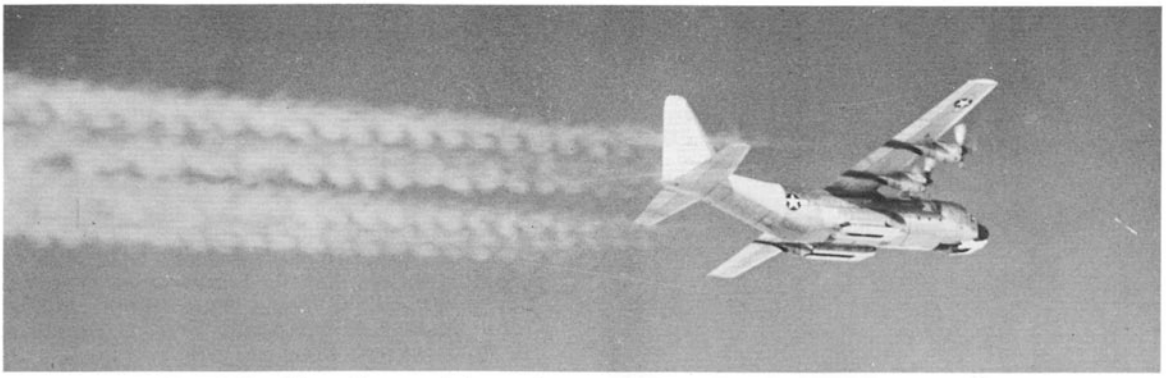
At the opposite extreme of climatic conditions, in Summer 1957, the T.A.C. conducted trial operations from desert sand strips, at weights up to 116,000 lb., paving the way for regular service in these conditions. Another early new test application for the C-130 was that of in-flight refuelling, this time for the U.S. Marine Corps which saw the Hercules as meeting both assault transport and tanker requirements. Two C-130As were loaned to the U.S.M.C. at Patuxent River, Maryland, in the Summer of 1957 for in-flight refuelling tests, nearly three years later they received the first of their own C-130s.

Meanwhile, the U.S.A.F. C-130A strength was increasing rapidly, and by the end of August 1957 six squadrons in the U.S. were already equipped with the type. It was also beginning to replace the C-119 Flying Boxcar as standard equipment for the U.S.A.F. 317th Troop Carrier Wing at Evreux A.F.B., France. Maximum payload of these aircraft was 39,400 lb., and successful operation at high weights from rough, hastily-prepared strips was facilitated by the low tyre pressures of 50–70 lb. per sq. in.

Next major Hercules development was the *C-130B*, announced on 13 August 1957 and featuring greater power, higher weights and more fuel to improve payload/range performance. Powerplant was to be the 4,050-e.s.h.p. Allison T56-A-7, driving a new Hamilton Standard four-blade propeller of 13 ft. 6 in. diameter, with higher engine/propeller reduction gearing ratio to reduce blade tip speed and associated vibration. Undercarriage strengthening permitted maximum weight to increase to 135,000 lb., and an additional 1,710 U.S. gal. of fuel tankage was installed inboard of the inner engines, bringing total internal fuel capacity to 6,960 U.S. gal. Additional electronics were also incorporated. Initial orders totalling 53 examples had been placed by the U.S.A.F. by the time of the C-130B's first flight on 20 November 1958; and the series entered service on 12 June 1959.

A ski-equipped US Navy LC–130F prepares to land at the New Byrd Site on Marie Byrd Land, Antarctica—at three o'clock in the morning. This picture just shows how the skis are mounted beneath the standard wheel undercarriage units. (Photo: Lockheed)





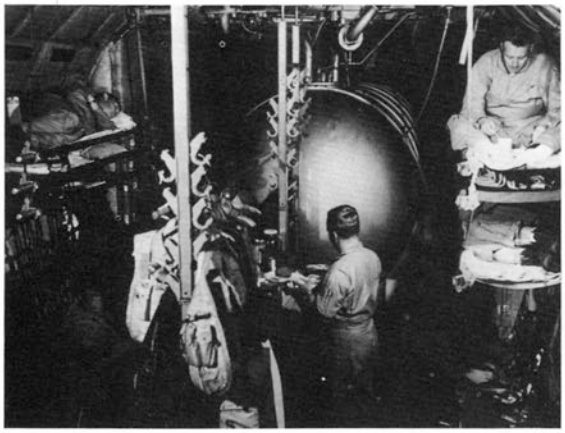
The US Navy LC–130F JD8320 in flight, trailing contrails from its four 4,050 eshp Allison T56–A–7 turboprops. (Photo: Lockheed)

Medium transport aircraft lend themselves to reconnaissance work if they can provide the necessary endurance, altitude flexibility and low operating costs, and early in its career the Hercules was earmarked by the U.S.A.F. for this rôle. From the beginning of 1959, 16 C-130As were converted to *RC-130A* standard for service with the 1370th Photo Mapping Group, in the Air Photographic and Charting Service section of the Military Air Transport Service (later, Military Airlift Command). Deliveries were completed that year. Among the equipment featured in these aircraft were aerial electronic geodetic surveying apparatus, and cameras for photo-mapping. An Airborne Profile Recorder Mk. 5, a Canadian-built 176 lb. radar device providing a precise measure of terrain height above sea level, was installed within a blister under the nose radome. Camera windows were let into the fuselage underside, including an optical glass lens of 42 in. diameter and weighing no less than 325 lb. Additional crew stations were provided for photo-navigator, photographer, 2 HIRAN operators and the airborne profile recorder operator. To enhance the self-contained nature of the RC-130A's facilities and to process the information obtained into useable form while still airborne, mapping equipment, darkroom and galley were also installed.

Production of the C-130A itself terminated in February 1959, after 231 examples of this version had been completed. Of these, 219 were delivered to the U.S.A.F. and the remaining 12 comprised a batch for the Royal Australian Air Force (R.A.A.F.), with T56-A-11 engines. The R.A.A.F. placed their order as far back as mid-1955, deliveries beginning at the end of 1958, and some ten years later ordered a second dozen Hercules, this time of the C-130E variant. Around 1959, all U.S.A.F. C-130As were given modifications enabling them to operate at heights up to 35,000 ft. with a full 40,000 lb. payload. These included structural strengthening in the form of thicker fuselage skinning, a new tandem rudder boost system and revised propellers turning more slowly, reducing noise and vibration but leaving performance unimpaired.

A C-130A derivative which appeared shortly after production of this first series ended was the *GC-130A* drone carrier. Only two were converted, the first initially flying from Dobbins A.F.B. in April 1959. They incorporated comprehensive equipment for the launching,

This US Navy ski-equipped LC–130F of VX–6 Squadron makes a quick turn-round in the Antarctic. These Hercules are the largest aircraft regularly operated in skiplane configuration. (Photo: Lockheed)



As this US Navy LC–130F ferries its way from New Zealand to Australia, some of the crew snatch a short rest. In the centre is a U.S. 3,600 gal fuel tank, carried for long flights. (Photo: U.S.N.)

Loading a pre-fabricated hut into a USN LC–130F skiplane on Antarctic snow is easy with the right equipment. (Photo: Lockheed)

Key to colour illustrations

1 C-130A of the U.S.A.F. in markings applicable to combat operations in South Vietnam. No military serial visible.

2 C-130E (serial 10769), one of 24 supplied to the Royal Canadian Air Force—now renamed Canadian Armed Forces. Note French inscription applied to starboard side of Hercules; English on port side.

3 LC-130F (BuAer. No. 8320) belonging to the U.S. Navy's Air Devron Six (VX-6), the Navy's only Antarctica-based aerial logistics support squadron. Wheel-ski undercarriage, retracts.

4 HC-130B (U.S.C.G. No. 1344) of the U.S. Coast Guard. The U.S.C.G. now places the military "star-and-bar" insigne on the fin instead of rear fuselage.

tracking and control of drones, the drones themselves being stored on underwing pylons. Primary function of these aircraft was to launch realistic targets in support of research, development, evaluation and aircrew training in regard to relevant Air Force weapons systems. Ground control antennae and other equipment were installed within a nose radome lengthened by 30 in. Up to four target drones of any standard type could be carried, such as the Ryan Q-2C Firebee (now redesignated U.S.A.F./U.S.N. BQM-34C), or a similar number of missiles. All electronic equipment for drone launching, monitoring and control was mounted in portable consoles to permit conversion of the aircraft to cargo carrier, assault transport or ambulance. This variant has alternatively been designated *DC-130A*.

An interesting proposal which entered the news around the middle of 1959 was a greatly enlarged development known as the *Super Hercules,* studied under the Lockheed designation GL-207. With a gross weight of 200,000 lb., this transport was to be able to accommodate a 77,400 lb. payload within its 7,500 cu. ft. cargo volume, and the 5,000 s.h.p. Allison T61 turbo-prop, under development, was selected as powerplant. Span was to be 145 ft. and length was to be increased some 23 ft. to 121 ft. 1 in. This project was aimed especially at the civil market, then relying even more on converted passenger airliners for its all-freighters than now, and in fact on 21 March 1959, Pan American World Airways and Slick Airways placed tentative orders for 12 and six Super Hercules respectively. However, further progress on the design was held up by lack of funds for development of the T61, although consideration was given to a version equipped with the Rolls-Royce Tyne, of roughly similar power. U.S.A.F. support for the T61 was withdrawn altogether in late 1959. By mid-1960 design studies were turning more and more to a turbofan-powered development with swept wings, and this eventually crystalised as Lockheeds C-141 Starlifter military transport.

Meanwhile, development and production of the basic C-130 Hercules became more active than ever. A new customer, for a C-130B derivative designated *SC-130B,* was the U.S. Coast Guard (U.S.C.G.), which placed an initial order for four aircraft. These were specially equipped for search and rescue missions, with modifications including the addition of a radio operator's station in the flight deck, three further crew stations for search team commander and two observers, and a clear-vision panel in the rear paratroop doors for low-level search. Deliveries to the U.S.C.G. began in 1960. A typical mission would comprise a 1,000 mile positioning flight at 370 m.p.h. and 25,000 ft., and a seven hour period of search duties on two engines at 145–170 m.p.h., followed by a 1,000 mile return to base at 345 m.p.h. Thus the aircraft would remain airborne for nearly 13 hours, being left with a 15-minute fuel reserve. The search endurance could be extended to 10·2 hours if the positioning legs were flown about ten per cent. more slowly. Twelve of these aircraft ultimately entered service with the Coast Guard, and they have more recently been redesignated *HC-130B.* The last was delivered in November 1963.

Erratum: The publishers wish to apologize for the transposition of the colour illustrations on pages 9 and 16. The key numbers on the drawings are correct, as are those against the captions.

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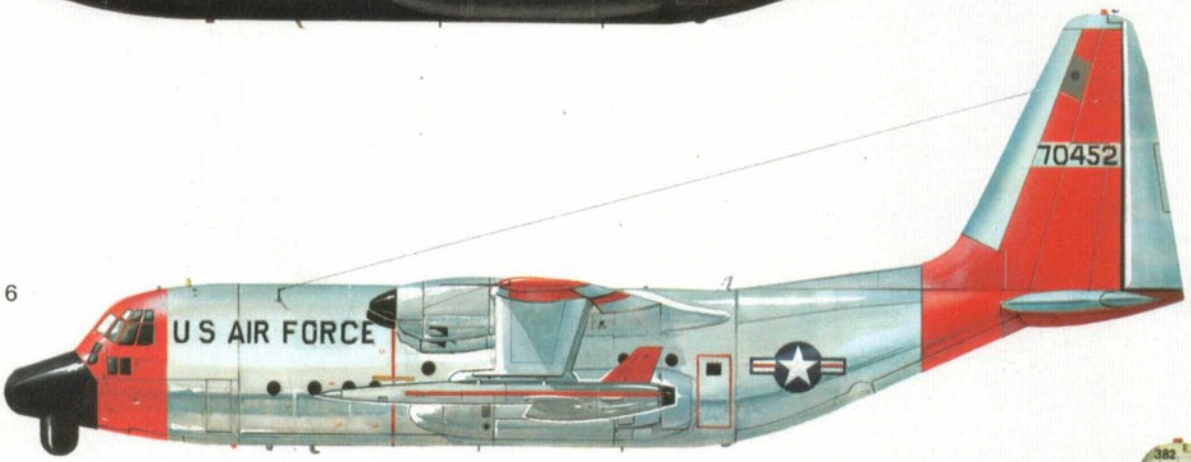

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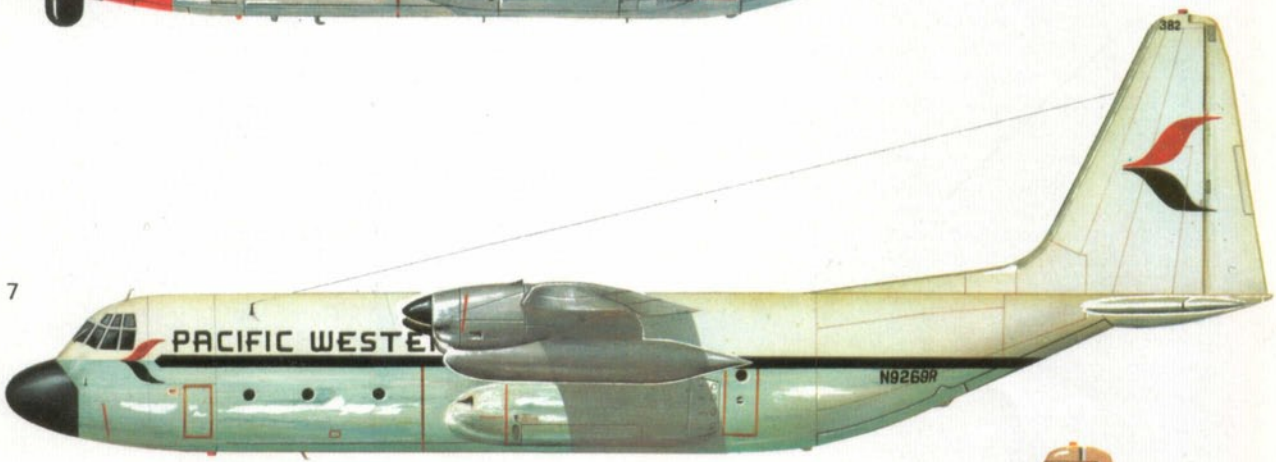

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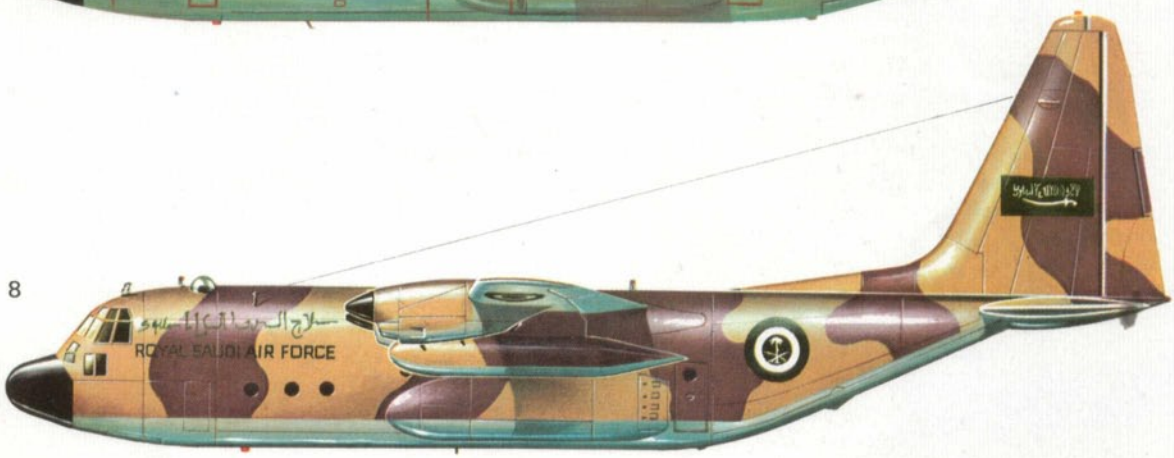
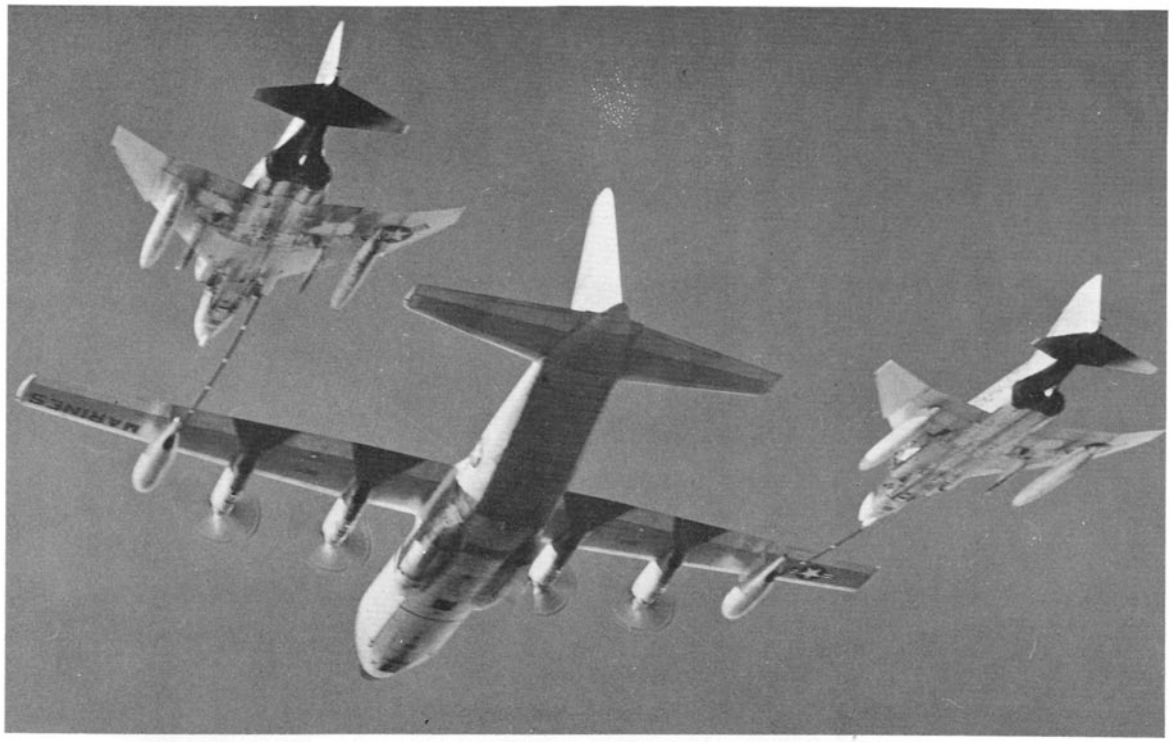




Two US Marines F-4 Phantoms take on extra fuel from a KC–130F (GV–1) Hercules, also of the US Marines. (Photo: Lockheed)

A more abortive Hercules development was the *C-130C,* a proposed STOL series with boundary layer control and other refinements intended to meet U.S. Army requirements. In the event only one such aircraft was built, a converted C-130B with two Allison YT56-A-6 turbojets mounted in pods under the outer wings, to augment the airflow at take-off and landing over the ailerons, flaps and tail control surfaces. Flap deflection and operating rate were increased, as were the rudder and aileron chords. A 22 ft. diameter braking parachute completed the modifications to ensure take-off and landing ground roll no greater than 1,400 ft. at maximum all-up weight. Stalling speed was reduced to 60 m.p.h. This aircraft, designated *NC-130B,* initially flew on 8 February 1960, thereafter serving as a boundary layer control test bed for the U.S.A.F. Shortly afterwards large new U.S. military orders were placed for other C-130 models and through pressure of this work Lockheed did attempt to have the C-130C project taken further in the U.K., especially by the British Aircraft Corporation and with Rolls-Royce powerplants, but without success.

A GV–1 (KC–130F) of the US Marines VMGR 352 squadron, depicted in 1961 in use as a tactical transport and being loaded with vehicles. (Photo: U.S.M.C.)

Mention has already been made of the ski-equipped Hercules, and by 1960 two U.S. services had ordered these aircraft. In addition to the 12 C-130As converted to C-130D skiplane standard for the U.S.A.F., four ski-equipped C-130Bs, designated *C-130BL* more recently *LC-130F*), were ordered for the U.S. Navy. Deliveries of both variants began in 1960, the first of the latter being received that August. Three large semi-retractable skis were fitted, in the position of the normal wheel units, the total installation weighing 5,600 lb. Each main ski was 20 ft. long and 5 ft. 6 in. wide, weighing just 2,000 lb., whilst the forward ski was of the same width but only half the length. Bearing surfaces were of Teflon plastic to minimise friction and adhesiveness of the snow ice. The skis were able to follow uneven terrain by being free to move through an up-and-down pitch range of 8° and 15° for the main and nose units respectively. It was calculated that the added weight and drag of the ski installation reduced range by some five to ten per cent, but this was alleviated by the addition of two 450 U.S. gal. underwing pylon tanks and, for longer journeys such as ferry flights to the Antarctic, two 500 (or one 3,600 U.S. gal) tanks in the cargo-bay. The underwing fuel tanks were installed between the engine nacelles on each side. Another feature was the provision of Jet-Assisted-Take-Off (J.A.T.O.) in the form of eight 1,000 lb. static thrust KS-1000 rocket units, of 15 seconds burning duration, at the rear of the main undercarriage fairings, four on each side. This J.A.T.O. system can be fitted to any C-130 variant.

The Hercules skiplanes represent the largest aircraft of their kind and are a tribute to the exceptional ruggedness

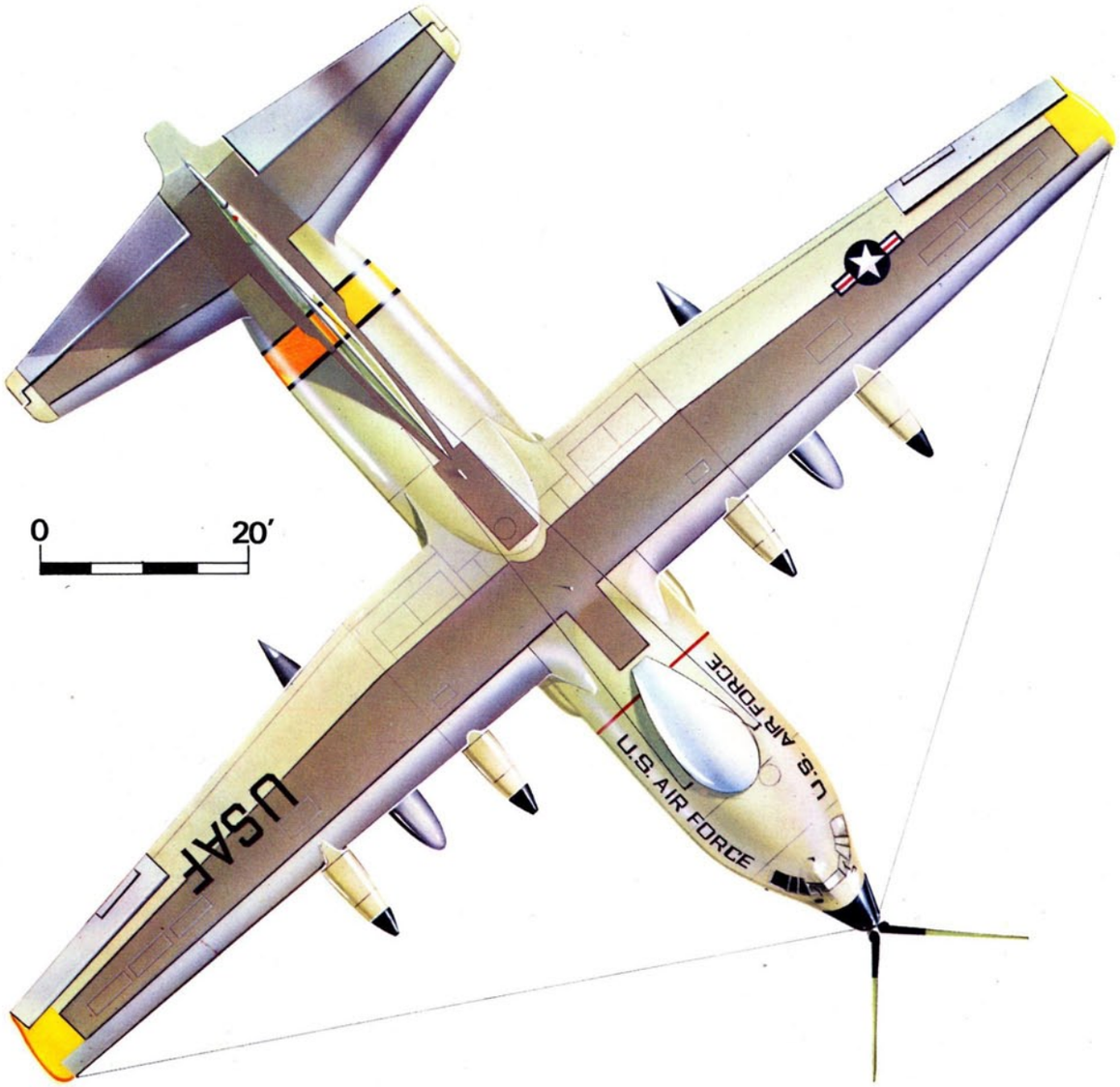
Up, up and away . . . with J.A.T.O. "lift-off", a Lockheed GV–1 Hercules of the U.S.M.C. in the early 1960s. About this time, the U.S. Dept. of Defense brought into effect on September 18, 1961 a single system of designating military aircraft for all the services. Thus, the GV–1 illustrated became the KC–130F. (Photo: Lockheed—Georgia Co.)

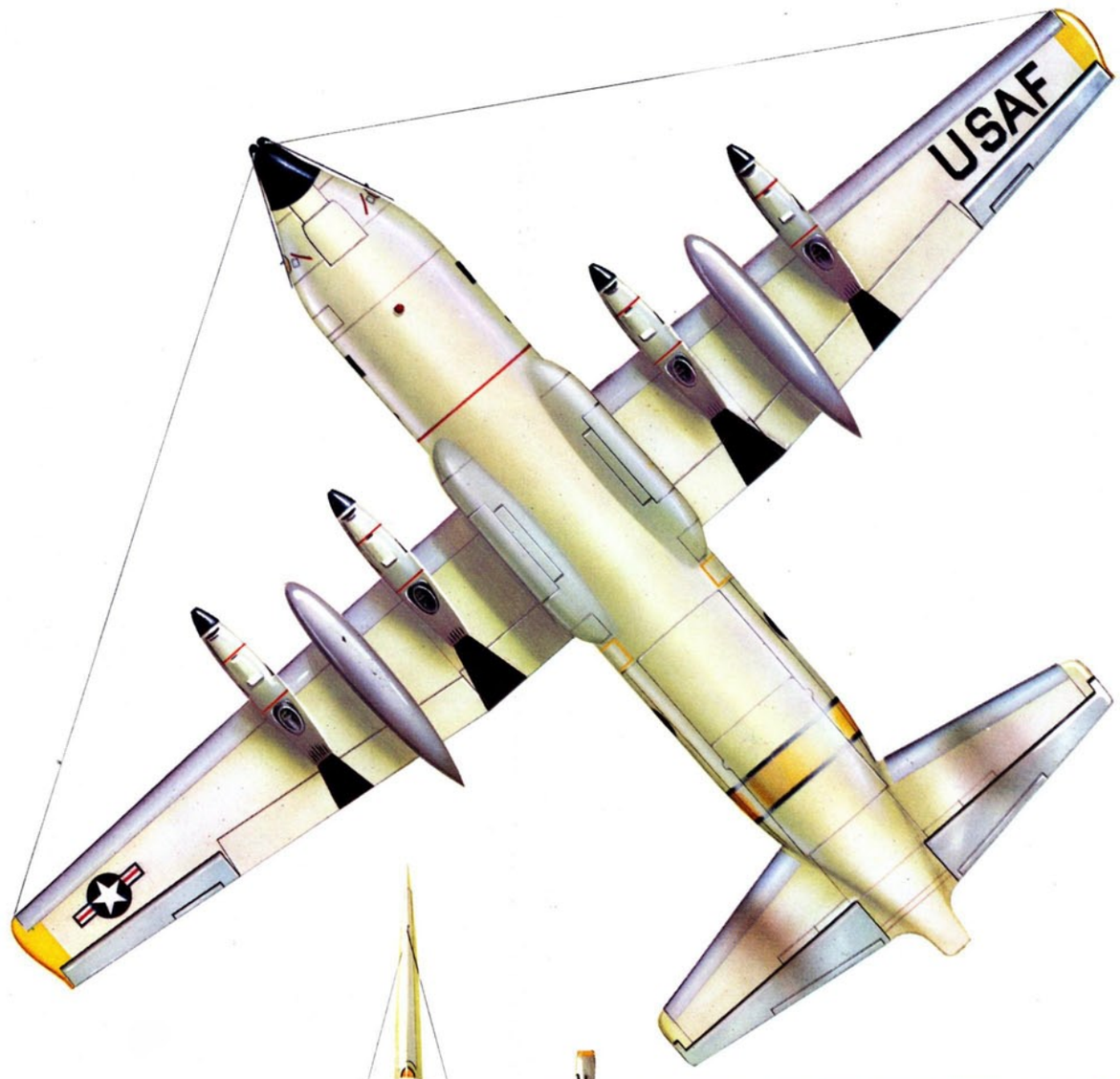
of the basic design. Equipping the U.S.N.'s only Antarctic Squadron, VX-6, the LC-130Fs play a vital part in aerial logistic support of military and research parties, together with search and rescue work, photo-mapping and reconnaissance, and limited airlift support between this polar region and the U.S.A. or New Zealand.

The U.S. Marine Corps involvement with the C-130 stemmed back to the summer of 1957 when they evaluated two C-130As on in-flight refuelling trials, as mentioned earlier. Their experiences led to orders for two derivatives of the C-130B, one specifically for in-flight refuelling and the second as a logistical support and general assault transport. After an initial order for 16, a total of 46 such C-130s was built, receiving the U.S.M.C. designations *GV-1* (tactical tanker) or *GV-1U* (cargo/transport). With a 5–7-man crew, the GV-1s can refuel two aircraft simultaneously and normally carry a transferable fuel load of 3,600 U.S. gal., adequate for four F-IVs pod-feed from the huge cargo-bay tank. On a typical mission these aircraft can transfer up to 33,000 lb. of fuel at 25,000 ft. some 1,000 miles from base and at a speed, while refuelling, of 355 m.p.h. First flying on 22 January 1960, deliveries were completed in November 1962. Alternative designations for the GV-1 and GV-1U are the U.S.A.F.'s *KC-130F* and *C-130F* respectively. The entire refuelling equipment of the KC-130Fs may be speedily removed or re-installed. One of these U.S.M.C. aircraft contributed to an unusual world record when nine Marine Corps parachutists made a free-fall parachute jump of 44,100 ft., from a GV-1U, opening their parachutes at 2,600 ft. The KC-130F refuelers equip three aerial Squadrons: VMGR-152 (with detachment in Vietnam), VMGR-252 and VMGR-352.

Next major Hercules version was the *C-130E,* essentially an extended range development of the C-130B. This range could also be traded for extra payload on short stages to maximise flexibility, so that it could carry 34,000 lb. non-stop from the U.S. to West Germany, or as much as 80,000 lb. on sectors up to 1,000 miles. All weights were increased by comparison with earlier variants, especially the gross weight which in standard configuration was 155,000 lb. but with a permissable overload all-up weight of 175,000 lb., subject to certain operating restrictions. More powerful T56-A-7A engines were fitted, each delivering 4,050 e.s.h.p. and driving a four-blade propeller. Cruising speed, however, at 368 m.p.h. differed little from that of its predecessors. Two 1,360 U.S. gal. underwing fuel tanks supplemented the main capacity, giving a total fuel complement of 9,680 U.S. gal. and enabling this new Hercules to fly 3,500 miles with a 35,000 lb. payload. In December 1960 an initial order for 16 C-130Es was placed by the

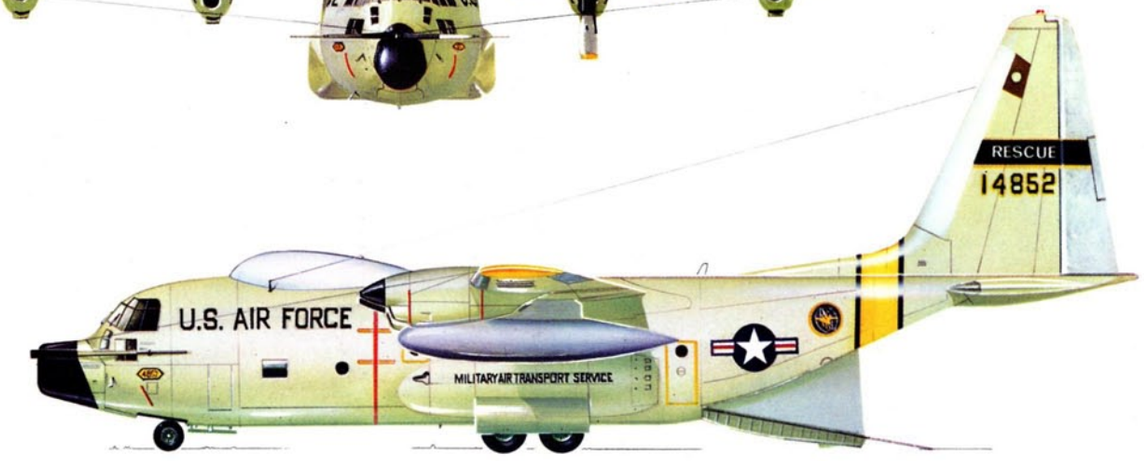
This KC–130F of US Marines Squadron VMGR 352 is boosted into the air with the aid of eight 1,000 lb thrust rocket units, located on the rear of the main undercarriage blisters. Note the large, tandem wheels on each main undercarriage unit. (Photo: U.S.M.C.)

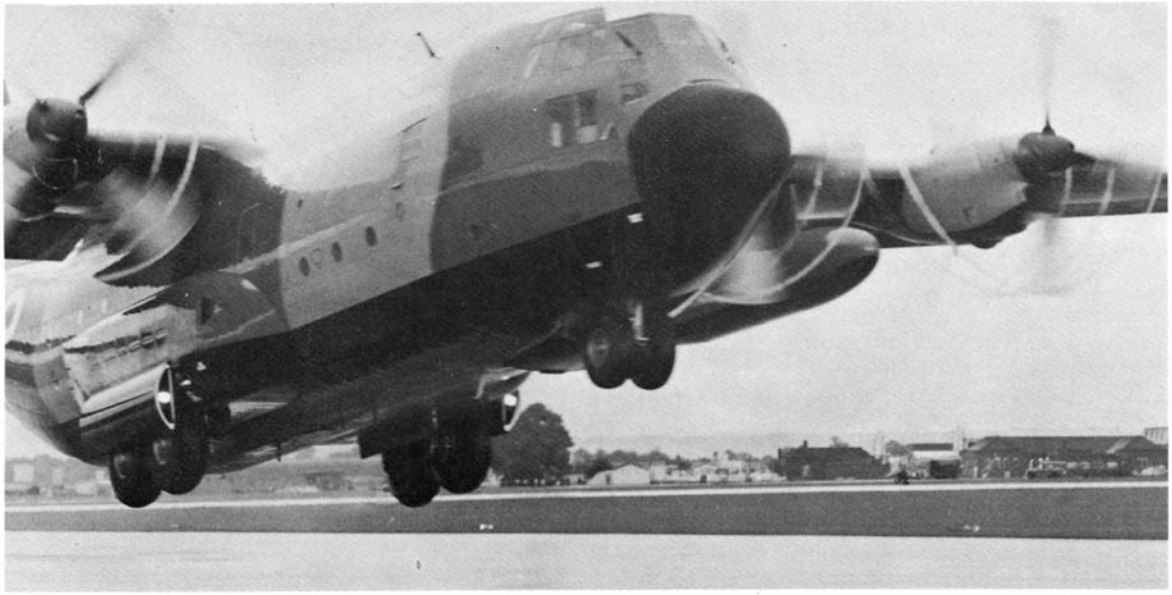




June 1965—United States Air Force Lockheed HC-130H (U.S.A.F. serial 61-4852), one of the first of 63 initially assigned to the Air Rescue Service of the Military Air Transport Service—now the Military Airlift Command.

Hadler/Johnson/Trim © *Profile Publications Ltd.*





Wet landing with propeller tip vortices, an R.A.F. Air Support Command (C–130K) Hercules seconds before touchdown in England.
(Photos: U.K. Ministry of Defence)

U.S.A.F. for the M.A.T.S. (now M.A.C.), first of a succession of U.S.A.F. contracts which had accounted for 363 C-130Es by the end of 1969.

The first flight of the first C-130E was on 25 August 1961, with deliveries beginning the following April. This version was built in greater numbers than any other Hercules variant, and besides the 363 U.S.A.F. examples serving variously with the M.A.T.S., T.A.C. and Military Airlift Command, substantial export orders were received for the C-130E. Twenty-four have been bought by the Canadian Armed Forces, 28 by the Imperial Iranian Air Force, 12 by the Royal Australian Air Force, 11 by the Brazilian Air Force, nine by the Royal Saudi (Arabian) Air Force, six each by the Royal Norwegian, Libyan and Peruvian Air Forces, three by the Argentine Air Force and two each by the Colombian and Royal Swedish Air Forces. In the United States, 14 C-130Es were acquired by the U.S.A.F. Aerospace Rescue and Recovery Service, 12 by the U.S. Navy and one for the U.S. Coast Guard. This made up a total of 510 aircraft, according to the latest figures available at the time of writing.

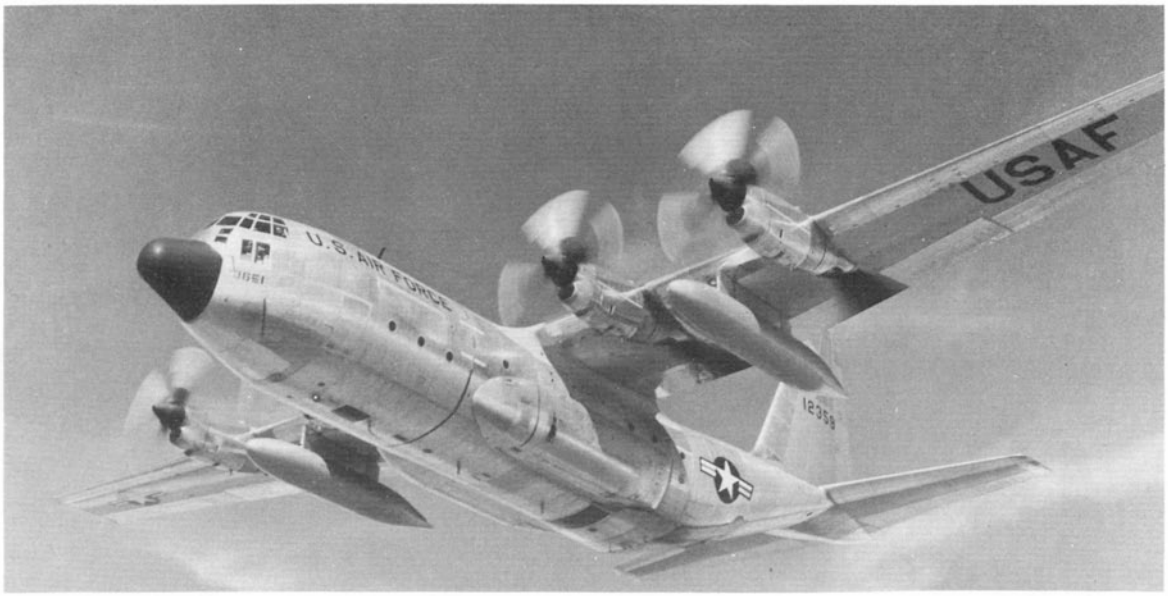
C–130E 10302 of the Royal Canadian Air Force (now Canadian Armed Forces), just unloading one of the three Hiller CH–112 Raven helicopters it had brought from Manitoba (Canada) to Guetersloh Air Force Base, West Germany. (Photo: Lockheed)

STILL MORE APPLICATIONS

Further derivatives continued to appear at a prolific rate from the early 1960s, and indeed throughout the decade as new tasks were found for this versatile transport. Production of the basic C-130B version continued until about mid-1965 with the completion of 230 aircraft, including export orders for 10 to the Indonesian Air Force, seven to the South African Air Force, six each to the Pakistan and Brazilian Air Forces, and four each to the R.C.A.F. (now Canadian Armed Forces) and Imperial Iranian Air Force. Mid-1961 saw the delivery of six *JC-130Bs* to the 6593rd Test Squadron, U.S.A.F., at Hickam A.F.B., Hawaii. These were specially modified C-130Bs, equipped for Discoverer satellite recovery, and replaced C-119 aircraft. Later they were re-designated HC-130B.

In September 1963 the U.S.A.F. gave Lockheed its support for a new specialised Hercules to be built for the U.S.A.F. Air Rescue Service, a sub-command of M.A.T.S. This was to handle a complete range of search and rescue work, including astronaut recovery from land or sea. During the following twelve months or so orders for this variant, designated *HC-130H*, quickly mounted up to 63 aircraft. Coupled with the HC-130H was a small batch of *C-130H* aircraft based on the C-130E but with more powerful 4,910 e.s.h.p. Allison T56-A-15 powerplants, derated to 4,500 s.h.p. because of airframe structural limitations. The Royal New Zealand Air Force ordered a total of five C-130Hs, equipping their No. 40 Squadron, and it was from this variant that the Air Rescue Service aircraft were derived. Late in 1970, the Imperial Iranian Air Force placed a £51m order for 30 C-130Hs, making Iran the third largest Hercules customer, with 62 of '-B, '-E and '-H variants purchased.

The first HC-130H example took to the air for the first time on 8 December 1964, introducing much new external and internal equipment to the Hercules repertoire. A salient feature was the elaborate nose-mounted Fulton recovery system, enabling men or objects to a

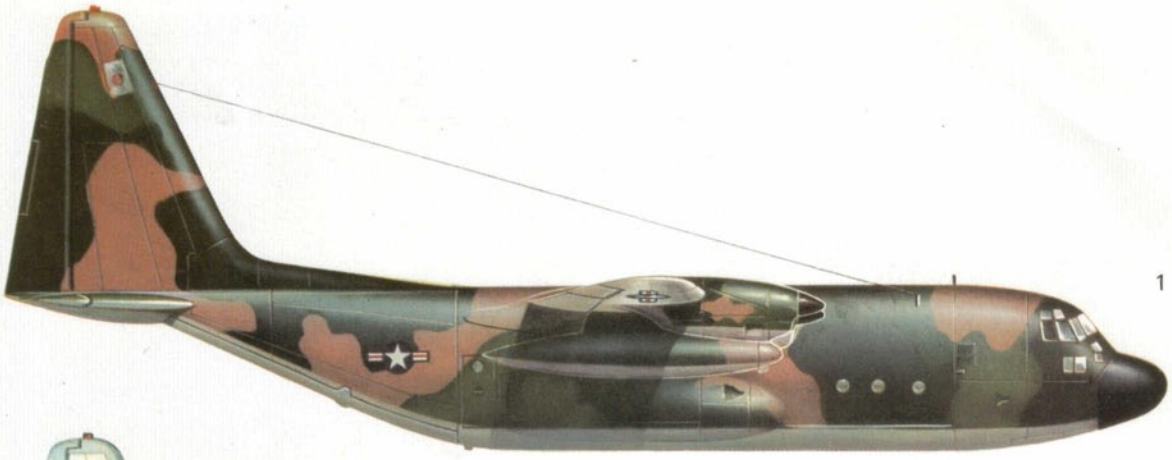


One salient feature of the C–130E, seen here in USAF markings, is the 1,360 US gal supplementary fuel tank under each wing. (Photo: Lockheed)

total weight of 500 lb, including recovery gear, to be picked up safely from land or water with the aircraft in flight. For recovery of a man on the ground, a recovery kit is first dropped to the man who then dons a special harness and releases a 24 ft, ×6ft. helium balloon on the end of a 500 ft. nylon line attached to the harness. The HC-130H Hercules then flies into wind at 500 ft and at a speed of 120–140 kt., trapping the line by means of a two-piece V-shaped yoke, folded out from the nose. Each arm of yoke is 14 ft. 6 in. long, and when not in use both are folded back along either side of the forward fuselage. The balloon is separated by means of a weak link while the line is trapped and mechanically knotted at the base of the yoke. As the man is pulled away from the ground, with forces no greater than those experienced in parachuting, he is winched-up and hauled in towards the rear of the aircraft, which he finally enters through the rear cargo ramp. Special precautions are taken to ensure that the man or load do not strike the aircraft when being reeled in, and to protect the propellers if the "yoke" does not catch the line. Two men simultaneously have been successfully recovered by this method, which is invaluable for remote areas unsuitable for aircraft to land on and beyond the range of helicopters.

Standard equipment aboard the HC-130H includes four 6-man rafts, two casualty litters, bunks, recovery winches, 10 flare launchers and a wide range of other rescue equipment, any of which may be precision-dropped with the aid of an intervalometer and special overhead rails provided for this purpose. A crew of 10 is

Another view of the same USAF C–130E as that shown in the previous picture, illustrating the compact installation of its 4,050 eshp T56–A–7 A turbo-props. (Photo: Lockheed)



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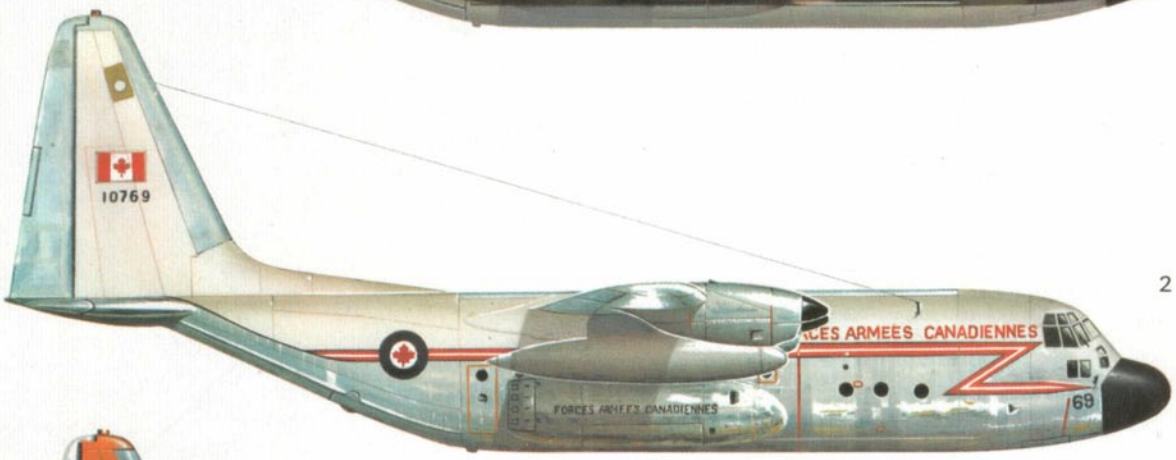

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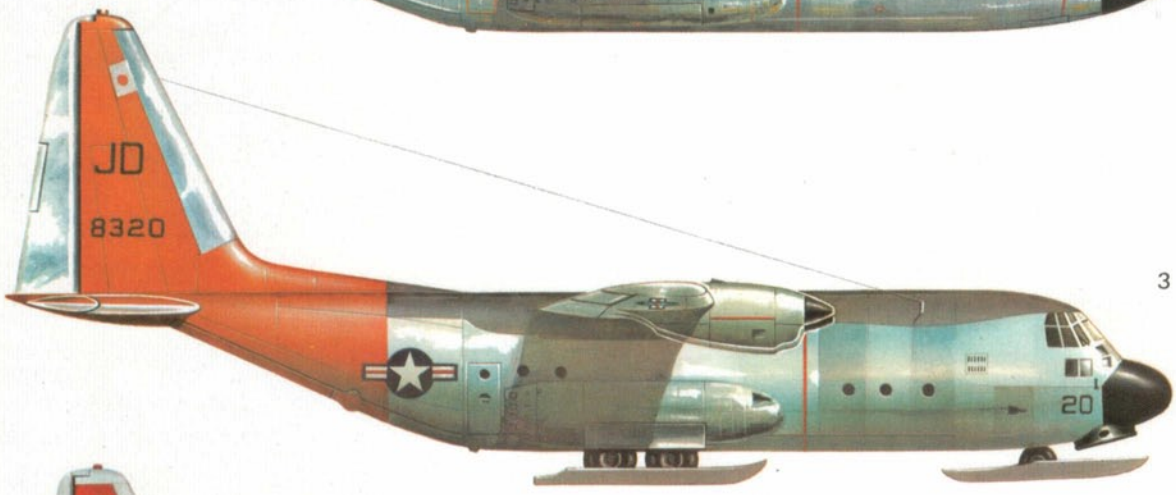

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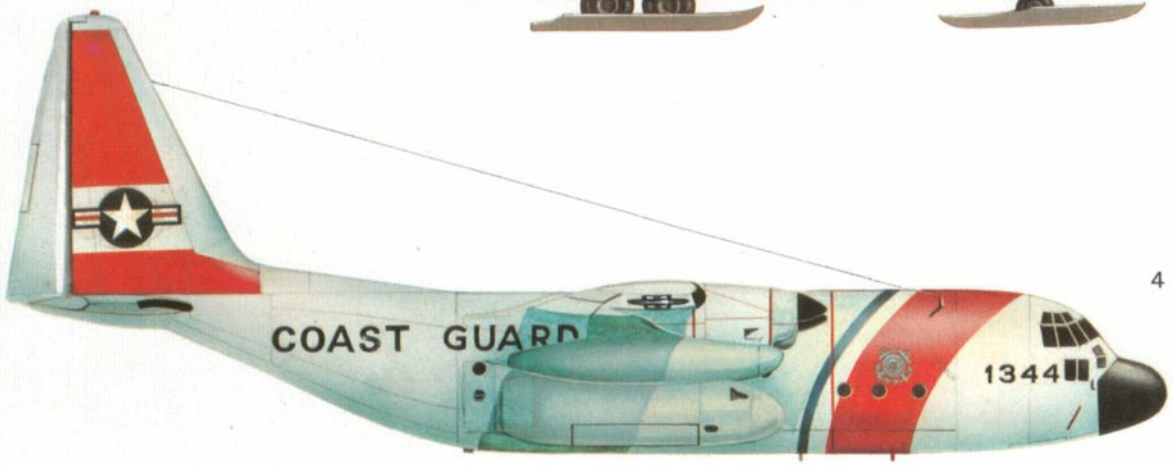

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Key to colour illustrations

5 C-130K (serial XV194), a Hercules C.Mk.1 of Air Support Command, Royal Air Force. Note miniscule patch of white above cockpit, a "heat shield" against the sun's rays.

6 GC-130A (serial 57-0452). one of two C-130As converted as "parasite carriers" (prefix "G") for the U.S.A.F. to carry up to four drones under the wings. Drawing depicts "0452" carrying a Northrop Q-4B supersonic drone in 1960.

7 Model 382E Hercules L-200-20 (N9269R) of the U.S. operator, Pacific Western Airlines. The L-200-20 has fuselage "stretched" by 100 inches.

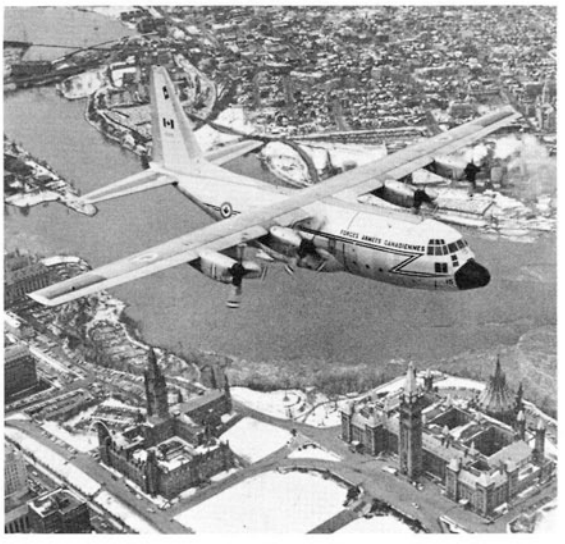
8 C-130E (no serial) of the Royal Saudi Air Force. C-130Es serve with a number of foreign air forces.

carried, comprising pilot, co-pilot, navigator, two flight mechanics, radio operator, two load-masters and two para-rescue technicians. Two additional 1,800 U.S. gal. fuel tanks can be installed in the cargo compartment, allowing the aircraft to drop supplies or carry out a recovery 2,740 miles from base, and return to the same base. Deliveries of the HC-130H began in mid-1965, and terminated about three years later. In addition to the 63 ordered by the U.S.A.F., three were acquired by the U.S. Coast Guard. About 1966, 20 of the Air Rescue Service aircraft were converted for in-flight refuelling of helicopters and mid-air retrieval of parachute-borne loads. This variant is known as the *HC-130P,* and is capable of transferring 48,500 lb. of fuel 575 miles from base.

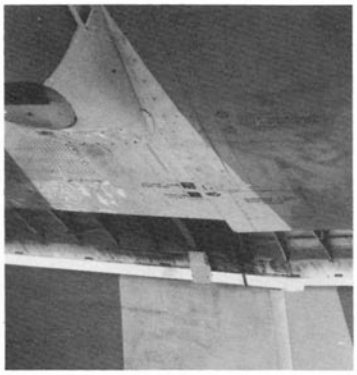
Production rate of the Hercules actually increased during the early 1960s, reaching a peak rate of 15 aircraft per month, or one every two days, around late 1963. By mid-1965 it was levelling out at some five aircraft per month, which was maintained for the rest of the 1960s. Late 1964 saw some particularly interesting C-130 trials —aircraft carrier operations, with a view to developing a proposed carrier-based version. A U.S. Marine Corps KC-130F successfully made 21 landings and take-offs from the deck of *U.S.S. Forrestal,* without even the help of arrester wires for landing, or catapult or J.A.T.O. for take-off! This was a remarkable demonstration and created for the Hercules a world-record for size of aircraft to operate from an aircraft carrier. Nevertheless, in view of lack of carrier storage space for such a large, non-folding aircraft and the strong over-deck winds necessary, further plans for C-130 carrier operations were abandoned.

Taking off from a dirt air strip some 40 miles northwest of Saigon is this USAF C–130B. The picture was taken during the delivery of troops and equipment for Operation Birmingham, a search and destroy operation, on April 24 1966. (Photo: U.S.A.F.)

A C–130E, 10315, of the Canadian Armed Forces. At the time of writing these aircraft equipped 436 Air Transport Squadron, Uplands (Ontario) and No. 435 A. T. Squadron, Namao (Alberta); occasionally also flying with No. 4 Transport Operational Training Unit, Brenton (Ontario). (Photo: C.A.F.)



Darkly camouflaged U.S.A.F. C–130B of the 834th Air Division took part in a Hercules' airlift of an entire division—the U.S. Army's crack 1st Cavalry Division (Airmobile)—from their home base of Camp Evans to a combat base in South Vietnam's Tay Ninh Province. (Photo: Lockheed via David A. Anderton)



On closer inspection, (left) HC–130H (65–0975) shows the recovery "Yoke" at rest, (centre) the double-slotted Lockheed-Fowler mainplane flaps and (right) tandem-wheel undercarriage bulge also housing four vertical sited windstream deflectors used when airdropping parachute troops. (Photos: G. Pleasance)

This US Coast Guard HC–130B is on ice patrol, locating and tracking icebergs off the coast of Labrador as a service to North Atlantic shipping in the area. (Photo: U.S.C.G.)

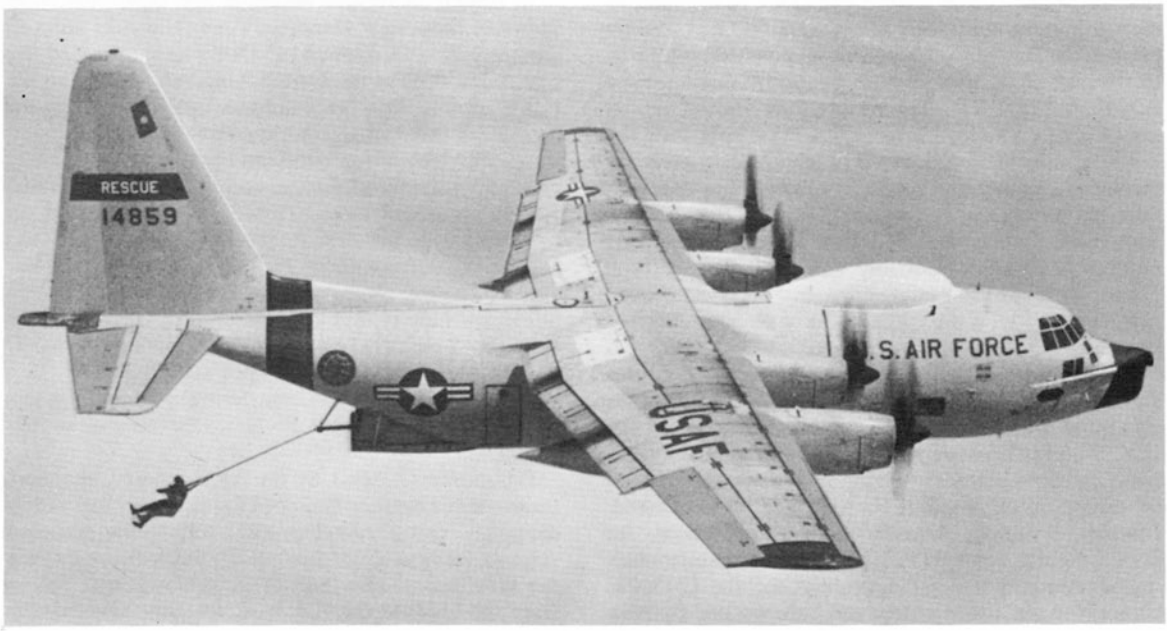
HC–130H 65–0975 at dispersal at Woodbridge, England, in July 1970. This aircraft, of the 67th Aerospace Rescue and Recovery Squadron, 40th A.R.R.W., is equipped with the "Yoke" recovery system.
(Photo: G. Pleasance)

One of the three HC–130H Hercules of the US Coast Guard, with more powerful 4,500 eshp engines and an extended nose with provision for the "Yoke" recovery system. (Photo: Lockheed)

From its earliest days the C-130 had demonstrated an impressive suitability for dropping exceptionally large and heavy loads from the air. During trials in mid-1956, for example, a C-130A dropped a 27,000 lb. single load of iron, attached to six 100 ft.-diameter parachutes, then acclaimed as a new world record. Some years later, a C-130 dropped a 41,740 lb. load in this way. A new technique developed around 1964 was the low level extraction method, whereby heavy loads are jettisoned from a flying aircraft without the risks or imprecision of parachute dropping at altitude. Two variations are possible, each capable of dealing with single loads up to 14,000 lb. In either case the C-130 can make a touch-and-go landing or fly past some 4–5 ft. above the ground, with rear cargo doors open. For the first, a hook attached by cable to a palletised load in the aircraft is trailed out from the hold, to engage with a steel cable on the ground. The load is thus extracted, and brought to a stop on the ground within about 100 ft. by an energy absorption system manufactured by All American Engineering. In the second technique a 22 ft. diameter ribbon parachute is used to drag the pallet out of the cargo compartment. This latter method especially has been widely used in Vietnam, allowing precise positioning of quite heavy loads in conditions where it would be dangerous or impossible for the necessarily large aircraft to land.

Other equipment developments have been made to enhance the value of the Hercules as an assault transport in forward-field areas. One of these was a cargo handling system developed by McDonnell Douglas and introduced in 1965. Comprising seven track-like sections stored inside the aircraft as a 600 lb., 7 ft. × 6ft. package, it can be deployed behind the aircraft by two men in a space of 30 seconds, after landing. With the help of

Dramatic moment as a guinea-pig "astronaut" is reeled aboard a "Yoke" recovery HC–130H; which accounts for the almost lifelike "arm" extending from the rear of the Hercules. (Photo: U.S.A.F., via M. J. Hooks, Air-Britain)



Two of the Royal Air Force C–130Ks (Air Support Command). XV194 in foreground. (Photo: R.A.F.)

special tracks and roller guides in the aircraft floor, palletised cargo can be slid out from the aircraft at a rate of 12 ft. per second. The heavy-duty ramp may then be disconnected for immediate departure, and the entire operation of unloading 40,000 lb. of cargo can be completed in five minutes, from touch-down to take-off.

FORCE-FED INTO THE ROYAL AIR FORCE

The United Kingdom's Royal Air Force had looked at the C-130 when it was new, but at the time hardly considered that British aircraft would not be available to meet its future needs. An advanced S.T.O.L. turbofan project, the Hawker Siddeley 861, was indeed under way by the mid-1960s, as a medium assault transport for the R.A.F., but early in 1965 it received the now proverbial axe of a new Labour Government. As a substitute the C-130 seemed ideal and would at least help to make up through versatility and economy of operation its shortfalls in performance. On 11 February 1965 it was announced that the R.A.F. was to have an unspecified number of C-130Es, possibly with Rolls-Royce Tyne powerplants which could offer markedly improved performance at some penalty in cost and delivery schedules.

However, when placed in mid-1965 the initial order was for 24 *C-130Ks*, based on the C-130H but with some electronic and other equipment manufactured in the U.K. Two further orders, for 24 and 18 aircraft respectively, had been placed by Spring 1966, making a total of 66 examples, all for R.A.F. Air Support Command. Scottish Aviation, already much experienced on R.C.A.F. and some U.S.A.F. Hercules maintenance, manufactured a few sub-assemblies for the C-130Ks, comprising six fuselage top and side panels, the two undercarraige strong frames and two external fuel tank pylons for each aircraft. This contract was soon afterwards extended to include similar components for all Hercules built in the future. The first R.A.F. Hercules, serialled XV176, made its initial flight on 19 October 1966, and then like all its successors was ferried to Marshalls of Cambridge (Engineering) Ltd., England, for the installation of U.K.-built electronics, instrumentation and other equipment such as tie-down fittings. These aircraft were also camouflaged by Marshalls, who received the first on 16 December 1966.

In helping to replace Beverleys and Blackburn (now Hawker Siddeley) Handley Page Hastings aircraft the Air Support Command C-130Ks have equipped five squadrons, four in the United Kingdom and one in the Far East. The first few examples initially went to the Aeroplane and Armament Experimental Establishment, Boscombe Down, for handling trials, and then joined No. 242 Operational Conversion Unit, Thorny Island. Re-equipping in Summer 1967, No. 36 Squadron, at Lyneham, was the first to receive C-130Ks, and was followed that Autumn by No. 48 Squadron of the Far East Air Force, Singapore. At the end of 1967 No. 24 Squadron moved to Lyneham to take delivery of its Hercules, whilst the remaining two Squadrons, Nos. 47 and 30, formed with C-130Ks at Fairford in 1968. Two years later these units, too, transferred to Lyneham where all the U.K.-based R.A.F. Hercules were now concentrated.

Designated C. Mk.1 by the Air Support Command, these aircraft are fully equipped for paratrooping, supply dropping, troop carrying and, with roller-conveyor systems, for heavy air dropping. They can also operate in the aeromedical rôle, and fly a regular freight service from the U.K. to the Far East, reaching Singapore in

Another Hercules tanker, this time the HC–130P of the USAF, for in-flight helicopter refuelling. (Photo: Lockheed)

In bare metal while undergoing manufacturer's flight trials at Marietta, Georgia, in 1966, the R.A.F.'s first Hercules C.Mk.1 provides clear evidence of skinning detail normally obscured by Air Support Command's "night black" polyeuthethane gloss paint finish on undersides.
(Photo: Lockheed via Harold G. Martin)

27 hours' flying time. By comparison with the slightly larger Beverley, the C-130K was considerably faster, heavier and more powerful, and after entering service were equipped for low level extraction techniques of discharging heavy loads. Most C-130K maintenance is carried out at R.A.F. Colerne, in Wiltshire as is R.A.F. Lyneham.

FURTHER MILITARY DEVELOPMENTS OF THE LATE 1960s

Even here the saga of Hercules developments had by no means ended. Studies on a significant new S.T.O.L. proposal for use right up to the battle regions themselves began in the summer of 1966, with active U.S.A.F. interest. This assault transport would be designated *C-130J* and powered by Allison T56-A-15s rated at 4,590 e.s.h.p. Greater aileron and rudder chords, by 30 and 40 per cent respectively, would improve low speed handling, and to cut down the landing run still further a more powerful anti-skid braking system and faster-reacting reverse thrust mechanism were to be incorporated. Mainwheel track was to be increased to 20 ft. and other undercarriage modifications would enable the aircraft to traverse gullies ten inches deep. With a 20,000 lb. payload ground roll would be only 700 ft., and on taking off again a mere 380 ft. would be required for the ground run, barely three times the length of the aircraft. Armoured seats and other flak armour protection would shield the crew from "hot zone" gunfire, whilst the fuel tanks would feature self-sealing blankets and an explosion suppressing system. An assault tanker derivative would be able to bring 60,000 lb. of fuel and oil to forward areas, with provision for in-flight refuelling. Development was suspended for a time under the MacNamara cuts, but became re-activated around mid-1968. However, this ambitious project appears to have sunk into limbo again.

Two further derivatives of the C-130E were the *EC-130E* for search and rescue duties with the U.S. Coast Guard, and the *WC-130E* weather reconnaissance aircraft operated by the U.S.A.F., introduced about 1966 and 1967 respectively. Five C-130Bs were also converted for weather reconnaissance work, as the *WC-130B*. No doubt the Vietnam war was a powerful catalyst in the development of the *AC-130*, a potent close support conversion of the Hercules with four 20 mm. multi-barrel cannon backed up by four 7·62 mm. miniguns, intended for use against local ground targets. Evaluation of such an aircraft took place at the Wright-Patterson A.F.B. in the Summer of 1967, and in the following year a contract was placed with Ling-Temco-Vought Inc. to modify seven Hercules to AC-130 standard, otherwise known as Gunship Two. In addition to their formidable armament, these aircraft were fitted with searchlight, and sensors including forward-looking infra-red target acquisition equipment and direct-view image intensification sights. By 1970 these aircraft were seeing active service in Vietnam.

A further wheels/ski variant for the U.S. Navy, introduced about 1968, was the *LC-130F*, derived from the C-130H and with roughly similar T56-A-16 powerplants. At about this time the U.S. Navy also took delivery of an electronic countermeasure development designated *EC-130Q*. In 1969 the U.S.A.F. placed an order for 15 of a new Search and Rescue variant, the *HC-130N*, fitted with advanced direction finding equipment and other special installations for retrieval of astronauts and space capsules after re-entry. Derived from the HC-130P, these long-range aircraft also provide for helicopter in-flight refuelling. Late in 1969 the U.S. Navy contracted for two C-130As to be modified for target drone launching and control, with wing strengthening and underwing pylons for four drones. Each aircraft also incorporates a three-man tracking and control station. Deliveries of these aircraft, essentially a more advanced variant, tailored to U.S.N. requirements, of the U.S.A.F. GC-130A introduced ten years earlier, took place in Summer 1970.

INTO COMMERCIAL SERVICE

Lockheed had been investigating the possibilities of a commercial cargo derivative of the Hercules since 1956 but through pressure of other commitments and lack of sufficiently active airline interest little further headway was made for some years. Earlier proposals included a

Head-on view of another RAF Air Support Command C–130K. Like the C–130Es, these aircraft feature 1,360 U.S. gal underwing fuel tanks. (Photo: R.A.F.)

Lockheed 382A development of the C-130B, and the greatly enlarged Super Hercules. Finally, by about 1963, the definitive L-382 commercial Hercules was announced, based on the C-130E but with some military equipment removed. Serialled N1130E, the prototype initially flew in mid-1964 and served as demonstrator as well as for F.A.A. certification trials. An F.A.A. Type Certificate was awarded on 16 February 1965. Powerplant was the Allison 501-D22, a 4,200 s.h.p. commercial version of the T56.

Production aircraft were given the basic type designation *L-100,* and with Alaska Airlines as the first customer received F.A.A. certification on 5 October 1965, for delivery shortly afterwards. Only distinction from the prototype were slight alterations to the cargo loading system. Customers for the L-100 (Model 382B) comprised Alaska Airlines (3 aircraft), Delta Airlines (3), Pacific Western Airlines (1), Zambia Air Cargoes (5) and Pakistan International Airlines.

In August 1967 Lockheed offered a *L-100-10* (M. 382D) derivative of the C-130H, featuring uprated 4,508 e.s.h.p. Allison 501-D22A powerplants, but none were ordered. Subsequent developments involved an appreciable lengthening of the fuselage and consequent rise in volumetric cargo capacity, beginning with the *L-100-20* (M. 382E) having a 60 in. fuselage extension aft of the forward crew door, and an additional 40 in. plug aft of the rear paratroop doors. This, with 501-D22A engines, received certification on 4 October 1968, after first flying in May that year. With its 49 ft. long main cargo hold, up to six standard pallets can be accommodated, on- and off-loaded by means of a rail and roller pallet system. Orders (listed at end of section) for some 22 examples of this variant had been received by late 1970, more than for any other commercial Hercules. One further example, serialled CF-PWN, was built as a hybrid Model *382F* with 501-D22 powerplants, for Pacific Western Airlines. Latest and largest civil Hercules, in fact the largest of any Hercules, at the time of writing was the *L-100-30* (382G), with a further 80 in. fuselage extension by comparison with the *L-100-20*. J.A.T.O. provision is deleted but the ramp, ramp door and rear side doors can be controlled from outside the aircraft. This Hercules can accommodate seven pallets

WC–130E airborne weather station of the Air Weather service division of MATS, (now MAC) USAF, seen just after take-off. (Photo: Lockheed)

"HOW"—the "Hercules-on-Water" project was U.S. Navy Air Systems Command-sponsored in 1968 for hydroski feasibility studies. Lanier Industries of Gainesville, Ga., was sub-contracted to build 8 ft. 3 in. wingspan boat-hull/tip floats' model for tests on Lake Lanier using radio-control. Jet engine intakes were to be inverted as on Lockheed L.188 Electra. (Photo: Lockheed, via David A. Anderton)

"BLC"—the Boundary Layer Control Hercules was tested in 1960 to meet U.S. Army requirements for a heavy transport with STOL—(Short-Take-Off-and-Landing) capability. Initially the C–130C, this converted C–130B became the NC–130B. Noticeable differences are the extra outboard turbojets and increased rudder and aileron chords. Note airflow tufts on rudder. (Photo: Lockheed, via David A. Anderton)

within its 56 ft. long hold, and three were ordered by Saturn Airways for delivery in early 1971. First flight was in September 1970. One of their major tasks will be to ferry Rolls-Royce RB211 powerplants for another Lockheed transport—the L-1011 Tristar. *L-100-20 Customers* (as at late 1970): Interior Airways (5); International Aerodyne (6); Red Dodge Aviation (5); Pacific Western Airlines (2); Safmarine (1); Southern Air Transport (3).

By late 1970, Hercules orders were nudging the 1,200 mark, with over 1,140 delivered. There were very few activities other than that of revenue passenger carrying to which Hercules were not being or had not been applied. Low costs, ruggedness and ease of operation under difficult conditions have enabled its high performance and carrying capacity to be introduced to a remarkable range of tasks otherwise beyond the scope of an aircraft to this specification.

HERCULEAN STRUCTURE

Of conventional design by modern standards, the Hercules was unusual when new in featuring extensive use of machined skinning, with integral stiffeners, for the wings. A similar technique is employed for the cargo floor. The cantilever high wing is of two-spar structure, with tapered machine panels up to 48 ft. long. Metal bonding is applied in certain areas, such as the joining of doublers and stiffeners to the trailing edges of the wing and tail unit. Conventional Lockheed-Fowler double-slotted flaps are fitted.

The stressed-skin fuselage provides a single, unobstructed cargo compartment, and is of constant diameter throughout this section. Normal flight crew accommodation is for four men: pilot, co-pilot, flight engineer and navigator, with standard duplicated flight instrument panels, and central engine control pedestal between the two pilots. Multiple hydraulic jacks operate the two-piece rear loading doors, described in more detail in the second main section of the text. Air conditioning and pressurisation to a maximum differential of 7·5 lb. p.s.i. can maintain sea level conditions up to 18,000 ft., or a cabin altitude of 8,000 ft. at 35,000 ft., for both flight deck and cargo hold. Numerous tethering fittings are installed in the walls and floor of the hold, to facilitate rapid fastening of items of all weights. A secondary cargo door, 6 ft. high and 7 ft. 3 in. wide, is provided in the port forward fuselage, whilst two paratroop doors are fitted just aft of the main undercarriage fairings, one on either fuselage side.

Integral fuel tankage to a capacity of 5,250 or 6,960 U.S. gal. is provided in the wings, with addition fuel in underwing pylon tanks on most examples. Basic powerplant is the Allison T56 turbo-prop, a compact constant-speed single shaft unit with a four-stage turbine and 14-stage compressor. An AiResearch gas turbine auxiliary power unit is installed in the port undercarriage fairing, just ahead of the wheel well. While on the ground this provides electrical power, air conditioning and compressed air for engine starting. Engine compressor bleed air is used for wing and tail unit de-icing. The hydraulically boosted control system draws on its own 3,000·lb. p.s.i. hydraulic circuit, but can also make use of the second, independent 3,000 lb. p.s.i. system which supplies pressure for flap, undercarriage, brake and

Export Markings One . . . A C-130E Hercules of the Royal Saudi Air Force with temporary marks N79919. (Photo: Lockheed)

nosewheel steering operation. The main undercarriage, comprising two wheels in tandem for each unit, retracts vertically into large blisters flanking the lower fuselage. Airframe construction is of metal throughout, largely aluminium alloy with the use of steel for certain highly stressed components such as the undercarriage assemblies.

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C-130 Production *(This does not list all C-130s built)*
And Military Serials

YC-130A: 53-3396/7
C-130A: 53-3129/35; 54-1621/40; 55-001/048 (-021, -031 to C-130D); 56-468/551; 57-453/497 (-484/495 to C-130D); 57-498/509
RC-130A: 57-510/524
C-130B: 57-525/529; 58-711/758 (-712 to NC-130B); 59-1524/37; 59-5957; 60-293/310; 61-948/972; 61-2634/2649; 62-3486/3496*; 62-4140/3 (Pakistan) * (3488/91 to Iran (late Pakistan). Last 5 to WC-130B standard)
SC-130B: 58–5396/7 (USCG as 1339/40); 58-6973/4 (USCG as 1341/2) 60-311/2 (USCG as 1344/5); 61–2081/3 (USCG as 1346/8)
C-130E: 61-2358/73; 62-1784/866; 63-7764/899; 63-9810/6; 63-13186/9 (to Turkey); 64-495550; 64-566/72
HC-130E: 64-551/65
C-130H: 64-14852/66; 64-15094/6 (RNZAF as NZ 7001/3); 64-17624/39 (RCAF as 10305/20); 64-17680/1; 64-17949 (Turkey); 64-18240/4; 65-12766/9 (to RCAF as 10321/4); 13021/44 (to RAF as XV176/99)

Series Editor: CHARLES W. CAIN

SPECIFICATION

		C-130B	C-130E	L-100-20
Powerplant	4x:	4,050 e.s.h.p. T56-A-7A (Allison turboprop)	As C-130B	4,508 e.s.h.p. 501-D22A
Span		132 ft. 7 in.	132 ft. 7 in.	132 ft. 7 in.
Wing Area		1,745 sq. ft.	1,745 sq. ft.	1,745 sq. ft.
Length		97 ft. 9 in.	97 ft. 9 in.	106 ft. 1 in.
Height		38 ft. 4 in.	38 ft. 3 in.	38 ft. 5 in.
Cargo Compartment:				
	Length (excl. ramp)	41 ft. 5 in.	41 ft. 5 in.	49 ft. 1½ in.
	Max. Width (floor level)	10 ft. 3 in.	10 ft. 3 in.	10 ft. 3 in.
	Height	9 ft. 1 in.	9 ft. 1 in.	9 ft. 1 in.
	Usable Volume	4,300 cu. ft.	4,300 cu. ft.	5,307 cu. ft.
Total Flap Area		342 sq. ft.	342 sq. ft.	342 sq. ft.
Wheel Track		14 ft. 3 in.	14 ft. 3 in.	14 ft. 3 in.
Wheel Base		32 ft. 0¾ in.	32 ft. 0¾ in.	38 ft. 8¾ in.
Empty Weight (equipped)		69,300 lb.	72,892 lb.	71,602 lb.
Max. Zero fuel Weight		—	117,892 lb.	120,000 lb.
Max. Landing Weight		—	130,000 lb.	130,000 lb.
Max. Payload		35,700 lb.	45,000 lb.	48,398 lb.
Max. Take-off Weight		135,000 lb.	155,000 lb.	155,000 lb.
Normal Fuel		6,960 U.S. gal.	9,680 U.S. gal.	5,779 U.S. gal.
Max. Speed		—	384 m.p.h.	—
Max. Cruise Speed		370 m.p.h.	368 m.p.h.	371 m.p.h.
Stalling Speed		—	115 m.p.h.	—
Initial Climb		2,000 ft/min	1,830 ft/min	—
Service Ceiling		34,000 ft. (C-130A)	23,000 ft.	—
Take-off to 50 ft. (ISA, Max. AUW)		4,300 ft.	5,580 ft.	6,000 ft.
Range with Max. Payload		2,200 mls.	2,230 mls.	2,402 mls.
Range with Max. Fuel (with external fuel for -B, -E)		4,850 mls.	4,700 mls.	2,417 mls.
Payload with Max. Fuel (as above)		19,800 lb.	20,000 lb.	48,380 lb.

Export Markings Two . . . A C-130E bearing the Forca Aerea Brasileira marks of C130-2453 on the fin, photographed at Miami in January 1967. (Photo: Harold G. Martin, Air-Britain)

Export Markings Three . . . Royal Australian Air Force C-130E carrying the serial A97-210 and the distinctive military insigne of a red wallaby with blue outer circle. (Photo: Norman B. Wiltshire, Air-Britain)