Flying the DC-3

A dream fulfilled

BY BARRY SCHIFF

This month marks the fiftieth anniversary of the Invasion of Normandy. The first French town to be liberated on June 6, 1944, was Sainte-Mère-Église. In that small town is a museum that pays tribute to the 15,000 paratroopers who dropped behind German lines that day. And in that museum is only one airplane, the one that General Dwight D. Eisenhower considered the most important in ensuring the Allied Victory of World War II. It is not a P–51 or a B–17. It is a C–47, the military version of the DC–3. Thousands flew across the English Channel on that day and on the bloody days that followed. I have always had a strong desire to check out in a DC–3. But to help celebrate what that aircraft accomplished a half-century

PHOTOGRAPHY BY MIKE FIZER


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ago and later, that desire became almost an obsession.

Perhaps it was serendipity, perhaps fate. But when a DC-3 recently became available for training at my home airport, I knew that my dream was to become a reality.

The DC-3 based at Cloverfield Aviation at Santa Monica (California) Municipal Airport is owned by the husband-and-wife team of Jan (pronounced Yon, as in Don) and Britt Aarvik. Jan was a pilot in the Norwegian Air Force and has amassed more than 17,000 hours (4,000 in DC-3s). He has been using the aircraft to train pilots, haul skydivers, and fly in a variety of television and motion-picture productions.

A 7,000-hour pilot, Britt also is rated in the -3. So, too, is their son, Thomas, who also serves as crew chief for the family airplane.

N7500A is powered by a pair of nine-cylinder, 1,200-horsepower Wright Cyclone radial engines. From the firewalls forward, these are the same supercharged engines used on the B-17 Flying Fortress. Many other DC-3s have 14-cylinder Pratt & Whitney Twin Wasps that deliver the same power.

Oil drips anywhere within 50 yards of either engine and seems to have an affinity for expensive clothing. It is said that a pilot's experience in a DC-3 is measured more accurately by the number and value of shirts destroyed by oil stains than by the hours in his log.

Checking oil and fuel quantity during the preflight requires climbing atop the wings. The oil tanks have a capacity of 232 quarts (58 gallons), which is more than the fuel capacity of many lightplanes.

The plexiglass landing-light cover on the leading edge of each wing must be inspected to ensure that each is secured by a pair of crossed wires. The wires prevent the plexiglass from blowing out due to strong pressure changes at large angles of attack.

The wing flaps are split, like those on a Cessna 310. On the -3, however, they span all the way from one aileron to the other (including under the fuselage). The flaps increase lift by 35 percent and parasite drag by 300 percent. Slips are allowed with the flaps fully extended.

The DC-3 is an all-metal airplane except for the primary flight control surfaces. These are fabric covered to save weight and facilitate field repair.

Climbing into the cockpit makes it obvious why a DC-3 pilot should not be required to undergo periodic medical exams to be given a medical certificate. Climbing the long and steeply sloped cabin several times a day without passing out should be a sufficient testament of health.

The DC-3 was designed to seat 21 passengers plus the two required pilots. The record for the greatest number carried appears to be held by

a China National Airways' DC-3 that evacuated 75 people from China to Burma during World War II. Among them was James H. (Jimmy) Doolittle, who had recently completed his bombing raid over Tokyo.

Stirring an engine to life requires simultaneously engaging the starter and primer switches, waiting for the propeller to turn through four revolutions ("count 12 blades"), and then turning on the mags. With a little luck, the big radial will show some sign of life, which is the signal to enrichen the mixture. The Wright Cyclone awakens one cylinder at a time, belching and coughing great swarms of smoke that is guaranteed to create IFR conditions for anyone standing behind.

When taxiing a DC-3, the aircraft moans and groans and creaks and squeaks, as if it were a mechanized, prehistoric monster. Maintaining control of this oversized taildragger is not difficult as long as the tailwheel lock is engaged for the straightaways, especially in a crosswind. Otherwise, the Gooney Bird seems to have a mind of its own and weathervanes into the slightest zephyr (even when there is none). One also must be mindful of the 95-foot wingspan when taxiing in tight quarters. It is comforting to know that if the wing tips clear an obstacle while turning, so will the tail. Negotiating narrow taxiways and tight turns is made easier by visualizing that the main-gear wheels are directly behind the engines.

Over-the-nose visibility is excellent, better than in most small taildraggers.

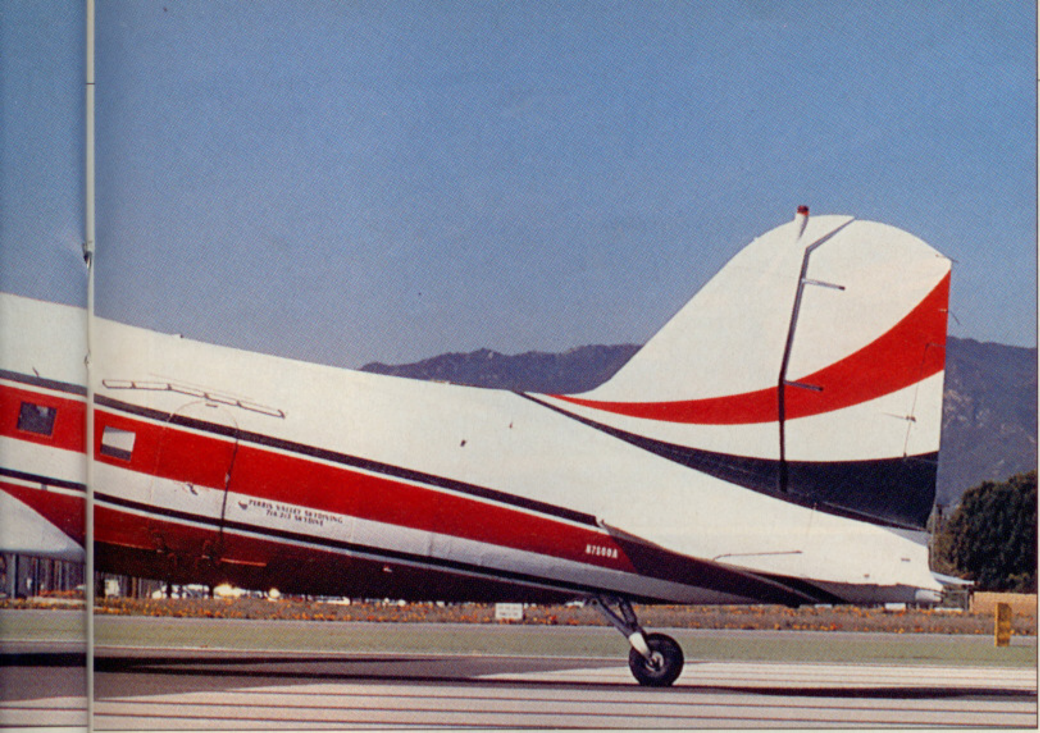
When depressing the tops of the conventional rudder pedals, hydraulic pressure inflates a doughnut-shaped

expander tube that has composition brake pads mounted on its outer perimeter. These press against the brake drum to slow the aircraft.

When retracted, the main-gear tires extend 11 inches below the nacelles. The wheels remain free to rotate so that normal braking is available during a gear-up landing (not that this would necessarily be needed).

Although you can crash a DC–3, it is said that you can never wear one out. Some have had so many parts replaced that the only original parts remaining are the registration plate and the airplane's shadow.

An example of the DC–3's adaptability occurred during the summer of 1941. Another airplane operated by China National was on the ground at Suifu, China, when it was strafed by Japanese fighters. The right wing was destroyed, and there were more than 50 bullet holes in the rest of the airplane. The only available wing replacement came from a DC–2. Trou-



ble is, this wing was 5 feet shorter and designed to carry much less weight than the wing of a DC–3.

The shorter wing was nevertheless installed. The "Dizzy Three" (also known as the DC–2½) looked lopsided but flew well despite using all the aileron trim to keep the wings level.

The DC–3 is a very hydraulic airplane. In addition to hydraulic brakes and landing gear, hydraulic power also is used to operate the cowl flaps, autopilot, and—believe it or not—the windshield wipers.

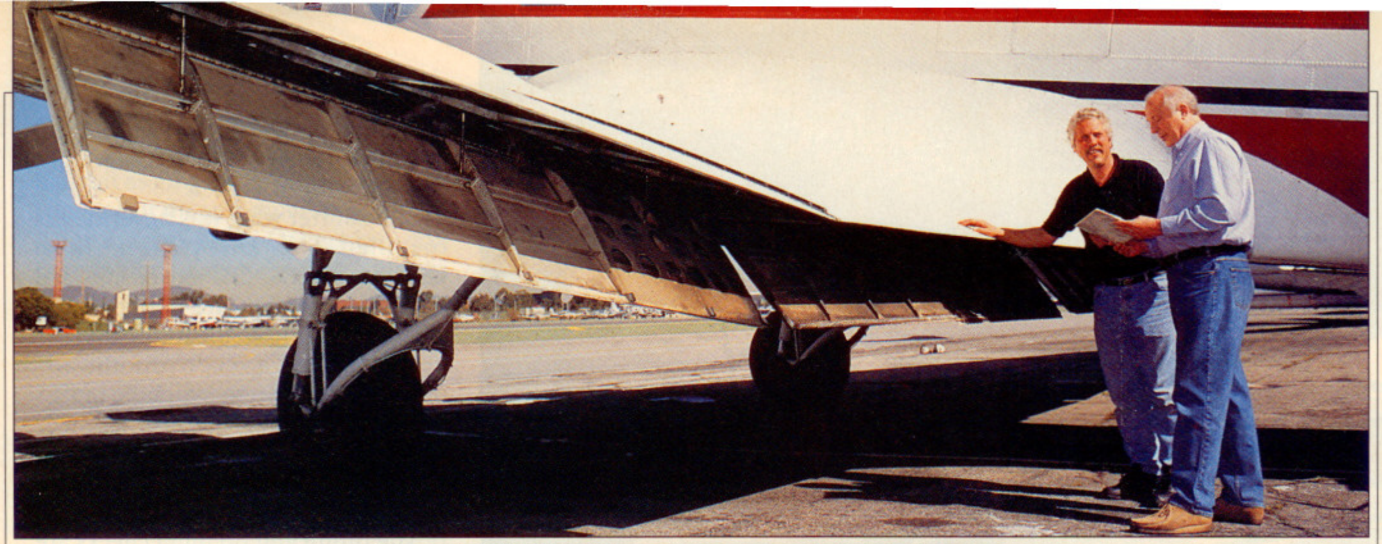
The runup and preflight checks are conventional. After taxiing into position, lining up with the runway, and locking the tailwheel, the throttles are advanced to 25 inches of manifold pressure with the brakes locked. Each pilot then looks at the engine on his side to ensure that the cowlings are not shaking or vibrating. The brakes are then released and the throttles advanced for takeoff: 45.5 inches and 2,500 rpm.

The pilot must forcefully lower the nose to an approximately level attitude. During my first takeoff, this seemed excessive, and I had the distinct impression that I was going to shove the nose into the ground. It takes a whopping 12-degree attitude change to lift the tail 7 feet into the air and prevent the DC–3 from lifting off prematurely (below the 77-knot V_{MC}). Slight back-pressure is applied to the yoke at V_1 and V_2 (both of which are fixed at 84 knots), and the DC–3 becomes a graceful creature of the sky.

The takeoff from Santa Monica was particularly nostalgic, a flight across the pages of history. This was the runway from which I made my first takeoff in 1952. It also is where this 31,000-hour airplane was born and made its maiden flight more than 50 years ago. Santa Monica was the home of the Douglas Aircraft Company and is where almost all of its piston-powered airliners were built.

The first DC–3 flew in 1935 (also from Santa Monica) and was so successful that by 1938, it carried 95 percent of all airline traffic in the United States. A year later, 90 percent of the world's airline passengers flew on DC–3s, a record never likely to be broken.

Aarvik's airplane first flew on April 30, 1943, and was delivered to the U.S. Army Air Force, which used it to drop paratroopers and tow large gliders. Following a postwar career with Eastern and then Mercer Airlines, it was purchased in 1977



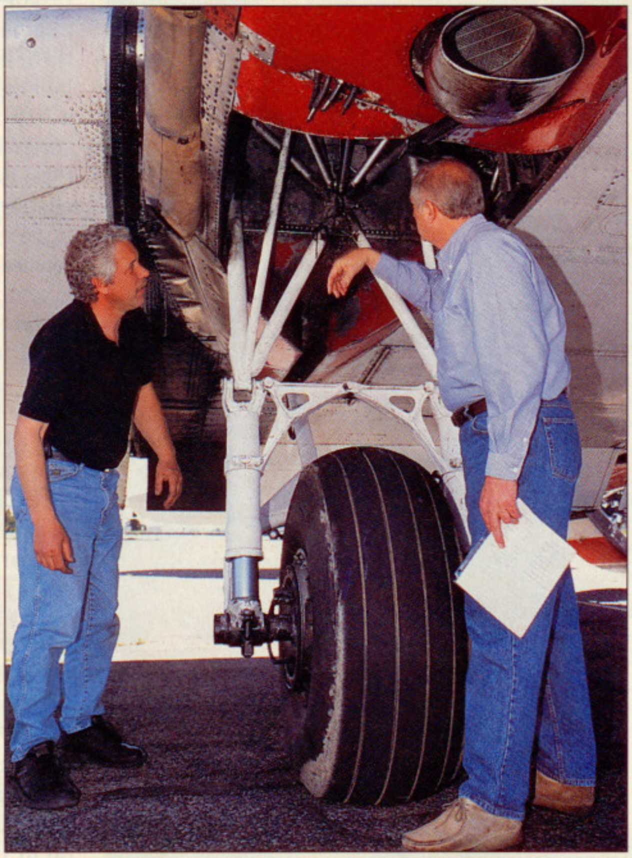
by actor John Travolta, who sold it in 1983 to the Aarviks.

Douglas built 10,926 DC-3s, most of which were Navy R4Ds and Army C-47s. Despite their official designations, pilots affectionately refer to the DC-3 as a Gooney Bird, a king-sized, sea-gull-like bird found on some South Pacific atolls.

Each cowling has a ring of 16 large cowl flaps that surround the big radials. They are wide open for takeoff but create so much drag that they should be closed to the trail position shortly after setting climb power (39.5 inches and 2,300 rpm). This eliminates enough drag to noticeably improve engine-out climb performance. Partially closing the cowl flaps also reduces airframe buffeting.

Leaning the mixture is a breeze. Use the auto-rich position for takeoff and climb and the auto-lean position for cruise. Be careful, however, when enrichening the mixtures prior to landing a Wright-powered DC-3. The controls work backwards so that pushing them forward results in a very quiet and underpowered airplane.

In flight, the DC-3 is heavy on the controls and sluggish in roll and pitch. This airplane is not flown with the fingertips. A new pilot quickly learns that the trim tabs are his best friends. The airplane is so sensitive to movement of the center of gravity (CG) that some veteran airline pilots claim that they could tell the weight of a stewardess walking toward the cockpit with coffee.



Flying it can be a workout and gives me great respect for airline pilots of yore who had to battle weather and turbulence a hundred hours a month.

The DC-3 cruises at 157 knots on 50-percent power and 94 gallons per hour. Some claim with tongue in cheek that the -3 consumes as much oil as it does fuel.

One would expect that the big, high-lift wings would have docile stall characteristics. Don't bet on it. Stalls propagate from the wing tips and can result in strong rolling moments and substantial altitude loss. Recovery demands aggressive, albeit normal, manipulation of all primary flight controls.

On a nice day, either pilot can slide open his side window and rest his arm on the windowsill as when driving a car. The shape of the front windshield creates a low-pressure zone near the side windows so that only a waft of air can be felt. Nor does the noise level increase with an open window. The din of a DC-3 assaults the ears equally well with the windows open or closed.

In those carefree days of ecological ignorance, airline pilots flying DC-3s used to revise their Jeppesen manuals while enroute. Each obsolete page was lifted out of the binder on the pilot's lap. The reduced pressure outside the open window would remove

the chart from between the pilot's fingertips and send it carelessly to oblivion. It is said that one could determine an airline's route structure simply by following the trail of discarded charts.

When the outside air is cold, a conventional Janitrol heater provides warm cabin air. On some older models, heat is provided by a steam boiler in the right engine nacelle.

The DC–3 has a reputation for leaky windshields on rainy days. This prompted more than one pilot to add the following to enroute position reports: "Light rain outside; heavy rain inside."

Although one can make three-point landings in a Gooney Bird, this is discouraged because dropping in such a heavy airplane can unduly strain the landing gear. Instead, wheel landings are the norm. Just pull off the power when about 10 feet above the ground. There is little or no tendency to drop as those big wings slice deeper into ground effect. There also is little tendency to bounce, which makes the DC–3 easier to land on the mains than many light airplanes.

Some experienced pilots claim that they can land shorter in a DC–3 with the tail up than down. The procedure involves simultaneously applying aggressive braking and enough back-pressure on the yoke to prevent nosing over. According to Perry Shreffler, a retired captain who flew DC–3s for TWA, this combination of brake and elevator control is so effective that—with a little help from a headwind, a forward CG, and a smidgen of power—a competent pilot can come to a halt with the tail suspended in the air. (I did not have the courage to try this.)

A private pilot certificate is the only prerequisite for a DC–3 type rating. Aarvik advises that the training required (including the check ride) varies from three to four hours (for an experienced taildragger pilot with round-engine time who wants a VFR-only type rating) to about 10 hours for a private pilot with limited experience who wants a type rating with instrument privileges. These hours can be reduced, however, if the student first obtains some instruction in a small taildragger.

For me, learning to fly a DC–3 was a dream come true—even if it did cost $625 per hour. □

Douglas DC–3

Specifications

Powerplants	Two Wright Cyclone 1820-202A, 1,200 hp @ 2,500 rpm and 45.5 in (one-minute limit) 1,000 hp @ 2,300 rpm and 39.5 in (max continuous)
Recommended TBO	1,200 hr
Propellers	Hamilton Standard Hydromatic 23E50, 11-feet 6-in diameter
Length	64 ft 5 in
Height (tail down)	16 ft 9 in
Height (level attitude)	23 ft 6 in
Wingspan	95 ft
Wing area	987 sq ft
Wing loading	25.7 lb/sq ft
Power loading	10.5 lb/hp
Seats	2+21 (typical)
Passenger cabin length	31 ft
Passenger cabin width	7 ft 8 in
Passenger cabin height	6 ft 6 in
Empty weight, as tested	16,822 lb
Max ramp weight	25,200 lb
Max takeoff weight	25,200 lb
Max landing weight	25,200 lb
Useful load, as tested	8,378 lb
Payload w/full fuel, as tested	3,446 lb
Fuel capacity	822 gal (812 usable) 4,932 lb (4,872 usable)
Oil capacity, both engines	232 qts
Baggage capacity	Forward 300 lb Aft 1,700 lb

Performance

Takeoff distance, ground run	1,700 ft
Accelerate-stop distance	3,750 ft
Max recommended crosswind component	13 kt
Rate of climb, sea level	1,140 fpm
Single-engine ROC, sea level	200 fpm
Cruise speed/range (cruise fuel consumption)	
@ 50-percent power	157 kt/1,740 nm
10,000 ft	94 gph
Service ceiling	25,000 ft
Service ceiling, single engine	9,000 ft
Landing distance, ground run	1,600 ft

Limiting and Recommended Airspeeds

V_{MC} (min control w/one engine inoperative)	77 KIAS
V_1 and V_2	84 KIAS
V_X (best angle of climb)	91 KIAS
V_Y (best rate of climb)	96 KIAS
V_{XSE} (best single-engine angle of climb)	81 KIAS
V_{YSE} (best single-engine rate of climb)	97 KIAS
V_A (design maneuvering)	119 KIAS
V_{FE} (max flap extended)	97 KIAS
V_{LE} (max gear extended)	223 KIAS
V_{LO} (max gear operating)	144 KIAS
V_{NO} (max structural cruising speed)	183 KIAS
V_{NE} (never exceed)	223 KIAS
V_{S1} (stall clean)	67 KIAS
V_{SO} (stall in landing configuration)	62 KIAS

Specifications are based on manufacturer's data. Performance is based on standard atmosphere at sea level with aircraft at maximum-allowable gross weight.