

Uncovering the Mysteries of the



JU-52

Creating the Masterpiece

Professor Hugo Junkers was a gifted inventor and industrialist who dabbled in everything from heating systems to high-rise steel buildings. He received more than 380 patents for his inventions, and late in his lifetime, he steered his company into aircraft production. In 1915, Junkers produced

one of the first all-metal aircraft, the Junkers J1. Like most aircraft manufacturers of the day, the production count of any specific model could be calculated on one hand, but then, in 1932, Junkers created his aeronautical masterpiece, the Junkers (pronounced Yunkers) JU-52.

The JU-52 was originally designed as a single-engine cargo

aircraft of the sturdiest construction. In its 20-year production cycle 1,845 JU-52s were produced by Junkers Flugzeugwerk AG. Hugo Junkers, however, wouldn't live to see it happen. Like many in Germany at the time, he refused to support the rising scourge of National Socialism and was dispossessed of his companies in 1933.



Flying Germany's Tin Goose

ARTICLE AND PHOTOS BY JEFF SKILES

He died shortly thereafter. But, his JU-52 design carried on to become a mainstay airliner operated by Lufthansa throughout the 1930s and 1940s.

The JU-52 was also produced in many variants for the German military in World War II. While it was mostly used as a troop and cargo transport, less successful versions

were produced that bristled with machine guns and, in one of the more inventive adaptations of an airplane, a bomber version.

The JU-52 "bomber" was affixed with what looked remarkably like a simple metal trash can suspended below the cabin of the airplane. After takeoff, a man would climb down through a hatch in the floor into the

canister and would be able to drop bombs on targets below or fire a machine gun as necessary.

The JU-52 is a solidly-built airplane designed for strength and ease of maintenance. Like the Ford Trimotor, it will forever be known for its sturdy duralumin-corrugated skin, but it also has many inventive and unusual systems.



The Heart and Soul of the JU-52

First and foremost, and at the heart of any aircraft, are the BMW motors. The JU has three 660-hp motors. The nose-mounted motor sits so high that the propeller hub is 10 feet off the ground. All radial engines must be turned over before start to ward against hydraulic lock and the JU is no exception. Each engine must be manually pulled through 18 blades before each new day of flying. A long pole with a hose loop on the end is used to fa-





cilitate this for the center engine.

The wing-mounted motors are not mounted symmetrically with the fuselage, rather they are toed outward quite noticeably. This is designed to improve engine-out handling by providing a thrust vector in opposition to the natural engine out yaw tendency. Even so, the JU is still quite a handful after an engine failure.

On the rear portion of the engine nacelles are two protrusions allowing for the fuel and oil quantities to be monitored by simple cork floats similar to the fuel gauge on a J-3 Cub. These are the only fuel gauges in the airplane.

Each motor has two smallish-looking oil coolers hanging below it. Many oil coolers have a door that you can close to limit the air-flow through the cooler to keep the oil warm in winter. The JU has valve-operated controls that limit the oil flowing through the cooler. The series of valves reside on the lower First Officer's panel and look just like an exterior water spigot available at any hardware store.

The brakes on the JU are pneu-



In flight, you don't hold a heading as much as you hold a generalized direction with the nose yawing back and forth.

matic, not hydraulic. A JU taxiing on the ground sounds like a truck stop at dinner time, and they are controlled, not by heel or toe brakes, or even by a brake lever; they are controlled by the throttles. The throttles of all three engines work conventionally in the power range, but they can be pulled below the idle position to operate the brakes, much like the reverse range in a turboprop. The levers are spring loaded to the idle position.

The center throttle of the trimo-



JU-Air & Rimowa

In 1939, only four weeks into the war in Europe, the Swiss Air Force took delivery of three Junkers JU-52s. These were operated in various capacities for 40 years. They transported Swiss Air Force staff members and equipment, and they were able to transport engines for their Vampire jets in Britain through a specially constructed hatch in the roof of the cabin. During the so-called Avalanche Winter of 1951, the JUs supplied high mountain valleys cut off from the outside world with supplies and fuel.

In 1980, however, the Swiss military decided to retire the three JU-52s that they owned. A committee to save the aircraft was formed, and a large Swiss newspaper spearheaded a "Ja zur JU" campaign ("Yes to U") that raised \$1 million in a single day to preserve the aircraft. Keep in mind this was in a country that numbered only 4 million people.

Thus, JU-Air was born and still thrives today. The three aircraft, and a fourth JU license built in Spain by CASA in 1949, fly passengers on sightseeing trips out of Zurich's Dübendorf Airfield. JU-Air operates much like EAA's Ford Trimotor with a small paid support staff and strictly volunteer pilots, flight attendants, and mechanics devoted to keeping the JUs in the air.

There are a total of eight surviving JUs in the world: the four operated by JU-Air, one operated by Lufthansa, and three others located in France, the United States, and South Africa. Only the four JU-Air JU-52s and the one operated by Lufthansa are allowed to carry passengers.

In 2012, Rimowa, a manufacturer of high quality metal and polycarbonate luggage, brought one of the JUs, HB-HOT, to the United States for a summer tour. Rimowa sponsors one of the JUs and along with JU-Air is rebuilding an original Junkers design, the Junkers F13 single-engine airliner set for completion in 2014.

tor operates both brakes in unison. Differential braking is accomplished by pulling the left or right throttle into the braking range operating its respective brake alone. A right turn is generally accomplished with both hands on the throttles gunning the left throttle while braking the right wheel. Part of the final landing check is to abruptly pull the center motor in the braking range, look for symmetrical rise in brake pressure on gauge, and hear the trucker's air brake sound.

The most distinctive feature of the JU is the *Doppelflügel* which means, quite literally, "double wing." The ailerons, flaps, and elevators are separated from the wing and tail surfaces with a noticeable gap that can be seen from a great distance. Several Junkers designs displayed this arrangement of the control surfaces with the most notable being the Ju-52 and the Ju-87 Stuka dive bomber.

The flaps are also pneumatic and are operated by a large wood wheel attached to the side of the pilot's seat, much like the elevator control of a blimp. This wheel also doubles as the trim wheel with a lever to switch between the two functions. Lowering the flaps requires pulling the lever upwards and cranking the wheel back which simultaneously lowers the flaps and trims the elevator to compensate, then pushing the lever down to fine tune the trim, then pulling the lever upwards again for more flaps . . . you get the idea. The Junkers is a handful on approach.

The rudder pedals have an unusual configuration. On the Captain's side, they operate conventionally and have leather straps to hold the pilot's shoes into the pedals. Giant levers operate the rudder trim by simply recentering the neutral position of the cables rather than messing with an actual



BMW

The JU-52s operated by JU-Air in Switzerland are powered by three 9-cylinder BMW radial engines (BMW 132A/3). The BMW 132 radial is actually an outgrowth of the American Pratt & Whitney Hornet engines that BMW produced under license beginning in 1928. The so-called BMW Hornet engine was, at first, an exact copy of the Pratt & Whitney engine producing 525 horsepower. However, BMW engineers began to modify the design and, by 1932, had introduced the BMW 132 that was produced in six different variants. While the JU-52's engines produced 660 horsepower, some BMW 132 models employed fuel injection ranges as high as 1,200 horsepower. Over the course of their production, 21,000 BMW 132 engines were produced.

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trim tab. The Copilot's side, however, has rudder controls that pivot around a central axis looking like a Lazy Susan mounted to the floor. Handling engine failures from the right seat can be a challenge.

The landing gear on the JU-Air aircraft have been modified with DC-3 tires and wheels because of the lack of availability of the narrow tall tires that the JUs used to sport when new.

Flying the big Trimotor

So what does the JU fly like? Well, first of all, let's start out with a disclaimer: HB-HOT is a 72-year-old airplane. No airplane of that vintage that I have ever been associated with is without unusual quirks all its own. I suspect HB-HOT is no exception to that rule. It has a tremendous amount of vibration in flight. Holding on to the control wheel is like grabbing hold of a sander, and it wags its tail quite ferociously in just about any form of turbulence.

In flight, you don't hold a head-

ing as much as you hold a generalized direction with the nose yawing back and forth. Likewise, it is not particularly stable in pitch. I'm not sure if it has a built in phugoid oscillation or people were just moving about in the cabin, but it requires a lot of work with the big trim wheel. This is not a hands-off-the-controls airplane by any means.

The pitch attitude in just about any flight regime is tail down as the big wing rides up over the air rather than slicing through it. On landing, as you might imagine, with a wing as big as a Boeing 737, but at only one-seventh the gross weight, the Junkers flies like, well . . . a Piper Cub.

HB-HOT is equipped with modern gauges and radios and I was pleasantly surprised when I saw a fairly flush number registered on the airspeed indicator. That is until I saw the Kilometers/Hour printed on the gauge. As you might guess with all the induced drag from its gigantic wing, not to mention the parasitic drag from all the protrusions

and the giant fixed landing gear, the JU is no speed demon. Plan on cruising at 110 mph. Maybe that's not such a sacrifice with the closely spaced cities of Europe, but when covering the vast distances we face in America, that's a burden.

Much the same as the Douglas DC-3, the JU-52 began as an airliner in the 1930s but gained its greatest fame as a military transport during World War II. So versatile was the design that even after the war, 545 more of the outdated aircraft were built in France and Spain.

The importance of the JU in European aviation was signified in 2008 when historic Tempelhof Airport, Berlin's "City Airport" was closed. Tempelhof's first operation was as early as 1909 and it bore witness to Lufthansa's first flights and the Berlin Airlift. At exactly four and a half minutes to midnight a Junkers and a DC-3, two iconic aircraft for Berliners, took off in parallel and arced off into the night sky. The runway lights were extinguished for the final time thereafter.