

All dressed up

And ready for its new owner

BY ALTON K. MARSH



C'mon, it's a biplane, not an avionics showroom. Flying doesn't get any more basic than a 1940 Waco UPF-7. Yet, we did manage to cram the very latest in technology into the rear cockpit,

of our fully restored \$250,000 sweepstakes prize. (The aircraft also can be flown from the front cockpit, or the front seat can accommodate two passengers.) As we did so, we also kept the aircraft as original as possible, refurbishing original engine and flight instruments right down to their funky Waco wings logo.

The claim for the newest technology in the Waco goes to PS Engineering because the company developed its PM1200 intercom during the Waco's restoration at Rare Aircraft in Owatonna, Minnesota. Original plans were to donate a PMA4000 audio panel to the aircraft, but Rare Aircraft President Roy Redman told PS Engineering President Mark Scheuer that it didn't fit into the limited space available in the rear cockpit.

"We were in the middle of designing an intercom specifically for the loudest aircraft, namely open cockpit, warbirds, aerobatic airplanes, and others where traditional VOX [voice-activated] and microphone circuits just don't cut the mus-

tard," Scheuer recalled. "We agreed to send Roy the PM1200 as soon as it became available."

The PM1200 is based on two new technologies, one that PS Engineering calls IntelliVox (microprocessor-based voice-activated relay) and a second called AMP (active microphone processor). IntelliVox eliminates the need to constantly adjust the squelch sensitivity manually every time the cockpit noise changes. A computer relieves the pilot of that chore. In our Waco, noise levels change dramatically from idle power to takeoff power. In case, however, the pilot prefers manual control, another feature allows the use of a push-to-talk switch for intercom communications.

The AMP circuit is where the real work is done, Scheuer said. It basically sorts out and keeps the human speech frequencies while throwing away other noise. The result is audio fidelity that intentionally sacrifices crispness in favor of high intelligibility.

"This is unbelievable," said Bill Finagin of Dent Air, an Annapolis-based aerobatic school using a Pitts S-2C. "It's like sitting in your living room and hearing a normal conversa-





tion. I tested it with three different headsets for compatibility and they were fine," Finagin said. He noted he has tested the PM1200 at high power settings used for aerobatics.

Despite its recent development, the PM1200 is shipping and costs \$499. "This unit does not hold FAA approval under TSO C50c," Scheuer said. "This is because the things we do to the microphone signals do not comply with the requirements that are outlined in this TSO. So, in order for it to be legally installed in an aircraft, it must be installed using the FAA Form 337. And of course, in Experimental aircraft, this [a 337] is not required at all."

Sennheiser headsets

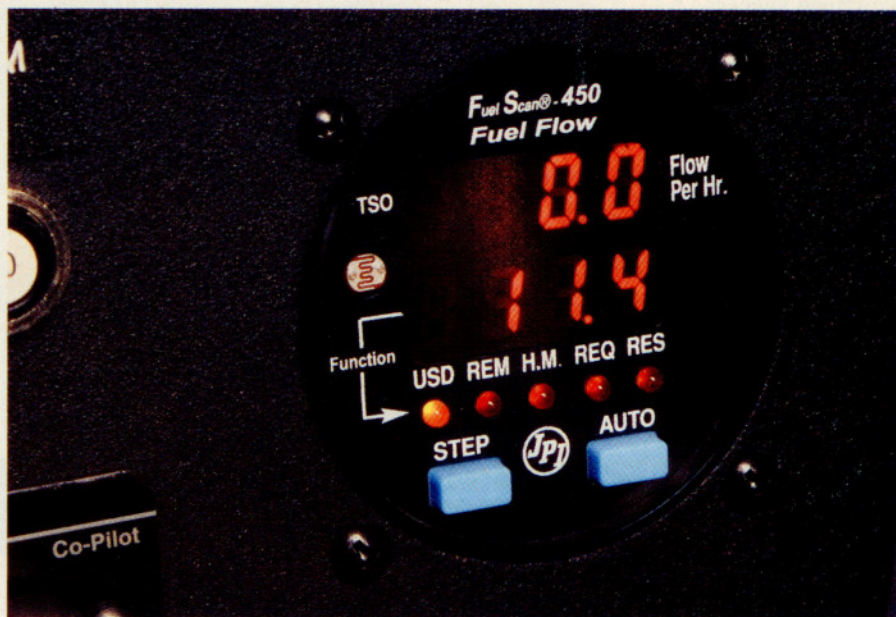
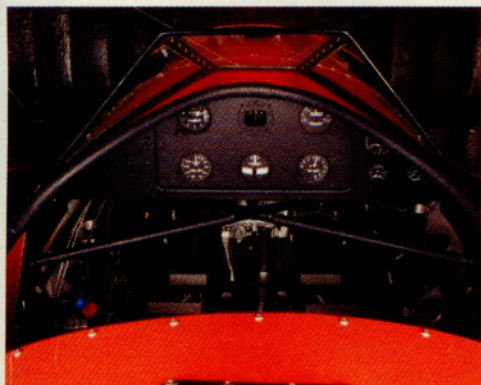
Complimenting the PM1200 is Sennheiser's HMEC 300 active-noise-reduc-

tion headset for high-noise environments such as those in helicopters, aerobatic airplanes, and biplanes. Sennheiser provided three of them, two for the passengers in the front cockpit and one for the pilot in the rear. They go nicely with our Perrone Leather helmets. Sennheiser's Mike Feldbauer noted that the HMEC 300 is effective because of the microphone system that rejects unwanted noise. It retails for \$699. The headset boasts 25 dB of passive noise reduction (mid- to high-frequency noise), as certified by a laboratory using government standards, and 16 dB of active noise attenuation in the low-frequency area such as that caused by aerodynamic noise, including noise from the wind and propeller.

The rear cockpit where the pilot sits has restored original instruments and a Garmin 250XL GPS/com with moving map.

by its customers as being the most comfortable of many available on the market. Phil Coulson of Lawton, Michigan, president of the 450-member American Waco Club, has used an HMEC 300 for a year. He owns a Waco UPF-7, the same model as AOPA's sweepstakes aircraft.

"I do a lot of cross-country trips [in the open-cockpit Waco]," Coulson said. "It's several hours at a time, and the wind noise is fatiguing. I arrive a lot more refreshed and alert [since using the HMEC 300]." Coulson has flown Wacos since 1969 and travels in one each year to the club's fly-in at Creve Coeur Airport in Maryland Heights, Missouri.



JPI fuel scanner

Noise is good to some degree of course, such as that proving the engine is in healthy and happy operation. To monitor the engine's fuel flow, our \$250,000 Waco uses a J.P. Instruments FS-450. JPI President Joe Polizzotto had at first offered one of his top models especially configured for radial engines—the EDM700-7 that shows the engine's complete health, including EGT and CHT, oil temperatures, and fuel flow information. It can also record data for later viewing, yet it fits the same 2.5-inch hole used by less capable JPI models. The data can be used after the flight to compare oil and cylinder temperatures to fuel flow for a better picture of the engine's status. (The unit offers other sensors as an

Sennheiser headsets with Perrone Leather helmets (top) and a JPI FS-450 fuel analyzer (above right) are part of the prize package. The front cockpit (bottom left).

and sensors associated with turbocharged engines.)

However, that model proved to have too much depth for the limited mounting space available in our biplane. As it turns out, Redman feels the fuel-scan functions of the FS-450 are the most important ones for a biplane. The lumbering seven-cylinder 275-horsepower Jacobs provided by Radial Engines, of Guthrie, Oklahoma, rarely generates temperatures of any concern, he said. The real concern in a biplane, Redman said, is information about the fuel supply, such as fuel flow, fuel used, total fuel remaining, fuel reserve at the next waypoint, fuel required to the next way-

option, such as outside air temperature, carburetor temperature,

point, and endurance in hours and minutes. The FS-450 is linked to the GPS. The JPI fuel scanner is extremely accurate; the transducer that measures flow sends more than 18,000 pulses for each gallon.

The FS-450, including transducer and wiring harness, costs \$699.

Garmin 250XL and other items

Once crew intercom concerns are met and there is plenty of fuel to make the destination, the primary issue becomes navigation—and avoiding special-use airspace. Our Waco UPF-7 will conquer that with a VFR Garmin 250XL GPS/com with moving map. The 250XL uses a five-watt transmitter to get your message out, a front-mounting datacard for easy updating of the database, and lots of pixels in the high-resolution screen

A wacky Waco

Is it a jet or a Golden Age biplane?

Perhaps you've heard of airshow entertainer Jimmy Franklin's unusual Waco. First of all, this is not the Waco one of you will win from AOPA. It is the same model, and was made the same year, but is highly modified.

Franklin's Jet Waco has beneath its belly a General Electric CJ610-6 jet engine, the same model used by military T-38 jet trainers. That's in addition to its 450-horsepower Pratt & Whitney R-985 radial engine.

When the radial engine is operating at max power and the jet engine at half power—the stick full back—Franklin can get airborne literally in two seconds. After that he climbs his 1940 Waco UPF-7 at 12,000 feet per minute. A wing walker (his wife, Carol) is part of the act.

"The climb is the act," Franklin said. "While you

are doing that, you can be doing vertical rolls." Once at altitude, he does the usual wild gyrations familiar to airshow audiences.

The unusual power combination allows him to do a special maneuver called a *torque wheel*. Don't try this at home, but here is how one does a torque wheel. (1) Climb vertically using the radial engine, with the jet engine at idle power, until the aircraft slows and stops; (2) slam the jet throttle full open; (3) place the stick in the full forward position and apply full left rudder at the appropriate time. The result is a cartwheel, seen from the ground as a double hammerhead. The Waco can take it without beefing up the airframe. Might check your insurance before actually trying something like that. The Jet Waco is one of two UPF-7s that Franklin owns. His second is called the *Waco Mystery Ship JMF-7* (his initials). As the "7" implies, this Waco is also a highly modified 1940 UPF-7,



but it does not have jet power. (Its serial number is only 55 off the one that AOPA is giving away.)

The most obvious modification is the use of a 450-hp Pratt & Whitney R-985 radial engine with a three-blade Hartzell propeller (the AOPA Waco has a Jacobs 275-hp engine with a two-blade propeller). The cockpit has been moved back 30 inches (to correct the center of gravity with the larger engine) and the landing gear has been extended for prop clearance and a shorter takeoff roll; it sits tall in the saddle. "I made the modifications to make it look more

exotic, like the old Waco fighters." The fighters came before the time of the UPF-7.

Franklin has owned both airplanes for 34 years. Franklin fell in love with airshow biplanes as he watched the late Charlie Hillard and Harold Krier perform, and shortly thereafter saw a UPF-7 in a magazine centerfold. At the ripe age of 19 he came across the very one he had seen in the magazine and bought it on spot.

"And then I started modifying," he recalled. It became the Jet Waco. But that's where we came in.

—AKM

so that curved restricted airspace actually looks curved. The 12-channel GPS receiver feeds data to the FS-450 fuel scanner to calculate fuel needed to reach the destination and the fuel reserve once you get there. The 250XL has a street price of about \$2,800.

A Garmin GTX 327 transponder eliminates knob twisting for the busy biplane pilot and allows newly assigned codes to be punched in quickly from a keypad.

Other additions allow our Waco UPF-7 to take advantage of more technology that wasn't available in 1940, such as the Parker Hannifin Cleveland wheels and brakes. Redman estimates



Along with the Garmin 250XL GPS/com the AOPA Waco is equipped with a Garmin GTX 327 transponder that records flight time.

the brake upgrade, done under a supplemental type certificate (STC), is valued at about \$3,000 but provides a much safer system, and one for which parts are more readily available. Parker Han-

nifin also provided the tailwheel. With a \$200 tailwheel modification under an STC from Russ Aircraft, of Avery, California, a modern tire and tube can be used. Also added was a Skytronics alternator. Redman combines the alternator with a state-of-the-art wiring harness, including modern circuit breakers, for an electrical-system improvement worth about \$2,500.

Improvements in the cockpit include five-point "sport" harnesses made by Hooker Custom Harness, of Freeport, Illinois, for the front and back cockpits. The rear cockpit harness includes a ratchet handy for tightening down the belts prior to aerobatics. The two harness sets are valued at \$490.

Contributors

AOPA would like to thank the following companies that donated or discounted their products and services to restore AOPA's Centennial of Flight Sweepstakes Waco UPF-7 or are otherwise assisting with the project.

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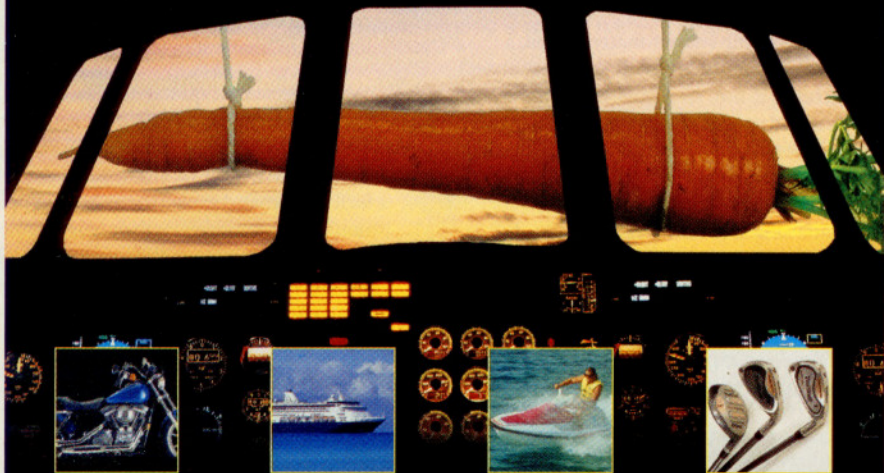
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AOPASWEEPSTAKES

Fine leatherwork graces the seats—done by Airovation, of Eden Prairie, Minnesota, using leather donated by Douglass Interior Products, of Bellevue, Washington. The seats and various appointments by Airovation are valued at \$5,000. While the company has done biplanes such as the Waco in the past, its bread-and-butter work is creating luxury interiors for jets and turboprops, sometimes even customizing interiors to accommodate taller pilots.



Butler Parachute Systems, of Roanoke, Virginia, provided sheepskin-covered parachutes that double as seats.

For aerobatic work, Butler Parachute Systems, of Roanoke, Virginia, provided seatpacks capable of handling a 500-pound load at 170 kt. They have sheepskin covers and seat pads that were custom designed for AOPA's Waco.

At 63 our Waco is no spring chicken, but it's no slouch, either. Pilots who flew it in 1940 will be amazed by the added creature comforts, the fancy PPG Industries paint, an absolute certainty about navigation thanks to GPS, and the ability to talk to the passengers up front. It's a modern old airplane.

i Links to additional information about our AOPA Waco UPF-7 may be found on AOPA Online (www.aopa.org/pilot/links.shtml).
Keyword search: Waco.

AOPA

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