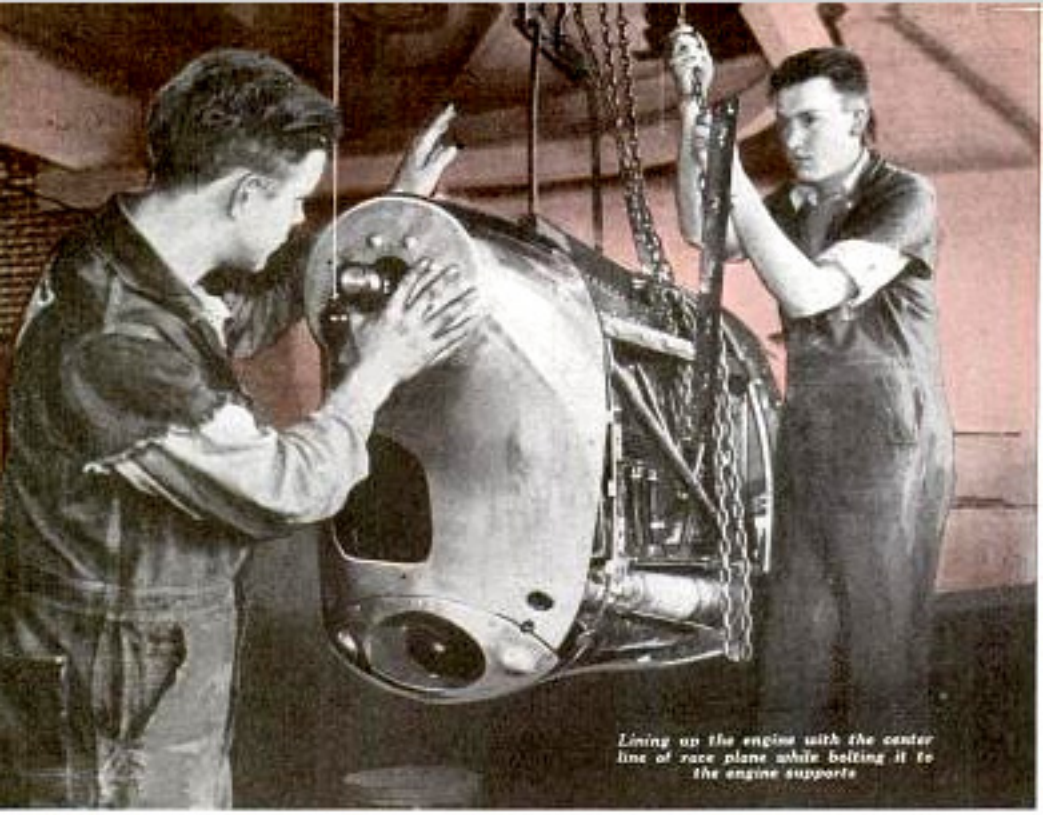


Lining up the engine with the center line of race plane while bolting it to the engine supports

FLYING *the* WINGED

ONE mile and a half from shore and only fifty feet above the water, the crankcase of Art Chester's tiny racing plane suddenly burst and vibration almost shook the wings off before Chester could cut the switch.

The pilot didn't have a parachute, nor altitude to use one. Yet a minute later, instead of crashing into the water at 250 miles per hour, he was setting his wheels down on the airport at the edge of the lake. Sheer speed had saved his life. Traveling close to five miles per minute when the engine failed, Chester automatically pulled back on the stick while he was fumbling for the switch, and momentum had swung him up nearly 1,000 feet above the water. From that altitude he was able to glide safely to the field.

"You can always tell, during a race, when someone gets into trouble," Chester says. "The planes will be roaring along in level flight and then suddenly you notice that one of them has started to skyrocket. When something happens, the smart thing is to zoom as high as your speed will carry you, giving time to get your wheels down and a chance to pick out the best landing area within a mile or so."

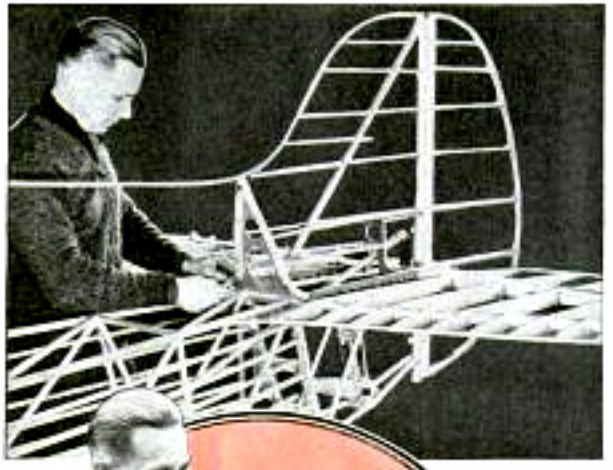
Modern race planes are unbelievably small, no larger than is necessary to get the engine, pilot, and fuel supply off the ground and still permit good maneuverability. Small as the wings are, the pilots would cut them smaller if most races were not held around closed courses. If the wings are too small the plane mushes sideways when making a vertical turn around a pylon, while another plane whose wings "stick" better in the air can whip around the marker and make off at once on the next leg of the course.

This year, with more planes than ever being groomed for the races, new American speed records are anticipated. Straightaway speeds of 300 miles per hour, and averages of 275 miles per hour around closed courses will be surpassed, the pilots think. More than a score of competitive speed planes were built during the spring and competition will be hotter than ever, due to the larger prizes offered. More than $100,000 will be posted for winners of the National Air Races, an increase of 30 per cent above prizes in the past.

Fast as they will be, however, the American

BULLETS

Top, closing cockpit hatch which completes streamlining of racing plane. Hole in transparent cowling enables pilot to signal the starter. Bottom, putting on parachute before testing new speed plane



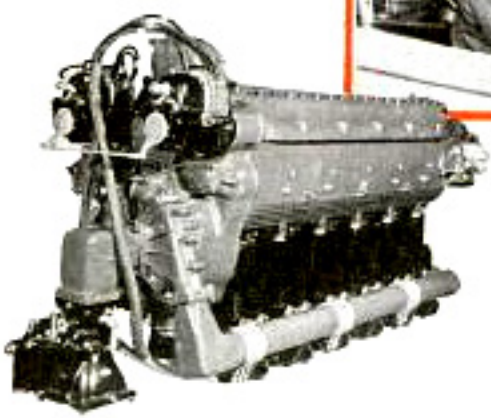
ships probably will set few international records. Each American speed pilot has to create his airplane at his own expense. With no racing engines available, the pilots use stock commercial engines worked over for greater speed. The average American pilot may spend $8,000 to build a plane for the 550-cubic-inch class, while many times as much goes into each subsidized foreign speed creation built to uphold national prestige by smashing records.

Pilots like Art Chester and S. J. Whitman, who finance, build and fly their own race planes, know exactly what they need to fly much faster, but a special racing engine of 1,000 horsepower or more, for instance, would cost a fortune to design and build. Another thing the racing fraternity needs is a variable pitch propeller, not now available in the small sizes suitable for racing planes. A fast propeller ideal for high-speed racing has small diameter and extremely high pitch, but such a propeller would not develop enough thrust to pull the

Top, working on tail assembly of new racing plane. Center, odd-shaped fuel tank fits into fuselage behind cockpit. It is designed to take advantage of every cubic inch of space. Bottom, rear view shows streamlining of racing ship. The fuselage is just wide enough to accommodate the in-line engine

plane off the ground and get it into the air. Present racing propellers are a compromise, with the diameter and pitch suitable for getting the plane off the ground, and with still enough pitch to the blades to develop fairly high speeds in the air.

"In many respects, airplane racing today is similar to automobile racing," one of the pilots says. "Both the airplanes and cars used in competition are built by individuals or by small syndicates that have no money to waste. The big difference has been that in the past there was far less prize money to be won in aviation, and a successful pilot could hardly gross more than his expenses and the cost of his plane during a racing season. Most of our best racing planes are backyard jobs, built in private garages and the corners of hangars, and financed on shoestrings."



Top, fitting tiny air wheel on retractable landing gear of a racing plane. Center, attaching plywood skin to steel tubing fuselage. Bottom, 260-horsepower air-cooled in-line engine which pilots "soup up" to deliver 560 Horsepower for racing

In spite of their lack of proper engines and propellers, American speed planes are steadily drawing closer to the marks set by European racers. Many of the improvements in radial and in-line engines during the last few years have resulted from knowledge learned on the race courses.

There are two principal classes in racing, one limited to planes powered with engines of 550-cubic-inch displacement or less, and the other the so-called "unlimited" class in which any airplane having an engine of 1,875-cubic-inch displacement or less may compete. Most of the

(Continued to page 118A)

Flying the Winged Bullets

(Continued from page 549)

planes in the unlimited class have been powered with radial engines in the past but now many pilots think that the day of the radial engine is about over in racing. Last year's Thompson Trophy race was won by a tiny plane powered with a stock

The tiny ten-inch landing wheels retract into the low wing of this racing plane

260-horsepower in-line engine, that beat radial engines of as much as 1,000 horsepower to win. The better streamlining allowed by the smaller frontal area of an in-line engine more than compensated for its low power.

Most of the planes in the 550-cubic-inch displacement class are powered with a stock-inverted in-line air-cooled six-cylinder engine rated at 260 horsepower. Some pilots extract nearly twice the rated power from these engines by increasing the compression ratio and supercharging ratio, changing the valve timing, and turning them up to 2,900 revolutions per minute. To some extent the pilot who is the best engine mechanic has the most successful racing season. Likewise, he needs nerve to fly the "souped up" engine wide open in the air, and luck enough for the engine to hold together through each race.

A number of the pilots have re-built and re-engined their planes for this summer's competition, but more than half a dozen brand new race planes have also been built. Art Chester is flying a 550-cubic-inch class full cantilever low-wing monoplane equipped with flaps and retractable landing gear and tail skid. The

wing, with a span of eighteen and one-half feet, has only sixty-six square feet of surface, and is plywood-covered for better streamlining and increased strength.

Harry Crosby's new 550-cubic-inch racer is an all-metal full cantilever low-wing monoplane with a special wing curve, retractable landing gear, flaps, and a span of sixteen feet and a length of twenty-one and one-half feet. He has a one-piece transparent cover for the cockpit, an adjustable seat that raises six inches to provide better visibility for taking off and landing, and a fresh-air intake under the wing to ventilate the cockpit.

Just the opposite from the construction standpoint is the new all-wood racer in the same class built by Keith Rider. It is a full cantilever low-wing monoplane, with a twenty-two-foot span and a length of twenty feet, equipped with retractable gear, flaps, and brakes. Molded plywood covering permits complete streamlining.

In the unlimited class, Lee Williams will fly a new high midwing monoplane powered with a "souped up" liquid-cooled V-type Curtiss Conqueror, rated at 625

Pilot in cockpit. The instrument board contains the conventional instruments

horsepower, that delivers close to 800 horsepower at full throttle. Some of the other racers built this year are being held under wraps until their pilots learn exactly how fast they will fly.