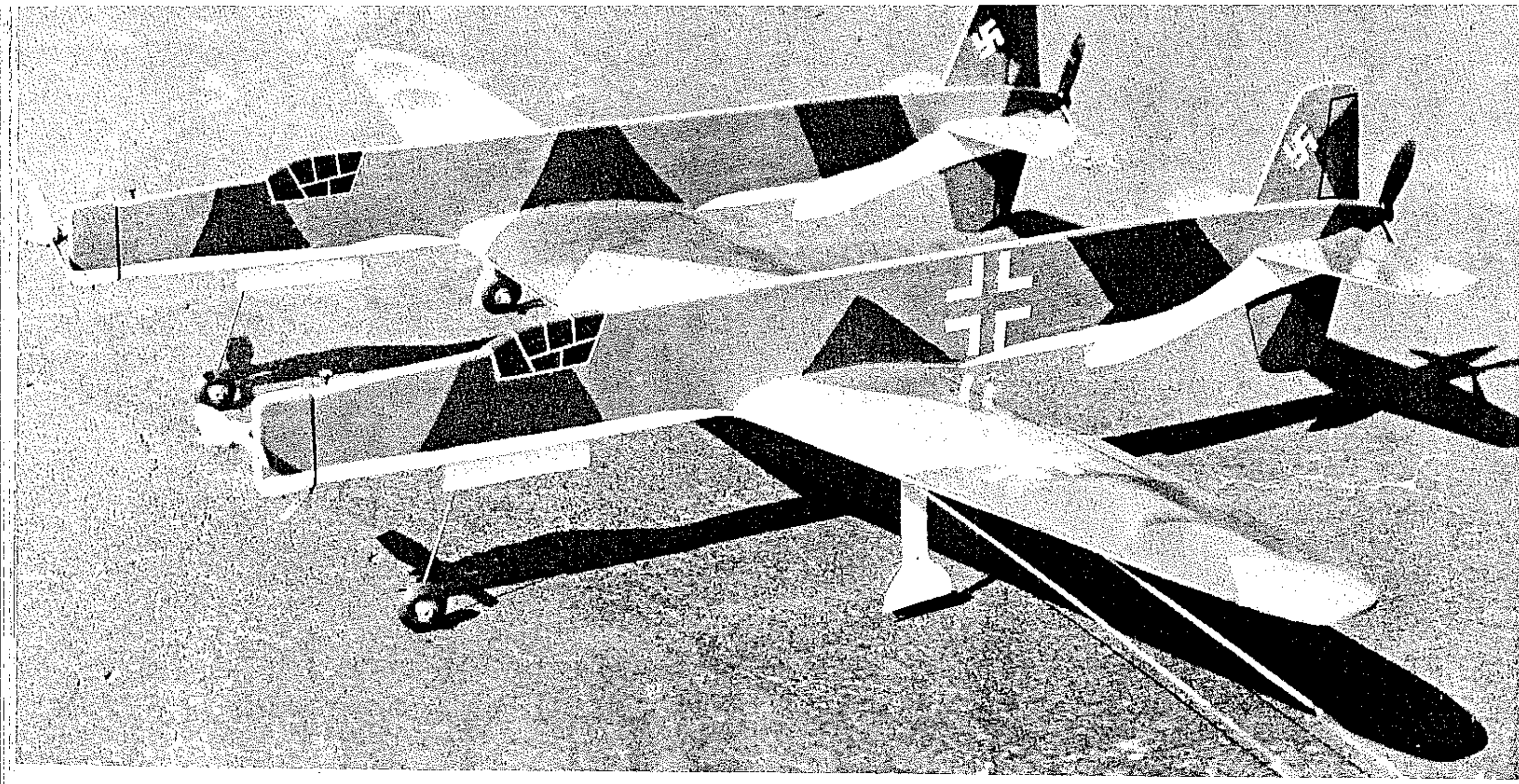


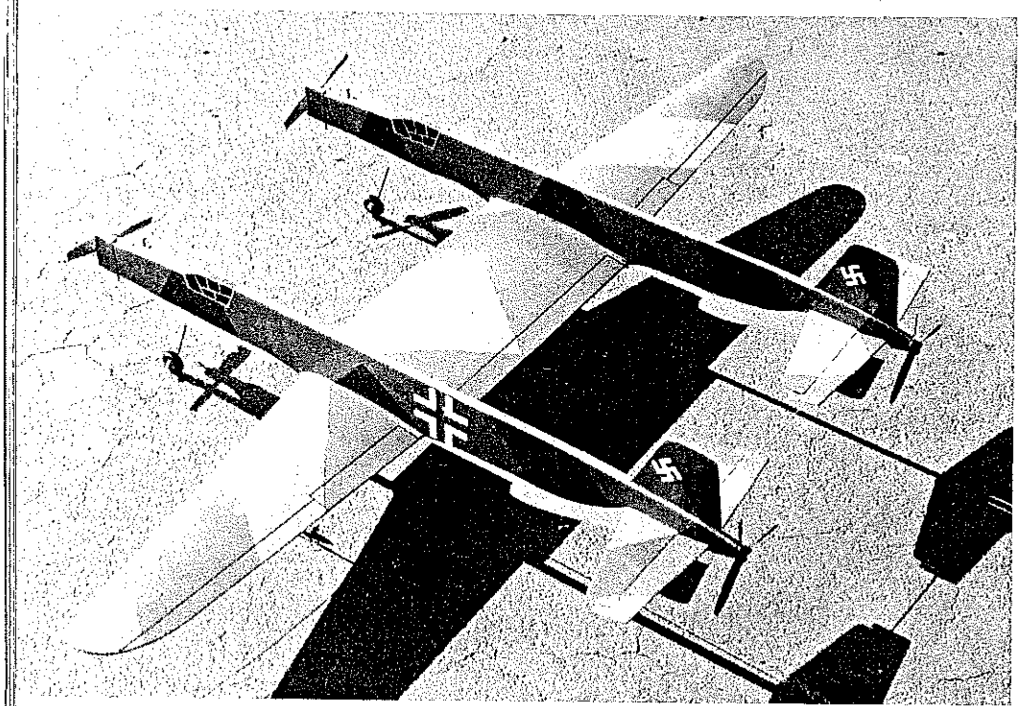
PROFILE JU-635

THE ONE THING German engineers in the earlier years of aviation never seemed to have to worry about was orthodoxy. One has only to thumb through a book on German warplanes to see what I mean. They have tried almost every configuration and type of construction known to mankind. Just how they sold their strange designs to the War Department is beyond me; but most of these odd and eccentric World War II designs *were* built and flown. Some even made it into production.

The Junker Ju-635, however, was not quite so lucky. While it shared a number of design concepts with similar planes that were being explored and built, the Ju-635 was a victim of unfavorable timing. The end of WW II arrived before construction on

It can be great fun to take a design that, for whatever reason, never got past sketches or conceptualization, and bring it the rest of the way into reality. Such was the case with this profile Scale model designed for two .049s

■Gene Nelson



Top: *Fast* is what this full-size design says. You cannot have four engines packaged like this and be slow. Even the long thin fuselages add to the look of speed. Above: There is ample wing area for a small twin. The center section of the wing is sheeted for additional strength. The elevator joiner wire shows up well here; it too adds strength while reducing vibration.

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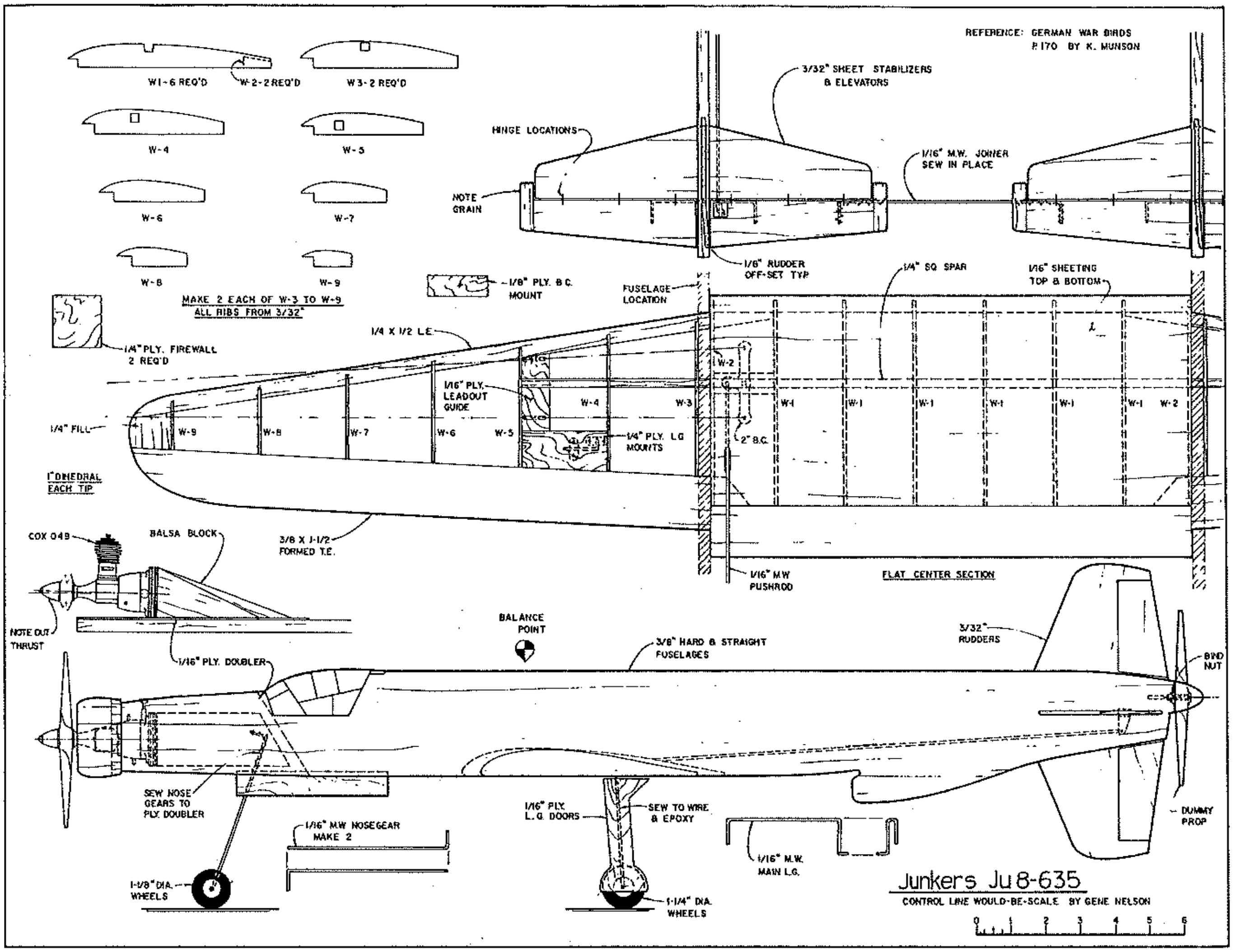
Full-Size Plans Available . . . See Page 188

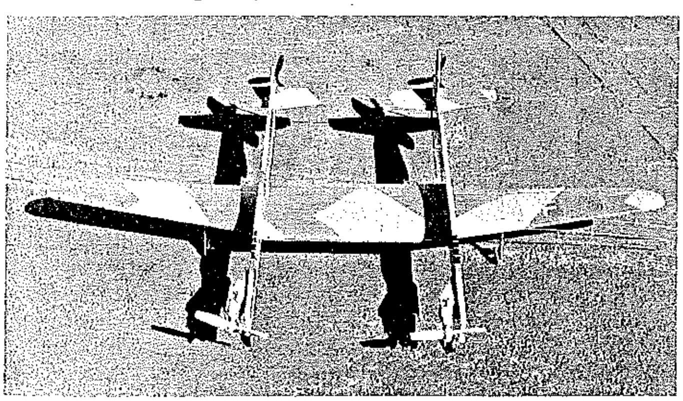


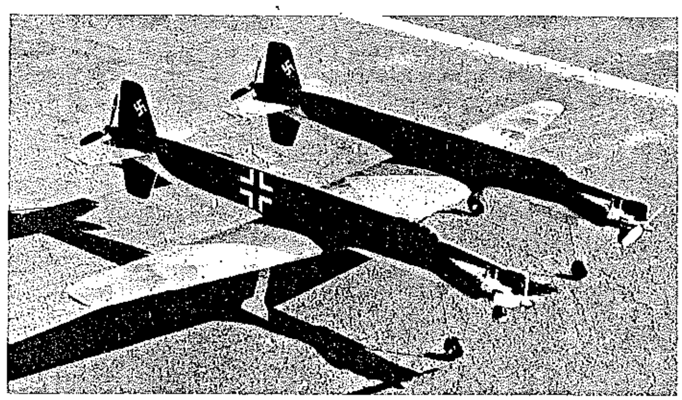
the prototype could begin, and the design never got off the drawing board.

Prominent among the design concepts that the Ju-635 shared with other warplanes of the period was that of taking two aircraft and joining them together with a common center wing. This was called *zwilling,* or twin configuration. The most famous plane using zwilling was the Heinkel He-111z—two He-111 bombers joined by a new center-wing section making, with the addition of a fifth engine, a new airplane capable of towing mammoth troop gliders. Other zwilling designs were tried with varying success. Messerschmitt built a Bf-109z from two fighters, but it wasn't completed until the closing days of the war and was destroyed before it got a chance to fly. Even over here in America, the idea was a popular one. Although the North American F-82 was thought to be a combination of two Mustangs, it actually was not. It only appeared to be a zwilling design. The F-82 was in fact a new airframe designed to utilize the benefits of the zwilling layout.

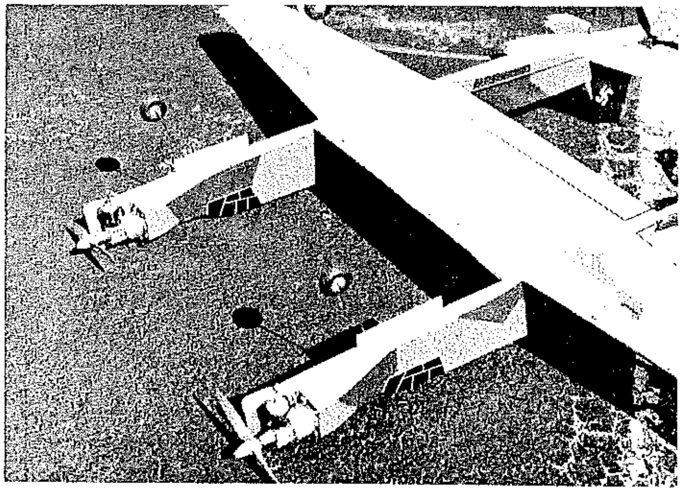
The Ju-635, on the other hand, did make authentic use of the zwilling concept—but did so with great originality. The aircraft chosen for mating to form the in-line engine configuration was the radical Dornier 335. Not only was this fighter the largest fighter of its day, but it was the only operational in-line, push-pull, twin-engined fighter ever built. It was chock-full of unusual things like ejector seats, tricycle landing gear, and heavy armament capabilities.

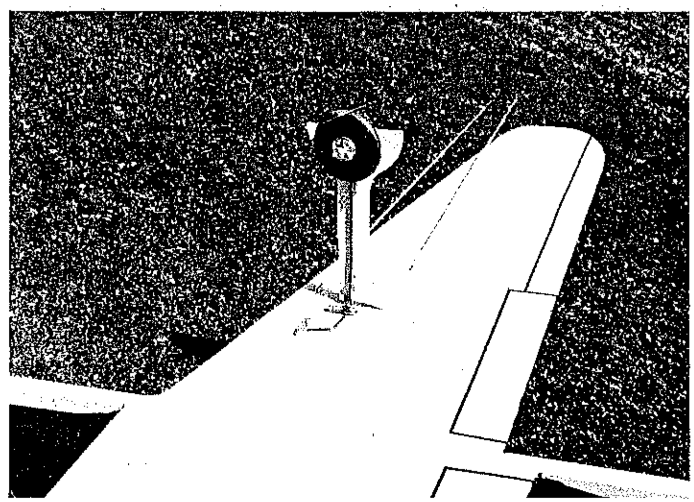
Having been an avid Luftwaffe fan for many years, I was surprised to see the Ju-635 drawing in Kenneth Munson's book, *German War Birds.* I've researched and built almost everything the Germans built during WW II in 1/72-scale plastic, yet I had never even seen the Ju-635 mentioned. I quickly bought the book and started enlarging and comparing the design to the drawings I had on file of the Dornier 335. It appears that the design utilized an extended fuselage, a standard-model tail configura-



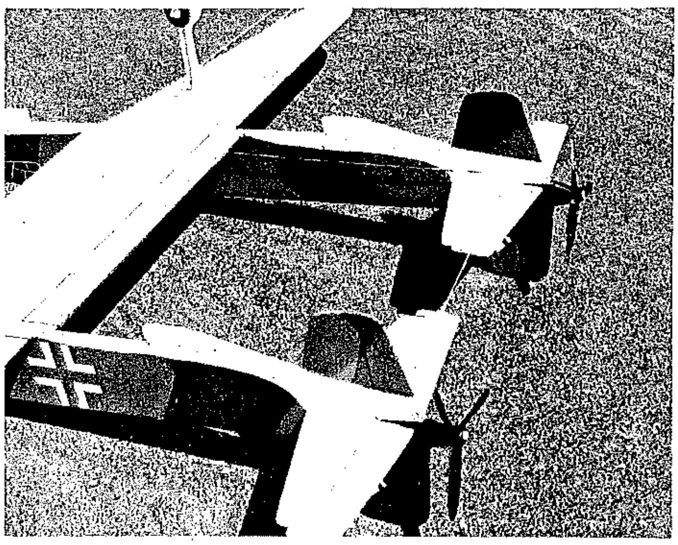


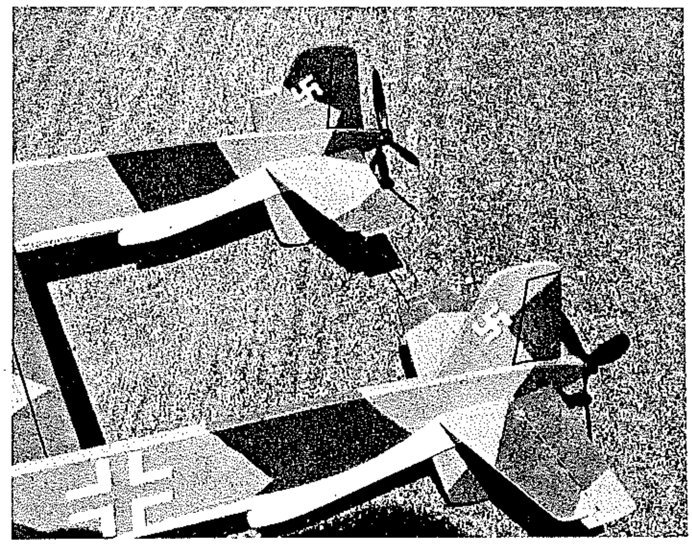
Left: A view down the centerline shows the engine offset clearly. Both engines have out-thrust built into their mounts to keep the model out at the end of the lines where it belongs. Right: Having both engines on the outboard side improves both looks and weight distribution.





Left: The landing gear doors are extra work but look great when finished. The landing gear in the wings was moved back, on the plans, to improve its strength and ground handling. Right: Because of the dihedral the lead-outs need to exit the wing early. Epoxy the tubes in place.





Left: The elevator connecting wire is sewn to each elevator on the hinge line to ensure smooth and free movement. The rear props are freewheeling and are anchored in the fuselage with blind nuts. Right: Don't leave the freewheeling props off—they add a lot of charm.

tion, and Dornier 335a wings. The center section was straight with a chord significantly wider than the standard wing root. I pieced the side-view together and came up with the model presented here. It is probably not 100% accurate, but it is the best I could do with so little information. Perhaps this model will stir up some lost information.

As for the model, I wanted something that would catch the essence of the Ju-635 that never got its chance to fly. The long, narrow fuselages and four-legged gear make it very distinctive in the air. Try as I might, I could not find a way to power the propellers without shaft extensions, which would have made the project overwhelming; so I elected to go with the freewheeling rear props. It does look neat in the air, and I think in the future I'm going to add drop tanks for even more fun.

Construction is quite simple and straightforward. There are just a few areas that need to be considered first, though. Because this model has such long nose and tail moment arms it is important to keep everything aligned. The two fuselages need to be parallel in both side and plan views. With this in mind I designed the model to key together. Notice the slots built into the wing to fit the fuselages. I suggest the wing be pinned down to a large, flat area at the final assembly and the fuselages set in place and aligned carefully before gluing.

This is one of those models where you have to build two of almost everything. Begin by cutting out the four rudders, the two elevators, and the two stabilizers. Join the elevators with the 1/16 music wire joiners and set them aside to dry. The rudders can be sanded and their offsets cut in and glued. Make sure they all point the right way. Hinge the stabilizers to the elevators and sand their edges round.

Select two *straight* and firm sheets of 3 x 3/8-in. balsa for the fuselages. Cut out the side view per the plans and cut out the underscoop as well. Do not glue the scoop on until after the final assembly, ensuring that the model will set flat on the bench for alignment. The firewalls can be cut out as well as the plywood nose doublers and engine mount blocks. Bend the nose gear wires to shape and sew them to the plywood doublers with heavy thread. Carefully glue the doublers, engine mount blocks, and firewalls in place, keeping them in alignment.

Wing. While the fuselages are drying, cut out all the wing parts. Begin with the outboard wing panels. Pin the leading and trailing edges in place and glue in the ribs and wing tip with cyanoacrylate (CyA) glue. As soon as the glue sets, unpin the panel and turn it over. Lay a sheet of wax paper on the bottom of the wing and pin the leading and trailing edges of the other wing panel to the bottom of the finished panel. Glue in the ribs and tip, unpin the panels—and bingo, you have two opposite wing panels.

Cut out and pin down the center section parts. Make sure the outer wing panels fit snugly into place. Block up the outer panels for the dihedral shown on the plans, and glue the wing all together. Keep the fuselage slots in the wing open 3/8 in. for the fuselage and check to make sure the slots are parallel. Add the top spar, bellcrank and mount, and planking.

Once the wing has cured, sand it as required and trial fit the fuselages in place.

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CL Navy Carrier

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all parts and are about the only option for the steel slide. A drill press is helpful, but a hand drill will suffice.

The method of construction is obvious from the photographs. The dimensions of the various parts depend upon the dimensions of the exhaust stack to which the assembly will be attached. Size and shape are not critical at all.

The opening in the slide should be tapered. If the slide is used in conjunction with an intake throttle (used primarily for fuel metering as described in the August column), the length of the taper may have to be adjusted to provide optimum performance.

If the fuel mixture is correct at idle and full throttle but the engine goes excessively rich as the throttle is advanced slowly from idle, the taper should be shorter (open faster).

If the engine is lean slightly above idle, then the taper should be longer so that the exhaust opening will increase more slowly as the slide is moved.

Adjustments can also be made to the amount of throttle arm movement in relation to the exhaust slide movement. Some experimentation will probably be required before an optimum setup is achieved.

The example shown is mounted using 4-40 flat-head screws. The slide tracks are attached to the base with 2-56 screws, although smaller ones will work just as well. The best method to maintain a straight, smooth edge on the brass slide tracks is to use the finished edge of the strip as the interior side of the track. By cutting the base wider than the finished dimension and using ¼-in.-wide brass strip for the track parts, the outside edges of the slide unit can be cut to final size after the assembly is complete and tested for smooth operation. By cutting all outside edges in the same operation, a smooth edge can be produced with a minimum of work.

On-Off pressure. The advent of throttles which contain their own fuel metering has greatly simplified engine speed control. The use of exhaust restrictors in conjunction with a metering carburetor can allow for quite reliable engine speed control with pressure fuel systems, as described in the August column. An alternative system exists which, although a little harder to construct, offers extreme ease of adjustment.

The system to which I refer is a switched pressure/suction system. This type of system operates on pressure for high speed then switches to suction for low speed. On low speed the intake throttle is fixed, and engine speed is controlled solely by an exhaust restrictor.

The Kavan pressure carburetor provides the easiest method of installing a switched pressure/suction system. It contains a valve which releases the pressure in the fuel tank when the throttle is closed. I have not seen one lately, and they were very expensive when they were current-production items. They have never been in great supply.

The photo shows a Kavan carb with an over-center spring which is used to hold the carb in both open and closed positions. The carb is opened manually before the engine is started and closed by a small-diameter cable as the throttle is closed for the first time. The very flexible cable allows for free movement of the exhaust restrictor without movement of the intake throttle.

There is an alternative to the Kavan pressure carb. Any carb with a fuel meter can be used. To release the pressure in the fuel tank, the simple device shown in the photographs works well. The wire is 3/63-in. diameter and can be the same wire that operates the intake throttle. The housing which pinches the vent line is the cap from a Bic pen. The protective covers for the needles of some hypodermic syringes will also work well, but they are a little harder to find. A large brass eyelet could also be substituted, but the tubing would have to be replaced more often.

Surgical tubing is used on the tank's vent line. During high-speed flight, the tubing is pinched inside the housing, sealing the tube very effectively (and thereby trapping pressure inside the fuel tank). When the wire loop is moved out of the housing, the surgical tubing straightens out and allows the pressure to escape from the fuel tank. The vent line must be placed in the upper, inside, forward portion of the tank to prevent fuel from being forced out the vent line.

To set up the speed control, open the exhaust restrictor and the intake throttle (tank vent closed) and set the needle valve for best high-speed performance. Minor changes in high-speed setting should have little effect on low-speed adjustments.

Next, close the intake throttle (tank vent open) and leave the exhaust restrictor fully open. Set the idle speed adjustment stop (carb opening) so that the engine speed is the maximum you anticipate needing during low-speed flight (probably 12,000 to 15,000 rpm). Set the idle mixture adjustment to produce a slightly rich run with the exhaust restrictor open. Close the exhaust restrictor gradually until the desired low speed is achieved, and adjust the linkage so that the slide will stop at that point with the bellcrank in the full low-speed position.

Throttle response should be smooth and rapid and should be independent of the rate at which the throttle is opened. I have found systems such as this to be very tolerant of changes in fuel, altitude, and weather with few, if any, changes required in idle mixture once the initial settings are satisfactory. If you are having difficulty with your current pressure-throttle arrangement, consider a switched pressure/suction system; you may be pleasantly surprised.

Richard L. Perry, 10035 Deadwood Ave., Ellsworth AFB, SD 57706.

JU-635/Nelson

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Give the wing a few coats of dope and sand off the fuzz. Cover with medium-to-heavy silkspan and shrink with water. When it is dry, apply two or three coats of thinned dope to the wing, fuselage, and tail assemblies.

Sand and fit the rudders to the top of the fuselages now—the lower rudders will be added later. Place the wing on a flat surface and align and glue the fuselages to the wing, getting them as parallel as possible to each other. Fit the stabilizer assemblies in place. Line them up from above and from the rear to make sure they are even and level, and that their hinge lines are straight with each

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JU-635/Nelson

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other. Glue them in place and bend up the 1/16-in. music wire elevator joiner. Use CyA to tack it into place, then carefully sew it to the elevators as shown on the plans. Check the fuselages to make sure they are still parallel and finish gluing the wire joiner in place.

While all this is setting, cut out the plywood landing gear doors and give them a few coats of dope to seal them off. Bend the main landing gear wires to shape and sew the gear doors to the wire as shown. Now add the lower scoops, nose gear doors, main landing gears, and lower rudders to the fuselages.

Finishing. I chose to paint my model in a common Luftwaffe splinter pattern: light blue undersides, and dark green/black green upper surfaces. The canopies were painted black and outlined with silver pin-stripping tape. The crosses were cut from black and white MonoKote trim sheets and stuck in place. Install the engines, wheels, and rear props. Add a drop of CyA glue to the rear prop screws to keep them from coming off in flight. There should be little trouble in balancing the Ju-635, but check it just the same. Add any needed weight.

Twins are a lot of fun to fly, but it is not much fun to sit and monkey with them at the field. Test run your engines before you go out to fly. They should start and run well individually and together. Try tuning them to the same pitch and timing their runs. The longer running of the two engines should be put on the inboard fuselage. Once you are satisfied with their performance, get some 30-ft. steel lines and head for the field.

Warm up the engines and set their needle valves in harmony. Shut the engines down, refuel them, and hook up the lines. The Ju-635 rolls out rather awkwardly with its four wheels, but it picks up speed quickly and will break ground with a touch of elevator. In the air it is very stable and maneuverable. On one engine it settles down to a slow, steady flight pattern, yet is still responsive. Have fun reliving the past that never got to happen.

FF Old-Timers/Haught

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engine started on booster batteries—only to have it quit when switched over to the flight batteries. Today, on my larger models, I use alkaline C or D batteries for the flight pack and start the engine without booster batteries. For bench-running, I still prefer to use boosters made from hooking two #6 dry cells in series to provide the required three volts. I do use boosters on small models which are equipped with AA flight batteries. Incidentally, polarity of the ignition system is optional, but care must be used when using booster batteries, as reversing their polarity will ruin the flight pack.

Ignition engines run slower than their glow counterparts and generally require a propeller which has a larger diameter and lower pitch. As a rule of thumb I usually use a nine-inch-diameter prop on small engines (up to .19 cu. in. displacement), 10-in. on small Class B (up to .25 cu. in.), 11-in. on the .29s, and 14-in. on the .60s. Pitch is in the neighborhood of four to six inches. I like to use the largest propeller that will still allow the engine to attain its original rated rpm.

Fuel for the ignition engine must be mixed. Although ignition engines will run fine on glow fuel, SAM competition rules require a gas-and-oil mixture. The originally recommended formula was three or four parts white gasoline to one part SAE 70 motor oil. (*"Motorcycle oil," we used to call it.—RMcM.*)

White gasoline is no longer available at your local service station, but unleaded auto gas is a welcome substitute. The oil is now the problem. SAE 70 oil used to be available from motorcycle shops, but it is scarce now. I use Aviation SAE 60 uncompounded oil from the local airport and mix it three-to-one with unleaded gasoline. It seems to work fine.

Some suppliers do offer mixed fuel, oil, and other lubrication additives, but I have no current information on what's available. Perhaps some of you out there can help me out?

Before attempting to start our ignition engine, there is one other caution worth mentioning. The old engines were not designed to be used with electric starters. Electric starters place a reverse thrust load on the crankshaft and may push it back into the crankcase far enough for the rotating crankpin to chew up the rear of the engine casting. At best, using an electric starter places an undue strain on the crankshaft bushings where they meet the rear of the prop drive washer. Newly converted glow engines may handle starters just fine, but unless your original or replica engine has a ball thrust bearing, you will be better off hand-cranking your engine.

To obtain maximum power, ignition must occur near top dead center of the piston's stroke—and preferably just before the piston reaches top dead center to allow for the fuel/air mixture to begin burning before the piston starts down, thereby assuring that maximum energy will be utilized.

Trying to start an engine with the spark timed to occur at top dead center can result in backfiring or "kicking" of the engine which, in turn, can whack you a good one on your finger! To avoid this situation, the engine is cranked with the spark-timing retarded. Simply move the adjustable timer-arm *in the direction of propeller rotation* a few degrees so that ignition will occur

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