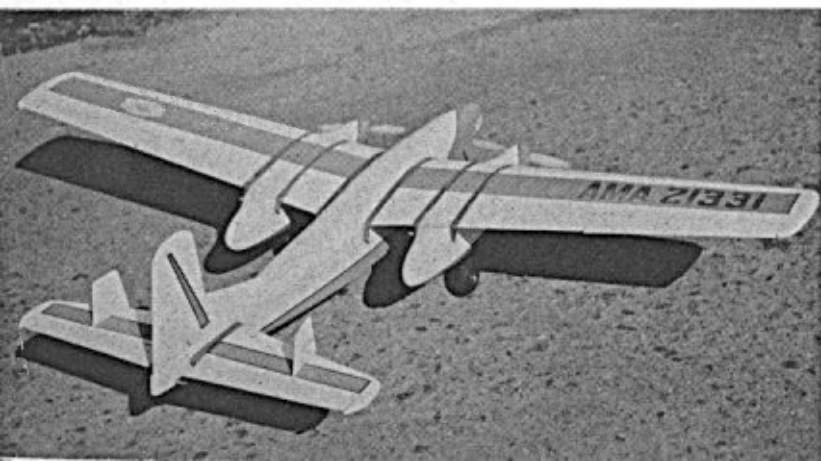




BOB HEISE'S TWIN-ENGINE R/C

GEMINI

Leading twin powerplant designer and flyer from Alameda, California, tells you how much more exciting life as a radio control fan can be when you shift to dual engines. Bob's been flying these for four years.



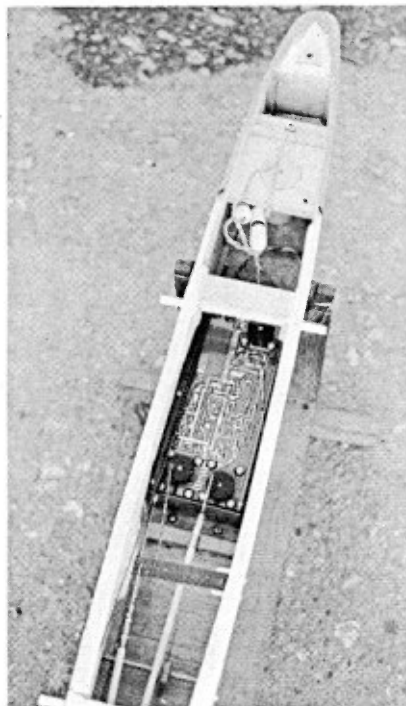
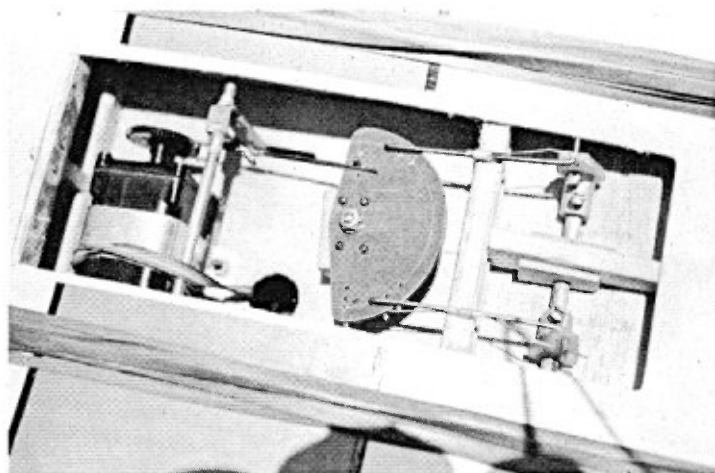
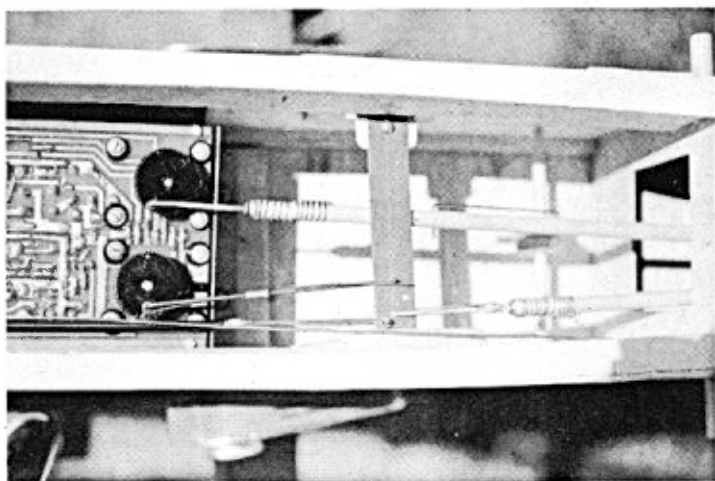
■ As some of you may know, Twin Engine R/C Model Aircraft are not exactly strangers to me. I flew my first one in 1959 at the Nats in Los Angeles. That, by the way, was my test hop. It was flown on WAG Dual Radio with two K&B .35's—1,040 sq. in. of wing and 9-3/4 pounds when ready for the air. Needless to say, it was a real thrill. Not so much in performance as noise. This plane was not fast, it had a very thick wing and a lot of protrusions in the air stream. I flew it through the speed traps at 50-mph, not fast either, but it showed great possibilities. Eventual result: the present Twin.

As the plans and photographs show, it is clean. Maybe not round, but clean aerodynamically. I used the same configuration as that used on my first Twin. Shoulder wing, tricycle gear, no up or down thrust in the engines.

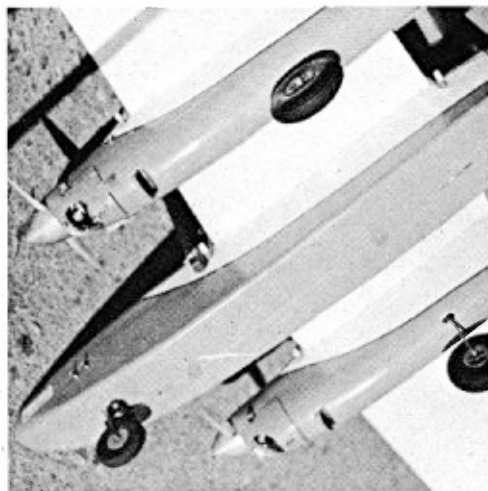
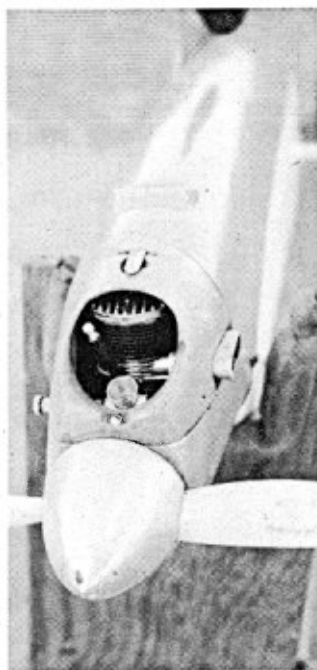
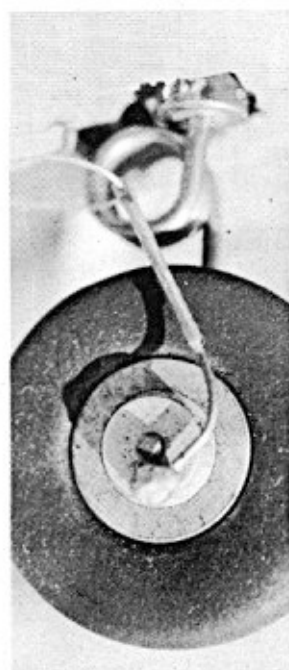
Let's say it is a bright, sunny day, a little breeze is blowing about five knots. You have arrived at the flying site ready to fly your "Gemini". Of course, to make things more interesting, you never arrive first. Always make an entrance, remember, you're in the center ring with this one.

You get out of your car and start assembly. (If your car is small like mine, you will have everything completely disassembled in order to carry it.) First the tail, then the wing (about that time someone will say "Hey, look fellows, here's a plane without an engine"). Well, fool them. Get one engine out and strap it onto the wing, then the other one on the other wing. About that time, you will hear more comments like; "Geel a bi-motor. No! a Twin, gosh, one on each wing, not a tandem one." By this time, you have it all ready to go. Pick it up and carry it out to the field. Not the regular way, carry it up over your head, like it is so big that this is the only place where there is room enough.

Place it in your favorite spot on the field in a stand. I usually have a stand that holds the fuselage during assembly. Open your tool box and fill your balloon tanks. (That is the easiest kind



Interior views of control and actuating mechanisms in Heise's "Gemini" give you an idea of how much space can be picked up when you remove powerplant and fuel tank from the fuselage. Plane is seen on opposite page with and without sub-ruders on stabilizer. Drawings on following pages show model in its latest configuration. Full size drawings for Gemini appear on Hobby Helpers' Group Plan #963 (85 cents).



Gemini flew originally with K&B 45's for power and Bob encountered some vibration problems. Shifting to K&B 35's he found that performance was changed very little yet that shaky effect had departed for good. Heise credits fellow East Bay Radio Club member Ed von Adelung with the aileron and nose gear arrangements shown in his drawings.

HEISE'S TWIN-ENGINE GEMINI

of tanks to use). Then, turn on your Space Control transmitter, then the receiver and check your control movements. Steerable nose wheel, brakes, etc. Set your throttles open, choke your engines about two times until fuel runs out when you remove your finger from the carburetor. Attach the glow plug battery to the #2 engine (right engine looking forward). Start it, throttle it back and stop it by grasping the spinner. Re-open your throttles and start #1 (your left engine). Throttle it back then place it on half speed and start your #2 engine. Now open the throttles and rev them up until they start to beat or synchronize. Check the throttle operation three or four times, high to low speed. Make sure they work smoothly and your engines don't miss, stop, or one engine accelerates too much before the other one. Remember with this plane, you don't have to have a real low idle on your engines. I removed the exhaust throttle on my 45s when I was using them and put stacks on to get the exhaust out of the cowl.

Now, taxi out. This plane has excellent ground handling features. The steerable proportional nose wheel along with proportional brakes on the nose wheel makes it a breeze to taxi. You can even taxi on one engine. Don't forget, there is nothing like the sound you get from a Twin, both from the spectators and the engines.

Okay, line up on the runway and open the engines. Then, *hang on*, you are in for the flight of your life. I usually let it roll about 200 feet before taking off. It will take off much much shorter, but it is nice to have single engine air speed on takeoff just in case one of the engines stops. I have had it happen to me and it is not too happy an experience. It is hard to keep the nose down to gain air speed when you're so close to the ground, but you must or you will stall and crash.

So you are in the air and really moving out. (About 90-mph, I would say). Come on around over the runway and pull her up into three nice victory rolls, just keep the ship pointed up at about 45 degree angle and roll it. Never mind about her stalling, she won't. She will roll on out as long as you want her to. I have done rolls completely around the field and she was still climbing. Now, try some loops, not too much up elevator or she will climb too high at the end of three loops. Don't be afraid to drop the nose, air speed never hurt this plane. She loves it. She flies steadily and grooves along. I have done a long split "S" and really let it howl down from 200 feet and she didn't even wiggle her tail or vibrate. Now, try some rolls. No sweat, all kinds of power, outsides easy, four points, feed in a little top rudder and she hangs there like she was glued. Inverted, just turn in a little down trim on your transmitter and she stays there, hands off, I don't bother with the down trim, though, because I would rather hold it there with the stick. Vertical 8s? Fine, power to spare.

How about a touch and go? Come over the field at about 50 to 100 feet high up wind. At the end of the runway, make a 90 degree left, then about 150 feet out, make another 90 degree

left. Now, you are on the down wind leg, throttle back, notice no change in trim. The nose drops slightly and you are ready for your landing. Remember, keep your air speed up until final. Now, turn another 90 degrees and you are on base. When you think the next turn will line you up on the runway, you turn final and begin to slow the plane up. Hold your attitude until you are about two feet from the ground, then ease the nose up. You will note that all that happens is the nose comes up, the plane does not balloon. Now, roll it down on the main gear and gently touch down on the nose wheel. Open your throttles and away you go; remember now, not too fast on the stick for take off, let her get moving even though you have plenty of power.

Feels great, eh? Just listen to that sound. Two K&B .35's on nylon props really whine, eh what? Now, feel it out, notice no torque when you come over the top of your outsides. Smooth all the way. So you want to really rack it around; well, take it easy, remember, you have a lot of speed there and it can come down just as fast as it can go up. Now, throttle back and land it. OOPS! you flew too long, now when you throttle back one engine ran out of gas. Never mind though, it flies nicely on one engine. Come over the field, just the same as before; don't worry about banking into the dead engine. I have done it many times. Just remember to keep your air speed. It is better to run off the end of the runway into the grass than to stall her out turning final and dump her into the ground. Taxi back, so you only have one engine, that's all the rest of the R/C planes have.

Now, park it, turn off your transmitter and your Space Control automatically turns your engine off. Turn around, remove your hat and make a sweeping bow to the crowd as the noise of applause and cheering rings like Twins in your ears.

I have taken quite a lot of ribbing during my time in proportional control and twin engines, but as I have said before, there will come a time. This, I believe to be the time. I have called this the Year of the Twin.

I have received many letters asking for information on Twins, their design and how to fly them. Many of the theories of Twin design in model work has been discarded as old wives' tales by myself and others who have had nerve enough to build and fly multi-engine R/C models.

Directional stability, one of the largest drawbacks to multi-engine has been overcome in my plane by engine location, rudder and fin areas; also by the use of sub-rudders for those who do not have Space Control or proportional radio equipment with four simultaneous controls.

Now to details: I have tried the sub-rudder on my plane as the photographs show and complete control on one engine out has been accomplished by aileron use only. As stated previously, I have turned into the dead engine with no problem.

This, however, brings up another problem, that of engine vibration. This was so bad in one of my engines that it finally tore itself out of the mounts and took the firewall along with it. Then, on the way out, (Continued on page 94)

Gemini

(Continued from page 43)

it hit the stab and rudder, changing my total throw onto the controls. I recovered from the spin, but when the plane leveled out, I couldn't hold it from spinning again, so . . . *crash*. This is now repaired and no apparent further vibration problems have shown up. Although my first installation with .45's used regular K&B radial mounts, I suggest in order to get away from possible trouble, you use Tatone mounts. They are radial mounts on firewall, but beam mounts on engine. This removes the engine load from the back plate.

I am now operating with .35's and recommend that power. Should anyone want K&B .45's I suggest you write to K&B Manufacturing Company and obtain two counter balance plates with some of the material removed as suggested to me by Johnny Brodbeck. This, of course, applies only if you are going to run 10 x 6" props on the plane with the larger powerplants. If you run 11 x 6" or larger, you won't get up to the high engine rpm and resultant vibration.

As the fliers in my area know, I have really shown the single engine performance of this plane many times due to the above vibration trouble. I have had engines stop in nearly every altitude or time, caused by numerous troubles, but mostly engine vibration. I even had an engine stop about two feet off the ground on a go-around when I applied full power. I still recovered and landed safely. Shaking, but safe!

The construction of the plane is very

simple and straightforward. I used no gimmicks or hard-to-obtain materials. One of the nicest aileron installations in model R/C work is in this Twin, designed by a fellow E.B.R.C. member, Ed von Adelung. This control hook-up along with the rudder, elevator and engine control makes it nearly impossible to damage the servos in a crash or if some one wants to see how hard they are to move (which I have had happen). The steerable nose wheel works fine, easy to adjust and install, also designed by Mr. von Adelung. Although the stab and vertical fin may look to be rather heavy, it is not bad if you use light wood about 8 ounces completed. The wing and fuselage could be reduced in weight, but I don't recommend it because of handling. I have damaged mine more in rough handling than in normal daily flight.

I used 3-1/2 inch wheels on the main gear, but you can vary the angle the plane sets on the ground by the size of the main wheels. The nose wheel is a Space Control wheel and brake. The smallest size that they make; works fine, holds both engines on idle easily.

The C.G. is best between 33 and 36 per cent. I have moved it around and further limits seem to make it fly better for some maneuvers, but worse on some of the others.

It is only fair to tell you of the drawbacks in Twin Engine R/C flying:

One: Requires more fuel (I'm looking for a sponsor, to sell space on my plane, for fuel).

Two: It takes more fuel.

Three: It burns twice as much fuel.

Four: Last, but not least, you will never, never be satisfied with single engine R/C models again.

SPECIFICATIONS

Wing Span	75 in.
Length	55 in.
Wing Area	860 sq. in.
Weight—Empty	8-3/4 lbs.
Wing Loading	23 oz. per sq. ft.
Fuel Load	16 oz.
Flight Duration	11 min.
Top Speed	90 mph.
Landing Speed	30 mph.
Normal Rate of Climb	4,000 ft. per min.
Note: Aluminum tubing available from Ducommun Metals Supply Co., 2550 7th Berkeley, Calif.	

Well, now that you know as much as the plane designer, how about starting on a Twin. Just remember, hang on for that first ride. It is worth every amount of energy and trouble.