

THE EX-29

An easily built rudder/elevator sport model that delivers truly excellent performance from an inexpensive Kyosho AP-29 motor and a five- or six-cell battery pack.

BY AL CLARK / PHOTOS BY JOHN CHAPMAN

The EX-29's simple, straightforward design and construction show up well in this photo. Weight and drag eliminated by omitting the landing gear is one secret to the model's amazing performance with a small power system. Motor battery sits directly above the wing, hence the row of cooling air holes on both sides of the fuselage.

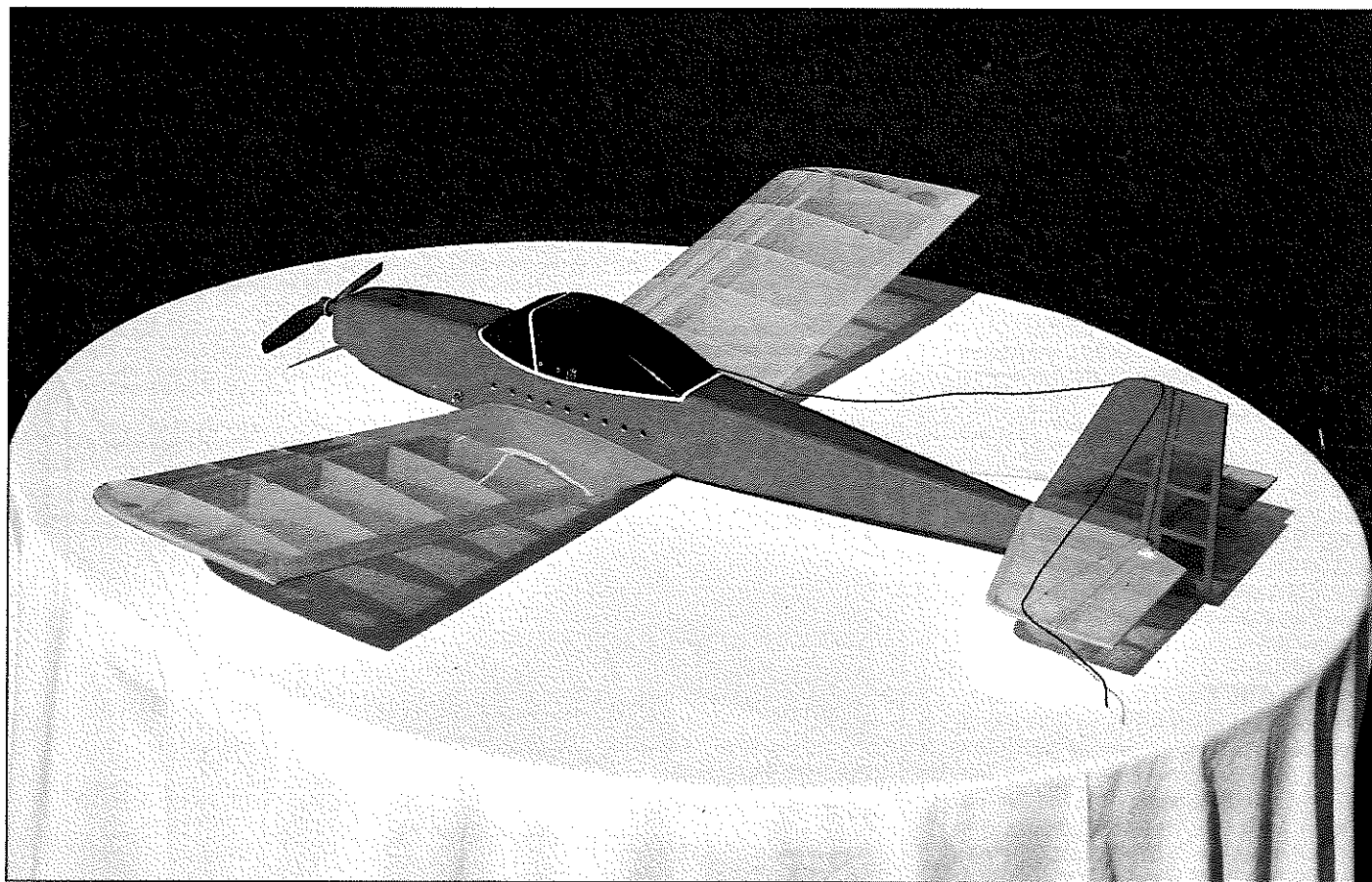
I've long been tempted to build an electric-powered RC airplane, but the cost of the power systems most modelers were using seemed excessive to me. When I tried to get some of my friends enthused about electric power, they told me I was crazy to spend that kind of money. I concluded that many modelers are like me and aren't willing to try an electric airplane unless the initial expenditure for the power system is reasonable.

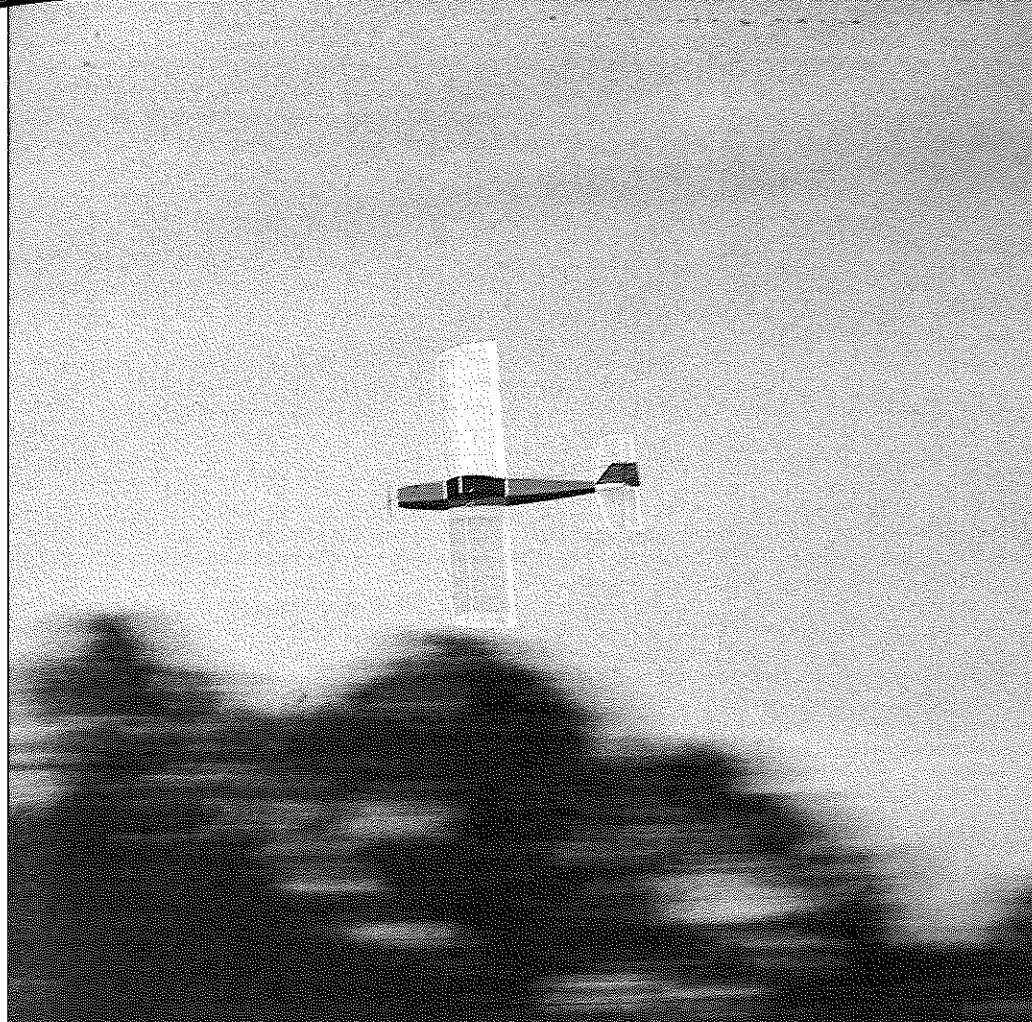
I had almost forgotten about electric planes until purely by chance one rainy summer day, I witnessed something that got me to thinking that maybe there is an inexpensive way to fly electric. A good friend of mine, Rex Powell, called to say he was about to test-fly an electric sailplane, and did I want to come see it fly? After watching several flights in the overcast, no-lift conditions, I was impressed with the performance

of Rex's little motorglider. The model used a wing from a Class A (59-inch span) hand-launch RC sailplane and a Kyosho AP-29 motor.

Rex had found the AP-29 in the Tower Hobbies catalog. This motor was used in some Kyosho ARF electric airplanes. It's an O35-size ferrite motor and sells for about 20 bucks! Also, it operates on five or six cells, resulting in light and inexpensive (\$15-\$25) battery packs. The motor and battery pack together don't cost much more than a Cox Tee Dee .049! Could this be the inexpensive electric power system I thought didn't exist? The more I thought about it, the more enthused I became. If Rex's motorglider performed this well with the AP-29, then it should also be possible to design a small, 1/2A-size power model that would fly well using this motor.

Back home, I sat down at the drawing board with calculator





Low and close-in—the fun way to fly! The use of plenty of dihedral and rudder/elevator controls results in decent axial rolls as well as great snap rolls and spins. We've seen a video of this model in action and can attest to its aerobatic capabilities—including outside loops!

and pencil to see what I could come up with. A couple of days later, I had the prototype EX-29 drawings completed.

I designed the EX-29 to be as light as possible but still have sufficient strength for everyday flying. First, I used poor man's retracts (no landing gear) to reduce weight and drag. I normally fly at a grass/weeds field, and a landing gear would only

flip the plane over anyway. Second, I decided to use only two flight controls, to lose the weight of one servo. The two controls would be rudder and elevator, allowing snap rolls and spins in addition to rolls. With ailerons and elevator, snap and spin maneuvers wouldn't be possible.

The final weight was 25.5 ounces with a five-cell, 800-mAH battery pack; and 27 ounces with a six-cell pack. This results in a very reasonable wing loading—13.4 to 14.2 ounces per square foot. I've flown many 1/2A gas models that had higher wing loadings than this.

So how does the EX-29 fly? I must admit that I was a little surprised by its performance. I've seen several electric-powered airplanes that were obviously struggling when they flew, but this is definitely *not* the case with the EX-29! Performance is very good with the five-cell pack. Consecutive loops from level flight, rudder rolls, snap

rolls, spins, split-S's, Immelmans, hammerheads, and inverted flight are no problem. As expected, with six cells the model flies and climbs faster. Maneuvers are quicker, and snap-rolls on top of loops as well as outside loops are pos-

sible due to the increased flying speed. The six-cell pack is lots of fun and is good for showing off a bit, but I usually use the five-cell pack unless it's a very hot day (high density altitude).

What about launching and landing? Just grab the model behind the wing, hit the power and give a smooth, level throw. Within a few seconds, the EX-29 will be up to flying speed, and then the fun begins! It will climb out at a fairly steep climb angle, and altitude is gained quickly. Power-off performance is very good, the glide being quite flat. Landing approaches are easy due to the shallow glide angle, and the EX-29 will slow up quite well just before touchdown, so the landing speed is not "hot" like some electrics you may have seen. In fact, I normally fly mine from a soccer field, and have had no problems with landing space.

The EX-29 gives you a lot of bang for the buck, and considering the very reasonable price of the Kyosho AP-29 motor and a five- or six-cell battery pack, you have no excuse not to give electric a try!

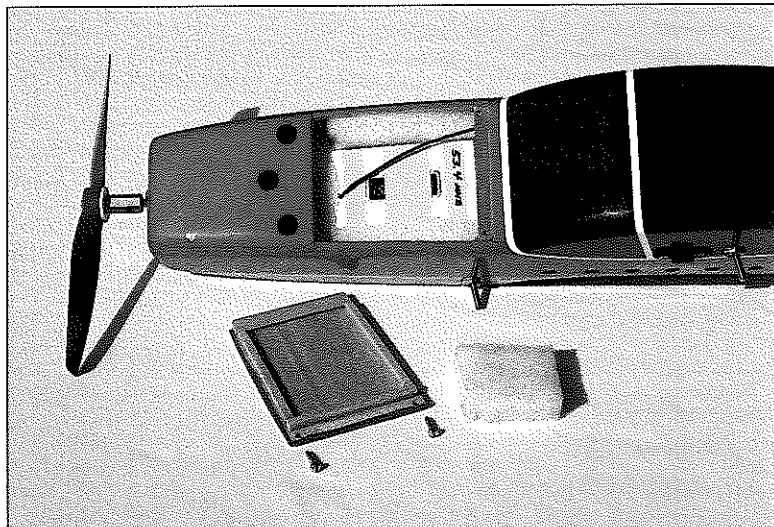
CONSTRUCTION

(Editor's note: The construction text that Al supplied was very detailed—stick-by-stick detailed—and was much longer than we had room for. Rather than chop it down to a useless fraction of its original length to make it fit, we've decided to keep it intact but not reproduce it here. Those who order the full-size EX-29 plans will get a copy of the complete original text.)

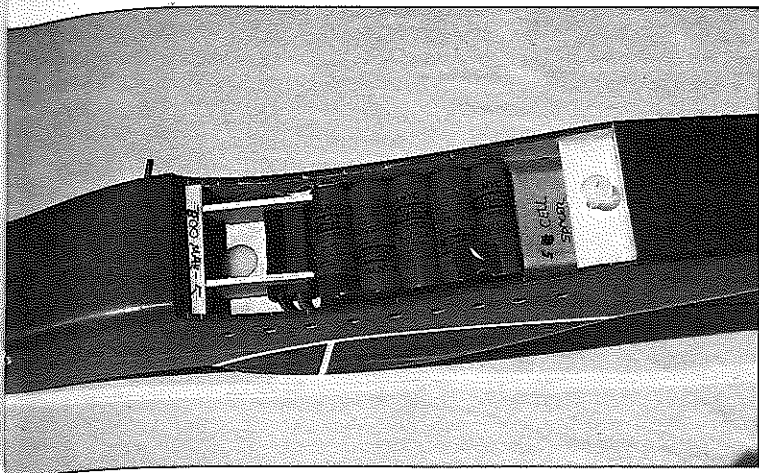
THE EX-29

Designed by Al Clark

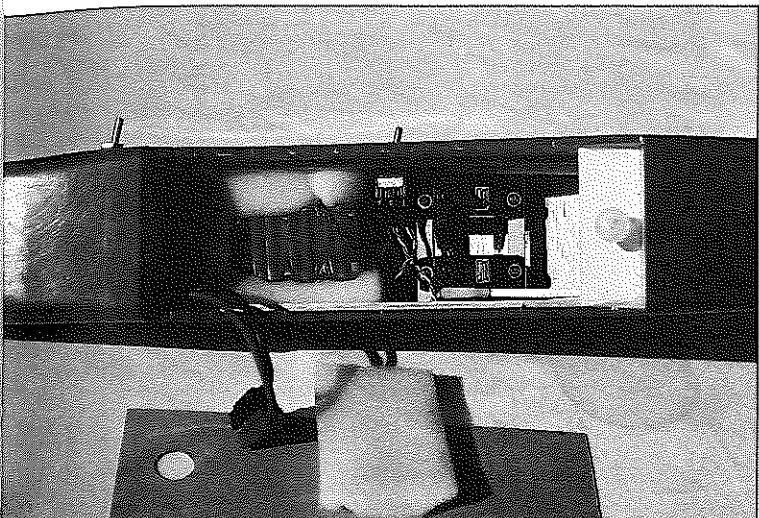
WINGSPAN	40 in.
WING AREA	274 sq. in.
FLYING WEIGHT	25-27 oz.
WING LOADING	13-14 oz./sq. ft.
CONSTRUCTION	Balsa
	spruce, plywood
POWER	Kyosho AP-29 motor
	(available from Tower Hobbies)
	800-mAH battery pack
	(five or six cells)
RADIO	Three channels required
	(rudder/elevator/on-off motor control). Lightweight micro system recommended for best performance.



Removing the forward hatch reveals the Ace Silver Seven receiver; a High Sky on-off motor controller lies underneath and is taped to the receiver.



Removing the wing gives access to the motor batteries—either five cells (seen here with appropriate spacers) or six, depending on the performance you're after.



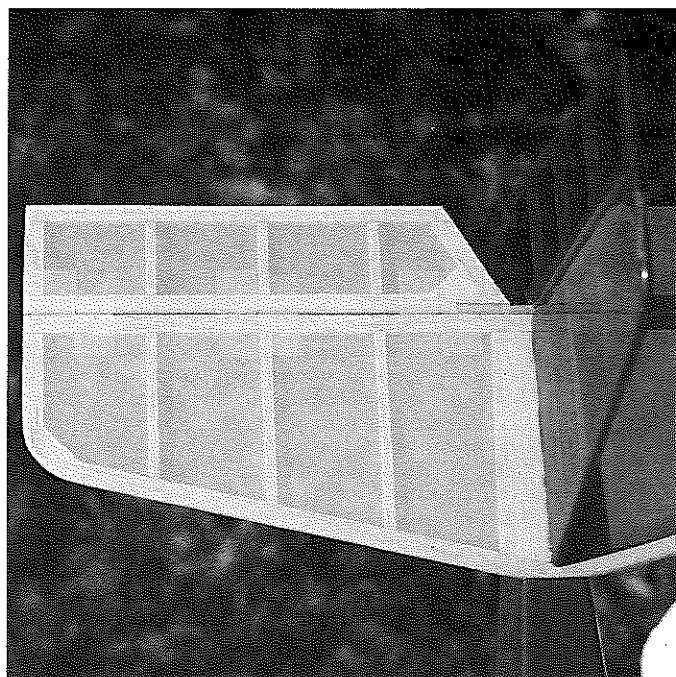
The battery floor is a drop-in fit; removing it exposes the rudder and elevator servos (Futaba S33 micros) and the radio battery.

POWER SYSTEM

I recommend replacing the leads on the AP-29 with 16-gauge wire (look in the RC car section of your local hobby shop) to better handle the current. I use a High Sky on-off controller (see their ad elsewhere in this issue of

Model Builder). The motor and arming switch are wired directly to the controller using the screw terminals provided. The only connector in the system is a Sermos connector for the motor battery.

I'm using packs made of Sanyo 800-mAH AR and 1200-mAH AE cells. With a Cox gray



Tail control surfaces are hinged via MonoKote "figure eight" hinges. The author's construction text, which is not presented here because of its length, goes into much detail on how to make such hinges. A copy of the complete construction text is included with the full-size EX-29 plans.

6x4 prop, I get about 3-1/2 minutes from the 800s and about 6 minutes from the 1200s. The 1200 AEs are the same size and weight as the 800 ARs, but they aren't designed for fast charging or high discharge rates. By raising the battery floor, Sanyo 1700-mAH SCRCs can be accommodated. I'd use a six-cell pack because of the extra 3.7 ounces; the EX-29 should handle the increased wing loading with no problem. This pack would give you 8 or 9 minutes of flying time!

I recommend not using the motor brake circuit on the High Sky controller—just let the prop freewheel. This allows the prop to be knocked out of the way when landing and avoids breakage. I have

yet to break a prop that was freewheeling upon landing.

FLYING

Launch the model into the wind (no more than 5-8 mph for test flying) using a firm, level throw. Don't try to climb until the EX-29 gets up to flying speed—this won't take more than a couple of seconds. Get some altitude and trim for level flight, then have some fun! During the test flights, it's best to land before the motor battery runs completely down in case you have to make a go-around. After you learn the glide angle, you'll find that precise landings are easy.

I hope you enjoy your EX-29 and let your buddies fly it. It has a high fun-per-buck ratio! **MB**

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