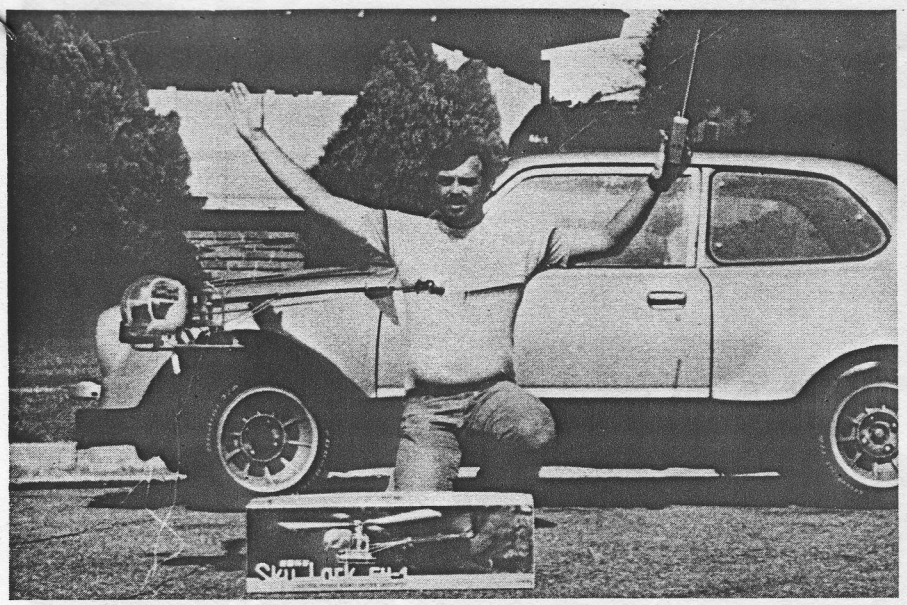
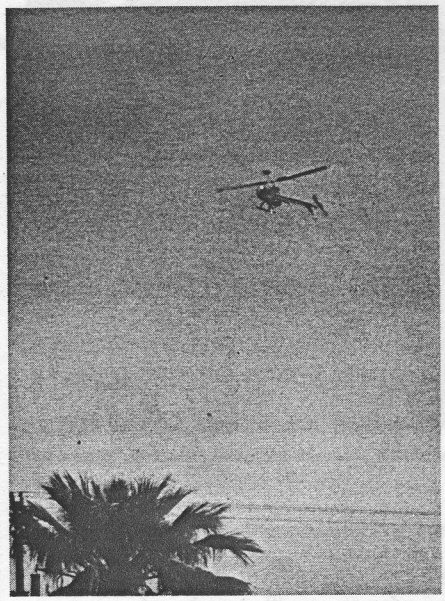


Larry Jolly demonstrates one of the reasons why the Ishimasa Skylark is an excellent choice for a first-time helicopter. Experts will have a blast too!



Who says electric helicopters don't have performance!

PRODUCT$ IN U$E
ISHIMASA SKYLARK EH-1

By LARRY JOLLY . . . Take a look at a very unusual flying machine: it's electric powered, it doesn't make a mess of itself every time it gets flown, it's very quiet, it's cheap to maintain, it's a stable flier, and *more!*

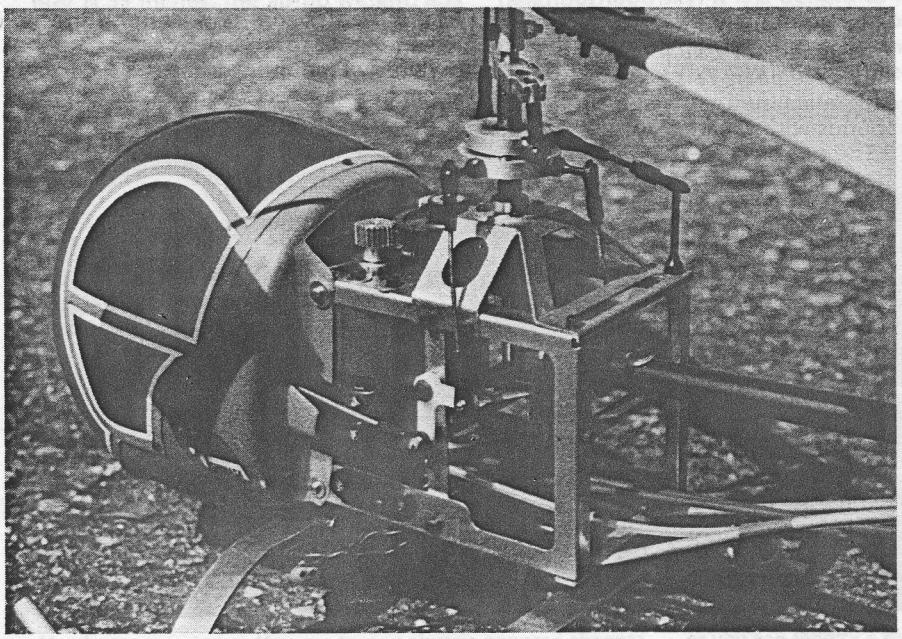
• Okay Jolly, you told us all about electric sailplanes, your Electricus was pretty spiffy, I'm even thinking about *trying* an electric someday, but electric powered helicopters?. . . Brother, you've been sniffing too many vented NiCds!

As fictional as it may sound, electric helicopters are a reality, and one that is coming of age rapidly. Our story starts in the fall of 1978. That is when I met an engineer named Charlie Gilbert. Now, I know Charlie's name is not new to long-time **Model Builder** readers, but a lot of you don't realize that Charlie designed and built the first electric helicopter to successfully carry its own power supply. I know, because I was the test pilot. A picture of the historic 39-second flight was featured in a 1979 copy of **Model Builder**. *(July to be exact. wrf)*

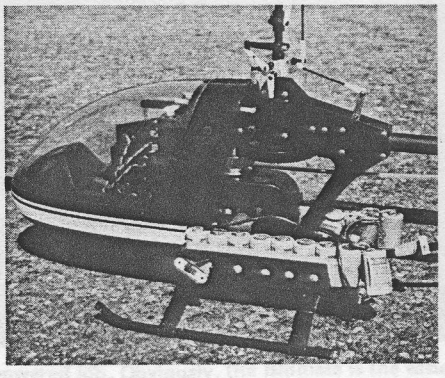
If you've read any of my ramblings, you will know that I'm still out of breath trying to catch up with those darned, rapidly-evolving electric power units. It was four years ago that Charlie and I shivered in the after midnight cold, coaxing his silent egg beater into the air. The recent advancements in electric power have been staggering. I knew our *sailplanes* were climbing better, but I had put the helicopter thing on the proverbial back burner.

In November of 1982, I decided that I was going to fly a helicopter designed for gas, but substitute an electric system for power. I chose Kalt's Baron 20 as the best possibility for my experiments. Bob Boucher became interested in the project and helped me with prototype Astro cobalt 25s and 40s.

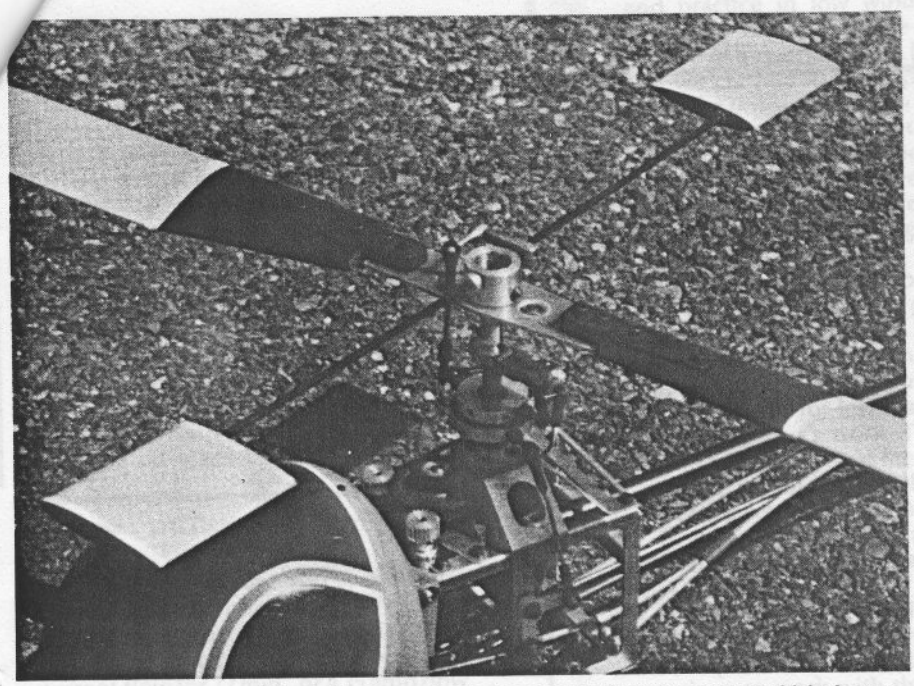
As I got into my project, Cliff Rausin of Condor Hobbies contacted me and asked me if I'd consider trying an electric helicopter that they were thinking of importing from Japan. I said that I



Close-up view of the electric Skylark reveals power transmission gears, control linkages, one of two electric motors, and on/off switch.



A more expensive way to go electric . . . a Baron 20 with single Astro 40/16.



A very nice feature, especially for beginners, is the break-away fiberglass seesaw which shatters on main rotor impact thus saving blades and gears. See text.

Did I say *impact?!* Minimal damage. Machine is designed to take abuse. See text.

hoped it wasn't that thing that flies on a tether, "Helicopter pilots have to be macho you know." Cliff told me that it *was* the tether machine, but that it would also fly independently from an airborne battery pack.

I got the kit from Cliff, but continued to work on the Baron 20. I did get the Baron to fly, which was quite an accomplishment in itself. Flight times of two minutes have been achieved with the promise of longer flights from changing the gear ratios.

I decided that I had better get the helicopter I received from Cliff built and going so that he could decide what to do. Cliff's machine is manufactured by Ishimasa of Japan and is called the Skylark EH-1. It has the following specs for you technical types. The rotor diameter is 39 inches, the all-up weight, less motor battery is 3.5 lbs., and it is powered by two Mabuchi 540S electric motors. All helicopters require at least four channels for control. What's the attraction for EH-1? Well, it's really easy to assemble, it's small and compact (even with the blades still on it), it's affordable, and it flies!

I remember my first tether flights on the EH-1. As I was adjusting the tracking, I thought to myself this thing doesn't fly too bad for a toy on a string. After a few minutes of tinkering, I had that little jewel whirling away and hovering hands-off. Dad had the NiCd pack all charged up, so I strapped it to the machine and stood back. I remember saying to dad, "This is going to be good. . . Did you feel how much this thing weighs?" Well, as I pushed the throttle stick forward, I was not prepared for the performance I was about to witness. My little EH-1 climbed out spritely and scooted all over the neighborhood sky. It is a delight to fly, and it's very gentle and predictable. Countless flights have been logged since that day, and much experience has been gained while studying my electric helicopters.

First, gas powered helicopters can be converted to electric fliers using the new cobalt electric motors. The motor to rotor gear reduction will probably have to be changed to somewhere around 13:1 to 15:1. Efficiency is the key to longer flights. My longest free flight is three minutes with the EH-1. Why so short? Well, as Ray Hostetler would tell you, helicopters are interesting little mechanical beasties that use a *lot* of excess power turning gears, transmissions, and various drives, not to mention the power lost to drag from pushing the rotor blades through the air. This adds up to a big burden on the motor. Of all things that fly, maybe discounting rockets, helicopters are the most inefficient users of available horsepower. To give you an idea, by means of comparison, of just how much power is used by electric choppers, our indoor electric models fly on two amps, the Whistler draws eight amps, the Electricus draws 18 amps, and my helicopters draw between 27 and 35 amps. If you can get Matilda to divide 72 by 35 for you, you'll see that that electric whirlysnapper of yours isn't going to fly

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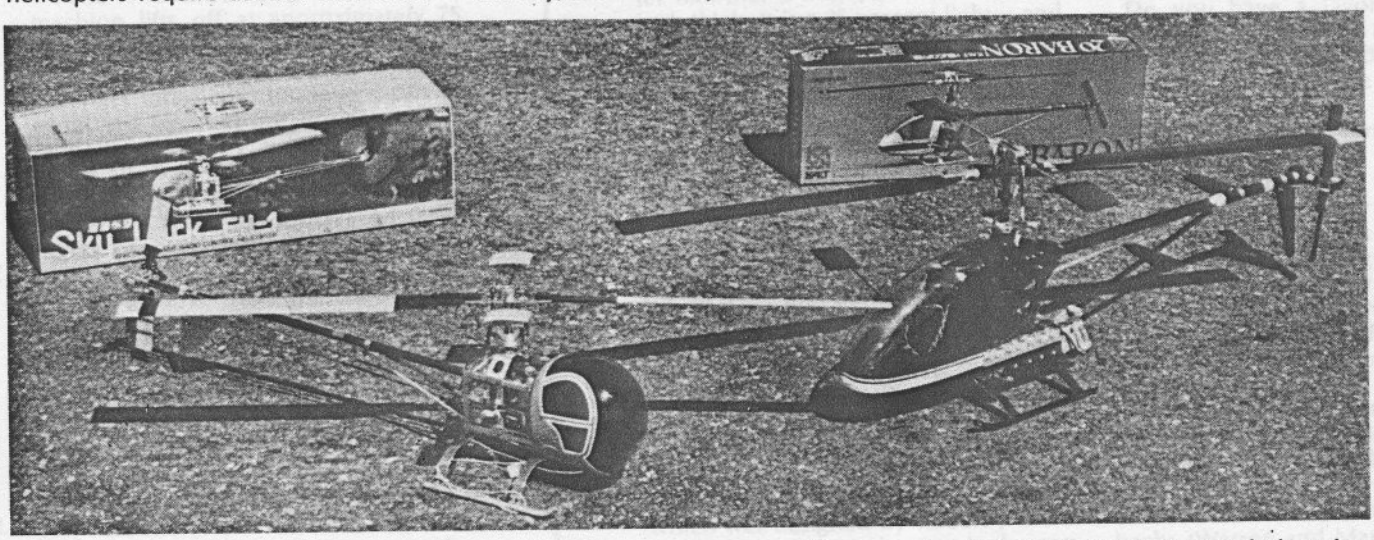

You have your choice. You can buy an electric powered chopper . . . or you can modify a gas powered job. Obviously, the Ishimasa is the easier way to go . . . not to mention less expensive!

all that long. *(In case you aren't quite following the numbers here, I'll explain . . . the battery pack has a capacity of 1.2 amp hrs., i.e. it can put out a one-amp current flow for 72 min., or a 35 amp flow for about two minutes. wrf)*

If you are interested in trying an electric helicopter, I would suggest that you get an EH-1 first, *before* trying to convert that gas ship you have hanging on your wall. Otherwise, you'll find that you can get nearly the same performance as the EH-1 for an investment of only $450.

When you assemble the EH-1, be careful to achieve the proper gear mesh, too tight of a mesh will decrease efficiency, cause your motors to overheat, and lower the available power.

Not mentioned in the instruction manual, but something I think is important, is to break in your motors before attempting flight.

It is important to set the blade pitch and tracking while on the tether. The NiCd pack is used up so fast that you cannot track the machine in the time you have available.

Make sure that you have full travel on the motor control.

I like to set the blade pitch so that the machine lifts off at approximately 75 percent of the throttle stick throw. This seems to be the most efficient setting.

Longer free-flights (no tether) can be obtained by keeping hovering to a minimum, thereby using less power. Make all turns to the left, which will unload the tail rotor and draw less current. I have demonstrated free-flights of over two minutes duration, featuring climbs to over 100 feet, and including stall turns. People say what can you do in two minutes? Well, my friends and I who have EH-1s have friendly competitions to see who can remain aloft longest. With a given amount of fuel, as is contained in the 1.2-amp cell, he who stays up longest, flew the most efficiently.

What about crash survivability? Can I learn on the EH-1? Yes, have someone who knows helicopters help you set the machine up; this is advice I would give for any helicopter. Stay on the tether and practice in low wind conditions. Parts are cheap! I have included a picture of a crashed EH-1. I'd like to say that we crashed it on purpose, but that would be untrue. The truth is we weren't paying attention, a wind gust hit us, and we *(OK Larry, who was the other pilot? wrf)* hit the car the power chord was attached to. Notice the rotor blade is not broken. Ishimasa has designed the EH-1 to survive a crash.

The fiberglass seesaw breaks on impact saving the shafts and gears. The tail boom is a fiberglass shaft that will snap on impact. This could have been an expensive, major crash, but the EH-1 was back in the air for less than $10 in parts and a half-hour's work. The EH-1 is so docile that the newest flier should have no more trouble with it than he would with a conventional gas helicopter.

If you have questions about electric helicopters, you can contact Cliff Rausin at Condor Hobbies, or me *through* Condor Hobbies. They will be happy to let you know of any new mods or techniques that we may discover as we continue to work with the EH-1.

Good luck until next time, and fly *quietly.* •