Classic designs remain the same regardless of size.


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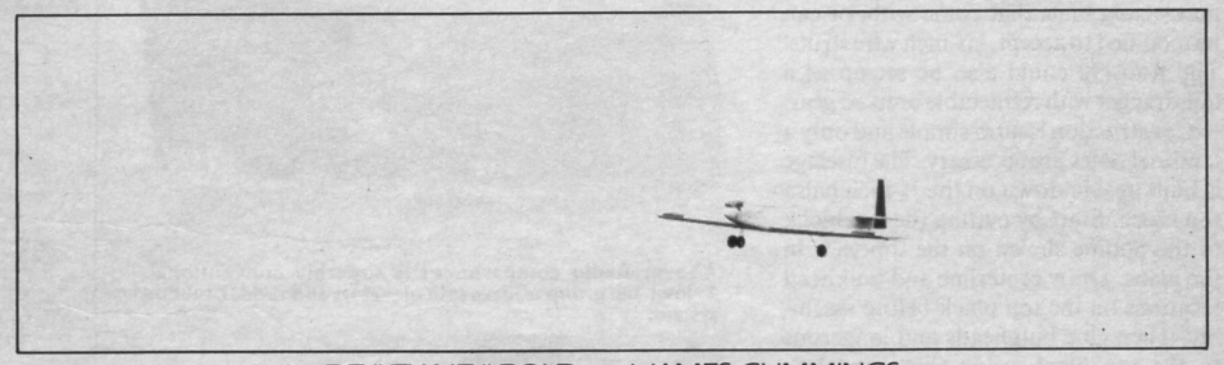
KAOS-90

A new approach to a classic design.



by DEWEY NEWBOLD and JAMES CUMMINGS

DESPITE ITS occasional frustrations, I love pattern flying—but there are times I've wished for something simple and yet impressive in its presentation and performance. Larger models have an impressive smoothness and grace, but I wanted something *completely* aerobatic and yet very simple to construct and maintain.

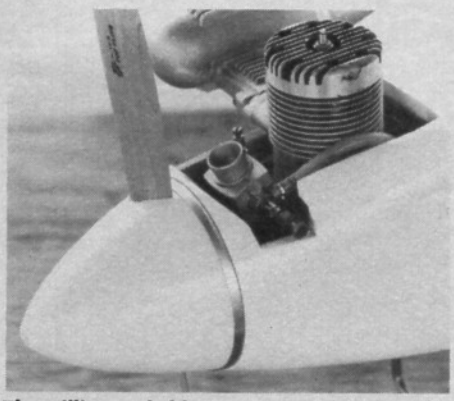
Local hobby shop owner James Cummings and I decided that by enlarging a good basic pattern design and taking advantage of the improved Reynolds Numbers, we could have spectacular performance without the complexities of retracts, pipes, etc. Since 1970 Joe Bridi's Kaos design has maintained a reputation as the most docile and simple airplane available with competitive aerobatic capability. I can wholeheartedly agree with Dave Brown's recent endorsement of it as an ideal first low-winger.

The Kaos-90 is a 25% direct enlargement of the Super Kaos. Please note, the original Super Kaos is still produced by Great Planes but at this time there are no plans to manufacture a kit of the Kaos-90.

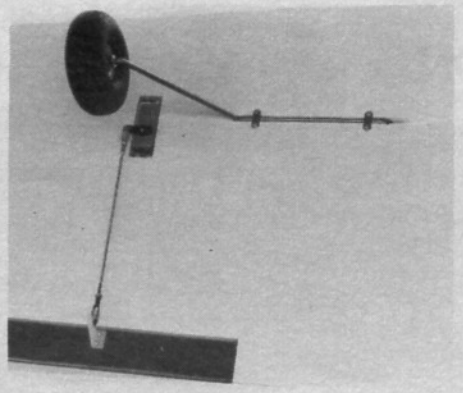
Whereas the standard size Super Kaos spans 59 inches with a wing area of 644 square inches, the Kaos-90 spans 73 inches with just over 1,000 square inches of area. All of the good flying traits of the original design have been retained and even enhanced. I think this design fills a real void between conventional-sized models and giant-scale. The Kaos-90 is ideal for beating up the sky on a Sunday afternoon and will fly a surprisingly precise pattern. I feel it would make a good transitional aircraft for those wishing to move into the larger models, especially if built as a tail-dragger. The simple fast construction also makes it suitable as a testbed for some of the larger servos, engines, etc., before they go into that ultimate quarter-scale project.

Speaking of engines, we flew the prototype with an O.S. 90. This is a good engine, but it shares the same size muffler with the .61 FSR and this restricts performance somewhat. I would recommend drilling out the outlet tube in the O.S. muffler or discarding it and using a less restrictive type, such as the Mac's. At 10½ pounds, the .90 is plenty of power for lively aerobatics. Real hot-doggers could add a tuned pipe or, better yet, one of the new O.S. 1.08s. We've considered installing a 1.20 four-stroke, which should also be an excellent combination. Please do not consider using any of the chainsaw-type engines as the structure is simply not designed for that size.

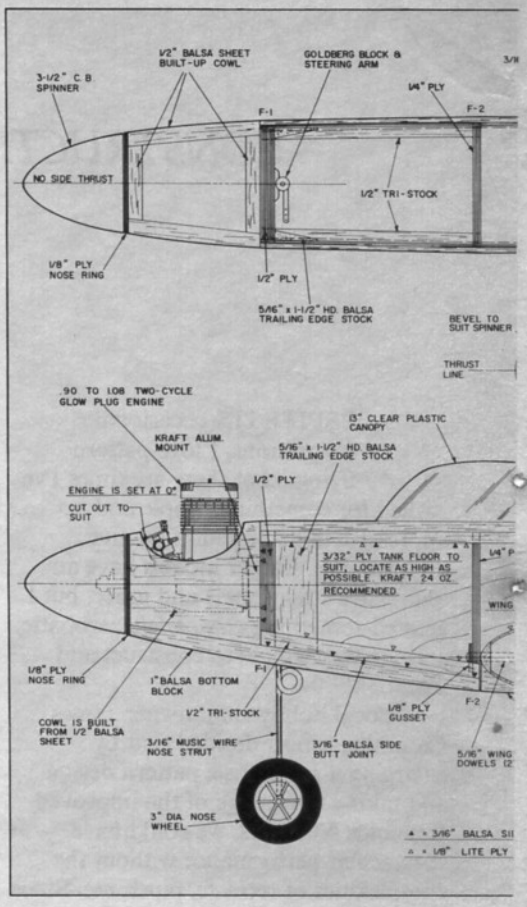
CONSTRUCTION. The construction has changed very



The willing and able O.S. 90-FSR rides in style.



Independent aileron control via an extended servo.



Maneuvers are large, smooth, and graceful.

little from the original Super Kaos design, as I don't feel the Kaos-90 is large enough to warrant switching to giant-scale construction methods. We opted for simple, light construction familiar to most modelers. The major deviations from Bridi's design are a foam-core wing in place of the original built-up one and a firewall-type motor mount instead of beams.

As shown on the plans, the prototype featured fixed tricycle gear. If the weight can be kept under 11½ pounds, the landing speed is slow enough that most of the standard commercial retract systems should function well. You should plan on purchasing units that come with, or can be modified to accept, 3/16-inch wire struts. The Kaos-90 could also be set up as a tail-dragger with retractable or fixed gear.

Construction is ultra simple and only a few brief notes are necessary. The fuselage is built upside-down on the 3/8-inch balsa top block. Start by cutting the top block to the outline shown on the top view in the plans. Draw centerline and bulkhead locations on the top block before assembly. Then glue bulkheads and longerons to the top block using Sig* modeler's triangles to ensure alignment. After you assemble the sides and doublers, they can be added to the top and bulkheads and the bottom can be sheeted, all without removing the assembly from the building board. Be sure to brace the firewall with *large* triangular stock on each side and don't forget to coat the inside of the tank compartment with resin or epoxy. Install the nose-gear bearing blocks (Goldberg or similar) before gluing the bottom nose block on.

Build the cowl up from ½-inch sheet balsa to suit the engine you're going to use. Wing fillets are not shown on the plans but you can add them if you want, using a 1/32-inch ply base and a micro-ballon filler.

Sheet the wing cores with 3/32-inch balsa. I prefer a slow-setting epoxy for this, as opposed to contact cement. Spread a very thin coat on the inner surface of the balsa skins only. An auto body putty

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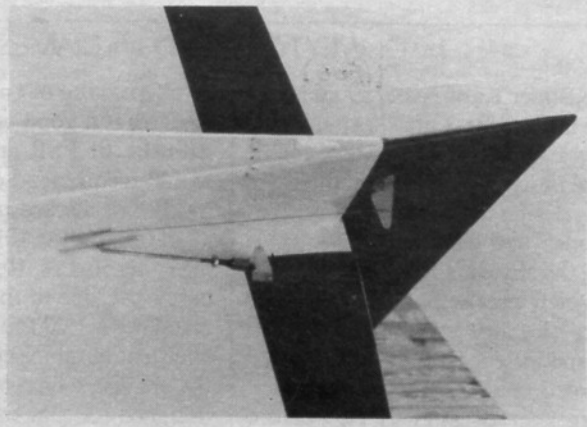
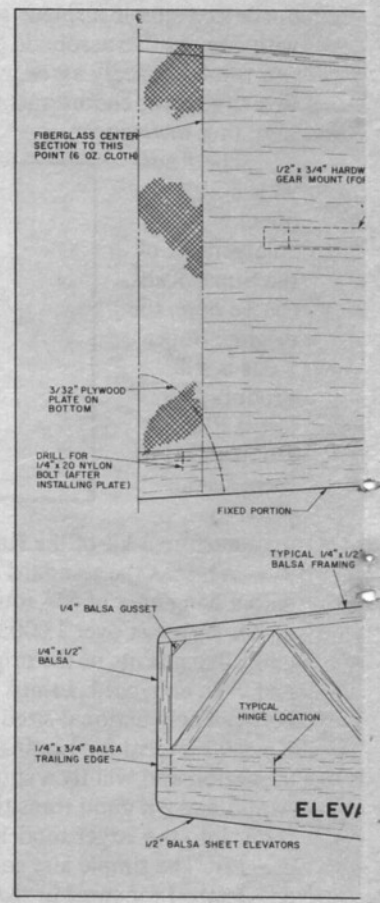
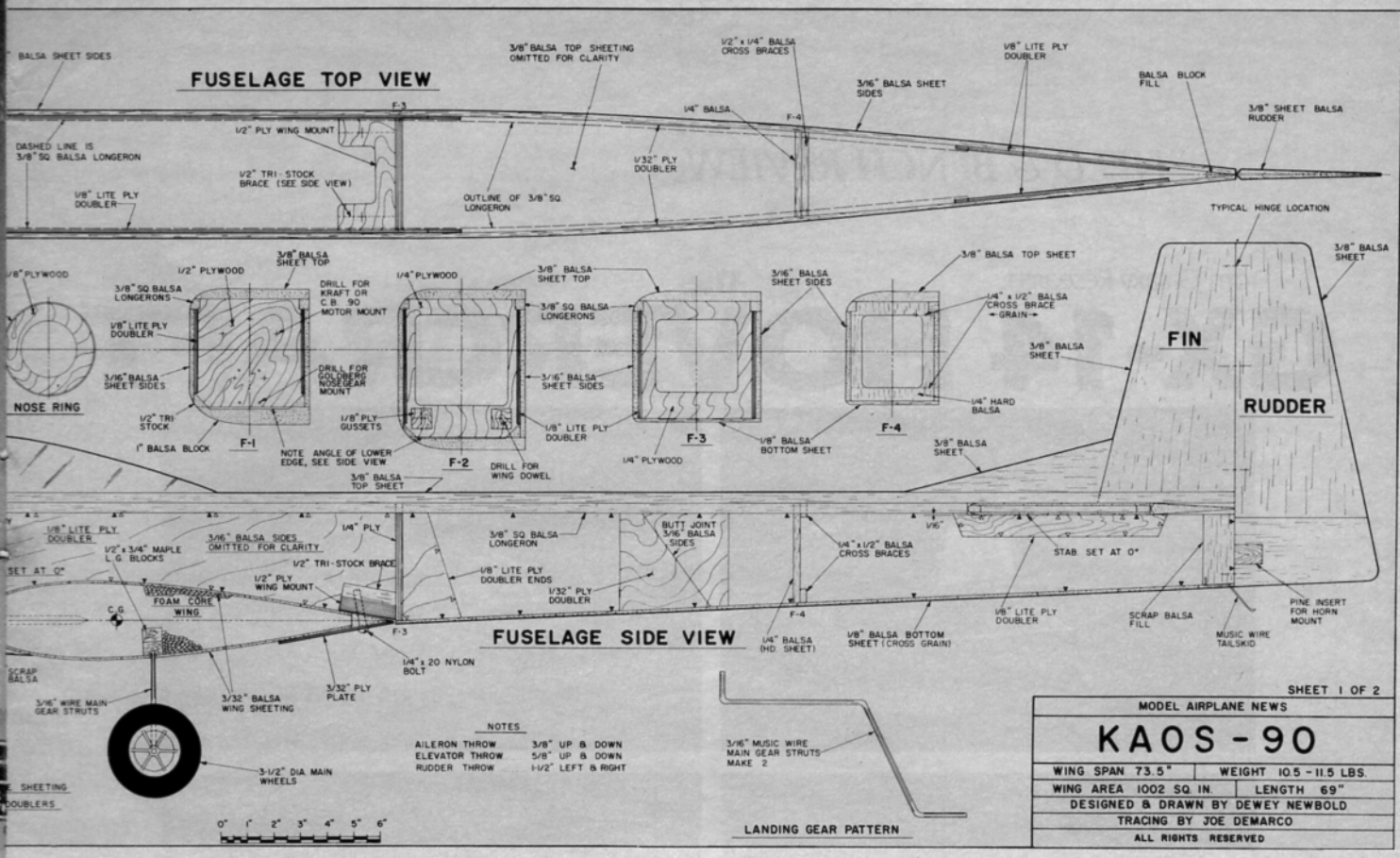
Above: Radio compartment is superbly conventional. Below: Tail group utilizes split elevators and rudder cabling system.







SHEET 1 OF 2

MODEL AIRPLANE NEWS

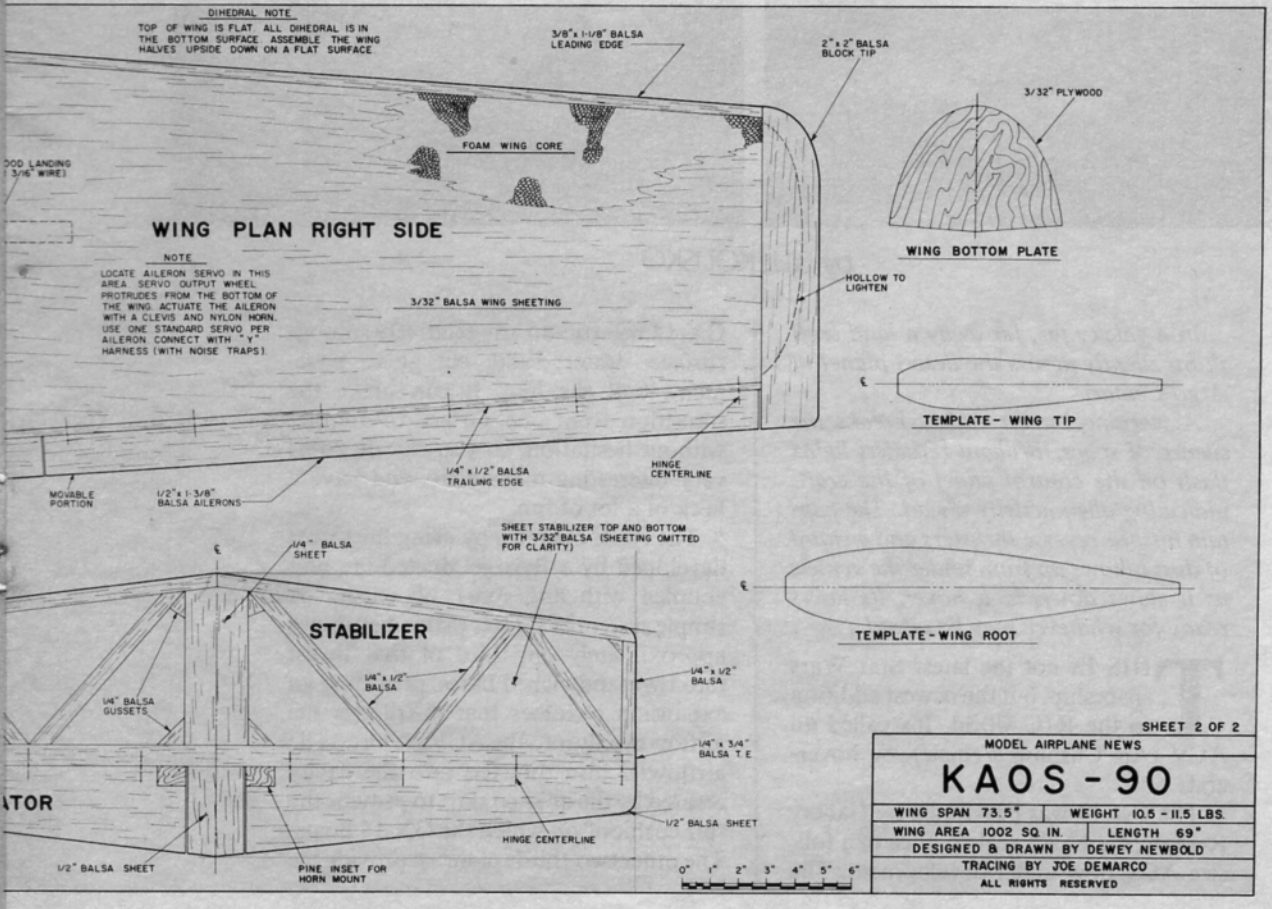
KAOS - 90

WING SPAN 73.5"	WEIGHT 10.5 - 11.5 LBS.
WING AREA 1002 SQ. IN.	LENGTH 69"

DESIGNED & DRAWN BY DEWEY NEWBOLD

TRACING BY JOE DEMARCO

FULL-SIZE PLANS AVAILABLE...PAGE 124



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think what this man and his airplane have meant to the United States. They have meant the beginning and the prospering of a new era of high-quality competition pilots and airplanes, and he has given America some of its very finest moments in the air. ■

KAOS-90

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squeegee works great for this. All dihedral is in the bottom surface and therefore the right and left halves can be joined upside down on a flat surface. Be sure to wrap the center section with 6-ounce glass cloth and resin. We suggest you leave the ailerons full width all the way to the tips rather than narrowing them as on the original Kaos. The Kaos-90's large foam wing has a lot of inertia to overcome in the roll axis and that little bit of extra control surface area at the tips is helpful at low speeds.

The stab, fin, and rudder are flat sheet affairs and my only comment here is to use light balsa.

Finish the Kaos-90 with your favorite method, but watch the weight. We used Super MonoKote on the prototype. No additional balance weight was necessary, however the radio gear had to be located toward the rear of the compartment to correct an initially nose-heavy condition.

We flew the prototype with a Kraft* Signature Series radio with standard KPS-15 II and 14 II servos. Separate aileron servos were mounted outboard in each wing panel and connected with a Y-harness (Kraft P/N 200-196). We also connected one servo to each elevator half. Be very careful during the installation not to allow any control surface slop. We didn't counterbalance any of the surfaces but all linkages are tight and no flutter problems have occured. The elevator pushrods are braced midway down the tail section and a cable arrangement connects the single rudder servo. There is plenty of room for a 1,000 mAh battery pack, although we've experienced no problems with the standard 550-mAh pack. The 900-mAh SR pack would probably be the ideal one for the Kaos-90.

Control throws were set up as follows: Ailerons ⅜ inch up and ⅜ inch down, elevator ⅝ inch up and ⅝ inch down, rudder 1½ inch right and left. Don't forget to check the CG and alignment.

FLYING. Flying the Kaos-90 should be an extremely pleasurable experience if you've done your homework. James Cummings built the prototype and I credit a great deal of the success of this project to his light and accurate construction. We could have called it the "Lazy Kaos" and not been stretching the truth at all. Maneuvers are large, smooth and graceful. Although a .90 engine is too large to be legal for pattern, the Kaos-90 could be very competitive with a four-stroke 120. Light construction will really pay off, as the only limitation is vertical performance. (Note that in this context I'm comparing it to a tuned-pipe pattern bird.) With a pipe on the .90 or possibly with the new 1.08, even that should no longer be a restriction. Inside and outside loops are large and smooth, and rolls are quite axial. Windy weather has little effect on the smoothness. If you are accustomed to flying .60-size pattern ships, you may find yourself undershooting, as I did on the first few landings. The Kaos-90 lands slower than a pattern plane and the larger size makes it appear closer than it really is until your depth perception gets reprogrammed to the difference. We've used a number of props in the 13- and 14-inch

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KAOS-90

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range and settled on a Zinger 13x6 as the best all-around choice for our particular engine and plane combination. Some experimentation may be necessary on your own version.

Above all, relax on your first test flights. The Kaos-90 is easy to fly and it won't embarrass you. If you don't believe me, ask Paul Duncan of Denison, Texas. Paul currently owns the first prototype and is using it as an intermediate trainer!

In summary, the Kaos-90 is a simple, docile, honest and fun machine. I'm confident it will add a lot of enjoyment to your R/C hobby. That's what we designed it for!

**The following are the addresses of the companies mentioned in this article:*

Sig Manufacturing Co., Montezuma, IA 50171.

Kraft Systems, 450 W. California Ave., Vista, CA 92083. ■