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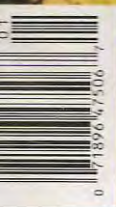


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**L&L's
Technician**

PHOTOGRAPHY: BOB HUNT

A potent new Turnaround design. The *Technician* was first baptized in the 1983 Nats Expert Class competition and is moving up the ranks.

An FM Product Review:

L&L Model Products' *Technician*

By Bob Hunt and Dean Pappas

A double threat R/C pattern design for both A.M.A and F.A.I. events that is available in both basic and deluxe kit form.

Every once in a great while you see an airplane that for one reason or another attracts your attention to the point that you just have to have one. For me the L&L *Technician* had that effect. Carl Lovins, its designer, was flying the prototype in the Expert class pattern event at the 1983 Nats. Being on the same line with Carl, I had six opportunities to watch this seemingly simple airplane fly. The impressive thing about the bird was the state of almost perfect trim it appeared to be in. This was one airplane with no apparent bad habits, and the illusion of flying along tracks in the sky was complete. Lee McDuffy had a spot of bad luck with his plane at the Nats and Carl let him use the *Technician* to finish the meet. Lee's scores actually improved from that point on, giving further evidence of a well trimmed and balanced design. You

can't just pick up the transmitter and fly an untrimmed or poorly trimmed ship that well.

I asked Carl for a construction article on the *Technician* but he opted to kit it. Good thing for all of us, too, as the *Technician* translates into a fine kit with excellent fiberglass and foam work.

I received a copy of the kit far further back than I care to think about, so my apologies go to Carl for the delay, but - at least for me - it was worth the wait.

Parts check

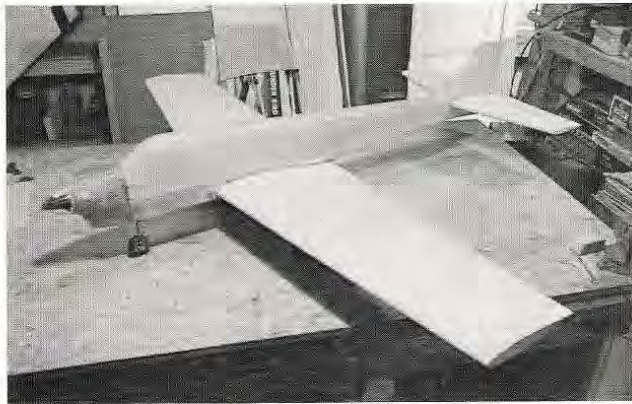
The *Technician* is available in both basic and deluxe kit form. The basic kit consists of a ripple free and accurate fiberglass fuselage with correct down and side thrust molded into the spinner facing, plus hot wire cut foam wing and stabilizer cores, a plywood firewall, and a basic hardware package which

includes $\frac{3}{32}$ pre-bent landing gear wire for the optional fixed gear version.

The deluxe kit contains the above plus all required balsa, a Dave Brown glass filled motor mount and pushrod system, and additional hardware. The basic kit is priced at \$107.95 and the deluxe version is listed at \$159.95. Included with both versions is a complete instruction manual and rolled plans.

I opted for the deluxe version and was well pleased at the quality and consistency of the balsa supplied. The ailerons are from pre-formed stock, while the elevators and rudder required shaping with a knife and sanding block. The wing skin material was a straight grained $\frac{1}{16}$ stock which I joined using Hot Stuff Super "T". (A complete how-to on joining skins with Hot Stuff appeared in the August 1982 issue of FLYING MODELS.)

L&L's Technician



The **Technician** kit comes in a basic and a deluxe version. The basic kit provides fuselage, cores, ply firewall, and basic hardware package. The deluxe kit adds all the necessary wood sheeting and motor mount.

I followed the general procedures outlined in the recent Project Pattern series, and a copy of that would certainly come in handy during construction of the **Technician** or any other pattern bird.

Construction

I started construction with the preparation of the foam wing cores for covering. The retract wells were installed - again, as in Project Pattern - and cores were given a light block sanding to achieve a smooth surface and allow complete adhesion of the skins to the cores. The skins were attached with Hobbykopy Formula 2 glue. I've found this to be the lightest and strongest method when the glue is applied carefully and sparingly. The stabilizer was covered in the same manner and when the epoxy had cured the edges were trimmed and block sanded smooth. The tips, along with the ailerons and their actuating torque rods, were fitted to the wing and then the elevators to the stabilizer. Before joining the wing halves, the retract pushrod holes were cut from the center section to the wheel wells. If you forget this part, you'll have a real problem later.

The indicated amount of dihedral was sanded into the root sections and then it was time to join the panels. I prefer Hobbykopy Formula 2 glue for this operation, as it allows adequate time for alignment and a double check of everything before it's set aside to cure.

Next to be put in the wing were the four hardwood dowels that the hold-down bolts bear up against. A sharpened piece of brass tubing that is the same diameter as the dowels makes a useful tool for cutting through the wing. Have someone sight from the side while you sight from the rear and push down while turning to get a straight and clean hole. Be careful when breaking through the bottom surface, so the wood isn't splintered.

After aligning and gluing in the dowels, I proceeded to finishing the center section joint. A six inch wide piece of six ounce fiberglass cloth adhered to the center section of the wing with Hot Stuff (regular formula)

insured a solid joint. Prepare the stab in a similar manner using four ounce cloth across its center joint.

The fuselage is next. Install the firewall as per the directions. The Project Pattern series is very clear on this procedure and it should be studied thoroughly before proceeding here. Note that the nosewheel retract mount must also be located and the mounting bolt holes drilled prior to the installation of the firewall. Install the tank floor and the wing hold down plates.

The wing is fitted to the fuse and is carefully lined up before drilling for the bolt holes. I prefer to tack glue the wing lightly in place with a little Hot Stuff for this operation. The wing dowels should have been centered drilled with a #7 drill for a pilot hole. This allows you to use the dowels as a drill guide for the wing hold down bolt holes in the fuse-

lage holddown plates. After drilling them, remove the wing, and drill out the dowels to a 1/4 inch clearance for the bolts. This is best done in small increments insuring a round hole. Now tap the plates in the fuse with a 1/4-20 tap. Bolt the wing in place and again check the alignment.

Now it's time for the most critical part in any pattern bird's construction. The installation of the stabilizer must be accurate. No room for close-enough here. The trim woe that come from a misaligned stabilizer/wing will drive you crazy, so perfection at this point is a *must*.

Centerline everything. The wing should be bolted into the fuse and then this assembly must be blocked up on a flat bench until the wing's leading and trailing edges on both sides of the fuse at a specific point on the span are at the same height above the table. Double and triple check this. Slide the stab into its hole (which must be cut with a Dremel tool, using the supplied pattern).

At this point the stabilizer must be aligned in three axes. The only advice I can offer is to have patience and measure everything a number of times. Shim the stab one way or the other using small bits of balsa until the measurements from the table top to the centerline of the stabilizer at both the leading edge, trailing edge and on both sides of the fuselage are identical. Pin a long stick onto the outer fuselage centerline seam near the spinner facing and swing it from one stab tip to the other, and adjust the stab in its seat until the measurements are identical. Alignment from the front for stab tilt is best done with the human eye. I know it doesn't sound too precise, but the eye is more accurate than you might think. Sight across the wing and back to the stab. Now lower your line of vision until the stab appears to "sit" on the wing. The tips should appear to contact the wing at the same point on both sides. Keep adjusting until it is perfect.

When all three axes are perfectly aligned, go take a breather for an hour or so and come back and re-measure one more time. The



B&D mechanical retracts were used all around for the gear requirements. The nose unit has been trial fit and the appropriate cut-outs carefully checked. The nose gear has its own dedicated retract servo.

amount of time I'm taking to explain this should tell you something; this is the most critical part - make it right! When you are sure that the stab is perfectly aligned, tack glue it in place with Hot Stuff. Glue the stab in place permanently with Hobbypoxy Formula 2 glue. The stab should be glued in from both the outside and the inside of the fuse. You can get to the inside seam through the rudder post hole. It's a good idea to clamp the rudder post in position during the mounting of the stab to assure alignment. A small strip of fiberglass cloth along the inside seam of the fuse/stab joint is also a good idea, just be careful not to add too much weight.

From this point on it's easy. The rudder post, lower wing-to-fuse fairing and general sanding should bring the *Technician* to the finishing phase. Oops, almost forgot the installation. You do a complete radio installation before finishing don't you? You should. It would be a shame to mar a beautiful finish just because you miscalculated a pushrod hole or a cable exit and had to move it. Dean Pappas volunteered to explain the installation so I'll turn the typewriter over to him now.

Installation

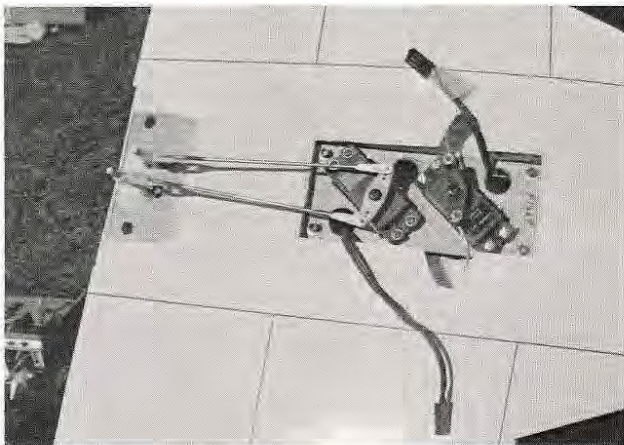
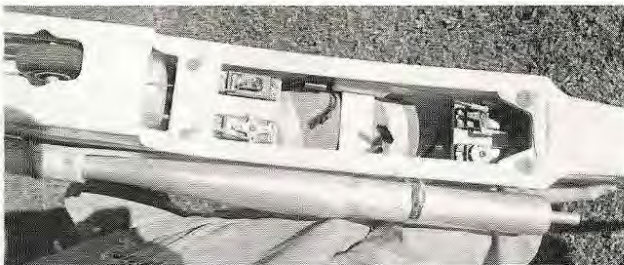
Philosophically it's always been a good idea to do the dirty part of the radio, retract, and engine installation before putting a finish on your pride and joy. It always seems that the movement of the throttle arm requires a little bit bigger of an opening in the fuse than what you had made originally. I hate cutting into a finish, because fuel always gets under the paint - that is if the airplane lasts long enough! It hurts to have a plane that looks like something the cat dragged in just because it has lasted long enough to get well trimmed, and for you to get used to it.

Planning the installation in this case was easy. With the engine installed, and the retracts (B&D mechanicals, my personal favorite) bolted in, all the radio parts were stuffed into the fuse in pretty much the desired arrangement and slid around with the airplane assembled for rough balance. Since two retract servos were planned, it was decided to put two servos at the back of the radio compartment, and two at the front. They are the throttle and nose retract, and the rudder and elevator, respectively. Care was taken to place the rudder servo on the same side as the nosewheel steering linkage, and to pick the direction so that the steering cable could be run along the side of the fuse. The elevator servo direction was also chosen so that the elevator rod ran as close to the center of the plane as possible. A Dave Brown Products fiberglass pushrod was used for the split linkage. Cables were used for the rudder, and while there are quite a few pre-packaged pull-pull arrangements out there, I opted for the cable that comes with the thinnest Sullivan cable and tube pushrod. As can be seen in the picture that shows the completed installation, the *Technician* has plenty of room, allowing you to be neat.

The wing retract and aileron servos were placed in a plywood tray at a 45 degree angle as to take up less room in the middle of the wing. The strip aileron linkage was done conventionally, as was the retract linkage. That's enough for planning; now a few words on the



The wing attaches with four 1/4-20 nylon bolts through hardwood bearing dowels drilled into the wing (above). The tail end gets a little "busy" with pull-pull rudder cables and dual elevator pushrods exiting the rear. Equipment installation in the fuselage (below) needs careful consideration. The two forward servos handle the nose gear retract and throttle; the two rear servos are elevator and rudder/steering.



For quick maintenance, the main gear retract and aileron servos were placed in a removable ply tray. The angular mounting narrows the width requirement and helps prevent servo "rock".

L&L's Technician



Portent of things to come. Marguerite Gargiulo had just accomplished her first R/C solo flight when she spied the *Technician*. She asked to hold it and then announced she was going to fly it. Look out, Kristensen and Hyde.

implementation. Project Pattern will be helpful here. I know, it's a cop-out! One thing worth mentioning though is the use of silicone rubber sealant to glue the servo trays (plywood) into the fuse. RTV or the equivalent really is the adhesive of choice for this. At this point, it's back to Bob for the finish; maybe he'll tell you about the sanding party.

Finish

I used the same method of finishing as outlined in the January 1986 issue of *FLYING MODELS* in the Project Pattern series. Copies of that issue are still available from Carstens Publications. It would be a good idea to pick

up a copy of the February issue, too, as that installment of "PP" covered the surface detailing with simulated panel lines and a how-to on making accurate stencils for special paint effects.

I'll go over the finishing procedure briefly one more time - realizing that you all have your own pet methods at this juncture.

The entire airframe is carefully detail block sanded (foam backed sanding blocks). I prefer to coat all of the wood parts with Hobby-poxy clear (part # H08-8). After this coat has cured it is time to fill any minor nicks or dings and blend the edge of the fiberglass wing center section into the wing. I use Dap

vinyl spackling for this job. It goes on easily and when completely dried, it sands and feathers well. Using this material you can virtually eliminate any trace of the fiberglass tape at the wing center joint.

I use Sig's Epoxilite for any fillets. While not light, the amount used does not add an appreciable amount of weight and the material is extremely strong and crack resistant.

The airframe is now covered with a fine grade of silkspan if a truly grainfree and light finish is desired. You can skip this step, but be prepared to see grain after a season of use. The choice is yours.

Fill the weave of the silkspan with Aerogloss clear dope (Aerogloss sticks to the Hobby-poxy very well). Two to four coats here, please. Now shoot on a coat of Dupont's 1315 Fill and Sand primer. When dry, carefully block sand the airframe with a foam backed sanding block and #220 or #320 paper used dry. Use a mask!

If you are satisfied with the airframe, shoot on the first coat of color I prefer Hobby-poxy paints here. They are easy to match in case of an accident and are readily available at your local hobby retailer.

The first coat of paint gets a thorough block sanding and is followed by a second coat of somewhat thinner consistency. Use high line pressure here for best results (50-80 psi).

Now add the trim, panel lines, stencilled trim, etc. Follow this with a coat of Hobby-poxy clear paint. Let this cure and again carefully block sand, only this time use #600 Wet or Dry paper used wet. When you are satisfied with a flat surface, clean the airplane with Dupont Prep-Sol and recoat using a thinner mixture of Hobby-poxy Clear. The second coat should flow into the sanding scratches and leave a very shiny airplane indeed!

Fanatics take note: this coat can be rubbed for a dazzling finish. Just be ready to expend a bunch of effort and elbow grease.

I'm turning this jewel back over to Dean for the re-installation of the equipment and test flying. Along with it goes a threat to his very existence if he should put a scratch in it!

Final Preps and Flying

Look Bob! If ya wanna avoid scratchin' it, keep it outta my car. Reinstallation of the goodies went quickly; the only interesting part here being the final placement of the battery (an SR 900 mA pack, of course) and the Airtronics receivers. Since the receiver in this set is so small, a brace had to be put across the fuse to hold the wrapped receiver stay put. These two items were placed for final C.G. adjustment, and the throws were set up. The recommended throws were just fine, and allowed enough authority for all maneuvers desired. So it's time to charge the batteries, and set off to the field.

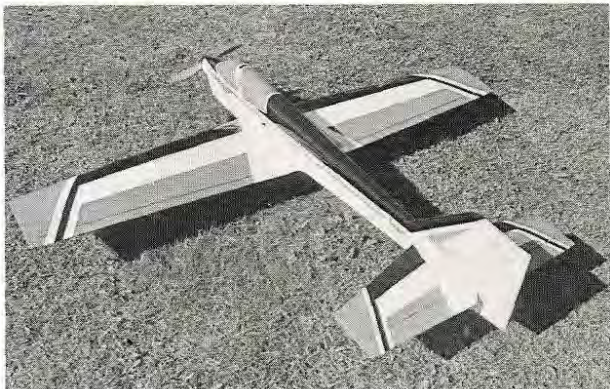
The *Technician* looks like a no nonsense airplane: I am pleased no end to be able to say that it flies the way it looks. The design has absolutely no weakness, and I tried all the flight regimes I could think of. You should have seen Bob cringe! A great many designs over the last few years have had one, or several, outstanding characteristics which had to be played against their weaknesses. A prime example of this is the *EU-1A* which must be the best rolling Pattern plane ever



In both AMA and FAI applications, a Webra .61 Long Stroke was the power choice complemented by a Macs Products tuned pipe and 11 1/4-10 1/4 Yoshioko prop. Fuel used was S&W 7%. Output was 11,300 RPM.

developed, but heaven help the Expert flier who had to do a figure "M" with half rolls in it. Historically, this was caused by the old "elective" Masters Pattern, which allowed airplanes that weren't at least acceptable in all types of maneuvers to be competitive. An airplane that does everything equally well has always been desirable, and with the likely evolution of the schedules, it will become imperative. One particularly impressive feature of the plane was the very axial snap roll that exhibited no real heading change; another manifestation of the same characteristic was the severe nose-down attitude in both inside and outside spins. This is good as it leads to quick and predictable exits. The very powerful rudder was no doubt, the case for both this and the *Tipo* like Stall Turns.

If I might be allowed to pick nits, there is one criticism that I want to discuss: I don't like pipes hung along the fuselage side. The potential exists for this to cause all kinds of strange looping trim problems. Just to make me a liar, the *Technician* did not suffer from any such problems. Gee Bob, ya messed up and got this one straight! If I had my own *Technician*, I would probably do it with an upright engine, and the pipe buried in the top of the fuse, as in the *Arrow*.



Using the techniques outlined in the Project Pattern series, Bob chose several types of paint to yield a glass smooth finish (above). The specific Project Pattern how-to on finishing appeared in the January 1986 issue. Right from first lift-off (below), the *Technician* proved a no-nonsense airplane. Part of the excellent all-around performance can be attributed to its relatively light weight, 7¼ pounds.

Vital stats

The *Technician* is available from L&L Model Products, 1188 W. Kemper Rd. Cincinnati, OH 45240. It features a wing span of 64 inches with a wing area of 704 square inches. Mine tilted the scales at 7¾ pounds which is on the light side. A Webra .61 Long Stroke was the power choice and proved to be ideal for both A.M.A. and F.A.I. applications when coupled to the 11¼×10¼ Yoshioko glass/nylon propeller. A MAC tuned pipe was set at 15¾ inches to the high point, yielding an RPM of 11,300 on S&W 7% fuel.

Summary

Our thanks go to Carl Lovins for the opportunity of reviewing this exceptional pattern bird. The feelings I first had about the *Technician* at the 1983 Nats have been thoroughly reinforced since flying one myself. This is one you can win with. 

