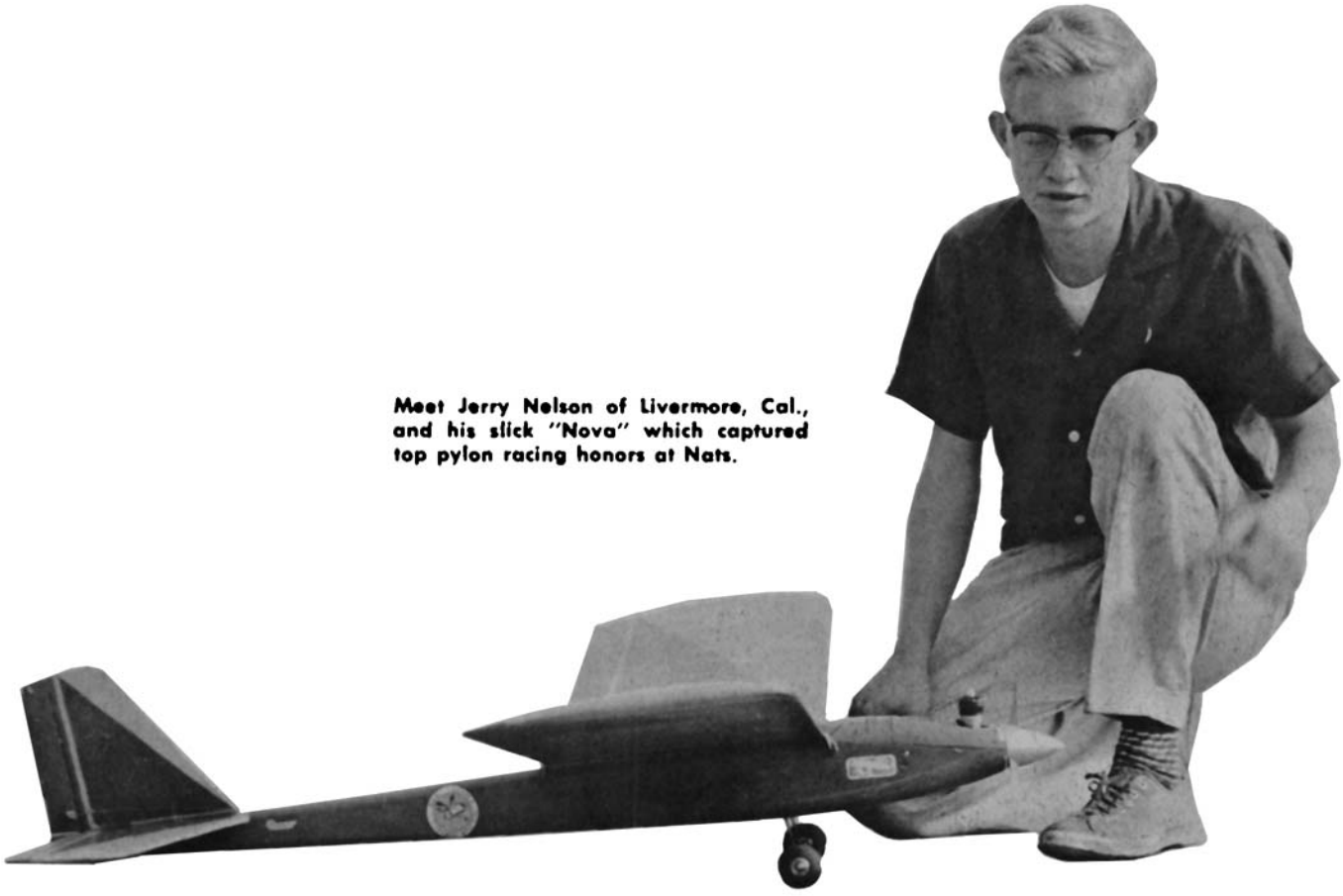
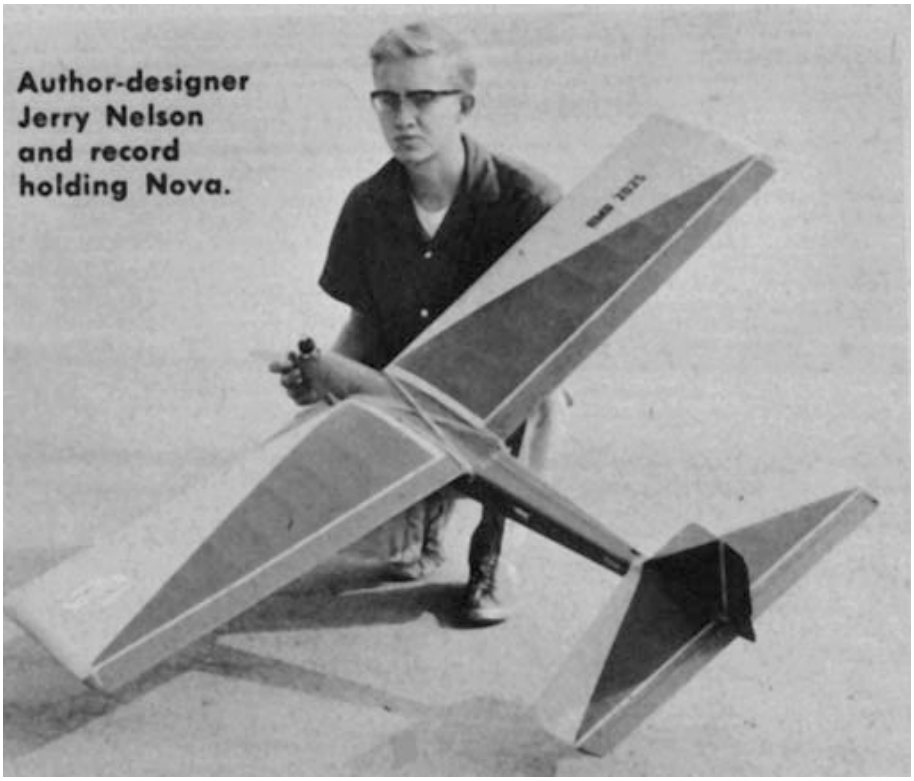


Meet Jerry Nelson of Livermore, Cal., and his slick "Nova" which captured top pylon racing honors at Nats.

Jerry Nelson's NOVA—Championship Radio Controlled Pylon Racer



Author-designer Jerry Nelson and record holding Nova.

AMERICA'S CHAMPIONSHIP RADIO CONTROLLED PYLON RACER: NOVA
Designed by "Jerry" Nelson

• The Nova design which Bill Deans and I flew to first and second place (respectively) in AMA pylon at the last Nationals is based on the aircraft I entered in the '57 Nats. The original has since gone thru several changes; the final configuration is presented here.

Nova placed first in every major AMA pylon event entered in the West Coast as of the time this was written and holds the AMA record for pylon. The record was first set by Bill Deans at the '59 Nationals, later by my-self at the F.A.S.T. club pylon record trials held last November. The record was 44.28 MPH. Nova also racked up a West Coast record for open pylon with a speed of 44.5 MPH.

Nova is a very functional design without any frills or complex construction features. The fuselage height and width were determined by the size of the Orbit 8 receiver and the Bonner Duramite servos. Since Nova will do about 70 MPH on the straight-away, stream-lining becomes very important. The engine is cowled in partially and the nose is faired into a 2" spinner. The stabilizer is glued to the fuselage to eliminate drag from hold-down dowels. The landing gear is 3/32 wire. The gear isn't too sturdy, but this ship wasn't designed to do touch-and-go landings. The only extra drag-producing items are the push rods and control horns, and the wing hold-down dowels. The latter are external for ease of assembly and to let the wing knock-off in a rough landing. The dowels could be installed inside the fuselage.

The wing section is 7% thick, flat bottom, with the maximum camber position at 40%. There are two reasons for the choice of the flat bottom section. The first is for ease of construction. The second stems from a theory of mine. I believe that the curvature of a very thin airfoil section as used in model aerodynamics is not very critical. So instead of a hard-to-build semi-symmetrical section, why not a simple flat bottom section? The results seem to prove my theory.

Nova incorporates a very large fin for good directional stability—very beneficial for pylon racing. The rudder action is just like an aileron action. When the rudder is applied the ship will bank and then turn. To do a pylon turn you bank the ship with the rudder just as if you had ailerons, and then give "up" elevator to turn the ship around. More on flying latter.

The elevator is very small with little movement because of the ship's zero-zero decalage and high speed. The stabilizer is quite large to provide excessive longitudinal stability for an airplane that will fly "in the groove."

An engine speed control is not used. An engine cut-off is employed instead. There are several reasons for selecting the shut-off control. The actuator can be very light in weight. An engine using hot fuel doesn't run in low-speed very well. A throttle usually reduces the high speed of the engine. The ship probably wouldn't settle very good on low-speed because of its clean design and light weight.

The shut-off is built from an old escapement. Detail drawing shows its basic construction. When the shut-off is operated, the air supply to the tank is cut off and the engine will take about 7 seconds to quit. The advantage of this type of shut-off is that you cannot kill the engine by mistake. You must hold the control for an extended period.

There are a few comments regarding trimming and flying the Nova which I feel are important. Adjust the ship so that under full

power it will fly level or have just a very slight climb. Put down-trim in the elevator to kill the climb. A Nova built according to the plan will usually require about 1/16" down-trim in the elevator.

There is an optimum position for the up elevator limit. The pylon turn is made by banking the ship over about 45 degrees and then giving full up elevator to finish the turn. The amount of up elevator is determined by trial and error. You can adjust the travel by the length of the control horn. If you have the ship adjusted so that you have to hold full-up on the turns, you will find that all the turns will be a constant radius. If the ship turns the same each time, you can judge the pylons very accurately. The ship should not slow down in the turn if it is properly adjusted.

Assuming you have the ship adjusted properly, let us go through a typical pylon race. Assume that the wind is blowing about 5 to 10 MPH parallel to the pylon course.

After you get your engine running you can check your shut-off to see if to see if it working properly. When the shut-off is operated the engine will start to sag immediately. Release the shut off and the engine will pick up again. The starting flag drops and your helper re-leases the ship. Nova will accelerate rapidly. It will stay on the ground unless you lift it off with a tap of up elevator. I generally let my Nova stay on the ground for about 150' before I lift it off. About 20' to 30' is a good altitude to fly at. When going up wind you probably will have to hit a tap of down elevator. Have your helper tell you when your flagman signals for the turn. You won't have time to look at your flagman and your airplane at the same time.

When it is time to turn, hold rudder until the ship banks about 45 degrees and then hold full up elevator for about 2/3's of the turn. The last 1/3 turn is done with the controls in neutral. The up wind turn will be tighter than normal because of the wind effect. When you are lined up for the downwind leg, hit opposite rudder. The ship will recover rapidly and the nose will come up slightly. A short tap of down may be required at this time. Normally you won't have to correct for direction or altitude going down wind if you made the turn properly.

The down-wind turn is done the same way. Your helper tells you when to turn. Don't forget that the wind will cause the down-wind turn to be slightly larger than normal. Usually a tap of down is required coming out of the down-wind turn. After you finish the race point the ship into a climb and shut the engine off. The glide will be very fast due to the down trim in the elevator. Don't be afraid to flare out close to the ground or make a slow and low turn close to the ground because the ship is very stable. Matter of fact, Nova won't even spin.

Close teamwork among your assistants and yourself is necessary. One helper must tell you when to turn. You have to fly the model. Remember the speed turned in will be determined by the kind of turns you make. If you make good turns you can out-fly almost any design on the pylon course. Don't let those .59 and .60 jobs scare you out of a race. These ships may go faster, but Nova will make up the speed difference with its tight turns.

Nova can be a good Sunday flyer. Take out some down trim so it will fly slower and have a normal climb. She will do every stunt in the AMA pattern except for the spin. The outsides are quite tight even with the flat airfoil section. Here's proof of my theory again. The rolls have a constant rate of rotation. Simultaneous operation is required for many of the stunts, however.

Nova is a good beginner's multi ship if a few changes are made in the design. A 15 engine or a low power 19 should be used. A stronger landing gear would also be required. A Live Wire Champion type of gear would be ideal. The wing area could be reduced slightly. One rib less on each panel works out quite well. A bubble canopy can be added for appearance. Nova will turn out light so it can be easily flown by a beginner.

Nova was designed to be flown with a reed type receiver. If any other control system is to be used, you are on your own! Personally I don't see why a proportional system would give any trouble. I would think that the Galloping Ghost type would work fine. One could certainly save quite a bit of weight with this system.

I would welcome any comments regarding the design be they good or bad. Write to Gerald Nelson, c/o American Modeler.

Equipment Used In Nova:

Orbit 8 or 6 receiver
Bonner Duramite servos
Bonner control horns;
Ritchie Battery pack
deBolt 2 oz. tank
K&B 19 engine
Cox racing fuel
Veco combat glow plug
2" Veco needle nose spinner
2" K&B wheels
silk covering.
Weight of model, 4 Ibs.
Prop, 9-5 Top Flite
Leininger 8 transmitter (not commercial built).