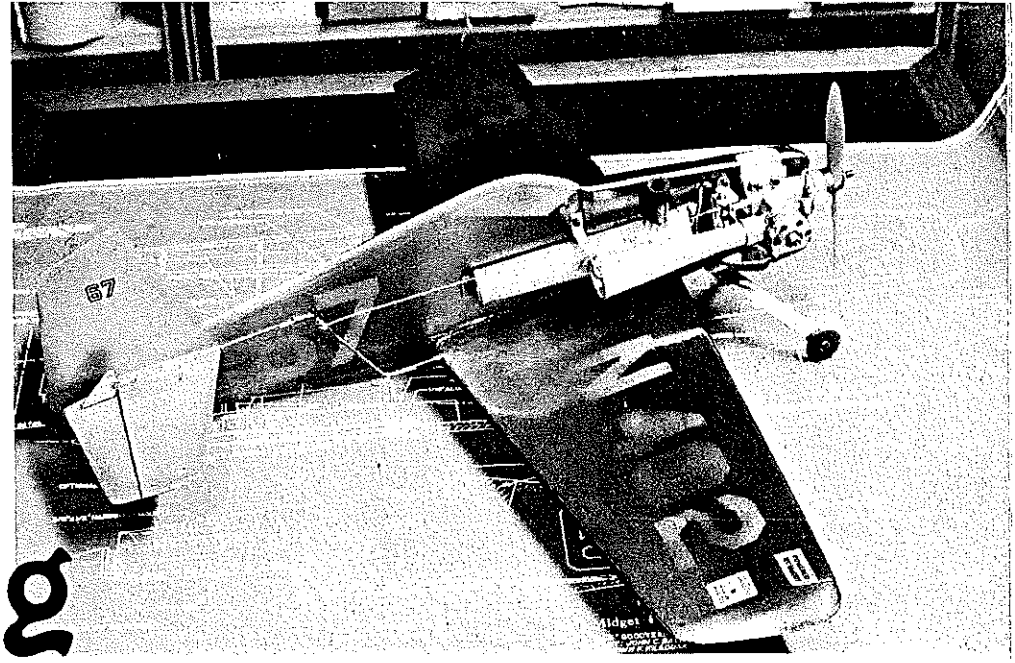

Right: Rear view gives feeling of proportions of the low-wing design. Note how pushrod is reenforced by additional piece of wire aft of top bend; also attachment fuel shut-off trip wire.

John C. Ballard

Midget Mustang

To be competitive in Goodyear requires more than just a good airplane. Here are the total system details used by the 1975-1976 Nationals winner.

DURING THE late Summer and Fall of 1974, Goodyear racing passed through an important milestone. Prior to that date, competitors spent the majority of their effort with liner and piston fitting on the Rossi, or trying to squeeze an additional 1000 rpm's from the dependable Supertigre. The 1974 Nationals saw the first racing competitors with tuned exhaust extensions. Some "horns" were short in length and large in diameter, while others were long and slender. For the most part, their actual performance boost was limited to terrifying the competition with noise and visual adornment. The eventual first place winner was, in fact, running "open stack."

During our long trip home, John Kilsdonk and I decided we should investigate using the so called "horn." We evaluated several different megaphones. These included the standard Rossi model, along with several others that were fabricated based on technical data available for small 2-cycle engines used on motorcycles and go-karts. Obviously, we were favorably impressed with the power gain.

The next decision was centered around which model to use. The Falcon models we had been flying were not adaptable for megaphone application without some extensive modification. We pursued the available 3-view drawings for a more suitable model. Kilsdonk came up with the Zipper, which I built and used to win first place at the King Orange Internationals in Jacksonville, FL over the 1974 Christmas holidays. Although the Zipper is a fine flying model (I still use it for my back-up model), I wanted a more original model for myself. Thus, I came up with the Mustang presented here.

The Mustang is a very sleek, low-winged model, which gained much popularity as a full-scale racer, and is a natural for control-line racing. This particular model has been the most successful I have ever had. With it, I have enjoyed great success. During the four month Midwest season it won eight first places and one third place in ten contests. Additionally, it placed first at the 1975 Nationals in Lake Charles, and set an unofficial record at the 1975 KOI with a 5 min., 58 sec. time for the 160-lap race.

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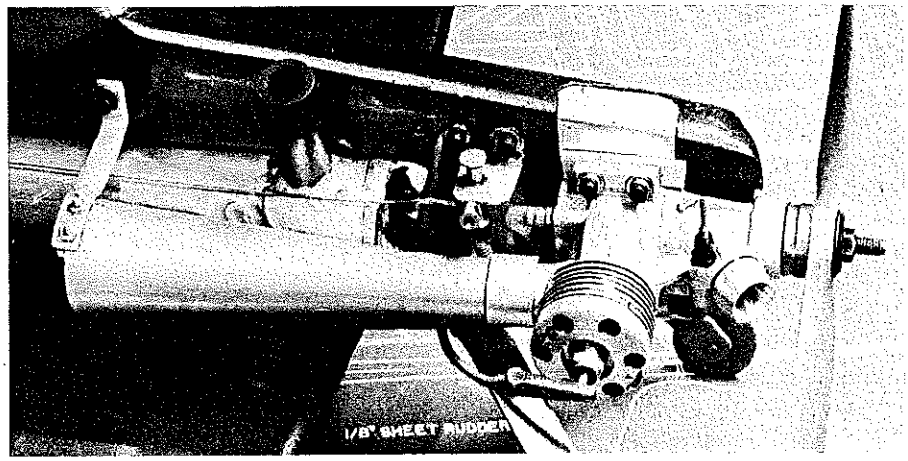
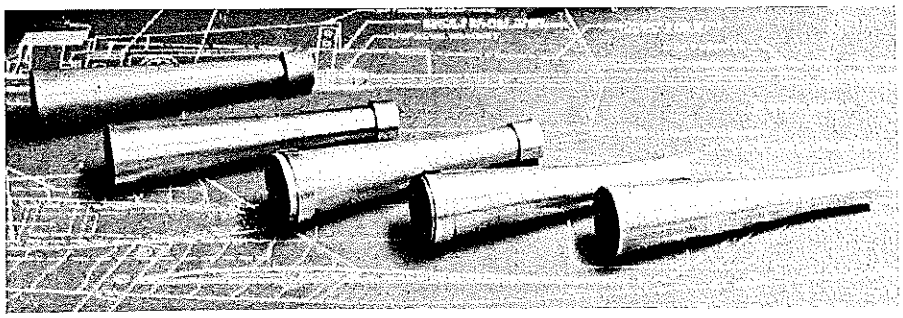
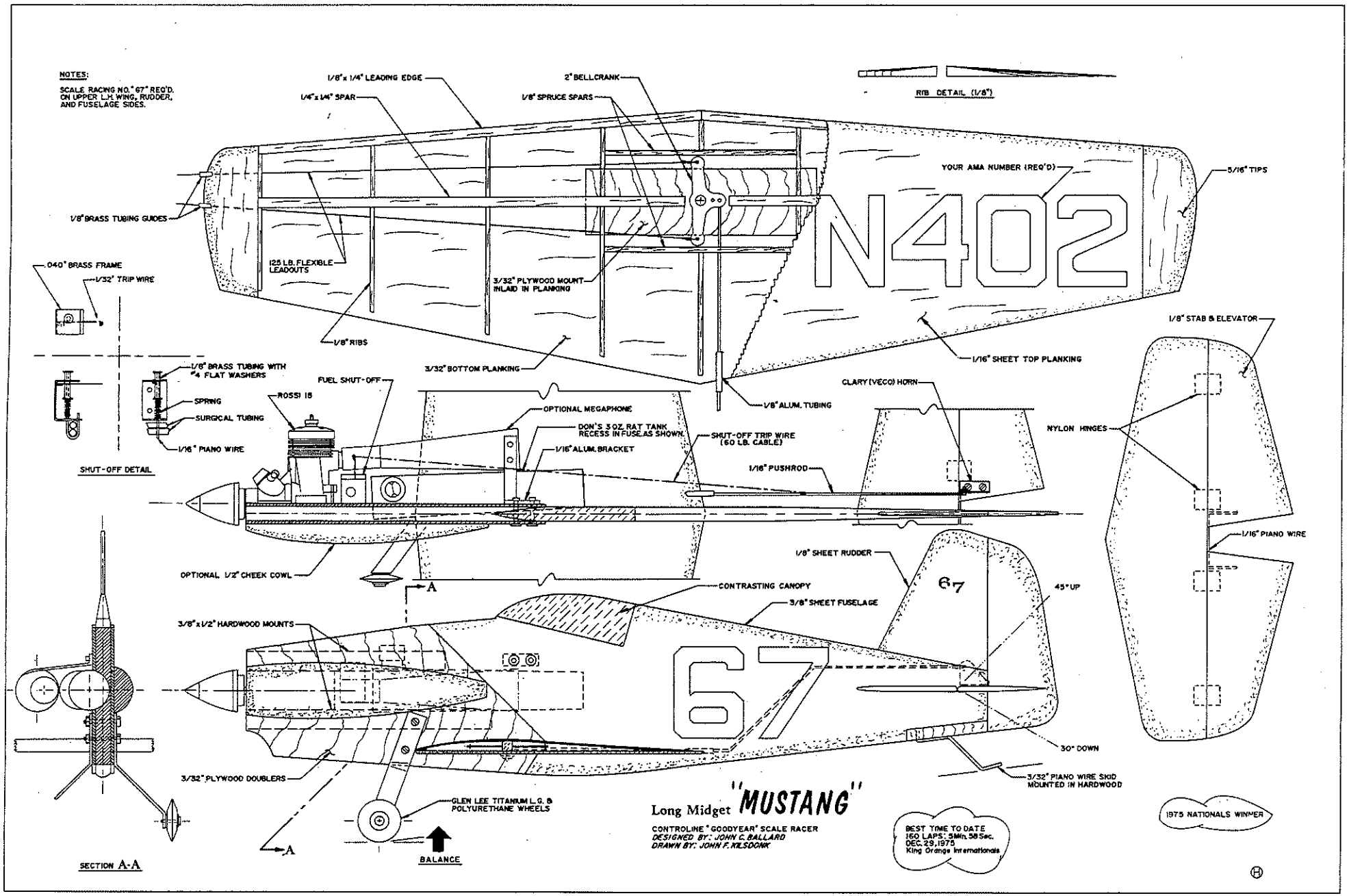


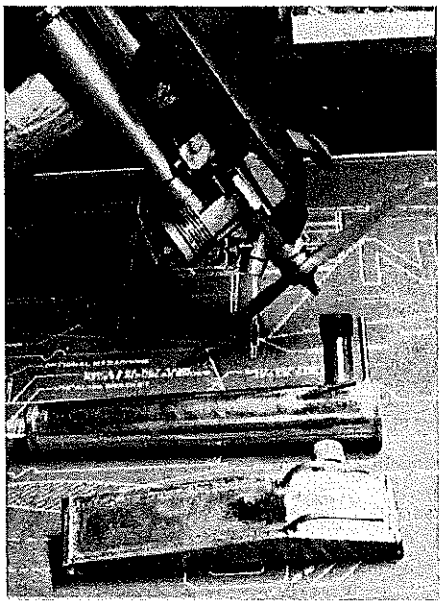


Above: Closeup of 'power section' shows spacing between the engine, fuel shut-off and the tank. Note the tank fits in a recess cut in fuselage, and the megaphone mounting bracket.

Left: Modeler must try several different combinations of engine, horn lengths for maximum performance. Each horn in pic is cut 1/2 in. shorter than preceding one from left to right.


NOTES:
SCALE RACING NO. "67" REQ'D. ON UPPER L.H. WING, RUDDER, AND FUSELAGE SIDES.
1/8" x 1/4" LEADING EDGE
1/4" x 1/4" SPAR
2" BELLCRANK
1/8" SPRUCE SPARS
RIB DETAIL (1/8")
YOUR AMA NUMBER (REQ'D)
5/16" TIPS
1/8" BRASS TUBING GUIDES
125 LB. FLEXIBLE LEADOUTS
3/32" PLYWOOD MOUNT INLAID IN PLANKING
N402
.040" BRASS FRAME
1/32" TRIP WIRE
1/8" RIBS
3/32" BOTTOM PLANKING
1/16" SHEET TOP PLANKING
1/8" STAB & ELEVATOR
1/8" BRASS TUBING WITH #4 FLAT WASHERS
SPRING
SURGICAL TUBING
1/16" PIANO WIRE
SHUT-OFF DETAIL
FUEL SHUT-OFF
ROSSI 18
OPTIONAL MEGAPHONE
DON'S 3 OZ. RAT TANK RECESS IN FUSE. AS SHOWN.
1/16" ALUM. BRACKET
SHUT-OFF TRIP WIRE (60 LB. CABLE)
1/8" ALUM. TUBING
CLARY (VECO) HORN
NYLON HINGES
1/16" PUSHROD
1/16" PIANO WIRE
OPTIONAL 1/2" CHEEK COWL
A
1/8" SHEET RUDDER
CONTRASTING CANOPY
3/8" SHEET FUSELAGE
45° UP
67
3/8" x 1/2" HARDWOOD MOUNTS
30° DOWN
3/32" PIANO WIRE SKID MOUNTED IN HARDWOOD
3/32" PLYWOOD DOUBLERS
GLEN LEE TITANIUM L.G. & POLYURETHANE WHEELS
A
SECTION A-A
BALANCE
Long Midget "MUSTANG"
CONTROLINE "GOODYEAR" SCALE RACER
DESIGNED BY: JOHN C. BALLARD
DRAWN BY: JOHN F. KILSDONK
BEST TIME TO DATE
160 LAPS: 5 Min. 58 Sec.
DEC. 29, 1975
King Orange Internationals
1975 NATIONALS WINNER

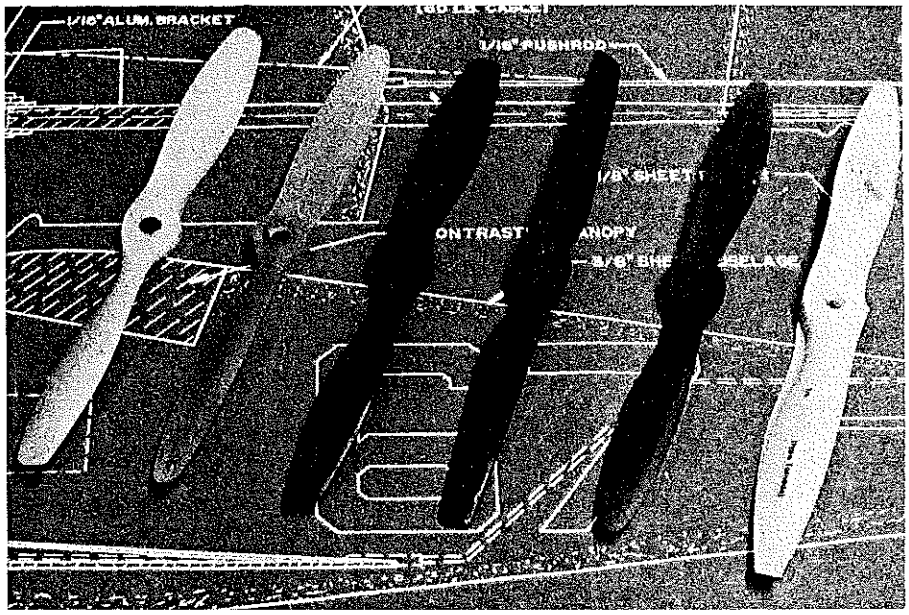
The purpose of this article is to acquaint the control-line Goodyear enthusiast with this excellent performing model, engine, shutoff, propeller, megaphone, and fuel tank systems required to produce competitive results.



Left: Round tank, top, Don's 3-oz. 'rat race.' Below it, one made to specs in Aldrich article Oct. '75 issue. Aldrich tank mounts flush, does not require fuse cutout—allows megaphone to pass between feed lines and pressure tube.

Midget Mustang

Below, L to R: Bartels prop per article—particular prop copy press-wood Tornado; Tornado 7 x 6 plastic, also per article; copy of Tornado 7 x 6 press-wood utilizing carbon fiber reenforcement instead of fiberglass filament; next, copy of Australian TR prop. Both these carbon fiber modified props very rigid, hold true pitch within high rpm range. Second from right, typical fiberglass filament Tornado press-wood copy. Extreme right, unfinished Bartels. Type, selection, important when blending power, rpm range with type, weight, of airplane.



Construction

Wing: The basic construction is fairly straight forward. The plans should be complete enough for anyone to construct a good performing model.

I find a set of light cardboard templates useful in the layout and placement of the wing, fuselage, engine, tank, and motor mounts. Critical areas include care in preventing the 3/32" bottom sheeting from warping during rib placement and top planking. The 1/8" spruce spars, as shown on the plans, are necessary to prevent wing breakage during high speed shut-offs. The optimum leadout line rake can be adjusted by taping the wing, tail, engine, and tank in place and moving the leadout position until the fuselage hangs perpendicular to the leadouts. The location shown on the plans is what I have found to be the most suitable.

Fuselage: Care must be given in the selection of the wood used in the fuselage construction. A soft or flexible piece can cause engine vibration or breakage between the wing and stab section during rough landings. If you plan to use a Don's 3-oz. rat race tank, take care that the tank is installed with proper spacing to nestle between the hardwood motor mounts. Use a good quality 3/32" plywood for fuselage doublers, and 1/2" hard balsa for the optional cheek cowl.

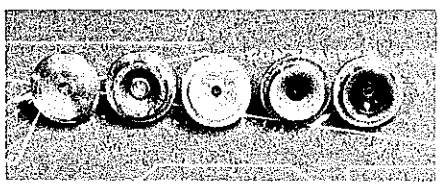
Stab and Elevator: Straight and hard balsa should be used in the construction of the elevator and stab section. After assembly, the pushrod wire is bent at a 45° angle at two points. It is important that an additional piece of 1/16" wire be bent and soldered in the section between the angles to reinforce the bends. This prevents the pushrod from flexing, due to wind pressure on the elevator.

Fuel Shutoff: The fuel shutoff as shown is easily constructed from brass shim stock. The main plunger wire is made from 1/16" piano wire with a length of 1/8" brass tubing soldered between two No. 4 flat washers. The brass tubing is notched for the trip wire. This type of construction is very durable, as the notch for the trip wire does not go through the plunger wire.

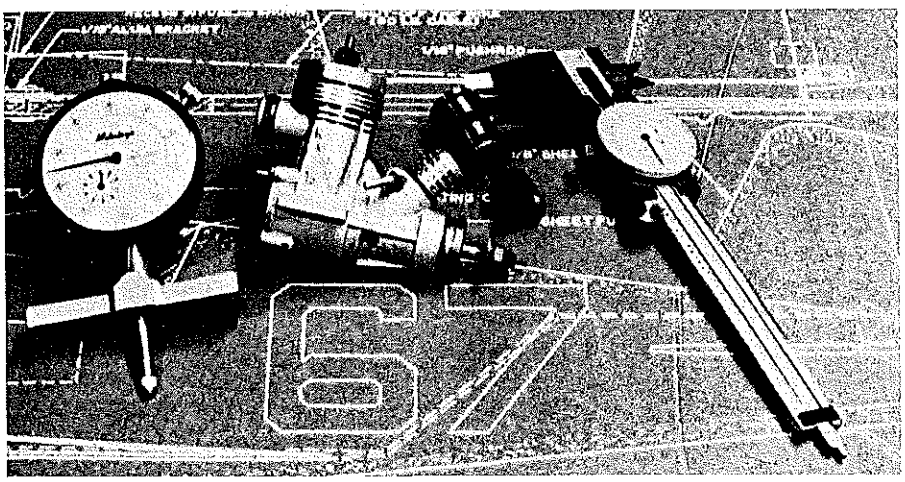
I set up all of my models for "pull" type shutoffs. This requires the control horn to be mounted on top of the elevator and an external 60-lb. test flexible cable linking the pushrod and the shutoff. All connections should be soldered well.

Tank: The construction plans show a Don's 3-oz. rat race tank. The only problem which develops with this is that the fuselage must be recessed around the tank mounting area to clear the megaphone. Since the tank must remain pressure tight, I recommend re-soldering the fill tube, lines, and seams. The only other modification required is to lower the pickup tube exit approximately 1/2" at the front to clear the megaphone. In his column on racing, George Aldrich showed a tank for the megaphone equipped profile Goodyear racer, which does not require the fuselage to be cut out. You can observe the drawing in George's column (Pg. 3, Oct. 1975). The pickup and pressure lines are spaced to allow the megaphone to pass between them. Either tank will give you a consistent engine run from a full to an empty condition.

Engine: The term often used by speed fliers is "it's whats up front that counts." Success in competitive racing requires an engine set-up that develops the necessary model speed and pitting dependability. The Rossi .15 can be modified to produce both of the necessary requirements. This is not to say that there are not other production engines or "new releases" on the horizon that may not be used. However, at this juncture in time, the Rossi appears to be the best choice. The standard "normal" engine is expensive, at times in short supply, and replacement parts are somewhat difficult to acquire. To this end, I would

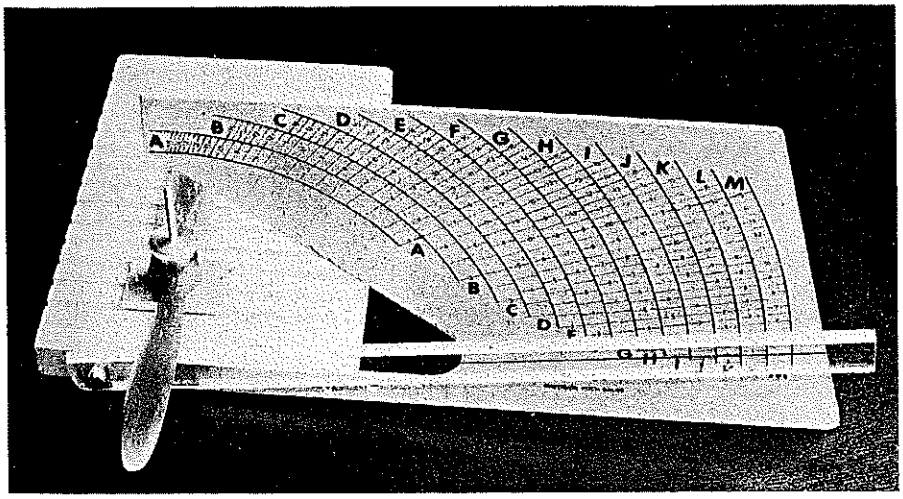


No. 4 Rossi head, center, has best overall performance. Two heads, left, have less angle to chamber—less head volume—with resultant rpm increase. But, with plug lowered into chamber, additional compression results in plug failure after one minute running. Two heads, right, have larger cavities, result in much less compression ratio; are very easy on plugs, but 500-600 less rpm.



Left: Instruments necessary to correctly measure timing. Left, dial indicator depth micrometer, right, dial indicating caliper, here measuring liner flange to top of exhaust. Micrometer is used to measure top dead center, bottom dead center and stroke of engine. The caliper is for measuring exhaust and intake timing when referenced to top of cylinder flange. Also can be used to measure head to piston clearance.

Below: Important that prop be balanced and pitched as accurately as possible. Pitch gauge shown is variation of Kilsdonk's gauge in Aug. '75 issue. All props—wood, fiberglass, plastic, are received with pitch variations and varying blade lengths. Proper balance, pitch, increase performance, prolong shaft bearing life.



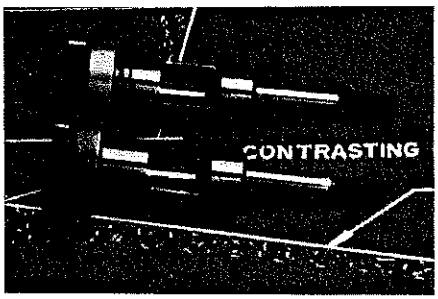
Midget Mustang

recommend that an individual purchase a "re-worked" engine from a competent rework specialist. There are two in my area that I am familiar with: Mr. Doc Anderson of Anderson Aero Units, 4804 Janet, Sylvania, OH 43560; and, Mr. George Aldrich of Aldrich Products, 1317 St., Marie, Mission, TX 78572. You may, of course, want to modify your own engine, but a miscalculation or slip can be very costly.

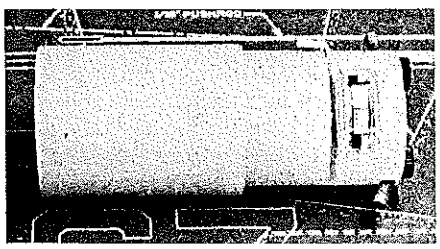
Engine Re-work: Modification in several areas of the Rossi will produce a slight performance gain in each. The accumulative result will be a 2000-3000 rpm gain, yet retaining the necessary dependability.

Shaft Timing and Bearings: It is important that the crankshaft spin freely when assembled in the case with a prop drawn tightly against the thrust washer. Most of the crankshafts received, open at 40° ABC, and close about 55° ATC, or 195° total duration. Opening the closing side to 62° ATC for a total of 202° duration will improve performance. You can go further, but the needle valve adjustment becomes extremely critical, and frequent crankshaft breakage may result.

Piston and Liner: The single most important factor in producing a "strong" Rossi is the piston and liner fit. The liner must be measured for roundness and taper, and should taper approximately .0005 until the last 1/8" before top dead center. I hone the liner round and then bake the piston at 450° F. for 3 to 4 hours. Usually, after the piston has cooled to ambient temperature, it will have grown enough to require a hand lapping fit to the liner. Ideally, the piston should drop free to bottom dead center from 1/8" below top dead center. If you plan to utilize the power boost of the megaphone, the exhaust timing of the liner must be modified prior to final lap fitting. A standard timed "normal" has about 143° of exhaust timing. To optimize the megaphone, the exhaust must be filed to approximately 155°-158° duration. To utilize a full length tuned pipe, Rossi modifies the "pipe timed" liners to approximately 162°-168°.



Crankshafts: Top one is stock, bottom one opened as per article specs. You may not be able to see it clearly but corners of the crankshaft and fuel flow passages are radiused slightly while opening and closing sections of the shaft are sharp and well defined. Author recommends that builder purchase "reworked engine" from a specialist and gives sources.



Dependable battery with plug meter, not cumbersome, easily attached to arm, is necessary. Prototype Glo-Bee 'Fireplug' shown. Note: positive and negative hookups, right end, top and bottom. Amp meter clearly visible, and right-angle arm which comes from slot (rheostat to control voltage). Voltage to plug has to be increased or decreased with climate changes.

Head Configuration: Rossi produces several different head designs and each is numbered. I use the Rossi #4 drilled and tapped for a standard glow plug. I have tried numerous designs, but in my high humidity Midwest area, this design is as good as any. The only glow plug that I have found that will withstand severe racing conditions and high nitro is the "Glo-Bee," manufactured by Fusite Division of Emerson Electric Company.

Megaphone: The standard Rossi megaphone and adapter can be used as a starting point. Cut the adapter that comes with it to 5/8" long and flare the inside diameter slightly. Slide the megaphone back and forth on the adapter while operating the engine with a prop that produces approximately 21,000/22,000 rpm's full bore. A rpm gain of 1500/2000 should indicate the approximate ideal length of the megaphone. This length is usually about 4⅜" to 4¾" from the front of the adapter to the rear of the "horn." A 1/16" half-soft aluminum bracket must be made to hold the megaphone securely to the model. John Kildsonk has made some tapered aluminum bands which slip over the megaphone and lock at the very base of it. These help prevent the "horn" from cracking at the point of attachment.

One final note for those of you who

continued on page 90

Midget Mustang/Ballard

continued from page 62

might want to produce your own megaphone. A thinner wall of .012/.022 on the "horn" creates more resonance and consequently yields slightly higher performance.

Propeller: Selection and proper sizing of the propeller can make or break a Rossi. The two brands I have worked with are the Bartels 7×6, and the Kelly 7×6. Bartels are difficult to acquire, but this is not so with the Kelly. Aldon Kelly produces six different types of 7×6 propellers in either fiberglass or carbon fiber. His address is Kelly Products, Inc., P.O. Box 38, Western Springs, IL 60558. The prop I use measures 6⅞ × 5½". Different engines or atmospheric conditions may require some modification. Be sure to carefully balance your prop prior to mounting the engine.

Re-Starting During Pit Stops

The problem of consistent re-starts during racing conditions is often caused by a faulty or weak battery. We have had some difficulty finding a dependable battery with "plug meter" which could easily be attached to the arm and was not cumbersome. Re-starts during cold or rainy meets were often difficult. We had no way of increasing or reducing the voltage to the glow plug which changes with the climate. The Fusite Division of Emerson Electric Company has produced a compact 2-volt battery pack that contains a rheostat to match voltage to the glow plug requirements, and includes a built-in "plug meter." The unit is small and packed in a polypropylene case.

Racing is a team event. One man cannot do it alone. I would like to thank my pit man, Gary Fentress, for his hard work and thorough preparedness which has enabled the system presented here to be a consistent winner.

If you have any questions or comments, my address is: 10102 Kimblewick Drive, Louisville, KY 40223. Good luck, and good racing.

Nats/CL Navy/Perry

continued from page 29

a new Junior record of 341.1 in winning Class I. Jim Potochnik's second-place score of 336.3 was also high enough to have placed in the Open class. These two Juniors are experienced competitors and should have many years of successful Carrier flying ahead of them.

Open Class I was won by Bill Boss at 345.5 with a Guardian. Competition was keen in Class I with places changing throughout the day. When it was all over, only 10 points separated first and fifth place. Dick Perry was first in Class II with a 205 sq. in. MO-1.

In Class II, the winners were ranked by high-speed scores because of relatively small variations in low speed (4 mph in second through fifth place). In Class I, the increased emphasis on low speed under the new scoring system, and a greater spread of low speed scores, made high speed less dominant in determining placing. The speeds recorded by the trophy winners in Class I and II ranged from 95 mph to 120 mph for high and 23.7 to 34 mph for low with one speed of 41.7 in Class I.

In Profile Carrier, the Aloise family took the honors again with Carlos A. (Senior winner in 1975) winning in Open and Richard winning Junior again this year. Carlos E., the 1975 Open champ, entered, but did not fly. Senior Profile Carrier was won by Otto Graf.

Two topics of debate surfaced in Profile Carrier this year—the cost of engines and the procedure for slow flight. The newer engines being developed for Profile Carrier are rather expensive compared to the standard engines of a few years ago. There is some concern that the increasing cost of the newer specialty engines and the increasing number of modified racing 40 engines appearing in Profile Carrier will be bad for the event. While there were some of these engines present at the Nats, many of the contestants who brought them didn't use them, choosing instead to run more conventional engines.

The excitement over slow flight centered around Dick Davis and his modified Mongoose. Dick has become quite good at hanging his Mongoose on the prop at attitudes greater than 60° nose high. The resulting low speeds on three attempts were under 10 mph. Dick lost forward motion on the first attempt and missed his landings on the two official flights, preventing him from winning first place and setting a new record.

Dick's slow flight technique is quite legal, and he is to be admired for his piloting skill, but one must wonder what adverse effect such a development could have on the event. Many opinions were expressed for and against, but the predominant feeling seemed to be that the *flight* portion of low-speed flight should be emphasized.

There were many old and well-used models in all classes. "Wait until next year," was the dominant theme whenever anyone was asked about their plans for new aircraft. If all the plans become reality, next year's Carrier events should be full of surprises.

Nats/RC Pylon/Hager

continued from page 15

Kent Nogy placed second and we had a fly-off between Bill Preis and Bruce Richmond for third. Third was determined when Bill Preis made a high-speed touch-and-go coming around #3 pylon. Bruce Richmond took third and Bill Preis ended up fourth. The fast time in Formula I was 1:19.9, turned by Bob Brogdon.

Best Junior-Senior trophy went to Bruce Richmond. Hmm. And where have you heard that name? Bruce and Brian are brothers. Bruce finished third place over all. Nice going guys. It looked like the Richmond brothers will have to rent a trailer to get all of their trophies home. Watch for them next year.

What a week of racing! This would not have been possible without the help of a great bunch of guys and gals that worked so hard. I want to take this opportunity to thank the 60 people that helped make pylon racing a success at the 1976 Nationals.