A few new theories advanced here:
.45 to .60 engined Stunt Controline. . .

by Larry Scarinzi

▸ The plane . . . the engine . . . the pilot . . . trim, adjust and *work*. These are the necessary ingredients for a successful competition stunt model.

It was about two months before the Dallas nationals when the old yearning to attend this annual modelers convention came back. A casual comment to 17 year old Barry Simonds of Rich's Hobbytowne brought an enthusiastic reply that he would also like to attend. Did he really mean this? Would he actually drive the 1,800 miles to Dallas to fly in a model contest and even worse—in my old 1953 Pontiac!! To be sure he was serious I explained how long a trip it would be and that he would be flying against the nations best with an airplane that

THE "BLUE-ANGEL"

FULL SIZE "TIMELY PLANS" AVAILABLE AS ADVERTISED

Fredrica Anderson, who's hubby tied for Senior Stunt. Bottom view of the ship plugs for Navy.

. . . 3rd spot in Open Stunt at the '64 Nationals

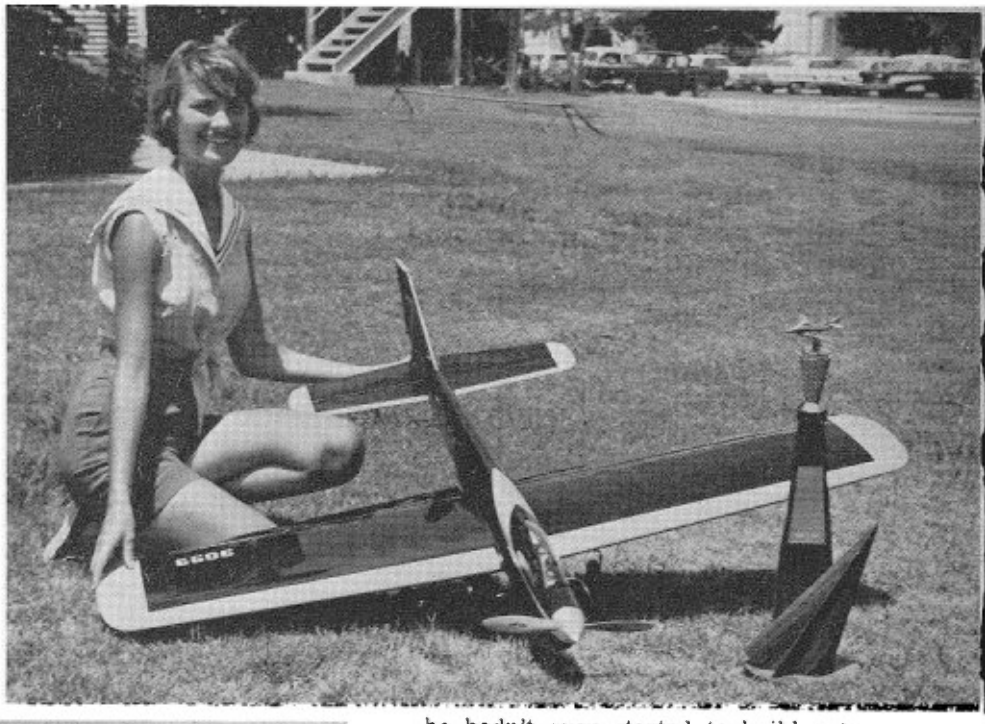
BLUE-ANGEL

. . . continued . . .

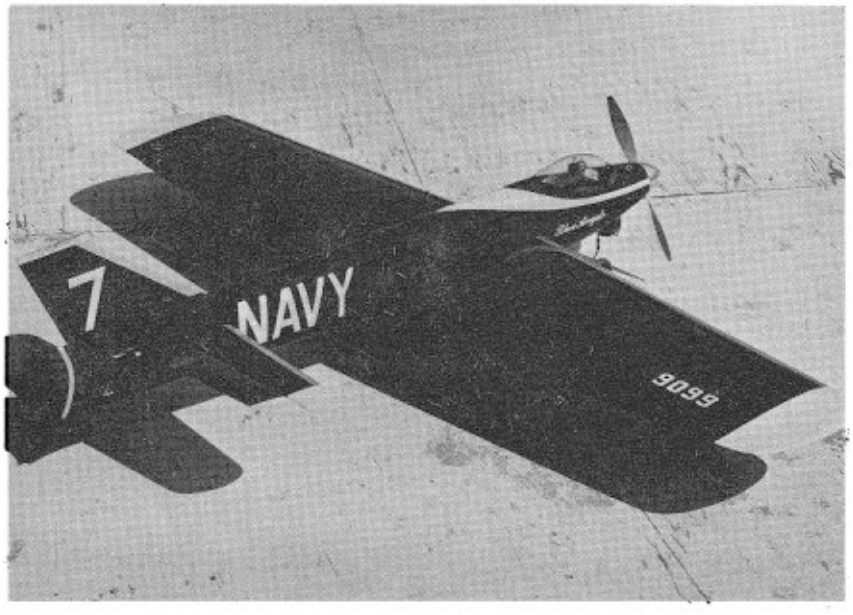
Only a big engine can provide big torque. The engine is tuned for stunt flying. A neat nose.

Mrs. Freddie Anderson graces the scene. "Blue Angel" is a potent contest aircraft, different.

Note soft-sprung gear for smooth ground rolls. Larry sees no need of 1000 squares of area, uses the restrictor in intake, 608 sq. inches.



"Ducharme Hangover", a tail end theory that is aimed at wobble-free corners on tight turns. A bit more on this in text. Superb finish on it.



he hadn't even started to build yet. When he pondered his answer I also reminded him that he could expect no help from me as I too had a new model to build. Barry replied that he could finish the model in time and would still like to go. His humble sincerity convinced me that I now had a traveling companion. Little did I know that we were nurturing the next Senior National Stunt Champ. Barry proved to be the "Dark Horse of the East". We were now both obligated to each other to complete our models and make the trip. (1800 miles in a 1953 Pontiac!! — kid must be nuts!!)

Now came the problem of designing a new model that could justifiably claim some of those hard-earned appearance points and still turn in a good pattern. I have always maintained that a good big airplane will outfly a good small airplane. I also feel that

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The ship was designed around a .59 mill. It is suitable in size for a powerful .35 powerplant.

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the limitation of this theory is the point where the models length or size is so great that it just takes appreciably more room to fly through maneuvers properly. The finished product had to have ample wing area to keep the wing loading low enough to safely execute the A.M.A. pattern in average "Texas" wind conditions. The wing is the heart of any stunt design. Correct wing loading along with properly worked out nose and tail moments, C.G. location and "mass weight" concentrations should give us a model that would groove easily giving smooth flying characteristics yet still retain a margin of reserve turning capability. All of these details had to be worked out and designed into an airframe that was attractive yet relatively simple as building time was short.

The choice of a powerplant was the first step. Although other engines will work, a Fox .59 was chosen for this model. It was decided that a .59 would certainly have enough power for any model that I would build. By properly restricting the intake and adjusting the compression ratio (by adding head gaskets) I felt that smooth vibration free power was available. The .59 seemed to have a lower vibration level than a lot of .35's, hence it was felt that the typical .35 stunt model structure would safely hold the big .59. This became even more evident as the intake throat diameter was reduced to .300" and lower using restrictors.

Having chosen a powerplant the next step was a choice of the type and shape of airframe that our design criteria must be worked into. In order to avoid a case of "acute brain strain" it was decided not to try to come up with an original model shape, but to more easily copy a real airplane to some degree.

I have always had a love of the "Blue Angels". This Navy aerobatics team has thrilled millions of Americans with their high speed precision performances. I'm sure all who have seen them perform in their usual standard of excellence were duly impressed. As a side effect perhaps the Navy judges would also have a love of the "Blue Angels" as we do and be favorably impressed by a copy of their ship. It was decided to pattern the new model after the "Blue Angels" performer, the Grumman "Tiger".

An estimate of the finished weight of the model was needed in order to determine the wing area required. Considering such factors as the type of structure, weight of powerplant and other related items, we came up with an estimate of 50 ozs., for the finished model. Another consideration that had to be dealt with was the weight and drag of the flying lines that the model had to fly on. I was used to building stunt models for .35's that can fly on 60-66' of .015" diameter lines. This one had to support substantially heavier 70' lines of .018" diameter wire.

Throwing all of this into our "exact approximations" formula, it was concluded that 600 to 610 square inches of wing area would be needed to give us what we were looking for. Some may wince at the thought of using a .59 in a 600 square inch model, as many a past expert has pretty well convinced the modeling public that anywhere from 700 to 1,000 square inches of wing area is needed for a .59-.60 powered stunt model. I will briefly outline the basis for my beliefs on the big engine—comparatively small model.

1) I had a strong conviction that I could build a .59 powered model down to about 50 ozs. with the vibration free powerplant available.
2) 600-610 square inches of wing area should fly this weight in a manner that I wanted. The wing area was chosen based on the design *weight* of the model, *not* the maximum power obtainable from the powerplant.
3) I wanted to fly the model on 70' lines, the maximum allowed under AMA rules. This would allow a little more room to complete maneuvers. For example, it would allow more straight length to the sides of square loops giving it a "squarer" look.
4) I believed that the versatile .59 could be made to run extremely steady and at slow speeds, if properly restricted and compression ratio adjusted. Although a .35 can be made to fly a model on 70' lines, it is really straining its limit which generally results in a model that will flounder through the more difficult maneuvers.
5) I also felt that the bigger prop diameter that a .59 is capable of swinging should only help in yielding a model that was extremely steady through maneuvers. Only a big engine can deliver big engine torque, hence more big engine pulling power through maneuvers.

I felt that the above explanation was in order as the large engine in such a relatively small model tends to surprise most stunt flyers when they first see the model. I have always

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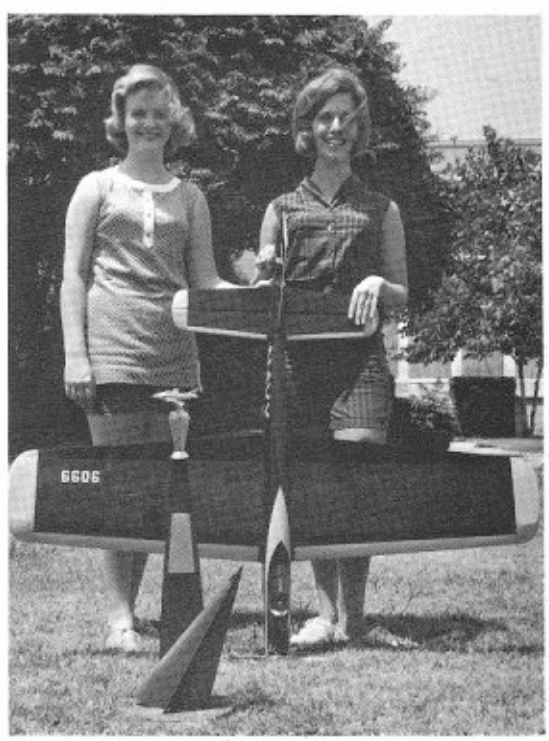

Two genuine Texan's support the blue beast. We suspect Larry uses glo-fuel for hair tonic, or just plain tonic. Leaning tower for 3rd place.

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tried to remain open minded to any new or different approach to stunt model design or flying. Although the big engine — not so big model is a somewhat different concept from what is being followed by most other stunt flyers, the idea looked sound and well worth the gamble. The only disadvantage of any significance that I could forsee was the A.M.A requirement to use heavier (.018" dia.) lines for the .59. Contests are certainly the proving grounds for new ideas, designs or products. To keep my interest high I wanted a new model along with its new problems for the Dallas Nationals.

Construction was started on the new model with little time wasted. Sketches were drawn. An immediate concern was to keep the overall weight down to the design weight of 50 ozs. as well as keeping weight concentrations at the extremities of the model to a minimum.

A lot has been written on factors effecting stunt model design covering moments, side area, etc. so I will not go overboard here. It should be stressed, however, that undue weight concentrations at extremities can only hurt your models performance. Seems this weight has the property of staying in motion once it has been set in motion by some external influence. This property is commonly known as inertia. An example of this can be described by considering the stunt model with the extremely heavy tail assembly. Upon entering a square inside loop, the tail assembly tends to keep on its original flight path when it is time to be flying up the vertical leg of the maneuver. This tends to produce a very obvious jump in the square corner.

The fuselage profile was laid out to look as much like a Grumman Tiger as we felt possible and still obey most of the side area rules applicable to stunt model design. The overhang of the fuselage beyond the elevators is not an accident. I had a tail moment in mind that I felt would give me the turning capability desired. The overhang will not have a detrimental effect on the turning radius that the model will be capable of. It will have a definite effect, however, on keeping the model stable about its yaw axis when flying through tight turns. It is a method of getting more side area in the model without effecting the tail moment. Have to give credit to my old flying buddy Leroy Ducharme for influencing me on this. After he beat me at several contests with his "Lieutenant" (M.A.N., 1/58) I began to consider utilizing his tail end theory . . . tsk tsk. Have since named this tail end overhang idea the "Ducharme Hangover" Theory.

There is another advantage to this "long-tail" idea. The "extra length" makes for a more impressive model when flying through maneuvers. Let's face it fellows, judges are human and putting out their very best when they are at work. However, being human beings and judging maneuvers by eye and not by a positive measuring device as a stopwatch, they can be influenced by certain factors. Where possible you may as well try to have these factors working for rather than against you. The fuselage profile tapers symmetrically and in a straight line starting at points above and below the wing leading edge to the tail end of the fuselage. Tnis coupled with the "extra length" effect has a further advantage of more plainly showing the *direction* that the fuselage is pointed in. Consider the square loop again. When you turn a square corner and have your model flying up a perfect vertical leg, the fuselage is pointed perfectly straight up and is very clear to see because of its long "arrow-like" shape. When good maneuvers are flown they will appear obviously good. However, if you "goof", this will also show up so you'll still have to get out and practice.

The landing gear set-up is simple and very easy to install. It is mounted in the fuselage as it is in the full scale Grumman Tiger. The torsion arms on the main gear are made long to give the soft spring effect desired. Guess I was lucky here as the set-up shown makes take-off and landing points nearly a gift at contests conducted on hard surfaces.

The model was finished in time for a few flying sessions before leaving for Dallas. After several verses of "Anchors Aweigh" from friends and well wishers, the big .59 was fueled up and flying. First impression was UGGH— flies like the Queen Mary. Had the engine restricted so much that I could barely loop the monster. Over the chuckles of my "buddies" I remained confident that I just *had* to have enough power available. After varying restrictors and props I got the model to fly well enough to indicate that it could perform a respectable pattern with more time spent on trim and practice. With less than a week to go before leaving for Dallas my physical energies gave out and I decided to take it easy before the long hard trip with my 1953 Pontiac. Guess I can't take those 3:00 A.M. work sessions like I could 10 years ago. Well, the take-offs and landings were good. I had hopes of polishing up on what goes in between while at Dallas and more nearly under actual contest conditions. So, I sat home and polished the Blue Angel while my partner Barry was out bashing his new model in, necessitating a hasty repair job. . . . Sob!!

A trike gear with long torsion arms add up to a very smooth ship on the ground, handles nicely.

Inspired by the appearance of our two U.S. Navy models along with our natural love of the real "Blue Angels", we decided to organize the "Blue Angels Precision Aerobatics Team": an exclusive group with a starting membership of two. Boy!! That's real exclusive.

The day finally came and we were off. It was a breezy Monday that we circulated in the work hanger at the Dallas N.A.S. Have to admit that we were somewhat disappointed, as the turnout was obviously smaller than the last Nats that we had attended in Chicago in 1962. Met George Aldrich and learned that he was going to be the official stunt event director. This was good news as I can't think of anyone with a better background or more qualified to run a Nats stunt event. To the newcomer, George has won the stunt event at the Nats so many times that I've lost track of exactly how many. George also designed the "Nobler" back sometime around 1949; a model that was destined to be the standard stunt layout for years to come. Wonder what it feels like to have designed the most widely copied stunt model in the nation.

We flew and adjusted our stunt models Monday afternoon and as much of Tuesday as we could endure. These Texans are sure rugged. Heard it said that the temperature over the runways was around 130°F!! Never saw a place so *HOT!!* (Just wait — the Editor.)

Wednesday was the day of the Senior event. This was Barry's big day as he proved his abilities when he tied with Chet Anderson for first place. Then came the dramatic and difficult-to-judge flyoff. Barry came

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out on top and I was proud of my buddy. However I have to congratulate both boys as they both worked hard, flew hard and showed a definite feeling for each other. Yes; George was conducting a meet where sportsmanship and friendliness were prevailing without question. Sure wish all meets were as sporting as this one.

Exhilarated by the win both of us felt like celebrating. It didn't take much coaxing by Duke Fox to convince us to go to dinner with him at an air conditioned restaurant featuring Mexican food. Also chuckled over the big decision to cut the rudder down by about 2" on the "Blue Angel". Seems there was a "Powered by Fox" decal on the top of the rudder and Duke suggested that cutting it down would help to eliminate some detrimental wind effect. When reminded of the Fox decal on the piece to be cut off, Duke reconsidered but agreed it was better to forego this bit of commercialism in favor of a better flying model.

The day of the open stunt event finally came. We were up early, ate a quick breakfast, and rushed out to get in a few warm up flights. As the wind seemed to let up by late morning each day, the plan of action was to practice some and go over for an official after 10:00 A.M.

Spirits rose even higher when the "Blue Angel" was awarded 35 appearance points to tie for top appearance honors of the meet with Jerry Worth's finely detailed "Electra" (M.A.N., 5/64).

Competition was going strong. Two circles were being run, the idea being to pick six top flyers from each circle and fly them off in the finals the next day. In my circle we saw Jim Kostecky of New York put in a superb pattern for a total of 418 points which made him justifiably unbeatable for the day. The "Blue Angel" qualified 3rd in this circle with an interesting 387 points. I say interesting as there were three judges scoring the flight and all three came up with an identical total of 387 points!! This could be used as a favorable indication of how well the judges were trained. We were content with being in the running.

Friday, the day of the finals in open stunt was now here. The twelve who qualified met with George Aldrich to discuss the flyoff, flying order, etc. Straws were drawn and a flying order was established. It was *HOT*. The first flight with the "Blue Angel" put it in position somewhere around 3rd or 4th. (forgot just where). It became evident that I could not win flying as I had been. It was felt that I was trying to fly just a little too slow. The extremely rich setting seemed to allow the model to flounder some on entering maneuvers. I was willing to gamble on some change. It looked as though further intake restriction with a leaner setting would net us a model that would fly slightly faster with a steadier engine run. It was during our lunch hour that brother Duke used his calibrated eyeballs to carve a "precision" wood plug to add to the already restricted intake. A quick test flight was taken to get a setting and we were ready to go.

The "Blue Angel" was seventh in the line-up to fly. When the time came we fueled up, flipped and were off. It became immediately apparent that the engine was running too lean. After a few maneuvers it began to look as though the big .59 might just heat up and sag out before the pattern was completed. It was decided to do one maneuver per lap and hope the judges were fast enough to catch everything. At about the six minute mark it became evident that the extremely lean setting would be sure to run overtime. It was then decided to fly as high as possible in an attempt to lean the engine out to the point of heating up and stopping. After about one minute of high flying the desired effects were had and the "Blue Angel" came gliding down with the engine smoking hot. Upon further examination it was found that the tank was still about 1/3 full. I believe the over lean setting was due to a mistake on my part of leaving the model on the hot runway after our lunch hour. Someone mentioned that the runway temperature was about 139°—WOW!! This would be hot enough to allow a lot of latent heat from our earlier test run to be stored in the engine and consequently foul up the fuel setting. Hope this excuse satisfies most readers.

There was satisfaction in the home camp as this flight put the "Blue Angel" temporarily in first place with 392.26 points. It was Jim Silhavy who put in a fine flight to net him a deserved 396.7 points for the ultimately winning score. Mario Rondinelli, obviously the *biggest* competitor at the meet, was yet to fly. Mario pleased onwatchers with what was perhaps the smoothest flight at the Nats to net him 396.4 points, just three tenths of a point behind Silhavy! Flying was really close. Glad I didn't have to judge this one. This put the Blue Angel in 3rd spot at the end of the Dallas Open Stunt competition. Sure enjoyed my associations during this meet. That evening saw another steak dinner on Duke Fox.

The final day of the meet saw George Aldrich and Don Still flying precision formation stunt in an excellent demonstration of skill and ability on the parts of both. Flying two of Don's Fox .25 powered Stuka's, speeds were nicely matched and two old masters followed each other by a mere few feet while flying through wingovers, loops, eights, etc. A real fine bit of precision flying that impressed all.

The trip home included an overnight stay at Fort Smith, Arkansas and a final bull session with Duke Fox and friends. From there we drove the remaining 1600 miles non stop never turning the engine off (except when it stalled two times) as the valves were so bad and compression so low that it just wouldn't start. Have since done valve job and the "last of the cast iron eights" is still with us.

TRIMMING FOR STUNT:

Now let's go over some of the trim adjustments that were made on the model. The fore and aft C.G. location was varied, but I ended up using it at Dallas as indicated on the plan. There was absolutely no weight added to the nose or tail of the model to achieve this. For all around use this may be just very slightly over nose-heavy. However this condition was chosen to suit the light Dallas winds and also make up for the little practice time that was available. Outboard wing weight was varied and ended up as shown. Lead-out location was varied and finally located as indicated on the plans. More on this later.

Everyone has a different feel for a stunt model. Final trim adjustments are necessary and should be made particularly if your main purpose is to fly the model in competition. To make things easier, you yourself should be willing and able to take honest constructive criticism. It helps to have a reliable flying buddy who has a knowledge of stunt flying to give you these evaluations, preferably a National champ as I had—tsk. tsk.

It is suggested that you trim your model to suit average contest weather conditions. Trimming a stunt model takes time but will reap many rewards. Be persistent in trimming any stunt design. I've seen many good stunt designs tossed aside simply because a trim problem existed.

Before flying, the model should be carefully checked for alignment and warps. If any warps can be detected in the wing, carefully steam it straight. This is easily done by using a tea kettle with a spout and applying steam to the warped area and twisting. Be careful not to get the finish too hot as it may bubble. Check the wing again at a future date as it may creep back some. Check carefully for flap alignment and stab-wing alignment.

As a further check on wing warps and flap alignment, take the model out for some careful flight tests and watch for a banked angle. If the outside wing rides low upright, chances are that it will ride high while inverted. (This assumes that the amount of outboard wing weight used is in the right ballpark.) This banking would also be evident when comparing inside and outside loops. The condition described would show up as

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banking away from the flyer on inside loops and towards the flyer during outsides. The flyer would also evidence a lessening of line tension while performing outside loops.

The reasons for the above condition can be attributed to any one or more of three reasons. They are: (1) a slight wing warp that you were unable to detect or to remove; (2) a misalignment of the flap system or (3) a vertical C.G. that is not properly located. In any case a fine adjustment to remedy this situation may be had simply by twisting the flap horn. To correct for the condition where the outside wing rides low in upright level flight and high in inverted level flight, the outside flap must be bent *down* with respect to the inside flap. Do this by pinching the flaps just over the area where the control horn is mounted in the flap and giving it a twist. Do this gradually with test flights in between as a check. If the banking symptoms are reversed; reverse the cure. If there is an obvious warp or misalignment, it is advisable to straighten it before flying and use the flap twist method as a fine adjustment only.

The fore and aft C.G. location has a definite effect on the stability and sensitivity of a model. A tail heavy model is sensitive and hard to fly smoothly through maneuvers. Check the model out by flying through square loops and watching for over control causing the model to "gallop" or jump on the corners. This is a signal that the model is too sensitive as a result of the C.G. being located too far aft. Correct this by adding weight to the nose in small increments with test flights in between. Have your flying buddy stand just beyond the area where the maneuver is being performed and compare notes with him. Keep adding nose weight until the over control on the corners is eliminated. Moving the C.G. foreward by adding nose weight results in a model that is more stable and consequently one that turns wider. However, there should be a happy medium where you can perform good square corners and round maneuvers without much difficulty in flying and still have a model that will turn tight enough to perform a good pattern within the limitations set down by the A.M.A. rule book.

Outside wing weight is another important factor in trimming out your model. Because the lead used as wing weight possesses the property of inertia which tends to keep it in motion in its original flight path, a sharp turn will yield a model that banks away from the flyer when the outboard wing weight is excessive. It will bank away from the flyer an equal amount on both inside and outside turns, hence a different set of symptoms from that of a warped wing or a flap maladjustment. Because we need a relatively fast, sharp turn to check for proper wing weight, the pullout on wingover makes it an ideal maneuver to check this on. Station your flying helper close to the spot where the model is going to make its pullout, and at an angle where he can get a head on or head away view of the model turning the corner. This is a good vantage point for observing the wing angle with respect to the lines when pullouts are executed. Perform a series of wingovers turning the required 5' radius on pullouts. Perform upright and then inverted pullouts. If the model banks *away* (outside wing low) from the flyer on both inside and outside pullouts, there is too much outside wing weight used. The excessive wing weight tends to keep on its original flight path, hence it tends to "drag" the wing into a banked angle while the turn is being executed. Remove some and try again. Repeat this process of fine trimming until the model will pull out with no banking tendencies (wing in line with flying wires during pullout). This process will give you a model that is dynamically balanced about its roll axis.

The lead-out location, motor offset and rudder offset shown on the plans are as they were used in the Dallas Nationals. I feel that more potential is hidden in this aircraft and I intend to experiment further with rudder offset and lead-out location. At Dallas, pull during downwind maneuvers was more than it had to be while the model flew light on the lines through overhead eights. I believe a more happy medium can be reached by moving the lead-outs forward (to eliminate downwind pull) and by offsetting the rudder more (to add line tension while performing overhead eights). I will probably move the leads foreward by about ¾" measured at the wing tip and cut a fin about 1½" wide in the rudder and offset this an additional ⅜". Changing these trim items by so much may raise eyebrows but the model is extremely wobble free while performing maneuvers. This characteristic is not a "razor's edge" balance with the model as proven by previous trim changes. I realize it is poor salesmanship to admit to the imperfections of a model, but please give some credit for recognizing these as areas of even greater hidden potential. These changes were not included in the plans as they were untested at the time of writing.

In changing trim adjustments on this or any stunt model, you may have to go back and repeat some parts of your check list. For instance, after running your outside wing weight test you may notice that the banking angle you observed during upright pullouts was not equal to the banking that you observed during reverse pullouts. This would be a signal to recheck for warps and flap alignment.

ENGINE TUNING: Engine tuning for special purposes or applications is an area that is very commonly overlooked by the bulk of stunt flyers. The innards of most stunt or sport engines are set up and timed to deliver good steady pulling power at lower rpm's and on suction feed. Blitz-type 35's are generally considered Taboo by the stunt specialist. This we can refer to as "Harsh-power" while the stunt flyer prefers soft power. Simply by varying intake restrictors and compression ratios a new kind of power is available. Restricting the intake will yield an engine that will run steadier through maneuvers and at lower rpm. It will also be more economical on fuel so check your engine run time when making these changes.

Adding head gaskets will lower the standard compression ratio that your engine comes with. This change will yield an engine that will deliver near the same pulling power when running rich but will put out noticeably less top end rpm when the engine breaks into a two cycle. The value of this characteristic is to be considered if you have a model that flies at a comfortable speed when it is running rich, but speeds up excessively when the engine leans out, as they generally do when a maneuver is entered.

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From this we can visualize further advantages of the big engine. With the reserve of power available in a big engine it is possible to adjust its running characteristics to give a smooth and steady run that will fly a model with little speed variation through maneuvers. This can be accomplished by varying intake restrictors and head spacing. These are the basic principles that make the big engine—not so big airplane concept workable and practical.

The "Blue Angel" was flown at Dallas with an intake restrictor of .300 inches throat diameter and a standard compression set-up. However, since that time further experiments were conducted in these areas. The compression ratio was varied, and I am nearly ready to settle on a total head spacing of .071" on the Fox .59. This may be accomplished by installing two standard Fox .59 head gaskets with an .011" aluminum spacer between these gaskets. Fox .59 head gaskets are about .030" thick when compressed. Two gaskets plus the .011" spacer will yield .071" total spacing. When gaskets are installed, run the engine for about three minutes and re-tighten the head screws. Tighten head screws after each flight for about four flights and then check them intermittently after this.

Intake restrictors as small as .268" I.D. were tested and it looks as though an intake restrictor with a .275" throat diameter will work best with the compression set up as described and in a 50 oz. airplane similar in size to this design. Fox Superfuel was used in most test runs. Please take heed of the fact that different atmospheric conditions in various areas of the country may have an effect on which compression ratio and intake restrictor combination works best. The engine run obtained with the above set-up was extremely steady and consequently at near constant torque. The net result is a model that flew at a near constant speed through all maneuvers.

A shielded Fox RC plug is advised for the .59. Early runs with a standard plug resulted in an engine that wanted to cut out on turns. It is felt that fuel surges up the intake bypass during maneuvers were cooling the plug and consequently the engine would tend to cut out. The shielded plug keeps this cooler fuel charge from splashing directly on the element hence its temperature remains high and eliminates this tendency to cut out. A hotter fuel as Missile Mist also seemed to help but the shielded plug works well with any fuel.

Break-in was absolutely no problem as the engine had only two tanks of fuel run through it on a test block before it was flown in a test model. I believe this lack of a formal break-in period as such is common to most piston ring engines. Sure is a big factor when you're in a hurry for results.

As described earlier, construction is similar to the tried and proven methods used in most .35 stunt models. Although slightly larger than most .35 designs, it is quicker to build than a lot of them. A .59 was used in the original, however a "strong" .35 should fly the model well. The real Grumman Tiger has no wheel pants, hence they were omitted from this model. Also the real Tiger front end dictates a shape that conveniently omits the need for a full engine cowl. These considerations were carefully weighed at the outset of this project.

I prefer building the wing first. Construct the wing as you would any standard stunt wing. Notice the extra 1/8" ply bellcrank mount above the bellcrank and also the 3/8" balsa reinforcement in the adjacent inside rib panel. This added structure is a precaution to enable you to safely pass the required fifty pound pull test for .59's. In keeping with our feelings on building extremeties light, hollow the inside wing tip blocks. Finish the wing assembly, sand and cover with blue silk. (See following section on finish before covering wing.)

Build the basic fuselage structure made up of the motor mount-doubler assemblies, two 1/8" balsa sides and balsa half-formers. I prefer cutting the formers at the cut line indicated and assembling the fuselage upside down over the plan to keep it aligned. Drill the motor mount holes.

Build the horizontal tail assembly, keeping light weight in mind when choosing materials. The only member here requiring any substantial strength is the full length 3/8" x 1/2" stabilizer main spar. The horizontal tail assembly on the original weighed 35.1 grams (1¼ ounces) complete with bushed control horn, hinged and completely sanded. This should serve as a good target weight.

Alignment of major components plays an important part in the performance of this or any stunt model. With this in mind, carefully align the wing in the fuselage sides and cement securely. Bend the elevator pushrod; slide the 1/16" ply pushrod guides over the pushrod and install this in the fuselage with the tail assembly. Align this carefully and glue, locating so as to give 0° elevator deflection when the flap is at 0°.

Bend the landing gear to shape and install as shown. Install the tank. If a smaller engine is used, use a correspondingly smaller tank. Add the 3/8" tail block (use super-soggy mush here) and complete the top and bottom of the fuselage using light contest grade balsa. Add the cowl cockpit detail and rudder.

There are many good methods of finishing a model. I will briefly outline the method used on the original Blue Angel. Sand all wood surfaces with #400 paper. Coat all wood surfaces with two thin coats of clear dope, sand lightly and then apply one coat of talcum powder and clear dope to partially fill the grain. Sand with #400 paper and then silk cover the wing. Note that the wing is covered before it is glued in the fuselage. If the finished model will be painted blue, use blue silk on the wings and cover the flaps, fuselage, rudder and horizontal tail with blue Jap tissue. Apply enough clear dope to seal the pores in the silk and about two thin coats on the Jap tissued area. Now install fillets using 3/8" square mush soft balsa around the wing and 1/8" square around the horizontal tail. Sand these to shape, apply preliminary dope to the fillets and Jap tissue cover.

Now mix filler consisting of one part talcum powder, one part clear dope, one part thinner and one part blue dope (chosen to match the color of the finished model). Spray on one application of this filler and wet sand using #400 wet-or-dry. Always sand carefully, removing every bit of excess filler in order to remove excess weight. Spray on another coat of this colored filler and wet sand. Now apply a thin spray coat of clear over the entire model and spray on the first application of blue. Two spray applications of blue will be needed.

After this mask off all the tirm and spray in trim colors. The U.S. Navy signs were masked off letter by letter while the Blue Angels name was cut out of masking tape and stuck on the side of the fuselage. All trim was yellow with a silver stripe on the leading edge of the wing rudder and stabilizer.

Remove all tape and carefully break the sharp corner left on the edges of the trim by the masking

tape. Do this with careful light strokes with #600 wet paper. The entire masking tape ridge may be removed by spraying clear dope over the edges, rubbing the edges down and repeating the operation until the edge is completely removed.

Spray on a top coating of clear dope over the entire model in two applications using a 50-50 mix of clear dope and thinner. Allow this to dry for a period of time and then rub down and wax the entire model. The method of rubbing down the finish was to apply a small amount of compound to a soft rag and rub a small area until the compound was actually dry and then to keep on rubbing dry until a bright shine appeared. Be careful not to rub through areas where covering meets wood as at the edges of the capstrips. A polish was then rubbed on and a top coat of wax was applied. Ditzler auto rubbing compound, Prestone polish and Vista wax were used. Finished weight on the original was 52 ozs. After drying for one month, this dropped to the planned 50 ozs!!

There are no tricks in flying the model. Rev-up 11-6 and 11-7 props were used on the .59, with the 11-7 generally accepted as a little better. To take off, hold dead neutral or a little down, to allow the model to roll the required 15' on the ground and then gradually ease up control until it gently lifts into the air. To land, come in for a gradual slow approach at a slight positive angle of attack. The main wheels will touch down first but the soft springing will quickly ease the nose wheel to the pavement, making for an extremely smooth touch down. Once the three wheels make ground contact, hold some down elevator on the model and it will roll gently to a stop. Adequate practice should give you a winner. Good Luck and happy flying.