BUILD A 5-CHANNEL SUPERHET MONITOR

radio control MODELER

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AMERICA'S LEADING PUBLICATION FOR THE WORLD'S FASTEST GROWING HOBBY

KEN WILLARD: SUNDAY FLIER

'HOW TO TRIM YOUR R/C MODEL'

DON DEWEY'S 'ROYAL COACHMAN'

MULTI- TRAINER FOR .09 TO .15

RADIO CONTROL MODELER

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EDITOR'S MEMO

by DON DEWEY

I REALLY DON'T LIKE TO SEE anyone lose their temper.

But I must confess to a certain degree of amusement every time one of our editorials hits home and a few of the "good old times" advocates become irate. We've allowed the necessary two months lapse of time since our stand against the BOM rule and expect at least one competitive publication to offer a rebuttal this month. If so, we urge every RCM reader to carefully read the arguments they present in defense of this controversial regulation. There are certain very basic principles at stake here, and the "other side of the coin" dictates that these principles be defended. We sincerely hope that this defense will not be presented as another look through the traditional rose colored glasses. There's an old saying that all a politician has to do to get elected to office is defend motherhood, kiss babies, and intermittently wave a small flag. You certainly can't get into too much difficulty defending the sanctity of the basic precepts in which nearly everyone believes in order to temporarily obscure the real issues involved. In order that this small flag, which will undoubtedly be waved furiously from another editorial pinnacle this month, not obscure the facts of the issue, let's take a concise last look at both sides of the coin. After that, it's up to you to decide for yourself.

What is the Builder of the Model Rule? Who is in favor of it? Who is against it? Is it enforced? These are the questions that must be answered. First of all, the Builder of the Model Rule applies only to A.M.A. sanctioned competition, in that the competing flier must certify that he built his own model. This ruling does **not** prohibit the use of styrofoam wings or fibreglass fuselages. It **does** prohibit ready-to-fly models (of which there are none, at present, suitable for competition), or models built for the flier by another person, persons, or commercial concern. Sound unreasonable? Seemingly, no.

Who is in favor of the Builder of the Model Rule? If we were to look at the results of a recent reader survey conducted by one of the national general model publications, we would undoubtedly find that they had a three percent return from their readership, and that of the responding readers, eighty-five percent were in favor of the ruling. Let's assume that this publication has a paid circulation of 85,000 which includes all phases of model aviation. Three percent of that figure would be approximately 2,500. Assuming that half of those responding were RC'ers, and that eighty-five percent were in favor of the ruling, that means that approximately 1,000 RC'ers took a stand **for** the BOM rule. We'll go even further — we predict that this sampling is completely accurate — that eighty-five percent of the active RC'ers **are** in favor of the Builder of the Model Rule — at least in theory—and that that figure would then be many times one thousand.

Why, then, this writer's stand against a seemingly popular favorite? For one reason, I made a statement many issues ago, that this publication would not subscribe to the fashionable editorial rose-colored sunglasses. And the view through those lenses, at present, would seem to view a happy scene where contestants preparing for the "big meet" are all busily engaged in building their own models for the coming event.

Take off the glasses, and you see a different picture. During the past few Nationals, alone, a rather alarming percentage of contestants did **not** build their own models, although their entry into their specific areas of competition certified that they did just that, according to the prescribed rules of competition. This is fact, not fiction. How do we know? No great attempt has been made to even conceal the fact now that the event is over.

And if the editorial that is due to appear in another publication this month claims that this rule is beneficial to all concerned, then the writer either subscribes to a policy of hypocrisy, or is admitting to the fact that he is not aware of what happens at the biggest event of the year. We wonder which is the case.

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FEATURES

DEPARTMENTS

COVER

Ray Downs' Shoestring, taken at the first N.M.P.R.A. sanctioned Goodyear event, Turlock, Calif.

Ektachrome by Chuck Waas

TECH QUERIES

DON MATHES

Questions for TQ should be addressed to the Technical Editor, R/C Modeler Magazine, P.O. Box 487, Sierra Madre, California. Please enclose a stamped, self-addressed envelope for reply.

Q. I want to add my opinion to your current discussion of the relative merits of the "fail-safe" feature of new proportional systems. A recent issue of RCM, disfavoring this function, pointed out that present day models have insufficient inherent stability to recover from disturbed attitudes without control action. Therefore, low throttle and neutral control provide no recovery margin if transmission is temporarily interrupted. The obvious objection to this reasoning is that, if a crash does occur, low throttle often means the difference between total destruction of everything and varying degrees of intermediate damage.

A more basic objection is that the characteristics of most current multi designs are intentionally tailored to accommodate the shortcomings of reeds, i.e., small control deflections cannot be easily held to maintain a disturbed attitude. The aircraft must, therefore, not tend to recover when the deflection is removed. The fallacy in your objection to "fail-safe" is that a proportional control system is misapplied to this type of airplane. This misapplication will, in my opinion, inevitably be corrected as new aircraft evolve, built around proportional control. These airplanes will be inherently stable, like full scale aircraft, and a dive, for instance, will be performed by holding a small elevator deflection. When the deflection is removed, the plane will return to level flight, after the transients have damped out. The roll and yaw axes will have similar characteristics, to varying degrees. The value of "fail-safe" on such a model is indisputable, and I predict its superior handling characteristics on proportional control will all but eliminate use of most current reed designs without modification. For those who insist on flying unstable reed designs on proportional perhaps an optional "fail-safe bypass" feature could be provided. Otherwise, I consider a proportional system (lacking 100% immunity from interference) without a "fail-safe" feature of some sort to be illogically conceived and incomplete, since the failure mode is disaster.

DAVID KORENSTEIN Montebello, Calif.

A. In my opinion, the word "fail-safe" is a problem of semantics rather than aerodynamics. If a system fails, is it safe? It would appear that some people regard a proportional system without a so-called "fail-safe" to have a failure mode of all surfaces in the "hard-over" position. This is not necessarily true. The systems I have seen, to date, without this alleged "feature" leave all control surfaces in the position last commanded. Further, I have seen several demonstrations "fail-safe" themselves away with no control, while systems without this "feature" still retained intermittent control.

You say that our present day models have insufficient "inherent stability" to recover from disturbed attitudes without control action. This is overwhelmingly true with every high performance multi I have ever flown. This is called, in aerodynamic terminology, "neutral stability." The majority of all full-size aircraft fall into this category. Your statement to the effect that "they will be inherently stable like full size aircraft" is completely incorrect. Full-size aircraft, as any light plane pilot will tell you, are not "inherently stable," as you mentioned. If you want to prove this to yourself, have a private pilot put a Cessna or Beech into a disturbed attitude, such as nose down and left aileron, hold it for a few moments, and then neutralize controls. You'll find that not only will the ship not recover by its "inherent stability," but if the pilot doesn't correct for this attitude, your insurance had better be paid up! To further prove this point, and if you will read some of the current aviation magazines, you will note that one major manufacturer is now offering, as standard equipment. a system referred to as P.C., or Positive Control, a system which has no other function than to keep the wings level, or if disengaged for a turn, to return the wings to level attitude.

Future proportional ships will not be designed with "inherent stability." Only free-flight models have positive stability, or as you refer to it — "inherent stability." This positive stability is definitely not wanted in multi-channel aircraft. If you are successful in the development of the aircraft you describe, we're sure that you will find that you have re-discovered the Super Buccanneer!

Q. In your 'RCM Convertible Superhet' article you list such transistors as the T-6058 Philco which you must know is no longer available. No substitute was listed. Where can this item be obtained? .....

JOSEPH ZAJAC JR. Hammond, Indiana

(Continued on Page 54)

An Approach To

FLYING PROPORTIONAL

by Cliff Weirick

Conclusion of a three-part series on the techniques of flying multi-proportional. Follow the 1964 Nationals Champion through the Class III pattern . . .

WING OVER. I recommend starting this maneuver directly into the wind. Gently lift the nose and as the model approaches the vertical position, start easing off power until the engine is at idle. As the model approaches stall speed feed in left or right rudder, as desired, and the nose should fall through without too much work on your part. As you come down the back side, try to time your pull-out so that you are back in level flight at exactly the same time you go through the altitude at which you entered this maneuver. In my book, this is probably one of the hardest maneuvers to do correctly.

THREE ROLLS. I recommend doing this maneuver downwind unless the wind should be exceptionally strong and your model has a relatively slow roll rate. If this condition exists, I would recommend doing them into the wind. I always like to build up a good head of steam before starting the rolls. I think it makes them easier because of the increased speed. Try to start your rolls at a point that would put the inverted portion of the second roll directly in front of the judges. By doing this they can see all three rolls very clearly. So many people always start the first roll directly in front of themselves and this does not make for a proper presentation. Try not to have the roll rate of your model either too fast or too slow. Mine is set so that with full aileron I have exactly the roll rate that I like. In doing this, I know that my model is going to roll at the same rate every time I do this maneuver. This is very important since your elevator timing is very critical and can only be utilized properly if your roll rate never varies. At the completion of the three rolls, don't forget that you must do 50 feet of straight and level flying before the maneuver is complete.

IMMELMAN TURN. I recommend starting this maneuver into the wind. Pull the model up in a gentle half loop being careful not to get the model slowed down too much at the top. I try to start my half roll just a split second before the half loop is actually completed. I find that this keeps me from getting that little noticeable dip right at the top as I am doing the half roll. You must be careful not to start the roll too soon for you can get downgraded for this.

THREE INSIDE LOOPS. Do this into the wind, also. When you are lined up directly in front of the judges, and as you start pulling in the elevator, try to pick a point out in space (such as a cloud) and fly around it as your reference. I like to do fairly large loops because (1) they look better, and (2) it allows time to make any rudder or aileron corrections that might become necessary to keep the model on heading, and (3), almost all the judges seem to prefer the larger circumference. (In this maneuver, once again, proportional comes into its own.) You should be working the elevator almost continually during the three loops. Done properly, you should have to apply some elevator at the bottom side and less at the top side unless you are flying into a strong wind. In the case of the latter you will have to use varying amounts of elevator to compensate for any downwind draft.

FOUR POINT ROLL. Again, this is a maneuver that should be done downwind and with all the speed you can muster out of your airplane. It is a rare model that doesn't have to describe a very shallow arc across the sky while doing this maneuver in order to start and finish at the same altitude. When starting, pull the nose up slightly to a point just above level flight. When going for your first point, do not use full aileron. If you roll it at a fairly slow rate, it is a lot easier to stop it with the wings exactly vertical, or on the point. This also applies to all the other points. When going from the first to the second point, we know beforehand that we are going to feed in a slight amount of down elevator when the model is on its back. This is a little awkward to describe, but I never allow my stick to go to neutral and then hit down elevator. I try to round off the corners, so to speak. If you practice this maneuver enough, you will know exactly what I am talking about. Remember to hesitate for the same period of time at all points. I try to get a little bit of a beat going in mine and time my points to this beat. Once again, don't forget to fly 50 feet straight and level before you call "maneuver completed."

OUTSIDE LOOPS. Start this maneuver directly downwind. It is almost exactly the same as the three inside loops except that now you must jockey down-elevator rather than up-elevator. Once again, when starting try to pick that reference out in space and fly around it. The most common fault in doing outside loops is to make the top portion too tight. Remember to relax the elevator right at the top and tighten up a little at the bottom.

CUBAN 8. For your entrance, nose over into a 45 degree dive. Do it gently because any violent application of down-elevator may tend to throw your wings off their level attitude. Gently execute about ¾ of a loop,

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HUMOR

THE BOX

by CDR. LOU GUERRIERI, U.S.N.

A triple-threater, a box among boxes . . .

It started quite innocently, as such things generally do.

We had a small group that flew at the Naval Auxiliary Air Station in Imperial Beach, the southernmost city in Southern California. Every Saturday and Sunday from seven to ten, several regulars would be out on the wide expanse of runway flying rudder only, rudder and elevator, and full house. Maybe we were too successful, if such is possible in RC. Whatever it was, it was disastrous. Cooperative companions became cutthroat competitors.

We were unsophisticated and unspoiled, a cheerful bunch who enjoyed flying and each others company. Good-natured ribbing was our stock in trade. Overnight it seems we went modern, too busy with our individual worlds to invite the other lads into it.

The downfall started one morning when A Box appeared. Can't remember who brought it; we were too engrossed in looking, on the sly, of course. Only the uninitiated make a fuss over something new or grand.

The details of the Box are hazy, but it was made of WOOD. After what had gone before it was a breakthrough. In one mighty moment the years of toting gear around in varieties of containers from shoeboxes to cardboard cartons became antiquity.

Nobody talked about the Box. Maybe we thought it would go away. It didn't. It made an impression, for another Box appeared shortly thereafter, followed by another, and yet another. In the space of a few short weeks only those without Boxes would venture a flight now and then. Their efforts went unheralded. At times a plane would be on its own as the pilot gazed surreptitiously at the groups clustered around each Box. No eye focused on his flight pattern. No comment attended his landing.

It was inevitable that I too would succumb. The idea of a Box grew so overwhelming that one day I flew into the side of a car from which a particularly fine specimen was emerging.

The heat of the morning erupted into the fever of an afternoon. My one source of lumber was two, foot-wide pieces of naturally-finished pine, six feet long. My wife claims she never did like that bookcase, anyway. She was a bit testy, however, upon stumbling over the hap-hazard stacks of comic books in the middle of the living room when she arrived home. The project was well underway by that time.

My Box was to be a Box among Boxes. It was to be a triple-threater. It had to carry all my gear, hold the plane, and provide seating accommodations. The latter requirement was the most stringent for I never could take the standard three hour standing stint that appears to be a RCer's forte. Basic measurements were made around a Kraft 8 transmitter and its antenna. THE BOX came out two feet long, one foot wide, and one foot deep, with endplates one and three-quarters of a foot high to accommodate U-shaped fuselage cutouts. The two piece top was hinged and could be opened and closed with a plane in the cradle.

By any standards it was impressive. All design criteria were met. It could be stuffed with transmitter, thermos, meters, mustard bottles, tools, tomato-and-lettuce sandwiches, batteries, baby food, fuel, Fritos, props, pineapples, and other essential items. The endplates tenaciously engaged even the largest multi, at its prop nut and elevators. Grandstand seating was provided for a large man (me), and three small children (mine). Two minor deficiencies resulted, however, weight and bulk. More about this later.

A bright Saturday in August was fortuitous for the unveiling. The regulars were out in force, Boxes lined up on the tarmac. As stealthily as possible I inched the station wagon toward the flight line. A snarling Super Tigre 56 masked my approach. The entrance was as good as made. I assembled old yellowbird, eased THE BOX out of the wagon, got a good grip on the inch thick broomstick carrying handle, and nonchalantly sauntered toward a prime spot. Engines died, transmitters clicked off, and an awesome quiet fell over my bug-eyed colleagues.

As quickly as the moment arrived, it was gone. A strident, "Will you look at that Box!" from a brash spectator broke the spell. In a thrice I was engulfed by this fellow and others of his ilk. The regulars moved off and soon there was just me and THE BOX.

The Battle of the Boxes was over. No challenger came forth. Little by little the regulars began dropping out.

(Continued on Page 66)

Navy Commander Lou Guerrieri, stationed at Moffett Field, California, is in his 21st year of service. Almost exclusively a sport flier, he started modelling in New York City in the late thirties with Clodhoppers, Kordas, Bay Ridge Topper, and the Playboy. Tried U-Control in the forties but gave it up — couldn't fly inverted. RC activity dates back to 1952. A member of the Pioneer Radio Control Club for the past two years, he writes a hints and kinks column for the Modulator, the club newsletter. Notable RC performances include first place 1953 Hamilton Air Force Base contest with a Liberty Belle (only plane entered), and fifth place 1956 Philippine Model Airplane Society contest, Manila, with a Mambo (one of five planes entered). Recent Navy flight experience has been in the P-3A ORION (Lockheed's, not Kasmirski's).

RCM'S FIELD STRENGTH METER

Quick, easy to build, this shop and field aid will aid in transmitter tune-up and relative RF output.

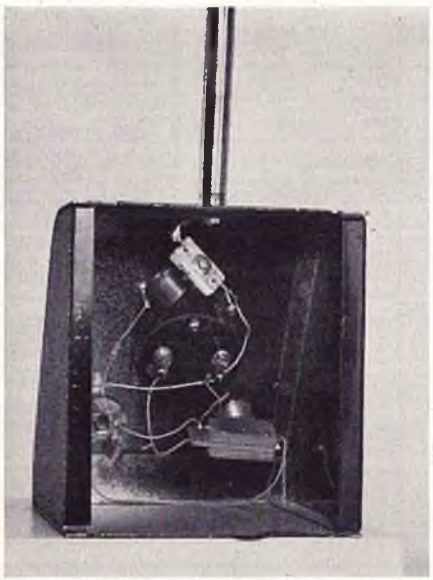
RCM's Field Strength Meter is a very simple to construct yet effective, shop and field indicator of relative transmitter output. Less than an hour's time will be required to construct the entire unit.

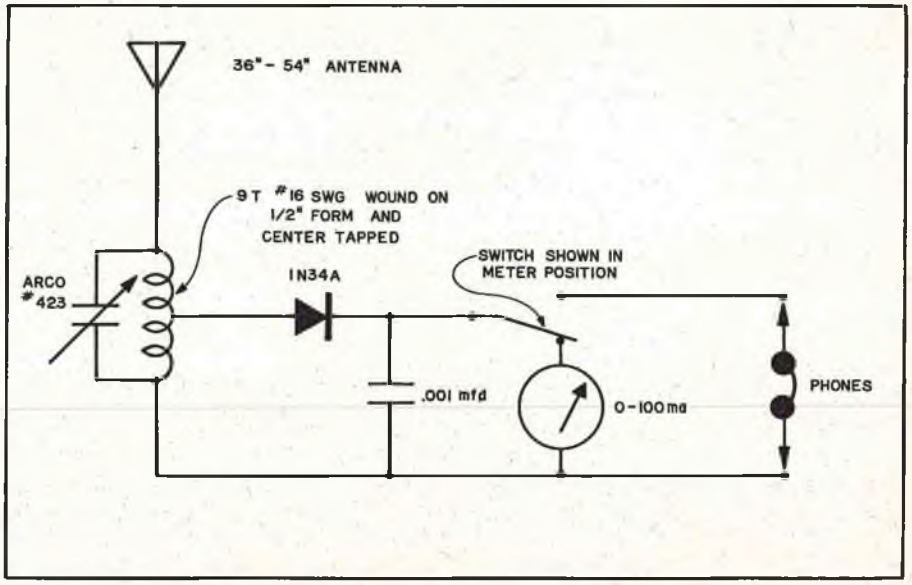
The case used for the prototype was a standard 4" X 4" X 4" panel front metal cabinet with black crackle finish. Any similar type cabinet will work equally as well. The meter utilized is a Calrad 0-50 ma which measures 1¾" X 1¾" at the face. Here, again, any standard meter of 0-50 ma or 0-100 ma will be more than adequate.

The coil consists of nine turns of #16 SWG wound on a ½" form, such as a ½" dowel. A 1N34A diode is soldered to the center of the coil with the cathode end soldered to one side of the switch, as shown in the schematic. An Arco #423 trimmer capacitor is connected across the two ends of the coil. A .001 disc capacitor is connected between one side of the switch and one terminal of the meter, as shown. A phone jack is installed in the front of the cabinet, and is connected to one side of the switch and to one side of the meter.

The antenna used on the prototype is a collapsible chrome, screw-in unit that is readily available, and most commonly seen on imported single channel transmitters. Any antenna from 36" to 54" in length will be satisfactory for this purpose.

You will find that a few dollars invested in the RCM Field Strength Meter, along with an hour's time to construct the unit, will provide you with a very valuable tool for determining the relative RF output of various transmitters, along with a method of fine tuning individual transmitters.





Sunday Flier

by KEN WILLARD

A step-by-step "how-to" on trimming the R/C model. An excellent reference for the beginner and more experienced flier alike. First of two parts.

"I don't understand it — you're always flying some ship with an .020 that I'd have to use a .049 on in order to fly right. Or, you use an .049 and I'd have to install an .09. Your models are underpowered, yet you're out there looping and rolling with the best of them. How do you do it?"

Quite a few modelers have made remarks to me similar to this lead paragraph — Sid Axelrod at Top Flite does it regularly with every new design I show him. How is it done? Well, it is a combination of three things, other than the basic design itself.

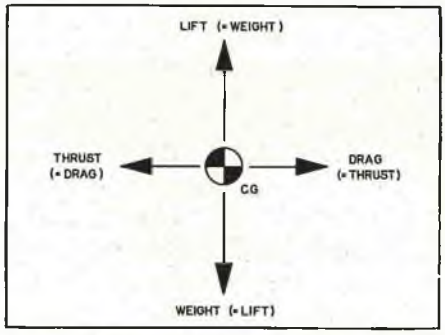
The most obvious facet is weight. The lighter the plane, the lighter the wing and power loading. And, in case you didn't know, balsa wood varies from 2 pounds per cubic foot to as much as 18 pounds! Thus, by careful selection of your materials — the strength of balsa is roughly variable as the weight — you can lighten a model significantly by using hard, strong balsa where needed (spars, longerons, etc.), and softer, lighter balsa where strength is not a a factor (wing tip blocks, fairings, etc.). Another weight factor is the dope, lacquer, or epoxy finishing materials, that you use, and the quantity and method in which you use them.

But, even with two airplanes of the same design and the same all-up weight, it's possible to have completely different flight capabilities due to the other two factors — the balance, or "trim," of the model for one, and the technique of flying for the other. I would like to talk about flight trim with you this month.

First, let's review some of the basic principles of trimming and balancing. Frank Zaic, in his book 'Circular Airflow and Model Aircraft,' points out that models can be flown successfully with the center of gravity located **ahead** of the **leading edge** of the wing — or, with the C.G. located at, or slightly **behind,** the trailing edge! So, what's so important about this C.G. location?

Admittedly, the two locations mentioned are extremes — neither would give satisfactory results with an R/C model. But, within the "normal" range of C.G. placement for R/C (25% to 50% of the chord, back from the leading edge), you can make force arrangements such that in one setup you need half again as much power as you would with another. Let's look into this.

To begin with, any airplane in straight and level powered flight must somehow achieve the following balance of forces:



Now, if any of those forces don't balance out to act through the C.G., you're "out of trim," and you just won't achieve straight and level flight. Unfortunately, though, there are an infinite number of ways to arrive at the above desired balance — and an equally infinite number of ways to depart! Most of us have already discovered more than our share, too!

But do not despair. Even with computers, scientists, wind tunnels, formulae, and all the trimmings, the giants of the aircraft industry still find that flight tests are the only acceptable solution. For example, just last year the designers of a new jet job, computed to the nth degree, finally decided to go the route so well known to the modeler. There was a lot of hemming and hawing and explaining, because the changes they decided upon cost a few millions of dollars and all added up to "we decided to enlarge the stab for better longitudinal stability!"

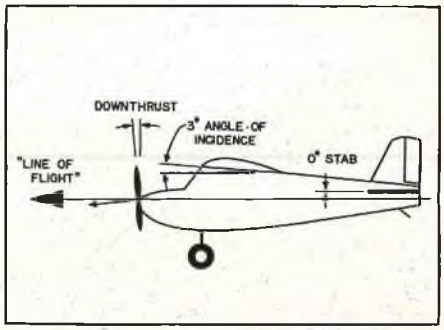
The complexity of the forces acting on an airplane defies precise mathematical analysis, but for our purposes with R/C models, some generalities can be made:

1. Free flight models have to have **positive stability** — if disturbed from normal flight, they must be capable of returning by virtue of the forces set up on the pre-set surface. R/C models do not require this capability, although most sport designs do include it.

2. R/C models need a combination of stability and controllability. The combination varies; a sport model has stability with some controllability; contest jobs, particularly Class III, are approaching **neutral stability** in order to achieve maximum control. In other words, **they go where you point them until you command them to change course.**

3. The longitudinal, or fore and aft trim, of a model has a significant effect on two things — the power requirement, and the sensitivity to adjustment. The further aft the C.G. is located, the more sensitive the model is to changes in the stab setting or the wing angle. The further forward the C.G., the less sensitive, but more power is required because of the increased drag of wing at the higher angle of incidence which is required.

Incidentally, this might be a good place to point out that many plans are published showing the profile of the model as it should appear in level flight — like this:



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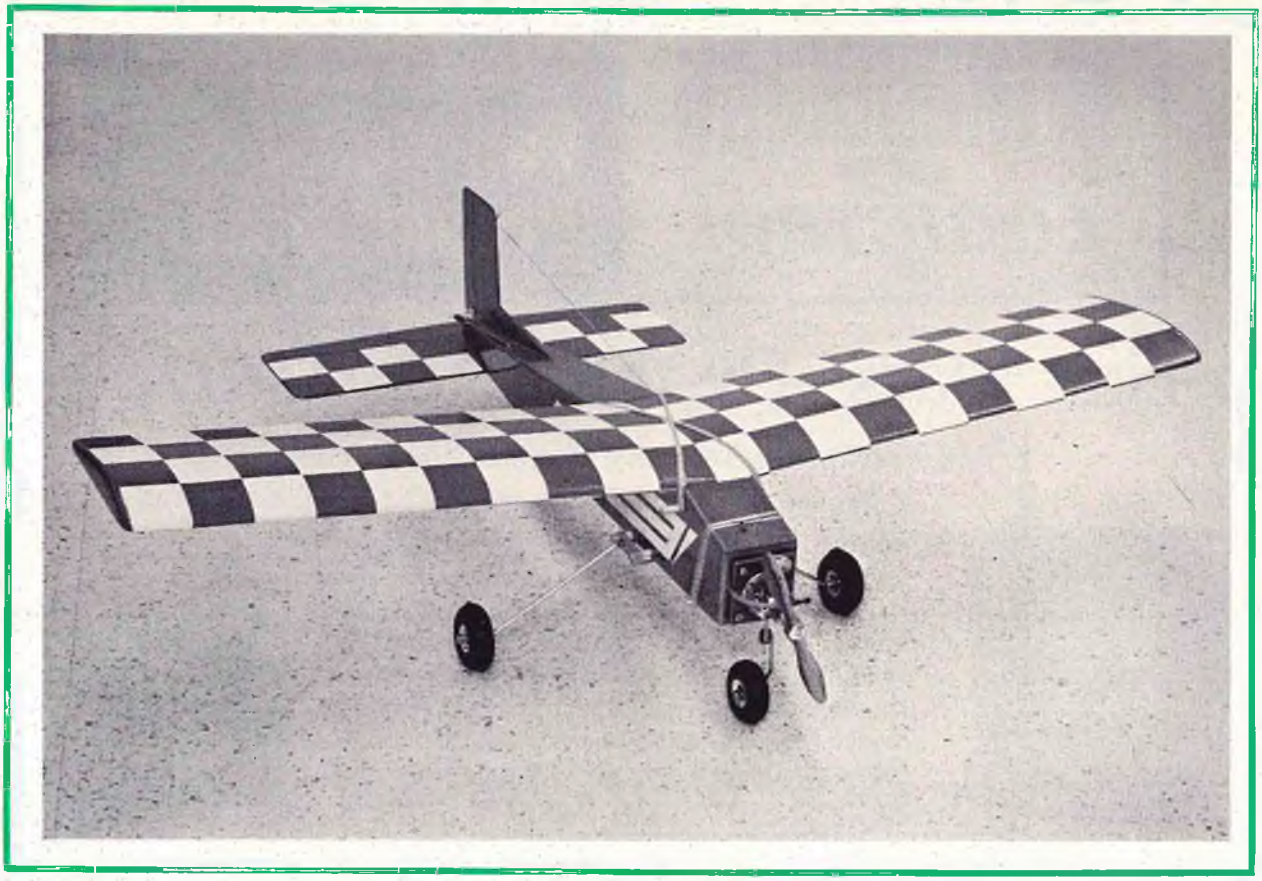
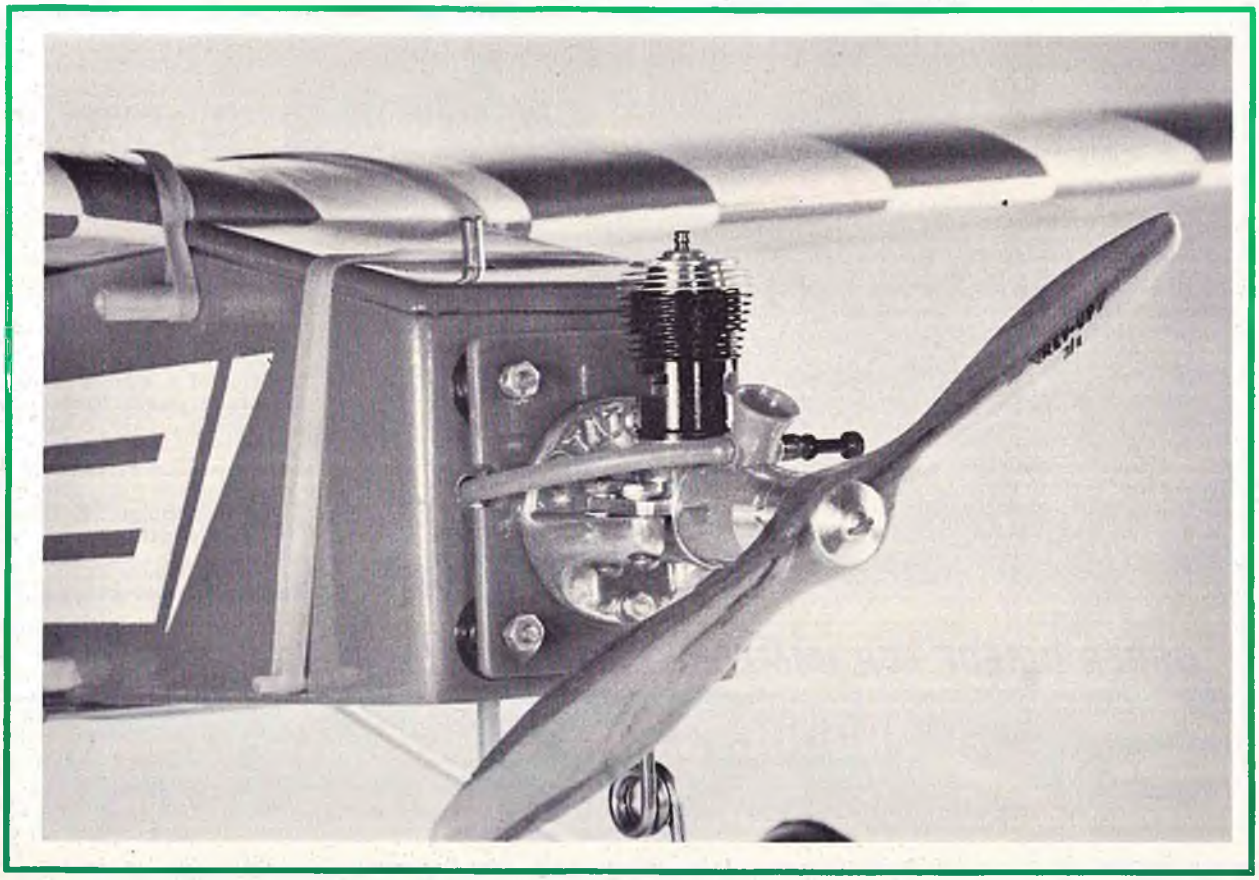


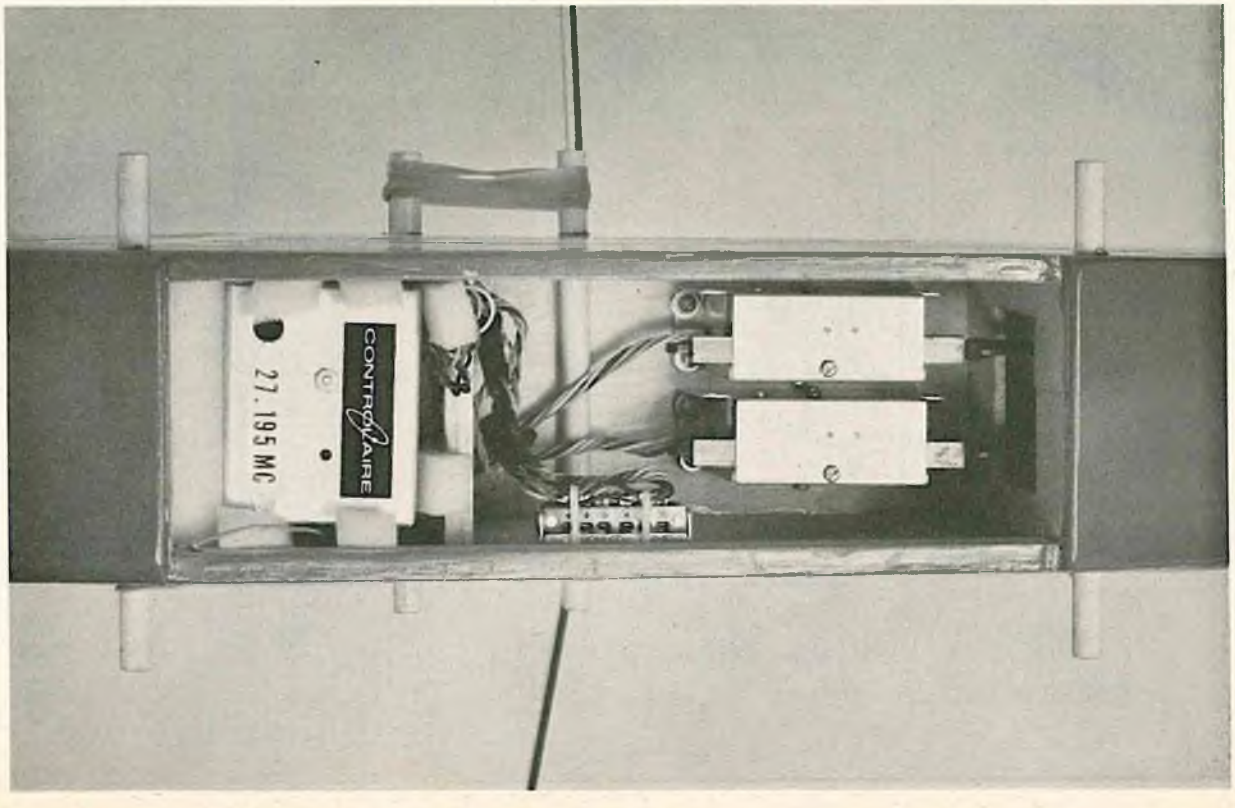
Royal Coachman

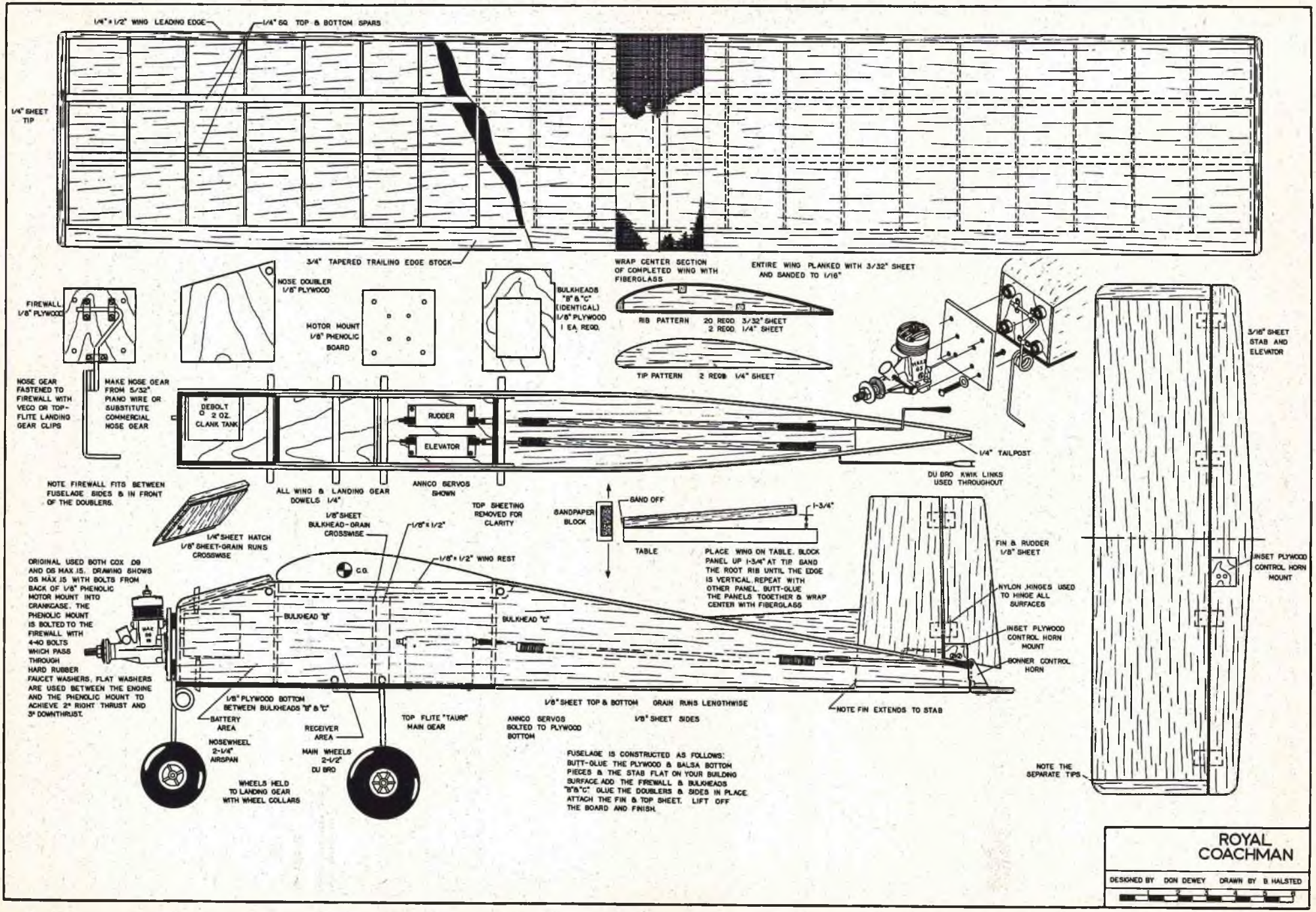


by DON DEWEY

There are several ways to discourage a beginner in this hobby and sport — one is to start him out with a ship that takes forever to build, the second is to provide him with a radio system that either takes a decade of tinkering to keep in working condition long enough to get to the field, or contains so many potential control functions that he is tempted to build General Frank Savage's 'Picadilly Lilly' as his first project.

It has long been this writer's opinion that the ideal combination for the newcomer to R/C would be a ship that could be built in one weekend at a minimum of expense, that would be inherently much stronger than the average model, and that would utilize a maximum of six channels of control. The Royal Coachman is all of these things — a model that can be completed (less paint) in two evenings, is rugged enough to withstand the initial pilot errors, and designed for rudder and elevator control (motor is optional — we didn't use it) with a six channel reed rig. The author has long felt that the six channel rig offers the beginner the most for the money and will give him many, many months of flying pleasure with maximum performance and reliability. Our prototype utilized the new Controlaire 6 which can be purchased for $100 and will last until you are ready for the additional controls offered by a ten channel rig or one of the new proportional





ROYAL COACHMAN

DESIGNED BY DON DEWEY DRAWN BY B HALSTED

Royal Coachman and friend. Short, 41" span makes for a small, easy to handle ship . . .

systems. We purposely designed this model to accommodate two Annco, or Royal servos — both were utilized in the prototype. A Cox Medallion .09 was used for power and subsequent flight tests proved the Royal Coachman to be an outstanding multi trainer that can be handled by the tyro with an absolute minimum of dual instruction from a more experienced club member.

And then we removed the .09 and installed an O.S. Max .15 . . . the 41" span ship was now about as docile as a Me 109! If you're a beginner, stick to the .09. It you've past the shaking, quaking stage, dust off the .15 — whatever your choice, you'll find the Royal Coachman offers more flying pleasure with less hassle than any ship you've built.

Design Notes

The Royal Coachman is no raving beauty — it wasn't intended to be. Rather, it was conceived as a fast-building, functional, and serviceable design that could withstand much more abuse than the average multi ship. The design formula itself was taken directly from 'R/C Design Made Easy' by Chuck Cunningham in the March 1965 issue of RCM. Having selected a 41" span with a 7½" chord, which gave us the desired 5.5:1 aspect ratio, we arrived at the airfoil configuration in a most scientific manner — we hunted through a stack of old model magazines until we found one that was the right size! A Cox Medallion .09 was selected for its availability, cost, and dependability.

Insofar as the construction goes, the Royal Coachman is all-sheet throughout. Standard sheet and strip sizes have been used, and all accessory items are readily available. Silk covering is optional — it depends on whether you habitually land on the strip or in the trees. The prototype was completely silk covered although it is not at all necessary. (I keep telling myself it was only to find out how much weight it would add!).

Construction

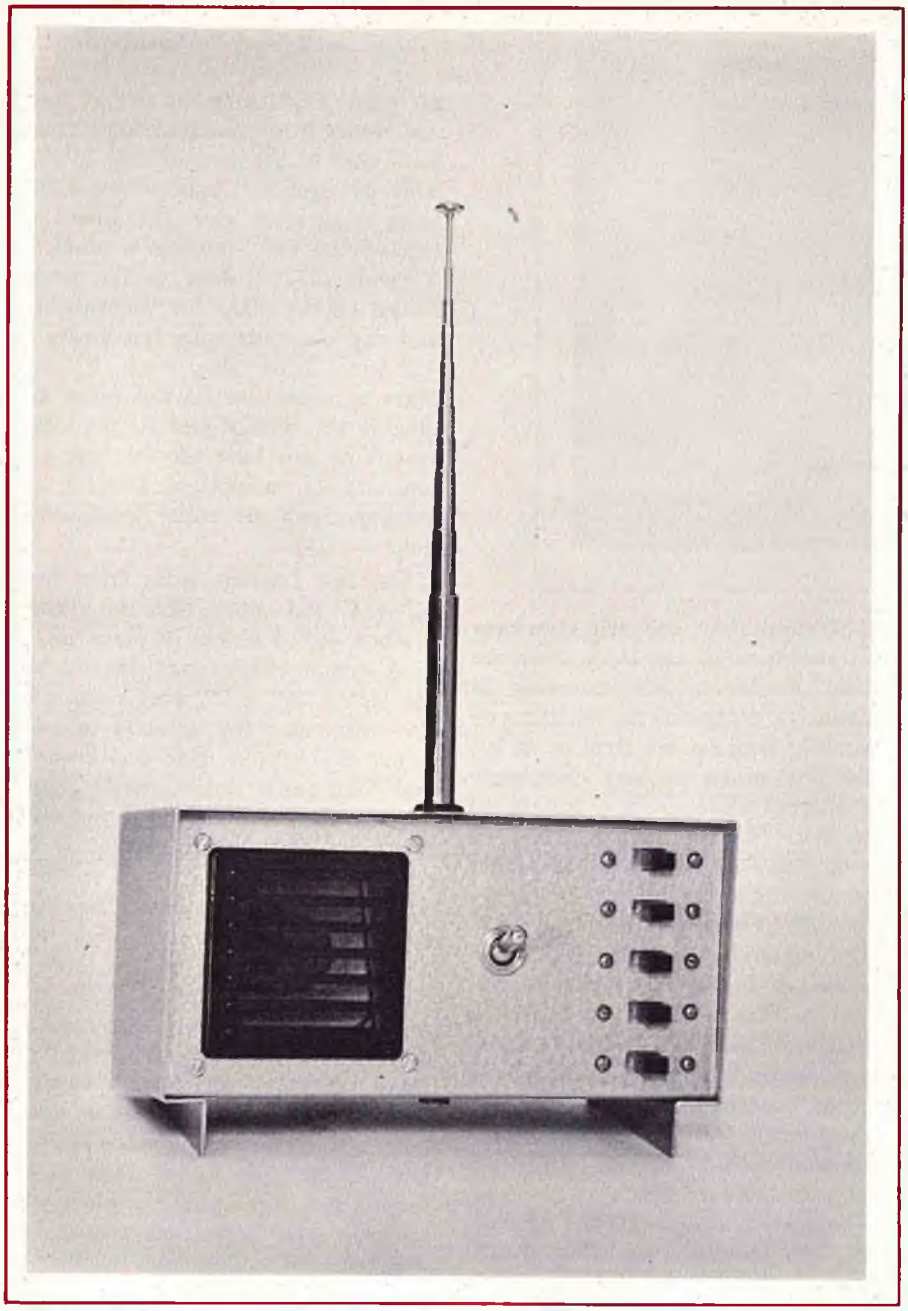
The majority of construction articles advise the builder to begin with the wing. This is done for two reasons —first most modelers dislike building wings; secondly open structure, silk covered wings take time for the dope to completely cure. Since this is all sheet and nothing has to cure, we'll start with the fuselage.

The method of building the fuselage was "borrowed" from Phil Kraft. Phil uses this quick-build idea on a design of his we have dubbed the 'Nasti-Stik.' First, cut a piece of ⅛" plywood 2¾" wide by 10⅞" long and secure it to your building surface. Butt glue to the end of this a 2¾" wide piece of ⅛" balsa sheet, 12½" long, using white glue. This forms the fuselage bottom. Now cut a plank of 4" wide, 3/16" sheet to the length shown on the plans for the stabilizer and cap the ends with two pieces of ⅜" wide, 3/16" strip stock, 4" long. Mark a center line on this piece and glue it at right angles to the other two. You now have the fuselage bottom and stab completed. Draw a center line down the entire conglomeration.

Cut two fuselage sides from hard ⅛" x 4" wide stock. Glue the vertical grained ⅜" doublers in place in the nose section with contact cement. Add the ⅛" x ½" x 7" wing rests. (We use white glue for plywood to balsa joints, Hobbypoxy glue for firewalls and high-stress joints, and Testors "A" for the balance. And if you think the latter fast drying cement is for repairs only, give it a try — you'll be surprised!) Now cut out the three main bulkheads, mark off their location on the fuselage bottom, glue in place (with the exception of the firewall) and hold securely with masking tape until dry. Check with a triangle to make sure they are exactly vertical. Now glue the fuselage sides in place, both to the formers, and to the fuselage bottom, but only as far back as the last former. Again, hold in place with masking tape. When this assembly is dry pull the tail section together at the center line (yeah . . . that's why

(Continued on Page 62)

. . . or a large, awkward one. It all depends upon your point of view!



Build the RCM FIVE CHANNEL SUPERHET MONITOR

A complete superheterodyne monitoring facility for five R/C frequencies . . . A needed safeguard against potential interference.

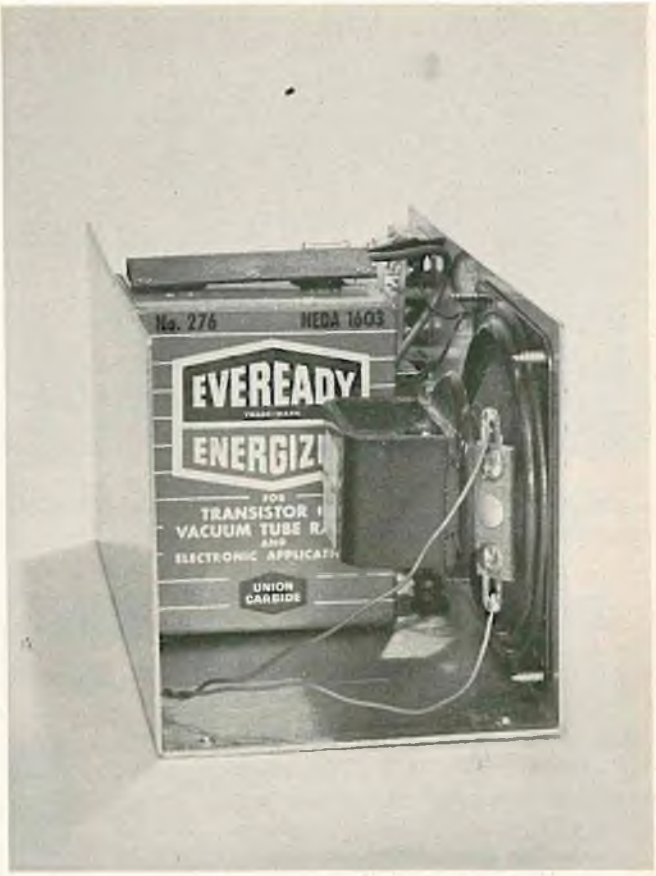
The RCM Five Channel Superhet Monitor was designed to provide a method of accurately determining interference conditions on each of the present five R/C frequencies. It is an exceptionally convenient device whose size and weight allows it to be easily carried in the average field box.

Construction of the Superhet Monitor is quite simple. The heart of the unit is the RCM Convertible Superhet Receiver which was presented in the May 1965 issue of R/C Modeler Magazine. Only a few minor changes have been made to this original circuit, and these can readily be determined from the schematic accompanying these notes. These deviations consist of deleting one 27 pf capacitor and adding one 15 pf capacitor; deleting one 10K-1K Zebra transformer, and adding one 600 ohm-3.2 ohm transformer; and deleting one additional 270 ohm resistor. Additional items required will be a 7″ x 3½″ x 3½″ cabinet, 3″ 3-6 ohm speaker, five DPDT slide switches, one SPST toggle switch, small speaker grille, one Burgess D6 9 volt battery, or equivalent, and a screw-in collapsible chrome antenna (approximately 48″ extended).

Begin construction of the Monitor with the receiver. Leave the entire circuit board, including the areas designated for the relay and the reed bank, intact in order to provide room for the larger transformer necessary in this application. Assemble the receiver per the instructions in the May issue, making the few changes as illustrated in the schematic. Mount the 600-3.2 ohm transformer on the portion of the circuit board normally occupied by the single channel relay. The primary side of the transformer connects as per the original circuit. The secondary leads go to any two unused lands, and then to the speaker. The portion of the board intended for the reed bank is used to secure the mounting brackets that hold the receiver in a vertical position within the cabinet.

Drill all necessary mounting holes and slots in the cabinet for the on-off toggle switch, plus the five crystal slide switches. Cut a hole for the 3″ speaker and affix a small speaker grill to the outside face of the cabinet. Drill a hole in the top of the cabinet for the antenna, slightly oversize in order to accommodate a rubber grommet. This will insulate the antenna from the metal cabinet.

One addition 1 hole is drilled on the receiver side of the cabinet — this is an access hole for tuning the



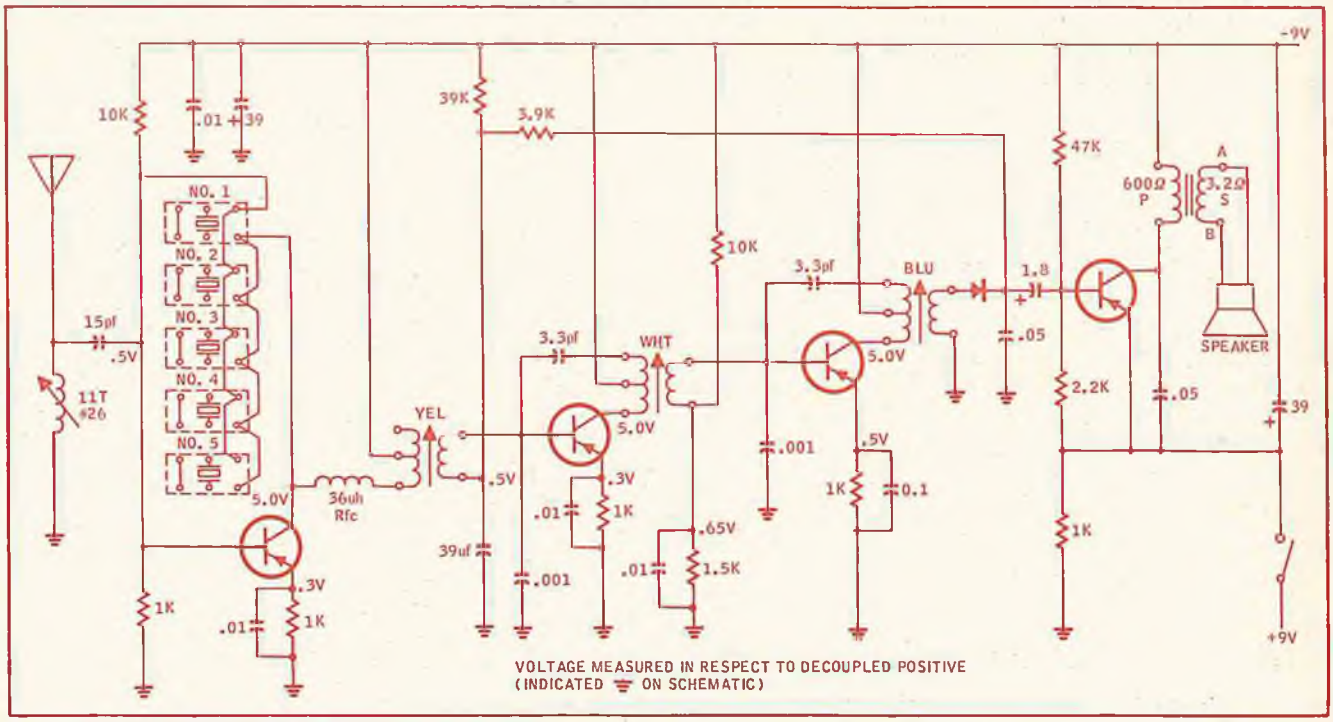
receiver, and can be drilled after the unit is completed.

The function of the slide switches is simply to short out the four crystals not in use when one channel is activated. The wiring procedure can be determined from the schematic and photographs. All leads must be kept as short as possible in the crystal bank.

Mount the speaker with sheet metal screws and the receiver with two small aluminum angle brackets. Be sure to allow room for the 9 volt battery. Add the antenna mounting bracket, and on-off toggle switch.

After all wiring is completed, place the cover on the cabinet, turn the unit on, activate one channel, and tune the receiver in the normal manner. It is suggested that the frequencies and their corresponding "color" be marked beside each switch for ease of identification.

You will find the RCM Superhet Monitor an invaluable assistant at the local flying field. Use it each time you fly —it may save your next ship!



Joe Martin prepares for heat against Jim Stevens' Little Gem. RCM's Don Mathes, assists. Qualified at 2:57.

Bronze and cream Denight Special (RCM March '65). Min-X 10 and K & B .35. Six channels used.

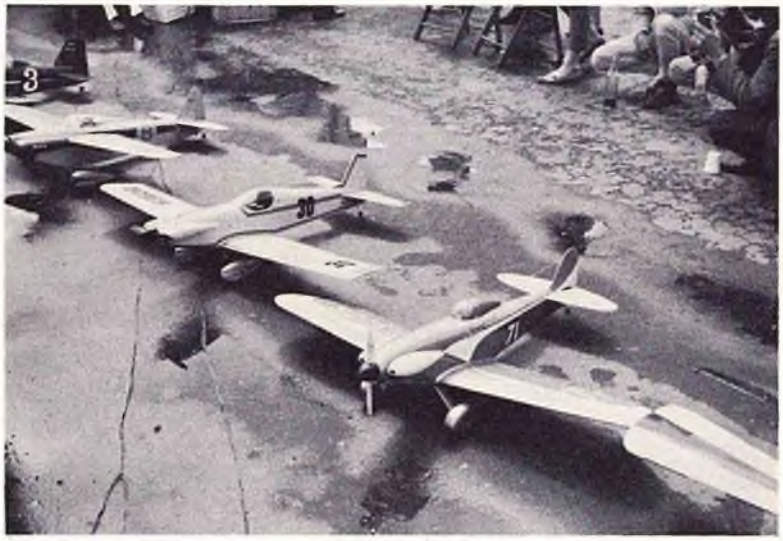
DENIGHT SPECIAL WINS AT 1st N.M.P.R.A. SANCTION

Proportional Bows to Reeds as Joe Martin Tops Field of 18

Joe Martin, with his Denight Special (March 1965 RCM), the latter completely refinished in bronze and cream, easily topped a field of eighteen entries in the first official sanction of the NMPRA, held at Turlock, California, March 26-28. With a qualifying time of 2:57, Martin's ship blazed down the straightaways at close to eighty miles per hour, topping a field of contenders, the majority of whom were using proportional equipment. It is interesting to note that Martin was flying his K&B .35 powered Special with six channels of a Min-X ten-channel reed rig.

Second place in the Finals was Jim Stevens' Little Gem with a qualifying time of 3:32. A ST .40 and Orbit quad proportional was used. The third slot went to Bob Heise with a Swea Pea powered by a K&B .35 and Orbit quad proportional. Qualifying time was 3:35. Los Angeles' Ray Downs was fourth with a Shoestring which clocked out at 3:47. Downs used a Johnson .36 for power and the new Orbit 3+1 proportional system. Fifth place went to Granger Williams with a modified Duck Hawk and a time of 3:24. Williams used a Bonner Digimite and K&B .35. All times listed are qualifying times.

Saturday, the first day of the meet, started off with intermittent rain that left much of the field in puddles. This day was used primarily for test flights, processing planes, and setting up equipment. The latter consisted of the ten-foot high checkered pylons, public address system, etc. Planes were also judged for scale and handicap points.

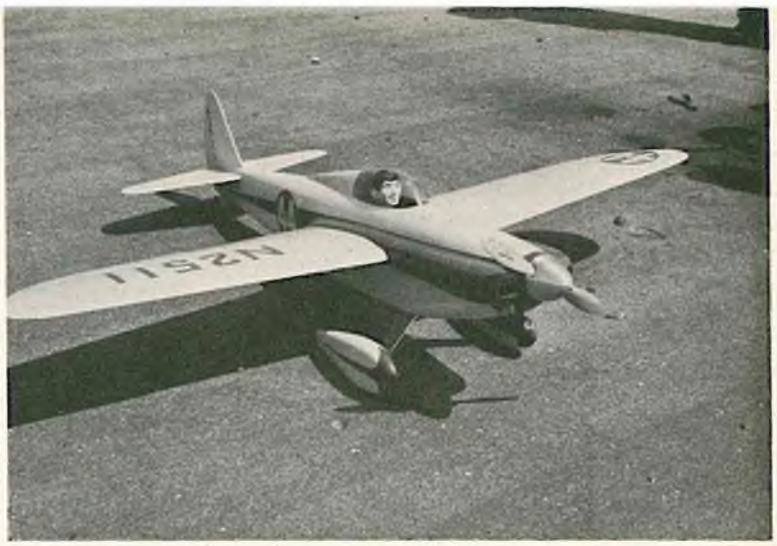


ABOVE: Denight Special in foreground. #30 is Dick Riggs' Aeolus (RCM April '65). Latter developed engine difficulties. BELOW: 2nd place winner — the Little Gem by Jim Stevens. S.T. .40 and Orbit proportional. Qualifying time was 3:32.

ABOVE: A few of the 18 pylon racers at the Turlock event. Jerry Nelson's Bonzo in foreground.

BELOW: Bob Heise's Swea Pea rounds a pylon just ahead of another racer. Bob's #13A qualified at 3:35 — took 3rd in Finals. K & B .35, Orbit proportional.

LOWER RT: Bob Heise's Swea Pea at the start of the flight. One of the best flying ships at the meet.



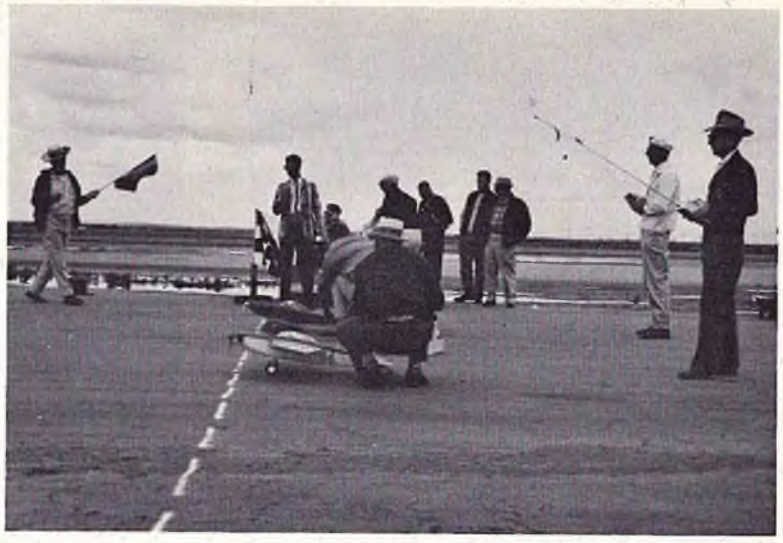
Ray Downs' fourth-place Shoestring. Johnson .36 for power. Orbit proportional. Qualifying time 3:47. Ray's Shoestring awarded Tatone Best Finish Trophy for a scale entry.

ABOVE: Garry Korpi's K & B .35 powered Cosmic Wind. Used Bonner Digimite for 3:59 and 4th place in the Semi-Finals. Pylons in background mirrored by aftermath of Saturday's rain.

Actual pylon competition began on Sunday, and from the start, it was evident that we were watching the first demonstration of an event that is destined to become the most popular of all radio control events. Both spectator and contestant interest and excitement was higher than we had ever before witnessed at any R/C contest. Several of the racing heats were so close as to be truly spectacular, with more than a few ships in danger of collision as they topped the pylons simultaneously. It is interesting, however, that no pylon collisions did occur during the two day event, the only crashes resulting from freak accidents either before or after a race, or from equipment failure.

Ray Down's Shoestring was awarded the Tatone Best Finish Award for a Scale Entry and Dick Riggs the Testor's Best Finish Award for a Semi-Scale entry. Intermission activities included a demonstration by Brodbeck in his full-size Meyers aircraft. Brodbeck, incidentally, is the current national light plane pylon champion.

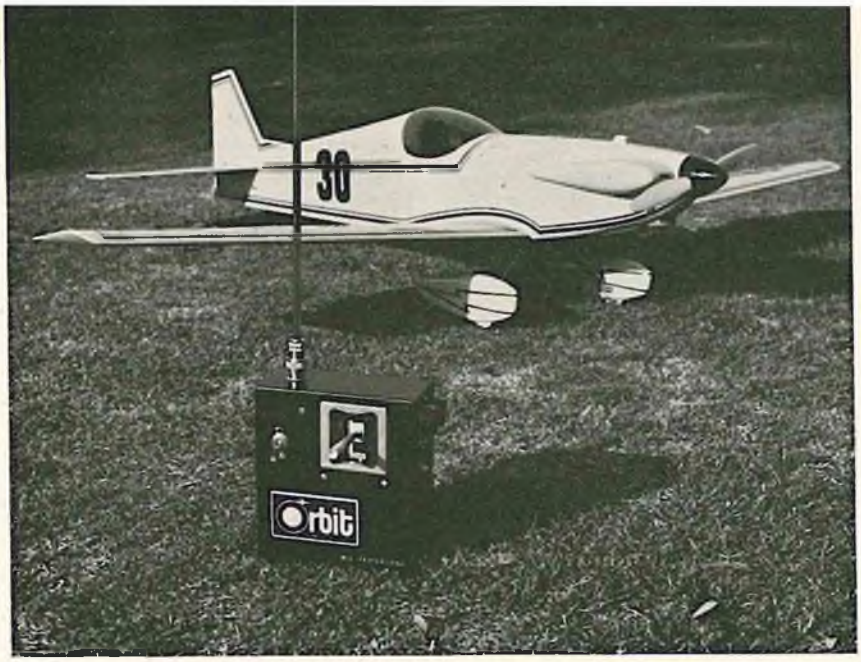
All in all, this was the most exciting event we have had the pleasure of covering. It is our prediction that it is the first of many Goodyear races to come — and the preview of R/C's most popular event in this and coming years.



ABOVE: Granger Williams in foreground prepares for a coming heat. Modified Williams Bros. Duckhawk took 5th in Finals at 3:24 — K & B .35, Bonner proportional. BELOW: Jim Malek's magnificent Cosmic Wind. McCoy .35, F & M proportional.

BELOW: Part of the contest recording area. Note communications system between pylons and main control area. Starter's checkered flags in rack in foreground.

Dick Riggs as he maneuvers the Aeolus around the far pylon. Orbit 3 + 1 proportional.



ORBIT 3+1

by DON MATHES

RCM Tests the Newest Offering From Orbit Electronics . . . Three Plus One Proportional Channels and a New Look.

It could probably be said, without fear of contradiction, that of all avenues of the modeling hobby, R/C modelers are the most dependent upon commercially available goods to fill their particular sporting requirements. Almost every month, new items become available—often very exotic, and inevitably very expensive.

For many years the 'black box" embellished with the name 'Orbit', has been looked upon by contest modelers and sport fliers as a symbol of reliability. In keeping with the march of progress, Orbit Electronics has now produced the 3+1 proportional system.

RCM accepted an invitation from the management of Orbit to select from their production line a 3+1 system. Although having little bearing on this test report, a few comments about the Orbit manufacturing facility might be in order.

Upon entering this rather awesome (by R/C manufacturers standards) facility of 10,000 square feet, one cannot help but have the feeling of being inside a giant, deliberate, well-oiled machine. All of the employees move in a determined, quiet, and an assuming manner. Everyone seems to have a job to do and is doing it with an absolute minimum of supervision. Orbit is one of the few manufacturers that fabricate almost everything used in the manufacturing process with the exception of electronic components. A complete sheet metal shop, a recently acquired machine shop with automatic screw machines, plus injection moulding of plastics are but a few of their complete, integral operations. To the individual modeler, and purchaser of Orbit equipment, this means complete quality control.

GENERAL

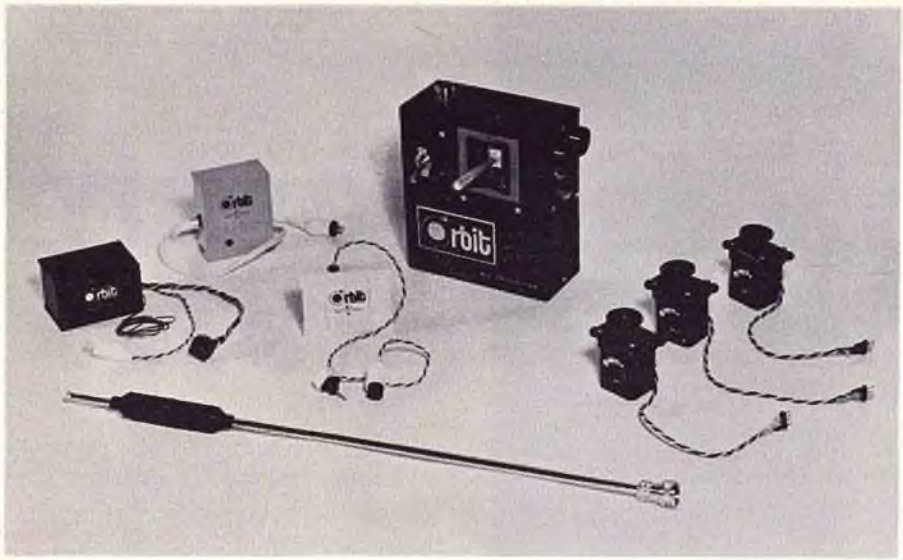
Our first impression of the new 3+1 system is that it is a well-packaged and flexible system. All plugs, switches, servos and battery packs are supplied completely wired and color coded. It requires only a matter of a few seconds to make the system operational — simply plug everything in and it works right in the box. The three servos respond with eerie smoothness and are exceptionally quiet in operation. No interaction of any kind was noticed between servos.

TRANSMITTER

The diminutive transmitter, in this case a "single sticker", seemed rather awkward at first, being accustomed to a two stick arrangement. The latter, however, is now in production for those either too old, or too tired, to break these acquired habits. Getting back to the single stick version, the recommended method of holding the transmitter is to cradle it in the left arm. Primary commands are given by the right hand, while trim and engine control functions are commanded by the left hand. At first, the trim functions (controlled by two knobs), located on the side of the transmitter, seemed a bit awkward to manipulate. However, about fifteen minutes of bench flying removed any confusion on our part as to "what does what and in what direction." The throttle lever is located directly below the trim knobs and is completely natural in operation — forward for high speed, back for low.

Mechanical excellence was noted throughout the system, from the smooth, positive stick action contained in a plastic bezel, so shaped as to avoid interaction of controls at extreme positions. All stick assembly components are machined from aluminum alloy angle stock and should provide years of trouble free service. A notable problem with any stick assembly of this nature is the uneven distribution of mechanical forces on the control potentiometers themselves. This normally results in wear at the pot bearings in a relatively short period of time, causing excessive slop and interaction. Orbit has provided for this by manufacturing and installing special close tolerance bearings in each control pot. Reports to the author from users of so-modified assemblies have indicated no further problems of this nature.

The familiar "black box" is fabricated from .050 aluminum alloy sheet



stock. The quality of the plating of the sheet metal work is excellent.

As may be seen from the photographs, the transmitter encoder, modulator, and RF section is built on a single P.C. board installed vertically within the transmitter case and secured with sheet metal screws. The mechanical ruggedness of the transmitter was tested quite accidentally (honest!) by falling from the top of a moving car onto a concrete roadway. (Ed's. note: We'd sure like to hear the 'explanation' for that maneuver!) Despite the "cement finish", in a few spots, the transmitter continued to operate perfectly.

RECEIVER

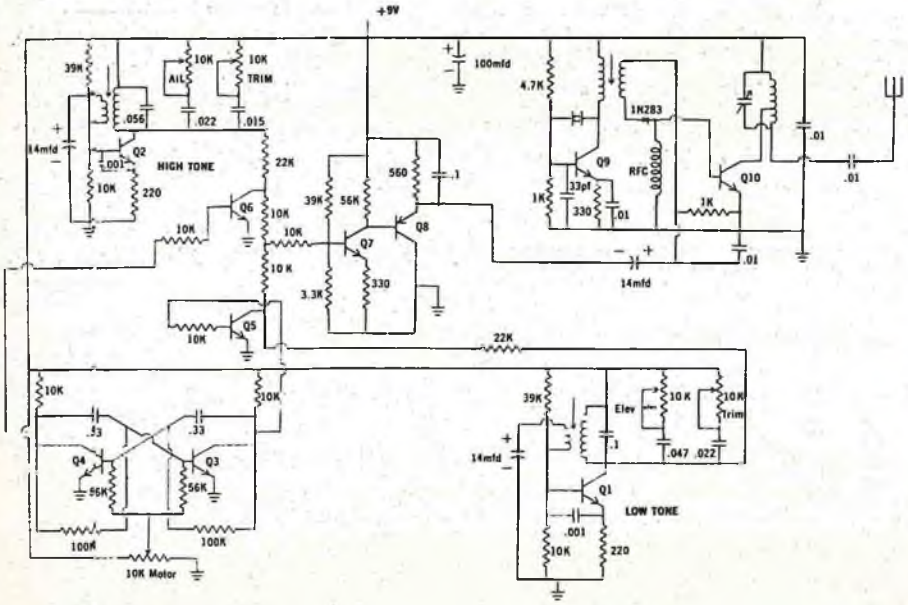
The receiver is of double deck construction, the receiver and audio sections on the top board and decoders on the lower tray. The overall shape of the receiver makes upright mounting in most aircraft extremely convenient. All servo and power connections are brought out at the receiver and terminate in a polarized block connector. All terminations are provided with color coded sleeving and strain relief is provided wherever necessary.

Laboratory tests conducted at RCM indicated the following theory of operation, specifications, and results:

The elevator and rudder functions are operated by two audio frequencies of 3.5 Kc and 1.75 Kc. These frequencies represent neutral rudder (or ailerons) and elevator servos, respectively. Movement of the control stick produces a relatively small frequency deviation which is detected by the receiver discriminators. The two frequencies are not transmitted simultaneously, but in separate segments. That is, one tone is sent for a short period of time, and then the other. These frequencies are multiplexed at a repetition rate of approximately 20-40 cps. This produces a third proportional channel of information which is throttle control. Low repetition rate equals low throttle speed, while high rate equals high throttle speed. This information is generated in the transmitter in the following manner; as can be seen in the schematic:

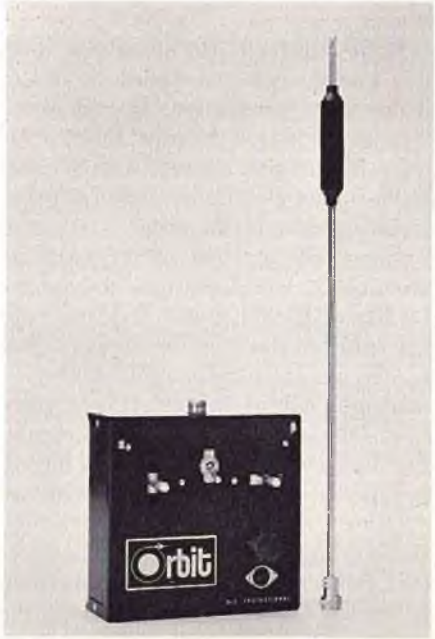
Two separate subcarrier oscillators are used which operate continuously. The frequency at each is determined by special inductors, wound to the manufacturer's specifications, along with the control and trim pots. These outputs are fed to transistor gates which depend on the output at a multivibrator for operation. This multivibrator determines the repetition rate of the subcarriers. The gates drive the modulator which, in turn, modulates the RF carrier.

The receiver consists of a single conversion, crystal-controlled superhet of quite conventional design. One unusual feature of this receiver, however, is the use of a common bias supply for the I.F. stages. Our test receiver exhibited excellent sensitivity and Automatic Gain Control. The Class B second detector used produces a much larger AGC voltage than the more commonly used diode detectors. The output power from the detector is coupled to an audio amplifier of conventional high temperature design which exhibits good symmetrical limiting. Symmetrical limiting, by the way, is mandatory in this application inasmuch as it is desired that the input signal strength have no discernible effect on the output control functions. One of the characteristics of interest is the large percentage of harmonics in the limiter stage. The presence of these harmonics would normally result in ambiguous operation on a channel



Transmitter

Q1 through Q7 — S7209NPN
Q8 — TR970PNP
Q9 and Q10 — S7210NPN



RADIO CONTROL MODELER

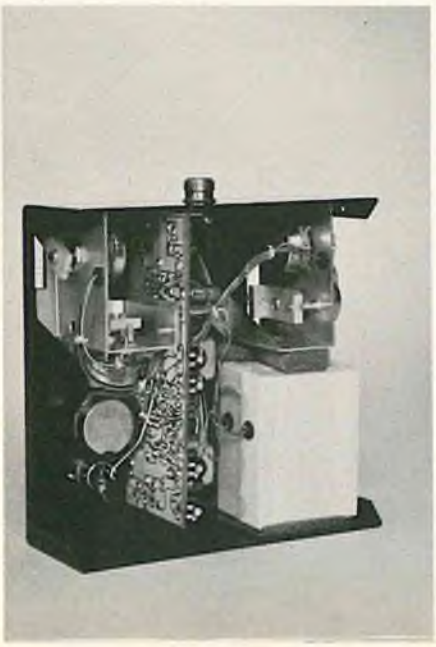
other than the one commanded, since it is entirely possible that a harmonic of one channel will coincide with the fundamental frequency at another channel. This eventuality has been guarded against in the Orbit receiver by the use of a transistor discriminator circuit that requires a minimum input signal before any output is present. The minimum input signal level is chosen so as to be greater than the maximum harmonic voltages, thereby achieving relative immunity from harmonic interference. This feature also provides good noise immunity, since noise input, unless of large amplitude, is not large enough to overcome the initial bias of the discriminator transistors, and operation of the control functions due to noise becomes remote.

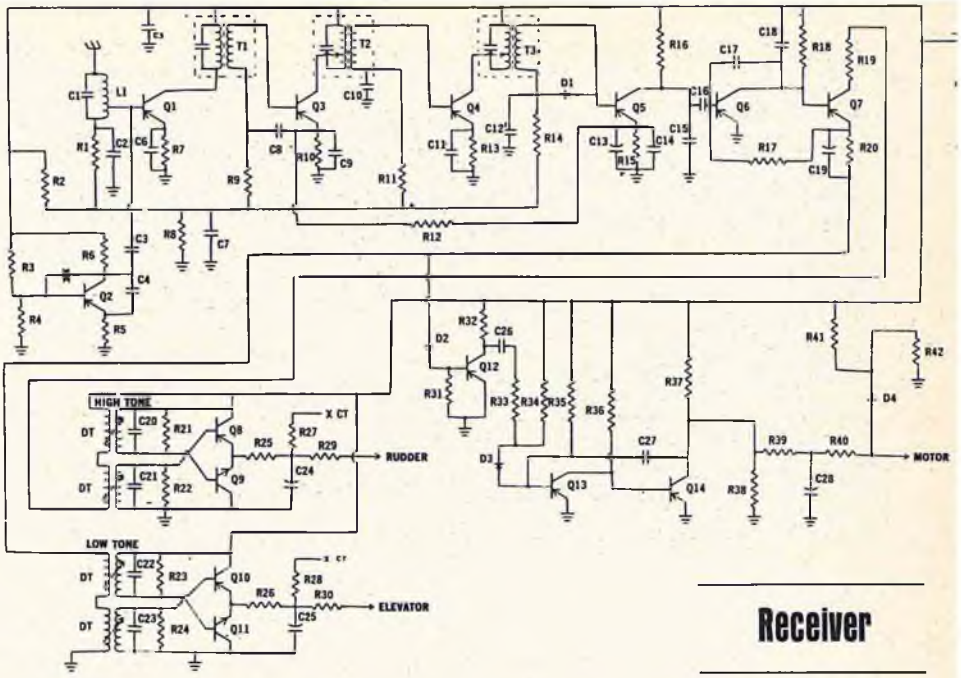
The output of the discriminator transistors are heavily integrated and produce approximately ± .75 vdc for operation of the servos. On absence of signal, these outputs rest at .05, or neutral. This output, before integration, is also used to drive a "one shot" multivibrator. Since a "one shot" is sensitive to the rate function, a third channel is available. As low rates command low engine, it can be seen that a no signal condition would automatically command a servo position of "lower than low speed." Linkage to the engine throttle must be made to provide for this overtravel. The throttle might also be adjusted so as to provide engine cutoff.

Servos

The servos supplied with this system consist of a 6 transistor D.C. amplifier with a differential input to increase sensitivity and temperature stability. When an error signal is imposed on the input transistor, one of the motor driver transistors turns on, causing the motor to rotate. As the motor rotates, the feedback potentiometer, attached to the output shaft, also rotates, creating a voltage which is in opposition to the input signal. This voltage is applied to one side of the differential amplifier. As the voltage approaches the input signal in value, current through the motor ceases and the motor stops rotating. Our servos responded to error voltages as small as .005 volts. The motors used for these servos are the familiar Micro-Mo, but with internal modifications to Orbit specifications. The latter consists of special bearings and epoxied armature winding, observed on disassembly. To say these motors run like a Swiss watch is not ambiguous inasmuch as the precision gears are made in Switzerland. The output shaft of the servomotor gear box drives an additional gear of nylon which is pinned to the output shaft. This gear also carries the feedback pot wiper. The output shaft terminates in a wheel which is drilled in four places for a 1/16" diameter pushrod wire. The wheel output provides complete ease of pushrod installation, and all that is required is to move the pushrod to the opposite side for reversal of surface movement.

"3+1" channels of control are available with this system. Quite complete instructions are given for coupled rudder and ailerons, wherein two servos are operated in parallel on low speed engine, with only the aileron servo remaining operative on any other throttle position. It would, therefore, seem possible to equip a full house multi with the 3+1 with only minor disadvantages over the quad proportional systems.





Receiver

Flight Tests

Complete and extensive flight testing was accomplished by RCM editors on the 3+1 system. Both ground and air range was more than adequate with the latter "out-of-sight." All control functions responded excellently, with a high degree of smoothness, and no interaction. The deliberate operation of other transmitters on all adjacent channels provided no cross modulation problems within normal operation proximities. No failure modes were encountered. The Orbit 3+1 operated perfectly during all flight tests, and to the complete satisfaction of the test pilots performing the evaluation.

Specifications

Servo

Stall current: 450 mA
Idle current: 12 mA
Maximum load: 2.5 pounds
Transit time (neutral to full extreme) .25 seconds (.5 seconds stop to stop)
Output: wheel, non-adjustable
Motor: modified Micro-Mo
Feedback element: hot molded carbon

Transmitter

Size: 2-5/16" x 5-3/8" x 5-15/16"
Weight: 2.5 pounds
Operating voltage: 9 volt dry battery (Burgess D6 or equivalent) or optional rechargeable nicad power supply.
Current: 70 Ma nominal
RF Output: .3 watt
Modulation Percentage: 95%
Operating Temperature Range: −20 deg. to + 150 deg. F.

(Continued on Page 49)

Woody, Smog Hog, and modified '404'.

MODIFYING THE SAMPEY 404 PROPORTIONAL SYSTEM

H. E. "Woody" WOODRUFF

Less than $35, plus a few hours work, will make your Sampey '404' Superhet Proportional System one of the most reliable rigs around.

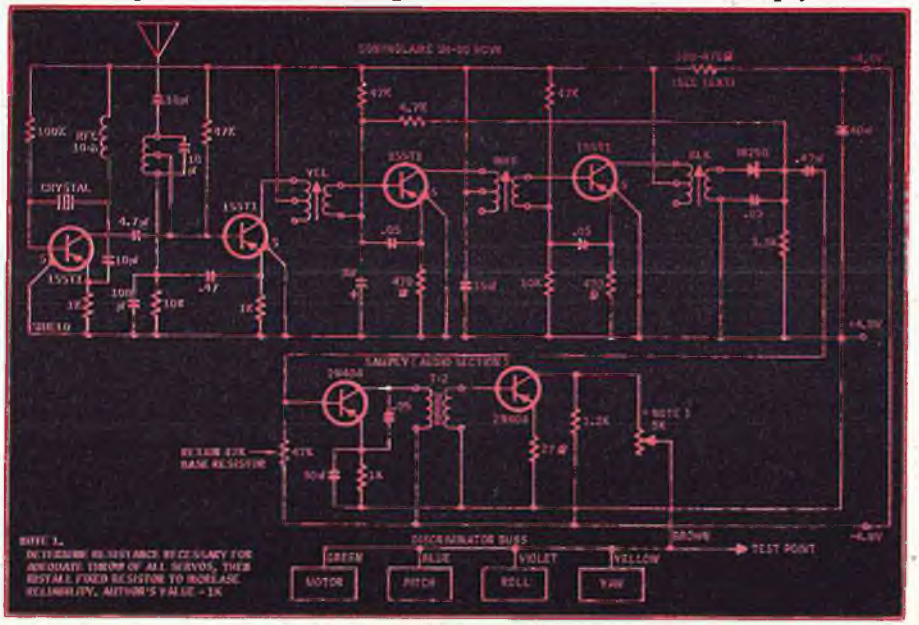
The following data and experience is being offered by the writer in an attempt to help those who have been having difficulty with the older Sampey '404' proportional equipment. In the author's case, the set is about a year and a half old and never worked quite properly. A few months ago we developed several modifications to this system, and if your trouble corresponds with our symptoms, then a few hours of shop work, plus an investment of under $35 will have you airborne once again.

The information contained in this article will be concerned with those sets utilizing the Sampey superhet receiver — the author has had no experience with the superregen version and, therefore, has no data concerning its operation. To get into the general symptoms, we had the 404 version which contained the airborne power pack converter. It had fair range, but we had a difficult time keeping zener diodes in it. When one of these went bad, all power supply regulation went to pot and the servos would jiggle around intermittently. We could, in fact, wave the transmitter back and forth and the elevator of the plane would wave back at us! Incidentally, ground range wasn't too good with this version, but was apparently just enough once the plane was airborne. It was also noted that elevator trim varied with the distance between the plane and the transmitter.

At this point, conversion to an all-battery model for the airborne portion became available, and it was decided to have this modification performed. This didn't help the situation at all, as now the equipment had even less range than it had before! We could walk away from the receiver, and at about 50-100 feet — nothing! Complete loss of control occurred, with the actual range varying intermittently for no apparent reason. If these are your symtoms, read on — there's a good chance of vastly improving your '404' system.

Your main problem is with the receiver. To borrow a good old field phrase, the 404 superhet "just ain't got it." When it is peaked up, the IF cans go into oscillation and you lose control of all the functions. You can prove this to yourself simply by connecting earphones to the audio tie-point and listening to **motor** tone only. In most cases the tone will suddenly jump **one octave,** or you will hear two tones instead of the one. This can also be observed on a scope, if one is available. The IF cans can be detuned to stop oscillation and make for more stable operation, but then you lose your range! If you are familiar with transistorized receiver circuits, a second glance at the 404's circuit configuration will tell you that this is a very unstable circuit from a

The complete schematic showing the Controlaire SH-20 and Sampey '404'.

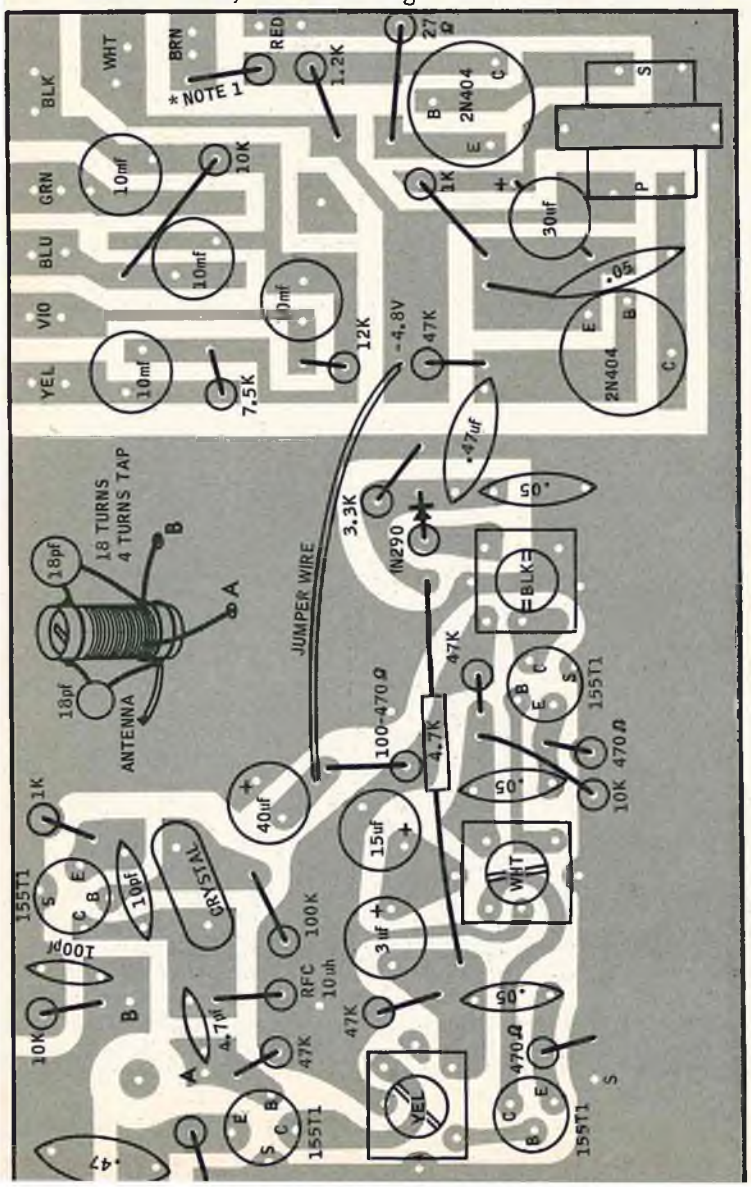


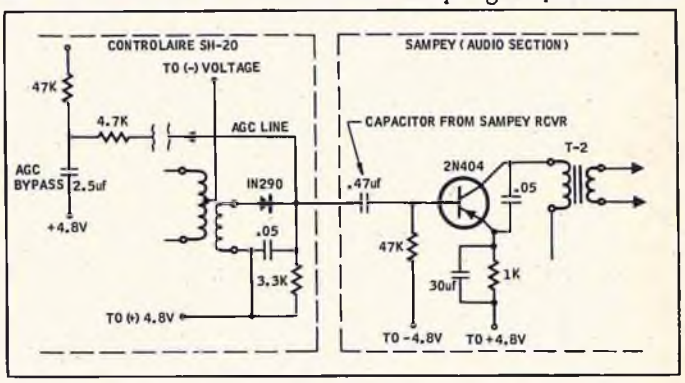
temperature standpoint. For instance, the transistor bases are not divided off so that there is a good steady voltage at these points — there are no emitter swamping resistors in the IF circuitry. So what to do? Get a receiver with better stability and plenty of pep — sensitivity-wise, that is.

In our case, the World Engines SH-20 Superhet kit filled the bill perfectly. This is available, sans reed bank and case, for about $32.95. It uses the same voltage as the 404 and you can actually vary the sensitivity by changing the common IF collector dropping resistor as specified in the instructions with the kit. We jumped right into the fire and installed a 100 ohm resistor here and were able to peak up the receiver in a matter of a few minutes **without** the IF's going into oscillation. Ground range was now **in excess** of 1,000 feet and those servos were as steady as a rock when no command was being sent. Normal rudder control was still available at this range, a fact that amazed us, since this is usually the first function to go out on the 404 system when signals become weak, due to its high modulation frequency. We felt that 1,000 feet was plenty of ground range, so we went ahead and flew at this point. What a difference! Although we have only been flying the modified 404 for two months, not one "glitch", or loss of any function has been experienced. So now, if you're interested in giving it a try, let's get into the technical aspect of the modification and go through the procedure we used with success.

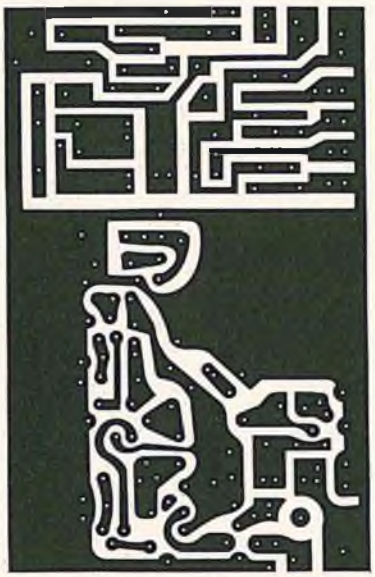
Let's start with the transmitter, as this is the easiest modification to accomplish and doesn't take much time. We inserted a milliammeter into the final RF amplifier (in series with the RCF-2 and +160 volts) plate circuit and found that the final was only loaded up to 4 milliamperes, as the transmitter came from the factory. We were able to load it up to 8 ma. and higher with the pi-network capacitors at which time the reading on our field strength meter actually doubled. This might be worth a check on your transmitter as we are interested in getting as much RF out as possible. We then checked the RF out with a neon bulb and found that most of it was still in the transmitter case around the pi-network coil. At this point we decided to make the antenna with a loading coil by following Dale Springstead's article to the letter. (Grid Leaks, Sept-Oct 1963). It was possible to load up the final to 7 ma without making any changes to the pi-network, and the field strength meter **had to be de-sensitized** by about three times to keep from pinning the needle! We were certainly getting more efficient radiation now! The author's transmitter power supply puts out 150 volts, the final draws 7 ma which gives 1.05 watts into the final. With an efficiency of umpty-ump percent — well, you figure it from there. We tuned the oscillator plate tank also, setting it just below the peak on the "stable" side to ensure good stability and maximum drive to the final. This should do it for the transmitter.

You can use the receiver board that comes in the Controlaire SH-20 kit and mount it just above your present Sampey board after you have removed all of the I.F. and oscillator parts from the board. You will retain the .47 mfd. audio coupling capacitor and

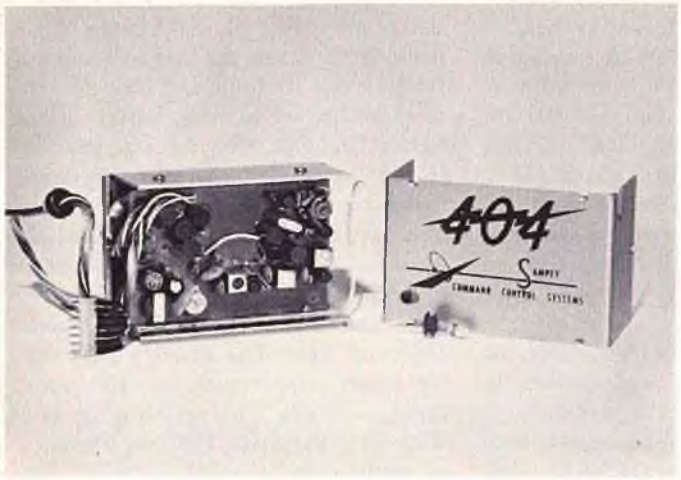




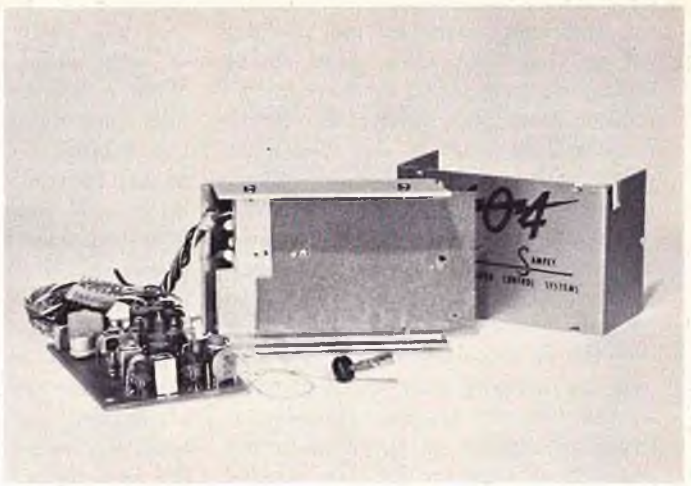
LEFT: Twice actual size P.C. board with component layout. ABOVE: Detail schematic illustrating the introduction of the Controlaire SH-20 superhet to the Sampey 404 audio section.



LEFT: Full size P.C. board for Sampey modification.



'404' receiver with new top deck, consisting of modifications in this article. Plenty of room for "ham-fisted" technicians.



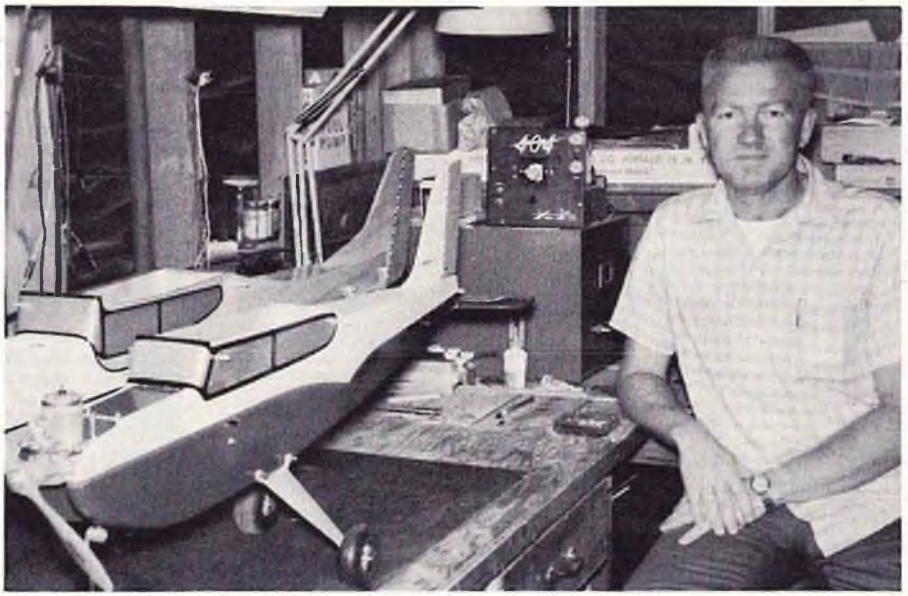
New top deck removed — Note sheet of insulation over metal deck support. Two small sheet metal screws hold P.C. board in place.

everything thereafter on the board. We did things up brown by fabricating a new printed circuit which combined the SH-20 receiver and the Sampey audio section. This circuit board is shown, here. Everything is used in the SH-20 circuit **up to the audio coupling capacitor.** Instead of using the 15 mfd coupler as supplied in the SH-20, use the .47 mfd out of the Sampey board. We found that it was unnecessary to go beyond the .47 mfd here. However, **don't** use the 15 mfd AGC capacitor in the SH-20. — we found that 2.5 mfd was ample and still gave us plenty of speed on AGC action time. The detector load resistance used will be the 3.3K as supplied in the SH-20 kit. A modification came out on the Sampey which changed the 47K resistor on the base of the 1st Audio stage to a 10K. We tried this and found that the gain through the stage was lowered quite considerably while it was supposed to improve the frequency response of the receiver. This we changed back to the 47K to retain our gain, and our frequency We would recommend installation of response is still more than adequate. a 47K at this point if one is not already installed.

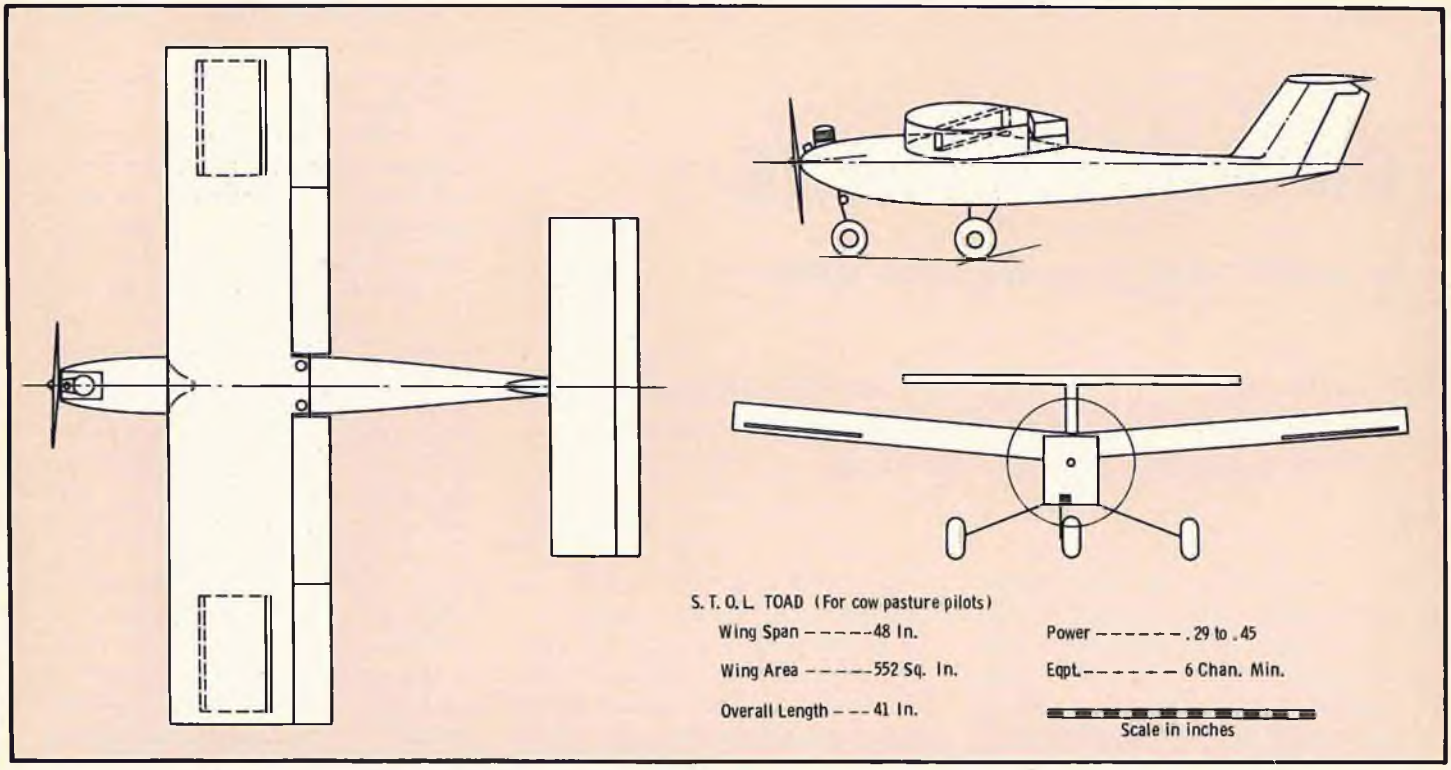
The best method in tuning the receiver is to use a scope connected to the audio test point using +4.8 volts as common. Turn on the transmitter, and with the **motor** tone only on, peak up the I.F.'s and antenna coil as much as possible while using the weakest signal from the transmitter. (We had to place the transmitter on the floor-board of the car and close the doors in order to get a very weak signal!) This should do the trick and you should be ready to install the 404 in your plane and **GO!** With just the airborne equipment **on,** you will notice intermittent wavering of your control surfaces. This is normal due to inherent receiver noise, and is really a good check to see if the receiver is operating properly. Turning on the transmitter and depressing the **start** button should bring all control surfaces to neutral and be rock-steady.

So get with it and get your 404 off the shelf! Considering that you have at least a $500 investment there, is $35 more worth it to get many hours of completely reliable air time? Sure it is, so give it a try. We think you'll be surprised at the results, and much happier, too!

(Ed's note: Sharp eyed readers may note that Woody has a 10 mmf across the Controlaire antenna coil instead of the 18 mmf as supplied with the SH-20 kit. This was necessary in the author's case since the coil happened to "peak out" with the slug all the way out of the form when using the 18 mmf. Installation of the 10 mmf gave Woody the peak where the slug is presently located.)



The author in his workshop. Smog Hog in background, newly completed Mark I (RCM plan) in foreground. Woody's Sampey system has performed to perfection since these modifications were completed.



R/C Design: STOL

by CARLOS G. FONDREN

Full-house multi from the local schoolyard? STOL may be the answer . . .

As most R/C modelers around the country are aware, suitable flying sites are becoming more and more scarce. Sites are lost to housing construction, noise complaints, etc. Even with this seemingly poor prognosis, there are open areas around the country that could be turned into flying sites if this design concept is put into practice — a good, rough-field airplane.

By the way of explanation, we need a short discourse on the state of the art as it exists today. Multi airplanes, in general, seem to have fallen into a rut since Ed Kazmirski designed the Orion. Most of the newer designs are kissing cousins of the Kasmirski designs. These planes are quite fast, requiring long, smooth runways for comfortable operation. The performance of these modern day multis can be likened to WW II fiighter craft as the Mustang, Spitfire, etc.

In my opinion, the average RC'er today, needs a model counterpart of the new LARA and COIN airplanes ordered by the government. These craft are somewhat slower than WW II fighters but can operate from small, unprepared airfields.

The drawing accompanying this article is of my proposed STOL model, dubbed 'The STOL Toad." (Named after Disneyland's "The Toads Wild Ride" — my flying is pretty lumpy!) The specifications for the new plane are as follows: The wing is very short, 48" in span, with a low aspect ratio (4:1) to make it easier to dodge boulders and weed clumps. There are moderately large flaps which would be triggered by micro switches on the trim to give half flaps and/or full flaps for increased lift at slower flying speeds. The wing would also have slots in the lower leading edge, spilling the air out over the top of the ailerons for better response at higher angles of attack. The empennage is of the "T" type in order to keep the stabilizer well clear of obstructions and to put the control surfaces more nearly in line with the propwash.

A typical flight with this type of design might be as follows: Find a spot in the field about fifteen or twenty feet long with no bushes or boulders in the way. Fire up the motor and punch in full up-trim which, in turn, throws the micro switch, giving full flaps. Advance throttle to high speed and the plane jumps off the ground in a few feet. The propwash, acting on the flaps, gives extra lift at low forward speeds. The plane gets twenty feet of altitude in a hurry, almost like a helicopter. Now, ease down on the trim a bit and the flaps come up to half position. The speed increases and the model climbs steadily. Neutralize the trim and the flaps and the model suddenly turns "tiger." After a few rolls, loops, Immelmans, etc., the model is turned on to the downwind leg. Throttle back and haul in enough up-trim to drop the flaps to half-position. The plane slows down but flies steadily with minor throttle corrections. Now a 180 degree turn and you are heading for the spot at about fifteen feet off the deck. Crank in full up-trim and full flaps, nudging the throttle a little to kill the stall. With the plane mushing along at a snails pace with only five to ten feet of altitude, you chop the throttle a few feet before the spot and the model settles to the ground like a duck landing on water. Even if you do hit something, the damage would be slight due to the very slow landing speed.

A plane of this type would turn many a weed patch into a potential flying field. With a good muffler it could easily be operated from the local school yard. It will also give the designers something to do besides copy Big Ed.

So, what do you think of the idea?

ON POLYSTYRENE

by ROBERT LIEN, M.D., and STAN JOHN

RCM Editors asked a leading foam wing manufacturer for an insight into current developments with polystyrene. Here's a closer look at "pre-fab" wings . . .

In the past two years, many important changes have occurred in this mutual hobby we all share and enjoy. It is not our place to detail all of these advances in this article, but we do wish to draw your attention to the use of expanded polystyrene as a modeling material. In the past year we have developed some little experience in this field, and we would hope this article will serve to dispel some of the common misconceptions in this area.

As with anything new, a certain period of time must elapse in order that a proper place for the new process or product can be found. Early attempts at this type of structure were naturally quite crude. Early model wings, and some newer ones, were heavy, cumbersome and anything but true, aerodynamically. Landing gear structures were weak and heavy. Adhesives and types of foam used varied from modeler to modeler, with much resultant confusion.

The work of several pioneers in this new field should be noted. In this country, Ed Izzo needs no introduction. His early writings on this subject are an excellent reference for those embarking on a foam wing program. The British published some excellent articles. many of them unnoticed by the American RC'er.

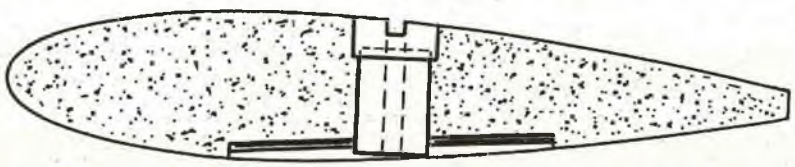
It would seem, in view of this existing confusion, that a definitive discussion of the present state of the art as concerns foam surfaces, is in order. The author bears no banner of infallibility in this respect, but we have had considerable practical and experimental experience with this aspect of the hobby during the past year, and possibly this experience may be of use to others.

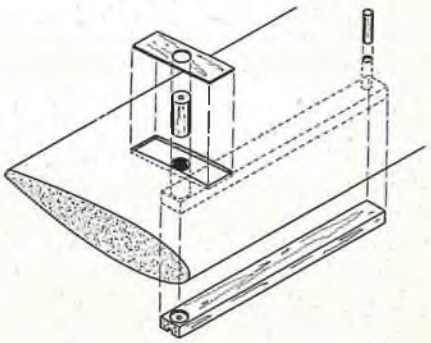
To begin, let us go back a year or so — when expanded polystyrene materials became generally available, and men such as Ed Izzo had foresight enough to see the potential application of these unusual materials as pertains to modeling. A method of cutting the materials was developed, using a heated nichrome wire. Frames were constructed, rheostats adjusted, and lo and behold, an airfoil shape could be attained. Later refinements allowed the construction of tapered panels. During these early years, new adhesives had to be found, since most common cements such as model cement, contact cement and polyester fiberglass resin attacked the foam voraciously, devouring it like a crazed, starving termite.

At this point, we began to adopt the vernacular of the plastics engineer, and spoke in terms of 'cratering' and 'dissociation'. As time went on, and more and more foam panels fell to the ravages of unsuitable adhesives, we learned that all foams are not alike, particularly as concerns weight. Most expanded foams weigh about 2.2 lbs. per cubic ft., yet the Armstrong Armalite we now use weighs less than half this much! What does this weight difference mean, besides the obvious point that lighter foam means a lighter wing? Well, probably the major advantage lies in the fact that this lighter material now allows us to form a solid core wing. The only cutouts needed are for servo opening and L.G. mount. Why is this an advantage? Because, a solid core wing is extremely warp-resistant. Cored (hollow) foam wings usually must have an exit point for the cutting wire which destroys the integrity of the foam material and thus allows warpage to creep into the picture. If the solid panels are cut from a warped piece of stock, of course this warp is carried into the wing or stab panel itself, so care must be taken to start with an unwarped true piece of material. Attempts at straightening a warped material block are fruitless — the warp is a product of internal stresses in the material, and cannot be straightened out. Do not attempt to use such a block in your own wing-cutting attempts!

We have found that the L.G. mounting shown has stood the most terrifying stresses, and to our knowledge we have never had a failure in this structure since adopting this method of fixation. It is simple, practical and extremely strong. Of course, use a good grade of Epoxy such as Hobbypoxy for gluing all L.G. components in place.

Many people ask us, why no spars in your wings? We utilize only a 3/16" sheet balsa doubler at the di-





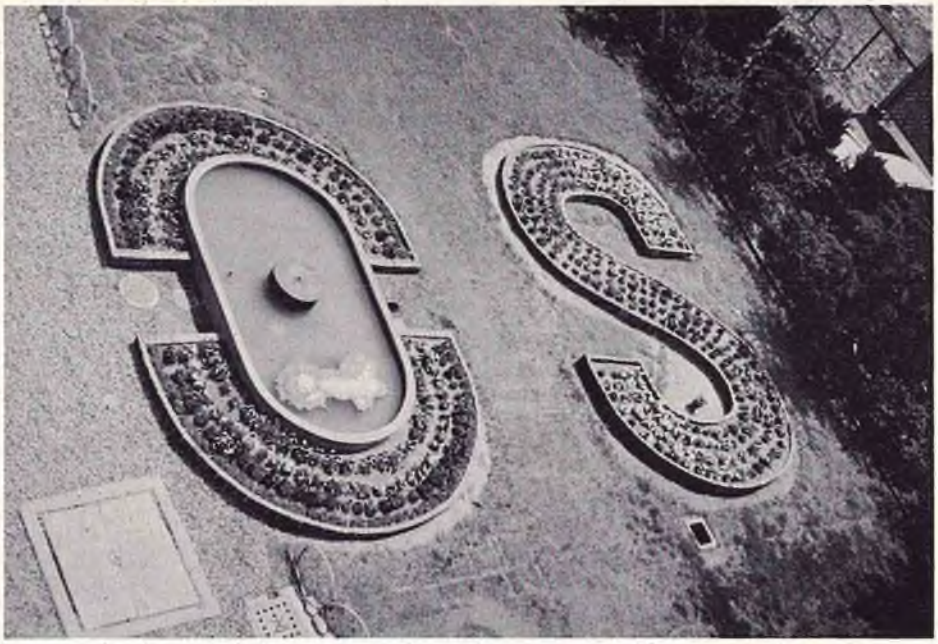
hedral joint, and we have never seen a failure at this point. The strength of a foam core wing lies in that piddly soft 1/16" balsa skin, laminated to the core. From an engineering standpoint, the foam is there only to hold the balsa sheeting apart. The balsa skin will withstand a fantastic amount of compression and tension. We do add a 6" wide fiberglass cloth and resin laminate to the center section.

We have already touched upon the problems encountered in adhesing this peculiar and frustrating material, expanded foam. Over a long period of time we have tried any number of adhesives of various types. We have left a trail of cratered and smoking foam in our wake in the process! Several important facts have come to light during this trying period of experimentation. First, a slice of any of the foam materials is impervious to air, if the slice is thicker than a few microns. Foam is a cellular material, and there is absolutely no provision for passage of air, water or whatever, through this seemingly porous internal structure. After all, expanded foam is now the best life-preserver material on the market! This fact has a very important and practical application — if one attempts to glue the panel roots with an adhesive such as white glue, which requires exposure to air to dry properly, you are in trouble. This is to say, the surface glue at the foam interface will dry, but will effectively seal the underlying glue from the atmosphere. The inner glue is as safe from drying properly as if it was still in the bottle on the shelf! For this reason, at the dihedral junction, one must use an adhesive which does not depend on air for proper drying. The answer here is obviously an epoxy material, which relies on polymerization for curing. Our personal choice is again Hobbypoxy, due to its great strength and rapid setting time. White glue is suitable for skinning the cores, since the overlying balsa sheeting is porous enough to allow air to enter, albeit slowly. For this reason, if white glue is used to adhere the skin, give it at least 24 hours before removing the panels from the sheath, or otherwise disturbing your newly sheeted wing. We use white glue for tip blocks, but epoxy is also of use here.

By far the most exciting development in foam wing construction is the recent discovery of a contact type of adhesive which will perform the skin bonding in a matter of minutes. The search for such an adhesive has been long, but worthwhile. It is now entirely possible to build an entire wing, ready for finishing in a matter of two hours! Most contact adhesives react unfavorably (cratering!) with all types of polystyrene foam. The development of a non-reactive glue has recently been completed by another RCer, Chuck Chambers of Huntsville, Alabama. His product, Quick-Stick Cement by Rocket City RC Specialties, 1901 Polk Dr. N.E., Huntsville, Ala., has proven ideal for this purpose. The cement bonds very firmly and rapidly, and makes it an absolute pleasure to build a wing! The weight saved in using one of these contact type adhesives is considerable. It is now quite standard to expect a foam wing to finish lighter than conventional all-balsa structures. This we all know has not always been the case! Adhesives of this type work best with the expanded bead foams.

It has always seemed to us a shame that such a light, true and strong structure as a properly designed and executed foam wing or stab must be

(Continued on Page 39)



RCM VISITS O.S. MODEL MANUFACTURING CO.

by BILL WEAVER

Courtyard of the O.S. factory showing the initials "O.S." in a flower garden arrangement. The letters are about 30 feet long. RCM photo was taken from the roof of the factory.

Exclusive RCM Photo Tour of O.S. at Osaka, Japan

Several months ago, R/C Modeler Magazine was privileged to be the guests of the O.S. Model Manufacturing Company, world renowned manufacturers of model engines, radio control equipment, and accessories. Located at Osaka, Japan, the O.S. plant facility consists of several two story buildings and a dormitory where their 80 plus employees reside. As is the Japanese custom, employee housing is company furnished. A great portion of the Japanese industry is paternalistic, and receive a high degree of loyalty from their employees in return. Entire families are employed at the O.S. factory and they add up to a stable, highly-efficient work force.

The founder and president of O.S. is Shigeo Ogawa who made his first engine, a steam plant, in 1936. The first O.S. model airplane engine prototype appeared in 1937, with production started on the O.S. 'Pixie' the following year. In 1939 the OS III was produced, followed by the O.S. V and VI. Both of the latter were popular in Japan during the late '30's. These engines were characterized by their sand cast aluminum sides, similar in appearance to the Ohlsson .60.

Mr. Ogawa, an active free flight modeler, won many Japanese contests during the late 1930's with an O.S. in a Carl Goldberg 'Zipper'. The following years of the later '40's and early '50's saw an upswing in interest in racing engines throughout Japan. Then, in 1958, the O.S. Max .35 was produced as an R/C engine. This success was quickly followed by the Max .29, .15, .09, and .19. All were widely accepted, the Max .15 coming into international popularity by its prominence in the winners circle at the U.S. nationals in Rudder Only. When Jim Kirkland won the 1963 Nationals with an O.S. .49, it became quite evident that O.S. was producing an engine that was equal to the best available for serious competition.

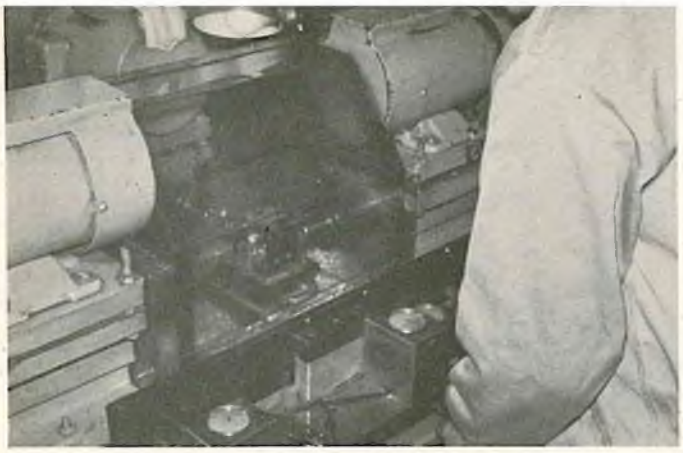
The next engine to be released by O.S. was their .50 R/C — a prototype used by the author was characterized by excellent power and idling characteristics. One-flip starts continually impress local fliers. This is a ringed piston engine with ball and roller races supporting a large 13 mm shaft.

World Engines, exclusive U.S. importer of O.S. products, has announced via their new catalog, the O.S. Max 60 R/C, the largest of the current crop of O.S. model engines. This new mill uses a reverse drum induction system. The piston is a cast flat non-dome configuration with two cast iron rings. Compression ratio of the R/C version is 6.8:1.

Although perhaps not so well known as their extensive line of model engines, the O.S. trademark is also applied to a rapidly growing line of radio control equipment. Among the first items in the O.S. R/C equipment line to make their appearance were the diminutive O.S. Minitron escapements and single channel receivers and transmitters. World Engines has also announced the current availability in the U.S. of the O.S. 6 channel reed system. In addition to a complete line of superhet radio equipment from single to ten channel multi, O.S. engineers are devoting extensive research and development to the production of a quad proportional system.

Our tour of the O.S. facility served not only to impress us with the organized, clean, and obviously efficiently run factory, but with the constant development work in progress. This continuing development is not only in the design field, but in production techniques. For example, special purpose, O.S. designed precision machines are employed in engine production.

As Mr. Ogawa said to us — "I have no time now to fly, as I am constantly occupied in study and research to keep the O.S. products in the forefront." And if O.S.'s past history is any indicator, O.S. products will be in the forefront for many years to come.



Precision lathe used to fabricate O.S. Max engine parts.

All the rear crankcase holes are drilled and tapped simultaneously for the O.S. .50 on this specially designed machine.

All O.S. Engine parts are carefully cleaned, assembled and checked out before the engine is test run.

Here, engine parts are polished in a giant tumbler.

O.S. electronic assembly line. Intense concentration of employees is particularly noticeable.

Trained technicians accomplish final assembly of the O.S. 10 channel transmitter.

Mr. Ogawa's office at the end of the assembly line where quality control and research is carried out. Proportional is current project.

One of four engineers, who along with Mr. Ogawa, perform quality control checks along with design engineering.

HINTS and KINKS

Fuelproofing decals. For those of you that want to seal a decal, try a product called Styrene Spray paint, manufactured by 410M with a code number of s-50, Clear Gloss. This product was made for the model train enthusiasts and can be found in most hobby jobs for 89c. Dope your plane in the usual fashion, add decals, then spray with Styrene Spray — you will find that it seals the decal from hot fuel, etc.

—Illinois R/C Association

On dope. A few nail holes around the lip of your dope can will prevent the butyrate from building up and overflowing the sides. Make the holes large enough to allow the dope to drain back into the can. While on the subject of dope, you can give your paint job a deeper shine, as well as reducing the odor, by adding six drops of Oil of Wintergreen to every 4 ounces of color dope. This is available at most drugstores.

—Valley Forge Signal Seekers

Balsa filler. AMT Advanced Customizing Body Putty, manufactured for model car builders, is an excellent balsa filler. A gray material, it applies easily and can be worked and sanded readily. It seems vastly superior to Plastic Balsa in that it does not pit after sanding and only a minimum of dope is needed for covering and touch up. Get a tube and give it a try — you'll be pleasantly surprised.

—Pioneer R/C Club

Hobbypoxy. Unless proper procedures are followed, adhesion problems may occur when using Hobbypoxy over clear doped areas. Be sure to remove high gloss from the doped surface before applying Hobbypoxy. Make sure that the dope has been allowed to dry 72 hours before application of this material. Mix the Hobbypoxy 45 minutes prior to application and be sure that temperature and humidity are reasonable. When masking, keep the cellophane and masking tape which adheres to the Hobbypoxy surface to a minimum — never more than ¼ inch. Remove the tape while the trim colors are still wet by pulling back over the tape and not lifting straight up. You will find that black electricians plastic tape works extremely well and will permit masking for curves.

—Twin City Whirlwinds

Servo contacts. After four minutes of air time a prang buried the fuselage in about eight inches of soil — we literally had to dig out the engine. The plane had gone in at a 15 degree angle, rolling to the right. A post mortem inspection showed that all connections checked out — no broken wires, batteries okay, etc. After the crash the aileron servo was trimmable instead of neutralizing. The servo in question was brand new, and had checked satisfactorily prior to flight. Upon opening the case, the two outboard finger contacts of the sector gear were found to be slightly depressed — the other four were in a normal position. Logic thus indicated that the crash would not have caused only two of the six fingers to be depressed, also accounting for the locked-in roll. Later, another servo exhibited the same tendency. Hint — check all the finger contacts of those new servos. May save some grief later on!

Pioneer R/C Club

Bonding nylon. If you should have occasion to bond one piece of nylon to another, use a small quantity of carbolic acid, available at most drug stores.

—Illinois R/C Society

Fuel pump. A handy fuel pump for an afternoon's fuel supply for quarter and half-A's can be quickly made from an 8 or 12 ounce Veco, deBolt, or Williams Brothers fuel tank. Give it a try.

—Source unknown

Here is an inexpensive and foolproof replacement for a glow plug ammeter. I use a 1½ volt low current flashlight bulb in series with the glow plug along with a SPST toggle switch across the lamp. Upon placing the leads on the glow plug, with the switch open, the lamp should light. The battery drain is only 100 mah. Close the switch for starting. There is no rush to remove the plug leads after starting as long as the switch is opened. This feature saves time, aggravation, and batteries when working with a balky engine.

—F. J. Charavay

An excellent, low-cost building aid is a metal "last forever" sanding device that sells under the name of 'Dragonskin.' For less than one buck you get the holder and a sheet of abrasive metal, the latter a stamped metal sheet much like a household cheese grater. Its advantages over conventional sandpaper is that it will remove material fast, yet not leave an excessively rough finish; it won't pack or clog up with sawdust; and when used on balsa, or other soft materials commonly employed on models, the sander will last a lifetime. Next time you have to sand a wing tip or engine cowling, try this tool. I think you'll be glad to have this dragon in your workshop.

—Dave Kovensky in the Carrier Wave

During the past year there have been numerous suggestions concerning doping silk and nylon so that the initial coats of dope will not run through and spoil a smooth finish by building up on the inside surface of the fabric. The method described here was discovered by accident when I first began to use my spray gun for doping. Using a spray gun, or aerosol dope can, give the surface four or five quick, thin coats of dope. This will not produce any closing of the pores, and you won't even be able to see the dope, but each thread in the fabric will be covered. Now, take a clean soft brush, dip it in thinner, and rapidly brush over the fabric. The result is like magic — if there has been enough dope sprayed on, every pore will be closed by a thin film of dope which is soon dry. The finish may now be built up in your usual way either with the spray gun or brush. The little vacuum powered spray gun will work for this process nearly as well as a larger gun. If some of the pores do not fill the first time, spray the area a little more and then apply thinner again. Perfect results guaranteed.

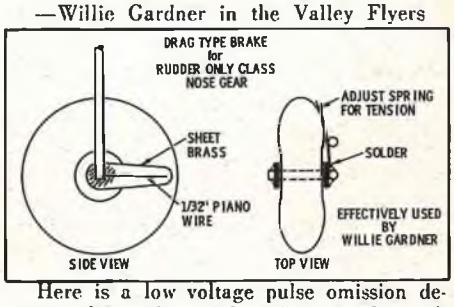
—Carl Mohs in the Marcs Sparks

An excellent idea for making your own dispenser for white glue or model cement is to use a Miss Clairol bottle, a product obtainable in most drugstores. Cut the long, tapered bottle tip to the desired opening and use a 1/16" wire stopper in the end. No more broken or squeezed glue tubes. In addition, you can see how much cement is left in the bottle.

—Darrell Yonker in the Valley Flyers

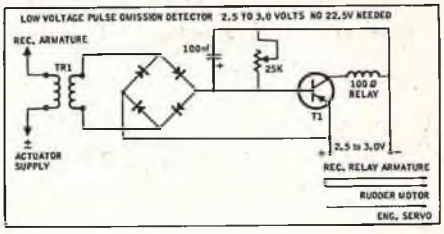
Rudder only class fliers desiring a drag type brake that is completely effective should try this combination of brass sheet and 1/32" piano wire. Simple... and it works.

—Willie Gardner in the Valley Flyers



Here is a low voltage pulse omission detector that utilizes only 2.5 to 3 volts with no 22.5 volt supply needed. TR-1 is a Lafayette Tr 98. Diodes are any four silicon or germanium "bargain" units. T1 is a CK722 PNP transistor. The P.O.D. battery supply can be taken from the receiver supply if a 3 volt receiver is used. If not, use two E91 alkaline energizers. Drain is only 20 mah when relay is energized. Do **not** tap off the actuator supply. Use an Annco servo, or equivalent, which will give trimmable engine with this circuit.

—New Jersey Radio Control Club



Want to keep fuel seepage from getting to the battery pack and foam rubber used in the nose compartment? Save those plastic bags in which model accessories are packaged. Place your foam in these bags and use another for the battery pack. You won't sacrifice any of the "give" from the foam, but will keep it from acting like a sponge. Batteries will be kept dry and the fuel simply wiped off the outside of the plastic bag.

—Bill O'Brien

On Polystyrene

(Continued from Page 33)

enveloped in a heavy finish. We are now covering our own wings with Jap tissue. Prior to the tissue application, a couple of thin coats of Hobbypoxy Stuff will give a glass-like surface for the covering operation. Jap tissue fills rapidly, and two or three coats of thin clear dope over it will do the work of six or eight on silk.

A few words on the crash-resistance of a properly designed foam wing are possibly in order. Much of the inherent crash-resistance is built in or out at the time the builder selects his foam material. The homogeneous foams, as opposed to the expanded bead type, are rather brittle, and when struck a blow, will fracture. We feel that one of the beaded foams (formed of myriads of expanded polystyrene beads) such as Armstrong's Armalite, is much more suitable — not only because it is half the weight of comparable non-beaded foams, but because it is much more resilient. Hit this type of material, and the hammer will bounce back at you! This same resiliency, or "rubberiness," if you will, works for the RCer in the event of a crash. Hit a boundary light with a standard wing and you are usually into the wing up to the spars at least; hit it with a beaded foam wing and an easily reparable dent is the only damage.

These then, are some of the facts on foam wings as we see them at the present time. The foam wing quagmire has been a deep and sticky one. It is now within the capability of any RCer to build a true, light and simple foam wing. We hope we have cleared some of the misconceptions concerning this most useful modeling material. Further work by the persevering modeler will no doubt see the development of other uses for the material. Molding of entire aircraft frames is a definite possibility in the future. Other, newer skins are rapidly coming into usage. The field of hardwood veneer covering has barely been touched. At the present time, using one of the new non-reactive adhesives, there is no better or faster method of wing and stab construction available to the RCer. The use of these adhesives and the newer lighter forms of polystyrene such as Armalite makes it very hard indeed to consider ever building another all-balsa wing or stab.

The Roostertail

The Official Publication of the International Model Power Boat Association
General Office: 2405 19th Avenue Broadview, Ill. 60155

Once a year, we have one great big R/C and Tether boat contest. This is the "homecoming" contest of the year, when enthusiastic boatmen pack up suitcases, kids, wives, and boats to make the trip to the model boating Mecca. This year all roads will lead to Cape Coral, Florida, for the 16th Annual IMPBA regatta. Be there, either as a contestant, or just to watch from the terraced amphitheater seating. The tentative schedule of events reads: Saturday and Sunday, July 3, 4, 1965. Radio Control: 9:00 AM to 12:00 Noon

Precision — Balloon Busting
Speed — ¼ Mile Oval—All Classes
Straight 1/16—All Classes
1:30 to 5:00 PM
Multi-Boat Racing
Saturday Evening, July 3, 1965, 7:00 to 12:00 Midnite—Annual Banquet and Business Meeting.

You must be a member of the IMPBA in order to compete at the annual regatta. Get your application in now, and avoid the line of those signing up on the day of the contest. Our new decal is included with your membership card, so you will have a chance to transfer it before the meet. Extra decals are only a dime apiece. Get a supply for yourself and your club. They will adhere to any clean smooth surface, such as a transmitter, store window, showcase, car window, tool box, etc. One word of caution, they are NOT fuel proof.

Model boating is growing by leaps and bounds. One of the reasons for this is the fine work which has been accomplished by the manufacturers of radio equipment, boat kits, and boating hardware. As the hobby grows, the demand for these items also grows. In order to keep up with the desires of YOU, the active model boat builder, the people who are responsible for this equipment would like to know what you want to see on the shelves of your favorite hobby dealer. This is your opportunity to do some "designing" of the things to come. They are not asking for plans, but rather

(Continued on Page 40)

Application for membership to the I.M.P.B.A. for 1965

I.M.P.B.A.
2405 S. 19th Avenue
Broadview, Illinois 60155

Annual dues 50 cent plus $5.50 for a year subscription to R/C Modeler Magazine. (See subscription rates for outside USA). Family Plan: 50 cents per person plus $5.50 for a single one year subsription (one address only).

Name_____

Address_____

County_____ State_____ Country_____

IMPBA LIFE #_____ Interest: R/C_____ Tether_____ Club_____

I have a current subscription to R/C Modeler: Yes__ No__ Fee Enclosed__

Roostertail

(Continued from Page 39)

want to know what type of equipment you would like to have. What kind of kits? In what material? Prefab? Do-It-Yourself? What kind of hardware? How about timing devices, electronic gadgets, dynamometers, audio tachometers, waterproof battery packs, engine mufflers, fuel cut-off fail-safe systems, safety devices, or what? Now is the time to express yourself with a postcard to the IMPBA General Office.

●

In a recent letter from Cliff Parker, of the San Diego ARGONAUTS, we were asked for clarification of hull classifications. Specifically, does Proto require seats? Could a model of the Unlimited Hydro "Tempo" run as a proto, since it is a four place boat? Where would a completely decked over "SK" hull fall? How do you classify a cabin cruiser running without a cabin?

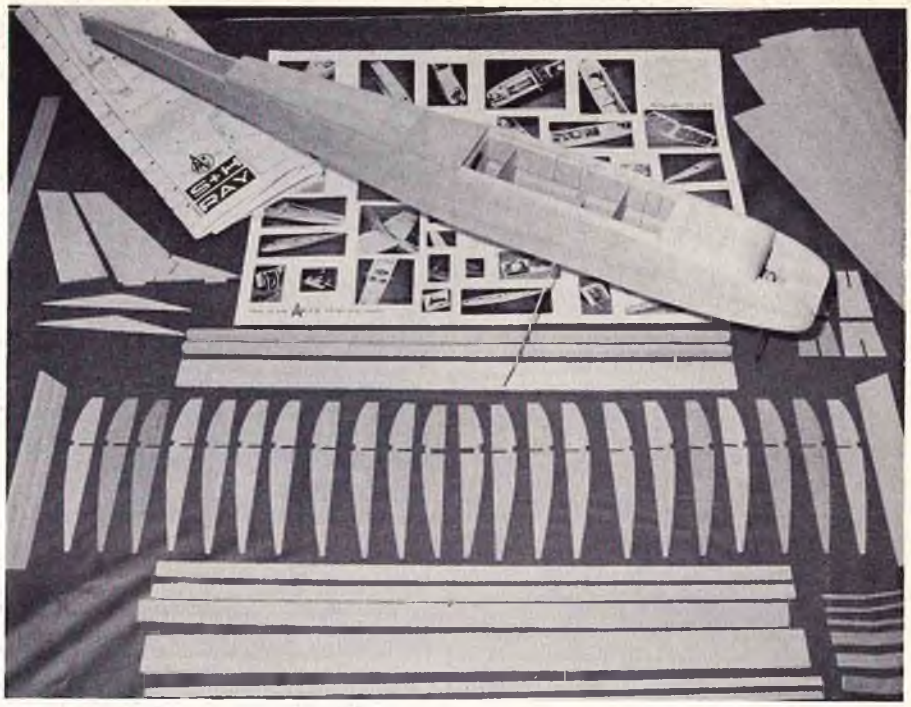
This is not the first time these questions have been asked, and since I believe that many members have had these questions come up at one contest or another, I feel that the answers will be of interest to all.

Proto Hulls are scale, or "near scale" models of real boats. Cabin cruisers, military craft, harbor patrol boats, etc., built from kits, or scaled from drawings, fall into this class. If the proto hull is one of the runabout types which has exposed seats, then in order to hold to scale the model must have seats. If the engine sticks up in the middle of the place where the seats should be, then the seats can be removed. Obviously, the placement of equipment is of prime importance.

A model of a hydro has a bottom which has steps, or discontinuities in the wetted surface, and thus falls into the hydro category, scale or not. This is part of the new definition of "hydro" in the new rules handbook.

Cabin cruisers running without their cabins are an eyesore, and since they are no longer scale or near scale, must run against everyone in the "Unlimited" class. Any hull without a cover is in the unlimited class, except the "hydro" which may run without the engine cowl, just as the full size hydros race.

All SK types fall into the "Unlimited" class, decked over or not. Most of the present "Unlimited" records are held by "K" type hulls.



KITS and PIECES

BERNIE MURPHY

Several months ago, when RCM's Editor, Don Dewey, suggested that I write a column, it seemed a very simple request. All you have to do is build one or two ships each month and report your findings. On the surface this doesn't sound overwhelming, but once into it, the balsa chips sure do fly! The basement is beginning to overflow onto the first floor. By Christmas, we will be forced to move!

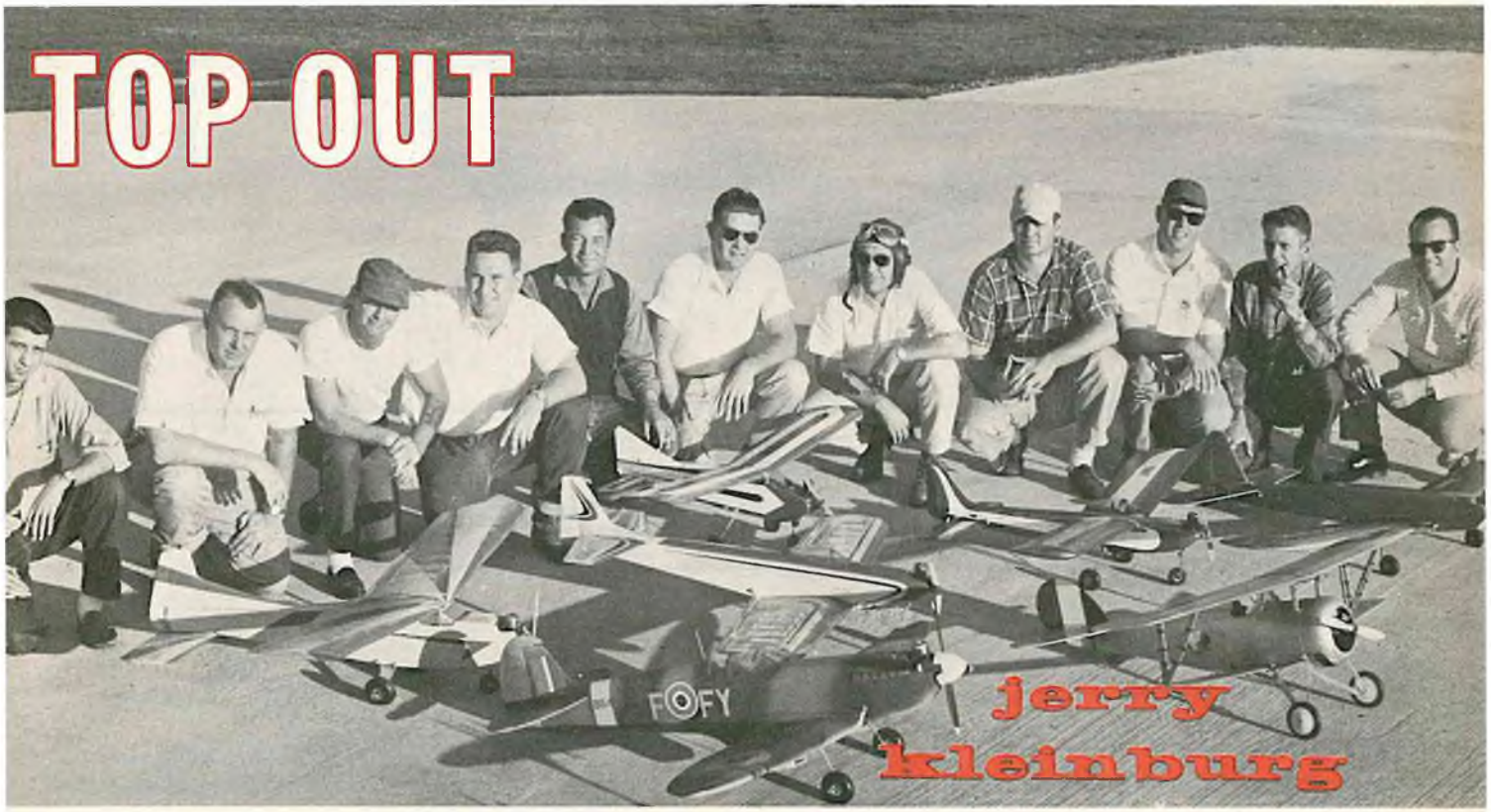
The past month has been spent probing the depths of the new AAMCO kits, the S-Ray and H-Ray. Before we begin with details of the kits, we suggest that you drive down to the nearest hobby shop. Go ahead — we'll fill in with background music until you get there.

Lou Andrews, who heads up AAMCO has been a well known figure in modeling circles for many years. We felt that a little of his background might prove to be of interest, providing some insight into these new kits. Lou is now in his fortieth year as a model builder, having started at the age of nine. Like so many of the "old timers", Lou began with rubber powered R.O.G.'s, having his first encounter with the kit business at the age of 12, when he kitted 75 Baby R.O.G.'s and sold them at 25c each. He was a member of the Jordan Aviation League along with Al Lewis (Editor of American Modeler), Willis Brown (first A.M.A. president), and the late Bruno Marchi. The J.A.L. was one of the first organized modeling activities in the country.

(Continued on Page 46)

ABOVE: H-Ray fuselage with kit parts. Finest quality materials, extensive plan details, and high degree of prefabrication. BELOW: Author with H-Ray ready for flight tests. Note idle on Enya .19.

TOP OUT



Past and present officers of the Port Arthur R/C Club gather around their varied creations which reflect diverse tastes — an important club ingredient. Joe Peacock, club prexy, sports Helmet. Norm Rhodes, 1965 King Orange Class I champ, third from right. A forward looking group (that's their own concrete they're resting upon), they favor rules development like those discussed in this month's column. Photo by Watkins.

An Open Letter To The Contest Board — Final Of Two Parts On Class I Rules

Item 5. **BUILDER OF THE MODEL:** This item deserves attention in view of the specter of prefabrication. The rule is a good one since modeling simply means building something with your own talent. When such 'building' is followed by a demonstration of usefulness or practical capability it is a natural extention of the original endeavor. However, such demonstrations are unnatural, or are otherwise severely diminish the accomplishment, in a competititve environment unless tied strongly to individual creativeness. In other words, not only can the cart **not** come before the horse — the cart cannot exist alone in the first place! Concern involving this problem is somewhat overdone, however, since the preponderant majority evidently prefer to 'make their own' and nothing is seen to diminish the do-it-yourself status modelers prefer. What **is** of concern is the **degree** of prefabrication allowed. A high water mark has apparently been reached in this trend through natural development of factors involving economics and the desires of the builders. Current Contest Board views paralleling FAI decisions constitute a reasonable position for the immediate future. The rule of self-certification as to individual effort should be continued so as to further demonstrate a moral faith in the integrity of the membership.

1.17 BUILDER OF MODEL. — to first sentence after the word "kit" delete the period and add: "...containing fiberglass or other semi-built fuselages and or polyfoam wings, stabilizers, etc."

— change second sentence to: "Models which are constructed by another builder or are completely fabricated and require only a few minutes of unskilled effort for their completion shall be excluded from competition." — no change to remainder.

Item 6. **NEW PATTERN CLASS:** Somewhere along the line in establishing competitive regulations allowance must be made for the beginner, and in the case of our RC sport/hobby, for those who do not wish to invest in multi equipment. The novice-expert divisions afforded recently to local contests acknowledged this basic requirement but did not go far enough to answer the complete need. Encouragement of juniors is requisite to the future, as is universally agreed. This is also true to a lesser degree for adult newcomers, especially where building and flying time is limited. Local activities need support and prestige to provide added impetus to 'grass roots' developments and this may be attained simply by creating an additional rudder sub-class following the classic pulse or escapement routes so well known. As a local option event, the new class would also be limited to a popular size engine, say .15, rudder, and to optional motor.

22.4 GENERAL: — no change to introduction.

22.4a No radio equipment limitations or requirements in any class except as established for Class Ia.

22.4.1 — add after last sentence: "Class Ia — As a local option event, planes in this category are limited to escapement or pulse equipment for rudder control. Power is limited to engines of .15 displacement or lower with motor control permitted. No auxiliary non-flight controls are permitted."

Item 7. **GIMBALING:** Ed, in spite of the fact that Emily (and other wives, as well) thinks this term involves shopping at a well known department store, what gimbaling refers to is motor thrust alignment changes made **during** flight. This capability, growing out of class I use of up and down thrust engine adjustments made on the ground to compensate as elevator control, is a conversation item presently in the thinking stage. While the idea is tempting, realizing a practical means of containing the vibrating buzz saws we hook to our planes, offers a considerable challenge for

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NATIONAL MINIATURE PYLON RACING ASSOCIATION

P.O. BOX 487 • SIERRA MADRE • CALIFORNIA

N.M.P.R.A. ORGANIZATION ESTABLISHED

John Worth, Executive Director of the Academy of Model Aeronautics, announced that radio controlled Goodyear type pylon racing will be featured at the 1965 Nationals. Although this will not be flown as a regular competition event, it will, however, be scheduled as a demonstration arranged through the cooperation of the National Miniature Pylon Racing Association and the Academy of Model Aeronautics.

Participation in the flying will be invitational by the NMPRA and that organization's officials will set up and operate the demonstration under the supervision of the AMA National's management.

Demonstrations are expected to be flown between 5 and 7 PM on Thursday and Friday of Nationals Week (July 29 & 30), sharing time with demonstrations of Radio Controlled Carrier Flying.

Latest news, also, is that NBC-TV will be featuring RC flying at the Nationals as part of its national network sports series — a tremendous public relations boost for all phases of radio control!

●

The following rules changes and additions have been approved by the NMPRA Rules Committee for addition or substitution to current and existing NMPRA Official Rules. Although these rules are now in effect, the changes specified below will not effect any ship constructed prior to June 1, 1965:

Altitude

No minimum altitude required for racing.

Weight

Maximum weight will be 6½ pounds. Minimum weight will remain at 4½ pounds.

Wing Span

No maximum wing span.

Engine Size

Engine size will be a nominal .40.

Idle Change

The engine shall be equipped with a workable throttle that will allow it to idle at a reduced RPM for a period of at least 10 seconds. The thrust on prolonged idle will be less than 1.25 pounds as determined by measurement with a suitable measuring device (spring scale 0-4 pounds recommended). Further, the engine shall be equipped with a shut-off actuated by reducing the engine throttle position further than normal continuous idle, or, the engine will have a low enough idle to allow it to land safely when required by the contestant or contest officials.

Fidelity To Scale Point Change

Awarding of points will be done on a 100-75-50-25-0 percent basis.

Fuselage and landing gear group change: 11 points maximum. Increase gear and wheel pants points to 2 points maximum. Add: prototype engine cowling or simulated engine cylinders, 2 points maximum.

Wing group: no change.

Stabilizer group: 2 points maximum. Outline, 1 point. Control surface outline, 1 point.

Rudder and Fin group: 2 points maximum. Outline, 1 point; Control surface outline, 1 point.

Points for V-Tail Configuration: For full points, elevators must be of a differential type. 4 points maximum.

Change Semi-Scale to Prototype

Points awarded on a 100-75-50-25-0 percent basis. Reduce fuselage and landing gear group to 4 points maximum. Reduce wing group points to 2 points maximum. Add prototype engine cowling or simulated engine cylinders, 2 points maximum.

If less than 50% points are obtained in prototype pylon racers it will be disqualified.

Engine Modifications

Any commercially available engine modification obtained from normal hobby sources is allowed except any such modification that increases the displacement of the engine above .40 cubic inches. (Examples: additional head gaskets, different cylinder heads.)

OFFICIAL RESULTS OF NMPRA SANCTION #1
Turlock, California, March 27-28, 1965

Name, City & State	Number	Placing	Qual. Time	Plane	Engine	Radio
Joe Martin Livermore, Calif.	71A	1st Finals	2:57	Denight Special	KB 35	Min-X 10
Jim Stevens Oakland, Calif.	77A	2nd Finals	3:32	Little Gem	ST 40	Orbit Prop.
Bob Heise Alameda, Calif.	13A	3rd Finals	3:35	Swea Pea	K&B 35	Orbit Prop.
Ray Downs Los Angeles, Calif.	44C	4th Finals	3:47	Shoestring	Johnson 36	Orbit Prop.
Granger Williams Huntington Park, Calif.	94C	5th Finals	3:24	Mod. Duck Hawk	K&B 35	Bonner Prop.
Don Blessing Los Angeles, Calif.	77C	1st Semi-Finals	4:04	Stevens Special	ST 40	Orbit Prop.
Ferron Green Fresno, Calif.	33B	2nd Semi-Finals	N/A	DeBolt Cosmic Wind	Johnson 36	Controlaire 10
Dick Riggs Costa Mesa, Calif.	30C	3rd Semi-Finals	3:56	Aeolus	K&B 35	Orbit Prop.
Garry Korpi Walnut Creek, Calif.	3A	4th Semi-Finals	3:59	Cosmic Wind	K&B 35	Bonner Prop.
Steve Kusby Palo Alto, Calif.	86A	5th Semi-Finals	4:43	Duke Special	Veco 35	Orbit 10
Win Biscay Oakland, Calif.	96A		4:08	Little Knarf	K&B 35	Orbit 10
Bud Crane Livermore, Calif.	8A		None	Shoestring	K&B 35	Orbit Prop.
Duke Crow Sunnyvale, Calif.	70A		3:35	Duke Special	Veco 35	Deans 12
Bob Francis Sunnyvale, Calif.	87A		None	Rebel	Merco 35	Orbit 10
Jim Gettman Redwood City, Calif.	84A		None	Shoestring	Johnson 36	Orbit 10
James Malek Vacaville, Calif.	32B		None	Cosmic Wind	McCoy 35	F&M Prop.
Jerry Nelson Livermore, Calif.	12A		None	Bonzo	OS 40	Orbit Prop.
Jim Parsons Santa Cruz, Calif.	73B		None	Parsons-Bonzo	ST 40	CitizenShip 10

THE CASE AGAINST AUTOMATIC CHARGING

by BOB KOSKI, *Reprinted from Valley Forge Signal Seekers*

A great has been written and spoken about nickel cadmium cells. Much of this discussion concerns itself with charging, and speaks of charging rate, charging time, etc. Quite recently an article in an R/C magazine described and elaborate automatic charger, designed to charge at a recommended rate to full cell capacity and then to automatically retard the charge rate. The alleged purpose of this multi-transistor automatic charger is to safely charge cells.

The above may appear to be the greatest thing since nickel cadmiums themselves, but I decided to pursue this a bit further. I recently attended the 1965 IEEE show (Institute of Electrical and Electronics Engineers, Inc.) which is a week-long display of the electronics industry at the New York Coliseum. Essentially, all major electronics firms are represented, displaying their new products and accommodating technical inquiries. Here is what I found out concerning nickel cadmium charging.

One supplier (Gould), specifically states that no harm will occur to Gould sintered plate sealed cells left on overcharge at the recommended ten hour rate "forever!" In other words, you can charge your 500 mah pack at 40-50 mils as long as you want beyond full charge — you need not worry about removing or reducing the charge at the end of 10 or 14 hours. As evidence of this, the Gould representative pointed to the multitude of new appliances which do just this. Some electric toothbrushes and shavers, for example, utilize nickel cadmium cells and are placed automatically on full charge when they are placed in their respective holders (the holder houses the charger). In other words, these are charging "all the time." Furthermore, automatic chargers such as the one referred to above, utilize cell terminal voltage as an indicator of charge state. This charger monitors the cell (or battery) voltage, compares it to a reference, and reduces the charge rate when the appropriate ratio of the two voltages is reached. I suspected, and the Gould representative confirmed, that terminal voltage is **not** a good indicator of charge state. For one thing, it is temperature dependent.

While I did not pursue these points at length with other manufacturers, Sonotone, in their literature, speaks of tests performed on their sintered plate cells where cells were left on the 10 hour charge rate for years and exhibited no detrimental effects. Personally, I have followed the practice of not concerning myself with "overcharge" on my Sonotone cells for two seasons of use, and they're still going strong. Based on this experience, but mainly on the above discussions, I conclude that "automatic chargers" are not necessary with sintered cells. In fact, I suspect I would find myself more worried about the behavior of the automatic charger and temperature effects than about the cells undercharge!

Kits and Pieces

(Continued from Page 40)

Over the years, Lou has been active in many areas of our hobby, including Indoor Rubber, Wakefield, U-Control Speed and Stunt, and of course, Radio Control. He has chalked up an impressive record of wins in major competition, all with ships of his own design.

The past 15 years, Lou has devoted his time and talents to R/C. Many of you have, no doubt, built Andrew's designed kits, which included the famous Beam, Explorer, Vanguard, Trixter series, and many, many others. Lou was among the first to advocate coupled aileron and rudder, and first (we believe) to employ full span ailerons. He also managed to R/C his control line Reactor, a direction toward which the multi ships of today seem to be heading!

Now that Lou is producing his own kits, it seems certain that we'll be seeing a large number of interesting and exciting airplane kits that are sure to please the majority of R/C modelers.

If you did as we suggested, you should now be standing at the counter of the local hobby shop. Don't disturb the man behind that counter — he's busy selling that road race set. Just reach up and pull down either the H-Ray or S-Ray kit. Open the box and carefully spread the contents over as many counter tops as possible. Unfold the two plan sheets and the Photo Aid sheet — spread these on the floor where you can get a good look. What's that clerk screaming about? Just ignore him . . .

Examine the balsa carefully. If your kit is as good as ours, and the seven others that we checked, you are quite impressed with the quality of the wood. Notice the Box-Loc construction of the fuselage. Now reach up on the shelf and grab that bottle of contact cement. Spread a little on the Box-Loc fuselage fronts and on the corresponding area of the sides. Also apply some white glue to the landing gear sandwiches together — the white glue is over there on the other shelf next to X-Acto display. Press the doublers and sides together, then install the bulkheads and landing gear, holding the assembly with rubber bands. Add the top and bottom planking, and the fuselage is completed. (Give the clerk twelve bucks so he will let you work in peace). We did notice that the machined slots in the doubler piece varied somewhat in depth. No attempt was made to equalize them, and no difficulty was encountered.

The best place to assemble the wing and stab is on that glass showcase top over by the door. Assemble the wing exactly per the plans. You no doubt noticed that the ribs fell out of the die-cut sheets. Move on to another showcase and build the stab — this will require the use of a knife for the first time! The wing and stab are exceptionally easy to build since they are both flat. The wing employs a sheeted leading and trailing edge, which is a little unusual in a ship of this size. This, however, does not make the wing difficult to build, and adds tremendously to its strength. Might just as well glue the fin parts together while you are waiting.

Pick up all of the parts that are left and return them to the box. Pick up some silk and dope and head for home. Bring the fuselage along, but leave the wings and stab to dry overnight. Your dealer doesn't really need those two counters any more tonight.

Once home, go directly to your workshop. Don't chance letting your wife see that empty box that you just bought. If not already completed, add

the top and bottom planking (stringers on top if you have the H-Ray). While this is drying, sand the nose area to shape, referring to the lines on the plans and also to the Photo Aid sheet. Silk cover and dope the entire fuselage (the silkspan included with the kit may be used here if you desire). If time permits, install your equipment.

In the morning, pick up the wing, stab, and fin. So — you're late for work already, might just as well take time to join the wing halves. By evening the wing joint will be dry, and the wing and stab can be covered and doped. Tomorrow, we fly!

Our H-Ray was equipped with the same Min-X system that was used in the C.G. Skylane, together with a prototype of the Minipulse. Four nicad pencells were used for the proportional actuator this time, and two alkaline cells were employed for the receiver. The latter was foam packed in the front compartment, using the sliding plate as a retainer. The Minipulse was mounted on two cross rails as shown on the plans. The photo sheet (a unique feature) is quite helpful when installing various types of gear. A torque rod connection was made to the rudder as shown, an Enya .15, complete with muffler, was mounted in the nose. Ready for that fateful first test glide and flight?

The engine was run-in in the back yard and adjusted for idle. This was a brand new Enya, so three or four tanks of fuel were run through before final adjustments were made. You will notice in the photos that the prop is clearly visible at idle. This little engine idles second to none, and delivers a surprising amount of power at peak — even with the muffler!

Test glides were made, (after a careful check of balance) with the radio in operation. All went smoothly with the ship turning accurately on command. The Enya .15 was revved up, then retarded to about three-quarters throttle. A smooth hand launch and the ship settled gently into the tall grass, about 300 feet away. A small shim (about 1/16") was added under the trailing edge of the stab and another attempt made. This time full power and away it went — straight away and up! The engine was retarded and the ship landed. A long walk retrieved it. A check of the equipment showed that the length and diameter of the torque rod allowed

(Continued on Page 48)

Kits and Pieces

(Continued from Page 47)

the rudder to be pushed into neutral by the prop blast.

A new torque rod was made using a shorter piece of 1/16" diameter wire at the aft end. A careful check showed this to be adequate. The shim under the stab was removed. The next flight was a complete success. The ship flew perfectly and was very maneuverable under the power of the Enya, along with a total all-up weight of 3 pounds, two ounces. With the engine retarded, approximating the power of an .09, the ship became docile enough for the average newcomer to R/C to handle.

The S-Ray, which is identical to the H-Ray, except for the cabin sides, was outfitted with a Babcock 27 system using rudder, elevator, and motor, with an Enya .09 for power. The ship was due to be test flown this past week, but 30 mph winds just aren't compatible with R/C ships! We will complete this phase of the program next month.

The H-Ray is highly recommended, and actually does build up about as quickly and easily as indicated. (The hobby dealer? — He's got a For Sale sign on his shop for some reason . . .). Both kits contain complete hardware — even foam for wing saddles. We suggest that the novice use the smaller engines and employ a veteran to assist in trimming.

New items that we have had a chance to examine this month included the VK Cherokee, which appears to be a typical VK kit — very nice. Action Industries, Inc., a new firm, delivered one of the first production models of a fibreglass fuselage for the Senior Falcon. This, too, appears to be a very well made item. It is available as a complete kit at $29.95, or fuselage only at $19.95.

Till next month — see **you** at the field.

Top-Out

(Continued from Page 41)

experimenters and developers. Rules, therefore should not be made to discourage its development but where it or other innovations are attempted provisions for safety are called for.

22.2b SAFETY REQUIREMENTS: — no change to introduction.

22.2b.1 — add second sentence: "Special

attention will be given to mechanical innovations (engine gimbaling, variable incidence mechanisms, etc.) to assure safe air operation."

Item 8. **POINT SYSTEM:** Closeness of contest results confirm the necessity for a broader judging scale of points. This has been recognized and some contest directors have exercised initiative in providing additional point spread. The increase at this time need not be big to achieve the required finer grading. By calling for half-point grading within the present five point system sufficient latitude will result to meet present needs.

22.10 POINT SYSTEM: — add new second sentence: "Each maneuver shall be judged on a point scale of zero to five with half-points allowed where judged necessary."

Item 9. **SEPARATE FACILITIES:** Progress has been demonstrated in meets like the Oklahoma City Annual, the Phoenix-Buckeye Southwest Regionals, the Wichita Annual, and others to the advantages of having separate sets of judges for different classes. By doing so, flight comparison is made meaningful since judging is concentrated to contestants who are in actual competition with one another. Since it is universally agreed that judging is an area deserving our best organizational efforts the advantages of separate judging must be encouraged. It is not too soon for this approach to be employed at the Nationals as an example for adoption wherever contests have sufficient entries. With pre-entry and frequency control the normal course for Nats registration, participation may be gaged accurately enough to permit establishing a separate flight line and frequency for class I, perhaps class II if enough entries. In this way competitive levels will be stimulated and flight presentations for all classes will be more understandable for spectators.

22.18 — renumber to 22.19

22.19 — renumber to 22.20
— add new paragraph 22.18:

22.18 When sufficient judges are available they should be assigned for each participating class. Where multiple flight lines are provided, and it is otherwise technically feasible, it is recommended that a separate flight line be provided for each class when sufficient entries are available. Frequency control (requiring contestants to use certain frequencies) and frequency assignment by class may also be employed when sufficient notice is possible (at least three months prior to close of registration).

Ed, this winds it up. I haven't attempted to 'shoot the moon' although some will view parts as a little out. Others will look for more extreme changes, but it is believed steady strengthening is achieved by reasonable and attainable steps. The current rules have endured mainly because they're realistic to present needs. Alteration of a major nature is not called for. This hobby-sport of ours, although a pastime and intended for pleasure, nevertheless deserves progressive leadership to bring about growth. Some advance is necessary at this time and it is sincerely hoped these suggestions are helpful in achieving that progress.

With kind regards to Louise,

Jerry Kleinburg
AMA 14796

Product Report

(Continued from Page 27)

Antenna: Telescoping four section center loaded whip. Extended length — 47"; collapsed length — 18".

Number of Transistors: 10

Adjacent Channel Interference: 45 db down.

Receiver

Size: 1-13/16" x 2-11/16" x 1-11/16"

Weight: 5.25 ounces

Voltage: 4.8 volt (4-600 maH nicads)

Current: 10 mA nominal with three servos.

Airborne Weight: 17 ounces — receiver, battery pack, switch harness, three servos.

Sensitivity: 1 uv for full control.

Operating Temperature Range: −20 deg. to +140 deg. F.

Selectivity: 6 db down at 5 Kc

Image Rejection: 6 db

Number of Transistors: 15

Prices

Transmitter: Single stick: $90.00 (dry supply); Two stick: $90.00 (dry supply)

Single stick: $125.00 (rechargeable nicad supply); Two stick: $125.00 (rechargeable nicad supply).

Receiver: $110.00

Servos: $40.00 each

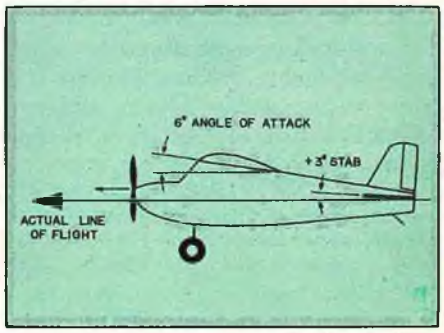
Receiver Batteries and Charger: $30.00

Total System Cost: Transmitter, receiver, receiver nicad supply, switch harness, three servos) $350.00.

Manufacturer: Orbit Electronics Inc., Garden Grove, Calif.

(Continued from Page 14)

But, when you see the model in flight, it's like this:



Under these conditions, this drag is much higher, so more power is required as it staggers through the air. So there's one "secret" to getting an airplane to fly with less power — balance it so that it flies like the drawing says it should. You can do it by moving the C.G. back a bit, or dropping the elevator slightly, or raising the trailing edge of the wing — or a combination of all three, which you'll probably wind up with anyway. And then you'll probably be faced with changing the thrust line, too. More about that later.

For your first step, check the accuracy of your model with the plans. Is the C.G. where it should be? As a general rule, for sport R/C designs, 30-33% of the chord back from the leading edge is a good range of location — although I tend to favor the 35-40% range because once you get the model trimmed out, the power is more effective, thus reducing the necessity for additional power. This setting does make the model more sensitive to elevator angles, however.

Next, check the angular setting of the wing and stab. Just because the kit (if you're building one) was die-cut does not always mean the setting is automatically right. You can check the angles either by "eyeballing," if you think your sight perception is accurate, or otherwise using some straight lengths of balsa. This is easy if you have a flat stab and a flat-bottomed wing. Line them up, like

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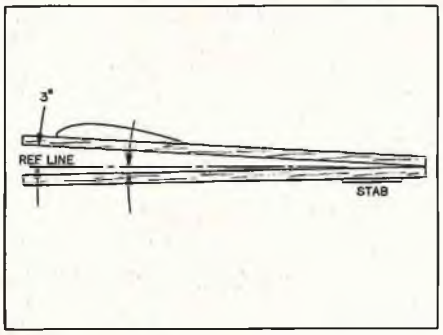
Sunday Flier

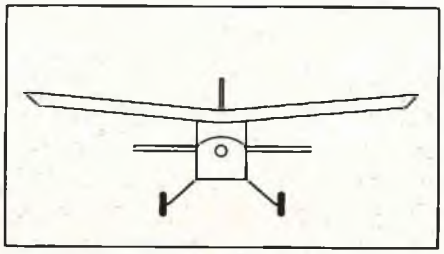
(Continued from Page 50)

this, and the angle between wing, stab, and reference line is immediately apparent for comparison with the plans.

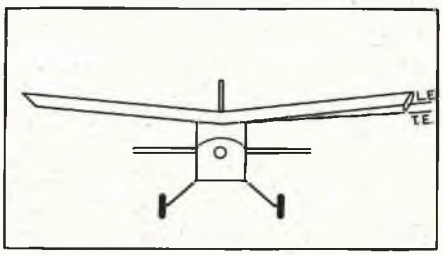


Of course, you should be sure there are no warps which destroy the angles locally. Here again the best way to check is by "eyeballing" the surfaces. Checking the alignment of a model for warps was covered in the construction article on the 'Virus,' in the February 1964 issue of RCM. Now, since the circulation of RCM was considerably smaller then, and those issues aren't available, to all of you, let me repeat those diagrams on how to check for warps.

First, let's check the wing. Sight right down the center of the fuselage with the wing and stab mounted in place. Do this from both the front and the rear. It should look like this:



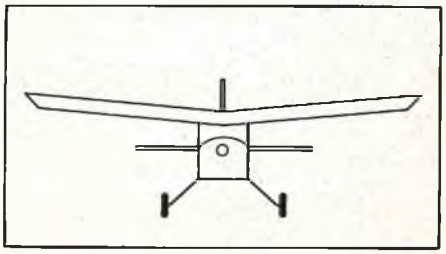
If either panel has warped, the leading edge and trailing edge will be out of parallel, as:



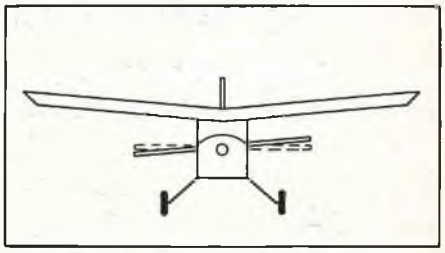
Here, the wingtip is "washed-in", and the tip will lift more than the other wingtip, causing a spiral to result. The difference in the angle at which the wing strikes the air will cause uneven lift. So let's correct it.

Use the dry heat method. Hold the wing panel over a burner on the stove with your hand under it. Your hand will serve as a heat indicator. The wood can stand any heat your hand can, but if you put the wood too close to the burner it could get too hot. So, heat the wing both top and bottom, and gradually you will feel it becoming pliable. Twist the panel in the opposite direction to the warp, and beyond the "neutral" point. Then remove it from the heat source and let it cool while you are holding it to the newly established setting. Quench it with cold water if you like. Then, when cool, release it — after you've tried this a couple of times you'll find it easy to reset any sheet of balsa which has been treated with dope to any angle of twist you want. For now, though, you want to make the wing have parallel leading and trailing edges. If you have a "box" wing (such as the 'Schoolmaster' type), and a warp is built-in, you're in trouble! That type of construction can't be "dewarped." Sorry — you'll have to build a new one.

Next, check the alignment of the wing and the stab. Sight along the fuselage as before, only this time you're noting whether the wing and stab are set right, in relation to the fuselage, and each other. It should look like this:



If the stab and wing are out of alignment, as in the next illustration, then shave off a thin strip of balsa and glue it to one side of the bottom of the fuselage



sanding it until the stab rests on it and the other side of the bottom of the fuselage, and is aligned with the wing.

Now check your fin and rudder for

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Sunday Flier

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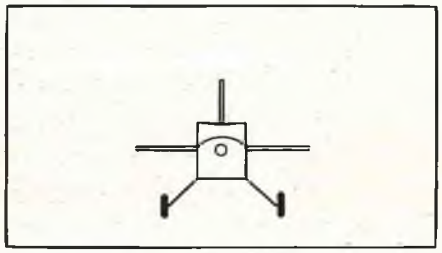
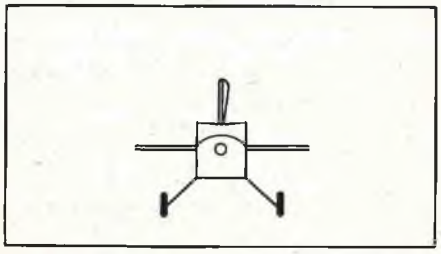
warps. Remove the wing and sight down the length of the fuselage. The fin should be aligned with the center line, as:



If you see a warp, which would appear as follows:



remove it, just as you did with the wing. A twist in either direction gives the same flight effect as application of rudder, causing a severe and undesirable turn.

Now, if you've accomplished all of the foregoing checks, and everything is "according to plan," your model should "fly right off the workbench." If it doesn't, then there are two possible reasons. One, you goofed! Two, the designer goofed! Now the latter may sound unusual, but it's a fact that some designs which are published in some magazines but not kitted, have never gone beyond the design stage, and you are actually doing the test flying! Fortunately this is the exception rather than the rule.

(To be continued)

T.Q.

(Continued from Page 7)

A. There have been many inquiries concerning the availability of the Philco 6058 transistor as used in the RCM Superhet. This transistor is still available to manufacturers but apparently not generally available to the individual experimenter. A suitable replacement is the G.E. 155 T.I. The Philco T-6058 is also available from R/C Kits or Ace R/C.

Q. Will the RCM Convertible Superhet work with an 8, 10, or 12 channel reed bank? Where can the Mitsumi I.F. cans be obtained?
T. E. BECKER Valparaiso, Indiana

A. As of this date we have not tested the RCM Superhet with an 8, 10, or 12 channel reed bank but see no reason why it should not be more than adequate for this purpose. The Mitsumi I.F. cans are available from R/C Kits or Ace R/C.

Q. What is your opinion of Citizen-Ship's new analog proportional system? Do you plan to publish a technical article on this system? Second, are there any more proportional systems similar in control and cost on the market now, or forthcoming in the near future that you would recommend? Third, what six-channel gear (transmitter, receiver, and servos) would you recommend?
RONALD PAGE Richland, Washington

A. We have only seen the Citizen-Ship analog system on display at a recent conference and cannot give you an opinion on the system. To date, the manufacturer has not submitted a system for evaluation. We do not know of any other system currently available, or forthcoming, that would be in this price range. Insofar as six channel equipment is concerned, we have used virtually every six channel rig available and without any difficulty. Considering price, we would suggest the new Controlaire 6, which although non-simultaneous, has been thoroughly flight tested by RCM, and is an excellent buy at $89.95 for transmitter and superhet receiver. The Kraft 6 is similar and is priced at $119.95. Any of the "big three" servos would give you years of trouble-free operation — Royal, Bonner, or Annco.

Q. With regard to your RCM Convertible Superhet, where does the .39 mfd capacitor go? I am confused on which of the quan-

tities I need for the 39 uf, since it shows one on the schematic and two on the parts list, and I'm not sure on the pictorial, since all it shows is 39 uf on each electrolytic. Also, what brand did you use — I can't find this exact value in either the Newark or Allied catalog?
RODGER HURT Fayetteville, Arkansas

A. The .39 was a misprint — all electrolytics except one are 39 uf — the one remaining is a 1.8 uf. This exact value is not necessary, and any value electrolytic from 25 to 50 uf will be quite adequate.

Q. I was thinking of getting a Min-X six channel transmitter and receiver combination and also a Kraft Battery Pack. Since the receiver takes 500 Mah and the Kraft pack is 600 Mah, I was wondering if they would be compatible?
JOHN GENDRON Arcadia, California

A. There is nothing wrong with using 600 milliamp nicads in place of the 500's —they have a slightly higher capacity, thus a longer "life per change" with only a slight increase in weight.

Q. I started out in this hobby several months ago by purchasing a ten-channel reed system. I have practiced diligently and have learned to get them up and down in one piece, at least. Now I am told that if I don't have a proportional system, I might as well quit. Unlike some modelers, money is of importance to my family, and this is a hobby and sport, not an expensive obsession. What is your opinion as to the future of reeds?
BILL OLSON Los Angeles, California

A. Dismal. However, I must say that most reed fliers have not even begun to extract the performance and reliability of their systems. It is more enjoyable to put in six good, reliable Sunday flights on a reed system than to sweat out six on a new proportional. I do not mean to imply that some of the new systems are not reliable — however, they have not had the long term field development advantage as have reed systems. Don't worry about your present gear — keep practicing and flying, and when you're ready to purchase a proportional system you'll find that they will soon be selling for the same price, or less, than today's reed rigs.

Q. There suddenly seems to be considerable controversy over the Builder of the Model Rule. As not only a technician, but a former R/C world's record holder, what is your personal opinion on the subject?
KARL WALKER Reno, Nevada

A. I am currently lobbying the appropriate agencies to institute a Builder of the Radio Rule, Builder of the Engine Rule, and Builder of the Field Box Rule... Seriously, I think the whole controversy is a bunch of hogwash. The rule, as it now stands, cannot, and is not, enforced. This has been well demonstrated to my own personal knowledge by widespread and flagrant violation at the Nationals during the past few years. I say, if a rule converts an otherwise honest modeler to lower his personal standards of integrity by certifying that he has personally built a model, which he, in fact, commissioned someone else to build for him, the ruling does more harm than good.

Editor's Memo

(Continued from Page 4)

For how can a rule be beneficial that tempts a basically honest modeler to certify that he has complied with a ruling by building his own model, when in fact, he has commissioned another person to accomplish this task for him. As our Technical Editor, a former competitive flier of some renown, asked — "How can a ruling be of value that converts an honest individual to lower his own personal standards of integrity?" We asked one such competitive flier. His answer? Simply that "very few of the top competitive fliers take this rule seriously —it's simply ignored."

And this is the real point in our stand against this ruling. If it cannot be enforced — and quite apparently, it cannot — then of what use is it? We asked several more top fliers what they thought of flying against a competitor who had one or more competitive machines which were built on

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Editor's Memo

(Continued from Page 55)

order for him. The answer? A unanimous "I couldn't care less — it's the flier and his ability I'm concerned about" was the answer to this question.

The average Sunday flier also "couldn't care less" about the BOM rule — he pursues his hobby in his own particular fashion for the maximum amount of enjoyment and fellowship he derives from it. This may take the course of building, flying, constructing his own radio equipment, or developing a new aircraft or system design. The competition pilot, on the other hand, has a different row to hoe. He is out to win contests, either because he enjoys competitive flying, or because it is his job to do so. Many top competition pilots eventually end up in a manufacturer's "stable" — representing that manufacturer with a job of proving out these systems in the actual fire of competition, making the best mark possible to aid the development and future sale of the product, or products, involved. Is this facet of our hobby and sport to be considered wrong?

I don't think so. For in the words of Walt Schroeder at an address before the First Annual Rally-Conference of the Hampshire Radio Controllers of Williamsburg, Massachusetts, and later reprinted in the September 1964 issue of Model Airplane News, this editor said: "The Sunday flier is the mainstay of our hobby, and the contest men represent only the smallest minority, but this minority is a very important part of our hobby, for without it the state-of-the-art would simply go the way of all things and our planes and designs would be back beyond the Flintstone era."

So, we are confronted with a paradox. The Sunday flier is the mainstay of our hobby, and is not as concerned with rulings involving actual competition as the contest men — the minority. The contest fliers, in turn, by their active competition and development of equipment, designs, and accessories, make a valuable contribution to the majority. And if the contest fliers, themselves, although certainly not all of them, do not observe the Builder of the Model Rule, and the governing body, the AMA, does not, or cannot enforce it, of what value is it? The AMA is certainly not to blame — they weren't there when the models were being built, by whom-

ever built them, and they must take the word of the competing flier. The rules of a forthcoming major scale contest, co-sponsored by this publication, allows a proxy flier, but awards a ten point bonus if the builder flies his own model. Is this the answer to the problem? Not really. For if the ten point margin is enough of a difference toward winning, then what is to prevent the flier from stating that he has built the model, when in reality, he is a proxy flier?

This is the problem as we see it. I, personally, have built models for over twenty years. I enjoy doing so, and always will. The majority of RC'ers are dedicated model builders, as well as fliers. If ready-to-fly models make their appearance, some will fly with them, others will not. As one of the general model publications stated at the time when plastic ready-to-fly ukies made their appearance — "this is a way for potential modelers to get their feet wet and possibly become model **builders** of tomorrow." Maybe that will hold true for R/C as well. But that is not the problem.

The problem lies in a ruling versus a matter of conscience. And if the rose colored view of model building along with the violent flapping of the political flag doesn't obscure the real facts of the matter, then perhaps we can all make an intelligent decision on this problem.

This is our last editorial on this subject. Whatever **your** choice — pro or con — whatever possible solution you may evolve, **your** opinion — your **voice** — is important! And the only way to solve this problem is to **make your voice heard — make your opinion known.** Let your Contest Board officials know your feelings. Writing letters to the model publications, either for or against, won't help.

But letters to the Contest Board **will.** The opinions in this column are my own — they are nowhere near as important as yours. So the eventual solution must come from **you.** Just because we ignore the problem doesn't mean it's going to go away. Let's find

(Continued on Page 59)

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Editor's Memo

(Continued from Page 57)

the answer before this sport follows in the footsteps of other notable examples around us. Don't think it can't happen to us.

It can.

●

One of these days we're going to stop telling you what's coming "next month" — it usually doesn't. Bill MacCormick's 'Sport Special' wasn't quite ready insofar as the artwork goes, and Don wanted to do some more experimenting with the new pulser. But we think you'll like this month's projects — a superhet monitor for all five 27 mc frequencies — simply switch to the frenquency you want. Great for individuals as well as clubs. Also, yours truly got into the act with his 'Royal Coachman'. I solemnly promised Bill Northrop that I'd build his umpteen-thousand square inch 'Big John' bipe if he'd build my Coachman. Wish I hadn't — will go broke buying balsa . . .

●

R/C is due to receive one of the biggest public relations boosts in its history when the forthcoming Nationals R/C activities are television nationally by NBC-TV as part of its national sports coverage. Speaking of Northrop, ol' Willie, we understand, is getting his TV makeup together already . . .

Flying Proportional

(Continued from Page 8)

correcting for any drift with your elevator, until the model is diving inverted at a 45 degree angle. Immediately upon reaching this angle, start your half roll. You should be exactly half way through this roll as you go through the crossover point. Upon completion of the roll, assuming that you have timed the roll rate right, you should start applying up elevator and do the second 3/4 of a loop until the model is again diving inverted at an angle of 45 degrees. Again, time your roll so that at the half way point you are at the crossover posiion. Immediately upon completion of the roll, bring her back to level flight. Make darned sure that during the roll portion of this ma-

(Continued on Page 60)

neuver you get off the elevator completely or it will pull you off heading. This is a very common mistake with Proportional and it takes a lot of practice to overcome it. ... Don't forget the 50 feet of straight flight.

SPIN. Do this into the wind. Close your throttle and very gently pull it up into a stall. As the model stalls, if it tends to fall off on one wing or the other, do your spin in that direction. No one likes to see a right wing drop and then fall off into a left spin. It makes for a very sloppy entry — and there go the points! As your spin is completed be sure that you know exactly where you have to start your recovery in order to fully recover at exactly the same heading at which you started. When you have achieved this heading, gently apply up elevator, bringing the nose up to level flight, and slowly and positively add power. Don't forget! — 50 feet.

INVERTED FIGURE 8. Not much you can say for his one except that it is exactly like the Figure 8 except for the fact that the model is inverted. Remember that the crossover point is right over the transmitter. Once again... 50 feet!

ROLLING 8. — They say in the book that the lower half of this maneuver should be directly below the upper half. I would sure like to see the man who dreamed up this maneuver! I'd like to see HIM do it. This would require a model with an instananeous rate of roll and I have yet to see one. However, there are a couple of little tricks that will help make it look like this. If you do both loops fairly big it will look almost like it is described in the Judge's Guide. Remember that you are to do two complete loops. The crossover point should find the model in exactly level flight. The most common mistake here, is to do the upper half fairly small and the bottom loop as big as a house due to the speed that you pick up coming down the back side. Don't be afraid to tighten up on that elevator as you start the lower half. Again, remember to get off the elevator while doing the half rolls because if you have pulled in any at all, it will sure drag you off heading.

TAIL SLIDE. Now we come to that maneuver that separates the men from the boys — and the lucky ones from the unlucky ones... the tail slide! I prefer to do this downwind because of that little thing that I mentioned before called optical illusion. If the

wind happens to be blowing quite strongly, even if your model should just stall, as it blows away from you, it will look like it's losing altitude and, therefore, it stands to reason that the judges will figure it slid, even though it may not have! As you close your throttle and pull up into this maneuver don't try to go exactly vertical because when the model does slide, if it is exactly vertical it is a 50-50 chance as to whether it will fall forward or on its back. If you stop just a couple of degrees shy of the vertical position, it should slide and it will almost always fall forward. Remember, if it goes on its back, you have yourself a big fat ZERO. As it falls through, apply the elevator gently bringing it up to level flight and then apply power. They say that your recovery should be at the same altitude as your entry. For this reason I try to build up quite a bit of speed before entering so that the model actually climbs quite a ways before stall because in this maneuver the loss of altitude after stall is out of this world. Good luck!

VERTICAL 8. Once again, this maneuver should be done downwind and with all the speed you can build up. Pull up into a fairly tight half loop until the model is exactly on its back, then apply just enough down elevator to take it up over the top. As the model crosses the top it should almost be stalled and your elevator should be just about at neutral. Now, as you come down the back side of the top half and it starts building up speed, you should tighten up on down quite a bit. Let it go until it is exactly on its back, then apply enough up so that you leave on the same altitude as you entered. I stress here the importance of making sure that the model is exactly on its back at the crossover point. Many fliers are prone to start applying down before the model is flat and the judges mark them down for this. Remember that both loops should be exact circles.

TRAFFIC PATTERN. I like to reduce power for this pattern unless I happen to be short of time. I also make the pattern fairly large (assuming that I am **not** running out of time) because it gives me added seconds to get set up for the landing itself. Make nice smooth 90 degree turns and try to hold your altitude. As I come exactly opposite the landing circle I reduce power even more and try to pull the model into a nose high attitude with no loss in altitude. The idea being to get the model slowed down even more prior to landing so that I don't have to worry about this on the final approach. Personally, I like to get it slowed down enough so that on the final approach I have to add just a slight amount of power and drag it in to the circle. I find that it is much easier to do it this way. Remember that all turns, including the one to final approach, should be 90 degree turns. That last turn for final is where I usually get snagged. The landing itself, I cannot say much about. Make it as smooth and easy as you can, rolling out in a straight line and very gently using your brake so as not to cause any yawing of the model.

TAXI BACK. This maneuver should also be smooth and in just as straight a line as possible from your stopping point on the landing to the hangar. Once in the hangar, kill your engine, turn off your radio, and announce to the judges . . .

". . . Flight Complete."

Royal Coachman

(Continued from Page 19)

the center line!), insert a piece of ¾" wide tapered trailing edge stock for a tail post, and glue together, gluing the sides to the bottom as you go. Add the ⅛" ply firewall with Hobbypoxy epoxy glue. While this is drying, cut out the fin and glue in place on top of the stab. Take a piece of 3" wide, ⅛" sheet, cut a slot in it for the fin, and glue in place on top of the sides. Be sure to apply glue liberally around the fin at the slotted area. Your fuselage is now completed except for the hatch cover. Fibreglass the nose area and sand well.

Add the elevator (cut from tapered T.E. stock) and the fin — we used the mylar hinge and toothpick route. Sand well. Brush on three or four coats of butyrate. Cover with silk if you so desire. Fnish the clear doping (with occasional light sanding) as desired, and paint. We sprayed on two coats of Aero Gloss white, stripped off a few areas with ¼" wide masking tape, then sprayed on two coats of Aero Gloss Stearman red. Drill ¼" holes and add hold-down dowels. Measure off the area you need for your receiver and add a "spacer" bulkhead to form a receiver compartment.

The motor mount use for both the Cox .09 and the Max .15 was a 2½" x 2¼" piece of ⅛" thick phenolic. For the Cox .09 use a Tatone radial mount bolted directly to the phenolic. For the Max .15 we replaced the four crankcase bolts with 3-48 bolts cut to size. Add the fixed nose gear, which happens to be a standard Midwest nose gear from a Hustler Delta kit. (Available at most hobby dealers as a Midwest accessory item). The phenolic motor mount is then bolted to the firewall with four 4-40 bolts and four standard faucet washers available from the local hardware store. These faucet washers not only act as spacers, but absorb engine vibration and also allow you to adjust your side and down thrust by tightening down the 4-40 bolts and thus compressing the washers. Three degrees of down and two degrees of right thrust proved adequate.

A dmeco two ounce clank tank fits the fuel and battery compartment quite well. Drill a hole in the plywood

(Continued on Page 64)

fuselage bottom for the overflow vent and one in the hatch for the filler tube. A short length of copper tubing soldered to the filler vent tube will facilitate fueling. Five 600 mah nicad pencells were used as a battery pack and fit quite nicely under the fuel tank.

If you use two Annco servos, mount them upright to the plywood fuselage bottom with 3-48 bolts and blind mounting nuts. 1/16" wire and 1/4" square balsa pushrods were used along with DuBro Kwik Links and DuBro keepers.

The main gear is a standard Top Flite 'Tauri' gear. This item is available at many hobby shops — if not, write Top Flite, and tell Sid or Mike that Don sentcha. That, along with a buck and a half should be good for one Tauri landing gear . . .

Wheels are 2½" DuBro with a 2¼" Air Span nose wheel. Adjust for negative rake by bending the main gear closer together . . . a most scientific method to compensate for any design or building errors.

The fuselage is done — and if it took you over one good evening's work, you "musta did it backwards."

The wing is of all sheet construction. Begin by gluing two sheets of 3/32" balsa together — one sheet 6" wide and the other 1½" wide. Or, if you prefer, one 4" sheet and one 3½" sheet. Use Ken Willard's method — that is, make sure the sheets match, add strips of masking tape to one side, add glue to the seam line, lay flat on the work table, wipe off excess glue, then add strips of tape to the second side. Set aside to dry. Make two panels, 20½" long, in this fashion. Make the two top panels about ½" wider, or 8", to allow for the curvature of the airfoil. Mark off the position of the ribs on each panel. Cut the ribs from 3/32" sheet. The two center section ribs are from 1/4" or 3/8" stock, whichever is handy. Glue the leading and trailing edges in place on the bottom wing skin. Locate the position of the 1/4" square bottom spar, glue the ribs in place, then add the top spar. Repeat this process for the opposite wing panel.

Allow both anels to dry, then add the top sheeting. Be sure to let the entire wing assembly dry before removing from the workbench. When completely dry, sand off the overhang on each end. Add the 1/4" sheet wingtips. Block up each wingtip 1¾" and hold the center sections parallel to the edge of your workbench. Now sand the required dihedral into these center section ribs. Lay down a piece of Saran Wrap or waxed paper and join the two panels with Hobbypoxy epoxy glue. When it has hardened (two hours or less), remove from the table and sand the entire wing. Sand well, or until the wing skins are about 1/16" thick. Now wrap the center section with a 2" wide strip of fibreglass, then add resin. Use Celastic, if you wish. Sand the wing again, then brush on two or three coats of clear dope. Decide whether or not you wish to silk the wing. (We did). Finish according to your perference. We sprayed on two coats of AeroGloss white, then laid out several strips of 2" wide masking tape on a glass table top. 2" divisions were marked off with a ruler, then cut with a triangle. The resulting 2" squares of masking tape were applied to the wing and tail. Clear butyrate was used to seal the edges, then AeroGloss Stearman red was sprayed over the entire wing. When removed, you have a rather bright checkered paint job.

And that's all there is to the construction. We cut out all the parts and made ourselves a do-it-yourself kit on Saturday evening, then put the Royal Coachman together on Sunday evening. All up weight should be about 2½ pounds.

Our prototype balanced slightly aft of the point shown on the plans. With the Annco servos we added three dead pencells to the battery compartment for ballast. With the light additional weight of the Royal MK multi servos, two of these were removed. If you have built the Royal Coachman according to plans, you will have no difficulty with initial flights. Use a 7/4 prop on the Cox .09 and an 8/4 on the .15. If your landing gear tracks straight and true, the Coachman will lift off with a slight tap of elevator in about fifty feet. As mentioned earlier in the article, flying this model with an .09 is simplicity itself — it is docile, yet will perform simple, basic maneuvers with six channel gear — an excellent trainer and sport ship for the Sunday flier.

But add a .15 and you've got a fast moving ship that's quite a handful. We hope you like ease of construction and the many hours of flying pleasure you'll get from the Royal Coachman. Drop us a line about yours.

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The Box

(Continued from Page 10)

Word filtered back that new horizons beckoned. One went to work for a living, another took up dominoes, yet another was building a Chinese room in his house. It was more than a relief when I was transferred out of the area. A fresh start was most necessary. What had started off as a lark became a plague. The Curse of the Box. It travelled north with me.

The new group was quite worldly. Nothing seemed to bother them. If a quarter-scale, quad-proportional B-36 with half a dozen Merco 61s and two Dynajets made a five point tailslide they wouldn't bat an eye.

For a while THE BOX was unobtrusive. It was too good to last. Clearing skies and fair weather cumulus brought out the spectators. To my chagrin they were a gusty, gabby group. In short order THE BOX was in the spotlight. I would be seated on the lid, arms resting on the endplates, when two or three of the curious would come up and start gawking. The more brazen would ask me to get up so they could look inside! Never any questions about my latest wind machine, always THE BOX, THE BOX.

Small boys would run hurdles over it. The larger variety crouched behind its windbreak whenever chill breezes bellowed. The grabbag under the lid was a great temptation to a few. More than once my cupboard was bare. Erstwhile golfers used the broomstick for driving practice. These were only nuisances.

As time went on the days of THE BOX were being numbered. Its bulk impressed itself on my shins, bruise on bruise. Hathaway could outfit a one-eyed man, but couldn't cope with the combination of a 34 inch right arm and a 36 inch left one. Then came the moment of truth. THE BOX, comfortable in a foreign-made car, couldn't make the transition to an American hardtop. Almost with a sigh of relief it was decided that THE BOX must go. By this time I had acquired a smaller transmitter. A streamlined Box was now in order. Two criteria shared equal billing: carrying the reduced payload, and the ability to fit between the front and rear seats of the new automobile.

Almost on impulse I began dismantling THE BOX and laid on the saw. THE LITTLE BOX resulted. It could almost be described as tiny! No longer was there a buffer of a cubic foot of air space between components, as was common to THE BOX. The days of the 2 B's, Bruise and Bulk, were over. True, I lost the seat THE BOX provided, but a $2.79 lawn chair was adequate compensation.

One thing continues to puzzle me though. The Curse surrounds even THE LITTLE BOX. People who are only vaguely familiar stroll up, gaze misty-eyed, and remark sadly, "I see that you have a LITTLE BOX." They reminisce about THE BOX as if it were a dear, departed friend. I try to ease their anguish a bit by telling them about using the very same lumber from THE BOX, and how the left-over pieces crackled and snapped in the fireplace and kept a poor family warm all this past winter. They smile bravely and walk slowly down the flight line shaking their heads.