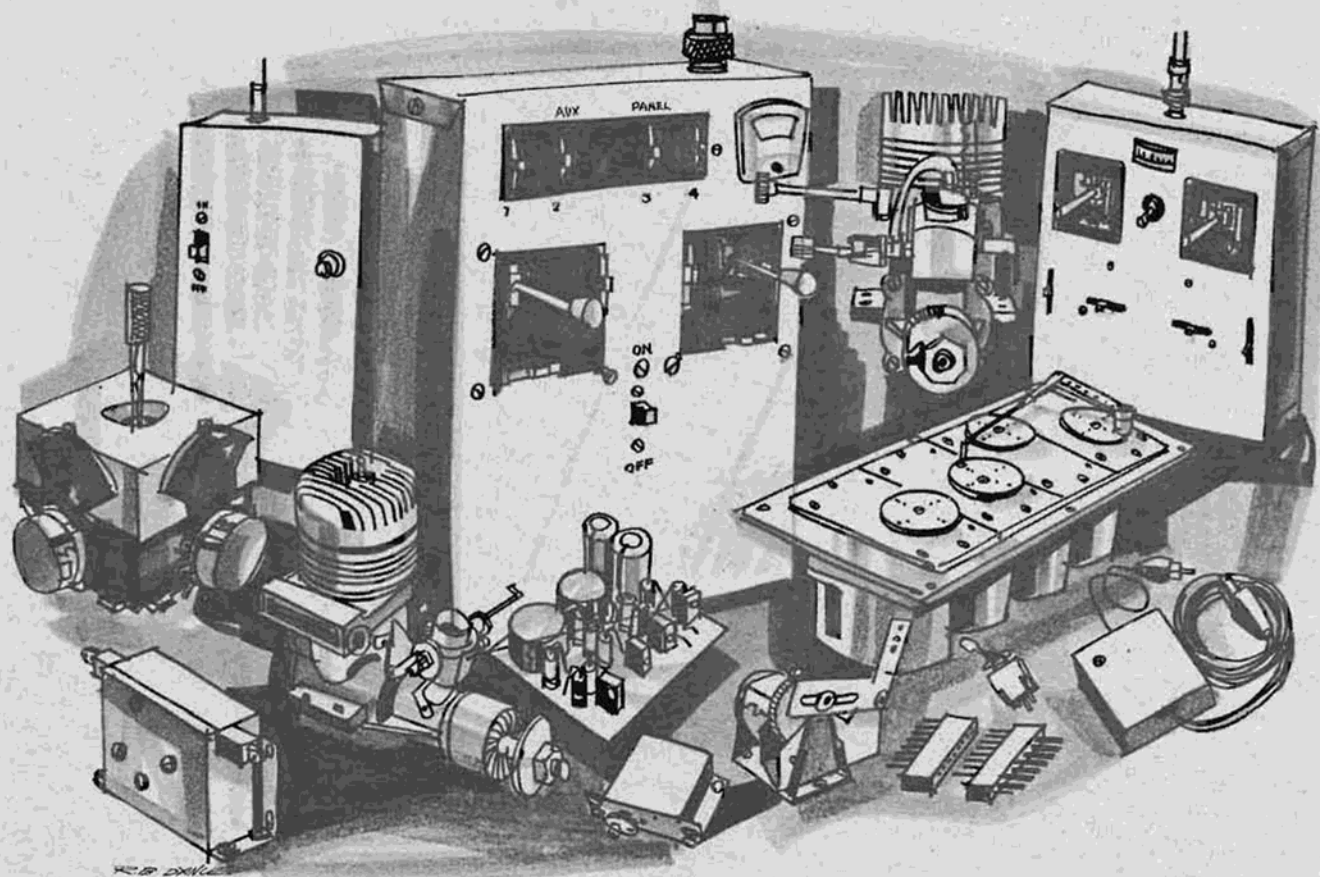




# THE INSTRUCTOR



By Chuck Cunningham



**"How do I get started in R/C?" "What equipment should I choose?" "Is there an airplane specifically designed as a trainer to fit my requirements?" "Can I learn to fly successfully?" These, and many more, are the questions this article will answer. If you're a newcomer to radio control, RCM is assigning you an instructor . . .**



. . . **CHUCK CUNNINGHAM** is an active RC'er and member of the Fort Worth, Texas 'Thunderbirds.' As a Contributing Editor to R/C Modeler Magazine, Chuck's monthly column 'Cunningham on R/C' has been a favorite throughout the world. 'The Instructor' was designed on assignment to fulfill a requirement for a modern and versatile trainer that would teach the newcomer to R/C to fly with today's modern equipment. The assignment specified a plane that would fulfill this function from two channels through full house proportional, adding controls as the sport flier increases his own proficiency. The 'Instructor' has been tested under all possible conditions, with a variety of engines and equipment. Regardless of your needs, **you can learn to fly with the 'Instructor'** . . .

**F**ROM all over the country RCM has received letters asking for help in getting started in radio control. This article is in answer to these pleas, and has been written primarily to assist the modeler who does not live close to a good hobby shop or to an active group of flyers. Of course it is hoped that those of you who are lucky enough to have proficient help will also gain some benefit from it.

Let's face it — it's hard to get a good start in R/C! It is certainly much harder to learn than golf, or tennis, for a number of reasons. If you do wish to take up these sports you can purchase the needed equipment, arrange for lessons from a pro and find plenty of places to play. It just isn't that easy, as you no doubt know by now, in radio control building or flying. To get a good answer on what equipment to buy, or what ship to build, or for that matter, how to build it, not to mention how to get it into the air and back on the ground in one piece, is a difficult proposition. If you have a good up-to-date model shop in your area, run by an active flyer, you are in luck. If you're like the majority of the letter writers, your local model store is in reality a "Hobby Shop" and specializes in plastic kits, a few hand launch gliders, and a ukie or two, and cannot offer you any real help in the pursuit of this sport.

In spite of the lack of R/C shops, if you have access to an active group of R/C flyers you are still in luck. You will never meet a more friendly group, or one more ready to aid the beginner. They can help you to decide what gear to buy and may even have some second hand gear for sale. An active R/C club is a great store-house of ideas, hints and help. If you can find one near you, by all means see about joining. Most clubs welcome newcomers, both as a source of new friends and as another pair of hands when it comes time to work on the flying field!

If you wish that you could be lucky enough to have one of the preceding outlets, but do not, than read on, this article is for YOU!

#### **EQUIPMENT**

The selection of equipment is probably the best place to start. The proper gear, suited to your budget and interest level, will go a long way toward keeping you happy in radio control work. If you buy less equipment than you really want, and can afford, chances are that you will want to trade up at an early date. This of course can be done, but you do lose some of your initial investment. If you want to get into radio work as a passing fancy then this, too, should be taken into account when deciding what gear to buy.

Single channel gear is by far the least expensive way to start in radio control and there are many good sets on the

market. Most of the major manufacturers such as Kraft, Orbit, F&M, Controlaire and others make good single channel equipment. Do not be taken in by a "bargain" at the local hobby shop, such as an old tube type receiver, or a ground based transmitter. If you buy single channel, buy only the latest superhet type receiver and small battery operated transmitter. Many good transmitters of just a few years ago had to operate on two 67½ volt batteries for power. This alone cost about seven bucks each time the batteries needed changing. Steer clear of these unless you get an awfully good buy from some modeler at way less than half price. The equipment works fine, but the battery replacement is just too expensive.

One of the most important points in single channel, and often the most overlooked is the batteries. Almost all new single channel receivers are designed to operate on two 1½ volt pencils as well as are the escapements or servos. You, the beginner, will be smart if you invest in pencil nicad batteries and build a pack of these rather than rely on a battery box. At least half of the single channel fly-a-ways are caused by faulty battery boxes, and you can prevent this if you spend a little more in the beginning and go first class. A simple charger is inexpensive, and you will be repaid many times for this step.

For many modelers single channel is the answer, but for every R/C flyer that has started with single channel and kept on, at least two others have lost interest and quit. I know of many fine modelers and flyers who simply got tired of the problems of single channel flying and gave up. Hung escapements, fly-a-ways and hard-over-rudder crashes are all too frequent with this type of radio equipment. A number will no doubt disagree with me, but I'm sure a greater number will agree. The best buy for your R/C dollar is Full-House proportional or Reed type multi gear. You will get both more air time (as opposed to ground time) and more trouble free operation.

Again, don't be misled by so called bargains in R/C. It is amazing how many old relay multi sets are still around gathering dust in some hobby shop display case. This, of course, is one of the reasons most hobby shops are not too anxious to stock much radio equipment as it changes so rapidly. Stick with the well known and advertised brands of gear. If you cannot find any of these locally, write to the manufacturer of the equipment and he will be happy to refer you to a model store or to sell to you direct if no retail outlet is nearby. When you want service on this equipment simply return it to the manufacturer and he will service it at a nominal cost.

Proportional gear is the optimum for all now. For smoothness of control and

prettiness of flight it can't be beat. The cost, in some cases, is high compared to reeds, but this cost already has dropped to a comparable level and will come down even more. If you plan to become a contest flyer in R/C then don't spend your money on anything but the best in proportional. Refer to past and current issues of RCM for product reports on proportional equipment.

Some of the six channel reed gear is pretty inexpensive as are the three channel proportional rigs. You have a wide field from which to choose. First decide in your own mind just what you want from this sport and invest accordingly. Investigate just as you would when buying a new car, and look at it from every angle. The price spread is tremendous, from about seventy bucks to seven hundred, so try and get the most from your inflation-bit dollar.

#### **THE AIRPLANE**

What model airplane to build is the next problem. I assume that you are interested in flying rather than in boats, but if boats are what you want, there are now a great group of kits to choose from. At any rate a number of fine kit models of airplanes are on the market. From now on, in this discussion, I am going to assume that you decided to buy multi channel gear and will only dwell on this with relation to beginning problems. Many thousands of words have been written on beginning problems in single channel. To find these articles takes only a trip to your public library to look up old copies of this or other model mags., or some of the books or pamphlets that have been published on this subject.

Since you have invested a fair sum of money in radio gear, don't spoil it by attempting a very difficult ship for your first aircraft. Remember, in the Air Force you learn to fly a basic trainer before climbing into a hot jet, and it should be the same with our smaller ships. Too many modelers make the mistake of trying a super hot stunt ship since all of the other guys at the field are flying this type. Don't do it! Start at the beginning, not the end, or it is liable to be the end! These ships are not hard to fly if you take the trouble to learn properly, but they do fly fast, reaction time is short, and you must learn to fly the model as though you were sitting in the cockpit. It takes time and practice to do it right, but so does a low golf score.

Before we pick out a ship to build first let us decide upon an engine. It is not practical to buy a large, expensive R/C engine if we are not going to build a super bomb at first so forget the big Vecos, Mercos, Foxes, Super Tigres and such. A good beginner size engine is a .19 and there are a number of them that are equipped with good throttles. A few may wish to start with a larger en-

gine, but if you do, limit yourself to a .35. Power will get you out of a lot of trouble, but also too much power can get you into trouble quite rapidly, and since your reactions will not be fast at first, it is wise to try and match the speed of the aircraft with the speed of your reactions.

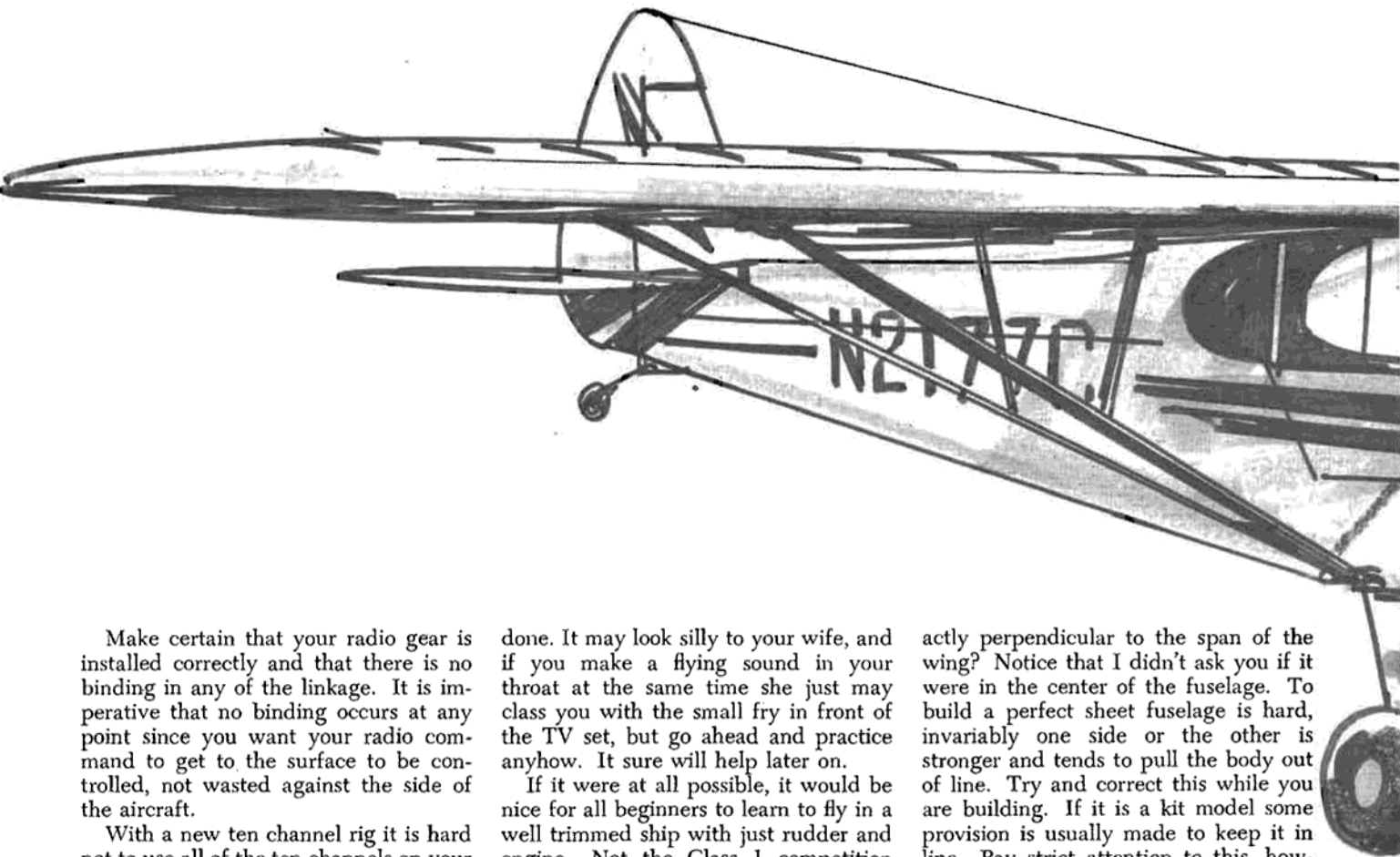
The Falcon, Jenny, Tauri, Explorer and a few others make good ships for learning to fly, or try the "Instructor." Build your first ship strictly according to the plans. Don't skimp on the glue, and if you feel the need of "beefing up" some of the parts such as the nose and the center section of the wing, by all means do it. Mount your radio gear as shown on the plans. While doing this, be sure that the balance point falls in the correct location. If it doesn't balance at this spot, then shift the gear around until it does! Remember to balance the aircraft with the wing in place, but with the fuel tank empty. The addition of two to four ounces of fuel in the tank would shift the cg to the wrong spot if it were added before the balancing takes place. A tail heavy ship is a tough thing to fly. It will stall and snap roll into the ground at the darndest times!

one for rudder, and one for the elevator. With fewer levers to push, the less chance you will have of thumbing the wrong one. This can happen, and often does with a beginner. The only way to learn the base position on the transmitter is by feel, and this feel comes with much practice.

Grab your transmitter with both hands, with your thumbs opposite the levers for elevator and rudder. This is the base position. Some transmitters have the trim lever below the elevator lever, and some have it next to the elevator lever on the same line. One of the most difficult things to do when trying to teach another person to fly is to get used to his transmitter. Practice with your own transmitter for quite some time during the building of your first R/C model. I call it "dry flying." Imagine your bird in the air and that you are flying it. Don't look down at the transmitter, glue your eyes to the imaginary ship. Think of what you want the ship to do and thumb the correct lever on the transmitter. Practice getting into and out of trouble in this manner. It will give you a chance to get used to the "feel" of your box and to learn where the thumbs go to get the job

more about why an R/C model flies, and how it can get itself out of trouble with stability than with a more advanced ship. One of the things that you will learn in the Flying-Segment of this article is in the early stages of learning to leave the elevator alone. Any over control can get you into trouble in a hurry, and most embryo flyers have a pretty heavy hand on the controls—especially the elevator! Since elevator is also very helpful when in some sticky situations we are going to use it on our first ship, but don't knock rudder only flying. It is a pretty wonderful sight to see a rudder ship come in dead stick from way up high and, by practice, swish into a landing just a few feet from the pilot!

When your ship is finally complete and you think that you are ready to fly take the time to check out everything thoroughly. You must do a bang up inspection job before your ship ever gets into the air. Check the wing for warps as well as check the elevator. Look at the trailing edge of the elevator. Is one half of the elevator up and the other down? This can spoil an otherwise fine aircraft and make it very hard to trim out. How about the rudder—is it ex-



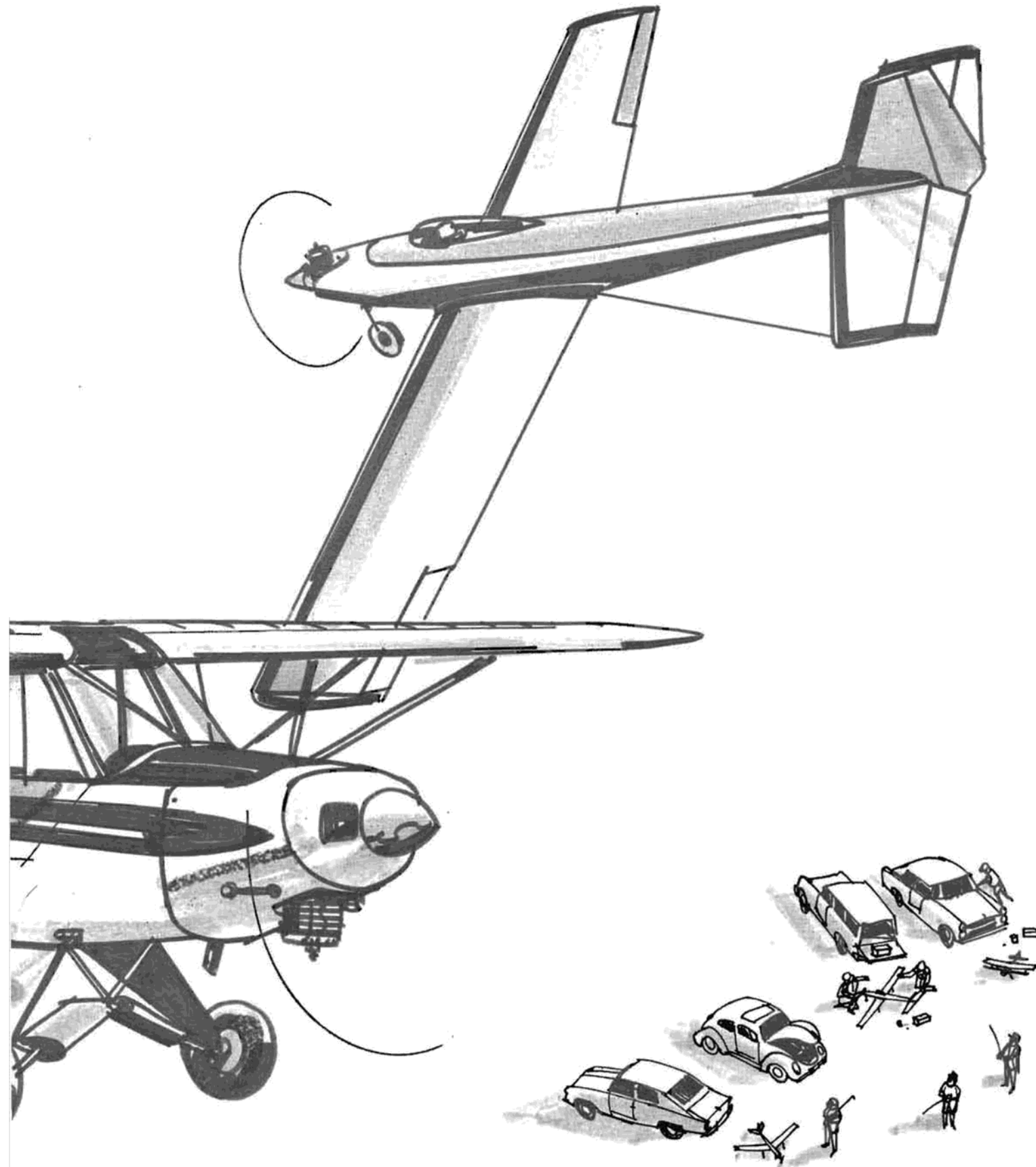
Make certain that your radio gear is installed correctly and that there is no binding in any of the linkage. It is imperative that no binding occurs at any point since you want your radio command to get to the surface to be controlled, not wasted against the side of the aircraft.

With a new ten channel rig it is hard not to use all of the ten channels on your first aircraft, but you will learn faster and easier if you limit the first ship to just six channels. Save two servos for later and only use three, one for engine,

done. It may look silly to your wife, and if you make a flying sound in your throat at the same time she just may class you with the small fry in front of the TV set, but go ahead and practice anyhow. It sure will help later on.

If it were at all possible, it would be nice for all beginners to learn to fly in a well trimmed ship with just rudder and engine. Not the Class 1 competition models that Jerry Kleinburg writes about, but a good stable ship with a multi servo on the rudder and one on the motor. You would be able to learn

actually perpendicular to the span of the wing? Notice that I didn't ask you if it were in the center of the fuselage. To build a perfect sheet fuselage is hard, invariably one side or the other is stronger and tends to pull the body out of line. Try and correct this while you are building. If it is a kit model some provision is usually made to keep it in line. Pay strict attention to this, however, because an out-of-line fuselage can deal out more misery than can any other bad building job. The reason is that you won't see it unless you take the



R.B. DANCE

time to look. If you mount the rudder on the centerline of the body you may be building in great amounts of either right or left rudder. First flights can be a terror with this condition. The "Instructor" is built around a central "crutch" to prevent misalignment. The engine thrust line should be offset to the right of the rudder center line by about three degrees. The more slowly the aircraft flies the more important this offset is. Many top contest designs do not rely on side thrust simply because they fly fast and torque is not much of a factor. Our trainer is to fly much slower and therefore you don't want it to torque to the left at take off. Only a fast set of thumbs can save a ship that breaks ground too soon, stalls out and torques left.

But, back to the alignment check-out. Make sure that the elevator is mounted exactly horizontal and that the wing is square with this plane. Many modelers who did not come up through free flight do not realize that a cocked up wing or tail can induce a turn. If you think about it, it becomes obvious that an elevator that is cocked at an angle to the horizontal plane will have one tip that stalls out first and induces a turn in the direction of the high tip. Keep all surfaces in alignment.

Next, check to make sure that all control rods are safety locked into the control horns or into the actuator arms on the servos. Use the hardware linkages such as "Kwik Links" wherever possible. If you don't have these available, then make certain that you have spring wire safety rods at each control connection. Be sure that there is no binding in any of the connections to the control surfaces and that the control horns are mounted against plywood — either plywood buried into the surface of the control or a piece of plywood glued to the outside of the surface. If you did go against advice and install the other two servos of your ten channel "Rig" make sure that the trim bar you use is strong and serviceable. Good aircraft have been lost by overly soft or too small trim bars.

A good practice to adopt is to safety all of the wires in your servo prior to installation. Very gently remove the metal case from the servo and with either rubber cement or with "C.E. Clear Tub Seal" stick all of the wires to the amplifier board, the printed circuit board and to the motor terminals. These points are subject to much vibration and a little clear rubber here may save you a problem later on. Make sure when replacing the cover on the servo that you don't bend the fingers that contact the printed circuit board. If you do slip and bend them, lightly realign them so that the tops are all at the same plane and contact the printed circuit board at the same time and with the same pres-

sure.

Check all of your other wiring, make absolutely sure that there are no bad soldered joints in your hook up. One of the things that proportional gear has over reeds is that it comes ready to plug together and fly. It would be a big help to the beginner if all reed equipment did come ready wired.

Next take a good look at the installation of your radio equipment within the ship. Are the servos mounted securely to prevent them from coming loose in a



crash (even a minor crash), and banging into the receiver? For receiver protection the best method of mounting is to build a small "house" for it of ½" foam rubber. Completely surround it in this foam box, and if you can, make the leading edge of the box of 1" rubber. In case of a crash the receiver will be protected on all sides, and even if it tears loose and goes flying through the air, the rubber "coffin" will protect it when it bangs into the ground. A number of beginners models do not have

enough room in the "club house" for proper installation and protection of radio equipment, and I feel that this is a grave error as the chance of a crash is much higher at this level.

Make certain to locate your batteries ahead of your receiver, and again, wrap the batteries in foam. Not only is this a highly concentrated weight mass but also they can be damaged in rough contact with the ground. The last check to make is to see if all of the control surfaces have been hooked up correctly. Is up really up? Is high engine, high engine, and so on. If it is not correct, change the wiring by reversing the yellow and orange wires on the servo plug. Most multi servo plugs are made to be cut apart at the yellow and orange wires so that they can be easily reversed. This applies to REED equipment only. One of the points that I have not mentioned before is in wiring your servo plugs. As in everything else in R/C there is a right and wrong way of doing things. When you wire the multi plugs be sure that the power plugs coming from your receiver are female and that the plugs coming from the servos are male plugs. Also that the battery plug is a female plug. The reason being that a male plug on the power end could short out and either run down the battery pack or get an unwanted signal to a servo if the other two power plugs are simply hanging inside the aircraft while only six channels are used. If you send in the receiver or servos to the factory for servicing they will have to remove the plugs if they are not correctly installed.

As you wire each plug, slip the sleeve over the wired surface while it is still warm, wrap each plug with thread and coat the surface with either white glue or with Tub Seal. Any method of preventing vibration at this spot will help in giving your equipment a long life.

All of the checkouts are necessary before your first flight to insure the success of it and the well being of your equipment.

During the time that you were building the model you should also have taken time to thoroughly break in your new engine. Follow the manufacturers directions for break in and don't skimp on the time involved. A stiff, unbroken, engine can become a cause of failure on first flights. It can sag and lose power on takeoff with a resultant crash, or it might overheat and "freeze" in the air, either ruining a good engine or causing you to lose power at a critical time. Operate the throttle over all of the speed ranges. Don't be surprised if your new engine won't throttle down on first running — it probably won't — but will as soon as it begins to free up. Do not run your engine for long periods at either high throttle or low throttle. Prolonged running at low idle will cause a

fast build up of varnish and cause you trouble very rapidly.

If you have finally completed all of the check-outs, practiced button flipping, broken in your engine and have charged up your batteries, it is time to take the giant step and learn to fly. If you can, contact an experienced flyer to test out your new ship. The first flights are the hardest on a new aircraft as well as on the builder. If you are the man in the vast wasteland of no other R/C'ers then it's up to you.

The Instructor is an airplane that has been designed especially to teach beginners how to fly. More than that, it has been designed to progress as the beginner progresses and to "grow up" with him. This ship was *not* designed in the old fashioned way of attempting to take a single channel ship and to modify it slightly for large engines and multi channel operation. Instead, the Instructor was designed to be a multi trainer — easy to build, a snap to fly, and to have the capabilities of taking on a larger engine and much more control when the Tyro is ready for it. In short, it has been designed to give *you* the best possible entry into radio control with a minimum of construction time and moderate expenditure of money. It is a small ship by many standards, and yet by being small, the weight is kept down allowing the builder to choose from a wide range of engines.

In its basic form the Instructor is designed to fly with six channel radio gear with either a .19 or .35 size engine.

The test model was equipped with a Veco .35 for test flights and with eight channels of radio gear installed. Tests have been made to see how this ship would respond with only rudder control, and by setting the elevator trim to up-trim position, it performed quite well. By using the standard contest set-up of up thrust it can be flown very well in rudder only competition.

Before we get into the construction I would like to unfold for you the reasons behind the Instructor and why it is a "different" airplane although it closely resembles various other designs.

To begin with, the basic design of the Instructor had to accomplish several

things. It had to be able to fly with engines from .19 to .49, one heck of a range! It also had to have room to take any type of radio installation, from four channel through full-house proportional. It had to allow for any ham fisted modeler to install his radio gear and engines and be able to change at will. It had to have provision for ailerons to be added later as the beginner became proficient. It had to be simple, yet easy to build for the newcomer to modeling. Last and most important, it had to fly, and *fly well!* In fact, it had to be *easy* to fly with the smaller engines in order that the beginner wouldn't feel as if he had a tiger by the tail. One other thing — it had to be rugged, able to withstand the high strain of a fast pull-out with a large engine and yet be light enough to fly with a smaller one.

All of these "had-to's" boiled down to the Instructor. It has *proven* itself in *all* categories. It is extremely easy to fly, has no bad habits, and is rugged. She can operate over a wide speed range, and yet handle like a baby carriage. One of the most satisfying flight characteristics is that on turns her nose stays *up*. To make a turn to the right or left, simply nudge the rudder a bit and then let her come on around — no blips of up elevator are required to hold altitude, the nose stays up. With many, many multi ships and trainers, when a turn is started, down comes the nose and a spiral dive is the end result. This is unnerving to the beginner, to say the least!

If you are not a beginner, but want to build the Instructor for a good airplane, you are in for a surprise, she can perform any flight maneuver, and well! One of the most thrilling stunts is to head downwind at full bore and then hold full up elevator and rudder — she will snap roll one and one half times, tumble through the air almost end over end for one flip, then settle down to a high speed spin! Try the same bit from an outside loop, but at the bottom hit full rudder while holding full down elevator, and she will snap roll inverted, tumble, and come out in an inverted spin! Try this on some of the so called hot multi ships and see if the wings

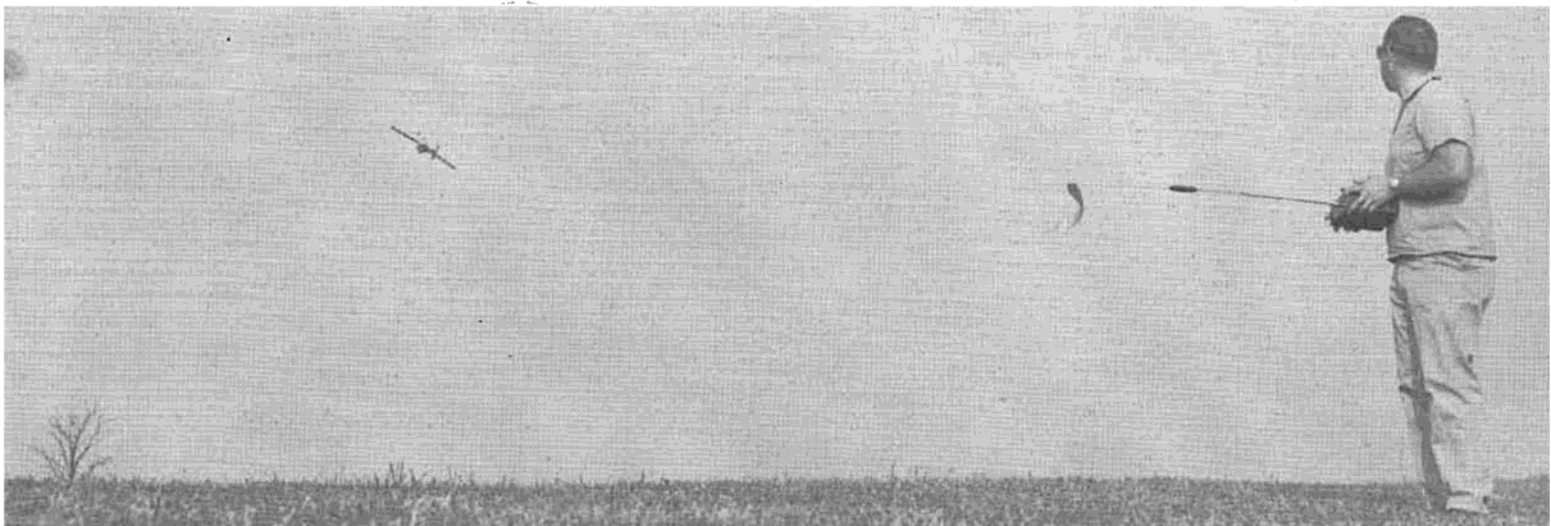
hold up!

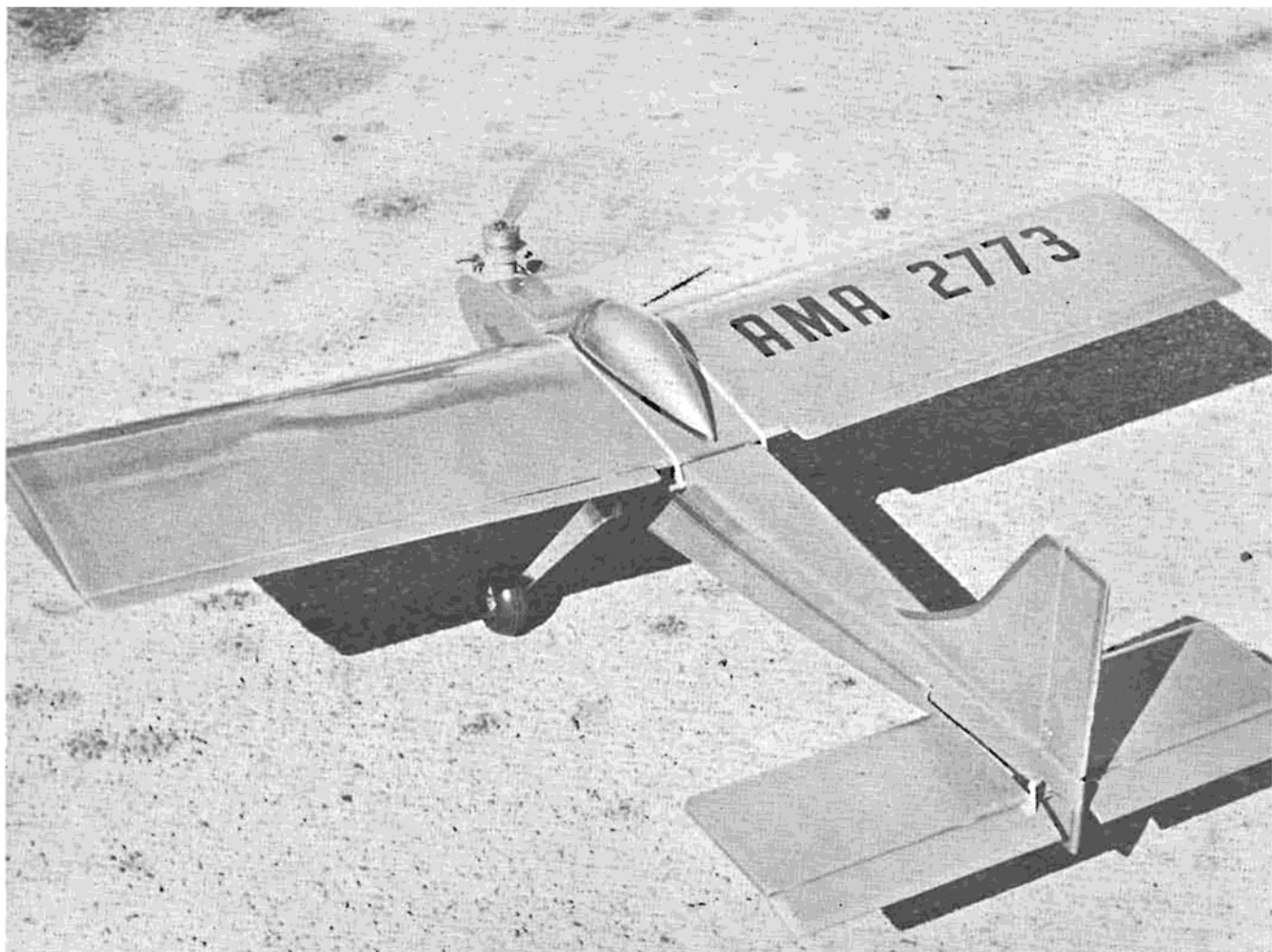
Frankly, I was surprised at just how well the Instructor does fill the bill for almost every type of flyer.

Since this part of the series is to help the beginner in starting construction we are going to take more than the normal amount of time to try and fill in the gaps in building. If you're an old hand you can skip over most of these words. At the end of this section you will find a complete material list for building in case you have to mail-order your materials.

One of the prime requisites for successful construction is a good building board. I have found that for all around good use chip board, or novaply works better than plywood. This board is made of wood chips and resin and is very warp resistant. I have two pieces that I use, each being four feet long by 16" wide. This may seem small, but I place these pieces on a card table when building and slip into a closet when they are not needed. Also having two allows me to use each piece for building wing halves or to build a fuselage on one and an elevator on another. I keep one side of each for wings only. This keeps all of the glue and other junk from marring the surface. Also, I have lined off the wing side of each with a plastic marking pen. Each panel is laid off in 1" spaced lines running horizontally and 3" spaced lines running vertically. This makes it easy to build wings since I can lay out the panels without using plans. If any other lines are required to get the spars or tips in the right place, these marks can be made with a plastic tip marking pen on the wax paper covering. Use wax paper to cover either the wood or the plans. Keep in mind that if you are going to build with wax paper, do not use model cement. It dissolves the wax in the paper; do not use model cement. It dissolves the wax in the paper, and in turn this wax penetrates the glue and makes a very weak glue joint. I use white for almost everything except around the fire wall, and presents no problem, whatsoever, with wax paper.

A good selection of tools is necessary for most R/C work, but you can start





with just a few items such as needle nose pliers, lots of pins, a hand drill (if you don't have an electric one), a soldering iron, and a good X-Acto knife. Buy several of the X-Acto saw type blades as well as a good selection of standard blades. Last, lay in a supply of single edged razor blades. I have worried for years about the problem of single edge razor supply. Who uses them to shave? Yet they are still on the stands, so perhaps the modelers buy them all!

With limited tools, a good working surface, and a desire to Build the Instructor, let's get on with it.

Start with the wing. Take all of the  $\frac{1}{16}$ " material that is to be used for the top and bottom leading and trailing edge sheeting and trim to the required length. Set aside all of the long pieces to be used for this, as well as the 4" wide short pieces. These are going to be used for center section planking. Now, trace the rib pattern from the plan to a piece of wax paper. Be sure that you use the rib pattern and not the full wing cross section. Next, transfer this tracing to a piece of  $\frac{1}{16}$ " balsa and cut out this rib. This will be your master rib. Mark it with a ball point pen and use it to lay out all of the required ribs. (Do not include the master rib as

one of the wing ribs.) After tracing the required number, put the master rib in a safe place and use it either to make a new wing or in case repairs are needed at some later date on this wing. While you are cutting out the wing ribs *do not* cut out the spar slots. Stack all of the cut-out ribs in one pile and line them up very carefully. Pin the stack together and sand them all to the same contour. Be sure that you do not mess up the original airfoil. Now take your razor saw and cut the required spar slots. Make sure that the leading edge slot is correct. Next, lay the plans out on your work table, or draw out the wing on wax paper over the guide lines, pinning the railing edge sheeting to the plans. Make the blocks that are to be used to prop the leading edge to the right height from scrap  $\frac{3}{16}$ " or  $\frac{1}{4}$ " balsa and pin in place. Now cut the spars to the same depth as are the ribs at the spar slots, then slot the spars with a razor saw to accept the ribs. Put all of the ribs on the two wing spars, egg crate fashion. Now lay a bead of white glue down on the trailing edge sheeting and glue in the cut down trailing edge stock. Again lay a strip of glue where the ribs contact the trailing edge sheeting. Pin the ribs in place, block up the front of the ribs with the prop blocks, and

glue the leading edge in place. When all of this is lined up, pin the spars and ribs together so that they won't slip apart, then dip a small paint brush in your jug of white glue and brush glue all over each joint. While this is drying you can lay out the trailing and leading edge top sheeting, mark out the rib locations with a ball point pen, and smear contact cement to the ribs and to the rib locations on the sheeting. When this contact cement has set contact the sheet to the ribs. Be very careful—once joined you can't get them apart! If you would rather stick to the usual method, then glue on all of the sheeting with Ambroid or other model cement. Let the wing assembly dry over night.

Build the elevator framework directly over the plans, and when dry, cover with  $\frac{1}{16}$ " sheeting, using either contact cement, standard glue, or white glue. Make the elevator from a piece of  $\frac{1}{16}$ " x  $1\frac{1}{4}$ " trailing edge stock with a piece of  $\frac{3}{8}$ " square glued to the front of it. This makes a perfect elevator, and one that is much easier than sanding to shape from sheet. When the glue joint is dry, sand the leading edge to a radius. Before you cut the elevator halves apart, install the  $\frac{3}{32}$ " wire cross tie and lock in place with a piece of pinked tape or good strong cloth. When this is

dry, cut out the rudder slot in the elevator. By installing the wire before the parts were cut you have insured a perfect flipper, with both sides having the same plane.

Cut out the rudder from  $\frac{3}{16}$ " sheet and be sure and run the grain as shown for each piece. This will keep the rudder from warping after you have done the final doping.

Now for the fuselage. I use the same method of construction for all of my ships and have never had a misaligned fuselage since developing this crutch system. It is very important that you have a true fuselage since an out-of-line one can give you a very bad time. Lay out the crutch on the top view of the plan and glue in all of the cross braces. Use the gussets where shown, which greatly strengthens these joints. While this is drying, cut out the firewall from  $\frac{1}{4}$ " plywood and drill the holes for the nose gear brackets. Mount the brackets along with the spaces as shown. Glue the firewall to the crutch, remembering that you are building the body upside down. Trace off each side pattern on the balsa sides and cut out. Next cut out the  $\frac{1}{32}$ " ply doubler. Paint contact cement on the fuselage side and the doublers, and when dry, glue together. Make sure that you are building one right and one left side! Go back and check this again. Lay each side down and glue in the rear truss braces. Don't skimp here, these are more important than most modelers realize and resist any twisting motion in high speed

dives.

The next step requires a steady hand and eye. Paint contact cement on the outside of the crutch and the inside of the side pieces where they are joined. When this has set, very carefully, beginning at the nose, place one side to the crutch. Work toward the rear, and bring the side in place against the crutch. All of this time the crutch has remained pinned to the table. Now repeat this with the other side, using a liberal amount of epoxy glue on the firewall joints. Glue in all of the bottom cross braces and all of the remaining nose doublers while the crutch is still pinned to the building board. You can also glue on the bottom sheeting while the fuselage is pinned to the board. After it is dry, pry up the front of the body and slowly lift the whole assembly from the board. The pins will still be inside, but you can slowly pry these loose from the board. Reach inside the body and remove the pins with needle nose pliers and glue on the top sheeting.

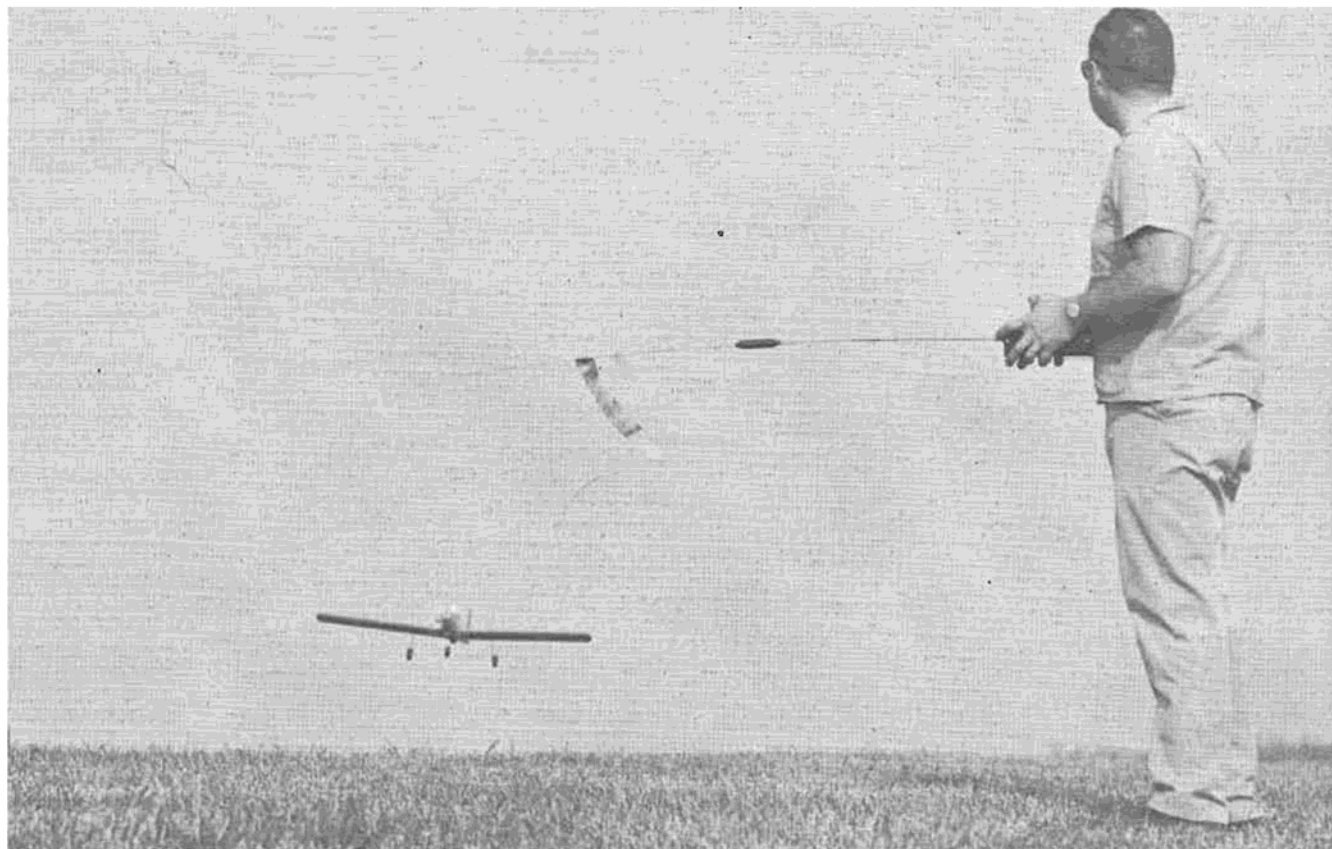
If you have completed the elevator and rudder, and have sanded them by this time, give them a coat of clear dope and set aside. Un-pin the two wing halves from the building board and trim off all of the excess glue droplets from the bottom. Turn the two wings upside down and cut the ribs at the center section for the dihedral brace. Unlike most ships, I use a balsa dihedral brace rather than a plywood one, but make it much longer. Cut the dihedral brace to the pattern shown on the plan. Cover

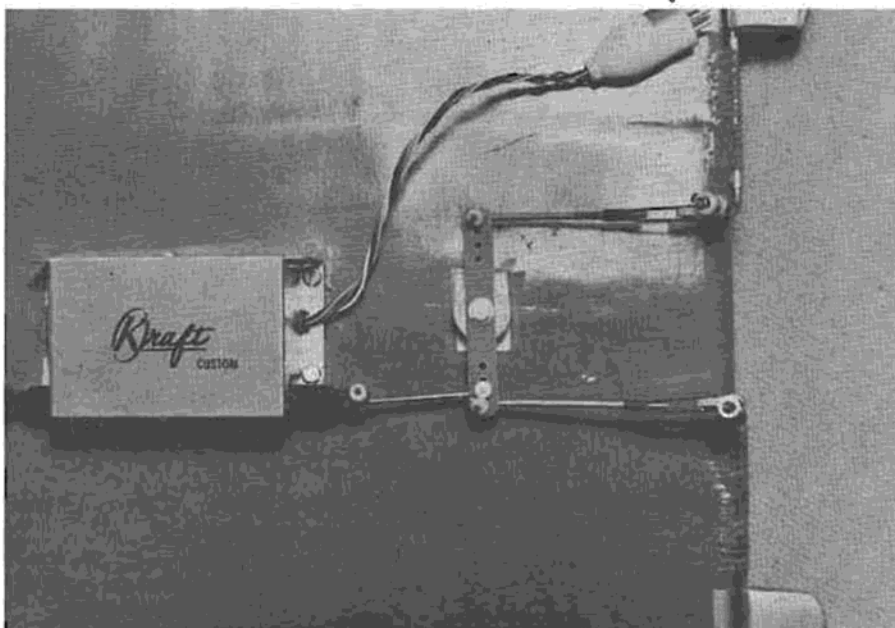
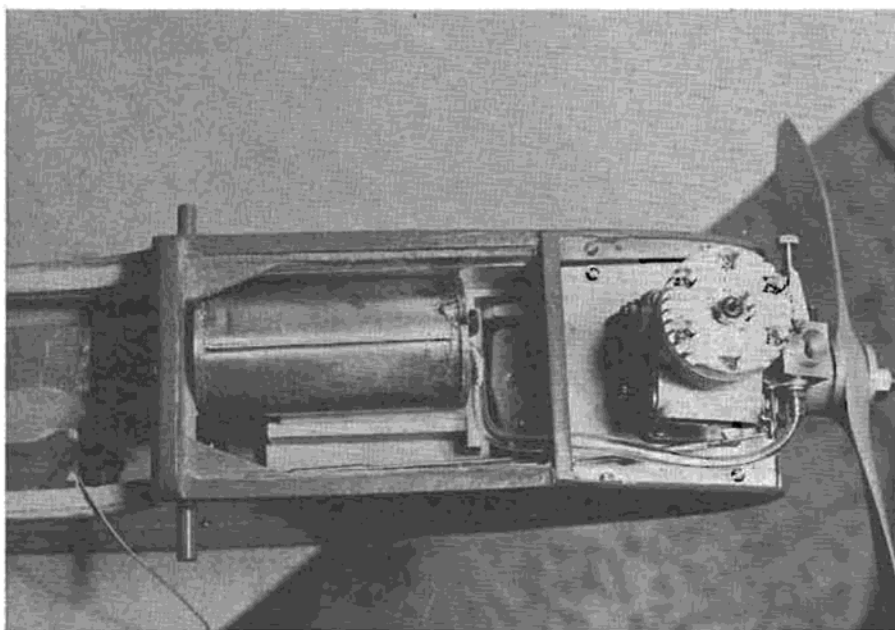
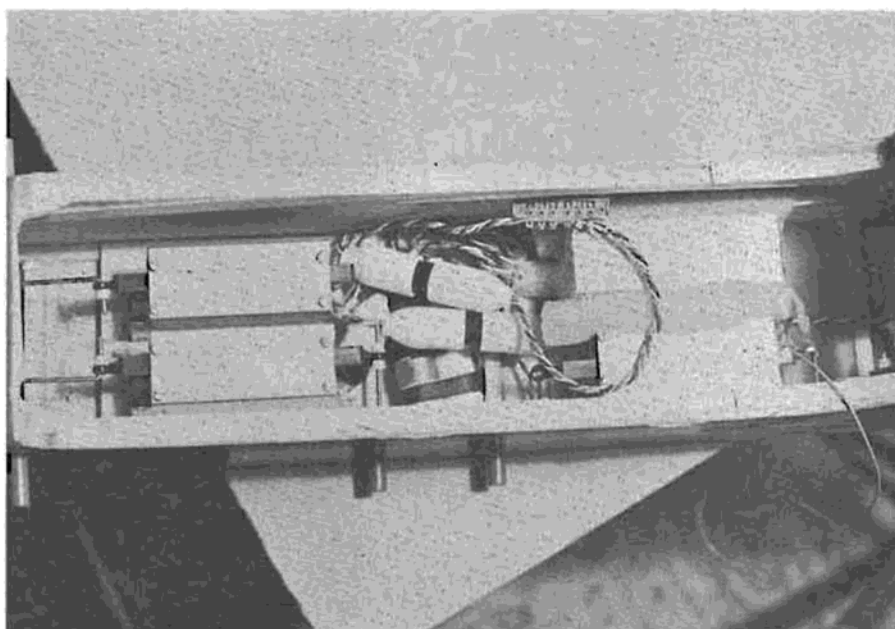
this liberally with white glue and put it into the wing halves. Make sure that each half lines up perfectly. Pin this assembly securely.

Next, install the bottom leading edge sheeting, the center section sheeting, and the cap strips. When all of this is dry give the entire wing two coats of clear dope. When the dope is dry take a five inch wide piece of pinked aircraft tape, or strong muslin, paint with white glue and wrap around the center section. When dry you will have a wing that is almost impossible to break.

Most of the construction has been completed by now and if you are looking at the wing you suddenly realize that something is fishy. That trailing edge is sure thick. You bet, about  $\frac{1}{4}$ " thick! If you are going to install ailerons you simply build them and hinge to the trailing edge after it is covered. If you are going to fly the Instructor with a rudder don't worry about the thick trailing edge. Actually, it is much stronger than a thin one, and it flies as well, or perhaps even better than a thin one. Many experts will scoff at this, but don't listen, it works quite well!

If by now, you have sanded all of the parts and given them each at least two coats of clear dope, then sanded again, lightly, you are ready to cover. Nothing frightens a beginner more than covering. If you take it easy and don't rush it, it can be done. The Instructor was covered with silk on the fuselage and silkspan, medium, on the elevator and rudder. The wing is double covered





with silkspan. Do this as follows: Get a sauce pan from your wife and put about an inch of water in it. Also, steal a towel from her. Cut out four pieces of silkspan for the wing, making sure that the grain runs spanwise. Take the first piece and fold it until it just fits in the sauce pan. When it is soaked with water (about ten seconds should do it), remove, and blot out all of the excess moisture on the towel. Lay this piece over the top of the wing and smooth out all of the wrinkles. Cover only half of the wing at a time. With the wrinkles smoothed out, start brushing clear dope through the silkspan and into the wood. Do not dope over the open areas. Work your brush away from the open areas and try to work from the center to the tip. Make little slits in the paper and dope it to the tip blocks. Wipe all of the doped edges down with the palm of your hand. (When you go in to take a shower after you have covered your ship you'll remember the dope, it's still all over your hands and scratches like heck when you lather up!)

Cover the top and bottom of the wing in the same manner. Also the tail surfaces. Set the wing aside to dry overnight. Cover the fuselage with either silk or nylon covering. This can be applied wet just like the silkspan and brushed into the wood. After the wing has dried, cut four more pieces of silkspan, this time be sure that the grain runs in the opposite direction. Wet like the first and apply just the same. Allow this to dry again overnight and then brush or spray on four coats of clear dope to the wing, tail and fuselage sections. Now you are ready to color dope or to trim as the case may be. This method of covering is much easier than silk, and has the advantage of being lighter, uses about a third of the dope required for silk and is a lot cheaper.

Color doping is a matter of choice. You can either use colored dope all over or just for trim. If you are going to use a .19 for power I recommend that you stick to trim only in order to save weight.

If you plan to use a larger engine then you can afford the luxury of color. Try Hobby Pox if you like or the new quick finish Ala Dewey/Cunningham. This is simply aerosol spray enamel from the hardware store. This is the easiest and lightest color to be had. What ever you do use, keep one thing in mind, always paint something on  
(Continued on Page 84)

Top: Kraft proportional installed in the Instructor. Center: Ueda .45 engine with DeBolt tank. Below: Underside of wing showing aileron servo. Ship will fly well with a .19 and rudder and motor control only, adding controls as you add to your flying skill. Custom R/C Products foam wing used on this prototype.

## THE INSTRUCTOR

(Continued from Page 18)

either the top or the bottom of the wing that stands out. Several bright stripes on the bottom is fine. This will aid you when you are flying since it makes it much easier to see which tip is up and which tip is down. More about this in the flying section.

Go back to the first section and re-read all of the advice on alignment and make sure that everything is correct. The elevator is glued to the body with epoxy resin, as is the rudder. Hinge all of the surfaces with either nylon hinges or figure eight stitches using a 30# nylon fish line.

Install the radio gear as shown on

the plans if you are using Bonner servos and reeds. If you are using other types of gear, place the radio and servos inside the body and shift around until the balance point is where shown. The servos are fastened to the side of the fuselage rather than to a servo board. This is easy to do, saves weight, and distributes the load over the body in case of a crash. If you don't like the screw heads showing on the outside make a servo board and install them in the conventional manner. However you make your radio installation, be sure that none of the torque rods or push rods bind at any point.

Make the landing gear from wire or aluminum sheet and the engine mounting plate from  $\frac{1}{8}$ " phenolic board, or  $\frac{3}{16}$ " plywood. Be sure and use the amount of right thrust shown. This will keep you out of trouble at low speed and won't show up at all at high speed.

If you plan to fly the Instructor from a grass flying field then let the ship assume a positive attitude when sitting on its landing gear. If you are lucky enough to have a paved field to fly from, set the nose gear so that the leading edge is just slightly negative. This will allow plenty of speed to build up before you take off.

The Instructor may take many forms. If you intend to fly it with ailerons from the very beginning, cut a hole as shown on the plans for the aileron servo, make the ailerons from  $\frac{1}{4}$ " x 1" hard trailing edge stock, and install the wire torque rods as shown. Sew or hinge the ailerons to the wing trailing edge. Make sure that both ailerons are lined up the same. Some modelers prefer to have their ailerons drooped slightly but for best results set them up to be exactly on the center line. To do this easily for the first test flights make a template of shirt cardboard and pin it to the wing tip in such manner that a line on the cardboard falls exactly on the zero line of the wing rib. By extending this line to the aileron you can see whether each is up or down.

If you have followed the building tips and notes down the line you are now ready to test fly your Instructor, and in the case of you beginners, to teach yourself how to fly.

One final word — the Instructor with eight channels of radio and a thirty-five should weigh in at about 5 pounds. With a .19 and six channels of radio it should weigh about  $4\frac{1}{2}$  pounds, no more if at all possible. If you go first class and install ailerons, the weight should be not more than  $5\frac{1}{4}$ # for best results with a .35. If you are one of the daring type and are going to use a big engine in this ship then weight is really not too important, but for best results try and keep the dry weight at  $5\frac{1}{2}$ #.

## THE INSTRUCTOR

(Continued from Page 85)

### Material List.

#### Wing:

- 4 pcs  $\frac{1}{16}$ " x 4" x 36"
- 4 pcs  $\frac{1}{16}$ " x 3" x 36"
- 2 pcs  $\frac{3}{16}$ " x 2" x 36" hard
- 2 pcs  $\frac{1}{8}$ " x 2" x 36" hard
- 2 pcs  $\frac{3}{16}$ " x  $\frac{3}{16}$ " x 36" hard
- 2 pcs  $\frac{1}{4}$ " x 1" x 36" T.E.
- 2 pcs  $\frac{5}{16}$ " x  $1\frac{1}{4}$ " x 36" T.E. (for ailerons)

#### Elevator:

- 4 pcs  $\frac{1}{16}$ " x 3" x 36" (use balance for ribs if needed)
- 2 pcs  $\frac{1}{4}$ " x  $\frac{1}{4}$ " x 36"
- 3 pcs  $\frac{1}{8}$ " x  $\frac{1}{4}$ " x 36"
- 1 pc  $\frac{3}{8}$ " x  $\frac{3}{8}$ " x 36"
- 1 pc  $\frac{5}{16}$ " x  $1\frac{1}{4}$ " x 36" T.E.

#### Rudder:

- 1 pc  $\frac{3}{16}$ " x 3" x 36"

#### Fuselage:

- 2 pcs  $\frac{3}{32}$ " x 4" x 48"
- 1 pc  $\frac{3}{32}$ " x 3" x 36"
- 3 pcs  $\frac{1}{4}$ " x  $\frac{1}{2}$ " x 36" hard
- 2 pcs  $\frac{1}{8}$ " x  $\frac{1}{4}$ " x 36"
- 1 pc  $\frac{1}{16}$ " x 6" x 12" plywood
- 1 pc  $\frac{1}{4}$ " x 6" x 12" plywood
- 1 pc  $\frac{1}{32}$ " x 12" x 24" plywood
- 1 pc  $\frac{3}{8}$ " x  $\frac{3}{8}$ " x 36" balsa

#### Miscellaneous:

- 2 pcs  $\frac{1}{16}$ " x 36" music wire (push and torque rods)
- 2 pcs  $\frac{1}{8}$ " x 36" music wire (or aluminum sheet for landing gear)
- 1 pc  $\frac{1}{4}$ " x 36" hardwood dowel (for wing and gear tie down)
- 1 pc Top Flite nose gear wire
- 1 Top Flite nose gear bracket
- 2 pk Blind mounting nuts
- 1 pc  $\frac{1}{8}$ " phenolic board 3" x 3" (engine mount)
- 1 pc  $\frac{3}{8}$ " x  $\frac{1}{2}$ " x 18" hardwood motor mount wood
- 3 pcs  $2\frac{1}{2}$ " wheels
- 2 pk wire keepers for landing gear wheels
- 2 pcs nylon control horns
- 3 pcs DuBro Kwick Links
- 5 shts medium grade silkspan
- 1 sht silk or nylon

The entire reason for reading this far is to get the whole mess into the air and down again. Down in one piece that is. Actually, the aircraft will probably fly, but as you may have suspected by this time it is the pilot that counts. We are going to cover an awful lot of ground (or air) in the next few pages and try and cram many experiences and lessons into a short space. I may omit some very important information, but not intentionally. It is our aim to make this section just about the most informative piece ever written at one time about learning to fly and some of the tricks of the trade after you become airborne.

First of all, turn back to the first sec-

(Continued on Page 88)

(Continued from Page 86)

tion on equipment and read again the portion on alignment of surfaces. This is very important because a misaligned ship can go into the ground before even the most experienced pilot can save it. Check it all over carefully and recheck all of your control linkages, trim bars, push rods, control horns, and solder the nut on the aileron bellcrank, if you are using one. Try and second guess any source of possible trouble. There are at least two million places that can be a problem so seek them all out. Don't be in a hurry to get into the air. If everything is all checked out and you are ready to try your wings, let's go.

Did you charge your batteries at least 12 hours, or better, 16? If not, wait another day. If you are using a dry battery operated transmitter, have you checked the batteries under load? Check 'em. One tip at the beginning — after a day's flying charge your batteries overnight. If you are not going to fly until the following weekend remove them from the charger and then charge them again overnight 24 hours before you are going out to fly. If you have a variable charger you may want to leave them on trickle charge all of the time.

If all of the batteries are fully charged, the next thing to test is the transmitter and receiver operation. If they are in tune and you are getting simultaneous control, fine. If not take the time to dig out the manufacturer's instructions and tune the receiver as directed. Next, range check your equipment. It is a good safety tip to always do this before every flying session. Also it is a good idea to check your simultaneous operation during your flying session. Some transmitters drift off with a change in temperature, so be on the safe side and check often.

While on the subject of transmitters and receivers always make sure that your transmitter antenna is fully extended before each flight. If your transmitter is equipped with a removable antenna, check that it is screwed tightly to its socket. Make sure that all joints are tight, and that the antenna is not broken in any place. Buy a frequency color flag for your antenna and at the same time slip into the dime store, or your wife's supply of ribbon, and find a piece of ribbon about 1/2" wide, 18" long and the same color as your frequency flag. Tie this to your antenna and you always have your own portable wind sock. It is much easier to check this wind sock than to wonder where the heck the wind has shifted to now.

Next, check the spot where your receiver antenna comes through the fuselage. If it comes through a hole and

trails back to the tail then slip a piece of fuel line over the antenna wire and down to the hole to serve as a bumper for the wire. It has been known to happen that in a hard landing or crash the wires inside of the plastic coating of an antenna wire have been broken, and not visible on the outside. Result, you guessed it!

Now, if you have some help, at least some helping hands, is the time to test your new ship for vibration problems. Take two large rubber bands and slip one over each wing panel. Start your engine and then have someone pick up the ship by the two rubber bands. Operate the throttle over its full range and watch for any unwanted movement of the control surfaces. If there are none then you have done a good job of installing your receiver. If you do get any surface movement, repack your receiver and test again. It is better to pack the receiver lightly in foam rubber than to jamb it into a tightly packed nest of foam rubber.

The time has come, it can't be put off any longer. It's now or never for you and your ship. If the wind is blowing over seven or eight miles an hour and you have never flown before it is best if you wait until just before sundown when the wind drops. A very gentle breeze is best for test flying. Since we are assuming that no experienced flyer is available to help you, and that you did build a ship such as the Instructor, or other easy-to-fly ship and not a hot contest type low wing aircraft, we must also assume that you have been practicing with your transmitter on dry flying as mentioned earlier. At the time of your first flight it is important that you understand where each lever is, and what each one will cause the airplane to do. For this first flight with the Instructor we are only going to have three surfaces to worry about, Rudder, Elevator and Engine.

Start your engine and let it warm up on high setting for about thirty seconds, throttle back to idle and check to see that it operates properly. Some beginners prefer to have the idle setting so low that the engine will stop when fully retarded. This is to allow them to shut down the engine completely in case of a malfunction. This idea has a lot of merit. If you elect to have the engine continue running be sure that the throttle will set it low enough so that the aircraft will be able to land at this setting. Just ticking over is a good setting.

Now that the engine is running at idle, check all of your other controls. Run through all of them, and while you are checking see that they work in the right direction. If you have ailerons hooked up on your ship and intend to go against advice and use them, then be

(Continued on Page 90)

(Continued from Page 89)

darn sure that you have plugged in the servo properly. When you stand at the tail of your aircraft, looking toward the nose, and give the lever a push for right turn, the LEFT aileron should go DOWN, and the right should go up.

For some strange reason almost every beginner will automatically think that the other way around is the correct hookup. All former full scale pilots will know the difference, but many, many first, and sometimes second and third ships, have been lost by hooking up the ailerons backwards. Also, you have to remove the wing after flying sessions and replace it for the next time and each removal means that the aileron servo must be unplugged. Take the time to always check this. If you are curious about why the left aileron goes down to make a right turn, the answer is that the left being down creates more lift on the left wing panel, while the right aileron being up creates more drag on the right panel. The two together cause the aircraft to rotate on its horizontal axis.

If you are going to fly with a .19 engine in the nose of your ship, more than likely you will have to hand launch for first flights. Especially if your flying field is a grassy one like most country fields. You should have a helper do the hand launching for you, better yet, get someone that is used to hand launching models. Again if no help is available and you are doing it yourself, it can be done, and reasonably easy. Make sure that both your transmitter and receiver are turned ON and that you have checked all of the controls. Advance the engine to high, pick up the aircraft in your right hand, grab it just aft of the main gear, hold your transmitter in your left hand, turn into the wind and run into the wind. You can tell just where the wind is coming from when you feel an equal pressure blowing on your ears. As you run into the wind hold the aircraft up over your right shoulder, wings parallel and the nose tipped just slightly up. As you run along you can feel the plane getting lighter in your hand and you should soon be at flying speed. When you feel the ship begin to lift out of your hand give it just a gentle shove straight ahead. DON'T throw it! Let it fly off of your portable launching pad. Above all *don't* throw it up. As the ship flies away from you, swing the transmitter up until you can hold it with both hands and your thumbs have found the base position. Stay off of the levers! If you have checked your aircraft for all alignments and you have set the elevator at neutral, and you have balanced it at the

spot shown on the plans, it should fly straight out away from you in just a very slight climb. If it tends to turn one way or the other just TAP the control lever for the opposite control. *Don't* hold a hard rudder or elevator!

Now that we have you in the air, let's go back and see how to do it if we are going to take off. If you have a smooth runway then a .19 will get you off ok, or if you are using a .35 you should have no problem in getting off of grass, but remember that that .35 has lots of power and you may get in trouble, fast!

Again, start your engine, turn on your radios, and check all controls for proper operations. Let your assistant carry the ship out to the takeoff point, and set it down facing directly into the wind. Make sure that he fully understands that he is not to release the ship until you nod your head. When everything is ready and you are at high throttle nod your head for him to release the ship. Let it run straight down the runway into the wind. Allow the speed to build up until the ship seems to be wanting to lift off, then tap an up. Don't get on the up button and hold, just tap it. If nothing happens, tap it several times in succession. The front wheel should lift off, and the aircraft lift cleanly into the air. *Never* force a ship off of the ground too soon. If you take off before flying speed has been reached you will probably stall out, snap over to the left, and crash. Once the ship is airborne let it slowly climb out away from you.

The best place for a new pilot to stand is right behind the tail of his ship. As it runs down the runway you can see it drift either right or left and correct, for it, and you can also see the climb out better and whether or not it drifts to the right or left.

With the ship in the air, either from hand launch or takeoff, it is time to start a turn. It seems more natural for most right handed flyers to make left turns so we will try this first. Gently tap the rudder for a left turn. Watch the aircraft. As soon as the nose starts to swing to the left, stop tapping. If you stop too soon the ship will simply continue on course and will require another nudge to get it to turn, but if you tap too hard, or too long, or hold a hard signal, then the nose will drop and the ship will go into a left spiral dive. If this happens don't panic, start tapping or holding the opposite rudder. **DON'T** give it up elevator. Almost everyone thinks that to get the ship to go up you give it up elevator, it isn't so. This is a holdover from U control where you are flying in one plane, but in radio you are flying free, and up on the transmitter is not always up. If you have heeled over into a spiral dive the rudder is almost horizontal and your elevator is perpendicular to the ground. Now the elevator

has become a rudder and an up signal at this point is really a rudder signal to the craft causing the turn to tighten up and you spin all the way into the ground. Many times I have heard some one say, "I gave it up, but it just wouldn't work." If you are in a spiral then your opposite rudder has, in effect, become your elevator and is your lever for getting the nose back up.

Over control is the bug-a-boo of all beginners and the one that will cause the most trouble. Learn to tap out your rights, lefts, and ups. By tapping, I mean to tap the lever with your thumb at about the same speed that a beginning typist punches the keys, and with a regular rhythm. You are doing the same thing manually that a proportional rig does electronically.

At any rate, now that you have your ship in a left turn, let it come on around. The Instructor will keep its nose up in a gentle turn and will come on around with out any further need for control. Once you get her on the new heading tap once for right rudder and she will settle back into straight flight. If the nose does begin to slightly drop after your gentle turn has started, give a couple of taps of up elevator to pull the nose back up. Most of today's trainers will not keep their nose up in a turn and require a bit of elevator work to keep from going into a spiral. It is a fine line just where the elevator keeps you out of trouble and where it gets you into a jam.

If you have made several turns by now and feel that your knees are not knocking quite so bad let's bring the ship in for a landing. As in the takeoff there are many right and wrong ways of doing it. The shortest and quickest way to make a landing is straight down — this can and does happen sometimes! There are two main ways to land, however; either power off (dead stick) or power on. Some fliers believe that a power off landing is easier than a power on, and vice-versa. Usually the kind that you learn to do first becomes the easiest, so try and do all of your landings with power on. After you have become reasonably good at this type, also learn the dead stick landing techniques since this will happen and you should be equally prepared.

The principal thing to keep in mind is not to land too slowly. Slow landings have been responsible for many more crackups than have fast landings, though a botched-up fast one can result in a more severe pile-up. If you land too slow, your ship will reach its stall point and snap roll into the ground. Sometimes the elevator stalls out before the wing, and sometimes the wing stalls first — either way when a stall condition is reached, watch out! Many models

will not tolerate a slow landing speed or even a reasonably fast landing, and must be brought in rather fast. This is true more of the hot multi stunt aircraft rather than the trainer types. Some trainers do react badly on slow landings, although this is generally because they have either horizontal stabilizers that are too small or the wing section is too thin. Even the shape and the size of the rudder have a bearing on slow flight as well as the placement of the rudder area.

The Instructor has been designed with a generous amount of horizontal stab as well as an unusually thick wing for such a small ship, and it's slow flying characteristics are very safe. It can stall out on a slow speed approach, but it is almost impossible to do.

If you are flying six channel equipment then you will need to tap at least once for up-elevator after cutting the throttle on most ships. Many hot ships will go into a high speed dive after the throttle is cut and will require quite a bit of up-elevator to bring up the nose. The idea is to get the nose up to almost level so that the aircraft is settling gently. Do not bring the nose up too high or you will induce a stall at this point. Try and keep the ship on course as you bring it toward the landing strip and try and pick out a point near the up-wind end for touchdown. If your ship appears to be going to overshoot the runway, let it. If you are landing dead stick let it go straight ahead. If you have power kick a bit more engine and go around again, but whatever you do, don't try and get into the right spot by hitting down elevator or making a 360 degree turn. Either one is madness. If you try to make a 360 degree turn dead stick at a low altitude, chances are that you will succeed in making only half a turn and wind up landing downwind, which is rough on the nose gears. Make a 360 degree turn only when you have plenty of altitude. If you are high, and going to be long, and you are dead stick, let the ship drift off to the left or right and then swing back toward the strip. After you have gained a little experience you will find that you can slip the ship toward the ground with either a rudder or ailerons, pull out at the last minute and land.

If you are going to land short of the runway a brief burst of power will possibly get you there, or if landing dead stick allow the nose to drop a bit and pick up speed. If you can't do either, then land short. Remember, if you have committed yourself to a landing and it is not at the right spot it is better to go ahead and land than it is to try and

jockey for the desired position.

There are really two types of power on landings, the slow, nose-high type and the hell-bent-for-election-fly-it-into-the-ground-type. Most ships will not land slow, nose high, dragging their tails on down, and you must learn the fly-into-the-ground type. This is the only way to get a lot of ships out of the air. It takes lots of nerve and practice to learn just when to feed up-elevator to keep from burying your ship's nose in the turf. This type of landing is better executed with trim controls than with six channels. Trim a bit of down trim and break up the resultant dive for the ground with short blips of up-elevator. At final let down, you can flare with either up-elevator or up-trim.

No matter which type of landing you learn to do remember to never lose flying speed, and to test out your ship up high to see just how slow she will fly. When you get near the ground the going gets tricky. Sometimes rough ground conditions will lead to gusty air currents near the ground. Be ready to act. But *don't* over control.

Actually you will be lucky to get even near the runway on your first fifty landing attempts, but keep at it, you'll get there. Your ship will probably come to ground some where either in front of the runway, past the runway, to the right or left, or in someone's car window. Keep the cars a long way away. As a matter of fact when the Gate Mouth and I were teaching ourselves to fly rudder only we felt that the safest place for the car was right beside us. Never get that close. (He hit mine four times that first summer, not while landing, while trying to keep from crashing.)

It is impossible to try and think of all of the troubles that you will have during early training periods, so rather than take you through another flight I am going to next give you a few tips and hints to help you when you do get into trouble — that is if you can remember the tips when that happens.

First, on take off don't break ground too soon, don't hold the elevator in a hard-up signal, the ship just might loop and come right back at you. If you are taking off and you seem to be running out of runway before your ship wants to get into the air, *don't* force it off of the ground, simply chop the throttle and try again. Hand launch a smaller ship such as the Instructor if in doubt. Don't try and hand launch a low wing ship, it's too hard to do unless you have someone to help you that is experienced.

When you are in the air throttle back to a cruise setting. There is no reason to go full speed all of the time. Set the throttle to the point that gives you a good feel and yet allows you ample reaction time. Use all controls with moderation. If you have attached the push

rods to the hole that is farthest away from the control surface you should have about the right surface movement.

Practice making rudder turns both right and left. Remember to keep the nose *up* in a turn, just a tap of elevator is sufficient. As you get more proficient with your flying you will want to know more about turns. You can make a very short, fast turn by using your elevator as a rudder. This is called either a pylon turn or an elevator turn. To do it you roll the ship over on its side with the rudder, hold a hard up elevator and, she will snap around rapidly. Then give the rudder a series of taps in the opposite direction and she will flip right side up. This type of turn can be better executed with ailerons. Many ships will not fly at all well without ailerons. Almost all low wing ships will not respond to the rudder. The reason for learning to fly with just a rudder is that you don't have so many levers to push. The ailerons will give you more control than the rudder and when you are ready to use them you will be surprised just how easy it is to pick up a low wing tip, or to make elevator turns. You might even wonder why I caution you to leave them off at first. Ease of learning and the fact that the ailerons can flip you over faster and, therefore, get you into more trouble, are the reasons.

As I have said before, the elevator can get you into a lot of trouble if you don't use it at the right time. Another source of elevator problems is on landing. Almost all beginners have the desire to make beautiful three point landings, and always try and flare out the landing to settle down on the gear. But almost always they are too heavy on the elevator and force the landing ship into a stall just above the ground with a very hard landing. Stay off of the elevator. If you are coming toward the ground too steeply, OK, give it a little up, but remember, I said a *little* up.

Also watch out when you go to nudge your engine into high, be sure that you are not giving down elevator instead. Down elevator is not often used. The main function of the down elevator is to correct for a ship that balloons into the wind, if you're not using trim, and for doing outside maneuvers. Near to the ground, the down is more rapid than any other control! Don't try to steepen a glide with down until you are sure of your ability with control pulses.

Another good trick to remember when landing is to always face your ship. Many pilots learn to fly by looking over their shoulder at an approaching aircraft. This seems to be the only way that they can tell right from left. *Don't* learn in this manner. Look at your ship coming toward you and remember one thing. If the ship starts to turn off in one direction tap the turning control lever (rudder or aileron) in the SAME

direction. This automatically gives opposite control and will bring the ship back on heading again. Think about that for a minute. Say that your ship starts to fall off to the left (your left while you are facing it), move your rudder control in the same direction, again, left on the transmitter. Actually your ship has turned to ITS right and you have given a left to control the turn. Simple! Don't worry about rights and lefts, learn to get the feel of your ship. This comes with experience but you can shortcut a lot of time by thinking.

Stalls can be broken up in much the same manner. Most symmetrical or semi symmetrical winged ships will not go into a series of stalls, but if they do, this can be broken up by making a turn at the bottom of the stall dip, or at the top. Also a bit of down elevator can be used to flatten out a stall. If you are landing and have caused yourself a stall by over-control at the flare point, don't try and hold up elevator to save you. Let go of the controls as soon as you see the zoom build up. If you can do this fast enough you may not get into a stall, but if not let it go ahead and stall, allow the nose to drop, and then tap a little up elevator. You won't stop a hard landing, but you may ease it somewhat.

During all of the preceding I have mentioned several times the tap of up or a tap of rudder or aileron. If you are flying a 10 channel rig and have installed the trim servo into your aircraft, which, by the way, I do recommend, now is the time to talk about its use. Many modelers fly by trim — they take off with up trim only and land in the same manner. This is a very smooth way to fly reed equipment but requires a great deal of practice, so let us examine the use of trim movement. If you put in too much trim it causes you to hunt for the right setting all of the time and consequently your flying suffers. The trim settings vary from aircraft to aircraft, and this variation is caused by change in location of C.G. or in the angular difference in settings between the wing and elevator. For the Instructor the neutral trim setting is exactly zero. Zero being exactly on line with the elevator. Full up trim is  $+\frac{1}{8}$ " and full down is  $-\frac{1}{8}$ ". If you use a DuBro inline trim bar the second hole down from the top will give this, coupled to the last hole on the elevator horn. For take-off, roll in full up trim then tap one tap of down trim. I have found that my tapping speed takes five taps from full up to full down, and the same from full throttle to low speed. At this up-trim setting the Instructor will break ground with one tap of up elevator and climb out in a nice shallow climb. When you have reached the

(Continued on Page 94)

## THE INSTRUCTOR

(Continued from Page 93)

altitude that you want, tap one more time for down trim and the Instructor should settle into flat flight. If you are an old hand at flying and roll her over on her back you will find that two taps of down trim will hold her level. When landing with trim, after you throttle back, one tap of up is sufficient to bring up the wing and slow the ship down for landing. Use of all of the trim will cause it to land too slow, though it has almost no tendency to fall off on either wing at slow speed. I use full up trim for fast climb out if you want to grab altitude in a hurry.

Some flyers prefer to use full up trim as the correct setting for take off and landing. The choice is up to you, but remember, use small amounts of trim.

After you have made your first flight, and prior to making your second, you should go all over your ship to see just what worked loose during the flight. Check to see that the engine mounting bolts are tight, that the tank is still in place, that any and all bolted connections are ok., and that none of the connections between radio gear have become loose. If your engine is pretty new it's a good idea to go over all of the head bolts after every third flight or so to be sure that they are tight. The bolts don't loosen, but the gasket does seat and will cause a loss of power if not tightened.

One of the best tricks that I know of for the beginner is to paint your wing leading edge white. This becomes very evident when you are bringing in your ship for a landing and you are trying to see the leading edge. Another good idea is to paint something different on the bottom wing so that you can tell top from bottom. It may seem silly to you on the ground, but when you get into the air and about a hundred yards away it's a rare pair of eyes that can tell which way the ship is banked. If you can't see, very gently send a left turn signal and watch to see which way it goes. If the bank tightens up then you

are in a left turn condition and you can signal a right.

Another problem, especially in winter flying, is in getting your ship between you and the sun. If you find that you are flying toward the sun use your transmitter, held at arm's length, as a sun screen, you can continue to fly and still be able to see your ship. Try and stick with bright colors when painting your plane. I can see a white or yellow aircraft much easier than a red one or a dark blue. Powder blue or silver is awfully hard to see against a cloudy or overcast sky. Follow the Air Force and use bright oranges on tail and tips, anything to help visibility.

There are any number of tips that can help you in flying, some of them have been passed along here, and many more will occur to you after you have been flying for awhile. The main thing to remember is *don't PANIC!* If you must teach yourself to fly, it can be done, an awful lot of us have done it. Try and train yourself and your reactions to act quickly at any given circumstance. The main points to remember are: Give controls gently, Be easy with up elevator, Don't rush anything, always double check and, have fun!

I would like to hear of your results with The Instructor and what problems you have in learning to fly.

As promised, here is a modification of the Instructor which I have chosen to call the Destructor. The accompanying drawing is in small scale and merely indicates slight changes to the Instructor plans.

The Destructor is our beginners ship with the wing on the bottom and the addition of more power if you can stand it. Even sticking to a .35 or one of the new McCoy .40's it will really come on strong. If you still have parts left after learning to fly with the Instructor you can modify them easily to allow for the low wing, or you can build a new ship. Either way it is a design that has been made to train you to fly. The low wing version to teach you the whys and wherefores of the low wing configuration. It will fly every bit as good as the shoulder wing, but a bit harder to fly.

Add plywood (1/4") braces to wing ribs and mount hardwood landing gear support in wing. Keep wheel tread at 18". Use Top Flite gear assembly. Called the 'Destructor!'

