Programming your computer radio.

The MC 24 by Graupner will control anything you can dream of flying. Loads of free mixers, delay timers, switches that can be positioned for your comfort, even on the top of the sticks. Large LCD screen and thumbwheel make the task of complex mixing easier.

A computer radio makes the job of setting up a model quick and easy, once you know how. If you don't know how and it is all too hard then ask someone who does know to do it for you because the outcome can make an aeroplane a lot better to fly. The instruction book is full of what seems meaningless jargon with functions such as dual rates, end point (atv), exponential, differential, mixers, free mixers and delay timers. What are these things do and what do you actually use them for?

End point adjustment (ATV) can determine how far each servo (control) will move for example if you need more down than up elevator. Most models usually need more down than up to give the same looping radius which can help make the plane respond to elevator the same way when inverted. If the plane rolls faster to the left than the right this can also be easily rectified. The engine idle speed can be set from the radio. Setting up the valve on pneumatic undercarriage system is a breeze now, it used to take me an hour the mechanical way. These tasks are just basic programming all you have to do is start with the servo in the centre then set the amount of atv (travel). The old methods of getting a vtail, elevon or flaperon equipped model with sliding servos and ball link devices are easier and more accurate when it is done by the transmitter. Aileron to rudder, elevator to flap mixing and basic landing attitude are preset mixers set by the factory and all you need do is change the value and the direction. Dual rates give more or less control for the same stick movement. Depending on the type of aircraft or flying reducing the control sensitivity can make manoeuvres such as slow and four point rolls easier to keep smooth. The snap roll and sharp radius in a square loop need large movements and although you can use exponential often the dual rate achieves a better feel. Of course you do have to remember to switch in and out as required.

For controls that require equal travel in both directions make sure the servo arm is straight across before you start. Always do the intitial set up with the radio switched on.

The more advanced programming uses free mixers to help improve the way the aeroplane responds to certain control inputs in various flight attitudes. For example in knife edge flight when you roll the plane to the left and apply right rudder if the plane starts to roll to the right (as they usually do) the radio can be programmed to input the correct amount of left aileron to keep the wing vertical. Roll to the right and hold left rudder then do the same. When you have that set your plane will be better to fly as it should react the same either way. Roll the plane to knife edge again and hold top rudder. The model will probably pitch nose up (they usually do) so you can mix a touch of down elevator with the rudder and get the plane to track straight. Usually the elevator mix value will be slightly different for each rudder direction, as will the aileron. Now you have a plane that will fly straight on knife edge either way and you have used two mixers. Your aeroplane is now easier to knife edge leaving you free to concentrate on other tasks such as positioning, losing height etc. Now the old fashioned purist might say " that's cheating and not a true test of flying skill". My experience is such that I find aeroplanes are a lot more fun to fly with a good set up and piloting in my book is making the plane look good in the air. What if you don't want this mixing to happen unless you are going to do a knife edge pass? You can either turn it on or off via a switch or set up an offset so the additional corrections only activate when the rudder stick reaches a pre determined position say one half rudder stick.

The landing switch on a middle level radio sets the amount of up trim for landing. This is used to set the airspeed on final leaving you to concentrate on other tasks such as descent rate, wings level, drift and the touchdown point. This is a great advantage when some one is in the initial stage of learning to land. If an aileron correction is needed on final most pupils release the slight amount of up elevator as they tend to the other task resulting in an undershoot and a go around. This simple mixing function makes the complicated task of approaching the field correctly, much easier. When the pupil can cope with the extra work load the mixer can be switched off. As per knife edge this mix can be either activate by a switch or an offset, pre determined throttle stick position say 1/4. Set the offset and the up trim can be removed as the power is advanced if a go around is required. A good starting point is 4% up elevator with the throttle off.

That works well on a trainer or sport model but what if you are flying a fast heavily loaded turbine model? There are a ☞

With the throttle stick at half and the servo arm straight across set the linkage so the carburettor is half open. If you need to use sub trim to get it exact try not to use more than 5% .

lot more features available in a high end set to help make flying easier. The jet is on final you are too fast and decide to abort. The gear is down as are the flaps, spoilers and the ailerons crowed to create as much drag as you can get. Jet engines have a lag in their throttle response from idle and the drag requires some power to applied to maintain the descent and the response time is a lot less at 1\4 power than it is at idle. A jet can take five seconds to start accelerating so if a go around is needed reducing the drag quickly is important. On a high end radio such as the Graupner MC 20 moving one switch can reduce flap to the take of f position, retract the spoiler, reset the ailerons and set the elevator trim to climb as the pilot waits for the power to come on. Doing that with a separate lever for each function is pretty dif ficult do and the high landing speed of jets soon becomes apparent as they whistle past and they start disappearing quickly as you wait for the power to come on. Advanced mixing helps to make this simple manoeuvre look smooth because that one switch has coordinated four control inputs to reduce the work load for the pilot to concentrate on what is important.

When model helicopters became available there was no such thing as a radio with mixing. The first system designed for r\c helicopters was a Sankyo which had basic mixing. When you open or close the throttle\collective pitch a dif ferent torque value needs to compensated for by the tail rotor or the heli will rotate. When you make this adjustment the change in thrust from the tail requires trimming the lateral cyclic (aileron) on the main rotor or the chopper will drift sideways. Mixers allow these changes to be allowed for and adjusted and on later model radios flight modes were introduced. A typical heli set up would have a mode for hovering, forward flight, aerobatics and auto rotation. Accurate hovering is easier with low rotor rpm and complex aerobatics are only possible with high rpm with dif ferent pitch values. Stopping the engine to glide in needs another set of values, yet again. Although very steep auto-rotating, is actually gliding. You can learn this manoeuvre with the engine idling and later actually stop it. It is highly unlikely model helicopters could perform the amazing manoeuvres today without modern mixing.

Gliding is another example where you can utilise flight modes to increase performance. Throw the switch for speed and the ailerons and flaps raise a few degrees to change the camber of the wing best suited for speed. Use the speed to get out of sinking air as fast as possible to reduce height loss. When you find lift throw the switch and the plane sets the trims for best glide speed and wing camber for best lift drag ratio. On final throw the switch to landing and the flaps drop ninety degrees and the ailerons move up twenty. This gives an enormous amount of drag and the pre set elevator trim sets the speed and steep descent for a landing on the

The edit or menu keys on the left decide what function will be activated or changed. Cursor keys in the middle selects the channel and the data keys on the right is used to change the value.

spot.

A simple overview suggests a basic computer transmitter will have a memory system to save settings for four aircraft with four or five channels. Menu functions will be servo reversing, subtrim, atv, exponential, vtail , elevon, aileron-rudder mixers. A middle of the road six or seven channel will have flaperon, landing function, free mixers and aircraft glider and helicopter menus, maybe flight modes and more model storage. With eight to ten channels you get delay timers, offsets, the ability to assign functions to particular switches, advanced flight times and more model memory. You can also set the percentage of trim (sensitivity) A model memory can be used for individual aircraft and experimenting with new settings on the same model. It takes some time to perfect a good set up so it is safer to copy that information to another memory. If you muck it up you revert to the original.

Delay timers are used to slow down or delay the mixing input, for example the landing function. Setting up for landing on the downwind leg you pull the power back to slow the aircraft. Throw the landing switch which mixes the up or down trim required and the aircraft will balloon or dip until the correct airspeed for that trim is reached. If you are flying in a scale competition where the rectangular approach is still judged any change in height will attract a downgrade. You don't have to be in a competition to be want to be able to demonstrate a high standard of flying skill. A timer can delay the elevator trim change until the speed is correct for the chosen setting. If you don't have a timer try activating the landing function as you commence the turn onto base. The speed will wash off and any balloon or dip can be hidden in the turn. When flaps or spoilers are activated a servo slow down timer both reduces the load and initial pitch change these large control surfaces generate.

Exponential can give a small movement around centre and large deflection at the extremes. Not really needed on a basic trainer.

The aeroplane is ready to be programmed when all controls are set at neutral, sticks centred with the radio switched. Set the control directions with reversing first and then adjust the linkages to centre. If you do this the other way around there may be a trim change when the servo direction is reversed. There is nothing wrong with the radio but this due to the pot in the stick not being correctly aligned. Next set the ATV or how far each function will actually move. That is the basic set up and after the test flights then it's time to start punching away at the keyboard to make subtle improvements. After a while you get to learn the percentage values for knife edge and as a rough guide, elevator mix on knife edge start with three percent once you have established what direction of elevator is needed. If the radio system has mix curves fine tuning can be a lot more accurate. The elevator percentage required is usually not linear as rudder input is increased. The small value needed at high speed knife edge will not be enough in a vertical climb as you apply right rudder to compensate for either torque or crosswind drift so you have to decide what is more important.

If the thrust line is incorrect the aeroplane may pitch nose up or down as the power setting is changed. Use a free mixer to apply a small amount (three percent) of elevator trim coupled with throttle to overcome this. The same can be applied to rudder and aileron if the side thrust is out. If your student is not coping with his first double tapered low wing sport model the tendency to tip stall on this type can be dialled out. First you set the maximum elevator

With twelve free mixers plenty of high level programming is available. The landing switch conveniently placed on top of the throttle stick makes flying the Turbine Vigilante easier. There are three positions for flight, take off flap with climb trim, landing flap with elevator trim plus spoiler and ailerons up slightly. Two timers are employed for elevator trim delay and plus slow down when spoiler activates. It takes a while to perfect the settings but it is worth the effort with such a valuable and fast aeroplane.

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Scale aerobatic aircraft like this Edge 540 need large control deflections for snap rolls and the Hanno screw. Exponential allows soft response around neutral and progressively more toward the end of the stick travel. Forty five degrees of elevator throw is not unusual for this style of flying and without expo it is nearly impossible to fly smoothly with these massive control deflections.

throw so the model will not stall when holding full up with the power. The elevator will be pretty soft on the flare and twenty percent reverse expo will improve the elevator response at slow speed and once confidence has improved you then revert back to the usual set up.

Free mixers can be used for specific things for example flying a twin on one engine by returning one to idle. Set up the retracts and gear doors with a combination mixers and delay timers. When the retractable undercarriage is selected up watch the gear doors open, the wheels disappear and a few seconds later the door closes. When you are working all of this out on the workbench it is a good idea to remove the output arm screws from the servos when selecting a more complex mix. If you dial in the wrong value or direction the servo can often stall as the control surface hits the stop. The result can be a damaged set of gears but if the screw is removed the servo arm should flick off.

The flight timer can be a simple countdown type activated by a switch or it can start when the throttle is advanced or maybe when the gear is retracted. A stop watch and flight time can also be programmed and is often used by electric flight competitors. Some radios give you the choice of digital trims that allow setting the ratio or sensitivity of trim. This system is safer as you cannot knock the trim when the radio is switch off which is a really good idea for beginners. Knock a trim when it's on and you be alerted by the beeps, another good feature. If you want to see how quickly you can get an aeroplane back down on the ground wait for the low battery warning on the transmitter to sound.

Some radios allow allocating one channel at a time with the buddy box and this really speeds up the learning process. For example learning to bank is made easier by only giving the student control of the aileron. The instructor can maintain altitude giving the student more time to concentrate on getting the correct angle before the plane starts descending rapidly. Once that is ticked off the list then move on to elevator. Giving the student only the rudder for a few take offs gets the automatic left and right reaction happening in less time than starting with all four controls.

End point adjustment makes setting auxillary functions such as retract valves a breeze.

A basic radio may have two model memories, model one and two. It is a very good idea to put the corresponding letter on the aircraft to avoid the possibility of attempting to fly with the wrong model memory. The more advanced transmitter usually has an alpha numeric display which makes it easier to not make this mistake. When you switch between models I have learned the hard way it always pays to take an extra few seconds and double check. No I did not get airborne but spent ten minutes trying to get a four stroke to start and it turned out the throttle was back the front because of the wrong memory. Four strokes don't usually start at full power and it was all a bit embarrassing.

In this hobby the cheapest thing you will ever purchase is a good radio so if you are deliberating on what type to get; I say get the best computer model you can afford. Stephen Green •