Great Britain Radio Control Aerobatic Association

AEROBATICS

NEWS

Newsletter of the Great Britain Radio Control Aerobatic Association

September 2000

Aerobatics Editorial

GBRCAA Home Page Address: http://www.samhwood.demon.co.uk
E-mail to newsletter: Keith@gbrcaanewsletter.freeserve.co.uk

Front cover
shows the participants at the very successful 4th centralised event at Cashmoor.

The European Championships
took place in Liege, Belgium from 2nd until 10th September. Predictably the winner was Christophe Paysant Le Roux (Znline Alliance / YS140LM) with Wolfgang Matt (PL Smaragd / YS140LM) coming second followed by Marco Benincasa (Angels Shadow / YS140L). UK placings resulted in Brandon Ransley being an unlucky 21st, Kevin Caton being a close 22nd and Keith Jackson being a disappointing 37th. The winning team was Italy with the UK team coming 7th, coming closely behind Germany.

The British Nationals Master Class
were won by David Mathias (PL Larimar / Webra 145), followed by Brandon Ransley (Znline Caprise / YS140LM) and in third place Richard Howarth (ZN Line Alliance / YS140LM). Senior class was won by Jeremy McCauley followed by Alan Simmonds and then Ken Moss. Standard Class was won by S Johnson followed by A Prime and Brian Dillon. More information on these two events will follow in the next edition.

The GBRCAA Annual General Meeting
will take place on **Sunday November 19th at the Mill on the Soar in Leicester, the week before the BMFA AGM.** More precise information will be sent directly to members closer to the time plus a schedule of the meeting including all proposals. It is crucial that any Proposals / Nominations for committee posts from members, reach the Secretary by November 5th as per the constitution. Remember that all proposals require a seconder to be passed into the AGM for voting. If you are unclear of the procedure for sending in proposals, please contact Stuart Mellor at the address given opposite. Please make every effort to support this meeting and also to consider very carefully your proposals / nominations, should you have any. Remember that the proposals that you make *may even* be acted on in the coming year, so please present them well so as to reduce the amount of time spent discussing any misunderstandings during the meeting.

Keith Jackson
Newsletter Editor

Wolgang Matt's Smaragd design, as produced by PL models flies superbly with YS140LM and most importantly, includes an airframe whistle. Weight in the region of 4.2kg.

New Products from the USA

OS160FX

OS is one of the dominant engines within F3A with their 140RX two-stroke, which is also available with a fuel injection system 140RX-FI. Those engines are with rear exhaust and fuel pump. With those engines OS has proved once again the high quality and performance from their products but the only draw back is the quite high pricing. OS has now released another big 2-stroke engine, maybe not a F3A-specific engine but still a suitable option, OS160 (26cc) which is as their FX series.

This is a side exhaust engine that comes complete with a silencer but the engine is without any fuel pump. According to OS it should deliver 3,7 hp at 9000 RPM. The weight is 925 grams. It swings props at a size of 18" or bigger according to pilots who has tested the engine.

Info from the US Nationals

At the US national F3A championship **Chip Hyde** won ahead of **Kirk Gray** and **Jason Shulman**. They will be the US Team for the World Champ next year. Some info regarding the equipment Chip was using: Hydeout model with fixed gear and YS140DZ (fuel

injection). He used also the new pipe (Carbon Exhaust Pipes) which is now available at Hyde Competition Products. These pipes/mufflers are made of carbon fiber and is designed for 1.20-1.40 four stroke. Price: US$149.95. It was noticed that his model/set up is very quiet, 89dB. The engine turned a 17x12 two-blade prop at 7600-7800 RPM with 20% nitro. This prop size was also used by several OS140 RX (&FI) along with the Super Tiger 2300.

Piedmont Models - ARF

Piedmont Models in USA has developed a F3A model called FOCUS, (see picture further down below) which is available as ARF (almost ready to fly) kit. The model is now available to order in two versions.

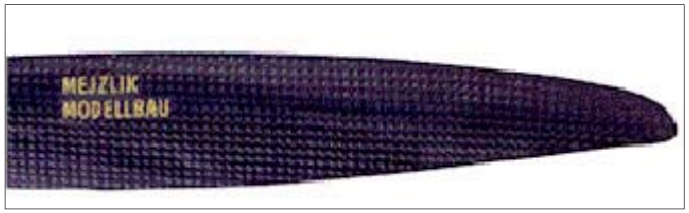
- **ARC:** is a kit with some assembly still left to do. The price is $US 700.
- **ARF:** is a kit with a completely assembled model, the only thing left to do is to install the engine and the radio equipment. The price is $US 800.

The FOCUS model comes with fixed landing gear including wheel pants. The size is 2m x 2m, weight of ~4,5kg and is designed for 1.20-1.40 2-stroke or 4-stroke.

It is possible that most future **Piedmont Models** planes will be as ARC and/or ARF models. They deliver models worldwide. For further information please check out their web site.

Mejzlik prop-information

Topmodel in France have the earlier mentioned Mejzlik propellers. And if you are within European Union it is very easy to order since there are no additional charges like tax or custom fees. These propellers have become popular within TOC and a lot of top F3A pilots starts to use them also. They are high performance props from the Czech Republic, with hollow blades and is fabricated of carbon fiber and epoxy. Prices are from US$25.00 to $34.00



for sizes from 14" to 19". For more information, check at http://www.desertaircraft.com/index.shtml

2-blade, propellor sizes include:

14.4 x 13
15 x 12
15.5 x 13n
16 x 8, 10, 12, 14
17 x 10
18 x 6, 8, 10, 11, 12
19 x 8, 10, 12

Pumps

There are several manufacturer of separate pumps for engines that has no built in pressure system, like the Super Tiger G23. In US there are among others a company called **Cline and Associates** who has specialized in model engines and accessories. They have developed an own membrane pump or as the call it "Cline regulator". The price is US$ ~50.

F3A props from Bolly

BOLLY has a lot of special designed propellers designed specially for the popular engines used in F3A. They are available both as standard and as pre-balanced. Here are some examples. (For more information, see: Bolly or Falcon Hobbies).

17.5-12 The King of OS 1.40RX
17.5-9 Custom for YS 1.40L
16.5-12 Standard for the YS 1.40L/FZ
16.5-8 Good for YS 1.20SF
16-14 Popular 1.40 Two Stroke
16-13 W Alternative 1.40 Two Stroke
15.3-12.3 Excellent 1.20 AC, NC, FZ
15.5-13 Excellent 1.20 AC, NC, FZ

Rossi R105

Rossi has been manufacturing powerful engines for a long time and these engines have been used in F3A in the "old days". Since the last 10 years they have not been seen so frequently in F3A but now they have released the Rossi R105 for F3A.

The engine is a 18 cc 2-stroke with rear intake/exhaust, with pump and weights 813 grams. According to the manufacturer it produces 5,8 hp at ~11.000 rpm! The RPM is maybe not so suitable for quiet F3A but they also mention that it swings a 16x16 prop at ~10.000 rpm! It comes complete with pipe and manifold.

Coloured fuel caps

A lot of F3A flyers are using these practical and good looking aluminum fuel caps. These are now available in different colours. This is good to use to distinguish between tank and pump caps on your model. One of the places where you can find these fuel caps is **Falcon Hobbies**.

Carbon fiber tuned pipes

ES Design makes tuned pipes/silencers of carbon fiber for 2- and 4-stroke engines. Available are for : 91, 120 and 140 4-strokes and also for 140 2-strokes. The prices are from US$ ~160 (91 4-c) to US$ ~210 (140 2-c). These pipes/silencers are available from **Central Hobbies** in USA.

F3A model as ARF

A manufacturer called Airborne Models in Hong Kong makes a F3A model which is according to the new fashion, length and wing span of ~2m. It is an *almost-ready-to-fly* model airplane. They use first grade balsa and plywood for the construction and then finally mount a layer of fiberglass. The model is also pre-painted with the pattern shown in the picture. The model is designed for retracts, the wing is a one-piece and the stabilizer is detachable. There is also provided a wooden box specially designed for this airplane during transportation. The price is US$2000 for the model. Shipping and handling not included. A set of covers for the model is also available in silver with foam layer to protect the plane from sunlight and bumping. The price for the covers is US$200 per set

RC Model Enterprises Complete Exhaust System 1.2/1.4

- MKII Exhaust System $140.00
- MKIII Exhaust System $145.00

The MK exhaust system come with the following items MKII or MKIII header, 1.2/1.4 Pipe and a Flex connector. These items are also sold individual.

- Header only $32.50
- Flex Only $27.50
- 1.2/1.4 Pipe $90.00

RC Model Enterprises Nomex Carrera Kit

Span 78.5", Length 77.0", Wing Area 1150 sq. in., Stab 31.5", Stab Area 244.5 sq. in., Weight 10-10 1/4 lbs. Engine 1.20/1.40 Four Stroke.

Kits available include:

- Carrera Kit with gear/pants: Fuselage, Foam wing, stab, and rudder, Black Anodized wing tube with sleeve, RC Model Enterprises Control System, wing adjuster, Wing attachments inserts, and Plans. ($625.00)

- Carrera Kit without gear/pants: Fuselage, Foam wing, stab, and rudder, Black Anodized wing tube with sleeve, RC Model Enterprises Control System, wing adjuster, Wing attachments inserts, and Plans. ($575.00)

- Deluxe Nomex Carrera Kit ready to paint and cover. $1,625.00

- Deluxe Nomex Carrera kit painted and covered (3) colors $2,050.00 add $25.00 for each added color.

- Nomex Carrera Kit ready to fly $2,250.00 Note! Your equipment installed.

For a deluxe kit contact Lamar Blair 256-351-8445 e-mail l.blair@worldnet.att.net

Spirit AXII - A 2 Stroke Saga

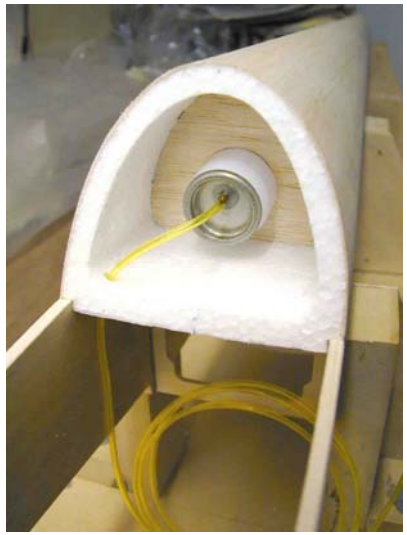
The idea for my Spirit AXII experiment arose at the end of the 1999 season after the realisation that my best contest scores with my Loaded Dice IIs were obtained on the odd occasion the engine was running badly! "How could a sick engine possibly help me?" Obviously, the lack of power was making me work harder for control authority at the top of various manoeuvres but at least I was getting more time to actually control the model whereas when the engine was developing full power, there was little time for corrections as the schedule flew by (pun intended) all too quickly. What could I do to improve? I could learn to use the throttle stick better (even limit the carb opening!!) but what about the quest for a constant speed? I figured that had to be determined by the down line speed which on my Dice with it's more slippery (non-standard) wing section, was pretty quick. No what I needed was a new model...

I called Phil Williams: "What model would you recommend Phil... Oh, and by the way, I want to use a 2 stroke..." - "But surely they will work with 2 strokes as well?" - (by now disheartened) "Well send me a plan for xxx anyway and I'll have a think". Had a look at the plan - "Cripes, that's a thin wing - I see what Phil means about "4 stroke models" - but it's not quite what I had in mind! Damn, this means I'll have to come up with something new."

What I was looking for was a medium size model with much higher drag coefficient than those currently available. It must be light enough for a 0.90 - 1.20 2 stroke to pull it up the verticals and enough control authority not to flop off a top radius in a strong wind (sometimes a problem with my Dice). Other important criteria were that it must fit in my current car and not cost a fortune to build, maintain and run.

Over the coming months while ideas were gestating in my mind, I was offered a second-hand Super Tigre G90. Would this fit in the scheme of things? Possibly, if not, I could always stuff my MVVS 120 in the front. My pal Brian Hoare was getting very good results from his ST S90 so releasing the moths from my wallet, I parted with a little cash and now had my power plant. A rear exhaust would be preferable, but if side exhaust is good enough for the 4 stroke boys... it's good enough for me! Now the design process could start in earnest.

Design of any kind is an iterative process which is why the modern computer is such a great design tool. With the right software you can sketch in a few basic ideas, make some adjustments here and there and when you have the basic shape drawn out, create a full 3D rendered surface model to get a better visualisation. If you don't like what you have at this point, you can scrap it and start over again without wasting any balsa or even any drawing paper. (By the way, that's what happened to the AXI.) The digital data later saved me some time by using it to create cutter tool paths for my CNC router to accurately cut such parts as fuz sides & doublers, ply formers etc. I am still cutting foam by hand but at least the cutting templates are accurate!



Spirit Top Deck. *Note the retract air tank glued to two 1.5mm balsa formers before mounting.*

Once I had completed the basic design, it looked very big next to the Loaded Dice. This worried me a little - the bigger fuz was what I wanted for extra drag but the much larger surface area equals extra weight. I was going to have to use some light construction methods for the experiment to work but since this was a prototype, it had to be conventional foam/balsa construction. Here are some of the construction methods used:

Fuselage

The fuselage was pretty standard construction, 5mm sheet sides with 0.4mm ply doublers, balsa top front deck, 3mm ply formers etc. The generous size top and bottom rear decks were cut from foam and hollowed out to leave a 9mm thickness before covering in 0.8mm balsa. This sounds a bit fragile, but read on…

The whole thing was assembled in a home-made jig which included a special angled bracket for the nose

ring set to the designed side and down thrust. The jig worked well but even so I had to slit and reset the tailpost to get the fuz perfectly straight.

To enclose the engine and pipe, I needed a one piece underbelly 900mm long. Being a pattern & mouldmaker for the last 30 years helped here and the 3D computer model provided all the data to CNC machine a temporary mould from a solid Jelutong block which was then finished in Furane resin to a gloss finish. I had to experiment a little to get the right lay-up but the 3rd attempt produced a nicely gel-coated (no pinholes!) carbon / kevlar moulding that would do the job.

Wings & Tail

The wing & tail cores were cut from 1.0lb/ft³ expanded polystyrene. My local supplier doesn't do virgin foam so I had to put up with the hot wire slowing down on the denser bits when cutting, but it wasn't that bad to cause any real problems. Since this was to be a draggy model, I chose to use a thickness of 15% at the root and 12% at the tip. This means the cores themselves are heavier than normal and would really benefit from some lightening holes; trouble was that I planned to vacuum bag the skins and I didn't want the surface to permanently distort if they were sucked into the holes! In the end I decided to accept the extra weight and hope I could compensate for it elsewhere.

The wheel wells and aileron servo openings were CNC cut into the foam cores just to the required depth (Hmm… might try a hot wire next time). Interlocking 1.5mm ply retract boxes were made to fit right through the core for strength and the wheel wells were lined with 0.4mm ply. In use, these boxes are a definite improvement in terms of strength over the 2 hardwood rails I've used before. The next job was to cut out and line the ailerons and elevators (see Phil Williams' excellent series of articles in RCMW for details of this and more) and sand everything to shape ready for skinning.

To skin the surfaces, I used light 1.5mm balsa (6 lbs/ft³) made up from 100mm wide x 1m long sheets. To avoid any waviness in the finished skins, it's important to get the edges straight before joining and working from past experience, this is not as easy as it sounds! This time I built a long sanding fixture which made the job a breeze.

Acting on Phil's advice, the skins were sealed with non-shrinking dope and sanded smooth prior to vacuum bagging onto the cores with just 13-15g of epoxy resin for each skin (incl. the resin used for the 63g/m² kevlar aileron hinges). Using such a small amount of resin, I was afraid the skins wouldn't stick all over but I needn't have worried. With wings this thick, I reckoned they would be strong enough without any extra spars and despite the really light balsa skins, they have not shown any signs breaking yet no matter how violent my snaps are! I really like this method of skinning so no more bent wings for me!!

After joining the two wing panels a tunnel was sanded on the centreline to clear the pipe. This was left un-lined but reinforced with a layer of carbon cloth when the wing bandage was applied. I prefer to use 200g/m² cloth for the bandage instead of glass tape since it can be cut to any size/shape and results in a neater edge once sanded down.

The tailplane was made in the same way as the wings but before joining the two halves, I cut the hole for the phenolic tube for the plug-in tail. Although this plus the adjusters added a total of 40g to the

back end of the model, I reasoned that it would help with storage but much more important, allow for incidence adjustment should the need arise (and it did).

Finishing and Covering

I used 25g/m² glasscloth & CT101 epoxy resin to cover the fuz. This was my 3rd model using this technique and I've got the hang of it now. This added just 80g to the weight of the fuz and improved the strength no end particularly the delicate top & bottom decks.

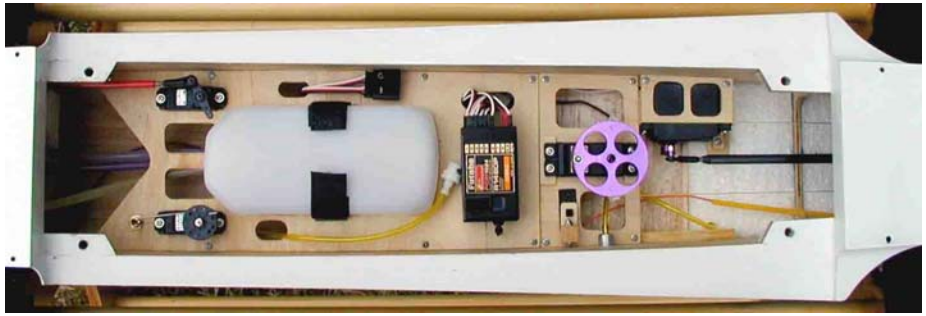
The final finish was provided with 2 pack acrylic auto paint. This, to my mind is where you can go seriously wrong if you're aiming for a light model. Cellulose + fuelproofer has always resulted in a heavy model for me and I whilst I found K&B Ultrapoxy was much better, the 2 pack acrylic covered so well, it job ended up 1/3rd lighter at approx. 83g/m² as opposed to 128g/m² for the Ultrapoxy used on the Dice.

The wings and tailplane were covered in Solarspan 2000. Whilst I much prefer a glasscloth and painted finish, I just couldn't afford the weight penalty on this model which I estimated would have worked out at an extra 160g or nearly 6ozs in old money.

Hardware Installation

The fuz of the Spirit is wide enough to accommodate a 1.20 (2 stroke of course!) and for the engine itself to be offset and still keep the prop on the centreline. I figured that if I could do this, I could get away with a smaller angle compared to the Dice where the centre of the prop is most definitely offset. Where I needed 7° on the Dice, I chose to start at 3° and adjust if needed. I eased installation/removal by mounting the Super Tigre G90 on Mick Reeves aluminium beam mounts which in turn were fixed to Nexus M4 iso rubbers screwed into captive nut in the engine bulkhead.

Radio installation is pretty standard except I chose to mount the elevator servo on it's side but I'll return to the whole issue of the elevator control in a future issue.



With the fuel tank mounted in what would normally be the radio bay, you need to pay extra special attention to ensure the silicone pipes can't come off when filling the tank (don't ask me how I know!!). I now solder a small wire loop onto the end of brass tubes exiting the fuel tank and secure the silicone tubes with spring clips.

Engine Set-up

Earlier, looking at my newly acquired ST G90, I wondered what I could do to pump the fuel. I didn't really want to use a bulky Perry (external) pump and I didn't have an old Hanno to scavenge parts from. Spotting Mick Wilshere from Tigre Engines at the International Model Show at Ally Pally last December, I asked if it would be possible for him to fit one of the old Perry backplate pumps to my G90 and if it would work OK overproped and running on 10% nitro. To my surprise, he said he thought he had a box somewhere with a few old Perry pump spares and after a short lecture on how to store the engine after use (nose up so all the gung drips down to the backplate) , I retreated. A few weeks later, I received the engine back from (a very helpful) Mick with the Perry pump duly fitted into a modified (S90) backplate along with a few Super Tigre plugs and a long list of do's & don'ts. (TIP: When sending an engine back to Mick, make sure it's fitted with a Super Tigre plug and don't send it packed in an MDS box!!)

Using a Maurice Aldous header I bolted it all down to my B&D Workmate, fitted the Hanno pipe from my Loaded Dice and took it all down to our local field with my rev counter and pipe cutter to see if I

could tune the pipe and achieve a similar power output to Brian's S90.

The first step was to cut 75mm off the header to get it in the right ballpark and then proceed with progressively shorter cuts as each increase in revs got smaller. Using 10% K-Mix fuel and a 12½x13 APC prop, the initial results were less than exciting - only a meagre 8900 RPM - not only that it was difficult to start, sounded rough and wouldn't idle smoothly. This was not totally unexpected, so I had taken the precaution of bringing along a Perry carb "just in case". Swapping the ST carb for the Perry, pushed the revs up to 9200 but it was still difficult to start and sounded rough. Replacing the ST plug for a Firepower F5 improved starting so I continued to cut bits off the header until I thought I had gone far enough with the revs now peaking at 9720. Not too bad I thought, about 3-400 revs more than my Webra 80 on the same fuel/plug/prop combination. Incidentally, the roughness turned out to be the rear bearing; the previous owner had obviously not followed the Wilshere storage formula!

Test Flights

By the middle of April, the Spirit AXII was complete and ready to fly. I chose an afternoon in the middle of the week for the maiden flight; there would be hardly anyone at the field to distract me (or laugh!). On arrival, there were a group of 4 or 5 of our retired members standing around chatting. “Nooo, too windy for us, like your model stand, is it new? Better finish than my dining table!” Crestfallen that they had totally missed my shiny new model, I fuelled up and did all the usual pre-flight checks.

I had heard the G90 went better with an F7 plug and that the only prop to use was an APC 14x10. However, I was concerned that my much "dragier" design which was ¼lb heavier than planned at 8lbs 9ozs might struggle in the vertical uplines so I tried it first with the original 12½x13 to which the pipe had been tuned.

I need not have worried, the first flight exceeded my expectations by a mile! Despite the low wing loading and the very blustery conditions, the model was rock steady.

Changing the prop for a 14x10 the next time out was quite a surprise too - although I could hear the revs noticeably drop at the top of the uplines, it still pulled well and the downlines were much slower than I had experienced before. The drop in revs in the uplines was simply cured by adding 15mm back on to the header length to take the larger prop into account.

Although I now had *sufficient* power for the model, the engine was still about 300RPM short of Brian's S90 and I couldn't rest until I knew why. Borrowing a Hanno pump and carb from Brian revealed (quite surprisingly) a very slight drop in power (120 RPM) but a silky smooth tick-over. We finally cracked it when we tried Ken Moss' OS Blue pipe - the elusive extra 300 revs! The results so far are shown overleaf:

Flight Quality

In windy conditions, I have been *very* pleased with the Spirit’s performance. Despite it’s bigger areas and higher drag coefficient, penetration is good and even strong gusts have little effect on stability. (I have struggled more in very calm conditions, but I think this is probably something to do with my flying, not the model!) In knife edge, there is absolutely no rolling tendency and just a small amount of elevator mix was needed to correct pitch.

After flying the Spirit for 3 months, I finally managed to find a little time (and conditions!) to do some

proper calm weather trimming. Adjusting the tail incidence and engine thrust line (now 4° right, 1° down), I have managed to get the model to fly straight in all attitudes, (or at least, as straight as *I* can fly it!) and having accurately measured all the angles, I have the information needed to progress the design further.

Pump	Carb	Prop	Plug	Header Length	Pipe	RPM	Notes
Perry	Super Tigre	APC 12½x13	F5	280	OS Hanno II	**8900**	
"	Perry	"	"	"	"	**9200**	
"	"	"	"	270	"	**9400**	
"	"	"	"	255	"	**9600**	
"	"	"	"	242	"	**9720**	
"	"	APC 14x10	F7	257	"	**9360**	2nd head shim fitted
OS Hanno	OS Hanno	"	"	"	"	**9240**	
Perry	Perry	"	"	"	OS Blue	**9660**	Longer header (not tested) may be better

General Notes:

Header length was measured from the exhaust flange, along the header centre line using a piece of thread.

Super Tigre G90 - street price: less than £100, Perry pump supplied and fitted by Tigre Engines: now (sadly) £59.95 (mine was made from old parts), Perry carb from Just Engines: £20.

Weight of engine, pump and carb: 564g.

Talking of which…

… the AXIII is now on the workbench. Although I have made a few minor changes, the next Spirit will be almost identical in size and shape to the current one. The plan is that it should have a lighter, moulded composite fuselage and plug-in wings. I have been so pleased with the power to weight ratio of the first prototype, I shall again be using a ST G90 but may experiment further with pump/carb combinations. Well, it would be a shame to spoil it with all that extra 4 stroke weight! More on this later.

In Conclusion

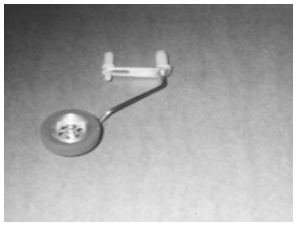
This model has certainly helped me to achieve my goal of more consistent scoring. It looks and sounds good in the air and the extra drag has lowered the airspeed giving me more time to think and make corrections. The only real downside to this is that my callers get less exercise since the accuracy of my landings has also improved!

Alan Simmonds

SPIRIT AXII DATA

Wing Span: 1858mm (73")
Length: 1870mm (73½")
Weight: 3.90kg (8lbs 9ozs)
Wing Area: 62.069dm² (6.6806ft²)
Wing Loading: 62.8g/dm² (20.5ozs/ft²)
Engine: Super Tigre G90 with Perry pump & carb.

M. A PRODUCTS



Price List

Tail wheel to match	***£ 5:00***
Exhaust manifolds	
made to order	***from £22:00***
Alloy wheels	***£17:00***
Prop nuts	***£ 6:00***
Exhaust deflectors	***£ 7:50***
Tuned pipe brackets	***£ 7:50***

Please make cheques payable to:-

M. Aldous, Romila, Hilders Lane,

Edenbridge, Kent TN8 6JU

Tel. 01732 865113

Futaba 7UAx radio setup.

These excellent articles were submitted to the K-FACTOR by former Dist. 2 VP Bob Richards. Whilst they are written specifically for the Futaba 7Ua series, the contents are directly applicable to other makes and provide invaluable information to novice and expert pattern pilots alike. So please, read on. Ed.

JANUARY 199
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This following information covers the Futaba 7UA family, including: 7UAP, 7UAF, 7UAPS, 7UAFS. This month I will talk about ATV, Dual Rates, and how they interact. This information is not intended to replace the manual, just supplement it.

ATV (adjustable travel volume) is used to set the maximum amount of travel of a channel. When adjusting the ATV value, remember that there are two settings per channel, one for each direction of servo travel, ie: up and down, left or right. Access to both numbers is done by moving the stick/knob/switch being programmed. For instance, after selecting the ATV screen and moving the pointer to the desired channel, you will have to move the control for that channel from one side to the other to get to both numbers.

I prefer having my ATV set for near maximum throw, making any initial changes in control throw by changing the mechanical linkage on the plane. The reason for this is that if you reduce the throw by using ATV, you are reducing the precision of the entire system. If you cut your ATV (or DR) throw to 50%, you are now using a 512 (or less) radio, instead of the 1024 positions the radio is capable of doing. Also, you are wasting half the torque and precision of the servo, although the control response will be quicker (less distance for the servo to move).

I do use ATV initially to determine just how much throw is needed to perform the pattern. I may fly a dozen flights, doing every maneuver (including snaps) and adjusting the ATV until I determine the maximum throws needed. Then, I measure the maximum control surface deflection. I set all my ATVs and DRs to their maximum (110% on the older radios, 120% on the Super 7) and adjust the mechanical linkage until I have the same throw as previously measured. Err on the side of more throw. Then, I fly the pattern some more, making fine adjustments with the ATV.

Whether to use DR or not is a matter of preference. I don't use dual rates unless absolutely needed, except on rudder. I always set my rudder throw to max for stall turns, and set my low dual rate to allow me to hold knife edge with full rudder stick deflection. I presently use elevator dual rate to increase throw for spins.

It is important to realize that a change in ATV affects every other function relating to an individual channel. For instance, reducing the ATV setting of channel 2 (elevator) will reduce the travel on both sides of the dual rate switch, and also reduce the available travel when the snap switch is engaged. So, once an airplane has been setup, it is wise to make minor changes in travel with the dual rate instead, unless you need to change the throw in only one direction. The DR setting affects the total throw in both directions, while ATV allows you to set each direction independently, ie: more down than up, or more left than right.

Another thing worth knowing about ATV and DR is how they apply to trim authority. Trim authority (the amount the surfaces move with a given trim lever movement) increases or decreases with a corresponding change in the ATV. Cut the ATV from 100% to 50%, and the trim movement is also cut in half. If you leave the ATV at 100%, but cut the travel by using the DR setting, the trim travel does not change. For instance, using my Ace Datamaster to measure the pulse widths, here are some numbers from my four year old Futaba 7UAP:

(Center was always 1.52ms)

ATV 100%, DR 100%
Full up = 1.95ms
Full down = 1.10ms
Trim up = 1.64ms
Trim down = 1.39ms

ATV 50%, DR 100%
Full up = 1.73ms
Full down = 1.31ms
Trim up = 1.58ms
Trim down = 1.46ms

ATV 100%, DR 50%
Full up = 1.73ms
Full down = 1.31ms
Trim up = 1.63ms
Trim down = 1.40ms

Notice that the total throw is the same whether the DR or ATV is used to reduce the throw, but the trim throw is directly affected by the ATV setting, but not by the DR setting. For the purposes of pattern flying, you are MUCH better off having a very small amount of trim throw, otherwise you my have difficulty trimming the plane to hold straight and level flight.

The following is just for comparison:

ATV 110%, DR 110%
Full up = 2.04ms
Full down = 1.02ms

110% is the max for both DR and ATV on the older 7UAP radio. The newer "Super Seven" allows you to go 120%, but (If I remember right) only on the first four channels.

If you have a Futaba 7UA radio, check your ATV and DR settings for every channel. If you have an ATV and/or a DR (high side) that is less than 75%, the precision gain by going to 100% or more, and a corresponding change in the mechanical linkage, may be worth the effort. The decision to change it is entirely yours, however.

Next month (if I get a chance) I will cover the ins and outs of two channel aileron setups. For instance, you CAN have aileron differential AND flaperons, you just gotta know how! Later on, I will cover the topic of mixing out roll and pitch coupling.

FEBRUARY 1995
****
Last month I began talking about the Futaba 7UAP line, and after re-reading it I decided that I probably need to back up and explain a few of the concepts pertaining to computer radios.

First of all, let's discuss basically how a computer radio works. The computer chips in our radios (and most computers, for that matter) are digital, which means that they deal with numbers. The stick positions, on the other hand, are analog (linear, or infinitely variable) and must be converted to a number before the computer can deal with it. The voltage from the stick pots are converted by an ADC (analog to digital converter) and the digital number is then read in by the computer. This process is where the concept of "steps", or "1024 technology" comes into being. The computer processes the stick positions and sends this information to the receiver/servos as 10 bit numbers, or a value from 0 to 1023.

Futaba often refers to their computer radios as "1024 stepless", which is a misnomer. What they are trying to say is that 1024 steps makes their system _seem_ stepless. What this really means is that the radio can command a servo to go to a MAXIMUM of 1024 positions. Understanding the concept of "steps" will help you to understand the best way to program your radio and get the most performance from it.

I made some measurements with some equipment available to me where I work, and here is the information I discovered:

(Measurements were taken using a Futaba 7UAP and 7UAPS transmitters, FP-R129DP receiver, and an HP 5314 Universal Counter. Some figures rounded slightly.)

Terms used:
ATV: Adjustable Travel Volume
DR: Dual Rate

7UAP: refers to the older 7UAP/7UAF radios.
7UAPS: refers to the newer 7UAPS/7UAFS "Super Seven" radios.

Channel used: 2 (elevator)
Measured center = 1.525ms
Minimum pulse width change = 1.171us (further referred to as "system step")
Maximum pulse width range = 1.198ms (2.120 to 0.922)
1023 x 0.001171 = 1.198ms

Setup: ATV 110%, DR 110% (Max on 7UAP)
1 Subtrim step = 1.05 system steps
1 trim lever notch = 4.9 system steps
Full stick travel: 1.023 to 2.043ms (870 system steps)
Full trim travel: 1.396 to 1.651ms (218 system steps)

Setup: ATV 30%, DR 110%
1 Subtrim step = 0.25 system steps
1 trim lever notch = 1.35 system steps
Full stick travel: 1.388 to 1.663ms (235 system steps)
Full trim travel: 1.487 to 1.556ms (59 system steps)

So, what does all of this mean? Basically, the radio has a finite resolution that it is capable of, but only if the ATV and DR are set to their max. As you decrease either the ATV or DR, the resolution (number of positions the system can resolve to) decreases with it. In the above case (ATV 30%) you have only 235 steps, or 1/4 what the system is capable of. I should note here that I flew an Ace Micropro 8000 for a short while, and found out that at best it was a 256 radio. I COULD tell the difference!! My thumbs could not tell the difference, but the lack of resolution caused the plane to be difficult to trim for level flight.

Now, lets talk about servo resolution. While I don't have any measurements to report on (not yet) we can talk in general terms about servos and how they function. There is no such thing as a perfect servo. Servos have several characteristics that limit their resolution. One is dead band, or how much the input signal can change without the servo responding. Another is backlash, or how much slop is in the gear train. Yet another is "holding torque", or the how well the servo moves to a desired position under a load. The better the servo, the less will be the dead band and backlash, and the higher the holding torque.

The effect of each and every one of these characteristics can be minimized by using the full travel of the servo. For instance, if you have a radio set up to only move a servo 30 degrees, and the servo has 1/2 degree of dead band, then the dead band alone can account for a 1.67% error. Couple this with the fact that you are working with only 235 steps in that 30 degree range, and you can add another 0.4% max error for a possible total error of over 2%. (I won't bore you with the formulas here, trust me.) For a given control surface deflection, a servo has three times as much power (mechanical advantage) when set to travel 90 degrees as it does when it is set to go only 30 degrees, so the servo will work less and be able to move the control surface closer to the commanded position. And we haven't even begun to talk about linkage slop! The only downside to using the full travel of a servo is the transit time.

So, if you are still reading this and I haven't bored you to death yet, here are my recommendations:

- Use 5 cell (nominal 6v) battery packs to speed servos and increase torque.

- Use high quality control linkage hardware.

- Use long servo arms, and corresponding long control horns, to reduce the effect of slop in the linkage.

- When possible, use pull-pull cables to remove control linkage slop.

- Program the system to use the full travel of the servos, ie: max ATV and DR. Reduce control surface throw the old fashioned way: adjust the mechanical linkage.

- Use good quality, high speed servos to compensate for the increased transit times with the high ATV and DR settings.

Other interesting facts:

- When using programmable mixers, the ATV setting of the source channel does not affect the destination channel. The DR setting and the mix percentage both affect the destination channel.

- The trim lever AND subtrim authority are affected by the ATV settings.

- An unused channel (6 or 7) can be mixed into the flight channels and used as either coarse or fine trim adjustments, depending on the mix percentage. Use 3% mix for fine adjustment, one notch equals slightly less than one system step.

- (7UAP) Full stick travel @ 110% ATV and 110% DR roughly equals 870 system steps. If full trim is included, then all 1024 steps are used, but with lost steps at ends (roughly 64 total). Full stick throw = 870 steps, full trim throw = 218 steps, total = 1088. 1088 - 1024 = 64 lost steps.

- (7UAP) Mix a channel into itself to get more movement with the stick, (max +16% mix) but with more lost steps at the end if including trim.

- (7UAPS) The max ATV settings for the first four channels are 120%, the rest are 110%. The max DR settings are 120%. If using two aileron channels, you should not go over 110% ATV on channel 1 since the other aileron channel (either 6 or 7) is limited to 110%.

- (7UAPS) When ATV and DR are set to 120%, stick movement gives the entire 1024 resolution, but only if the trim lever is centered and subtrim setting is 0. If the trim lever is not centered, then there will be lost travel at that end of the stick movement, ie: with full up trim, the servo will stop moving before the stick reaches the full up position.

I hope this information is helpful for someone. The main reason I am writing this is to help the average flier, most of whom are probably flying mid-range radios. I would like to write something about the JR 347 or 388, but don't have access to them. If anyone out there that has a JR radio wants to submit something, please do!

When I discovered that my Ace Micropro was only capable of 256 positions, I talked to several people about it, including Ace. The response was usually the same: "256 is better than most servos" or "your thumbs aren't that accurate". Well, let me talk about each of these statements.

First, it is true that some of the plain Jane servos are not very precise. However, regardless of how good or bad a servo is, having a radio with steps (whether 256, 512, or even 1024) is simply introducing another error into the loop. A cheap servo is not going to negate the lack of resolution of the radio, nor is a good servo going to make it worse.

The statement "your thumbs aren't that accurate" is entirely true (speaking for myself, of course). However, the centering mechanism on most sticks are very precise, and this is where the real problem with steps comes into play. The coarser the granularity, the harder it is to trim a plane. Anyone who has fought a trim problem and found out they had a bad pot in a servo knows what I am talking about, and that is exactly the feeling I got when flying a 256 radio.

MARCH 1995
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More on Futaba 7UAF/P

After I re-read my column from last month, I realized that although I talked about the Futaba 7ch radio, most of the recommendations I made applied to just about any radio / any plane. This month I will (finally) talk about two channel aileron setups on 7UA radios.

First, lets define 'differential' and 'flaperons'. Most people know what flaperons are: the control surfaces on the wing can move together as flaps, or opposite as ailerons. I have not seen much need for flaperons on pattern planes, although they can be deflected in small amounts as flaps to help trim a plane. They can also be deflected up to act as drag brakes during landing. Differential refers to unequal throw of the ailerons up/ down. Differential is (in most cases) used to counter adverse yaw, especially on high wing/ high lift planes. On pattern planes, differential may be used to help a plane roll more on its axis.

There are several ways to setup ailerons on the 7UA. First, you can use just one aileron servo with linkage going to each aileron. However, most fliers, pattern especially, are using two servos. This simplifies me-

chanical linkage and gives a much tighter connection to the ailerons. The simplest way to do two aileron servos is by using a Y-harness, with both servos working from one channel. However, there is also the option of using two channels/two servos, and there are two ways to accomplish that.

Two channel control of the ailerons can be done by either enabling DIFF (differential) in the setup menu, or by enabling FLPR (flaperon). The second aileron channel is #6 if using FLPR, or #7 if using DIFF. There are reasons why you might pick one over the other. If using FLPR, you can use the ailerons as flaps. You may or may not want to do that, but if you decide to use them you can trim the neutral point of the ailerons up or down during flight which might aid you in trimming the plane. However, you can still get differential throw using the FLPR feature, you just have to adjust the FLPR rate settings for each aileron channel just like you would with the DIFF feature. One reason why you would select the DIFF feature is so that you can't inadvertently move the ch6 knob and throw the centers off. Another reason would be that you would want to use seperate flaps. Use whichever method you prefer.

I will describe the latter method of selecting FLPR, since the DIFF feature is a little more straightforward. First, bring up the menu screen and page over to the FLPR menu and turn on the feature. Now, you should get aileron output from channels 1 and channel 6. (The manual does not state which channel should be use for which aileron. It has been my experience that it does not matter.) Then you must set the direction for each servo. In this menu, you can also select the amount of throw for each servo, but leave all these values (four of them, just like ATV) set to 100%. I alway use the ATV settings to make any adjustments for throw, then use the FLPR rate adjustments to obtain differential throw, if needed.

When setting up the ATVs, start out by setting the ATV for both channels to 110% in either direction. Then use a deflection guage to determine which aileron is moving the least in any one direction. Adjust all the other ATV settings until both ailerons move this same amount in all directions. This gives you a starting point of equal throw left or right and zero differential. If you don't have a deflection guage, you can measure the throw by using a ruler at the trailing edge of the control surface, although it isn't nearly as accurate.

For the initial trim flights, use the dual-rate settings to adjust the total throw until you get the roll rate required. (If you don't have enough throw with DR at 120%, increase the throw in the mechanical linkage and start this process all over.) If you use the snap switch, adjust the control throws until you get the desired snap. (This is a whole subject in itself, which I may cover in the future). Once you get the throws where you want them, check the DR and snap settings for the aileron channel. If both of these are less than about 80%, you may want to reduce the throw in the mechanical linkage and start this process over. As I said in the January and February columns, I like to have my ATVs and DRs (high side) at 100% or higher which will give me the most resolution and torque at the control surfaces.

Remember, while channel 1 can have an ATV setting of 120% (super seven ONLY) channel 6/7 can only have a setting as high as 110%. So, don't use a setting of over 110% ATV on channel 1.

Some people prefer having more throw to one side than the other, ie: roll faster to the left than to the right. This has to be done using the individual ATV settings for each aileron channel. If you want to roll left quicker than to the right, use the DR setting to get the desired left-roll rate. Then, use the ATV settings to decrease the right-roll rate. You want to decrease the left aileron down-throw, and the right aileron up-throw. (Just don't 'throw up'). Use a deflection guage to measure each and match them to each other, ie: the up-throw on the right aileron matches the down-throw on the left aileron.

So far you should have zero differential. Most of the pattern type planes that I have flown required little, if any, differential throw. Most people define differential throw as having more up than down throw. This definition is only accurate if the right and left ailerons have the same throws, ie: left aileron up-throw equals right aileron up-throw, and down equals down. It is more correct to define aileron differential throw as the up-throw on one aileron being more than the down throw on the other, and vica-versa. If you think you need differential (again, this is another subject altogether) then change the FLPR rate (or DIFF if using that feature) settings of the channels, but always remember where you started so you can return if it doesn't work. It helps to keep some sort of log book with radio settings so you can always backup to any given point. The manual that comes with the Super Seven has a data sheet in the back that can be used to record all the parameters in the program memory.

Remember, there are now a total of 10 settings which affect the throw of the ailerons. There are four ATV settings, one for each direction of each servo. There are four similar settings under either the FLPR or DIFF menus. Then, there are the DR settings, both low and high. (Kinda makes you want to say FORGET IT, and just use a Y harness). In the end, however, you can be sure that you will have balanced throws on both surfaces, and can adjust for just about any situation.

By the way, did you know that the Super Seven is known as the 'Field Force Seven' in other parts of the world?

APRIL 1995
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More on the Futaba 7UAF/P

This month, we will talk about using the two programmable mixers to correct roll or pitch coupling. Roll coupling is when the airplane rolls with application of rudder, and pitch coupling is when the airplane pitches with rudder input. When the airplane rolls in the same direction as the rudder input, this is referred to as 'proverse' roll, while the opposite is 'adverse roll'. When referring to pitch coupling, most people will say 'pitches to canopy' or 'pitches to belly'.

The causes of roll or pitch coupling are easier to understand than they are to fix. Roll coupling is caused by an improper amount of dihedral in the wing. Too much dihedral will cause proverse roll, and too little will cause adverse roll. If you can adjust the dihedral on the plane, this is the preferred way of correcting for it. Pitch coupling is usually caused by the placement of the stab being too high or too low on the tail. Too high will cause the plane to pitch to the belly, too low will cause the plane to pitch to the canopy. Adjusting the stab height would be the best way to cure this, although sometimes it can be cured by changing the wing and/or stab incidence. It is, however, very easy to mix out these tendencies, especially if the roll/pitch coupling is very minor.

One problem with the 7UAx series is that they only have two programmable mixers. If you have two aileron channels, you need to mix rudder into each one to correct for any rolling tendency. This does not leave a mixer to correct for any pitching problem. SO, I cheat a little. If I have roll coupling, I mix rudder into one of the aileron channels, and use the other mixer to correct for any pitch coupling. Get the roll coupling fixed before adjusting for the pitch coupling, since moving just one aileron may cause a slight pitch problem in itself. Keep in mind that we will probably be mixing less than 5%, so any movement necessary should be almost unnoticeable on the ground. If you need to mix more than that, you should probably think about fixing the problem on the plane instead of with radio mixing.

First of all, let me mention my philosophy when it comes to checking for rudder coupling problems. When I trim out a new plane, I always set the rudder travel for maximum throw on high rate. (I HATE flopped stall turns!!) I then fly the plane and determine just how much rudder is needed for knife edge, and adjust the low rate until full stick deflection barely holds altitude in knife edge. I then determine if I need mixing or not AT THE LOW RUDDER RATE. (I only use high rate for stall turns or spins). I fly the plane in knife edge flight and determine any coupling problems. It helps to have someone to write down which way the plane rolls or pitches while in knife edge flight. After I land, I figure out which way I need to mix things.

When mixing rudder into the other channels, you need to determine the polarity of the mix. I have never bothered learning how to determine this without actually plugging in values. If the mix polarity is + and it is the opposite of what you need, change it to a -, or vica-versa. You may also need to plug in a large value for the mix percentage to be able to tell which direction the servo is moving. Usually the mixing polarity will be the same for both sides when correcting for roll coupling, but will be opposite when correcting for pitch coupling. In other words, if there is an adverse roll coupling, you will need to have the ailerons move in the same direction as the rudder, for both sides of the rudder mix. But, for pitch coupling, you will have to have both sides of the rudder cause the elevator to move down if the plane pitches to the canopy. This is done by changing the mix polarity, each side of the source stick throw (rudder left or right) will be different. In some cases the plane may pitch to the canopy on one side, and pitch to the belly on the other side.

Once you have the directions figured out, then you can dial the mix percentage back down to around 5%. Fly the airplane some more, and adjust the mix percentages until you get a straight track in knife edge. Once you are done, you should be able to roll the plane on its side, kick full rudder stick (low rate) and fly knife-edge from one side of the box to the other without touching the right stick.

Remember, as part of your checkout procedure before you start your engine (you DO check your controls, don't you?) you will need to make sure that the PMIX switch is on.

I think I have someone lined up to write about the JR mid-range radios. Hopefully I will have something next month.

2000 GBRCAA Competition Calendar - Issue 5 24th September 2000

	Weekend 1	Weekend 2	Weekend 3	Weekend 4	Weekend 5
September	3 **Alloa, Scotland** Sportsman Mast-FAI (PO1) CD: Elliot Balfour	3 -10 **European Champs** Belgium	17 **Mansfield**, Notts Std Sen Mast-FAI (PO1) CD: Trevor Plumbe	24 **Maidstone, Kent** Std Sen Mast-FAI (PO1) CD: Mike LeMmon **5th Centralised LARKS** FAI (PO1) CD: **B Ransley** Entry to: Bill Harrop	
October	1 **Warrix, Scotland** Sportsman Mast-FAI (PO1) CD: Elliot Balfour	8 **Hastings** Std Sen Mast-FAI (PO1) CD: Alan Hilton	15 **Glenrothes, Scotland** Sportsman Mast-FAI (PO1) CD: Elliot Balfour	22 **Cashmoor** Std Sen Mast-FAI (PO1) CD: Alan Hilton	29
November	5	12	19 **GBRCAA AGM** More details to follow...	26	
December					

Sport Sportsman Schedule | **Std** Standard Schedule | **Sen** Senior Schedule | **Mast-FAI (*)** Master * indicates FAI schedule(s)

NB: Centralised competitions are open to all classes; with **all classes** flying the FAI schedule indicated.

Send entries to the Contest Director (CD) using the Competition Entry Form from Aerobatics News unless otherwise noted

Trim Chart - Original text by Michael Chipchase

TO TEST FOR	TEST PROCEDURE	OBSERVATION	ADJUSTMENTS
1. Control Neutrals	Fly the model straight and level	Use Transmitter trims for hands-off straight and level flight	Adjust control horns to center Transmitter trims
2. Control Throws	Fly model and apply full deflection of each control in turn	Check response of each control	Aileron: Hi-rate, 3 rolls in 3 to 4 seconds. Lo-rate, 3 rolls in 6 seconds
			Elevator: Hi-rate to give a smooth square corner Lo-rate to give a loop of approximately 130 feet diameter
			Rudder: Hi-rate approximately 30-35 degrees, for stall turns Lo-rate to maintain knife edge flight
3. Centre of Gravity (Method 1)	Roll model into a near vertically banked turn	A. Nose drops	A. Add weight to tail
		B. Tail drops	B. Add weight to nose
(Method 2)	Roll model inverted	A. Lots of down elevator required to maintain level flight	A. Add weight to tail
		B. No down elevator required to maintain level flight, or model climbs	B. Add weight to nose
4. Decalage	Power off vertical dive, cross wind (if any). Release controls when model is vertical, (elevator must be neutral).	A. Model continues straight down	A. No adjustment required
		B. Model starts to pull out,(nose up).	B. Reduce incidence
		C. Model starts to tuck in,(nose down).	C. Increase incidence
5. Tip Weight (course adjustment)	Fly the model straight and level, upright. Check aileron trim maintains wings level. Roll the model inverted, wings level. Release aileron stick	A. Model does not drop a wing	A. No adjustment required
		B. The left wing drops	B. Add weight to right tip
		C. The right wing drops	C. Add weight to left tip

6. Elevator Alignment. (for models with independent elevator Halves)	Fly model away from you and into any wind. Pull it into an inside loop or vertical climb, roll it inverted and repeat by pushing it into an outside loop or vertical climb	A. No rolling tendency when elevator applied	A. Elevators in correct alignment
		B. Model rolls in same direction in both tests	B. Elevator halves misaligned. Either raise one half or lower the other
		C. Model rolls in opposite direc-tions in both tests	C. One elevator half has more throw than the other, (the model rolls to the side with the most throw). Reduce throw on side with the most throw or increase throw on the other
1. Tip Weight (Final adjust-ment)	Fly the model high into the wind either coming to-wards you or or going away from you, smoothly push the model into a vertical dive, pull out sharply and watch for a wing dropping.	A. Neither wing drops on pulling out.	A. No adjustment required
		B. The right wing drops on pulling out.	B. Add weight to the left wing tip.
		C. The left wing drops on pulling out	C. Add weight to the right wing tip
2. Dihedral	Fly the model straight and level into any wind, apply rudder and watch for any tendency for the model to roll. a. Test in both directions. b. Make changes in increments of no more than 1/8" at a time c. Don't worry about the nose pitching down or up.	A. The model does not roll.	A. No adjustment required
		B. The model rolls in the direction of the applied rudder. (Proverse roll)	B. Reduce dihedral
		C. The model rolls in the opposite direc-tion to the ap-plied rudder (Adverse roll)	C. Increase Dihedral

3. Side Thrust (During tests re-trim with rudder until a straight vertical is achieved, then add side thrust to the value of half the rudder trim that was needed. Zero the rudder trim) (Go back and re-test after adjusting)	Fly the model away from you, into any wind. Pull it smoothly into a vertical climb going at least to normal maneuver height (watch for deviations to the left or right as it slows down)	A. Model continues straight up	A. No adjustment required
		B. Model veers left	B. Add right thrust
		C. Model veers right	C. Reduce right thrust
4. Up/Down Thrust	Fly the model cross wind, at a distance of around 100m from you, (elevator trim should be neutral as per test No 3), pull it into a vertical climb and neutralize the elevator, (watch for any deviations up or down as it slows down)	A. Model continues straight up	A. No adjustment required
		B. Model pitches up, (goes towards the top of the model)	B. Add down thrust
		C. Model pitches down, (goes toward the bottom of the model)	C. Reduce down thrust
5. Aileron Differential (Set the model up with 12 Degrees up and 11 to 12 Degrees down as a starting point.)	Fly the model level and into any wind, going away from yourself. Pull it up into a 45 Degree climb and roll to the right. (After adjusting, try again in both directions)	A. The model does not veer sideways.	A. No adjustment required
		B. The model's path veers to the right.	B. Increase differential, increase the up throw on both ailerons
		C. The model's path veers to the left.	C. Increase the down throw on both ailerons.
6. Pitching in knife-edge flight	Fly the model on a normal pass and roll into knife-edge flight, maintain height with top rudder, (do this test in both left and right knife-edge flight)	A. There is no pitch up or down	A. No adjustment required
(Method 1)		B. The nose pitches up, (the model climbs laterally)	B Alternative cures: 1. Move the C of G aft 2. Increase wing incidence 3. Add down trim to ailerons
		C. The nose pitches down, (the model dives laterally)	C. Reverse the above

(Method 2)	Fly the model on a normal pass and roll into knife-edge flight, maintain height with top rudder, (do this test in both left and right knife-edge flight)	A. The model does not pitch up or down	A. No adjustment required
		B. The model pitches to the canopy in both knife-edges.	B. Lower both Ailerons slightly Approxi-mately 2 turns
		C. The model pitches to it's bottom in both knife-edges	C. Raise both Ailerons slightly approxi-mately 2 turns
		D. The model pitches in oppo-site directions in each knife-edge	D. Use mixing from rudder to elevator to fix the problem.
7. Power off Tracking (Test #1)	Fly the model level into any wind, pull the power off and watch for any roll off to either side	A. No roll to either side	A. No adjustment required
		B. The model rolls left	B. Mix 2% to 3% right aileron to low throttle, enough to neutralize the roll.
		C. The model rolls right	C. Mix 2% to 3% left aileron to low throttle, enough to neutralize the roll.
Test #2	Fly the model high at a distance of approxi-mately 100m into or across wind but side-ways to yourself, push it into a vertical dive, watch for any tendency to roll whilst in the dive.	A. The model shown no ten-dency to roll	A. No adjustment required
		B. The model rolls to its left	B. Mix some right aileron to low throttle, enough to neutralize the roll
		C. The model rolls to its right	C. Mix some left aileron to low throttle, enough to neutralize the roll
Test #3	Fly the model high at a distance of approxi-mately 100m across any wind but sideways to yourself, push it into a vertical dive, watch for any tendency to pitch up or down whilst in the dive.	A. There is no pitching, the model continues straight down	A. No adjustment required
		B. The model pitches up, to-wards the canopy.	B. Mix 2% to 3% down elevator to low throttle
		C. The model pitches down towards the bot-tom of the model	C. Mix 2% to 3% up elevator to low throttle.

Notes:
1. Trimming must be done in calm conditions.
2. Abbreviations are used.
3. Make multiple tests before making adjustments.
4. If any changes are made, go back over previous steps and verify or readjust as necessary
5. A good Decalage starting point is 0 Deg. Wing, 0 Deg. Stab, 1.5 Deg. Downthrust & 1.5 Deg. Right thrust
6. The model should be perfectly aligned whilst it was being constructed.
7. Static balance the model prior to flying it.
8. Setting the C of G to between 34% and 38% of the MAC is a good starting point.
9. All vertical dives are power off.
10. Setting up the model with 12 Degrees up Aileron and between 11 and 12 Degrees down is a good starting point.

(carried on from p21)

JUNE 1995
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Eric Henderson was kind enough to send me this bit on JR 347 and 388 programming tips. Even though I don't fly JR, the information here helps me to understand more about those radios and what they are capable of. Here's Eric:

In response to Bob's request in a previous issue of K-FACTOR here are is an explanation of some ways to set up a pattern plane with a JR X-347 or JR X-388. I currently live near Boston in District-1 but will soon be moving to southern New Jersey and hope to meet Bob in the near future. Differences between the 347, read 512 bit resolution and the 388, read 1024 bit resolution will be highlighted where relevant. (Both radios will support PPM/FM and PCM 512). To avoid this becoming an instruction manual the steps to set up a plane are illustrated but the detailed keying etc. has been omitted.

Both radios have step through menus and require some initialization choices. You are required to select MODEL TYPE before you get into the main body of programming and servo set up. There are a couple of buttons on the lower left of the radio that you hold down while simultaneously switching on the radio. The radio LCD comes on but no RF is produced when in this state. AERO, meaning power planes is displayed. (For our purposes we shall ignore the Glider and Heli. options). Two decisions now have to be made. They are; 1) If you want Flaperons - a channel and servo per aileron, step to and select FLAPERON, and 2) Whether the flap channel is rotary pot driven or switch selectable, set to and select POT. You also input the model name at this stage and can copy another model if you wish. This is where you tell the radio what receiver you are using. The 388 has the option to use the new 1024 receivers. [I have tried both 512 and 1024 bit resolution receivers with 4131 servos and to be perfectly honest I cannot really feel any difference in the air but I can see a minuscule difference in electronic trim resolution]. Then you switch off and on and you are now ready to program!

"Programming" requires you to press two keys simultaneously. This will put you into programming mode and will produce an RF signal so you will see the results of your work on your receiver/servos as you program.

You first clear the flap servo rotary POT trim preset down to zero to avoid inadvertently, (might I hastily add embarrassingly) messing up the two servo aileron configuration with the Trim Knob. All the servos are default set to 100% throw and have the option to go up to 150% of their endpoints at either side of center. The best set up is to have 100% servo throw with the pushrod about two or three holes out on the servo arm and to choose horn lengths that give the specified/desired throws. Next set the direction and centering of each servo so that the arm is perpendicular to the pushrod. If the centering cannot be done mechanically the programmable SUB-TRIM option allows very fine adjustment.

Elevator and rudder are easy to set up. The END-POINT, often called servo throw, is set individually either side of the center, e.g. up and down. If after flight tests you find that you have too much throw a good technique is to use the DUAL-RATES option to reduce or increase the throws as desired. The rate switches have two positions and are default set at 100%. To get more throw you can go up to 125%, say in position 1 and 110% in position 2 and then try them out to see which setting you like best. This is much better than changing the end points especially when you are using two servos on the same control.

EXPONENTIAL is selected by the rates switches. 25% is a good amount to begin with on elevator. The higher the percentage the less movement you get around the center for the amount of stick movement. Some may call this an automatic dual rate but it is not! You use the exponential to desensitize the center actions of the stick pots. This make for smoother stops and starts in rolls etc. You will soon know if you have too much exponential because the plane will respond too slowly. A good set up technique is to begin with no exponential and set the servo rate first. Then set both the rates positions to the same percentage. i.e. no matter which position you have the switch then the rates are the same. Then program in some exponential on rate switch position one and go fly!. Try the plane with exponential out and then in. You can even try two different rates of exponential with rates switches. The rudder will work well at 40% EXPO, it will be pretty soft for takeoffs and landings, but will respond with authority in stall turns and knife edges.

Throttle was once a "No-brainer" to set up but with the big 120's some help is needed. First of all the rpm of the engine does not seem to be proportional to the position of the carb. flap.

To get a linear response use the SUB-TRIM option on the throttle channel. It allows you to move the cen-

tering of the servo and also affect the linearity of the servo action. If you couple this change with the ability to change the travel end points it does not take long to modify the resolution of a servo to meet your throttle response needs. Secondly a difference of 200 rpm on a 15 x 12 at idle can be the difference between a landing or an overshoot. A practice you might like on the both .61's and the 1.20's is to have a high/low idle switch. It is very difficult to do this with your thumb on the throttle trim during a contest landing so if it is pre-set on a mix switch life can be very enjoyable, read less sweat on finals!. What you set up is an idle that will not die during stall turns and spins but can be accurately selected for the final leg of landing or that stationary moment just before take off on a hard top runway. How you do it is to mix the throttle channel with itself. With JR this is channel 1 with channel 1. You tell the radio which of the three available switches you want use and then dial in a small percentage of mix that will lower the idle when switched in. The YS 61 will idle very slowly for a limited amount of time, the 120 a bit longer, and it feels great to be able to switch in LOW IDLE when you are lined up on the final leg of landing and only have to concentrate on keeping the wings level.

Ailerons with a servo on each control surface help you sleep better at night. Servos or connectors or gears do fail and a redundant servo will save your plane. It also allows such niceties as electronic selection of differential and flap/elevator mixing. A technique that you can use to slow down a plane is to employ a form of flap using both the ailerons. The JR radios have a series pre-programmed mixers that you can use. The elevator neutral setting can be preset to avoid ballooning upon flap deployment. The flaps in this instance are not drooped. They are set with 5 degrees of UP-flap, yes UP! select the LAND switch because it also disables the snap roll switch. Not a good idea to snap roll on landing approach!. What this configuration allows you to do is slow the plane in a higher than usual nose up attitude without stalling. It works very well on dead calm days but is usually not needed on windy days.

Fail-safe is a bit controversial these days but you get RX battery low fail-safe warning. The JR will give you approx. 30 seconds to land after it senses a low four cell RX pack. The throttle will cut to idle as a warning. You can then over-ride it but please, not for long. MHO the biggest cause of a low pack is a hung gear-leg. If you use the new low profile JR 703 servos you will get relatively low drain on a stalled servo. (Burnt our fingers on the servo wheel testing that one!)

Back to fail-safe. A good plan is to choose low throttle, (just in case you get it back), slight right rudder and half up elevator. The wheels are best kept up to save the wing in the event of a forced-free-flight landing. The 388 differs from the 347 in fail-safe options. The 347 allows either low throttle and HOLD of all other controls OR pre-select of all control positions. The 388 allows you, nay demands of you, to specify HOLD or PRE-SET per channel/servo. This gives you a lot of flexibility in emergency options.

SNAP ROLLS can be pre-programmed and selected from a momentary switch on the top of the TX. The snap roll program lets you set more throw than you have dialed as available on your control sticks. It is good for snap rolls on Avalanches etc. You can pre-program all four up and down snaps but can only have one direction selected at flight time. This makes the option a bit limited for spins however.

Mixers on the two radios is the same for the first four mixes. The 388 has two more. The basic program requests you to select the mix identity, A, B, C or D. You chose a master and a slave channel to be mixed and also the switch to be used. No switch means ON all of the time. You then select the mix percentage amounts either side of the center. You can also defer the mix to only operate when the driving channel reaches a certain point. An example being that when you mix the throttle to itself you only want the mix to work on the low position of the throttle and probably only during the last 10% of the low throttle operation.

There are two extra optional mixes on the 388, called E and F. They have a special feature called TRIM TRANSFER. This is very useful when you want to use two servos for elevators. You could just use a Y-lead but this still gives you a single point of failure. Two channels are definitely better than one. Anyone who has lost elevator will tell you! You would probably mix the elevator with Auxiliary Channel 2. Then when you trim your elevator with the physical trim lever you will get both elevator surfaces to respond. The electronic SUB-TRIMs and end point TRAVEL ADJUSTMENT can now be applied per servo to "Tune and match " each elevator control surface. The rates and pre-programmed mixes will also drive the elevator servo auxiliary servo as one.

Regards - Eric Henderson

Team Manager's Report

I only made the Monday for the Nats for family reasons but, from what I saw and heard, the attendees had great time. I would like to offer my congratulations to our new Nationals Champion, Dave Matthias, and to all the other winners too. Also to Stuart Mellor and his acolytes for a well run comp.

After the dust had settled we followed the precedent set at the 4th Centralised and held a one round ad. hoc. F01 competition. I was a bit disappointed with the small entry but quality made up for quantity. Four Master pilots volunteered to form the judging panel - Peter Brett, Dave Matthias, John Mee and Sam Wragg. As it happened John couldn't find his glasses so was unable to take part in the end. A great wheeze for getting out of judging; I'll try and remember that one John. Stuart was kind enough to hand over the mike to me and, with the consent of the competitors, I attempted a running commentary, not as easy as you'd think with an unfamiliar schedule. My apologies to the pilots and judges for a couple of garbled manoeuvre descriptions, I hope they weren't put off too much. From a couple of comments afterwards I think we may have fired some enthusiasm. Maybe, if pilots and judges are prepared to allow it, we should try and do a commentary at those few competitions where we have an audience. It helps to involve the public and and try give them with an understanding of what we are doing. The normalised result was 1000 Angus Balfour, 989 Kevin Caton, 988 our Swedish visitor Robert Sundstrom (who was also Team Manager for Sweden at the European Championships a week later), and 866 Malcolm Balfour.

On the subject of the European Championships, there will be full report in the next Aerobatic News, but I regret to tell you that this precis will tell no more favourable a story. There were 56 entries (although only 53 flew) from 21 countries . We came 7th in the team event and, after the four preliminary rounds Brandon was our top pilot at 21st with Kevin at 22nd and Keith 37th (though he did win the engine cuts competition).

The top 18 went into the semi-finals and the top ten from the semis flew the 4 round final, with two rounds of F01 and two different unknown's. CPLR won every round and Italy's Marco Benicasa and Wolfgang Matt took it in turns to be second and third, finally ending up with Matt second and Marco third.

The site was splendid and, generally, the organisation was good with plenty of information put out in a very timely manner and no problems or protests. The opening ceremony took place in a rainstorm and the banquet took place in a snowstorm, well - it looked like it anyway with WW2 being re-enacted with paper darts.For small persons the hotel was excellent. In addition to the team and trainer/mechanics Roy Ransley and John Harrop we were joined by Pam Ransley, Bob Reid, Dave Smith and Leslie and the ubiquitous "Barry Gacoigne four". Our thanks to all of them for their support.

Keith rather sprang this report on me, I was getting used to relaxed deadlines but he has turned overnight into a tyrant so, that's all folks.

Kind regards

David Tappin
UK F3A Team Manager.

MANSFIELD COMPETITION 21st MAY 2000

Down at the field on Saturday was Arthur Silsby from the Isle of Man getting in some practice, when the unthinkable happened, a mid-air. Fortunately Arthur landed safely but the damage to his model was not repairable in time for the competition the following day. The other model - lets say it will be quite a while before it will fly again.

The weather on Sunday although not quite as good as last September's comp i.e. sunny, warm, blue skies and light winds, was not too bad, chilly and cloudy with a moderate wind diagonally across the strip from the north west which would catch a lot of pilots out and see a lot of 'boxed' on the score sheets.

First away in Master was Dave Mathias putting in a reasonable score for the conditions but was just beaten by Sam Wragg. Brian Gascoigne was third with his new Alliance/140LM. Richard Welch's engine stopped on take off while Stuart Mellor's stopped soon into his flight. Gerry Scothern was extremely lucky to land his Dice 3 in the next field, close to a fence, when an aileron horn came adrift amid the buttock clenching sounds of flutter. Arthur flew his reserve model, a Kyosho Sensation, to attain some reasonable scores.

Into Senior & Lindsey Todd won the round with Brian Hoare second.

The first round in Standard was won by Brian Dillon with his well used, semi-retired (his words) Chilli Wind.

Second round of Masters saw Richard Welch winning (by 0.5!) from Dave Mathias with Sam Wragg in third place. But the weather then began deteriorating with ominous black clouds building. Lindsey again won the round in Senior with Brian closing the gap. In Standard, Mike Binnersley put in a good flight gaining his first set of promotion points. Well done Mike.

Third and final round saw what was to become the final placing in Masters i.e. Dave, Richard and Sam. In Senior Lindsey suffered engine problems part way into his flight, but with two 1000 scores he was unbeatable. Brian won the round with Ken Moss in second place. As the final round of Standard began, a light drizzle started but all the pilots elected to fly. Mike won the round with Graham Bankes gaining his first set of promotion points. Well done Graham.

The scoring was carried out by myself (the club's usual two scorer's had the audacity to go on holiday, but not together I hasten to add!) using the Association's lap top computer loaded with Stuart Mellor's excellent Excel program.

Thanks go to the (very cold) judges Daryl Foster and John Howarth (Seniors & Masters) along with Bob Reid and Richard Howarth (Standard). Thanks also to Andrew Kayes for assisting with the timekeeping etc.

Last, but not least, I would like to thank the Mansfield & District R/C Model Club for the use of the field for the day.

Trevor Plumbe – C.D.

		ROUND 1		ROUND 2		ROUND 3			
PILOT		RAW	NORMAL-ISED	RAW	NORMAL-ISED	RAW	NORMAL-ISED	FINAL SCORE (BEST 2)	POSITION
DAVE MATHIAS	MASTER	383.00	989.66	431.00	998.84	444.00	1000.00	1998.84	FIRST
RICHARD WELCH	MASTER	0.00	0.00	431.50	1000.00	436.50	983.11	1983.11	SECOND
SAM WRAGG	MASTER	387.00	1000.00	397.00	920.05	384.50	865.99	1920.05	THIRD
BRIAN GASCOIGNE	MASTER	359.00	927.65	325.50	754.35	318.50	717.34	1681.99	
BOB REID	MASTER	331.50	856.59	355.50	823.87	363.00	817.57	1680.46	
GERRY SCOTHERN	MASTER	193.50	500.00	337.50	782.16	329.00	740.99	1523.15	
ARTHUR SILSBY	MASTER	281.00	726.10	274.50	636.15	341.50	769.14	1495.24	
STUART MELLOR	MASTER	63.00	162.79	281.50	652.38	312.50	703.83	1356.20	
LYNDSEY TODD	SENIOR	277.50	1000.00	284.50	1000.00	108.00	386.40	2000.00	FIRST
BRIAN HOARE	SENIOR	269.00	969.37	282.00	991.21	279.50	1000.00	1991.21	SECOND
KEN MOSS	SENIOR	226.00	814.41	266.50	936.73	272.00	973.17	1909.90	THIRD
ADRIAN HARRISON	SENIOR	254.50	917.12	274.50	964.85	253.50	906.98	1881.97	
RUSSELL AISBITT	SENIOR	182.50	657.66	224.00	787.35	223.00	797.85	1585.20	
MICHAEL BINNERSLEY	STANDARD	167.50	907.86	202.50	1000.00	224.50	1000.00	2000.00	FIRST
BRIAN DILLON	STANDARD	184.50	1000.00	189.50	935.80	195.00	868.60	1935.80	SECOND
GRAHAM BANKES	STANDARD	177.50	962.06	192.00	948.15	200.00	890.87	1910.21	THIRD

MANSFIELD: Model Details

	CLASS	MODEL	ENGINE	SILENCER/ PIPE	PROP	FUEL/ NITRO	RADIO	U/CARRIAGE
DAVE MATTHIAS	MASTER	LARIMAR	WEBRA 145	WEBRA	APC 15.5 X 12 4 BLADE	MODEL TECH 12.5%	JR	
B0B REID	MASTER	NEW SOLUTION	WEBRA 145	WEBRA LONG	APC 15.5 X 12 4 BLADE	RIPMAX TEAM 10%	FUTABA FC28	RHOM AIR
SAM WRAGG	MASTER	EXCELSIOR 2000	YS 140 FZ	BOLLY	APC 15 X 12	18%	MC24	SPRING AIR
ARTHUR SILSBY	MASTER	SENSATION	OS 61	HANNO			JR PCM10	FIXED
RICHARD WELCH	MASTER	FASHION	YS 140 FZ	HATORI LONG	APC 15 X 13N	CHAMP 20%	FUTABA FF8	MECHANICAL
BRIAN GASCOIGNE	MASTER	ALLIANCE	YS 140 LM	HATORI 693	APC 15 X 13N	IRVINE 20%	FUTABA ZAP	MECHANICAL SUPRA
STUART MELLOR	MASTER	AKUMA	OS140 RX	BOLLY	APC 16 X 12	LIQUID GOLD 10%	FUTABA ZAP	MECHANICAL SUPRA
GERRY SCOTHERN	MASTER	LOADED DICE 3	SUPER TIGRE 20/23	WESTON	APC 16 X 13	DURAGLO 5%	FUTABA FF8	MECHANICAL SUPRA
KEN MOSS	SENIOR	LOADED DICE 2S	WEBRA 80	HANNO	APC 12.5 X 13	K MIX 10%	JR388S	RHOM AIR
BRIAN HOARE	SENIOR	SUPER DALOTEL	SUPER TIGRE 90 & OS PUMP	OS BLUE	APC 14 X 10	K MIX 10%	FUTABA FF8	MASSERTI
ADRIAN HARRISON	SENIOR	DESAFIO	YS 140 FZ	BOLLY	APC 15 X 12	20%	FUTABA FF9	RHOM AIR
RUSSELL AISBITT	SENIOR	LOADED DICE 40	OS 70 SURPASS	STANDARD	APC 12 X 8	COOL POWER 30%	FUTABA ZAP	FIXED
LYNDSEY TODD	SENIOR	AEROSTAR 69	SUPER TIGRE 90	OS BLUE	APC 14 X 10	DURAGLO 5%	FUTABA FF8	FIXED
MICHAEL BINNER-SLEY	STAN-DARD	LOADED DICE 2S	OS 91 FS	STANDARD	APC 13 X 9	DURAGLO 16%	FUTABA FF8	FIXED
BRIAN DILLON	STAN-DARD	CHILLI WIND	OS61 RF	YAMADA	APC 12 X 11	DURAGLO 5%	FUTABA FF8	FIXED
GRAHAM BANKS	STAN-DARD	EXCELSIOR 150	MVVS 77	HANNO	APC 12.5 X 11	DURAGLO 5%	FUTABA FF8	

3rd Centralised. Barkston Heath Mini Nats.
16th July 2000

Name	Rnd1	Norm	Rnd2	Norm	Rnd 3	Norm	Final Total	Pos.
K.Jackson	423.00	920.23	455.50	1000.00	407.00	867.80	1920.23	5
A.Silsby	179.67	390.86	336.50	738.75	188.00	400.85	1139.60	16
D.Balfour	391.67	852.07	412.50	905.60	399.00	850.75	1757.66	11
D.Mathias	421.00	915.88	428.00	939.63	440.67	939.59	1879.21	7
J.Harrop	409.67	891.23	431.50	947.31	439.33	936.74	1884.06	6
S.Wragg	354.00	770.12	417.50	916.58	386.00	823.03	1739.60	12
L.Shelley	378.00	822.34	389.00	854.01	399.33	851.46	1705.46	13
B.Ransley	441.00	959.39	451.00	990.12	469.00	1000.00	1990.12	1
D.Rumball	412.67	897.75	428.00	939.63	332.67	709.31	1837.38	8
A.Wild	339.33	738.22	376.50	826.56	362.00	771.86	1598.42	14
M.Balfour	396.00	861.49	425.00	933.04	413.00	880.60	1813.64	9
K.Caton	455.00	989.85	435.00	954.99	461.00	982.94	1972.79	3
G.Butterworth	0.00	0.00	0.00	0.00	0.00	0.00		
J.Mee	310.67	675.85	353.50	776.07	342.67	730.63	1506.70	15
A.Balfour	430.00	935.46	448.50	984.63	447.33	953.80	1938.43	4
R.Howarth	459.67	1000.00	445.50	978.05	464.33	990.05	1990.05	2
S.Underwood	392.67	854.24	409.00	897.91	419.33	894.10	1792.02	10

4th Centralised. Cashmoor. 4th August 2000

Originally David Tappin was to CD this competition, but because we had only secured the services of one Judge, I offered to be CD if David judged, which he willingly accepted.

For those who had taken part in the 3rd Centralised at Barkston, the procedures for running the flightline were fairly familiar. For those who experienced them for the first time, I think they enjoyed moving things along as quickly as possible, enabling us to complete three rounds between the start at 0900 prompt and the finish at 1730 with two fifteen minutes breaks between rounds, during which time the three team members and Angus Balfour had a private competition, flying the FO1 Schedule.

I had arrived on the Friday, as did David Matthias and Keith Jackson, and we all gave David Tappin a hand to set the markers and line the ground, and of course get in a bit of practice. This was a great help in getting the flying off to a cracking start. We also had a draw for who would do the Judges' warm up flight and the honour fell to Dave Rumball.

Noise checks were carried out at the start of the second round with some revealing results, enough to say that some have work to do to get the noise down before the EC.

The results of course speak for themselves, and because I was extremely busy running the flightline and organising the scribing roster, I was unable to observe the flying in detail. What I can say however, is that the standard of flying has improved somewhat, and all pilots should give themselves a pat on the back.

The day however was tinged with sadness, when at the end of the second round Marion Ailles received the news that her Mother had passed away and had to leave immediately. I speak for all members of the Association in passing to Marion and Bob our condolences at their sad loss.

I took over the judging for the third round, using the pseudonym BA, and John Mee taking the Chair when it was my turn to fly.

All in all, a good competition during which some more organisational lessons were learnt and these I will pass on to Daryl Foster.

Many thanks to our unstinting Judges Bob Ailles and Dave Tappin, to the female slaves of the computer, Alison Harrop, Marion Ailles and the lovely Angie. Where would be be without you all? And also a special thank you to the Cashmoor Club for the exclusive use of their site.

Bob Reid
CD, Judge
Flightline Controller (where will it all end?)

Name	Rnd1	Norm	Rnd2	Norm	Rnd 3	Norm	Final Total	Position.
M Balfour	430.00	887.51	458.50	932.86	448.50	942.23	1875.09	**6**
D Owens	317.00	654.28	346.00	703.97	327.50	688.03	1391.99	**17**
S Underwood	0.00	0.00	0.00	0.00	0.00	0.00		
J Mee	407.50	841.07	388.50	790.44	413.00	867.65	1708.72	**12**
A Balfour	465.00	959.75	469.00	954.22	470.50	988.45	1948.20	**3**
A Silsby	339.00	699.69	368.50	749.75	370.00	777.31	1527.06	**14**
R Welch	417.00	860.68	423.50	861.65	431.00	905.46	1767.11	**9**
R Christopher	363.00	749.23	390.00	793.49	358.00	752.10	1545.59	**13**
T Shore	346.00	714.14	333.50	678.54	325.00	682.77	1396.91	**16**
K Jackson	470.00	970.07	490.00	996.95	476.00	1000.00	1996.95	**2**
D Balfour	437.50	902.99	448.00	911.50	454.50	954.83	1866.33	**8**
B Reid	69.00	142.41	359.00	730.42	330.00	693.28	1423.69	**15**
K Caton	458.50	946.34	471.50	959.31	465.00	976.89	1936.20	**4**
D Matthias	452.00	932.92	456.00	927.77	455.00	955.88	1888.80	**5**
J Harrop	436.50	900.93	446.00	907.43	456.50	959.03	1866.46	**7**
S Wragg	404.50	834.88	422.50	859.61	408.00	857.14	1716.76	**11**
B Ransley	484.50	1000.00	491.50	1000.00	475.00	997.90	2000.00	**1**
D Rumball	418.00	862.75	415.50	845.37	420.00	882.35	1745.10	**10**

GBRCAA centralised Event League Table.
Final standings for 2000

	2nd	3rd	4th	Total
	2000	2000	2000	Score
	CVF Scotland	Barkston Mini Nats	Cashmoor	
B Ransley	1000.000	1000.000	1000.000	2000.000
K Jackson	970.335	964.882	998.474	1968.809
K Caton	0	991.292	968.099	1959.391
A Balfour	964.251	974.029	974.099	1948.128
D Mathias	854.046	944.272	944.401	1888.673
J.Harrop	0	946.704	933.230	1879.934
D Balfour	918.158	883.195	933.164	1851.322
M Balfour	904.144	911.320	937.543	1848.863
D.Rumball	0	923.250	872.549	1795.799
S Wragg	870.797	874.119	858.378	1744.916
J.Mee	0	757.091	854.360	1611.451
A Silsby	776.857	572.629	763.528	1540.385
R Ried	702.534	0	711.847	1414.381
R Howarth	0	999.964	0	999.964
S.Underwood	0	900.456	0	900.456
R Welch	0	0	883.555	883.555
L.Shelley	0	856.965	0	856.965
W Allison	854.877	0	0	854.877
M Harris	846.894	0.000	0	846.894
A.Wild	0	803.177	0	803.177
R Christo-pher	0	0	772.795	772.795
T Shore	0	0	698.456	698.456
D Owens	0	0	695.996	695.996

N.B. These results consider the best two of three scores obtained in the current qualifying period. Final team positions will only be determined from the best three scores from five events following the last two qualifying events, these being the first two events before June 1st 2001.

UPDATED 15/3/2000

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HYDE 1.40 SOFT MOUNT	£113.95
YS 1.40 ENGINE MOUNT	£145.00
HYDE COMPACT LITE .20 –.30	£19.95
HYDE COMPACT LITE .40 –.50	£23.70
HYDE COMPACT LITE .60 –.70	£29.95

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15*13 N APC PROP	£9.07
15* 14 N APC PROP	£9.07
15.5 *13N APC PROP	£9.07
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16*10 APC PROP	£9.07
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16*12.5 APC PROP	£9.07
16*13N APC PROP	£9.07
16*16 APC PROP	£9.07
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ALL PANELS ARE VAC BAGGED DURING MANUFACTURE TO ENSURE BEST ADHESION OF THE SKINS TO THE CORE MATERIAL.

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ALL PRICES IN THIS CATALOGUE ARE CORRECT AT THE TIME OF PRINTING. DUE TO ECONOMIC CONDITIONS PRICES MAY VARY, DOWN AS WELL AS UP !!!!!!!!!!

ProBuild

PROBUILD
PL PROD KITS

K

MODEL KC = Kevlar/Carbon FV = Glass Fibre	BASE KIT	BASE KIT ALL FOAM PANELS IN COMPETITION GRADE BALSA	AS PREVIOUS COLUMN WITH AILERONS, ELEVATORS AND RETRACTS FITTED
EXCELLENCE FV	377.77	511.11	611.11
EXCELLENCE KC	466.66	600.00	700.00
TORNADO FV	377.77	511.11	611.11
TORNADO KC	466.66	600.00	700.00
LARIMAR KC	466.66	600.00	700.00
LARIMAR FV	377.77	511.11	611.11
ALIZE KC	388.88	522.22	622.22
ALIZE FV	322.22	455.55	555.55
EXTRA 300 S FV		872.22	972.22
EXTRA 300 S KC		1044.44	1144.44
SMARAGD KC	466.66	511.11	611.11

SHADOW KIT FROM PROBUILD.

The shadow, further development from the world famous Desafio S, the model features plug in wing & Stab, one piece full length underbelly with access to radio installation via a carbon panel. The foam wing, tail are cut from low density foam with the CNC foam cutter for accuracy. The fuselage is a glass cloth with carbon fibre, with reinforcing panels in the rear of the fuz as well as the fin. Motor requirement is for a YS1.20AC up to the new 1.40 LM. Fuselage comes ready sprayed in a white gel coat.

Base kit
Glass fuz & underbelly, foam wing & tail cores with tube holes cut, plan, wing & tail joiner tubes.

Deluxe kit
Includes all above as well as the wings & tail skinned in contest grade balsa, with integral spar system. Ailerons & elevator lined & hinged with kevlar full length system, retract & servo wells cut & lined.

Hi Tec kit
Includes all above but with all formers cut from Nomex glass & fitted into the fuz, motor installation completed. Wing & tail fitted with incidence adjusters.

Base kit. £295.00
Hi tec kit £775.00

Deluxe kit. £525.00

ProBuild

USA ITEMS

Alloy ballraced tail wheel assembly, complete with fitting kit & alloy tail wheel.	£21.00
24" carbon Fibre rods with 4-40 titanium fittings for direct servo connections to control surfaces	£15.95
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- 2 1/2" FAI, LIGHT BACK PLATE £30.72
- 2 3/4" FAI £26.96
- 2 3/4" FAI, LIGHT BACK PLATE £30.50
- 3" FAI, LIGHT BACK PLATE £33.12

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- PL PROD SPRING LOADED CATCHES (PAIR) £6.00
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- TACK CLOTH £1.17
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- FINE LINE TAPE, 2.5MM THICK, 66 METRES LONG £2.75
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- JB WELD, 24 HOUR TWO PART GLUE, SUPER STRONG £3.60
- CRC DEFLECTION THROW METER £18.95
- OS PLUG WRENCH WITH KEEPER, IDEAL FOR YS COWLED MODELS £5.20

Synergy for 2000 as detailed on November 1999 Newsletter front cover, designed by Malcolm Harris & Steve Burgess. The kit consists of a white pigment gel Carbon/Kevlar fuselage, with computer generated & cut foam panels, for 140 YS power. Plug in wing & tail. Std kit. Fuz, underbelly, canopy, foam wing, tail & rudder panel's. Wing & tail joining tubes. £400.00 Deluxe kit POA

- FULL VOLZ SERVO RANGE. PLEASE RING AND WE WILL SEND FULL SPECIFICATIONS.
- ARNAUD POYET'S ZNLINE EVOLIS (SEE PICTURE **PXX**). BASE KIT £400.00
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- CARBON PIPE. VERY LIGHT WEIGHT. AS USED BY CHIP HYDE / BRANDON RANSLEY. £159.95
- DUBRO METAL BALL ENDED DRIVER SET. **£XX**
- ZNLINE ANODISED HORNS. £11.50 / PAIR
- EZ RETRACT MOUNTING SYSTEM. £6.00 / PAIR
- SERVO BOX MOUNTING SYSTEM. £6.00 /PAIR
- VITON 2" LENGTH COUPLER. £11.22
- 5 MIN EPOXY. 18OZ. THE ONLY ONE TO USE. £8.25

Phil Williams 1/8/2000

ProBuild

Warboys 23rd July 2000

The competition this year did not enjoy the normal warm sunny days we have enjoyed in recent years and proved to be very cold indeed for most of the competitors with the possible exception of Teesider Justin Meadows back into the hobby after a layoff of some years. They are usually made of sterner stuff up there.

Low cloud base was the initial problem with Tom Shore opening the proceedings and demonstrating a perfect spin entry unfortunately just above the clouds(at least that's what he reckoned).

Once the clouds lifted there were no further problems apart from Justin's engine cut near the end of his first round. Graham took an early lead with Alan Wild hot on his heels. In Seniors it was Brian Hoare making the early showing against Steve Birchall.

In Standard, Simon Carr took the first round with Alan knight second but both scoring promotion Scores and Nick Wicks just missing out.

Unfortunately during all the action yours truly was scoring and missed all the fun.

The second round saw the eventual winners in each class take the round but it was not over by any means.

After the lunch break it was the same leaders again but Alan Wild was making ground beating Graham narrowly for 2nd place while back in Standard, we had three promo scores.

Into the last round and Alan produced the best flight of the day to grab 2nd over all with Justin making the long trip really worthwhile taking the honours.

In Senior Steve Birchall making sure of 1st place with a promotion score with Brian and ken not too far behind.

Standard finished off in style with three more promotion scores with Alan Knight clearly leading the pack.

Well done to all the fliers , there were some impressive scores and well done to the hardy Judges Ross Donovan and Tim Butterworth for stoically sitting through four rounds in the cold breeze.

My thanks to all concerned for a great comp especially to the Judges and to the club for letting us have the site for the day. I hope to see you all again next year.

Clive Whitwood
July 2000

Warboys 23rd July. Results

	Round 1	Round 2	Round 3	Round 4	Total	Final Position
Tom Shore	339	387	387	414	1188	**4**
Bob Reid	303.5	356	327.5	349	1032.5	**5**
Alan Wild	377.5	412	464.5	510	1386.5	**2**
Justin Meadows	274 E/C	469.5	480.5	495	1445	**1**
Graham Reid	395.5	435.5	463.5	471	1370	**3**
Ken Moss	169	272.5	135.5E/C	272.5	714	**3**
Steve Birchall	244	282.5	296.5	316	895	**1**
Brian Hoare	252	260	229	289	801	**2**
Roger Robbins	177	210.5	207	197.5	615	**4**
Keith Barrington	163	195.5	182.5	221.5	599.5	**5**
Simon Carr	213.5	243	179.5E/C	68 E/C	636	**3**
Alan Knight	203.5	219.5	225	244.5	689	**1**
Nick Wicks	199.5	198.5	212.5	238	650	**2**

Warboys 23rd July. Model Details

Competitor	Model	Wing-span	Engine	Fuel	Propeller	U/carriage	Radio
Tom Shore	New Solution	72"	Webra 80	10%N	12.5 x 11	Rhom Air	FF7
Bob Reid	New Solution		Webra 145	15%K 10%N	15.5 x 12 4Blade	Rhom Air	Robbe FC28
Alan Wild	NFU 2	1.96M	ST 20/23	10%Oil/10%N	16 x14 & 15.5 x 12 4 Blade	Fixed	JR 3810
Justin Meadows	Loaded Dice 3		YS140LM	20%/20%	15 x 12	Retracts	9 VAP
Graham Reid	Loaded Dice 2S	70"	ST 90	Kmix 10%	13 x 12.5	Irvine Retracts	JR 3810
Ken Moss	Loaded Dice 2S		Webra 80	Kmix 10%	12.5 x 13	Rhom Air	JR388 S
Brian Hoare	Dalotel S		ST 90/P	Kmix 10%	14 x 10	Spring Air	FF8
Steve Birchall	Excelsior 177	1.77M	ST 90/P	5%N	14 x 10	Fixed	FF7
Roger Robbins	Aerostar 62	62"	OS61 RF	GN5	12 x 10	Fixed	FF7
Keith Barrington	Loaded Dice 2	68.5"	Webra 80	10%N	12.5 x 13	Retracts	FF8
Nick Wicks	Loaded Dice 60	64"	ST 90	5%N	13 x 11	Fixed	FF8
Simon Carr	Cuban 120	74"	YS120FZ	20%/20%	15 x 11	Retracts	FF8
Alan Knight	Summit 120	70"	YS120AC	15%N	15 x 11	Retracts	9ZAP

Competition Report: Woodham Ferrers
14th May 2000

Fifteen pilots arrived for the pilots briefing at 9.15am sharp. With the sun burning off the early morning mist and with just a whisper of a breeze, we were going to enjoy ideal flying weather.

Mick Burrel was the first away but had to abort after his model entered the mist during the vertical 8.

After a short break to allow the mist to finally clear, Greg Butterworth took off only to discover his model going one way with its elevators going another. The rounds proceeded smoothly although Alan Wild had an engine cut on take off in the first round and damaged his carb. landing in the out field and retired from further rounds. Terry Gevaux also lost the first round due to engine problems.

Alan Simmonds had senior class all to himself, other seniors having cancelled earlier.

For standard and Sportsman fliers, other than John Wighton, this was to be their first competition. Standard fliers Dave Stephens and Alan Knight gained their first

Name	Model	Engine
M. Burrel	New Solution	OS 140
G. Butterworth	Typhoon	YS 140 F/S
K. Caton	Fashion	YS 140 F/S
R. Christopher	Malibu	YS 140 F/S
S. Rutherford	New Solution	OS 140
L. Shelley	New Solution	OS 140
A. Wild	Own Design	ST G20-23
A. Simmonds	Spirit	ST G90
S. Carr	Cuban 8	Webra 80
A. Knight	Summit III	YS90 F/S
D. Stephens	Absolute	OS 140
J. Wighton	Loaded Dice	OS Prettner
T. Gevaux	Excelsior 163	MVVS 77
J. Hanmore	Wot 4	MDS 48
L. Vardy	Cap 232	ST G20-23

set of promotion points.

In Masters, Kevin Caton was steadily extending his lead as the rounds progressed, (I do believe this is good for the clubs and the GBRCAA when our UK Team Members participate in club events).

During a break between rounds in the afternoon, everybody was entertained by a demonstration of freestyle flying by Terry Westrop; well done Terry, I am sure we were all impressed.

The meeting closed at 5.15pm; the results as per the results given below.

I would like to thank all those who helped make the day a success, the Judges Phil and Bob Newman, the Scorers Martin B-B, Steve Gilbey and Barry Ashmore. Also thanks to A.M.F.C members who assisted prior to the competition.

Ron Newman. C.D.

GBRCAA Competition. Woodham Ferrers. 14th May 2000						
Masters	Round 1	Round 2	Round 3	Round 4	Total	Place
M. Burrel	353	363.5	388.5	380	1132	4
G. Butterworth	-	-	-	-	-	
K. Caton	427	423	443	449.5	1319.5	1
R. Christopher	318	323.5	-	-	641.5	5
S. Rutherford	372.5	363	398	416.5	1187	3
L. Shelley	394	171.5	416.5	409.5	1220	2
A. Wild	-	-	-	-	-	
A. Simmonds	245	277	270.5	245.5	793	1
S. Carr	146	157	171	159.5	487.5	4
A. Knight	197	180.5	209	200.5	606.5	2
D. Stephens	239.5	259.5	262	258.5	780	1
J. Wighton	186	192	191	182	569	3
T. Gevaux	-	83.5	88.5	92.5	264.5	2
J. Hanmore	71.5	65.5	55.5	68.5	205.5	3
L. Vardy	118	107	98.5	99	324	1

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For Sale

New, latest Futaba Zap, fitted with "World Champ" sticks (only normally available to order) with the following servos: 4x9202, 4x9102, 1x9204,1x9203 , 1000 nicad, Alu Tx case etc. All brand new. £750 o.n.o with rx, £700 without or any reasonable offer.
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ZNLine Caprise as featured in July 2000 newsletter. C/w two piece wing and travel case including retract servos and MK DX Supra retract units, single piece wing (8oz lighter) fitted with Futaba 136 retract servo and MK DX Supra retract units, removable adjustable tail plane. Previously fitted with YS 140LM, can be supplied with engine & mount, just mount (for existing YS140 FZ or L owners) with and without radio equipment. Sensible offers please.
Contact Keith Jackson on 01722 410279 or email to keith@gbrcaanewsletter.freeserve.co.uk

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