The Electronic News letter of the Chichester and District Model Aero Club

Clear Dope

July 2022

Chichester and District Model Aero Club: Committee 2022

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Please send more articles for CD

Happy Flying and be aware of others

Jeff Cosford reports more successful “A” test this time it’s Jon Greatorex and Ian Carby. Well done both.
Portshole Tuesday 14th June 2022 and 25th June

Some links for novice pilots – Jeff Cosford

If you are training, or want to train, for the "A" test, there is an overwhelming amount of content out there, and I will try and guide you through what is important: -

A Flying Start.pdf (sharepoint.com)

For complete novices, "A Flying Start" covers every aspect of model flying at a very basic level. A bit basic for most, and very long. But good for complete novices with time to spare.

https://www.youtube.com/watch?v=_pWP0lnWANs

The most accessible guide for the "A" test, because it is a YouTube video. Essential viewing, watch it several times. Excellent on the preflight checks and the shape and course of each manoeuvre. The overhead drone footage is clever, see the "figure of eight".

BMFA Public - Fixed Wing Power Certificates May 2022 V1.pdf - All Documents (sharepoint.com)

This has become a huge document, as these things tend to. It covers both "A" and "B" tests. It replaced the 2004 version which has separate guides for "A" test and "B" test and is an easier read, and still relevant since nothing has changed. That is the one I carry, and often refer to. Both versions explain exactly the standard the examiner is looking for in each task: for example, within the "B" test:

"(f) Complete two consecutive rolls into wind. These should be performed from standard height and line and must be continuous rolls with no straight flight between them. The model should be half way through the two rolls when it passes in front of the pilot although you may allow a little leeway here. There should be no serious loss of height or direction during the manoeuvre although slight barreling of the rolls is permissible. The speed of the rolls should be such that the pilot has to make noticeable elevator inputs to maintain the model's height. 'Twinkle rolls' that are so fast that no visible elevator input is required are NOT acceptable, you have to be sure that the pilot is using the elevator. Slow rolls which require elevator and rudder input are acceptable if the pilot can perform them but are NOT a requirement. Don't forget to note which way the model rolls"

(I chose that one for Paul's benefit!)

It also explains, for example, the differences in the figure of eight standard required for the two tests.

Handbook 2021 - web version.doc (bmfa.uk)

Finally, this is where I take the 5 questions from. Well, some are from the club Pilots' Handbook for the site in question, usually Portshole.

Again, this document has expanded over decades. But pages 22-33 cover what you need.

Article 16.and the RCC

You will not be questioned by the examiner on Article 16, so there are no so-called "compulsory questions". That is provided you have passed the Registration Competency Certificate, which all candidates so far have done.

Arado 234B

Hi club members, I was originally intending to present this in Clear Dope later on when my creation had had a chance to fly and prove itself, but in response to Ken's request for material I had to provide something earlier than intended. Moreover, I want to make this perfectly clear from the outset that this is not a me, me, me. It is simply the result of my dedication to a subject that I am interested in and I hope that I may have sparked some interest in other members.

This aeroplane model is the culmination of several month's effort and is still at the time of writing sin need of more fettling to finish it off ready for the flying field. I think probably this could extend to a 2 month article as there is a considerable amount of information to impart as I have done quite a lot of research into this most interesting aeroplane.

My model is based on a Chris Golds plan published in Electric Flight number MW2908 for a AR234 C and is still available together with a reprint of the original article. The model has a 42 inch span (1.067m) and was originally intended for 4 K & P (Knight & Pridham) 44mm EDF units powered by NiMH batteries. The article and plan were originally published in June 2001. Obviously since then things have moved on quite a bit, and ducted fan power is now way, way beyond what was available at that time. The K & P units would be considered fairly gutless by today's standards and I will not go into further mention about them. At that time the model had to save every iota of weight. It had no undercarriage and needed a bungee launch to get it in the air. The original design made extensive use of a mix of expanded poly blue foam and balsa construction. Such was the case then for weight saving that the elevator only operated on one side of the tailplane. Apparently this worked perfectly O.K. we are told.

To begin this article in detail I need to explain something about the Arado 234. It was a late WW2 aircraft although German plans for it existed since around in 1941. It went through a number of discrete design phases which although not entirely distinct can be summarised by the A, B and C versions. There was also a planned D version that was never built because of war's end. Although Germany and England were jointly inventors of the Jet engine, with the honours going to Frank Whittle, mostly because of our government intransigency at the time we were slow to move on, while in Germany, companies such as Heinkel, Arado, Messerschmitt, Junkersand Horten amongst several others stole the show. Meanwhile Arado developed the A version of the AR234. It was designed by Walter Blume. The A version used a take-off dolly and a retractable landing skid, a similar idea used by the Messerschmitt Komet 163 Rocket fighter. In the case of the Arado 234A the take-off dolly was a tricycle arrangement which was dropped immediately after take-off. The original idea was not only to save weight but also because the opinion at the time was that an undercarriage could not survive a high speed landing. Very early in the development cycle the Germans realised that this idea was a fallacy. In the case of the Messerschmitt Komet, which invariably used the dolly skid system right through to the war's end, the Arado 234 was a much too heavy aircraft for this to work. It ploughed huge furrows into the grass areas of the landing strip and presented huge problems when it came to recovery, leaving the aircraft highly vulnerable to enemy aircraft attention in the meantime.

the design of the Arado 234 dates back to Reichluftsministerium (State Air ministry) requirement (actually it was a competition) for a bomber design with characteristics of 1000+1000+1000 which was mostly the brainchild of Luftreichsmarschall Herman Goering. The three 'thousands' referring to 1000Kmph speed, 1000KG bomb load and a range of 1000Km. Of all the submissions presented the Arado 234 came the closest to meeting all of these requirements. Arado were actually ahead of the game in this and already had prototypes working before the original request was issued and so were able to compete with some initial prior knowledge that their design ideas was sound.

The Arado 234 as stated had 3 distinct versions before war's end although as always these versions were somewhat indistinct. However they can be fairly closely summarised by the following:

A version had no retractable undercarriage and used take-off dolly and retractable landing skid.

B version had a retractable undercarriage and generally 2 engines of type Jumo 004

C version had 4 engines of type BMW 003 with retracts.

The A version design is somewhat blurred because way back in April 1944 a quad mount of 4 BMW 003 engines was actually tried in version V6. These engines were in separate mounts. A month or two earlier in February 1944 a version V8 had the BMW engines mounted together in a shared blister case. Apparently this had very severe vibration problems and these were not fully sorted out until the C-version came to be made.

Perhaps the first definitive version of the Arado 234B was in the version V9 which had retracts and a pair of Jumo 004 engines. It could carry 500 Kg bombs which were attached in bomb releases beneath the engine pods. There was also space for the main bomb fitted in the middle of the fuselage between the main undercarriage legs.

Move on now to October 1944 and the versions V13 and V17 .V17 would probably be close to the definitive version of the B-series. On each outboard wing was positioned a rocket-assisted take-off engine (Starthilfe). I always thought that these were solid fuel rockets, but they were actually liquid fuelled. If you are interested you can read about it on https://en.wikipedia.org/wiki/Walter_HWK_109-500.

In simple terms this consisted of a Walter design engine, similar to that used by the Messerschmitt Komet with a liquid alcohol-based fuel and a high level Permanganate oxidiser. The Starthilfe (literally take-off helper) was mounted outboard on each wing and jettisoned shortly after take-off whereupon it descended back to ground for subsequent recovery by aid of an on-board parachute. I am guessing slightly here, but would expect that this accessory would only become necessary to assist the take-off run when a heavy bomb load was to be mounted.

If you are interested in the design and development, I can recommend two small books, Arado 234 & Junkers JU187, 'The world's first jet bombers' by Franz Kober. Another book is simply a set of scale drawings of the various versions. 'Marek Rys' AR234 B-2, B-2/N C3 by TopDrawings No 105. Polish English published by Kagero. All of these are obtainable from Amazon.
As to photographic material there are one or two references, but the most informative are the pictures of the full size at the Udvar-Hazy Center, Chantilly, Virginia (part of the Smithsonian Museum). This can be seen on

https://en.wikipedia.org/wiki/Arado_Ar_234#/media/File:Arado_234B_1.jpg

Here I must confess to a case of extreme numptiness. I had used a picture of a Hasegawa AR234 for my blister camouflage configuration, and also the cockpit detail. The former turned out to be completely inaccurate, and had I had the presence of mind to flick though the pages of pictures on the above website I could have gained an accurate profile of the actual blister camouflage used. Hey ho! No changing it now.

Following on from last month's article on the Arado 234 and its history, I am now going to describe the model that I have built and some internal details. As I have explained the concept started life from a Chris Golds plan MW2908 published in Electric Flight International in 2001. I think now in retrospect that I can almost claim a new design as my model is so different from the original in many respects. To begin with I have mounted retracts whereas the original had nothing except a bungee launch hook.

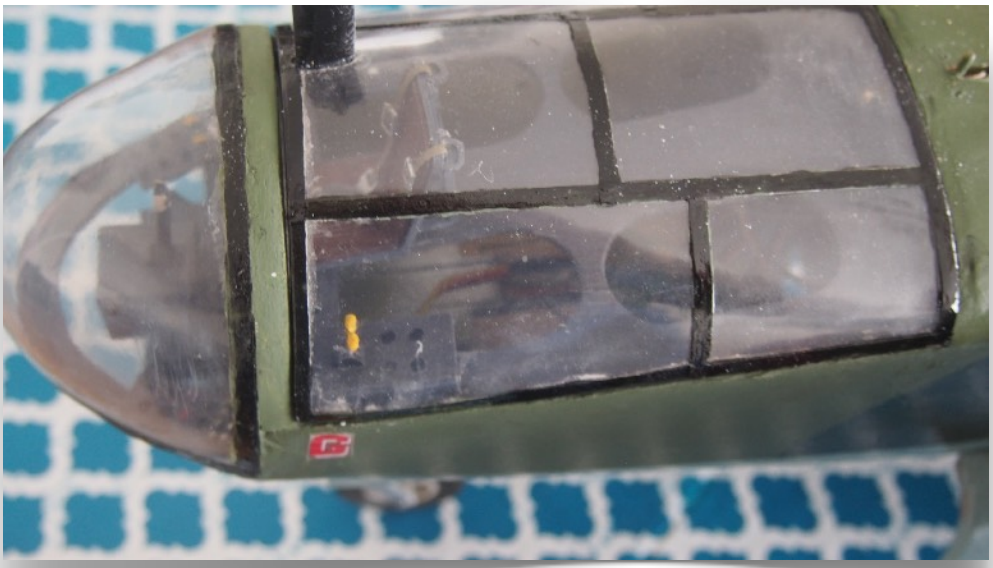
The Retracts

The retracts… Ah, now therein hangs a tale. I don't think that there has been any part of this build than the retracts and the undercarriage doors that have given me such problems. I started off getting some very lightweight metal ones from Hobbyking. These have a standard footprint, but are a few grams lighter than anything else that I could find. Furthermore, they have the essential steerable nose leg in the set. When I started, I could not figure out how the main gear retracted in the original. The head scratcher was that the undercarriage doors were just too small, only being large enough to accommodate each wheel.

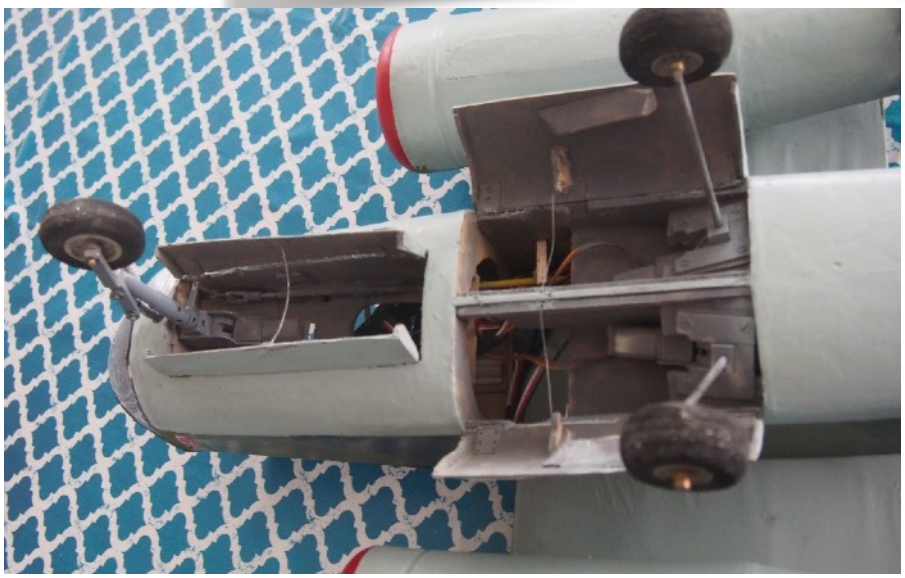
Let me point out at this stage that this model is not intended as true scale; far from it. To do so, one would have to completely start over again, but I did want it to bear a convincing resemblance to the original. Remember that this is no Mustang or Spitfire; there were only an estimated 214 of these machines ever built, many of which were destroyed by the Germans themselves at the war's end. There are only a few examples still left and, as far as I am aware, none in flyable condition. The most complete example that I have been able to locate is in the Udvar-Hazy Center of the Smithsonian Museum, USA. As a result the documentation on the subject is singularly lacking. In the end, I just had to 'wing it' if you excuse the pun and set the gear up so that it retracted forwards towards the front of the model. Later on, I found out that the original worked the same way! On page 16 of the book 'The world's first jet bombers' by Franz Kober is a cutaway drawing showing how the undercarriage was stowed in the fuselage, but the undercarriage doors were far too small. The mystery was only finally solved when I managed to see a side view of the aircraft in the Smithsonian museum which revealed that there were actually two undercarriage doors on each side, one considerably taller than the other! The doors must also be sequenced in some way that one opens before the other and vice versa.

In my model there is only one set of doors on each side and that's that! The first part of the build was to get the angle for the light ply mountings just right in order that the gear is not only correctly stowed, but, at the same time give as wide a track as possible on the wheelbase for takeoff and landing. This involved considerable experimentation before using the sticky stuff. The nose leg by contrast although simpler was complicated by the fact that available off-the shelf sprung units were far too heavy and of an incorrect length. As a result I had to get my lathe and milling machine out and make my own.

Hasegawa model Cockpit detail



I have used 3-D printer technology to create the cockpit internals and will describe this more fully below



The next area to be addressed was the undercarriage doors. These were made of 1/32 ply given an appropriate curve using steam from a kettle. Then a light ply former was mounted at each end to help keep the shape.

The hinges were simply small model pin and plastic devices obtainable from model shops which were held in place with super glue.

I could not afford the weight penalty of putting in door servos and so a much simpler method was needed. For the main gear doors, I used fine 0.6mm gauge piano wire that was anchored to the fuselage at one end and to a mid-point position of the door at the other. The length of the wire and its mounting position was highly critical to ensure correct operation. When the wheels are retracted the leg pulls on the wire and closes the door to exactly match into the fuselage. When the undercarriage is lowered the wheels push the door open and there is enough spring in the wire to keep the doors away from the legs. To facilitate the door closing operation I found that I needed some ramps of balsa glued to the doors in order to guide the wheels away from them while the undercarriage was retracting. Eventually, I got this all to work reasonably reliably.

The nose leg is different. There are two doors which must close together. The hinges were mounted in the same way as for the main gear, but to keep the doors open I made some tiny home-made coil springs that were mounted on the fuselage. The doors are closed by the nose leg quite simply by using some fine plastic-covered steel rigging wire.

Most of the construction was fairly standard and the plan was used to make the wings and fuselage. The original tailplane and fin used very thin balsa ribs which I did not reckon to be strong enough so I used ¼ square lightweight grade balsa instead.

The engine nacelles were designed around the FMS 50 mm 11-blade ducted fan motors. These pack quite a punch for their size, the specification being 630 gm (1.37 lb.) of thrust with 11.2V @ 32A. In fact, when they are mounted in a duct the current about 40A and the thrust more like 1 lb. The nacelles were made using a combination of light ply and blue foam to keep the weight down. The intakes and exhausts were 3-D printed out of PLA. The original speed controllers were 50A types which I obtained from Hobby King. They have managed to reach new heights in pants quality control (double pants) to which others could barely equal and never exceed. It turned out that one of the speed controllers did not work at all and the other wasn't up to much so it was a good job that I had the foresight in making provision for removal of the motors and speed controllers. In the end I used a couple of 40A types (replacements for WOT 4's) that I got from SMC which do the job and are somewhat lighter in weight.

Last year I met Tony Nijhuis at RC Hotel Corfu and had several enjoyable chats with him during the week he was there. For the jets that he sells plans for he reckons that the thrust to weight ratio should be near to 1:1. But Tony is a bit of a speed king and he likes his fast models. Anyway, in the end my Arado 234B came out more like 3.5 lb. in all-up weight, whereas the thrust was about 2 lb.

This gives a somewhat more sedate 0.57 power to weight ratio. Much of the weight being accounted for in the batteries as I will explain next. The wing loading is just under 2 lb. / Sq. ft.

Just when I thought that the model was more or less under wraps it came back and bit me once again. This time it was the batteries. Originally I had sorted out an Optipower 3650 3S pack for the model which I thought to be about right. Doing some initial testing on the motors I found that the flight duration would be woefully lacking at a combined current of 80A, giving only just about 2 minutes. This is plain to see when you look at the numbers. Consider that the battery would be used up at 15% of its capacity, so for a 3.65 A hour battery you have a realistic capacity of 85% or 3.1A hour. With a current of 80 A the battery life is then only 2.3 minutes – barely enough for a couple of circuits so clearly it needed bigger cells.

Way before this I had always considered using two 3S 2200 batteries in parallel as I have a lot of these, but persuading them to fit in the model was quite a trial. After much cutting and cursing I got them to fit side by side. These should now give a slightly more realistic 3 minutes, maybe more if I can keep the power moderated. You may be interested in some findings that I have had with batteries in general. I have a battery meter which checks the charge capacity of the LiPo and also the internal resistance of each cell or all cells. I have tabulated some results here:

The Batteries

Type	Cell Arrangement	Capacity (Ah)	DC Resistance milliohms total	Weight (gm)
Optipower 3650	3S 1P	3.65	10.8	325
Optipower 2200	3S 1P	2.20	11.0	188
Turnigy 4000	3S 1P	4.00	11.84	357
Turnigy 2650	3S 1P	2.65	11.62	219
Turnigy Graphene 2200	3S 1P	2.20	9.0	199
Turnigy Nanotech 2200	3S 1P	2.20	28.96	188
Super PAX 2200	3S 1P	2.20	55.76	187
Kong Power 2200	3S 1P	2.20	22.50	165

Powering the model using 2 sets of batteries makes a lot of sense with ducted fan if you can put up with the weight penalty. This means that the DC resistance is halved for two cells. A few milliohms makes a lot of difference at 80 Amps load current. Take, for instance, the Optipower 3650. 10.8 milliohms will dissipate almost 70 watts in the battery and associated wiring and also drop the volts to the motors by 0.86V. Not good. Conversely if you wired in two Optipower 2200's in parallel you would only have 40A from each cell so the power and voltage drop becomes 17.6 watts per battery or 35 watts total and 0.44V dropped. The Turnigy Graphene cells perform slightly better still.

The Canopies

A pet hate of mine are painted on windows. They look quite frankly, crap, so they had to be transparent of nothing. I produced some male blanks using balsa and car filler after a phone call to Kamtec models in Bognor. There they made some impressions for me in PETG, but the trouble was they were translucent rather than transparent. In the end I made my own plunge mouldings which came out O.K. after a bit of a struggle. So there you have it. Model completed. I have added a lot of 3D printing inside the cockpit, just for fun using photos and drawings for reference. None of it is scale, but scale-ish.

Conclusion

This has been quite a battle and a rocky road to get to this stage. I do hope it flies, but if it doesn't, I will not seriously mind as it has been a most interesting journey along the way and I have learnt a lot about this fascinating aircraft and the minor homage that I have paid to its design.

Hope my discourse was of interest to some,

All the Best,

Allen

Mike Notter writes:

I finished this Swannee a couple of years ago and have yet to fly it. It was a 38" span S/C design by John Bowmer and given as a free plan in the Feb 1966 Aeromodeller. Once again, it is a 'nostagia project' from my teenage years when I was rather new to the concept of radio control. That original version was equipped with a MacGregor super-regen Rx, Elmic Conquest escapement and home-made Tx. I managed to write it off after forgetting the L/R escapement sequence and hitting the only brick building within half a mile. The present rendering actually follows the plan fairly accurately and features sprung nosewheel and correct degree of washout - both regarded as unnecessary distractions when I was 16. I believe the appearance followed the popular 'multi' design trend at the time, e.g. Orion, Taurus etc, being a poor man's version of such classics. Power is a PAW 1cc diesel and control is 3-channel. Hope to fly it when the Thorney speed limit is restored to 30mph !

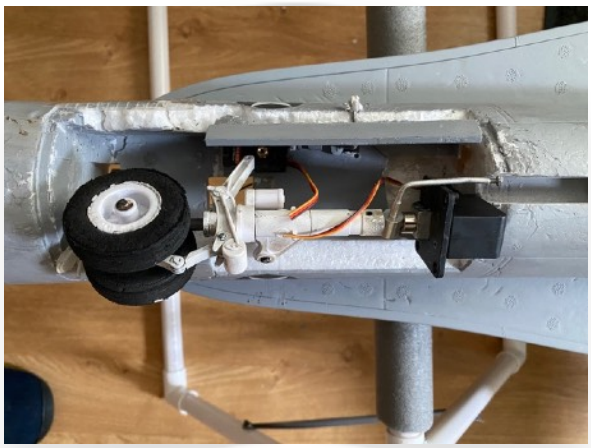
All the best,
Mike

The lineup for this June's Scale comp it was a good day and much fun was had by all. Ray did a grand job. The results are shown below:

"B" Certificate flyers
1st Derek - L39
2nd Ray - F16
3rd Adrian - Kawasaki Hein
4th Jeff - Spitfire
5th John Bransgrove DH Mosquito

"A" Certificate flyers
1st David H. - Mew Gull
2nd Ken K. - Mustang
3rd Jordan - Extra
4th Declan - Mew Gull
5th Ken Smith - Spitfire.

Joining servo wire – now why didn't I think of that?



I was faced with a dilemma during a recent repair to the nose section of my E-flite F18.

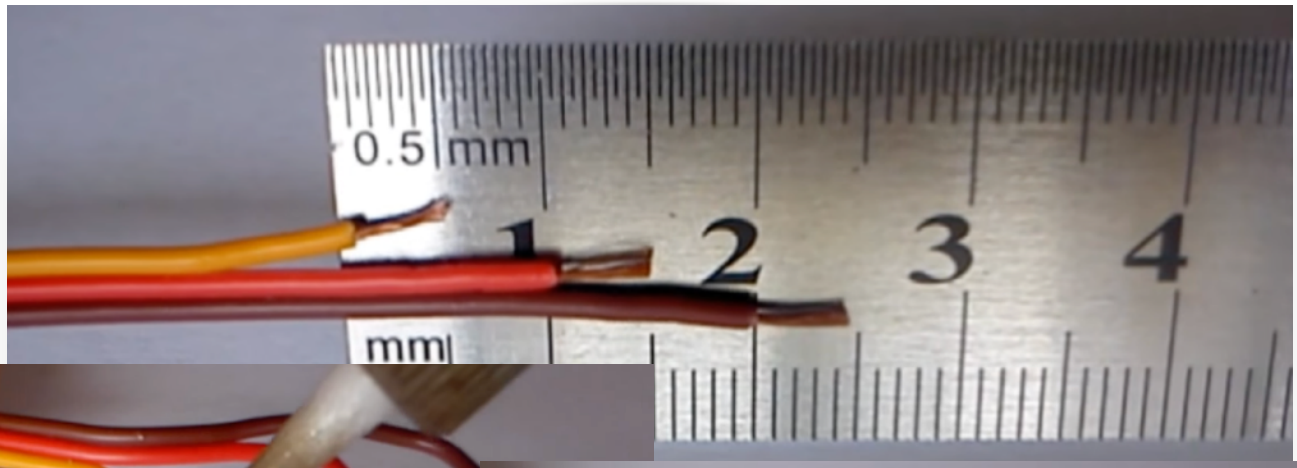
The problem was that I needed to remove the front retract, and the end of the servo lead disappeared into the bowels of the fuselage which, it transpired is a totally sealed unit!

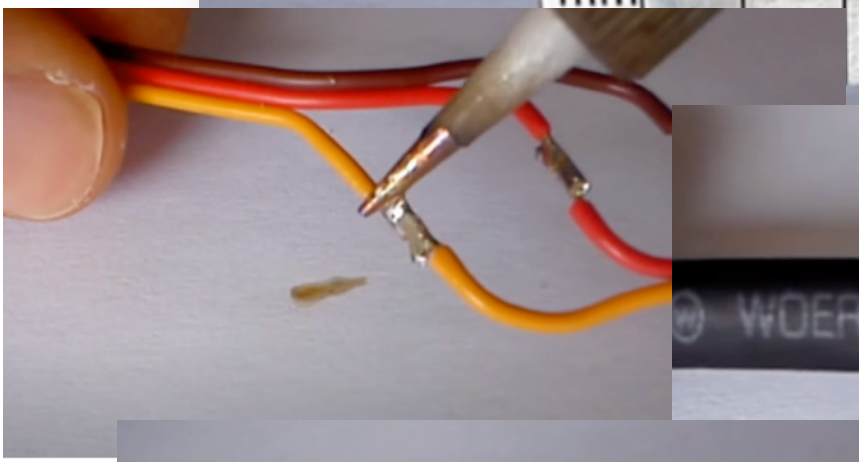
Reluctantly, therefore I decided to cut the lead, with a view to re-soldering it back together when the repair was complete.

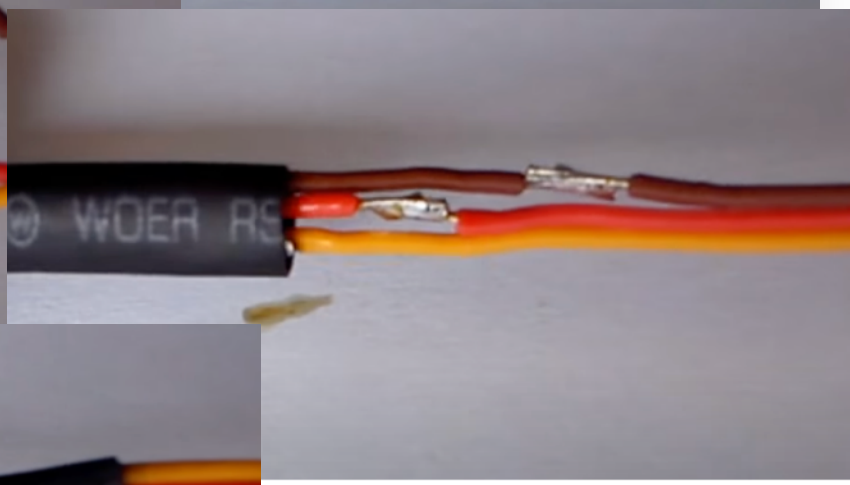
My concerns were that, given the size and proximity of the individual wires it would be a fiddly job, and that with shrink wrap around each wire the resulting repair would look like a clenched fist, and a snagging point.

However, an internet search revealed that by staggering the wire joins by 1cm a much neater result can be achieved requiring the use of just one piece of shrink wrap to cover the entire join. So simple; now why didn't I think of that?

Tim







Planed Club Activities for 2022

Date:	Event:
Thursday 14TH July	Club flying evening – Fishbourne Sports Field
Sunday 17th July	Chris Foss model flying event 7 BBQ – Thorney Island/ Portshole please contact Jordon if attending
Wednesday 27th July	Fun-fly & BBQ - Portshole
Saturday 6th August	Gliding comp – Thorney island. Back-up days: 13th & 20th
Thursday 11th August	Club flying evening – Fishbourne Sports Field
Thursday 8th September	Club flying evening – Fishbourne Sports Field
Thursday 13th October	Club evening meet – Fishbourne Centre
Saturday 5th November	EDF jet competition – Thorney Island
Thursday 10th November	Club AGM & evening meet – Fishbourne Centre
Sunday 13th November	Remembrance Day Gliding event – Thorney Island
Thursday 8th December	Club evening meet – Fishbourne Centre – subs.

Avro Vulcan XM655 is one of the last three taxi-able Vulcans. It is also the youngest of the type and is persevered at Wellesbourne Mountfield Airfield which is near Chipping Norton. Its first flight was in 1964 and the last flight was February 1984

Please Try to leave Porthole as tidy as possible, making sure no

30 metres from "uninvolved" persons"

15 metres when taking off & landing, subject to mitigations

Flying alone on Thorney is now not allowed on the grounds of safety

From 1 Jan 21 BMFA Article 16 is law: know the separation

When driving around Thorne be aware of young

The Commander at Baker Barracks Thorney and the MOD have decreed that there shall be NO drone flying whatsoever

When flying at Thorney please keep an eye out for traffic(all kinds walkers, horses, bikes, runners, and

The club Facebook page is now in its fifth year. It has over one hundred members. It contains many contemporary site reports, and has a wealth of photos in its archives.
Administered by Nick Gates. David Hayward & Ken Knox
Here is the link:-
https://www.facebook.com/groups/Chichesteraeromodellers/