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PART 1: 1/10 scale 45" (1140mm) wingspan, electric powered model by Peter Rake
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ON THE COVER

Nigel I'Anson's 1/6th scale 110" wingspan Grumman TBF-1 Avenger is our 'Master Models' Feature this issue. A 3W 75cc petrol engine provides the power for this 37 lbs masterpiece.

(Photo: Alex Whittaker)

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CONTACT

DEAR SIR, IS THIS A FIRST..?

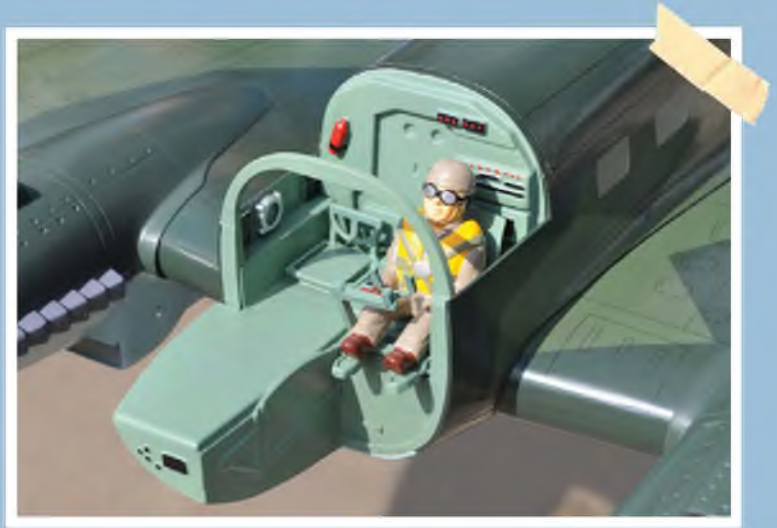
There is so much duplication in kits for models of full size aircraft. Over and over again, the same narrow range of aircraft types are repeated, albeit in a wide range of scales. But even after much head scratching and delving into the far nooks and crannies of memory, we cannot recall the **Heinkel He 111** ever being offered in scale kit form before.

The He 111 was the Luftwaffe's most numerously used bomber type during WW2, serving pre-1939 and throughout the 1939-1946 years and well beyond that period too with the Spanish Air Force.

So hats off to **Black Horse Models** for the introduction of their 69" (1750mm) wingspan kit, which works out at just about 1/13th scale. This is an ARTF presentation with a basic conventional balsa/ply airframe, jig built and supplied finished with film covering that carries the typical dual-green zig-zag camouflage scheme carried by Luftwaffe bomber formations operating in northern Europe.

The kit is presented to permit either IC power using two .25 size two-stroke engines or twin electric power, the latter ideally suiting the slim engine cowls that are a feature of the He 111. A dominant part of the Henkel's shape was the bullet-shaped all-round vision cockpit canopy which, in the Black Horse Models kit, is populated by a full-body pilot figure and instrument panel in a ready-painted enclosure - and finally, there are mechanical retracting main undercarriage units supplied with the kit.

Price, via Ripmax is £269.99.



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Engine: Evolution™ 33GX Petrol Engine (included)

Servos: Spektrum® A6180 Digital Servos (included)

Super Decathlon 100cc ARF | HAN1070

Wingspan: 3.50 m (137.0 inch)

Size: 80-120cc

Spitfire Mk IX 30cc ARF | HAN4495

Wingspan: 2.05 m (81.0 inch)

Size: 30cc

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CRUISING SEDATELY BY, THE POLIKARPOV HAS PROVED AN EASY BUILD AND A JOY TO FLY.

POLIKARPOV PO-2

PART 1: A 1/10 scale, electric powered model designed by Peter Rake, with the prototype model built and described by Pat Lynch

I'd briefly considered designing a PO-2 several years ago and even went so far as to buy a plastic kit to assist with reference. Then, of course, more pressing designs came along and the PO-2 was forgotten. So, when an on-line design/build competition came along and Pat Lynch suggested the type as a possible combined effort, the die was cast. Plans were drawn, revised slightly when I had a better idea about strut fixing, and sent to Pat for his inspection. The model you see here is the result of his hard work after I'd done the easy bit. Since this is really his build, I'll just hand you over to Pat for all the details.

PETER RAKE

My interest in the Polikarpov Po-2 was rather accidental. I'd been searching for photos of the radial-engined version of the Great Lakes Trainer I was then currently building and happened on an aircraft picture that yelled 'build me'. It ticked all the boxes: a biplane; heaps of character; I'd never heard of it (I live a sheltered life) and with enough quirkiness to really appeal!

Almost ugly, but it had a certain charm with big, well proportioned wings, masses of exterior detail and looked like a fairly simple structure - enough interest was piqued to contact Peter Rake and see if he'd be interested in it as design. He was!

The Po-2 was designed in the 1920s and built in the tens of thousands during the late 1930s and throughout WW2. Used in a huge variety of roles from civilian to ambulance to night bomber, 'Polly' could be considered a very successful design. Although it saw service mostly in WW2, many of the aircraft's features looked straight from the Great War. External control runs, exposed engine and open cockpits give it a rather curious quality. Add to that its interesting history with the infamous 'Nacht Hexen' (Night Witches) and the Polikarpov Po-2 was an ideal aircraft to model.

The Po-2 seems designed to be modelled having flat bottomed, parallel-chord wings, a moderate amount of dihedral, big tail surfaces and a square-box style fuselage with simple half-round formers on top. Straight-forward wing strutting and undercarriage simplified matters also. About the only tricky part was up front. A big exposed, easily damaged radial engine mounted on a rather curvaceous fuselage front end conspired to give the most challenge. But more of that later.

Peter designed the model as an entry for he and I, in an on-line 'build-off' competition where a model was to be designed, built and successfully flown in six months. The little Polikarpov was finished and flown in less than three! At 1/10 scale, the model is around 45" span and 30 oz in weight.

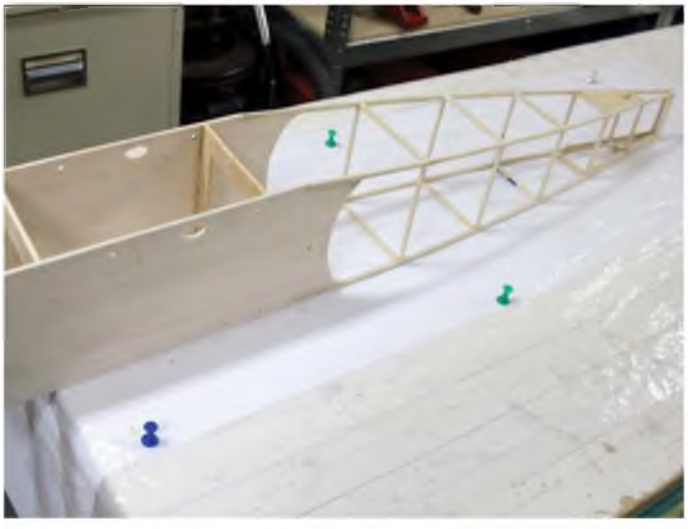
An *E-flite Park 450* motor turning a 10X6 slow-fly prop gives adequate power using a 1500 3S LIPO battery. Construction is quite straightforward and should present few problems for modellers with experience in balsa/ply building. Even the radial engine can be built from a modified vac-form kit. Although designed to be laser-cut, Peter also wanted a back-to-basics design that would also be attractive to those who like wielding a #11 scalpel. That is what I did with this prototype. Now, on with the building.

CONSTRUCTION

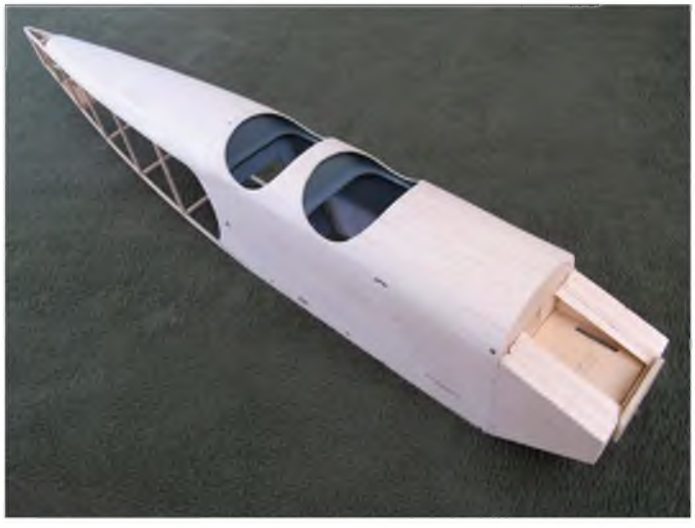
After deciding to cut my own kit, I printed out all the parts from the plan and stuck them on to the appropriate sheet wood using a water-soluble glue stick. The parts were cut using a new scalpel blade and if cut accurately, should go together like a laser-cut kit! An advantage of doing it yourself is the ability to compensate for the slightly different wood thicknesses available - 3mm for 1/8" etc.

Some holes in the parts are critical - the lower wing is mounted with brass tubes and carbon fibre rod and these must be accurate to establish incidence and dihedral. Wing ribs are all much the same and were cut as a stack using the ply ribs as guides while sanding and with the ribs slotted over some lengths of spar wood then the variations such as root rib widths, servo holes etc can be made as required.

The choice of wood was determined by its function - longerons, tail spars etc are from heavier grade material while fuselage cross pieces, leading and trailing

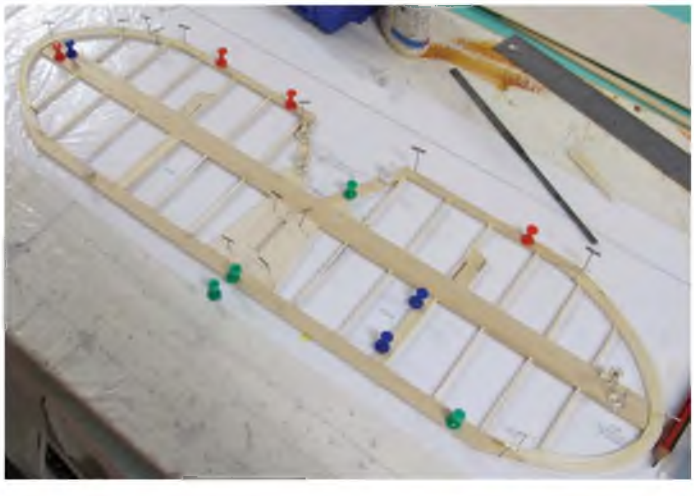


Since the top longeron line is completely straight aligning the fuselage over the plan is a relatively simple task.

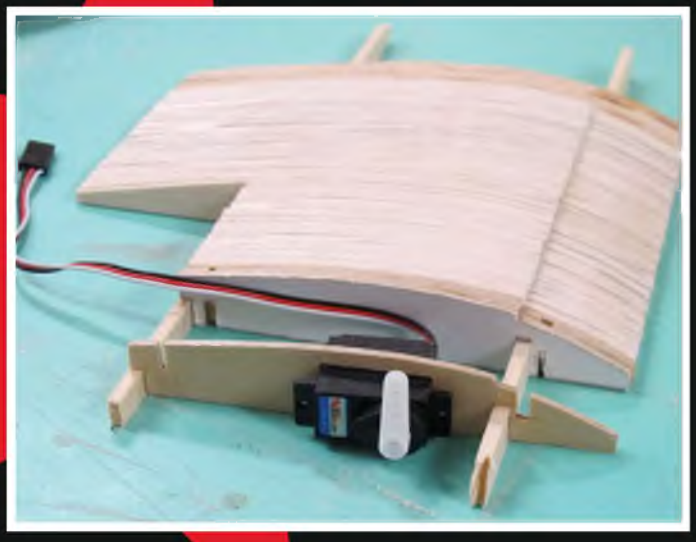


Pat fitted cockpit surrounds and painted the interior before the top decking was installed.

Here you see the shaped nose blocks and the ply motor mount fitted. The dummy engine will hide the motor nicely.



Apart from the laminated outlines there's really nothing very complicated about building the tail surfaces.



Pat cut his own kit so used the ply ribs as templates for shaping the others. Note how the aileron servo fits.

A lower wing panel under construction. The aileron servo lead needs to be extended but do fit the servos before the ribs are all glued in place.

edge stock were from a lighter grade. Ribs, I cut from quarter-sawn material when I could find it.

Since the actual construction is quite straightforward and assuming some previous experience, these notes will be fairly generalised - the plans show what goes where and few difficulties were encountered even building from the draft plans with no annotations at all!

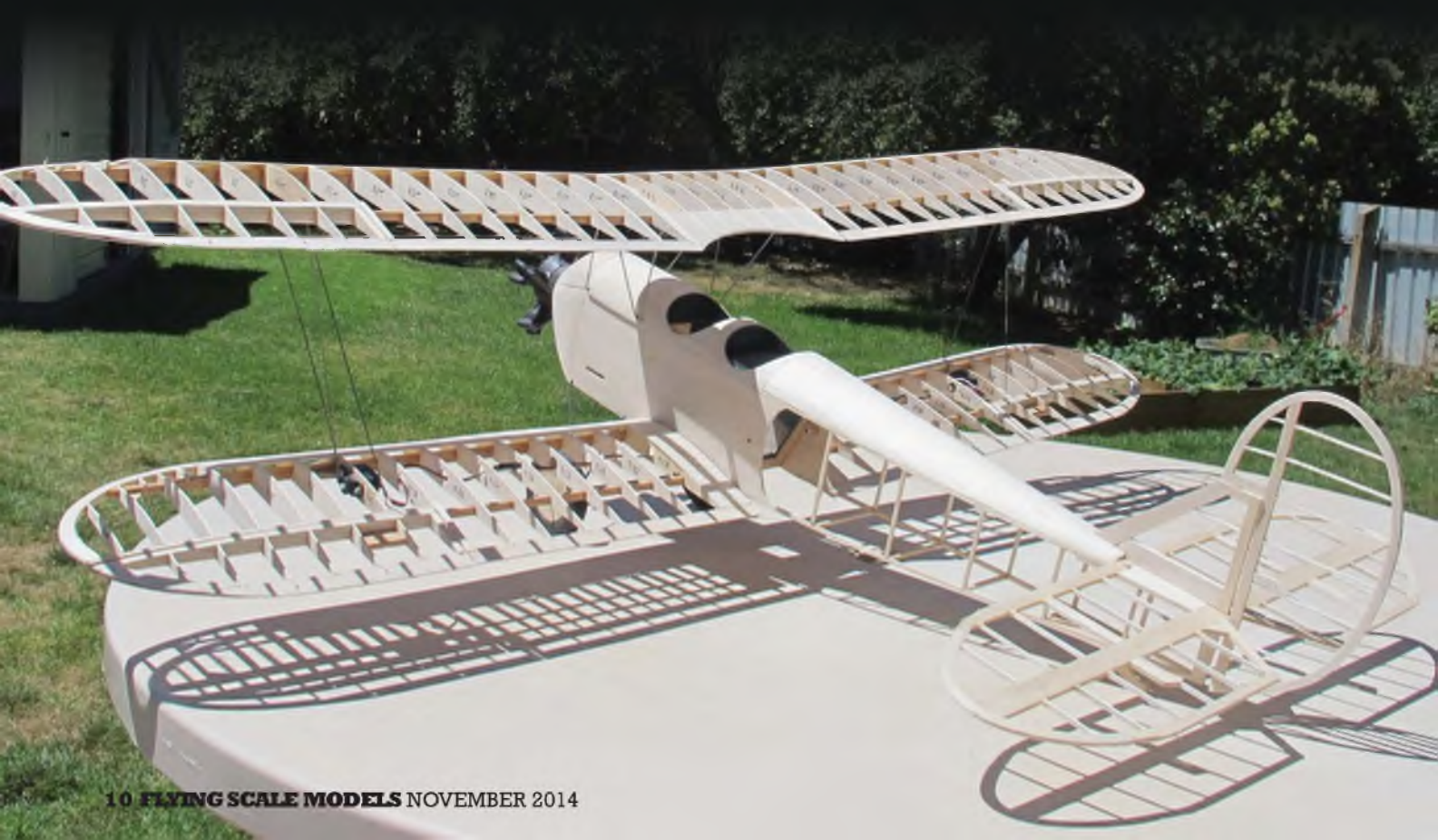
FUSELAGE

The sides are from sheet parts up front and 1/8" square strip material at the rear. Both frames were constructed over the plan with the second being constructed over the first to ensure some similarity! They were sanded together as a pair and the various former positions marked on the insides to aid assembly. The formers up front were added with everything being kept in alignment with engineer's squares.

The inverted fuselage was then pinned over the plan with the ends of the frames clamped together until all balsa cross-pieces had been added The rudder post ends were then chamfered and glued while held square and central over the plan. Finally, the remaining formers were added along with the many lengths of brass tube into which the wing dowels, centre section struts and undercarriage would be fitted later. After making some simple supports for the three internal servos and trial-fitting the elevator horn shaft, the fuselage top was sheeted with soft 1.5mm balsa and sanded smooth.

The front 'cowl' and engine mount is an assembly of ply parts, balsa sheet and block glued together with Titebond to allow easy shaping and sanding later. Card templates copied from the plan views aided in getting the shapes right when shaping the wood. A ply disc at the front locates the Park 450 motor mount and is also the base for attaching a dummy Shvetsov M11 radial engine later. With all the woodwork sanded, I used the finished assembly as a 'plug' to form some thin plastic panels. To make these panels, some .5mm styrene sheet was fixed to a pair of wooden handles (2 X 1 pine) and the plastic heated over a stove top until quite soft. The sheet was pulled down

THE OBLIGATORY NAKED MODEL SHOT. BASKING IN THE SUN POLLY SHOWS OF THE UNCOMPLICATED CONSTRUCTION.



over the fuselage to get a piece of shaped plastic big enough to make a panel later. The top, bottom, two sides and fuel tank area were made in this way. Cutting out the cockpit openings and fitting some rudimentary internal coaming completed the basic fuselage.

TAIL SURFACES

These are simple 1/8" balsa structures with laminated, curved tips, hard balsa spars and elevators coupled by a 1/16" wire joiner. The fin and rudder are built the same way. The laminated parts (including the wing tips) are formed from strip balsa, soaked in water until pliable, and gently coaxed around a packing-box cardboard template - held in place with pins until dry. I made all these parts at the same time and when dry, the laminations were glued with Titebond and ready for use. To avoid damage to the structure sitting on my usually untidy bench, the undercarriage wire was bent up and temporarily fitted to the model as was the tail-skid lifting it all above the busy bench!

WINGS

These were very simple to build. Armed with a bunch of ribs with all holes and slots where needed, the spruce spars were pinned in position over the plan and the ribs glued in place. The spars must be tapered from the last full rib to the tip and a few extra ribs were cut to fit in that area. The laminated tips were cut to fit and all ailerons parts assembled with the wing. After shaping and sanding, the ailerons were cut away and finally, all the miscellaneous parts added. The wings have balsa-sheeted leading edges on the upper surface only. Both wings have slotted ply ribs where the inter-plane struts will be glued and these have hard balsa cheeks each side to form sockets. Servo hatch parts, tip skid blocks, horn supports, lower

The top wing centre sction, showing how Pat added false ribs at the trailing edge area.

The simple jig used to assist with setting up the centre section struts while soldering. (see text)

wing root mounting tubes and sheeting can all be added before removing from the building board. The top wing centre-section is built the same way but has some ply dihedral braces and a solid balsa trailing edge at the cut-away area. I added some strip on the centre trailing edge to simulate ribs after covering. The top wing sections were assembled on the board with .6" spacers under the outer full ribs and a straight piece of timber to align the LE. The dihedral braces and root ribs were glued with the CS pinned to the board. After some careful sanding, (it is easy to break ribs at this stage) the aileron servo hatches were screwed into place and the extension leads threaded through the wing.

I chose to add the right hand side bomb-viewing window in the lower wing - a couple of extra ribs were added before the root sheeting was fitted and the servo cable was routed around the hole - a little detail to add to the realism.

STRUTS

The struts, both outer wing and centre section, were shaped from piano wire as shown on the plans. A simple jig was made to ensure the centre section (CS) struts gave the correct incidence. This was a ply plate the same size as the wing centre-section underside marked to show where the struts should be fixed. The forward struts were screwed to the jig using brass 'P' clips and the rear struts and clips adjusted to give an incidence of about +1 degree referencing the top fuselage longeron. The tailplane seat was also checked to be about the same. When all was well, the 'P' clips were soldered to the struts and the hole positions in the ply template transferred to the wing underside.

The undercarriage (UC) struts were adorned with some heat-shrink tubing to thicken up the front legs and some dummy shocks added to the rear legs. Shaped balsa clad in thin styrene with added dummy hinges and rivets add realism to the shock housings.

The CS struts and the interplane struts were clad in balsa strip and spiral-wrapped with a strip of Litespan simulating the struts of early Po-2s. Later versions had all-metal struts - the builder's choice! Where possible, I like to have the wire part of the strut as the leading edge. A small groove is cut into the balsa fairing, the wire cleaned and roughened with a file and the two parts glued using medium cyanoacrolate (CA).

With all the major parts built, everything was carefully sanded and prepared for covering. All parts, including the tail surfaces were covered and painted separately as my chosen scheme would have been almost impossible to complete otherwise!'

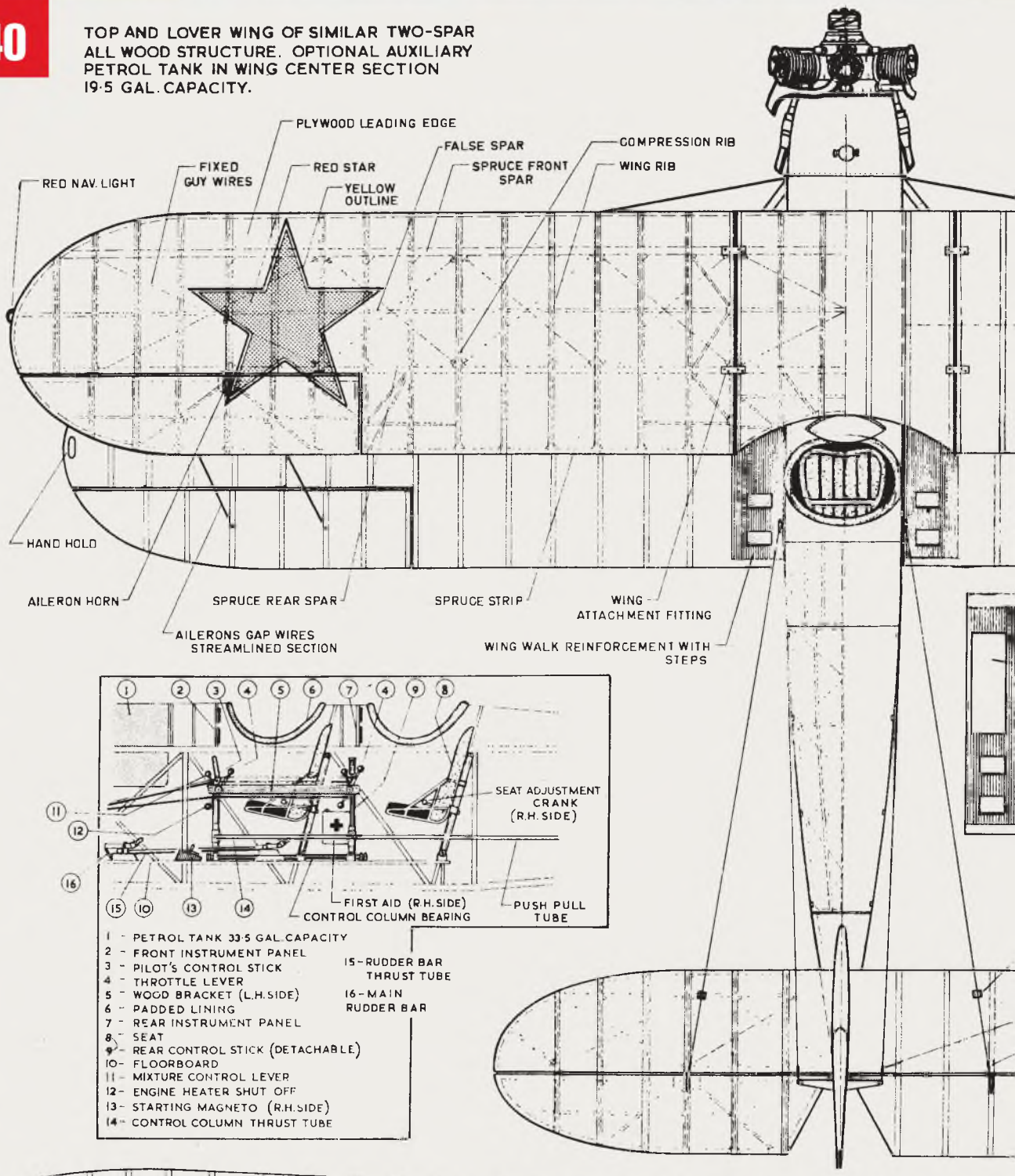
With the basic construction completed that seems like a logical point to leave things for this month. Next time we'll be looking at covering, finishing and the all important flying of the model.

ALL SET FOR ANOTHER SORTIE THE POLIKARPOV SHOWS OFF HOW OUTDATED IT WAS FOR USE IN WW2. AT LEAST ONE WAS STILL IN SERVICE DURING THE KOREAN WAR.

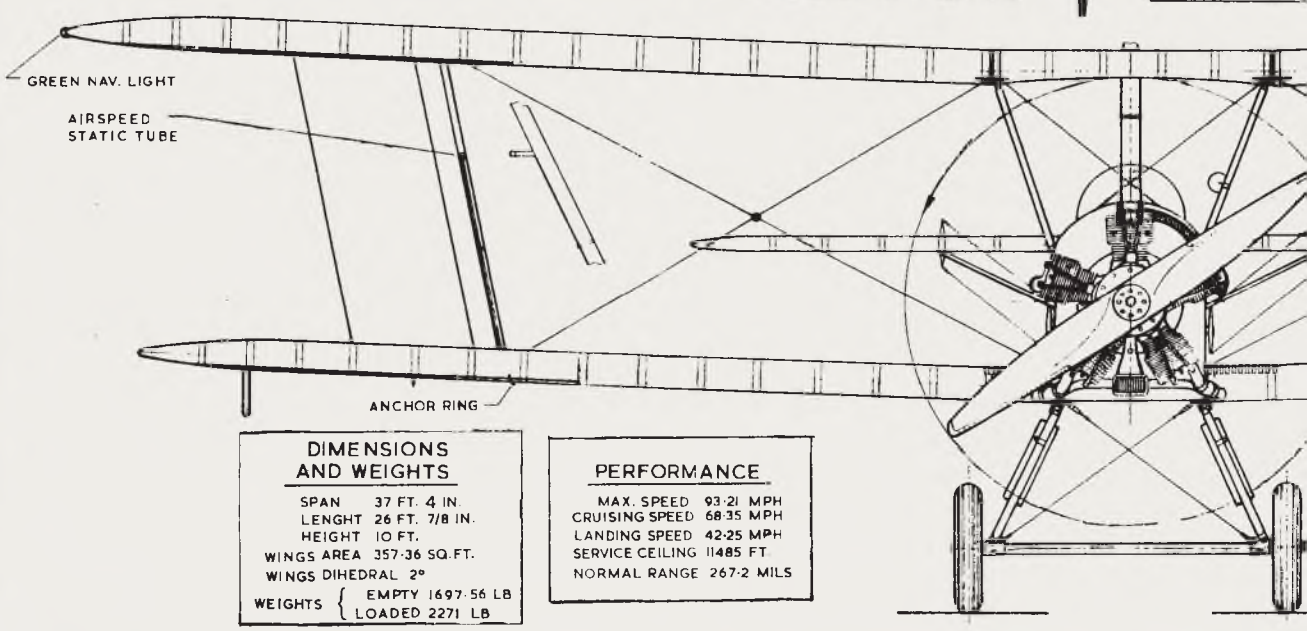
POLIKARPOV PO-2 STANDARD VERSION

SCALE 1:40

TOP AND LOVER WING OF SIMILAR TWO-SPAR ALL WOOD STRUCTURE. OPTIONAL AUXILIARY PETROL TANK IN WING CENTER SECTION 19·5 GAL. CAPACITY.



1 - PETROL TANK 33·5 GAL. CAPACITY
2 - FRONT INSTRUMENT PANEL
3 - PILOT'S CONTROL STICK
4 - THROTTLE LEVER
5 - WOOD BRACKET (L.H.SIDE)
6 - PADDED LINING
7 - REAR INSTRUMENT PANEL
8 - SEAT
9 - REAR CONTROL STICK (DETACHABLE)
10 - FLOORBOARD
11 - MIXTURE CONTROL LEVER
12 - ENGINE HEATER SHUT OFF
13 - STARTING MAGNETO (R.H.SIDE)
14 - CONTROL COLUMN THRUST TUBE
15 - RUDDER BAR THRUST TUBE
16 - MAIN RUDDER BAR

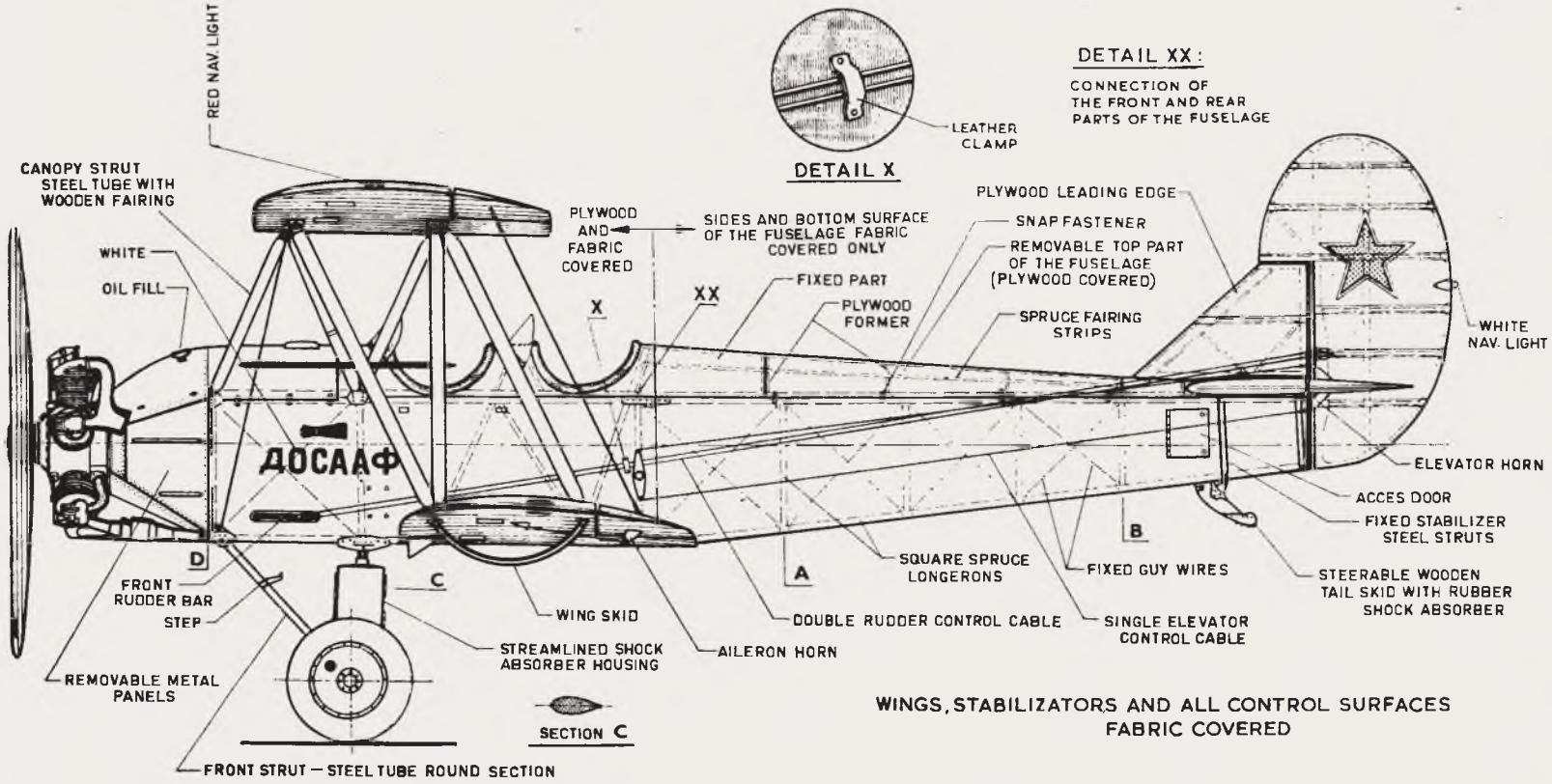


DIMENSIONS AND WEIGHTS

SPAN	37 FT. 4 IN.
LENGHT	26 FT. 7/8 IN.
HEIGHT	10 FT.
WINGS AREA	357·36 SQ.FT.
WINGS DIHEDRAL	2°
WEIGHTS EMPTY	1697·56 LB
WEIGHTS LOADED	2271 LB

PERFORMANCE

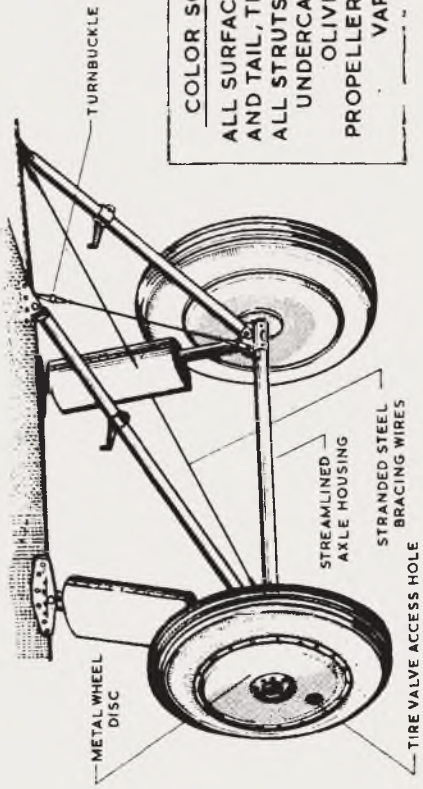
MAX. SPEED	93·21 MPH
CRUISING SPEED	68·35 MPH
LANDING SPEED	42·25 MPH
SERVICE CEILING	11485 FT
NORMAL RANGE	267·2 MILS

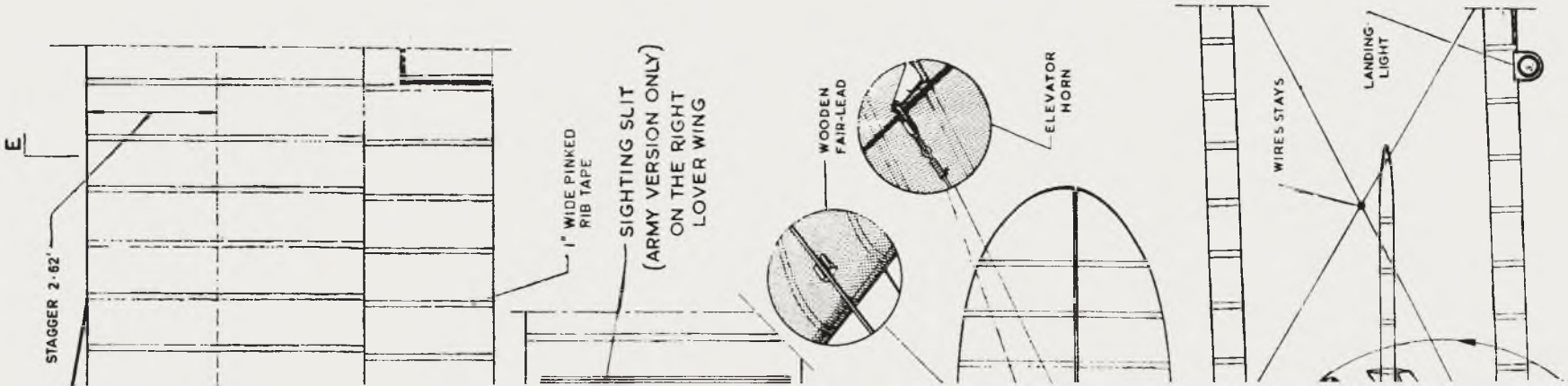


WINGS, STABILIZATORS AND ALL CONTROL SURFACES FABRIC COVERED

COLOR SCHEME

ALL SURFACES OF WINGS, AND TAIL, THE FUSELAGE, ALL STRUTS AND UNDERCARRIAGE, — OLIVE-GREEN, PROPELLER, — BLACK OR VARNISH.





POLIKARPOV PO-2

WITH AS MANY AS 40,000 MADE FROM 1928 to 1955, THIS SEEMINLY INOCUOUS LITTLE BIPLANE DESERVES ITS OWN SPECIAL NICHE IN AVIATION HISTORY

This diminutive biplane was known for 16 years as the U-2 ('U' - 'Utchebnii' - trainer) and only in July 1944, as a tribute on the death of its designer, was it re-designated Po-2 after Nikolai N. Polikarpov. Rather late in the day, it received the N.A.T.O. Code Name 'Mule', but from quite early on, the U-2 had been known affectionately in the Soviet Union as the 'Kukuruznik'.

The strictly literal translation of this word - a grower of sweet corn - fails to reveal the humour of the appellation. Perhaps the nearest parallel is the American 'Hillbilly' farmer, a bit of a clodhopper, but a likeable chap! This nickname arose, of course, from the U-2's association with agriculture. Towards the end of its career it was no doubt a different type of humour that inspired American troops during the war in Korean (1950-1953) to christen the Po-2s that nightly disturbed them with bullets from a sub- machine gun and occasional hand grenades as 'Bed-check Charlie'!

IN THE BEGINNING

The U-2 was designed in 1927 as part of an extensive Soviet Air Force development plan. At that time, the standard primary trainer, the U-1, a Soviet-built version of the Avro 504K suffered from the failings of its

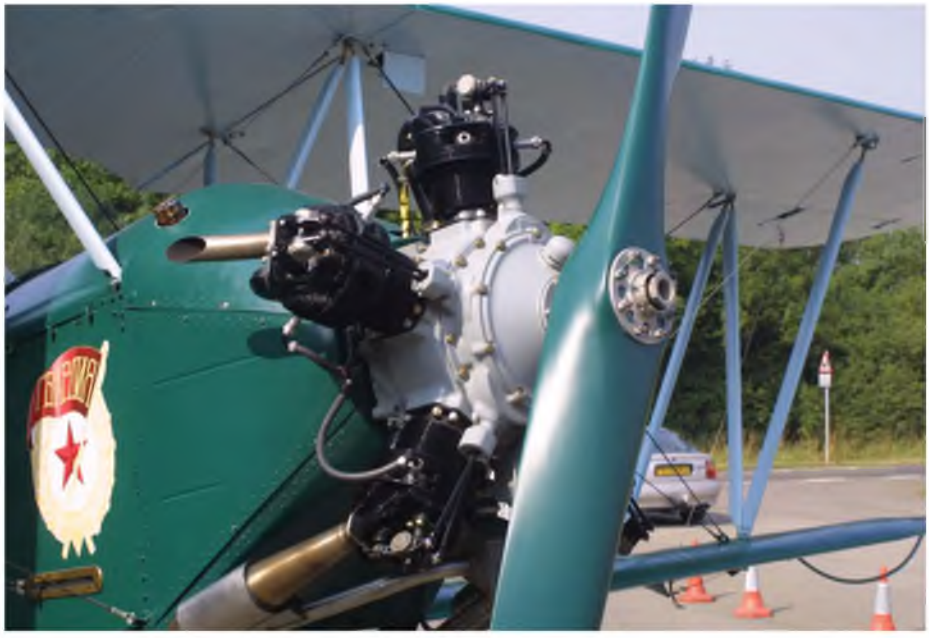
120 h.p. M-2 rotary engine and a replacement was regarded as imperative. Much care went into the original U-2 specification. Easy maintenance and the standardisation of parts had priority so as to achieve a high degree of serviceability.

The first prototype U-2 had identical rudder and elevators; four interchangeable ailerons; and interchangeable wing sections (all four of them!). It differed from its successors in being an equal-span biplane with wings of relatively thick section, square-cut tips, and square-cut tail surfaces. The first flight, on 7th January 1928, demonstrated the error of carrying even good ideas to extremes. The machine was too heavy and displayed inferior flight characteristics.

Nikolai Polikarpov was then given free reign to re-design the U-2 in accordance with his own ideas. The now familiar characteristics appeared in the second prototype - wings of unequal span with a thin airfoil section (TsAGI 541), rounded wing tips, and a curved tailplane. The previous ideas of interchangeably were largely discarded.

CONSTRUCTION

The U-2 was a single-bay, braced, staggered unequal span biplane with dihedral on both wings. There were ailerons on upper and lower wings, which were of wood and fabric covered. The fuselage was also of wood with plywood and fabric covering. The single fin had a balanced rudder, while he undercarriage was of the classic fixed close-axle type and a tailskid was fitted. It could be equipped with skis. An uncowled five-



cylinder Shvetsov engine of 100 h.p. drove a two-bladed wooden prop.

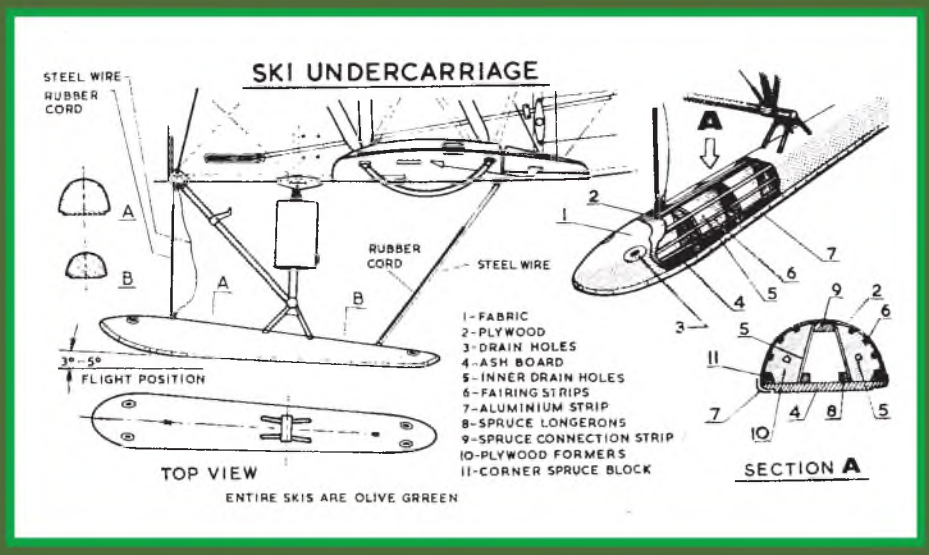
MAID OF ALL WORK

The redesigned aircraft proved a simple and safe primary trainer, easy to service and cheap to build, with a reliable engine. Production machines left the factory from 1930 and by June 1941, 13,500 U-2s of all variants had been completed. From the primary trainer, further versions for military and civil use were developed, including transport, liaison, forestry patrol, agricultural, sporting, glider towing and ambulance machines. Wartime variants were used on a vast scale.

Final production is understood to have been approximately 33,000, although one Soviet source mentions 40,000. In any event the Po-2 can claim to be the most produced biplane design in aviation history. Soviet production terminated in 1952, but output of the Polish CSS-13 licence-built version lasted into 1955 and further examples were assembled from parts in Aeroflot's workshops as late as 1959.

PRIMARY TRAINING

Primary training procedures were revised



Winter weather duty. A Polikarpov Po-2 in Polish military markings wears the ski undercarriage depicted at left.

to coincide with the introduction of the U-2 in the Soviet Air Force. This revision of methods eliminated an initial 'earthbound' stage utilising non-flyable versions of the U-1 with wing fabric removed, ceased. U-1s had been employed in the fashion of the French wartime 'rouleurs' (literally racing cyclist) to provide familiarisation training.

With the new primary trainer arriving in quantity at Soviet military training centres during the early 1930s, morale among pupils and instructors alike greatly improved. Better standards of training soon followed. Thousands, first of military pilots, but later of civil pilots and sport club members, learnt their basic flying skills on the ubiquitous U-2.

The original U-2 trainer was produced with only minor detailed constructional changes right up to 1941. Later came the improved U-2CT version with the more efficient M-11D engine of 115 h.p. but after several years service in the training role, the U-2 encountered a certain amount of criticism. Not all its characteristics were regarded as valuable for training. It had only limited aerobatic ability and was too stable and somewhat insensitive to the controls.

A DECADE OF COMBAT DUTY

First trials to arm the Po-2 - with bombs - took place in 1941.

During the defence of Odessa, in September 1941, the U-2 was used as a reconnaissance aircraft and as a light, short-range, bomber. The type was also adapted as a light night ground attack aircraft, thus launching the U-2VS (voyskovaya seriya - Military series). This was a light night bomber, fitted with bomb carriers beneath the lower wing, to carry 50 or 100 kg (110 or 220 lbs) bombs up to a total weight of 350 kg (771 lb) and armed with ShKAS or DA machine guns in the observer's cockpit.

German troops serving on the Eastern Front nicknamed it Nähmaschine (sewing machine) for its rattling sound and Finnish troops, engaged in their separate war against the Russians, called it Hermosaha (Nerve saw) as the Soviets flew nocturnal missions at low altitudes: the engine had a very peculiar sound, which was described as nerve-wracking, therefore the name.

The Germans soon became aware of the threat posed by the U-2, and Luftwaffe pilots were given special instructions for engaging these aircraft.

be regarded as insignificant, but the psychological effect on German troops was much more noticeable. They typically attacked by complete surprise in the dead of night, denying German troops sleep and keeping them constantly on their guard, contributing yet further to the already exceptionally high stress of combat on the Eastern front. Their usual tactics involved flying low over the ground, rising for the final approach, cutting off the engine and making a gliding bombing run, leaving the targeted troops with only the eerie whistling of the wind in the wing bracing-wires as an indication of the impending attack.

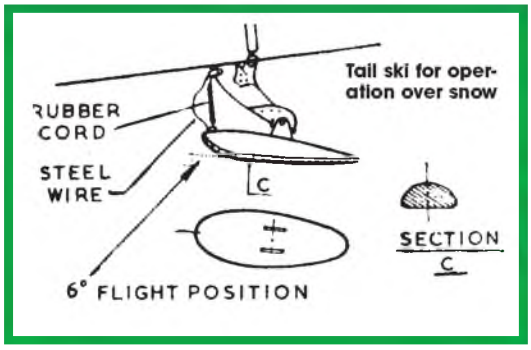
Luftwaffe fighter aircraft found it extremely hard to shoot down the Kukuruznik because of three main factors: the rudimentary aircraft could take an enormous amount of damage and stay in the air, the pilots used the defensive tactic of flying at treetop level, and the stall speed of both the Messerschmitt Bf 109 and the Focke-Wulf Fw 190 was similar to the Soviet aircraft's maximum cruise speed, making it difficult for the faster fighter aircraft to keep a Po-2 in weapons range for an adequate period of time

The success of the Soviet night harassment units using the Po-2 inspired the Luftwaffe to set up similar Störkampfstaffel 'harassment combat squadrons' on the Eastern Front using their own obsolete 1930s-era, open cockpit biplane and parasol monoplane aircraft, eventually building up to larger Nachtschlachtgruppe (night attack group) units of a few squadrons each.

The U-2 was the aircraft type used by the 588th Night Bomber Regiment, composed of an all-women pilot and ground crew complement. As such, the pilots earned the nickname 'Night Witches'.

AT WAR ALL OVER AGAIN

North Korean forces used the Po-2 in a similar role in the Korean War. A significant number of Po-2s were fielded by the Korean People's Air Force, on a few occasions inflicting some serious damage during night raids on Allied (UN) bases. On one such a lone Po-2 attacked Pyongyang airfield in north western Korea. The Po-2 dropped a string of fragmentation bombs squarely across a line-up of F-51 Mustangs. Eleven Mustangs were damaged.



Seven months later, Suwon Air Base was bombed by two Po-2s, each biplane delivering a pair of fragmentation bombs settling alight an F-86A Sabre and gutting the aircraft while a further eight Sabres were damaged in the brief attack.

UN forces named the Po-2's nighttime appearance Bedcheck Charlie and had great difficulty in shooting it down - even with dedicated night fighters, evasion being assisted by the wood-and-fabric-construction of the Po-2, which gave only a minimal radar echo, making it hard for an opposing fighter pilot to acquire his target. One Lockheed F-94 Starfire was lost while slowing to 110 mph during an intercept of a Po-2 biplane. ■

CIVIL VARIANTS

The main variants of the U-2 retained the characteristics of the original trainer. The construction and layout of the basic aircraft allowed a wide variety of developments.

U-2AP

('AP' _ 'Aviazionii Pilityel' - Cropspraying aircraft). Delivered to Aeroflot in 1931. Storage for 200 kg (441 lb) chemicals in rear cockpit. 360 delivered in 1932. Improved versions produced to 1945

Leso-Ocnrana

These were forestry work variants. Surveying and forest fire-fighting.

Po-2A

Post WW2 version for agriculture and transport with M.11K engine Production ended in 1946. Featured improved fittings and equipment.

U-2S-1

Ambulance variant. Series production from 1932. Immediately behind pilot's open cockpit was an enclosed profiled section for doctor and stretchered patient.

U-2S-2

1939 improvement with 120 h.p.M-11B.

U-2S-3

Produced from 1940. Alternatively known as SKF. Two enclosed containers on lower wings, stretchered patient in each.

U-2S-2 (revised)

1941 series. Followed by A. J. Schereakov-designed version with two sitting cases plus two stretcher cases, latter in under-wing containers. 1944 version had larger wing containers.

Po-2S

Post-1945 ambulance withmproved equipment. Externally similar to U-2S-1

U-2SP

In production from 1933. Passenger version with pilot plus two passengers in open cockpits ('SP - Svyaznoi Passazirskii' - Liason_Passenger). 861 built.

U-2ShS

('ShS' - Shtabnoi Svyazno!' - H.Q Liaison. Most radical redesign produced. Propeller of M-11F engine had a pointed spinner. Pilot plus four passengers in single cabin. Fin area increased. Tail wheel fitted.

ROLLS ROYCE SCALE MEETING 2014

Alex Whittaker attends this famous scale meeting, held at Rolls Royce, Hucknall

Rolls-Royce Model Aircraft Club not only possesses a famous name, it also occupies a prestigious flying venue. For many years, Rolls Royce Hucknall Works has produced highly skilled scale modellers as well as highly skilled aerospace engineers. Somehow the models from ex-Rolls Royce engineers always seemed to carry some of that illustrious marque's magic.

High Summer

It was a very hot morning when I drove in through the hallowed Rolls Royce portals. I followed the dusty road around to the model airstrip, with a glimpse of the factory, complete with famous name on its roof. This is a nifty strip, feeling surprisingly rural, despite the encroachments of industry and suburbia. RRRMAC are a very hospitable Club, and they made me feel very welcome.

Lanc and Wimpy

As I walked the pits, Geoff Graves imposing 'Bomber Command' immediately hit my eye. He had two heavy bombers, both of traditional balsa, ply, and glass-cloth construction. They were built to the well-known Tony Nijhuis Designs plans. The Avro Lancaster and Vickers Armstrong Wellington respectively are 17 and 11 feet in span. The Lanc' is powered by four Zenoah 38 petrol engines driving 18"x10" Biele scale props, and weighs 50 kgs. The Wellington is 11 feet in span, powered by two Zenoah Z 26 petrol engines, driving three-blader 16"x8" props. The Wimpey is seven years old.

Glens' CAP

The Glen's CAP was a cult scale aerobat just a few years ago, much in the way that Extras an Sbachs are today. Therefore it was good to see Malcolm Haddock's Glenn's CAP 232 built to 30% scale. This had that lovely Castrol scheme. The CAP is Desert Aircraft DA 100 powered, driving a Biele three-blade 22"x12" prop. Model weighs 24 lbs.

Tiny BAe Hawk

I am not a terrific fan of ARTF foam electric scale models, but I grudgingly accept that they have their place with

Rolls Royce "Hucknall" Scale Day is a traditional part of the English summer for many scale fans.

Derek Martin's Heston Phoenix with the Rolls Royce factory in the background.

The trick is in the flick: Adam Philips starts his Sbach.

Geoff Graves' Tony Nijhuis Designs Wellington. 11 feet in span, powered by two Zenoah Z 26 petrol engines.

Derek Martin's elegant Heston Phoenix in her clean configuration, with her wheels up.

Adam Philips' highly aerobatic Sbach, 76" span, powered by a DLE petrol engine driving a 23x8 prop.

Geoff Graves' Vickers Armstrong Wellington just before touch down.

many modellers. In a lull in proceedings, I watched open-mouthed, as Tony Murphy flew a truly tiny red blur. This tuned out to be an 18" span BAe Hawk! This ARTF was fitted with an electric ducted fan and was capable of ROG as well as a hand-launch. Despite a (hardly surprising) dinged nose, it flew amazingly fast, with a truly sparkling roll-rate. It was also highly aerobatic. Tony sourced it from the internet.

Heston Phoenix

Now for pukka scale model. We have seen her before many moons ago, but Derek Martin's scratch-built Heston Phoenix in blue was utterly majestic. As per the full-size, his beautifully finished model has a retracting undercarriage, a feature that was revolutionary in its day for a light aircraft. The full-size example and the model are both stunningly efficient. She is such a clean shape without the undercart, that drag is significantly reduced. Her turn of speed and general agility is astounding. The model is ten feet in span, weighs 39 lbs, and is powered by a 3W 70i petrol engine, driving a 24"x10" prop.

Mitsubishi A6M

Steve Foxon flew his recently completed Mitsubishi Zero, built from the Meister kit. It is scaled to quarter full sizwe, and is 118" in span. It is petrol powered, with a 3W 85 twin driving a 26"8" prop and the scale pilot figure looked suitably intimidating. Overall, this Zero looked very good indeed in the air, especially on low passes. I once read a pithy description of the un-armoured Mitsbishi Zero as: "...a light

An hot summer's day, but the wind was a bit boisterous around mid-day.

Fast charging the radio installation on Geoff Graves' huge Lancaster.

RRMAC Ground Support Team helping Geoff Graves as he starts his Lancaster.

Geoff Graves' Tony Nijhuis Designs Lancaster. 17 feet in span, powered by four Zenoah 38 petrol engines.

Fairey Firefly Mk.1co-built by Chris Peers and the shadowy 'Spartacus'.

Chris Peers' Firefly rumbling in.

Ivan Jordan's Tuskeegee Airmen red tail P-51D. Watch this space.

Full-size displays are becoming a regular part of many model displays, but still rare at Club level. BBMF C-47 / Dakota 'Kwicherbichen'.

aircraft with 1.000 Horse power available ...". Full photo-walkaround soon in FSM.

Sbach 342

The full size Sbach 342 is a high performance German aerobatic and touring aeroplane, designed by Philip Steinbach and Albert Mylius, and manufactured in Hecklingen, Germany, by XtremeAir Gmbh. It is powered by a 315hp Lycoming engine and has a wingspan of 24 feet 7" / 7.5 metres.

Models of the Sbach are becoming very popular, allowing a nod to both scale modelling and aerobatic flying. There was more than one Sbach flying on the day and of these, Adam Philips' example was 76" in span, powered by a DLE petrol engine, driving a 23x8 prop. This was from the Pilot kit. A very clean machine, and suitably aerobatic.

P-47

Mark 'Sparky' Roberts, well known warbirder from Bardney MFC, was flying a YT Models P-47. There are lots of factory-made P-47s out there, but this is one of the best ARTFs of this type. It was powered by a PTE 36 petrol engine driving a 19"x8" prop. The P-47 spans 76" and weighs 8.5 lbs. It flew very well, and looked particularly good when it caught glints in the summer sun.

P-51D Red Tail

Overcoming blatant racial prejudice, the Tuskeegee Airmen are rightly famous for their skill and bravery in WWII. Ivan Jordan has modelled his latest P-51D on the

Richard Scarbrough's well known gas turbine powered L-38 Albatros coming in low and slow.

Black Horse Me 109 flown by Dave Gents.

Dave Gent's Blackhorse T-39 Trojan damaged a nose leg on landing. 26cc CRRC petrol powered, driving a 17"x8 prop.

Mark Roberts' YT International P-47 powered by a PTE 36 petrol engine driving a 19"x8" prop. Spans 76" and weighs 8.5 lbs.

Ivan Jordan's brightly camo'd Yak 54 just about to touch down.

Malcolm Haddock's Glen's CAP 232 built to 30% scale. Desert Aircraft DA 100 power.

Tony Murphy's tiny Bae Hawk, electric ducted fan, 18" span, all foam construction, sourced from the internet.

Dickie Scarborough (left) awarded the Rolls Royce MAC "Best Overall Model. Geoff Graves awarded the Rolls Royce Merlin Trophy.

The Rolls Royce Merlin Memorial Trophy, won by Geoff Graves in 2014.

Tuskeegee Red Tail Mustang. This traditionally built scale model is to the famed Nick Ziroli plan, 1/5th in scale, and spans 102". She weighs 18 kgs and is 3W 60cc petrol powered. She uses a 24"x8" prop. I was able to get a full photo-walkaround of this delicious P-51D for FSM soon, so watch this space!

Full-Size Overflight

RRMAC had arranged a full-size flyover for later in the afternoon, and it was an absolute pearler! The pilot brought the Dakota straight down the field, surprising me by flying low enough for me to glimpse him staring down into my lens! This C-47 was the Battle of Britain Memorial Flight's version of 233 Squadron's 'Kwickerbichen'. I have loved Daks since my schooldays, when my mate 'Beep' (BP Jones) and I cycled to Speke Aerodrome to see them in our school lunch hour. Absolutely thrilling, then and now.

Rolls Royce MAC Awards

Ubiquitous Dickie Scarborough was awarded the Rolls Royce MAC Silver Salver for the 'Best Overall Model - Scale Event 2014'. This was for his Spitfire flight. Geoff Graves was awarded the Rolls Royce Merlin Trophy for his fabulous Lancaster. This Trophy featured a real Merlin piston. Quite fitting, when you think about it!

The Verdict

I had a wonderful day watching the flying. The atmosphere was exceedingly friendly, and the Club members were at pains to make all their visitors feel at home. It really was a buzz to be on such a famous field. However, it did feel like a cosy Club event, rather than the famed 'hard-core' scale meeting of old. Of course, this is fine. We are in the midst of cultural change in our hobby. Pressures of time, the pace of modern life, and the ineluctable rise of the ARTF, are taking their toll on our traditional scale assumptions. Many modellers of the scale persuasion seem now to be putting a greater stress on buying and flying, rather than building. I have begun to wonder if, just maybe, the high-tide of "build-it yourself" scale modelling may be passing. Undoubtedly a clash of dates with another scale meeting not too far away did not help this RR scale event. However, for my part, I intend to keep the faith. I will visit this very civilised and friendly scale meeting again next year!

Banzai! Pilot in Steve Coxon's Zero. I don't know about you but he terrifies me...

Steve Foxon's Meister Zero climbing out.

Steve Foxon gives scale to his meister Zero.

Techno Scale

Mike Evatt su

The Sukhoi Design Bureau of Moscow, Russia has developed the Su-47 (previously called the S-37 Berkut or Golden Eagle) fighter aircraft, which first flew in September 1997. Su-47 is in a forward-swept wing configuration and uses a highly unstable triplane aerodynamic configuration.

Surrey Models is the UK sole distributors for the range of super high scale radio control model aircraft from **LX Models.** They are provide some of the largest, highest detailed and innovated RC model jets and warbirds in the world, using the latest in product development and advanced technologies, including a superb 1.5 metre span Berkut. Check it out at www.surreymodels.com

Hawk Turbine is a high tech company located in Sweden with a web presence at www.hawkturbine.com They have a mission - to design and produce the state of the art model turbine engines. They strive always to be in the front, having the engines with the lowest fuel consumption and fastest spool-up times on the market. They are so confident of their technical knowledge and engineering skills that they deliver the turbine with a three-year warranty which they believe will seldom be used.

Tailormadedecals.com is a manufacturer of individual Decal sets for all kinds of models. You can see their current product range in their on-line shop at www.tailormadedecals.com The decal sheets are printed on letter sized sheets, using the 'micro dry technology'. The used colours are water and UV resistant and it is even possible to print white, silver and gold. Bright colours like yellow or red are equipped with a white undercoat to guarantee colourfastness when applied over dark surfaces. They will also create individual Decal sets based on customer requirements.

It has now been 12 years since **DPC Models** at http://dpcmodels.homestead.com opened trading to the modelling community. Looking around the site, you may think that Dave Cowell's interest in WW1 aircraft has declined. He will refute that. Right now there is a major push for kit restorations.

His original goals haven't changed over the years. He still tries to provide the best possible service and offer quality kits at the lowest price possible only now the field of production is a little bit wider.

Kingfisher Aviation have been involved in radio controlled modelling now for over 40 years and their first love was always the aero-modelling scene. Like most R/C modellers they started on full builds from a plan and a pile of balsa. With the introduction of some very good scale ARTFs onto the market it meant that you could now take a proven airframe and do what you wanted with it in half the time. To this end they offer a 'Build Service'. They offer any combination of builds; all depend on your personal preference. Their website at http://kingfisher-aviation.com also illustrates **Premier UK** retract systems, made in the UK, by modellers, for modellers.

Wren Turbines at www.wrenturbines.co.uk was formed in 1999 by Mike Murphy, John Wright, Roger Parish and Terry Lee. They had a shared interest in miniature turbines and had met through the Gas Turbine Builders Association. The name was chosen because the Wren is commonly regarded as the smallest British bird and the company intended to specialise in the

The LET Model's Su-47 Berkut is available from Surrey Models in the UK.

Hawk Turbine is a high tech company located in Sweden.

Tailormadedecals.com manufactures individual Decal sets for all kinds of models.

A delightful Sopwith Pup featured on the DPC Models website.

Premier UK retract systems, made in the UK, by modellers, for modellers.

The Wren 44i Heli - now with integrated V2 Kero Start System.

rfs hyperspace for more information sources for scale modelling

smallest engines. Wren is a company dedicated to the design and manufacture of miniature jet engines - they don't do anything else. Of note on their website is the *Wren 44i Heli* which is claimed to be the World's smallest helicopter turbine - now with integrated V2 Kero Start System.

The DFS Habicht (German: 'Hawk') was designed in 1936 by Hans Jacobs as an unlimited aerobatic sailplane, with support provided by the Deutsche-Forschungsanstalt Segelflug. Four examples were made available for the Olympic Games of 1936, where the flights of the Habicht over and literally inside the Olympic stadium enthralled spectators.

Esprit Model of Palm Bay Florida are stocking the **Let Model's** scale version of this delightful 3.89m span sailplane which comes with the fiberglass fuselage and flawless finish in white or beige gel-coat. The windshield is removable with fiberglass frame and comes complete with a scale-like latch. The cockpit is completed with instrument dashboards and fiberglass seats, just like the actual plane. Releasable launch wheels as well as tow release are also installed. Check it out at www.espritmodel.com

The **Opel RAK.1** was the world's first purpose-built rocket-powered aircraft. It was designed and built by Julius Hatry under commission from Fritz von Opel who flew it on September 30, 1929 in front of a large crowd at Rebstock airport near Frankfurt-am-Main. During the late 1920s, von Opel had undertaken a variety of publicity stunts involving rocket-powered vehicles, Opel-RAKs, for the Opel company. He was assisted in these endeavours by pyrotechnics manufacturer Friedrich Sander and rocketry advocate Max Valier. **Island Models** at www.islandmodels.ie have on sale a 1/4 Scale Opel Rak Short Kit. This has been improved for 2014 with the ribs now showing scale structure and the model is lighter and more accurate for better flying performance.

If you want to add a bit of spice to your scale flying try ESA - Electric Simple AirCombat. Log-on to the **Flying Dog** website at www.flying-dog.co.uk for full details, including provisional rules and a range of EPP models just made for the job such as the EPP Combat ME109 shown in the screen-shot. Simple EPP models for air combat. Simple to build, easy to repair even at the airfield.

BrainCube at www.braincube-aero.com produce sets of professional 1W+ LED modules and intelligent 20W controllers specifically engineered for flying models, drones and UAVs. Their FlightLights v5.0 Warbird Set includes their most advanced controller yet! This incorporates a high performance switching power regulator, the controller can drive up to 20W of LEDs from any kind of battery in the voltage range of 6 - 42V (e.g. 2S - 10S LiPo). Also in the set are 5 power LED modules, visible in flight from hundreds of feet away, in full daylight. There are enough LEDs for navigation and landing lights (the majority of warbirds were not fitted with strobe lights).

And finally! We all know the problem of not having the right fastener at the right time or having to buy 100 when you only need one! Log on to www.emkaysupplies.co.uk and avoid the hassle.

Emkay Screw Supplies of 74 Pepys Way Rochester UK offer a better way. They are a small retail company, established in 1989 offering a range of over 1,500 fasteners, by post, to model makers and engineers. All fasteners are sold singly or in quantities needed for the job. Therefore, you will not have surplus screws that may never be needed, but have had to pay for. ■

The DFS Habicht (German: "Hawk") was designed in 1936 by Hans Jacobs.

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Simple EPP models for air combat. Simple to build, easy to repair even at the airfield.

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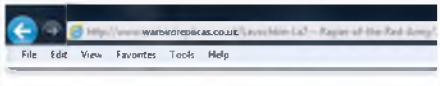


That's all there is time for from me this month light up that screen and if you find something out there of interest that might be good to share, email me at:

mikeevatt@hotmail.com

Nigel I' Anson is a well-known and well-respected UK scale modeler and also for his 'day job' as operator of *TDJ Models*. The notable 'public face' of TJD is their Display Team which covers all the big shows each summer, with a strong emphasis on Scale in general and Warbirds in particular. Significantly, the bulk of the TJD Team pilots are keen supporters of the model shop, not sponsored hacks!

Nigel built this Grumman Avenger seven years ago as a key performer in the TJD Models WWII Display Team. It is based on a Canadian plan pack using a commercial canopy and cowl. (We pressed him of the source but he could not remember - the model was built some seven years ago. Unfortunately a web-surf failed to reveal more).

His Avenger is built to 1/6th scale, has a wingspan of 110". It weighs 37 lbs, and is powered by a 3W 75cc petrol engine, fitted with the standard 6volt ignition system, driving a 24"x10" prop.

The basic airframe uses traditional construction throughout, using mostly balsa and plywood and Nigel cut all the shaped parts the hard way - no shortcut to a quick start by using a cut parts set here! The finished bare airframe was then prepared for finishing with glass cloth and resin. The final surface finish then used *Base Coat* automotive paints at all stages from primer to topcoat.

Panel line demarcations were done using panel line tape, while all those rivet heads (such a hallmark of all Grumman's WW2 warbirds) were applied with a

AWESOME AVENGER

The Grumman TBF Avenger is a subject that has rarely fired the imagination of scale modelers, but Nigel l'Anson saw the possibilities. Alex Whittaker reviews this superb example a 'regular' around the summer show circuit - no hangar queen here.

Nigel l'Anson's Avenger is built to 1/6th scale, spans 110", and is powered by a 3W 75cc petrol engine.

The full size Grumman Avenger was capable of both carrier-borne and terrestrial operations.

1: Pilot present and correct in the office. The bulkhead between pilot and crew is also visible in this shot. **2 & 3:** The upper turret is faithfully modelled. The crisply demarcated paint around the glazing is superbly done. **4:** The cowl was sourced with the plan. **5:** Effective weathering. Also note the judiciously restained exhaust and heat stains. **6 & 7:** These shots shows the convincing patina that Nigel has achieved on the panels and rivet lines. Note the handle detail. **8:** Note the accurately modelled tailwheel assembly. This unit also retracts. **9:** Very neat stencilling and an appropriate 'in-service' appearance of the paint finish. **10:** Trademark Avenger leading-edge slots. **11:** Finely modelled ailerons and trim tabs.

On the full-size Avenger the pilot and crew were separated by a solid bulkhead, denying any access fore and aft.

12: Crisp landing gear detailing. Model weighs 37 lbs. 13: Nicely weathered elevators and trim tabs. 14: Distinctive Avenger fin and tail assembly.

hypodermic syringe.

Nigel used *Flightline Graphics* paint masks for all the legending and graphics and constructed his own in-cowl exhaust for the petrol engine.

The main undercarriage retracts units are from *Sierra Precision*, and it's nice to see a retracting tailwheel applied to this model as on the full size, the mechanism in this case being based on a *Robart* type.

In the air

The Avenger is a regular performer on the UK scale circuit and has so far amassed over fifty flights. Nigel says the model handles very well indeed, very steady and a delight to fly. The four-panel flaps are very effective, allowing measured and slow approaches, and she has good ground handling under normal conditions. However, she does not like crosswinds, but otherwise is very satisfying to fly. ■

MODEL SPECIFICATION

Grumman Avenger built from a Canadian plan:

Scale:	1/6th
Wingspan:	110"
Weight:	37lbs
Engine:	3W75cc Petrol
Prop:	24"x10"

The archetypal WWI US Navy Pacific Theatre torpedo Bomber!

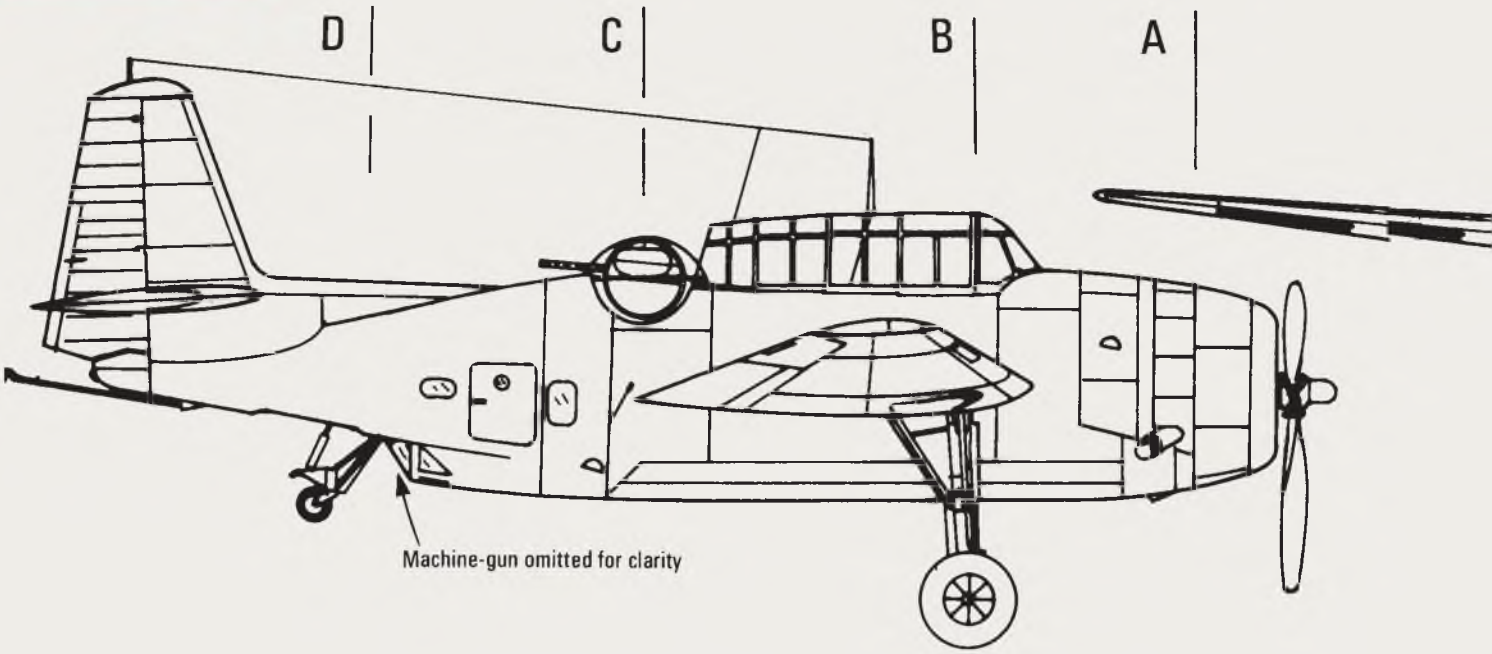
Note the surprisingly narrow track of the undercarriage. Model uses Sierra Retracts for the mains.

FLYING SEQUENCE

LEFT TO RIGHT: Nigel reports that she likes anything but a cross-wind! - Ready to settle in after a successful sortie. - Looking very attractive indeed as Nigel finesses her in on "ground effect". Note flaps down. - Glass fibre substrate is the basis for that superb finish on this traditionally built model. - The long glass-house, the upper turret, and the two-tone scheme have made the Avenger a modeller's favourite for seventy years.




SCALE 1:70


D
C
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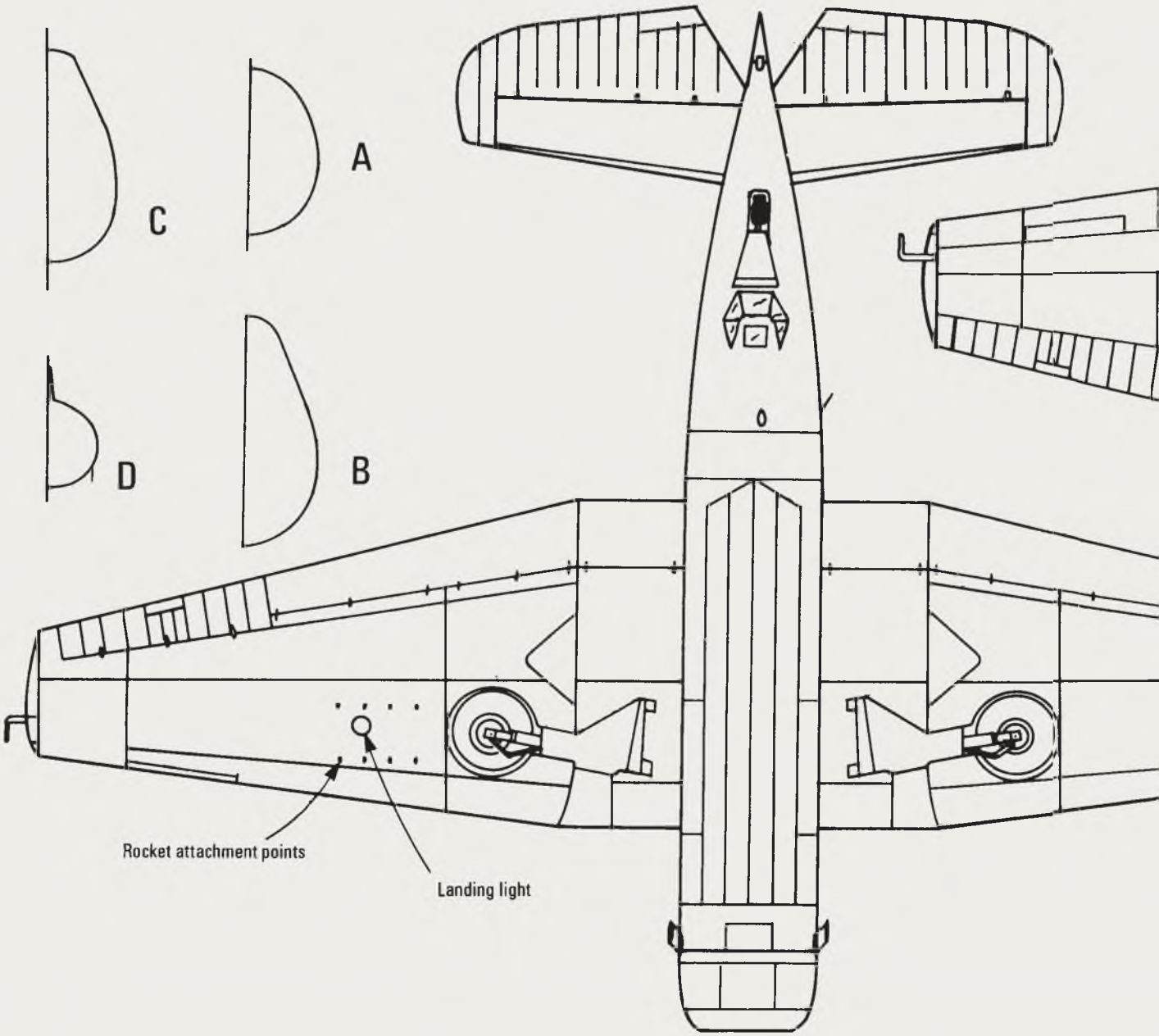
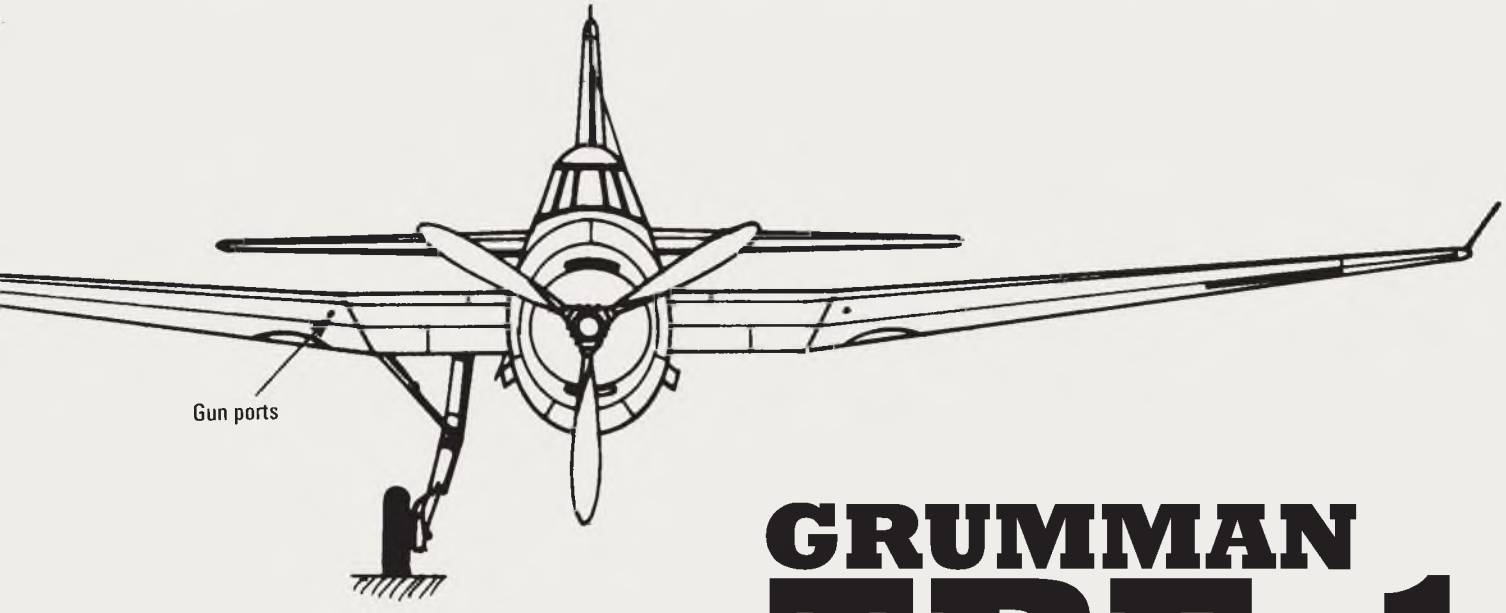
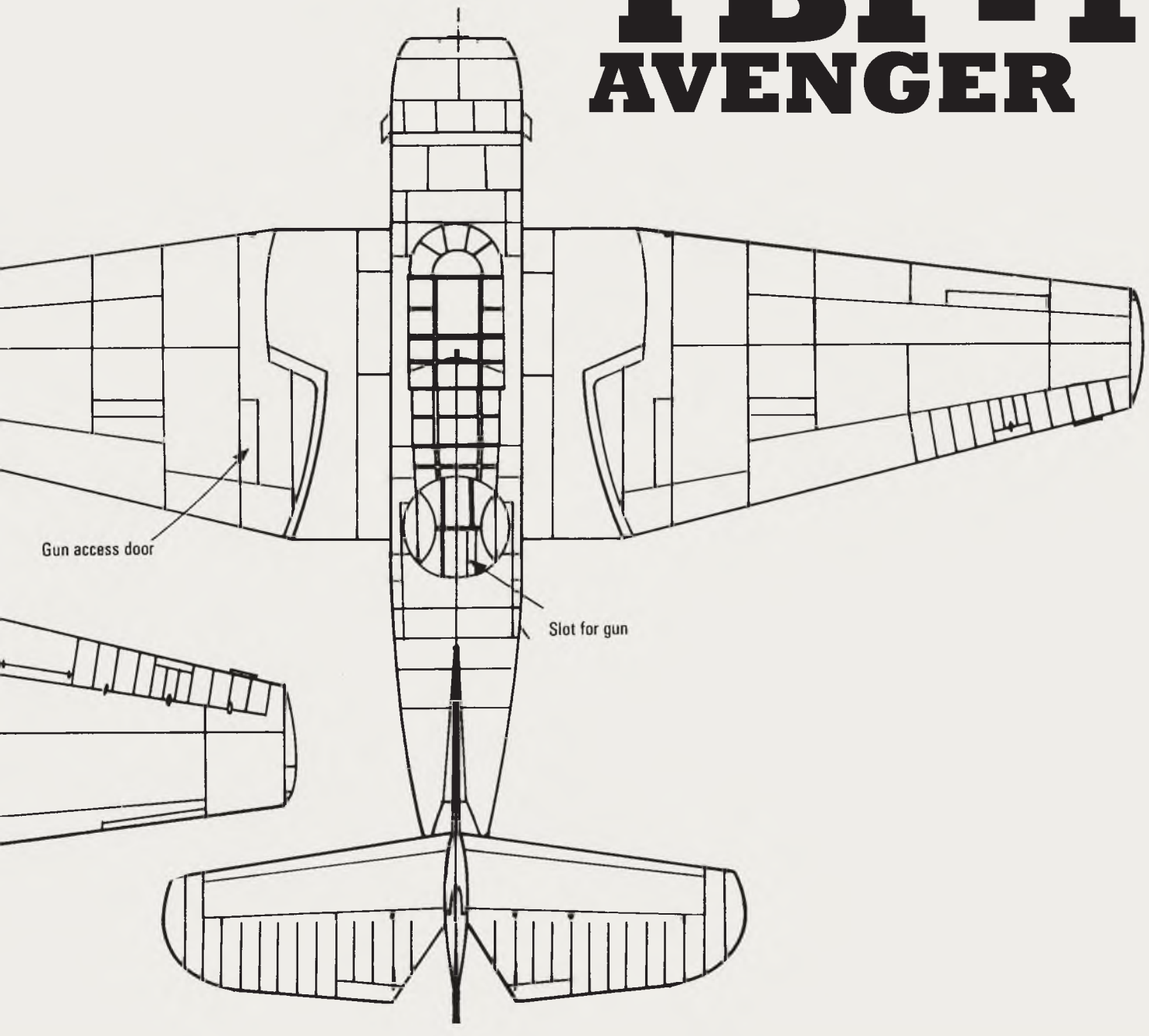
Machine-gun omitted for clarity


C
A
D
B
Rocket attachment points
Landing light



GRUMMAN TBF-1 AVENGER



The Royal New Zealand Air Force operated the Grumman Avenger in the Pacific theatre of operations during WW2. This one has the graduated three-tone blue colour scheme

GRUMMAN TBF AVENGER

By 1939, the U.S. Navy's main torpedo bomber the Douglas TBD Devastator, introduced in 1935, was obsolete and several US aircraft manufacturers had responded to requests for a replacement. Of these, Grumman's TBF design was selected and two prototypes were ordered by the US Navy in April 1940. The first of these, the XTBF-1, first flew on 7 August 1941 and Grumman geared up for rapid production.

Grumman's previous experience in naval combat aircraft had been in the field of fighters and this new type, their first torpedo bomber had the distinction of being the heaviest single-engined combat aircraft of World War II. Only the USAAF's P-47 Thunderbolt came close to equalling it in maximum loaded weight among all single-engined front-line combat types, being, in its late WW2 variants, only some 400 lb (181 kg) lighter than the TBF.

Despite its size, with a fully extended wingspan of some 54 ft (16.5m) the Avenger was a manageable aircraft for carrier-based operations thanks to the 'compound angle' wing-fold mechanism created by Grumman that folded the wings to sit fore/aft alongside the fuselage, thus minimising the required storage space on an aircraft carrier, a wing-fold arrangement that was also applied to Grumman's two other major WW2 designs, the F4F Wildcat (in its later F4F-4, FM-1 and FM-2 variants) and the F6F Hellcat.

The engine initially selected for the new torpedo bomber was the Wright R-2600-20 Cyclone 14 twin-row radial engine delivering 1,900 hp. The crew of three comprised pilot, turret gunner and radioman/bombardier/ventral gunner. One 0.30 calibre machine gun was mounted in the nose, a 0.50 calibre (12.7 mm) gun was positioned right next to the turret gunner's head in a rear-facing

Ranged on the flight deck, with catapult stop attached, for launch, this Grumman Avenger is fitted with with rocket-tube attachments (four under each wing) for anti-shipping/submarine action. Note also the large split-type wing flap.

electrically powered turret, and a single 0.30 calibre hand-fired machine gun mounted ventrally (under the tail), which was used to defend against enemy fighters attacking from below and from the rear. This gun was fired by the radioman/bombardier while standing up and bending over in the belly of the tail section, though he usually sat on a folding bench facing forward to operate the radio and to sight in bombing runs. In response to pilot's demands, later models of the TBF/TBM dispensed with the nose-mounted gun in favour of a 0.50 calibre gun in each wing for better forward firepower and increased strafing ability.

The Avenger had a large bomb bay, in which to enclose either one Bliss-Leavitt Mark 13 torpedo, a single 2,000 lb. (907 kg) bomb, or up to four 500 lb. (227 kg) bombs.

The Avenger provided overall ruggedness and stability. Pilots said it flew like a truck, for better or worse and with docile handling it was just what was needed in a naval combat aircraft for operations from the tight confines of a Carrier deck. Long range also made the Grumman Avenger an ideal command aircraft for Air Group Commanders, Air (CAGs).

Later Avenger models carried radar equipment for the ASW (anti submarine warfare) and AEW (airborne early warning) roles. The available radars in 1943 were very bulky, but only on the roomy TBF Avengers had the internal space for the installation.

Operational history

Grumman Avengers first became available for combat operations just prior to the pivotal Battle of Midway in June 1942, when the major part of the Japanese Combined Fleet spearheaded an operation to take the strategically positioned Midway island, situated less than a thousand miles from the Hawaiian Islands chain in the mid-Pacific.

The Midway action was largely a Carrier-to-Carrier engagement (the first of its kind in Naval history), but six Avenger TBF-1s were present on Midway Island as part of VT-8 (Torpedo Squadron 8), while the rest of the squadron flew Douglas

Despite the Avenger's size, the reaward wing-fold allowed aircraft to be tightly parked on an aircraft carrier's flight deck. Here Avengers are ranged on the extreme forward flight deck of a newly commisioned US Navy Carrier. Note the four-masted sailing ship in the background.

TBF-1 Avenger in fairly US Navy markings with two-tone grey overal colour scheme. The red centres to the national insignia date this to probably about mid-1942.

Devastators from the carrier USS Hornet. Unfortunately, both types of torpedo bombers suffered heavy casualties and out of the six Avengers, five were shot down, but Douglas SBD Dauntless did the damage that destroyed four Japanese carriers.

Despite this initial setback, Avenger crews quickly leaned the correct use of their new aircraft and a string of successful actions followed.

The initial version of the Avenger gave way to the TBF-1C, which provided the space for internal and wing-mounted fuel tanks that doubled the Avenger's range. Starting in mid-1944, the TBM-3 began production with a more powerful engine and wing hard points for drop tanks and rockets). The dash-3 was the most numerous of the Avengers (with about 4,600 produced). However, most of the Avengers in service were dash-1s until near the end of WW2 in 1945, and participated in all the island hopping naval actions of the Pacific theatre operations from mid-1942 onwards.

Combat in other colours

The Royal Navy's Fleet Air Arm operated the Avenger during WW2, initially taking 402 examples of the TBF-1 where it was first

Post WW2, the Royal Australian Navy became an aircraft carraier operator when, in 1949 the Service took charge of the newly completed HMS Terrible, re-naming it HMAS Sydney. Here, a Grumman Avenger in Dark Sea Blue colour scheme is raised to the flight deck on the hangar lift during carrier acceptnce trials.

known as the *Tarpon Mk.1*, a name which was later discontinued, as part of the process of the Fleet Air Arm universally adopting the U.S. Navy's names for American naval aircraft. A further 334 TBM-1s from Grumman were designated Avenger Mk II and 334 TBM-3 the Mark III.

An interesting kill by a Royal Navy Avenger was the destruction of a V-1 flying bomb on 9 July 1944. The much faster V-1 was overtaking the Avenger when the Telegraphist/Air Gunner in the dorsal turret fired at the V-1 from a distance of 700 yards.

The only other operator of the Avenger during World War II was the Royal New Zealand Air Force, which used the type primarily as a bomber, operating from South Pacific Island bases.

One of the primary post-WW2 users of the Avenger was the Royal Canadian Navy (RCN), which obtained 125 former US Navy TBM-3E Avengers from 1950 to 1952 to replace their venerable Fairey Firefly Mk.1s. By the time the Avengers were delivered however, the RCN was shifting its primary focus to anti-submarine warfare (ASW), and the aircraft was rapidly becoming obsolete as an attack platform. Consequently, 98 of the RCN Avengers were fitted with an extensive number of ASW modifications, including radar, electronic countermeasures (ECM) equipment, and sonobuoys, and the upper ball turret was replaced with a sloping glass canopy that was better suited for observation duties.

These modified Avengers were designated AS 3 and a number of these aircraft were later fitted with a large magnetic anomaly detector (MAD) boom on the rear left side of the fuselage and were redesignated AS 3M.

ABOVE: The red national insignia centres and the striped rudder identify this Grumman TBF-1 as one the earliest produced. BELOW: Underside view reveals the big belly weapons bay and outward retracting main undercarriage.

Another very early TBF-1 Avenger, showing the long 'birdcage' cockpit canopy. Although roomy by most standards, the two forward occupants were completely isolated from each other.

CIVILIAN USE

In 1945, Avengers were involved in pioneering trials of aerial crop topdressing in New Zealand that led to the establishment of an industry which markedly increased food production and efficiency in farming worldwide. To prove the concept to leaders of the agricultural community, pilots of the Royal New Zealand Air Force's 42 Squadron spread fertilizer from Avengers beside runways at Ohakea air base and provided a demonstration for farmers at Hood aerodrome, Masterton, New Zealand.

Many Avengers have survived into the 21st century working as spray-applicators and water-bombers throughout North America, particularly in the Canadian province of New Brunswick.

Forest Protection Limited (FPL) of Fredericton, NB once owned and operated the largest civilian fleet of Avengers in the world. FPL began operating Avengers in 1958 after purchasing 12 surplus TBM-3E aircraft from the Royal Canadian Navy. Use of the Avenger fleet at FPL peaked in 1971 when 43 aircraft were in use as both water bombers and spray aircraft. ■

BELOW: Royal New Zealand Air Force ground crew prepare to bomb-up a TBF-1 Avenger on a Pacific island airstrip. The fuselage rear side national insignian has the blue/while bars left either side of the roundel, but the red centre is still carried.

NEW ZEALAND AVENGERS

FAR LEFT: The Royal New Zeland Air Force operated Grumman Avengers in the WW2 Pacific Theatre of Operations. This one carries roundels in the European style with red centre. Later, all British, Australian and New Zealand aircraft operating in the Pacific had roundels without the red centre and with U.S style White/blue bars left & right of the roundel.

ABOVE LEFT: A RNZAF Avenger crew of three prepare for a mission.

LEFT: The lower wings of this RNZAF Avenger also has the full Red/White/Blue roundels on the lower wing surface. Note the F4U-1 Corsair in the background, also operated by RNZAF.

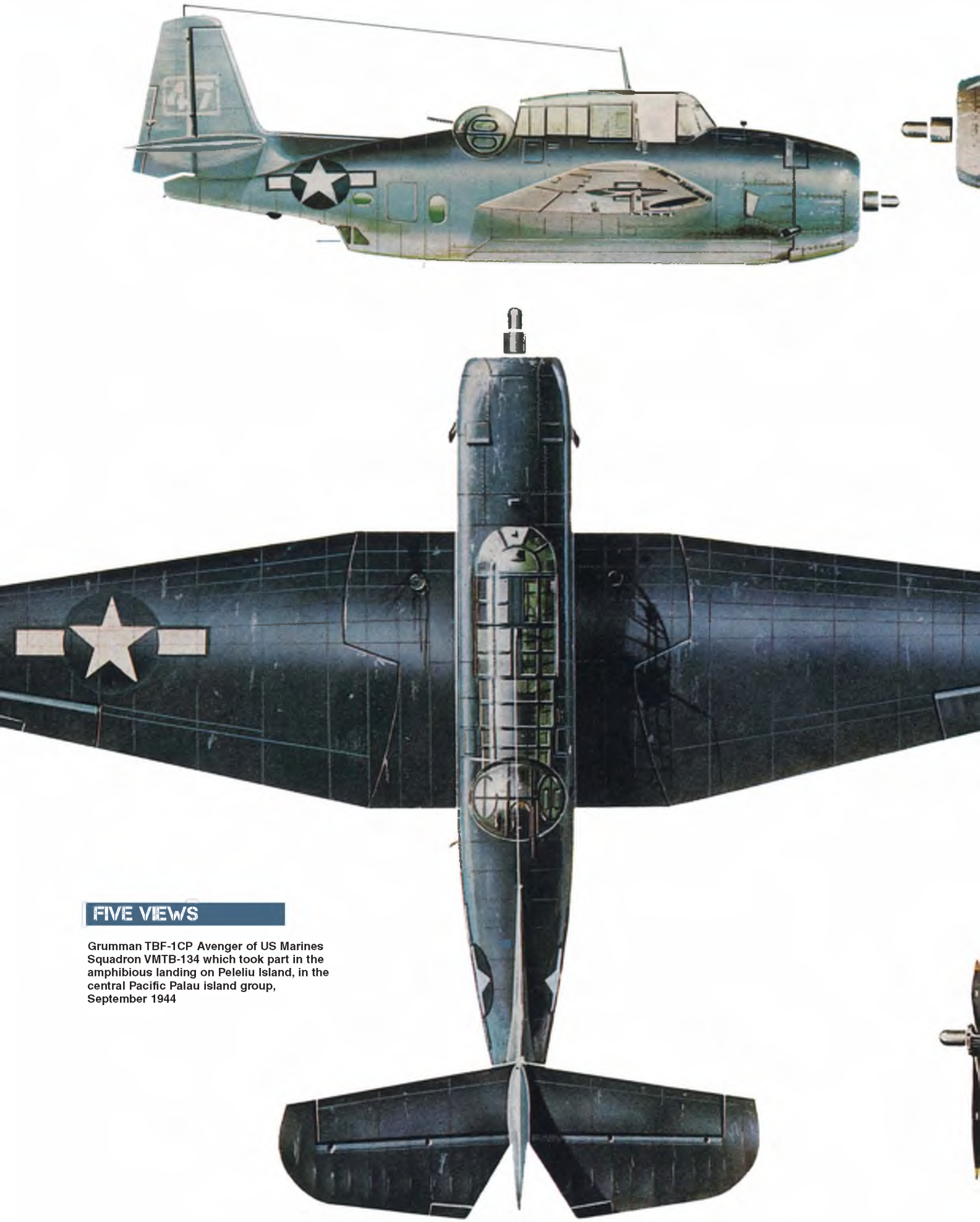
GRUMMAN TBF AVENGER FLYING COLOURS

Grumman TBF-1 Avenger of VT-6, US Navy. Midway Island June 1942. Non–specular Sea Grey/non-sprcular Light Grey finish, with national markings in six positions.

Grumman TBF-1C, Air Group 51, USS San Jacinto (CVL-30), mid-1944. Non-specular Sea Blue/ Intermediate Blue/Insignia White, with national markings on fuselage sides, above port and below stbd. wings.; fin/rudder code in white.

General Motors-built TBM-1C of VC-75, USS Petrof Bay (CVE-80), January 1945. Non-specular Sea Blue/ Intermediate Blue/White finish with national on fuselage sides, above port and below stbd wings. White '89' on fuselage rear sides and engine cowl ring.

Grumman Avenger Mk.II, No.849 Squadron, Fleet Air Arm, HMS Victorious, mid 1945. Extra Dark Sea Grey/Dark Slate Grey/Sky finish. White codes & black serial. Blue White national insignia (Far East combat zone) in Blue/White on rear fuselage sides, above port and below starboard wings



FIVE VIEWS

Grumman TBF-1CP Avenger of US Marines Squadron VMTB-134 which took part in the amphibious landing on Peleliu Island, in the central Pacific Palau island group, September 1944

On Silent Wings by Chris Williams

SCALE SOARING

It seemed like a miracle of historic proportions when this event was preceded by a favourable weather forecast. Given that the previous one in May was lashed by wind and rain, it was a grateful bunch indeed that assembled on the Saturday morning for the ritual of airframe rigging. After the usual comprehensive pre-flight briefing, the aerial action soon got underway.

Simon Warran-Smith's 40% ASG 29 is unusual in that, given the plethora of near ARF airframes out there for glass machines, it's unusual for anyone to bother going to all the trouble of prototyping one themselves. This Simon had done, displaying the process, mistakes and all, on the Scale Soaring forum over the winter months, and a creditable job he has made of it, too. As it weighs over 20Kgs, the validation process via the auspices of the LMA has been somewhat drawn out, given the vagaries of UK weather, and now Simon was to be able get to know the machine a little better. The process might have gone a little better if he hadn't left the wing joiners at home, but eventually the mighty beast was in the air, and subsequently seemed to be more in the air than on the ground.

Mostly satisfied with the experience, it was decided that a few tweaks here and there would improve matters even more, and it was good to see the satisfaction that is engendered when a long and complicated project finally reaches a successful conclusion.

Richard Vale's Wampir was another such a subject. The full-size was an experimental craft built by the SZD concern to explore the long-held theory that a tailless glider should be more efficient than a conventional one. The prototype eventually broke up due to wing flutter before the matter could be settled one way or another, (it's OK, the pilot bailed out) so building a model of this design shows a certain amount of bravery!

Some of this pedigree seemed evident in the Wampir on this occasion. Above a certain speed, violent pitch oscillations would occur (shades of De Havilland Dh 108 Swallow perhaps? - Ed.), and below a certain different critical speed, other things had a tendency to go divergent too. The construction of this machine reflects what is possible these days. The plan was drawn in CAD by Jilles Smits in Australia. From there it was beamed to the SSUK website where the Isle of Guernsey-based webmaster, Vince Cockett, made it freely

Expectant scene at the Ghost Squadron event at Middle Wallop.

Mel Gigg successfully landed this K8!

Dave Horten's DFS 230 at Middle Wallop.

Simon Warran-Smith's scratch-built ASG 29 gets sorted on a very large airfield!

Richard Vale's adventurous Wampir on tow.

available for download to any interested parties.

At this point, in steps Cliff Evans in Somerset, who has converted the drawings for use with his laser cutter, and from whom the short kit was made available. Such were the unknowns of this design, that the elevators proved to have little or no effect, and both pitch and roll control were handled by the ailerons. The postscript to this story was that soon after this event, Richard discovered that the wing joiner arrangements had come loose, and subsequent modifications gave him a model that now performs as it should. Don't you just love a happy ending?

Dave Horten's large DFS 230 troop carrier is an imposing sight indeed. He went to Germany to buy this machine from a veteran builder/flyer, but discovered soon afterwards that the airframe was riddled with woodworm. There was nothing for it but to build a new airframe, with only bits and pieces like the cockpit and undercarriage etc. that could be re-used.

There must have been a deficiency in the government-issue socks given to their troops during the war that necessitated the propeller on the top of the fuselage that drove a generator to supply heat to keep their feet warm! This troop carrier is an impressive sight in the air, and it thermals surprisingly well.

There was another model built from a free plan from the SSUK that had a less than happy ending. This was the little-known Antonov A9, a glider that was breaking records behind the Iron Curtain in 1960s. Designed by Jim Owen, the model A9 has the look of another tricky beast, with a short-coupled fuselage and highly tapered, high aspect ratio wings. Built by Terry Holland and test-flown by Dave Stokes, the hapless A9 seemed to suffer a problem with control surfaces. First she caught a wing tip, quickly recovered by the pilot, but then somehow the tug/glider combination ended up with the glider dangling vertically under the prop hanging tug at about eighty feet in altitude.

The valiant tug pilot had to let go for the purposes of self-preservation, the A9 then plunging to its destruction. The photographic sequence later showed that the ailerons and rudder were crossed throughout the whole evolution. Alas, the problem was not discovered, and the

A Paritech DG 303 Elan in action.

Brian Sharp down from Scotland with his o/d 3rd scale Gypsy.

Brian Sharp displays his Kaiser K11 at Middle Wallop.

Richard Vale with the impressive looking Wampir.

model ended up in the bin.

On a happier note, Brian Sharp made the trip down from Scotland with a trio of very nice models. As well as new 1/3 scale scratch-built Moore Gypsy, he had brought along a 1:3.5 scale Slingsby Type 51 Dart17R, and his latest creation, an electric motorglider in the form of a quarter scale Kaiser K11. As the latter two models were built from plans, my interest was more than usually sharpened. I had thought that although essentially a motorglider, my prototype version of the K11 could be surprisingly aerobatic, but Brian was confident enough with his to take one or two steps further!

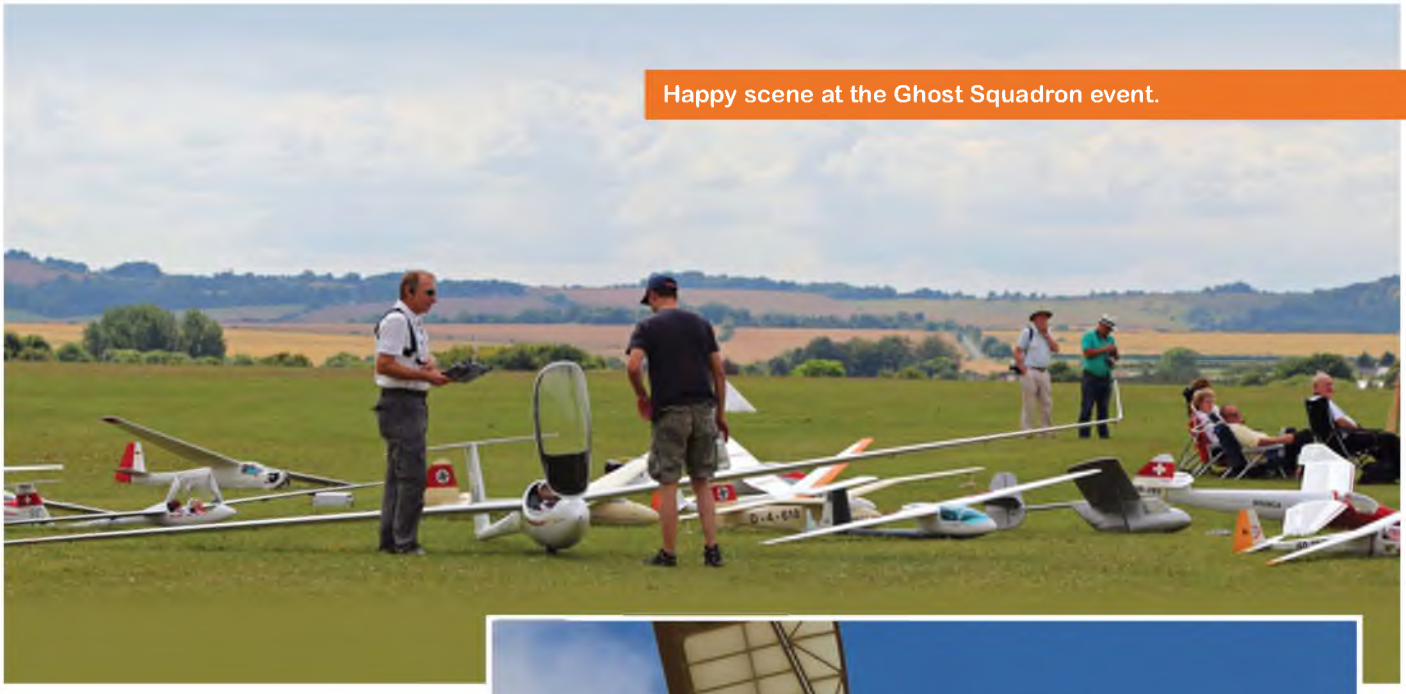
Darren Maple was flying his new-for-the-season glider designed by J.S. Sproule and his partner A. Ivanoff in 1937. The Camel, (couldn't they think of a better name?) has been reproduced by Darren to 1/2 scale, and certainly looks the part, with it's nicely varnished ply surfaces and unusual shape. It so happened that the SSUK webmaster Vincent Cockett came over from the Isle of Guernsey, bearing the prize of a book on Italian gliding, a prize which subsequently went to Mr Maple and his Camel, who landed closest to a secretly specified time set by the event director.

The event director in the person of John Greenfield was campaigning his half scale Musger MG12a late on the Sunday afternoon. After one of its flights, a freak whirlwind travelled through the glider park, neatly depositing the MG on top of my Habicht. My model suffered a broken windscreen, John's injuries were also small, but more numerous, including a damaged trailing edge on one wing that looked like a bit of a tricky repair. (Autoglass were less than impressed when I rang and asked if they had a Habicht screen in stock!).

Andy Anderson's charismatic Horten 3F is quite the floater.

The ill-fated Antonov A9 on its maiden flight.

Brian Sharp's 1/4 scale Kaiser K11 proved quite aerobatic.



Happy scene at the Ghost Squadron event.

ARF K8s took a battering over the weekend, with not one, but two shedding all or part of their starboard wings whilst in level flight. To everyone's complete surprise, both models were flown to a more or less conventional landing, miraculous in Mel Gigg's case, as nearly all the wing had sheared off.

All-in-all it was an excellent weekend, thanks both to the excellent organisation and unusually clement weather conditions. Thanks as ever to the organisers and tug pilots, and we look forward to the last of these events later in the year...■

John Greenfield's 1/2 scale Musger MG12a.

Terry Holland with the Antonov A9.

Darren Maple's 1/2 scale Camel in action.

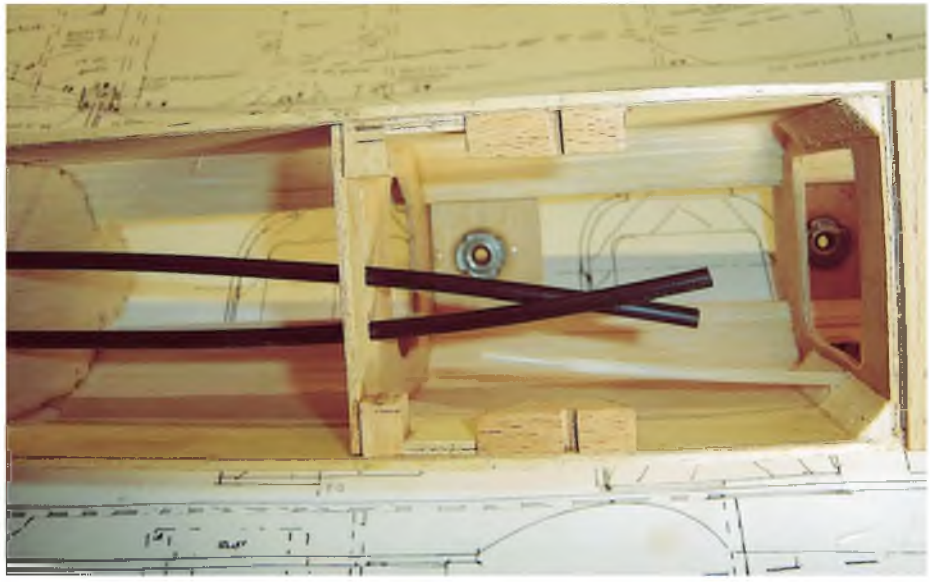
Dave Stokes' veteran 1/4 scale Jaskolka rides again.

CORBEN SUPER A

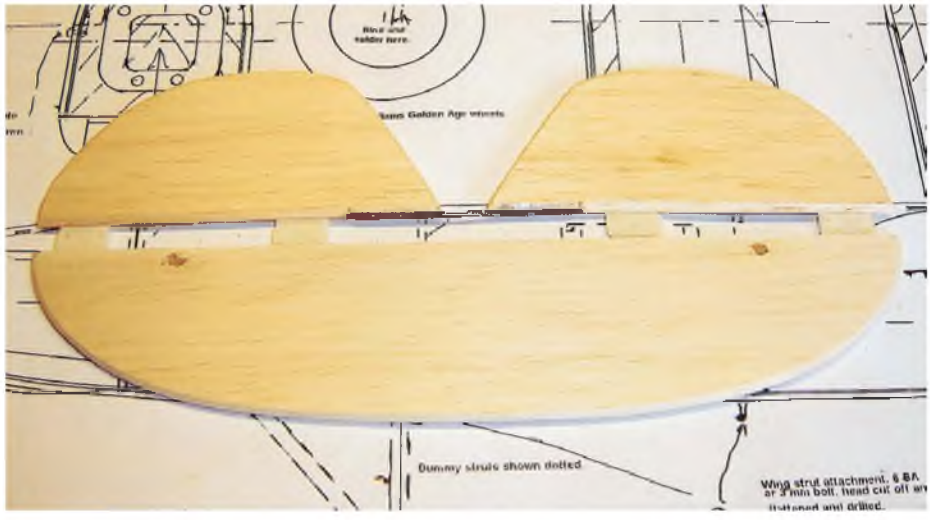
A 1/6th scale replica for .26 to .30 cu. in. four-stroke or .20 to .25 two-stroke engines, designed by Peter Miller and built by Dave Perryman. Electric power is a very appealing alternative.

Orlan Corben designed a whole series of different lightplanes intended for home-building including the *Baby Ace* and *Junior Ace* during the 1930s. The Super Ace was featured in a series of articles in the American *Popular Aviation* magazine in 1935. The aircraft was powered by a modified Ford Model A car engine and, originally, the wingspan was 25 feet. But Corben subsequently increased this to add extra wing area to improve 'hot-and-high' take off performance for people who lived at high altitudes.

ACE



Radio bay with snakes installed. Note wing bolt nuts and undercarriage mounting blocks.



The tail parts are extremely simple.

The model here is designed to the original 25 ft. wingspan as that was the available documentation, i.e. the *Williams Brothers* plastic kit three-views and the model is as accurate as possible, given the source from which the scale three-view was developed prior to designing it.

I designed it so that Dave Perryman could use his O.S. FS 20 in it. The model did fly on that power, but really needed more, so he fitted a Super Custom 30 FS, which is exactly the same physical size.

Flying the model

Most of my designs fly straight off the board, but this one didn't. The first flight was made in a 10 m.p.h. breeze and the model was found to be in dire need of downthrust. The test pilot had one heck of a job maintanining control but did get it down in one piece some distance downwind.

Dave added two degrees downthrust and the following week, in calmer conditions, we tried again. This time there was a lack of sufficient power for some reason and I swapped Dave my SC 30 for his O.S. 20.

On the third weekend, the model took off with ease with me at the controls. This time it flew with authority and we found out why it had been so difficult to control on the first attempt. The ailerons were virtually non-effective most of the time. Application of full aileron produced no noticeable effect, but a touch of rudder had the model trying to turn on its back.

Now I know of a full-size Aeronca Chief that performed in exactly the same manner and my model of the Aeronca Defender had the same characteristics. We soon found that the Super Ace must be flown with co-ordinated rudder/aileron turns. Apply aileron and a touch of rudder and she goes round perfectly - a good case for using a CAR (couped aileron and rudder) mix on your transmitter.

I handed over to Stuart Pickett who flies while I take photos and he was soon doing low passes with turns round the camera. The result of those initial test flights is that we can say the model flies very well, but does call for an experienced pilot who is aware of its peculiarities.

I consulted Alasdair Sutherland, my aerodynamics guru, who suggested that this handling is caused by a very strong lateral stability, partly because the wing is well above the CG and because of the interference effect of the fuselage. Alasdair suggested that rigging the ailerons 2 or 3 degrees up might help. He did have one or two other suggestions

CUT PARTS SET FOR THE

CORBEN SUPER ACE

Get straight down to construction without delay! This month's full size free plan feature is supported by a laser-cut set of ready-to-use balsa and plywood components. This provides all the parts that, otherwise, you would need to trace out onto the wood before cutting out.

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such as slats or a turbulator strip, but these would be non-scale.

Construction

This model is remarkably easy to build because **a)** it is a simple shape, and **b)** because I spent a lot of time working out the easiest way to do things. I am lazy!

The fuselage is built in the conventional way. Two 3/32" sheet sides with 1/32" ply doublers are made up and these are joined with Formers F-3 to F-6. The rear part of the fuselage is pulled in and joined at the tail with a piece of scrap wood in the middle. This takes the hinge at a later date.

It makes life easier if you prepare F-2 at this stage. Glue the 1/8" ply doubler behind the engine mount location and fit the blind nuts for the engine mount. Now the front of the sides are pulled in and joined to F-2 and F-1. This must be done over the plan to ensure that it is true.

Fit the main undercarriage mounting block. This is made by grooving out a piece of 1/2" sq. beech engine bearer. Alternatively, use 3/8" x 1/2" and build up the groove with strips of 1/8" ply. Glue on the rear undercarriage mounting blocks. These are made from 3/8" x 1/2" beech and are glued to the sides. They are designed in this way so that by undoing two screws and swinging out the metal clamps, the undercarriage can be swung away to give access to the servos.

Glue in the other small blocks that take the various strut attachments, the assorted ply gussets and the triangular stock behind F-2 and F-4. At this stage it is a good idea to fit the engine and tank and fit the outer Bowden cable for the throttle as well as the two snake outers for the rudder and elevator controls. The tank, engine and mount can be removed once this job has been done.

Fit C-2 and C-3 temporarily. C-2 can be supported on a scrap of balsa strip. Spot glue on the 1/4" sheet top to hold everything steady. Now plank the curved sides from C-2 to F-6 with strips of 1/8" balsa. Use 1/4" wide strips at the area of maximum curvature and 3/8" wide in the flatter areas. It is a good idea to mark the planks at the join between C-3 and F-2 so that you know where to separate the cowl later.

Remove the 1/4" top sheet and fit the 1/8" sheet sides from C-2 to F-5. Add C-1 and the 1/2" sheet between that and C-2. Shape the planking and 1/2" sheet and blend to the basic fuselage sides.

Cut the 1/4" sheet top at the join and glue into place. Once this has dried you can separate the cowl from the fuselage. Glue strips of 1/16" ply inside the sides of the cowl; these must extend down into the fuselage. You may need to pack these out slightly to get a good smooth fit. These take screws from outside the fuselage to hold the cowl in place

Make up the plates for the wing mounting blind nuts. These consist of a 1/8" ply plate under a piece of 3/16" sheet balsa. Epoxy the blind nut into place and then glue the plates between the sides and formers.

Fit the 1/2" sheet pieces under the nose and shape them as shown. Note The opening

Basic wing structure is light and simple.

Completed fuselage ready for covering.

under the nose; this allows the cooling air to flow out. Leave the 1/8" sheet between the sides for the time being. When the wing is complete you need to be able to mark up through the fuselage and the blind nuts for the holes for the hold-down bolts. Once this has been done you fit the 1/8" sheet as shown.

Add the tailplane platform and tailskid mount and then sheet the bottom with 1/16" sheet with the grain across the fuselage

Fit the stringers. These are let into the sheet on F-6. Note the way that the stringers are set in the corner of the headrest - this helps with the covering. Note also that the middle stringer on the headrest ends just at F-8. All stringers butt up against F-9.

The fuselage is now almost complete.

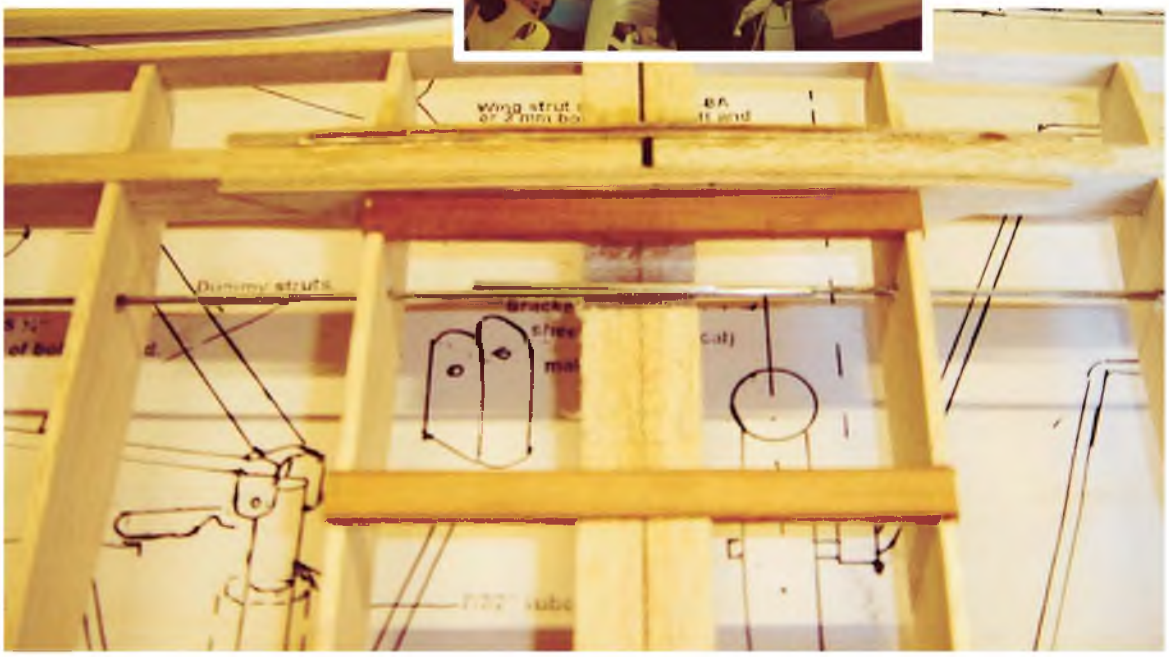
Wings

The wings hardly need any description. They are built over the plan in the usual way. The Clark Y section means that they do not need any packing of any sort.

Note that the struts are functional; they prevent the wing from twisting. The controls are also conventional except that the servo hangs down under the wing.

The 1/64" ply at the leading edge is thin enough to glue down without worrying about cutting away the ribs, etc., just feather the edges. The underside of the bellcrank bays is also covered with 1/64" ply, as this is the neatest way of making the slots for the pushrods to the aileron horns.

The wings are joined with the dihedral braces. The servo rails are fitted and then 1/16" sheet is fitted between the spars. This is cut away for



Underside of wing centre section showing servo bearers.

the servo.

Once the wing has been completed fit it to the fuselage accurately and mark through from the bottom for the wing bolts. Drill the holes and then carefully counter-bore the top. Use a piece of sharpened 1/2" brass tube sharpened for this. Make up two 1/16" ply washers and glue them into the bottom of the counter-bores.

The wing struts are detailed on the plan. Make up the lower ends as shown and then trim to the exact length with the wing on the model. Final adjustments are made with the nylon quick links. The idea of the silicone tube is to give a firm but flexible connection between the dummy undercarriage members and the strut.

The undercarriage, etc.

The basic undercarriage is held to the model with small screws and metal straps. Fit the 16 s.w.g. wire top pieces and bind and solder the bottom joint. Solder on the bottom bracket.

The wing struts are attached to the fuselage by clipping the quicklinks to their fitting. These are made by cutting the heads off 6 BA or 3 mm bolts then heating the ends and hammering them flat to make a spade bolt. Drill the flat for the quicklink. The threaded portion is epoxied into holes drilled in the appropriate blocks.

To build the dummy portions of the undercarriage the model has to be assembled with the wing and at least the front wing strut in place. The dummy undercarriage struts are cut slightly overlength and have a piece of 6 BA or 3 mm bolt soldered into one end. This should be at approximately the correct angle.

Fit the top bracket over the silicone tube on the strut. Now fit the dummy struts to this. You will have to trim them for a good fit and you may need to heat the solder holding the threaded sections to adjust the angle. Once everything fits, solder the dummy struts to the bracket.

The dummy shock strut is simply made from two pieces of telescoping tube. The lower one is held with a small bolt or even a soldered in pin. The top is held with an 18 s.w.g. safety pin. Finally, a shock absorber from 3/8" balsa dowel is glued to the top portion.

In use, the pin is removed to allow the wing strut to be fitted or removed. It can be replaced for safe keeping while the model is disassembled. It can also be removed to allow the undercarriage to swing forward for access to the servos.

The tail components

The tail is made from 3/16" and 1/4" sheet. Sand to the sections shown and add the paper strips; these will show up as ribs under the covering.

The tail strut is made from K&S 1/4" streamlined tube; this is flattened at the ends and is then screwed to the tailplane and strut mount under the fuselage.

Covering and installation

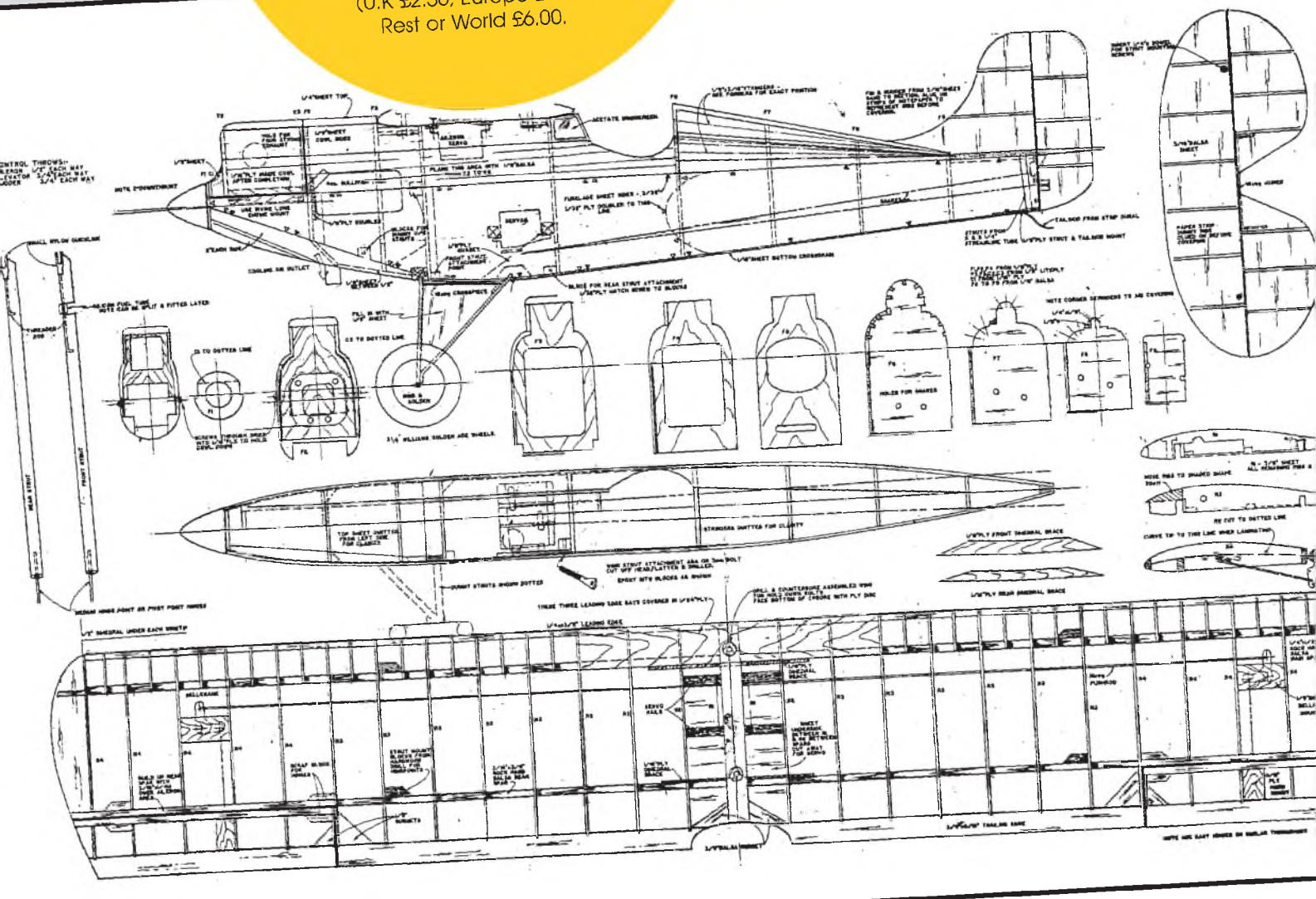
The model was covered with Solarfilm Supershrink Polyester and Solartrim. The set of lettering was cut for it by Sigma Signs who can provide a full set of lettering and registrations.

The radio was fitted as shown on the plan. The aileron servo location is unusual. It was found that a longish downward prong on the pushrod connected with the output arm and could not come out once the servo was screwed in place. The battery can be moved around to get the correct CG location.

The engine needs to be installed with 2 degrees downthrust - a couple of washers under the rear of the lugs will work or,

CORBEN SUPER ACE
(PLAN FSM/275)

Full size copies of this plan are available from Flying Scale Models Plans Service, ADH Publishing, Doolittle Mill, Doolittle Lane, Totternhoe, Bedfordshire, LU6 1QX. Tel 01525 222573
enquiries@adhpublishing.com
Price £19.50 plus p&p
(U.K £2.50; Europe £4.00;
Rest or World £6.00.



better still, use the plastic thrust line wedges available commercially. It was found that the engine tended to overheat a bit if run flat out on the ground but it remained perfectly cool in flight.

The fore'aft balance point was set at 2.1/16" from the leading edge or 25% of the chord. The control throws were measured after the last flight after completion of testing and were found to be:-

Ailerons:	1/2" each way
Elevators:	3/4" each way
Rudder:	3/4" each way.

I was amazed at the elevator throws as the model was not at all sensitive in pitch even with elevator throws of twice the range I normally use.

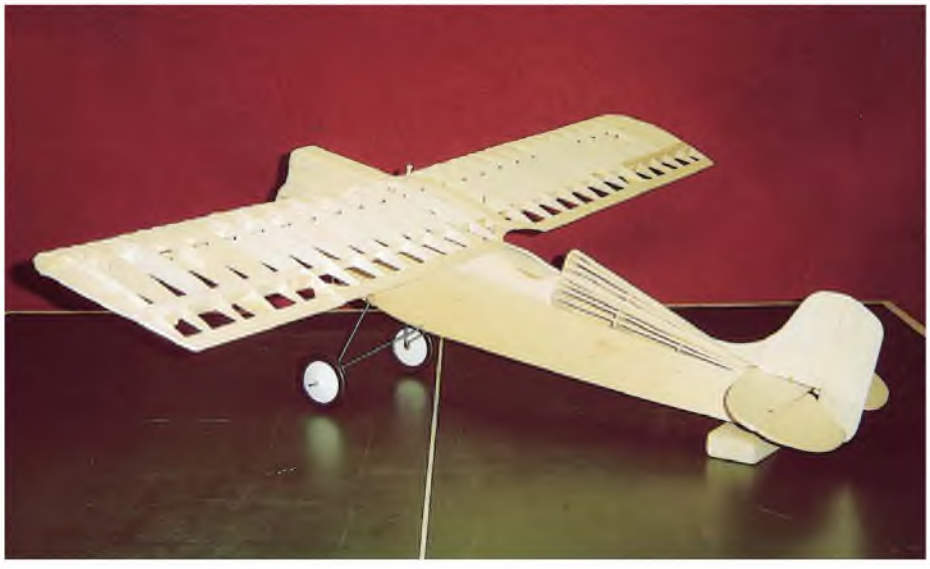
Weight ready to fly was 3 lb. 8 oz.

Summary

This is a very pretty little model that is interesting to build without being difficult. It does require an experienced pilot who is aware of the characteristics.

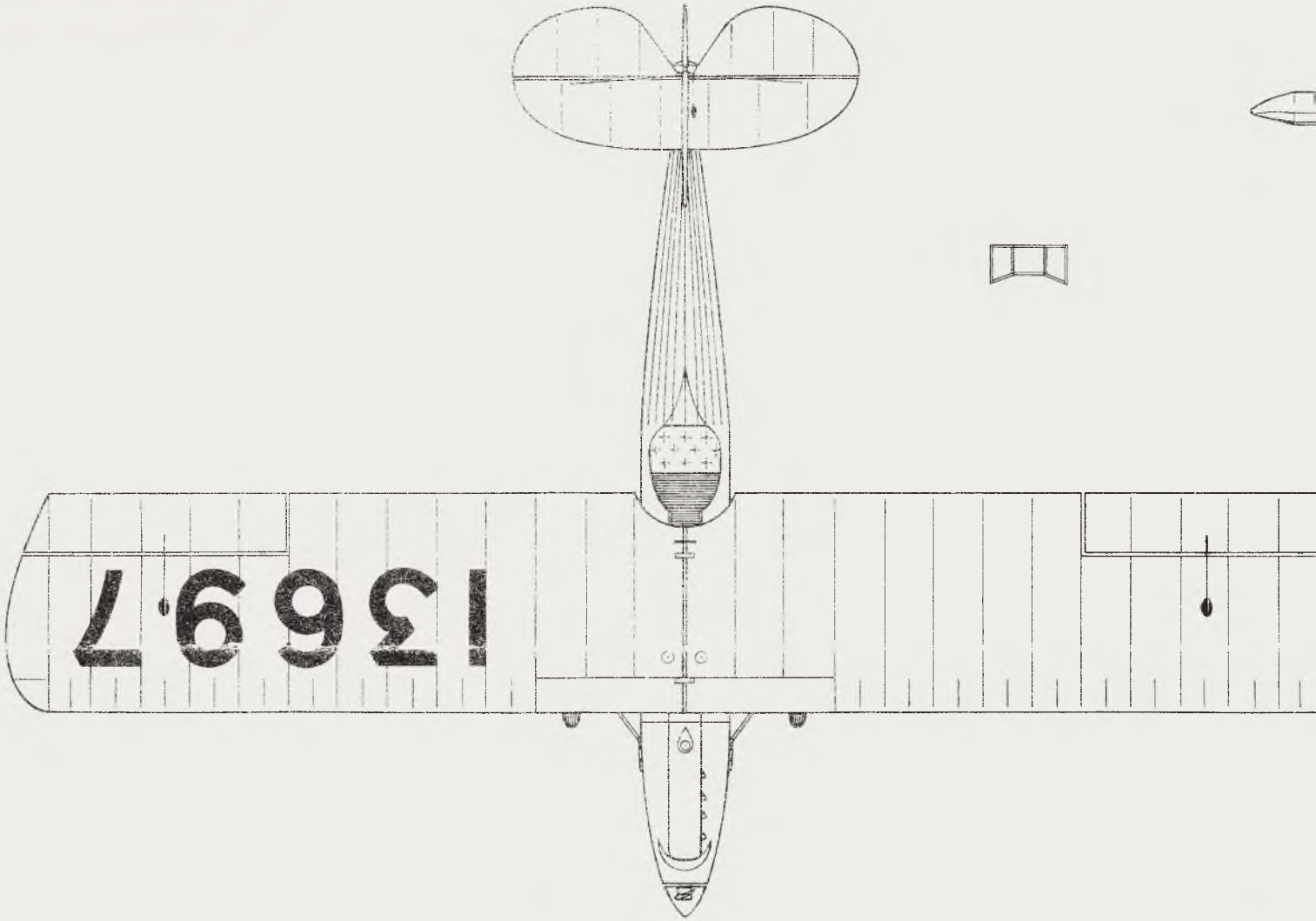
MODEL SPECIFICATIONS

Model:	Corben Super Ace
Type:	R/C Scale
Scale:	1/6th
Designer:	Peter Miller
Span:	50"
Area:	418 sq. in.
Length:	34 1/2"
Weight:	56 ounces
Wing loading:	19.3 oz. per sq. ft.
Power:	.26 to .30 four-strokes or .20 to .25 two-strokes
Radio:	Four function

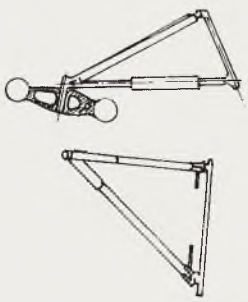


View of completed model - just a small amount of sheeting on wing still to be done.

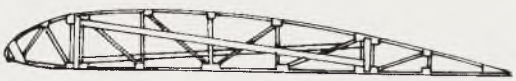
SCALE 1:40



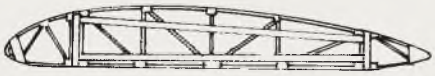
CORBEN SUPER ACE



DETAIL OF FULL RIB No.15. - 12 Required

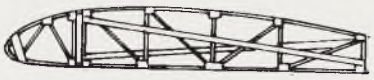


DETAIL OF COMPRESSION RIB No.12. 6 Required



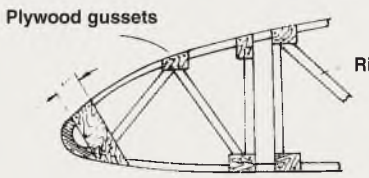
DETAIL OF ROOT RIB No.14. - 6 Required

DETAIL OF AILERON RIB No.14. - 6 Required

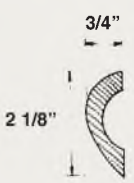


DETAIL OF AILERON COMPRESSION RIB No.13. - 2 Required

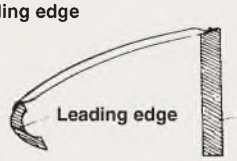
DETAIL OF REINFORCED AILERON RIB No.25. - 2 Required

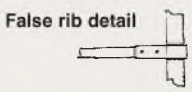


Detail for attachment of leading edge

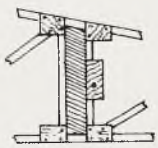


Leading edge detail
mat white pine

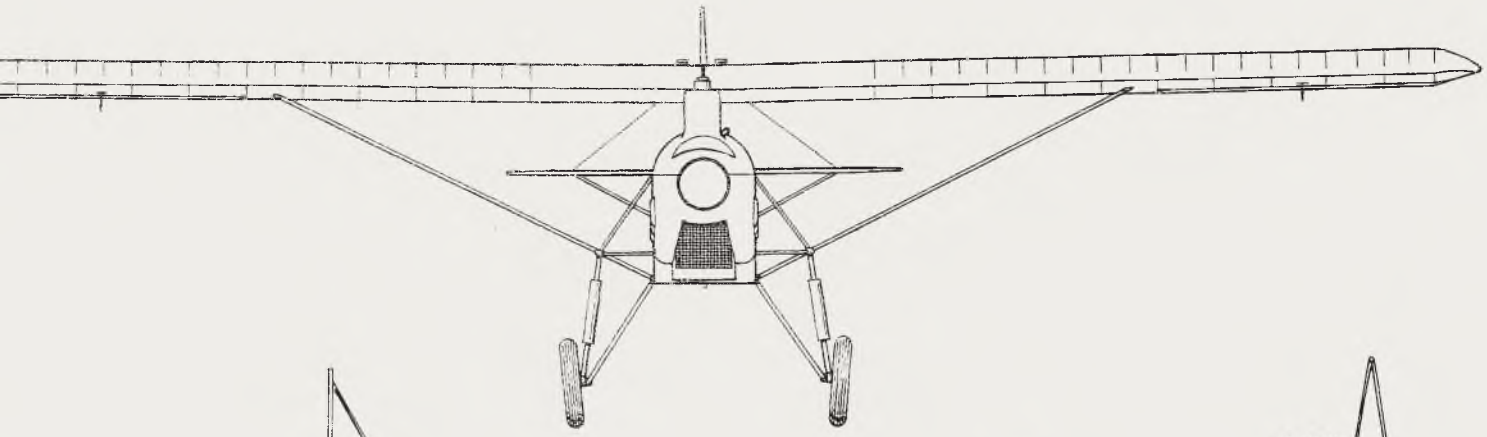


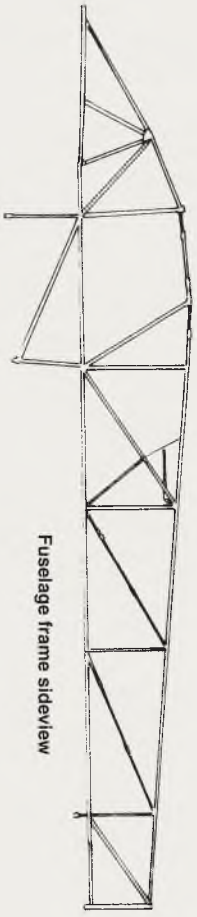


Trailing edge detail



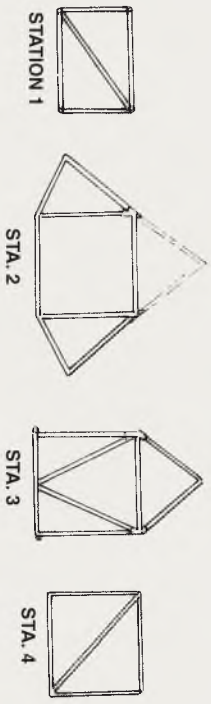
Method of attaching ribs. Note how rib brace is cut for tie rod block.

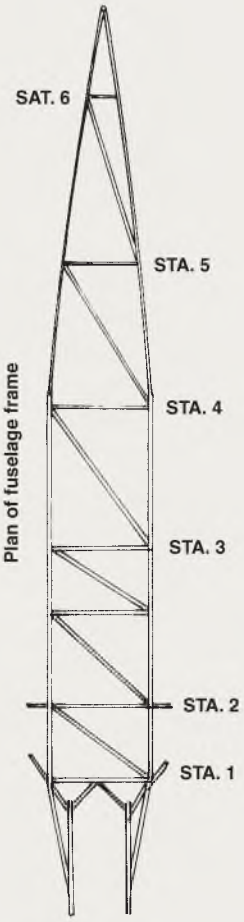




Fuselage frame sideview

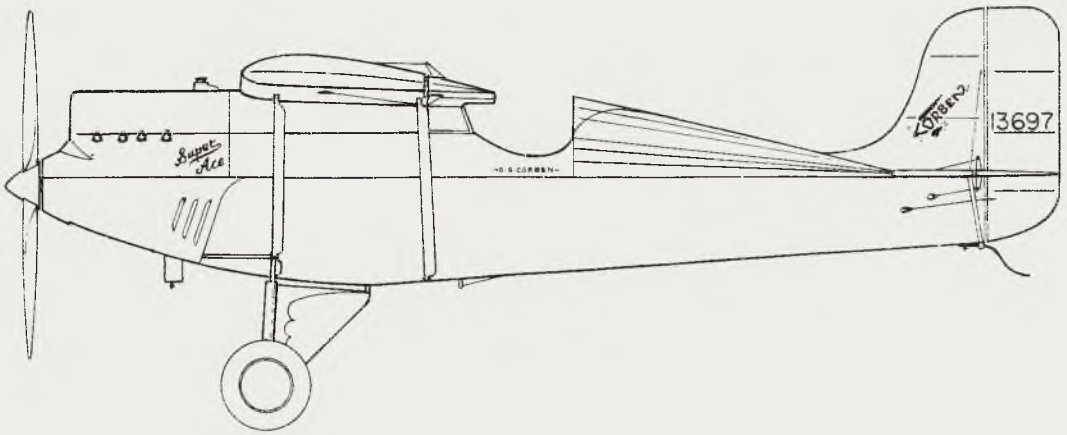
STATION 1Frame from 1 25" dia., tubular steel





Plan of fuselage frame

Front spar



WORLD SCALE CHAMPIONSHIPS

2014 *John Carpenter reports from Marmande, France*

The 2014 FAI World Championships for Scale Model Aircraft was held from July 19th to 26th at Marmande in the Gascone region of France. Two, three-man teams represented the UK for F4c (International Scale) and F4h (Stand-Off Scale). The formal arrangements for the event allowed for teams to have official 'helpers' and I quickly accepted the position when it was offered to me, despite having no idea what it involved.

Thus I met up with Neil Tidey (team manager, F4h) Richard Crapp and Dave Toyer at an impossibly early hour ready for departure by car, plus trailer, to Portsmouth for the ferry to Bilbao in Spain. From there it was just a five-hour drive into France and on to Marmande. The trip was largely uneventful and quite comfortable on the overnight ferry, despite a certain amount of snoring from one individual who had better remain nameless. Messrs Henderson and Kennedy, two of the F4c team had chosen the same route and were to be found on board.

On arrival at the site it was immediately clear that the hosts had made a maximum effort in providing the facilities for the event. Indeed the local municipal airport had been made available and laid out with all the necessary barriers and access. A huge hangar-like tent had been erected to house the models and water, power and other facilities set up for those camping on site. Hot food was available throughout the week, both from the event organisers and via vendors on site. Two flight lines were provided, one towards each end of the main (and only) runway. Crosswind take off and landings could be accommodated as the runway was sufficiently wide, although it did have a quite pronounced crown.

Tranfer of models to and from their flight lines was by trailers pulled by quad bikes and even the organisers 'runners' were provided with electric bicycles. It was noticeable that there was much evidence of sponsors' labels on just about everything and advertisements for the event were plastered around the local countryside. We were even promised a display by the Patrouille de France on the final day.

The first day was taken up with registration of the competitors and weighing the models. This was done prior to the first flight to provide a first

Caudron G1V of Petr Tax, Czech Republic placed 7th in F4c. A model that has featured before in international competition. Note the very neatly laid out maintenance bay. The dummy engines hide two Laser 200s for power of this 4.2m wingspan model.

Part of the UK team, ready to depart. Models are in the box strapped to the top of the trailer tent. Four up and fully (over?) loaded.

Boeing Stearman of David Kopal, Czech Republic, 1st in F4h. A beautiful model.

The teams begin to arrive. Transportation of models without damage is always a problem.

This Polikarpov Po2 from Japan had an interesting approach to modelling the engine. An SC 4 stroke radial was fitted, the crankcase painted to match the prototype and dummy exhausts to complete the picture.

indication of those close to the limit of 15Kg. These models would be weighed again after each flight to ensure the 'legality' of each flight. I took the opportunity to wander round the model hangar sizing up the models and the teams as they arrived and began to assemble their models. The overall impression of the quality of the models was high, with some of quite fantastic build and finish. The teams were equally diverse, from the single individual representing Portugal to the seeming hordes of camera wielding Japanese who popped up everywhere with beaming smiles and cameras clicking away like machine guns. Initial impressions were that the French and the Australians would feature in the mix and that a particular Russian model was simply outstanding. More on this later.

Sunday was taken up with completion of registration, team managers meeting, test flying for those who wanted to, and the opening ceremony. On Monday the flying competition commenced in almost perfect weather conditions. The lack of wind of any strength may have been a factor in some having difficulty on their landings with tail draggers squirreling about or even ground looping on roll-out after touchdown. The 'heavy' models

This Hawker Sea Hurricane had a large sound system installed behind the electric motor. The main speaker is just visible attached to the front bulkhead. There is a secondary speaker in the radiator.

The Sea Hurricane ready to go. Placed 22nd in F4c

ABOVE: The Stinson A1 Tri Motor of Max Merckenschlager (Germany), a previous winner. Tyre flat spots due to the heat caused take off problems. 4th place this time.

LEFT: Max Merckenschlager (and team) start up the Stinson. A dragging wheel caused problems on take off which must have cost points. Still managed 4th place in F4c

were carefully weighed after flight and the UK team breathed a sigh of relief when Richard Crapp's Westland Wessex came in a few, in fact a very few grammes within the limit.

Static judging was arranged in a further hangar from which several full size Jodel light aircraft had been ignominiously ejected to stand out in the sun. Each model received about twenty minutes of evaluation at one table of judges before passing to another for further consideration of some aspects. The whole process took about 40 minutes with judges examining the documentation and carefully examining the airframes from the regulation distance. All this was done with the other competitors watching carefully and giving their own models a last wipe down before their turn came. With the number of models to be scrutinised (62), static judging was set to take at least two days.

Flying continued and this was quite revealing to watch. Some competitors were clearly very practiced and experienced and their models had featured in previous World Championships. This showed when watching their flights which were all very smooth and precise and, most noticeably, at a scale speed. Others were less so with one or two having problems with out of trim models, or perhaps the odd

Pitts Special S2a of David Law, all the way from Australia. Gained a well-deserved 3rd in F4c.

Fouga Magister of Marc Levy, France. 1st in F4c. The new World Champion!

The Pacific Aerospace Corp T4 of Noel Whitehead from Australia undergoes some deep maintenance. A dodgy servo deep within the airframe caused some head scratching, but was eventually solved.

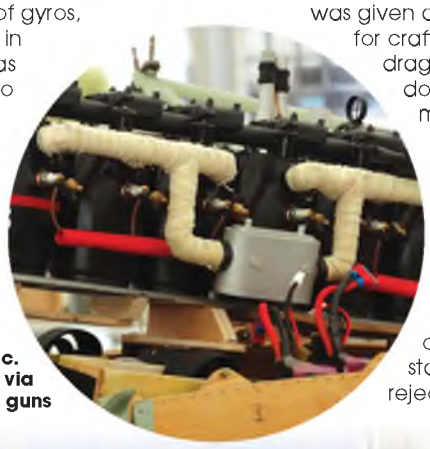
Fantastic Knoller C1 of Pavel Fencl, placed 13th this time.

Just look at the fine detail of the engine of the Knoller.

transmitter switch in the wrong place.

The jets, of which there were several, were particularly impressive with smooth, crisp manoeuvres. They were not necessarily perfect however as this observer detected some overcooked turns and untidy height control, not to mention a couple of bouncy landings. The Russian Yak 130 was flown impeccably and stood out as one to watch as the competition progressed.

There were several electric models taking part and they performed well. However the lack of any significant noise from most of them may have been reflected in their scores. One electric powered model had a full sound system and this was most realistic on the ground, replicating the start up and engine idle of its Merlin engine very well. However, in flight the sound was less convincing. Perhaps an approach to be watched for the future? One factor of interest is that the FAI allows the use of gyros, which are not allowed in BMFA events, and it was not easy to decide who was and was not using them. One or two of the slow flying biplanes looked as if they needed one, whereas others seemed to cut through any turbulence.



BELOW: Beautiful Albatros D.Va of Yannick Bueb of France was all electric. Placed 15th in F4c. RIGHT: Access to the 'innards'of the Albatros was via quick removal of the entire dummy engine and machine guns

Food for thought!

There was one incident of controversy, which arose when the static judging scores were posted. The Yak 130 of Vitaly Robertus, a member of the Russian team, was given a surprisingly low score for craftsmanship, which dragged the overall score down. The Russian team manager made an official protest and it was revealed that the low score reflected the judges view that construction and finish was not entirely the work of the entrant. After further consideration the score stayed and the FAI jury rejected the protest. The

ABOVE: The Yak 130 of Vitaly Robertus, Russia, around which controversy swirled. A superb model and well flown. Eventually placed 5th.
LEFT: The controversial Yak 130 prepares for take off. The wing tanks were dropped in flight.

Russians were not terribly happy about this outcome and it was noticeable that they had packed up and departed before the end of the Championships. However, even with that low static score that entrant finally ended up in fifth place, reflecting the quality of the flying, and of the model, if not the built controversy. Hopefully the pictures will provide the detail of the models and the quality of the competition. I could bore you at length about the fine details of the event; the riotous International Gathering which turned into a grand singing, dancing and drinking contest (the Poles won); the thunderstorm one evening that lit up the sky like daylight, or the final awarding of

WORLD SCALE CHAMPIONSHIPS RESULTS

CLASS F4C INDIVIDUAL (39 competitors)

1. Marc Levy - France	Fouga Magister CM170	5488.50
2. Andreas Luthi	Bucker Jungmeister Antares	5418.75
3. David Law - Australia	Pitts S2a Special	5387.25
4. Max Merckenschlager - Germany	Stinson A1 Tri-Motor	5316.25
5. Vitaly Robertus - Russia	Yakovlev YAK 130	5278.25
6. Fabien Bosum - France	Focke Wulf FW190-A8	5178.00
7. Petr Tax - Czech Rep.	Caudron G IV	5137.75
8. Noel Findlay - Australia	DH 83 Fox Moth	5047.50
9. David Knott - U.K.	Hawker Hurricane Mk.1	5025.50
10.David Womersely - U.K	DHC Chipmunk Mk.10	4955.50
16.Michael Hendersion - U.K.	Airco DH 9a	4732.75

CLASS F4C TEAM (15 Nations)

1. France.
2. Australia
3. Switzerland
4. United Kingdom
5. Czech Republic

CLASS F4H INDIVIDUAL (25 competitors)

1. David Kopal - Cech Rep.	Boeing Stearman	3575.70
2. Daniel Boulager - France	Caudron Luciole C272-S	3385.50
3. Roger Nieto - France	Chance Vough F4U Corsair	3363.50
4. Daniel Reidwag - Switzerland	Mudry CAP 231	3333.50
5. Kiyuhara Tamura - Japan	Fuji T-3	3315.25
6. Petr Tax - Cech Rep.	Avro 504	3298.50
7. Alessondro Frisoli - Italy	MB 339 PAN	3297.75
8. Alex Kennedy - U.K	DH 82 Tiger Moth	3277.75
9. Richard Crapp - U.K.	Westland Wessex	3276.75
10.Jean F. Bobo - France.	N.A. P-51 Mustang	3264.25
11. David Toyer - UK	Miles Messenger	3257.25

CLASS F4H TEAM (11 Nations)

1. France.
2. United Kingdom
3. Czech Republic
4. Switzerland
5. Italy

Dave Toyer makes a touch and go with his Miles Messenger. Top static score in F4h and 11th overall.

The crowd line was three deep for most of the event. The locals had really taken it to their hearts.

Richard Crapp awaits transportation to the flight line on the provided conveyance. Note the advertising and sponsorship signs.

medals and banquet in the outstanding location of a 12th century chateau, but space does not permit. I hope the photos give a good sample of the event.
All-in-all, the entire event was a great success, largely down to the efforts of our French hosts who pulled out all the stops to make it a success.

I must not omit to provide the final results. The UK team gained a splendid Team silver medal in F4h with Dave Toyer's Miles Messenger coming top in static judging. The UK team also gained 4th place in F4c. Individual Gold medals went to Marc Levy of France with his Fouga Magister in F4c and to David Kopal of the Czech Republic with his Boeing Stearman in F4h. The French team took home top spot in both team F4c and F4h thanks to excellent models and above all consistent flying. Well done to them. All the scores should be available by the time you read this on the BMFA website so look there for all the gory details.

Finally, I discovered what a team 'helper' does. Essentially it is to lift and carry plus whatever else needs doing. I think I got by in all but the cooking! ■

Focke Wulf 190 A-8 of Fabien Busom placed 6th in F4c. On charge here.

Magnificent paint job on the Ansoldo SVA5 of Piero Santucci, Italy.

Mick Henderson has a bit of a woops-a-daisy with his DH9a at the conclusion of a cross-runway landing, fortunately without serious consequences. He was not pleased.

Richard Crapp's Westland Wessex is assembled ready for action. Note the Union Jacks surrounding the UK team pit area.

THE QUIET ZONE

R/C SCALE ELECTRICS WITH PETER RAKE

Yes, it's surprising just how quickly these forays into the weird and wonderful world of electric flight come around. Okay, so maybe it's the column that's weird and wonderful, rather than electric flight itself. Still, you have to admit that life wouldn't be quite as much fun without your monthly fix of QZ to look forward to.

No? Well tough luck because it's what you're getting.

I've said it before, and will almost certainly say it again, when I sit down to write this it's almost as if another entity takes over. Someone bright and cheerful, rather than the miserable old so and so I usually am. Bright, cheerful and just a little bit strange perhaps, but you can't have everything.

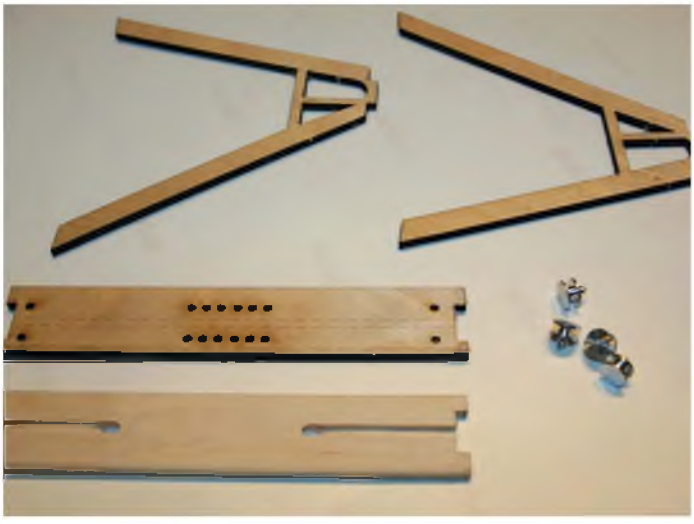
Okay then, with the brief, but slightly rambling introduction out of the way lets get down to what I'm supposed to be writing about.

AN UPDATE

A couple of months ago the column became something of a light entertainment section as I described the perils of an over stuffed modelling room. Good, because that's what it was intended to be - an amusing anecdote. Well, as you may recall I then went on to describe how it became even more cluttered by buying batches of 'dead' helicopters to gut for their innards. One thing I was unsure about, not having tried it yet, was how the 'brick' from a co-axial helicopter would respond to control input, afterall, the gyro is intended to cancel turning that isn't intentional and it does that by varying the motor speed. As you can possibly visualise, any turn induced by using the bank control (on the helicopter, but rudder as used on fixed wing) is likely to cause a speed variation in the motor because the gyro is trying to counter the turn.

So, that's how it might be, but as a result of that article (you see, I told you somebody reads them) I have received an e-mail from David Lovegrove about this precise subject. He tells us that, with a little care, it's relatively easy to disable the gyro chip without damaging how the board itself works. Rather than 're-invent the wheel' so to speak, I'll just paste David's e-mail here:-

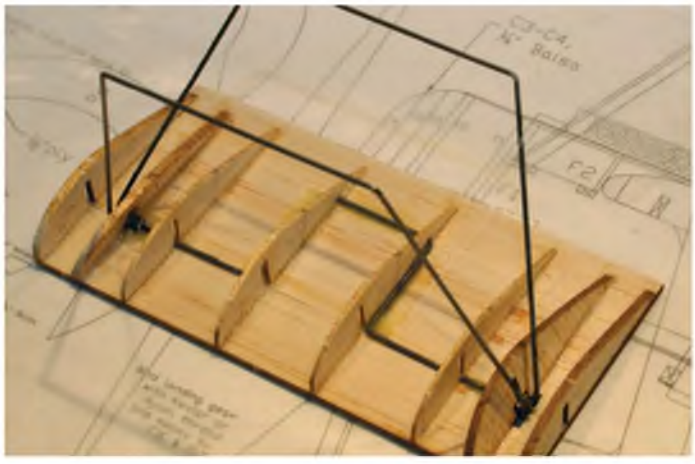
THE UNDERCARRIAGE ON A FULL-SIZE SOPWITH CAMEL REVEALS THE SPRINGING AND HOW WIRES PROVIDE RIGIDITY. ON OUR MODEL THESE WILL BE SUBSTITUTED WITH A RIGID WIRE FRAMEWORK.



The basic components of a model Camel u/c. Note the slots for the axle to emerge from and the turned metal items.

The centre of the laminated ply parts holds the axle centre while the elastic cord allows the ends to absorb landing shocks.

The leaning in effect so common on aircraft of this era.



The soldered, and rigid, wire framework supplied the basis for a Dr1 u/c. The U shaped section in the middle ensures the axle wing stays where it's supposed to be.

Just been reading your column in the Sept. Issue of Flying Scale Models. I just wanted to let you know that you don't have to put up with varying speeds from the motors driven by co-axial-type controllers when re-using the 'bricks' salvaged from old heli's.

Identify the gyro module (usually simple - it's the little shiny-topped metal component and the only one of its type on the board), all you have to do is to prise off the top. Get the end of a scalpel blade under one edge and lever it up, carefully. It will usually come off quite easily.

After that, the gyro will be dead - don't ask me why! - but all the remaining circuitry should be fine (assuming it was to start with) and the motors will now run without interference from the gyro.

I've done this simple mod on a couple of Blade MCX boards with complete success. Good luck if you decide to try it yourself!'

Thanks David, I have a few such boards that I'll try it out on. Nothing as costly as an MCX board, but then I don't do costly. Helicopters are great, as long as they're CHEAP helicopters.

I do stress that it's only the co-axial types that require this mod. Fixed-pitch ones rely on the tail rotor to do the job and we have already disconnected that from the brick.

SHOCKING STUFF

No, just because this is an electric flight column that isn't the sort of shock I'm on about. This is where I hand things over to Jonathan Rider for that second item I promised you last time. This time, surprise, surprise, dealing with suspension on WW1 style models. So, without further ado, over to Jon - who still hasn't learnt to write in English. More flipping i and u corrections to make. So over, again, to Jonathan.

Another shocking article on the trials and tribulations replicating early aircraft!

As I was going through my notes, some of my latest builds and some comments and suggestion and questions on the build forums, a lot of builders want to replicate working landing gear on their WW1 and post-WW1 aircraft. So, after making a few designs of my own, I thought we could cover the subject here, and see why those aircraft had the suspension they did, and what we can do to duplicate the same effect. Now I say 'same effect' because some of the early undercarriages were very complex, and would not stand up to the rigor or abuse we put our smaller models through.

There are so many designs we can discuss, I will limit this story to a few 'popular' aircraft, and that should cover most of the builder's questions, and cover some of the most replicated designs. The traditional undercarriage set-up for WW1 aircraft (Fighters and Scouts) was a two-wheeled front landing gear with a wooden or metal skid under the tail. The main landing gear normally had 'spoke' wheels, rubber tyres and some sort of axle between the wheels. The tailskid did double duty. In addition to providing something for the tail of the plane to rest on, it also served as a brake. That's not to say though that the tailskids weren't seriously engineered. I just recently had the pleasure of seeing the SE5 tail skid arrangement up close, and that is one elegantly engineered system. In this case, unlike most WWI aircraft, the SE5 tailskid was steerable, and the way it was done shows a great deal of engineering and complexity.

It does make me wonder though... why were conventional brakes not used on these early aeroplanes? There were certainly automobile brakes available at the time so I wonder if it was a question of weight, or need?

If you have ever been lucky enough to watch aircraft of this era perform a landing, one of the most interesting aspects is the short landing area they require. A Sopwith Camel can stop in about 30 yards, and I had a chance to watch an Albatros land, and it took the greatest distance to come to a full stop. That was mainly because it bounced a couple of times, yet still well short of a modern day aircraft of the same size and weight. So I don't believe brakes were needed for the weight, or for the way the tailskids slowed everything down. (Also, of course, brakes on the wheels increased the risk of a nose-over as soon as they were applied. Many German types did in fact have a brake on the main undercarriage, but this was more like a drag brake mounted on the rear of the axle. PR)

NOW IT'S GETTING ROUGH

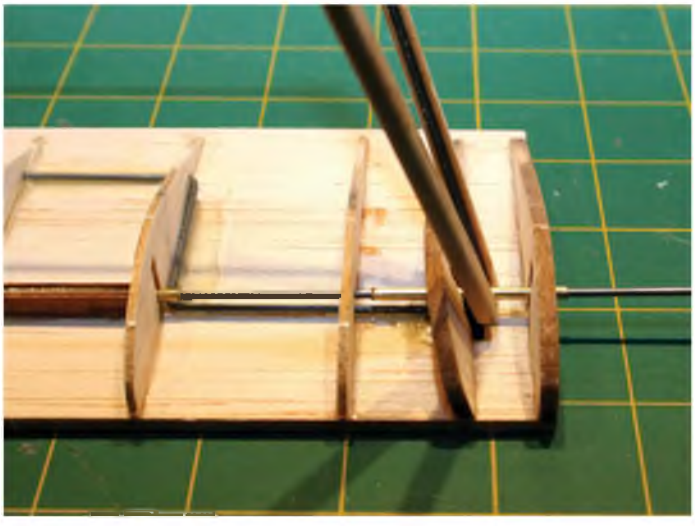
Another consideration these early undercarriages had to endure were unprepared and rough landing fields. Rough ground and rookie pilots, all will take its toll on the aircraft. These rough and unimproved fields would make operating an aircraft very difficult if it did not have the capability to absorb the terrain while it took off or landed. Without some sort of 'cushion' on landing, the aircraft would bounce, causing problems like low airspeed and high angle of attack, ground loops and possible damage to the aircraft. On takeoff, if the aircraft hit a bump, it may become airborne before it has enough flight speed and either settle back down or possibly stall and create a bigger problem.

Most undercarriages of this period, from almost every aircraft designer, used some sort of bungee or elastic cord set-up where the cord would absorb the movement of the axle (or called a floating axle) and provided a flexible systems to absorb landing and ground shock impacts. In fact, if you have ever seen a picture of a Sopwith Camel on the ground, you may notice the wheels are splayed 'top-inward', a trait of the aircraft weight against the bungee cords of the suspension system.

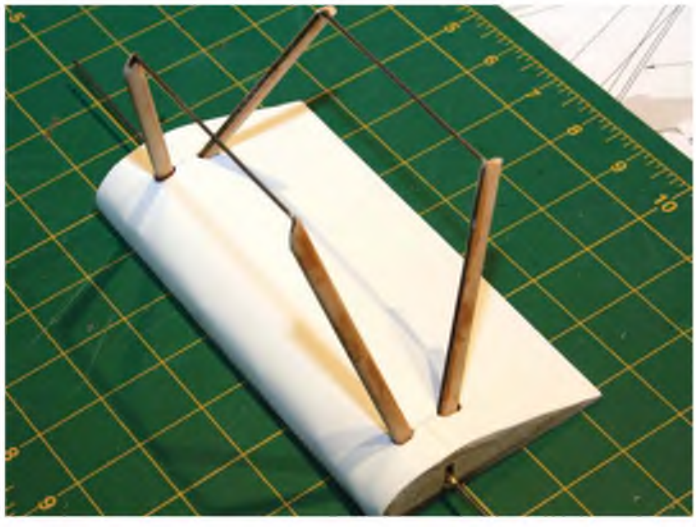
So how do we tackle the challenge of making a realistic suspension while keeping the strength we need to survive our local flying fields and our own skills? Let's plan on two key items as we design our scale undercarriage. We want to use strong wire (Piano wire or the equivalent), we want to wrap and solder all joints very well, and we need to support the aircraft weight X10. My rule of thumb is the undercarriage must support 10 times the model aircraft weight in order to keep up with any rough landings, rough handling or unimproved fields these aircraft have to endure. It also keeps the wheels, axle and undercarriage legs from bending, making tracking and control of the aircraft difficult.

Traditionally, you would make wire legs, normally covered in a hardwood or other 'simulated' products to make them look scale, and solder them to a single axle that spreads across the undercarriage from one side to another, then attaching the wheels to the axle, creating a 'triangle'. This method is adding significant strength to the entire set-up and it is a great design and is used in most WW1 model designs. I like to keep that engineering feature intact, but add additional capabilities to make the gear look scale, keeping the strength of a soldered structure of a 'one piece' system, with the look of an operational scale gear.

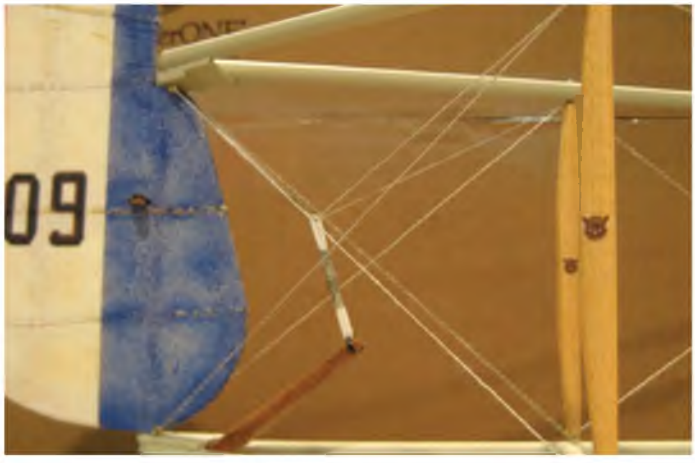
On the Sopwith camel, I made a one piece 'spreader' soldered to each landing gear leg, and then used a second floating axle on top of the spreader through slots on the lower landing gear wooden wing to simulate the two piece gear on the real plane. I then used elastic cord (found in any



With the central brass tube epoxied in place, the 'floating' tube bearings mean all elastic binding can be internal at that point.



What you get to see after the axle wing is skinned and the u/c fairings added.



A totally open tail end is all the excuse you need to make a functionally sprung tailskid part of the scale detail.

A slightly different technique, but the same basic principal sees the Albatros DIII u/c sprung.

JUST BECAUSE THE TAILSKID SUSPENSION CORDS ARE HIDDEN ON THE SOPWITH CAMEL, THERE IS NO REASON NOT TO MAKE THEM FUNCTIONAL.

sewing or craft shop) to use as the bungee system on each end of the gear. I actually turned small aluminium bungee posts to finish the look. The one-piece axle picks up about 80% of all the landing gear strain, and the bungee cord supports the rest. This design also allows the wheels to bow outward while at rest, simulating the real 'Camel stance'.

The Fokker Dr1 had a challenge of supporting the lower wing while making a working axle. First, I bent the fixed axle (spreader? PR) in a 'U' shape and epoxied it to the lower wing. In this maner, the wing stays quite solid and will not flex or change its angle while being dragged through the flying fields long grass. This fixed axle was soldered to the landing gear legs, making a very strong and supported fixture. Then I epoxied a brass tube in the centre of the wing for the floating axle to pass through. On each end of the floating axle, I used the elastic cord to attach the floating axle to the fixed axle and then I attached the wheels. The wheels are held on by plastic heat shrink tubing, allowing them to turn freely, and I don't have to worry about unsightly wheel collars or non-scale attachment points. When the Dr1 lower wing was covered (with thin plastic sheeting) all you see are the flexible floating axles and wheels, and the wing will never change it's angle as it's soldered to the main frame.

Let's talk a little about the elastic chord and its role in making scale landing gear. My rule of thumb is the smaller the plane; the more you can rely on the chord to take the weight of the aeroplane. If you have a small back-yard flyer, the elastic chord is enough for even the roughest grass landing. If you see my 1/6th scale DVa, The axle and lower wing are fully supported by two strong 'O' rings on each side, then will be covered by the scale elastic chord, then also have a safety cable (as in the real one) so if the chord would flex too far or break, the axle will remain operational. The heavier the aircraft, the more you should rely on the metal axle and fixed gear to handle the weight and stress of landing, and rely less on the shock cord to support the aircraft. Another reason to have a tight suspension is on unimproved fields is that too much flex and bounce will throw the wheels out of alignment and make it harder to track straight down the runway for takeoffs and landings.

Tailskids can be treated the same way. They can be fixed right to the aircraft and the bungee cord can be used only as a decoration. Or, as you see on my DH1a, where the whole tail is open, and the suspension is designed as the real one was, it is fully operational. I used Kevlar thread with tightly wrapped elastic chord holding a hardwood skid with a pivot point in the middle.

The main ideas here are to make a strong and reliable landing gear, but use some of the techniques and designs of the early aircraft as inspiration for your fully operational undercarriage. Give it a try; you may be shocked at your realistic and fully operating results.'

In support of what Jon has been saying, I have used bungee suspension on numerous models and it has one added side effect he didn't mention. Because it reduces the shock of landing, it also reduces the risk of bounce and makes mediocre landings look very smooth and professional. Yes, even mine!!!!

As usual, should you wish to contact me, I can be found at ***PETERRAKE@aol.com***

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1920s lightweight low wing sports aircraft designed to a low-power specification. Machine illustrated is the sole remaining example. (60 images)

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The 'export' version of the Curtiss P-36 that saw service in durng WW2 with Finland and during the 'Battle of France' in May/June 1940. Example shown is a combat veteran. (130 images)

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1930s racing aircraft. Example depicted is the radial engined example at Shuttleworth Mussel (91 images)

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A study of the example hung in the Fantasy of Flight Museum, finished in RAF WW2 colours. (35 images)

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Radial engine version. Example from Fantasy of Flight Museum. (79 images)

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Authentic example as exhibited at the Fantasy of Flight Museum, in WW2 Luftwaffe colour scheme. (43 images)

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Early WW1 fighter monoplane. Example depicted is the faithfully authentic replica built by the Northern Aero Works and operated by the Shuttleworth Trust museum. (100 images)

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