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FLYING SCALE MODELS - THE WORLD'S ON

ON THE COVER

Warbird Replicas is a kit manufacture long associated with WW2 fighter aircraft kits. Their latest is their .90 size, 1:5.5 scale 62" (1575mm) wingspan Lavochkin LA-5/7 radial engine Russian fighter, built and reviewed in detail by Brian Brassey in this issue.

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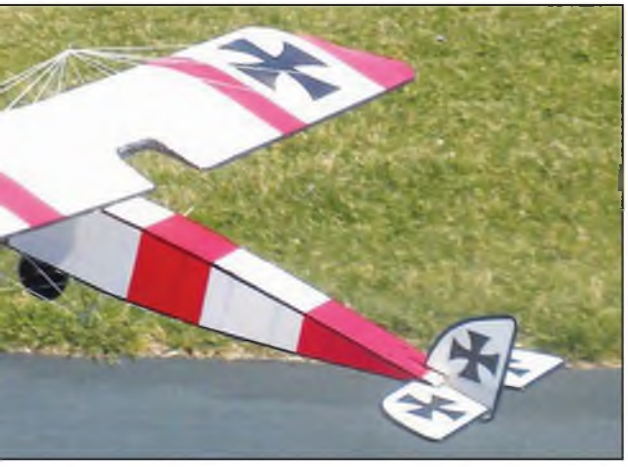

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Time to get out the building board

By the time this issue of FSM hits the newsstands, or drops through your letterbox, thoughts among readers must surely be turning toward selection of a new scale project for the Autumn/Winter building season. So what's it going to be then?

In this month's issue, we present another of Australian Gary Sunderland's series of successful scale design in the shape of his new quarter-scale Nieuport 27. Whilst working through this, the point arises that, even if a particular type presented in the magazine as a construction feature does not have an immediate appeal for the reader, there is, nevertheless real value in reading and learning about the techniques the designer used in the construction of the model.

Discovering how the other fella 'got away with it' makes the reading worthwhile - there's always something new to learn.

RARE AS HEN'S TEETH AT THE FLEET AIR ARM MUSEUM

Among the WW2 combat aircraft lost entirely to the post-war scrap men was the Fairey Barracuda carrier-borne torpedo/dive bomber. Not one example of the type was preserved for posterity, but then there were many others - De Havilland 103 Hornet for example.

However, in the case of the Barracuda, the FAA Museum at Yeovilton, Somerset, did not give up of getting together an example for their collection of naval combat aircraft and over many years, various 'components' have been amassed in hope. Now, there's enough, at least, to constitute a substantial wreck that will be on display at the FAA's Reserve Collection and viewable during the Museum's Open Day on October 27th.

The Barracuda was the Royal Navy's most numerous combat aircraft during WW2, with about 2,500 built. Very much an ugly duckling, and not much loved among it's operators at the time, but it is a significant piece of aviation history and by the look of the pieced together assembly show here, one can only admire the determination of those involved at the FAA Museum.

Gordon's Jungmeister

The name Gordon Whitehead has been synonymous with R/C Scale now for several decades and he has published a wide range of R/C scale designs.

Gordon's latest, just emerged for its first flight after many workshop months is his 27.5% scale Bucker Junmeister. It spans 70" and, with Saito FG-36 petrol/ignition ower, weighs in at 17 lbs. As the pictures here show, it looks great in it's red and yellow colour scheme and we look forward to presenting this as a full construction feature, with plans, in a coming issue of Flying Scale Models.

Gordon reports superb aerobatic performance during this models six-flight day.

JR Battery Regulator

JR have come up with a very useful little gadget that regulates the power supply from a main-power source that feeds both the motor for an electric-power model and the R/C receiver.

It is designed to fit between the 6-10v Li-Po or Li-Fe main battery pack and the receiver to provide a regulated output voltage of 5 volts to the receiver. It comes with two connectors to link the Rx and the battery, to provide the necessary current protection.

The REG-015B unit will handle an instantaneous maximum current of 25 amps for 0.8 seconds, a rise from 15 Amps normal continuous maximum, while also capable of handling a 20 second burst at 20 amps.

Price, via MacGregor/JR stockists is £79.95.

Big new Four-Stroke petrol ignition engine from Saito

Saito four-stroke engines have established a firm niche within the R/C Scale fraternity, particularly in USA. The new star in the Saito range is the FG-17 that delivers a power output comparable to their FA-100 two-stroke engine.

This is a 17.2 cc capacity type intended for a propeller range of 14 x 8 to 16 x 6 over a rev-range 2,000-9,500 rpm and weighs in at 23.35 ozs (660 grams) with muffler and ignition system.

Price via MacGregor Industries stockists is £477.75

New Hurricane and Spitfire from Mick Reeves Models

Mick Reeves has been busy again, now with an all-new 1: 4.5 scale Hawker Hurricane. At that scale, the 'Hurri', spans 110" (2800mm). Accompanying this is a revised version of his quarter-scale Mk.9 Spitfire, now with new, moulded glass fibre fuselage that incorporates the narrow wing centre section. Wings are now designed so that the two panels slot into the fuselage sides for a nice neat fit to the fuz.

In either case, the wing span is 110" (2800mm) and both models are intended for 60-100cc i.c. engines, or electric power. See the picture here for the electric power installation in the Spitfire.

The kits are available in a wide range of options. The full kits cost in the range of £800, but there's also an 'easy purchase option' in which you can buy just the plan to start with and then buy component packs for various sections of the airframe as construction progresses - rather less heavy on the wallet at any one time!

Retracts in both air/hydraulic and electric powered versions are also available

Also just introduced are new scale alloy wheel hubs to suit these models, which feature bronze axle bushes at £55.00. Look it all up on the MR web-site: www.mickreevesmodels.co.uk

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Guild of Aviation Artists

Superb creativity on display at the Guild of Aviation Artist's Annual Exhibition

Go to any of the really big UK air shows and among the tented city of traders you'll find several 'Art Galleries' all displaying and selling truly stunning examples of aviation art, depicting evocative scenes of every era of aviation from the dawn of aviation, to the most modern. And it's not all cheep stuff – the prices range from maybe £20 for a long-run print to maybe £250-£500 for a limited edition print and even thousands for an original.

Most, if not all the artists who produce the work are members, or have an association with the UK's *Guild of Aviation Artists*. They are a truly talented bunch whose works clearly emphasise their deep interest in aviation.

All of that becomes absolutely clear at their Annual Exhibition, which this year took place July19th - 24th at the Mall Galleries, at the head of the Mall in London and this year's event drew a total of 445 exhibits, all of outstanding quality and demonstrating excellent imagination in the scenes portrayed. All may be viewed at the GAvA web site (*gava.org.uk*)

We could have filled half of this month's issue with the stunning pictures we saw, but space precludes it so we're able to show just a taster of those works that grabbed the attention of you Editor the most – it's a matter of personal taste, perhaps coloured by those sectors of aviation that most hold one's personal interest.

A visit to The Guild of Aviation Artists Annual Exhibition is an experience well worth attending – look out for next year's show. ■

Frame Templates from: http://adaae-stock.deviantart.com

Winner

ABOVE: 'Ninack' by Roger H Middlebrook. (Airco DH9 & Fokker D.VII)

MAIN PICTURE: 'Battle of Britain Summer Victory' by Philip E West. (Downed Me109E & Spitfires)

1: 'Hermann Goring's Circus' by Roger H Middleton (Fokker D.VIIs)

2: 'Sunderland Attach' by John Wynne Hopkins. (Sunderland JM708 of no.228 Sqn)

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3: 'Tigris Morning' by Ken Farmer (Caudron G.III meets HMS Firefly). 4: 'Duel Over No-Mans Land' by Stephen Chard (DH2 Vs Fokker Eindecker). 5: 'Tables Turned' by Ken Farmer. (Vickers FB5 & Fokker E.III) 6: 'High Glass' by Anthony Cowland.(Harrier GR1A). 7: 'The Last Battle' by Simon Smith (Ltn Werner Voss & no.56 Sn, 1918). 8: 'Orpheus in the Overworld' by David R Hardstaff (Gnat T1 overhead CFS Kemble).
9: 'Antiques Airshow' by Edmund Miller (Spitfird, Hind, Gladiator , Tutor).
10: 'Early Bird' by Martin Simpson (SR-71 Operations Flight).

9

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11: 'The Razer's Edge' by Lee Lacey (Sopwith Dolphin ace Fred Gillet). 12: 'Firebirds' by Stephen Chard (No.56 sdn Lightnings. 13: 'Melee over the Med' by Stephen Chard (Hawker Harricane vs Regia Aeronautica Savoia Marchetti SM79). 14: 'Summer of Legends' by Stephen Brown (Hawker Hurricanes of257 Sqn).

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1930s Flight Refuelling Double

Alex Whittaker takes a look at Don Billingham's ambitious historic project

Sometimes an idea is so compelling that you just have to follow it through to its logical conclusion. And so it was for Don Billingham, when he conceived the bold idea of scratch-building a quarter-scale 1930s In-Flight Refuelling Double. Now, building one quarter scale model would be enough for most modellers. However, having the sheer grit to build two - and with one of them over fifteen feet in span - definitely demonstrates Don's true dedication.

Historic pair

In 1933, that consummate airman and showman, Sir Alan Cobham, successfully refuelled an Airspeed Courier from a trailing hose let down from a 1926 Handley Page W-10 biplane airliner. As

The Airspeed Courier takes off with the refuelling hose-grabber chappie hanging out in the breeze.

The W-10 trailing her 'refuelling tube'.

An awful lot of skill goes into getting two such dissimilar models to formate so few feet apart.

MODEL SPECIFICATION 1
HANDLEY PAGE W-10 AIRLINER

Scale:	1/4
Span:	15 feet
Weight:	83lbs
Engine:	2 X Laser 360 V Twins
Prop:	Metz 23" x8"

MODEL SPECIFICATION 2
AIRSPEED AS5 COURIER

Scale:	1/4
Span:	11 feet 6"
Weight:	38lbs
Engine:	Zenoah 80 twin
Prop:	Metz 23x*8"
Retracts:	Own design Air Up / Spring Down

refuelling counterparts they could hardly have been more different - the lumbering old biplane, and the (then) cutting edge monoplane. Certainly a very attractive pair. However, although refuelling this way was not a new idea, it did catch the imagination of the air-minded 1930s British public.

Subsequently, Cobham demonstrated this new technique at shows up and down the land. Unfortunately, the story has a tragic codicil: HP W-10 G-EBMM, '*Youth of New Zealand*', of Sir Alan Cobham's National Aviation Displays, crashed in Buckinghamshire. It was being used as an air-tanker and was returning after the mid-air re-fuelling of Cobham's Airspeed Courier, which was embarked on a long-distant flight to India. It had just departed Heston after being refuelled, when it crashed into a field killing all four crew. The Inspector of Accidents concluded that the probable cause was a fracture of a main bolt that secured the bracing wires of the front spar to the tailplane.

The refuelling tube exits some way aft of the c of g.

Don's home-made retracts stand up well to the hurly-burly of show life.

The Courier is an interesting aeroplane from all angles.

The Airspeed Courier has bags of character; note trouser on tailwheel - echoes of a Miles Aircraft.

The quad undercarriage and that forest of rigging contribute to an enormous amount of drag on the W-10.

Don's model is no slouch with her Zenoah 80 Twin safely swallowed up inside that cowl.

On this steep fly-by you can see that the Airspeed Courier has an interesting wing.

Don Bellingham lends 'scale' to the HP W-10 as he tows it back to the pits.

Don's sturdy home-constructed retracting undercarriage.

Wing-root on the Courier - note the fuel tank filler and float gauge.

Glazing has been dispensed with, in return for practicality. Not visible at typical refuelling heights!

Model In-Flight refuelling

I have noted Alan's pair of models before. They are large and impressive show beasts, rather than exact scale models. This is because they are expressly designed to fly week-in, week-out in all weathers, and in all wind conditions, at all the LMA model shows. Alan has put the emphasis on practicality and serviceability, over and above outright scale fidelity. I first spotted his in-flight pair at LMA Cosford.

The Courier is a handsome beast on a low fly by.

However, it was only later at the Woodvale Show this year that I first saw their in-flight display on an overcast and turbulent day.

The best way to describe the display is 'precise', involving some very proficient flying. The pilots had to carefully juggle their throttles and elevators to make up for large differences in power, drag, and rates of climb - nowhere near as straightforward as you might think, but a very satisfying display when it all went to plan. The crowd loved it. If you look closely at the pictures, you will notice that Don has even added a refuelling technician to stand up out of the top of the Courier!

The Models and the full-size

The air-tanker is modelled on a 1926 Handley Page W-10 Imperial Airways airliner, as converted to refuelling duties for Sir Alan Cobham. Don has modelled G-WBMR, not the ill fated G-WBMM. The model was designed by Don and scratch-built using traditional techniques. It is built

to 1/4 scale and spans over fifteen feet. It weighs 83 lbs, and is powered by two Laser 360 V Twin glow engines. These drive 23"x 8" *Menz* props. Don has also built in a working retracting hose.

The 'refuellee' is an Airspeed AS5 Courier, G-ABXN. The original was conceived as a six-seat light aircraft capable of duty as a light airliner. Sixteen were built, and interestingly, two were intended for the Republican side in the Spanish Civil War, but were not granted export licenses. As a result, two Republican sympathisers on the Airspeed staff set out to steal G-ACVA, and spirit them away to Spain. One died in the attempt, and the other was sentenced to four months gaol! The last Courier survived until 1947.

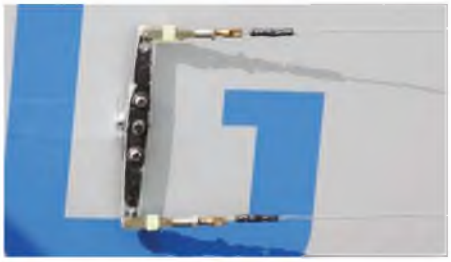
The Courier was technically noteworthy. It was the first British production aircraft to be fitted with retractable landing gear. Like the W-10, the Courier model is also traditionally built to quarter scale, and spans 11 feet 6". It weighs 38lbs, and is powered by Zenoah 80 Twin petrol engine, driving a Metz 23 x 8 prop. Don has designed and manufactured his own Air Up / Spring Down retracts for the Courier. The model is fitted two Futaba 2.4 GHz receivers. ■

Note how large the rudder is compared to the fin, and the almost equally balanced tailplane and elevator area.

Front cockpit with amazingly calm pilot.

Minimal but practical Laser V Twin engine installation. Note small additional oil-catcher tank.

Control wire ducting on front fuselage goes down to wing.



Working external closed-loop (pull-pull)control bell-crank.

Distinctive and quite ugly 1920's style rudder.

The passengers had to get in somewhere!

Lots of functional bracing and control-wire detail on the ailerons.

Characterful slatted radiator on the W-10.

I presume this is an aero-generator, or a device to drive one or more of the flying instruments.

Bryan Lea's Armstrong Whitworth FK8 cruising by; 48" span; PAW .06 powered.

Eddie Riding 2011

Alex Whittaker presents his photo report of this premier annual free-fight scale competition

The enormous Woodvale Show continues to host that little gem which is the famous *Eddie Riding Competition*. This is always held late afternoon on Woodvale Saturday, at 6.00pm prompt each year. So, if you've had a good day buying modelling stuff, and watching the radio display, you can troll over to the peri-track, and complete the day with more genteel and skilful free flight scale action.

Mind you, the famed Eddie Riding Marquee is open until mid afternoon. In this shrine to Free Flight Scale, you may examine the competing models at very close quarters, and decide which ones you think might win. The great thing about this competition is its range of internal comps, and the variety of propulsion methods chosen by the entrants. Thus you will see rubber, electric, Co2, internal combustion, catapult, and pseudo-Jetex (Reaction Class) being flown, all under the one umbrella competition.

This year the entries were healthy, and I counted 200-odd in the crowd. I'll let the pictures tell the story, but one or two models deserve a brief accompanying note.

Armstron Whitworth FK8

The first model that caught my eye was Bryan Lea's superb Armstrong Whitworth FK8. This model is 48.5" in span, and is built to his own design powered by a PAW .06 diesel. The model is of traditional construction with a dash of high-tech. In fact, it uses carbon fibre for the leading edge, trailing edge, and rib caps. It is covered in Mylar and silk and finished in *Humbrol* paints. There are lots of authentic details such as radiators, engine manifolds, and the funky conical-ended fuel tank. I particularly liked the trade mark 'AW' pressed into the engine cowling. The full-size example modelled was an ex-military version, and used for Post-WWI joy riding. Hence the *Evening Standard* legending, The ill-fated original crashed in August 1919. By the way, it was nice to see a PAW 0.06 diesel - a little jewel of an engine. And that wasn't all.

MiG 15

James Campbell's 14 3/4 " span MiG 15 fighter is an interesting scale model. For a start it is a catapult-launched Jetex style model, designed by much missed, and

Mike Stuart's ambitious own-design, rubber powered, Armstrong Whitworth Argosy. More on this brilliant achievement next month!

Roger Shaw's own-designed Stinson 108 is rubber powered and spans 34".

Sopwith 1 1/2 Strutter by Al Wood, 38 " span. Powered by an Aurora Indian Mills 1cc diesel driving an 8"x4" prop.

Barry Williams' 36" span rubber-powered ABC Robin, designed by Eddie Riding.

John Watters' Eddie Riding design Argus, of 36" span and Co2 powered.

Tim Milner's 36" span rubber powered Piper J3 Cub from the West Wings kit.

Tim Milner's 12.5" span MiG 27 'Fulcrum' catapult launched jet.

Mike Stuart's own-design Saab J-29 Tunnan 23.5" span uses Rapier L-3 rocket motors.

BAC Lightning, from the original 15" span Aerographics kit, but enlarged by 25% by owner Al Wood.

Barry Williams' immaculate ABC Robin.

James Campbell's 14.75" span Mig 15 catapult launch model, designed by David Boddington.

James Campbell's Breda 15 Italian Light Monoplane is electric powered and spans 26.5 inches.

much loved, David Boddington. This looked and sounded spectacular fizzing away.

BAC Lightning

Reaction models seem to be gaining in popularity with the coming of the *Rapier L3* system. Designs that struggled a bit with original *Jetex*, seem to do better with *Rapier* power, even when scaled up. There were quite a few *Rapier* powered 'Jetex' models present on the day, and their first cousins, the catapult launched jets. Al Wood's BAC Lightning, was a good example of a new take on an old favourite. His model is built from the original 15" span *Aerographics* kit, but Al has enlarged it by 25%. It was a bit marginal until Al gave it a few tweaks, and whilst there is still some way to go, it did leave spectacular tracks across the sky, not to say burn marks on the grass!

Saab J-29

Mike Stuart was also a rocket man on the day. He flew his own-design Saab J-29 Tunnan. This traditionally built model jet is 23.5" in span, and as the others, uses *Rapier L-3* rocket motors. You can even down load the plan free from Mikes' great website *www.ffscale.co.uk*. It seemed to be a bit erratic, then suddenly found some power, and promptly rammed the public address system pole at full tilt! Its leading edge was parted, and locked onto the upright, it spun around like a pole dancer, fizzing out lots of smoke to the undisguised delight of the crowd.

Fulcrum Jet

Tim Milner never disappoints. This year amongst his other models he flew a very nice little 'Fulcrum' (The MiG 29,). This was catapult powered and very impressive. It spans 12.5" and was built from an Aeromodeller free plan from November 1996, by George Milner Smith. Originally for Jetex.

Panther jet

There was even a Grumman F9F Panther, flown by John Watters. I was particularly interested in this model since it was built from the famous *Keil Kraft* kit. I have never seen one before, and it was delight to step back in time and see this pocket money marvel.

John Watters' Grumman F9F Panther (17" span) from the famous Keil Kraft kit.

Derek Gilbert's Westland Widgeon III, to the Eddie Riding plan. Model is KP 02 electric powered.

Roger Shaw's Eddie Riding designed Fairchild Argus; 36" span, and rubber powered.

Paul Bingham's own design Piper Super Cruiser is electric and 36". Standard KP 02 motor system.

Bryan Lea's impressively detailed Armstrong Whitworth FK8.

Great scale detailing on engine exhaust: Bryan Lea's Armstrong Whitworth FK8.

Scale fuel tank on Bryan Lea's superb Armstrong Whitworth FK8.

Radiator detail on Bryan Lea's Armstrong Whitworth FK8.

Mike Stuart's Mitsubishi Kamikaze.

John Watters' catapult-launch Panther from the famous Keil Kraft kit.

Mitsubishi Kamikaze

Mike Stuart also brought his own design 1/20th scale Mitsubishi Ki15 Kamikaze, originally designed for indoor F/F scale. In fact we have featured this lovely model at the Notts Natts (F/F Indoor Scale Nationals) reports in the last year or two. It is electric powered with a *Voodoo 25* motor and a *Zombie* controller. The full-size was the first Japanese aircraft to fly from Japan to Europe. Tokyo-London took 31 hours. Mike had decided to try her out-doors and I can report that she flew very nicely indeed.

Sopwith 1.1/2 Strutter

Al Wood was flying his very smart Sopwith 1.1/2 Strutter. This is 38" span, and had a lovely engine turned cowling. Being an i.c. power man, I was delighted to see that the 'Strutter was powered by an Indian Mills 1cc *(Aurora)* driving an 8"x4" prop. Mind you, I have two of these engines in my shed, and neither is a ball of fire. One of my examples has had two new conrod in three years! Still, such a lovely, carefully comstructed diesel-engined scale free flight model is a delightful traditional experience, both for the modeller and the crowd. One interesting crossover: the original plan was for a 67" R/C model, which Al has scaled down.

Stinson 108

Any Stinson is a delight, and Roger

1/12th scale Rubber Powered Piper Cub J3 by James Campbell. Flying on four strands of 1/4" rubber, 21" long.

Don't forget the portable stooge!

Tim Milner with his Fulcrum.

Mike Stuart's rocket-powered Saab ditched in the grass simulating a brushfire!

James Campbell's Breda 15 Italian Light Monoplane getting away.

Bryan Lea checks his Armstrong Whitworth FK8. Carbon fibre leading edge, trailing edge, and rib caps.

Paul Bingham's own design Piper Super Cruiser powered by a standard KP 02 motor system.

This is just part - I counted over 200 in the crowd.

John Watters' Eddie Riding design powering by on its Co2 motor.

Roger Shaw's doping the wind with his own-designed Stinson 108.

Roger Shaw's scratch-built Stinson 108. Rubber powered; spans 34".

After an aerial altercation with Al Wood's BAC Lightning, Barry Williams applied a quick fix of Magic Tape to his ABC Robin.

Mike Stuart's staggeringly ambitious own-design, rubber powered, four-engined Armstrong-Whitworth Argosy.

Shaw's scratch-built Stinson 108 was an engaging example. Roger's '108 is traditionally built, and rubber powered. I thought she flew very well, and looked convincing cruising aloft. Although only 34" in span, somehow she had a much greater presence in the air.

Armstrong Whitworth Argosy

Well, let's end on a rare treat. How about a British multi-engined civilian air freighter? How about a four engined rubber-powered air-freighter? Enter Mike Stuart's staggeringly ambitious own-design, Armstrong Whitworth Argosy. This model has four rubber motors, and flew like it was on wired. Stay tuned for next month's FSM, when we do a special feature on this amazing model.

The Verdict

You can't beat the Eddie Riding for the sheer range of free-flight propulsion systems on display. So for that alone, I would attend each year. However, the variety of models always delights, and this year, Mike Stuart's majestic Argosy made the whole trip even more worthwhile. By the way, do not miss next year's Woodvale Show, because the word on the street is that the much-missed morning r/c scale competition is to be reinstated. ■

BELOW: Mike Stuart's own-design Saab J-29 Tunnan; 23.5" span uses Rapier L-3 rocket motors.

RIGHT: Mike Stuart's Saab J-29 Tunnan 23.5" collided with - and did lap ot two around -the PA System pole.

TOP 5 POSITIONS

	Name	Model	Class	Total
1:	Bryan Lea	Armstrong Whitworth FK8	I/C	1592
2:	Mike Stuart	Mitsubishi Ki15 (Kamikazi)	Electric	1477.5
3:	Mike Stuart	Armstrong Whitworth Argosy	Rubber	1377
4:	Tim Milner	Piper Cub J3	Rubber	1323
5:	Roger Shaw	Stinson 108	Rubber	1248

I/C POWER

	Name	Model	Flight A	B	C	D	Static	Total
1:	Bryan Lea	Armstrong Whitworth FK8	0	0	687.5	-	874.5	1562
2:	Al Wood	Sopwith 1 1/2 Strutter	-	0	0	-	823.5	823.5
3:	Andrew Hewitt	Morane Type L or DH34	-	-	-	-	-	0

RUBBER POWER

	Name	Model	Flight A	B	C	D	Static	Total
1:	Mike Stuart	Armstrong Whitworth Argosy	627.5	720	-	685	657	1377
2:	Tim Milner	Piper Cub J3	600	0	0	0	723	1323
3:	Roger Shaw	Stinson 108	612.5	627.5	550	640	608	1248

ELECTRIC/CO2/AIR

	Name	Model	Flight A	B	C	D	Static	Total
1:	Mike Stuart	Mitsubishi Ki15 (Kamikaze)	732.5	670	657.5	712.5	765	1477.5
2:	James Campbell	Breda 15 (Elec)	-	0	635	-	379.5	1014.5
3:	Paul Bingham	Piper Super Cruiser	0	0	0	0	756	756

REACTION/CATAPULT

	Name	Model	Flight A	B	C	D	Static	Total
1:	John Watters	Gromman Panther (Cat)	515	665	482.5	587.5	548.5	1213.5
2:	Tim Milner	Mig 29 "Fulcrum" (Cat)	530	-	-	-	549	1079
3:	James Campbell	MIG15 (Cat)	0	-	275	-	398.5	673.5

EDDIE RIDING DESIGNS

	Name	Model	Power	Flight A	B	C	D	Static	Total
1:	Tim Milner	ABC Robin	Rubber	855	-	0	727.5	807.5	1662.5
2:	Derek Gilbert	Westland Widgeon	Electric	0	630	600	882.5	727.5	1610
3:	John Watters	Fairchild Argus	Rubber	617.5	0	0	847.5	735	1582.5

BELOW: BAC Lightning, from the Aerographics kit enlarged by 25% by Al Wood.
RIGHT: Al's BAC Lightning is Rapier L3 powered.

Tim Milner's ABC Robin climbing out.

KIT REVIEW *by Brian Brassey*

LUSCIOUS LAVO

BRIAN BRASSEY BUILDS WARBIRD REPLICAS' NEW .90 SIZE

I SUPPOSE IF OUR 'WOODEN WONDER' WAS THE DEHAVILLAND MOSQUITO THEN THE RUSSIAN 'WOODEN WONDER' WAS THE LAVOCHIKIN LA-5/LA-7 AIRCRAFT.

THE LA-5 WAS ONE OF THOSE CONVERSIONS FROM INLINE TO RADIAL ENGINES WHICH WERE SO SUCCESSFUL DURING THE SECOND WORLD WAR. THE JAPANESE KAWASAKI KI 100 AND OUR OWN HAWKER TEMPEST MK 2 BEING GOOD EXAMPLES.

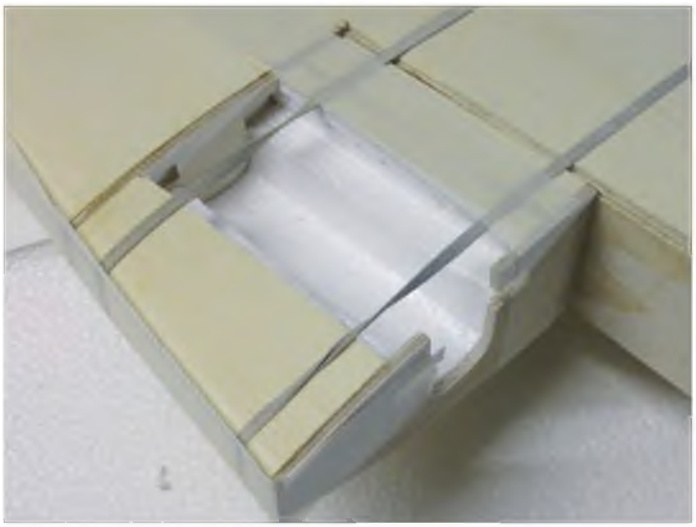
THE LAVOCHIKIN USED BAKELITE PLY CONSTRUCTION WHICH USES PHENOL-FORMAL DEHYDE RESIN, AN EARLY FORM OF PLASTIC. IT GAVE GREAT STRENGTH AND ALLOWED HIGH 'G' MANOEUVRES AT LOW TO MEDIUM ALTITUDE WHICH SUITED THE LOW ALTITUDE AIR-WAR ON THE RUSSIAN FRONT, THE GERMANS COULD NOT OUT-TURN THEM.

OCHKIN

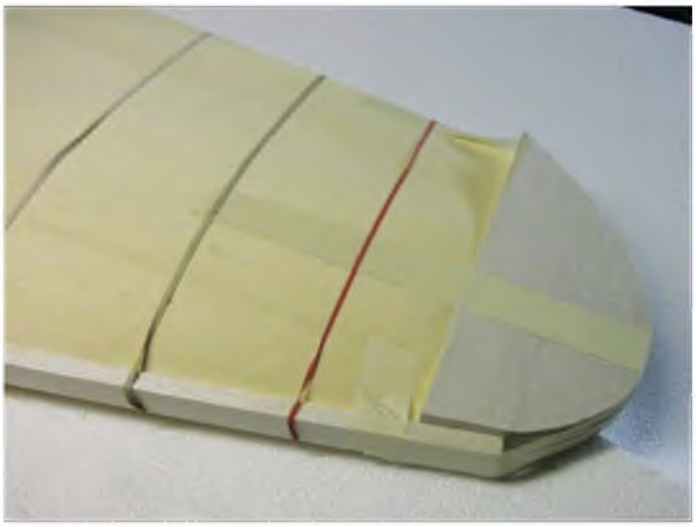
RUSSIAN WW2 FIGHTER

Wing cut-out for dihedral brace and retracts.

Wings joined with epoxy.



Ply bearers for retracts and ply dihedral brace fitted.



Wing tip glued on (White glue).

Now to the model

Richard Wills of *Warbird Replicas* produced a .52 F.S. sized La-7 model some years ago, which I built and gave me great pleasure, until destroyed in a mid-air collision. When I heard he was doing an enlarged version for a .90 sized four-stroke I mae contact and he sent me a pre-production kit to put together. If you have built an A.R.T.F. warbird you will be able to build this one and have the added bonus of being able to choose your own colour scheme. The other thing is, the kit is British. We've given enough to our Chinese compatriots, so I think it's time we model builders suported our home-grown industry.

What do we get when we open the box? The first thing which pleased me was a one-piece fibreglass cowl, very well moulded and not too thin like some of the A.R.T.F. cowls. Obechi veneered foam wings with routed cut-outs for aileron servos and retracts and a nice hole through the centre for the servo leads. Obechi veneered foam turtle decks and fin are also included to make things easier, and all

Leading edge glued on (White glue).

Wing tip sanded with washout sanded in.

Wheel wells lined with 1/64" ply, foam disc holds in place while glue dries.

the plywood pieces are pre-cut. The Balsa fuselage sides have a wonderful joint so no mistakes. The wing tips, tail, elevators and rudder are also pre-cut but will need sanding to section. There is also a lite-ply former to ensure the fuselage is kept straight during assembly.

Two vac-formed items complete the main contents, one in white styrene which has wheel wells, front part of radiator intake and gun blisters. The second is in clear and is the cockpit canopy.

I must stress at this point that my kit was a pre-production one so any little difficulties I encountered have been passed on to Richard and he will be making modifications before you get yours.

I always start with the wing. Here I made life hard for myself as I wanted flaps and air retracts on my model. I have altered the undercarriage bearers and put in a dihedral brace. These are all made from 1/8" ply. I have heard from Richard that there has been no problem with the original undercarriage system. Whatever installation you choose you will have to cut out the foam from within the wheel wells. Use a sharp blade and cut out a bit at a time.

You have to cut out enough depth to allow your chosen wheels to retract properly. Bear in mind the top covering is 1/64" Obechi. Trial fit your retracts at this stage and check that they work correctly.

Next, glue on the wing tips and leading edges. When dry, sand the tips to section. There is washout built into the wing (essential on a Warbird) so I like to maintain the washout through the wing tip. I couldn't get the vac-formed wheel wells to fit to my satisfaction so I elected to use 1/64" ply liners stuck in with white glue and held in place until completely dry with a foam disc.

Now we come to the flap and aileron cut-out. Flaps are not essential so I have described both with and without construction.

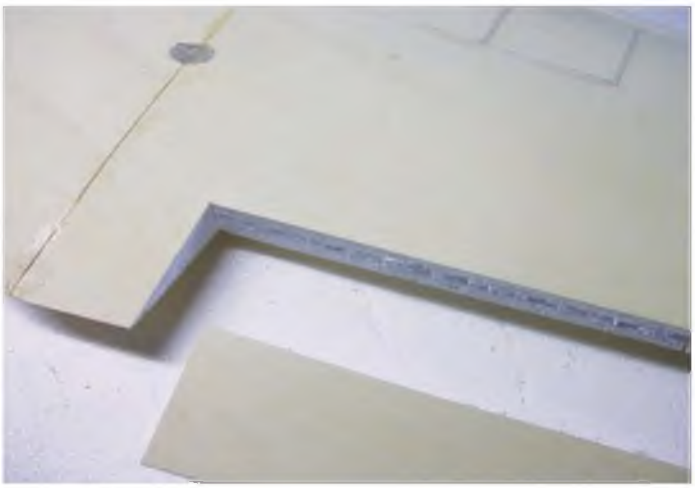
Aileron-only wing

Cut out the ailerons from the wing by cutting with a sharp scalpel from the top and the bottom using a metal straight edge. The wing cut-out has to be lined with 1/4" balsa to take the aileron hinges (Mylar strip in the kit) I use the top-hinge method as the aileron has no gaps and whatever covering you use (Film or Solartex) you can cover the joint as well as having hinges ('belt and braces').

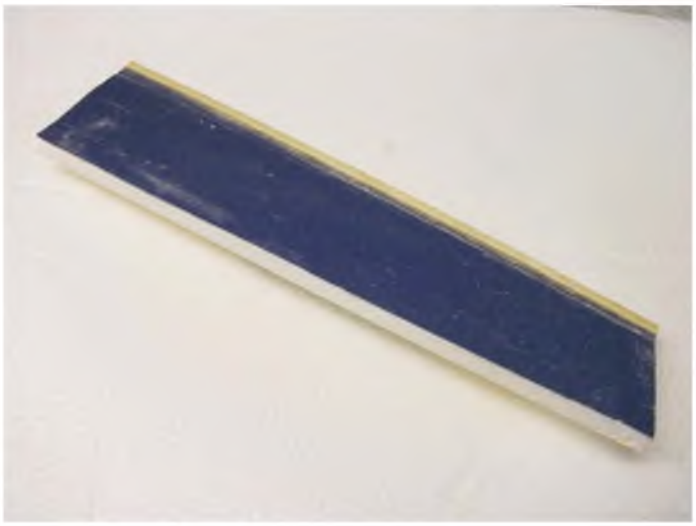
Flap and aileron wing

The flap and aileron are as shown on the photos and are cut out in one piece. The wing cut-out is then faced with 1/4" balsa. The Lavochkin has split flaps like the Spitfire so the top part of the flap has to be stuck back on the wing. I used a 'hot' wire to cut through the centre of the foam on the flap and then lined it with lithoplate stuck on with five-minute epoxy resin (you could use 1/64" ply if you have no lithoplate). The trailing edge has a piece of 1/16" x 1/4" glued on. The flap is

Eurokit retract trial fitted.



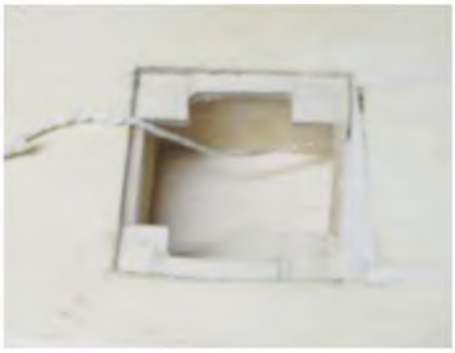
Flap and aileron cut-out.



Flap top construction (Split flaps).

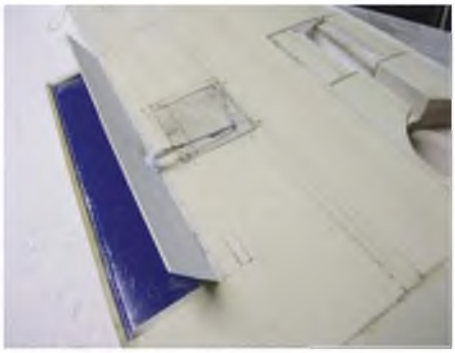
Top part of flap lined up with aileron and wing tip.

Flap servo cut-out and flap.



Aileron servo cut-out(N.B. string to pull wire through.

Aileron construction (uses top hinge construction).



Flap servo and flap fitted.

Aileron and servo fitted.

Tail cut-out on fuselage has 1/64" ply doubler.

1/16" balsa sheet faced with lithoplate and this sits inside the 1/16"x 1/4" ply trailing edge. I used S.L.E.C. pinned hinges for the flaps. You also have to cut out a box in the wing for the flap servos which are 10 kg. pull as there is a lot of pressure on them when deployed in flight. N.B. flap servos work in the same direction, aileron servos opposite. The servos are fitted to the bottom of the ply closing plates by screwing onto wooden blocks glued on with epoxy. Three wire extensions need to be fitted to the servos (I solder these and cover in heat-shrink before the wire is pulled through the pre-cut tube and 'Y'-lead at the centre of the wing in the same way).

Tailplane

I elected to do a built-up tailplane as having done many a Brian Taylor designed aircraft, I find it easier and it's also lighter. The cut-out for the tail has to be modified, butit should still have 0 degrees incidence. However if you like sanding balsa the wood is straight grained, soft and light enough to make a good job.

Fuselage

I have put a 1/64"ply doubler on the tailplane seat to strengthen this critical area. The fuselage sides have a 1/32" ply doubler. N.B. make a left and right side. The fuselage is constructed with the liteply former which ensures no bananas, I did however use 1/4"X1/2" doublers and 1/4" soft balsa sheet for the bottom of the fuselage as the full size aircraft had a rounded bottom section.

There were two potential problems with the two 1/8" ply bulkheads. They were slightly too large. I reduced them in diameter to fit the cowl. If you are using a .91 fourstroke engine, the rocker cover sticks out by about 3/8", also the silencer has to exit the cowl. The angle on the plan for the motor mount is a good one as the head is then in line with the cooling exit hole and most of the silencer is inside the cowl.

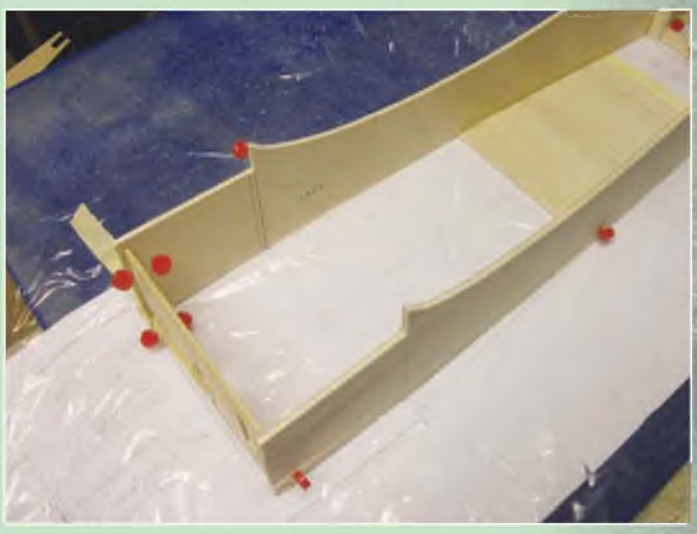
However a piece of the front bulkhead on the opposite side to the head must be cut off to allow the cowl to be squeezed over the rocker cover. The silencer has to swivel inside the cowl and therefore it is necessary to leave the pipe fitted to the engine loose. A cut-out is also necessary at the bottom of the front bulkhead. I did this by trial fitting, but it would be better if the cut-outs were done before assembly. The only holes in the cowl were for the rocker cover and the silencer exit.

Once the cowl is in the right position, the silencer is swung down and the nut on the pipe from the engine can be tightened from the front of the cowl. Trust me, it works and looks neat. I also added a 1/8" ply doubler to the front bulkhead (belt and braces again). The cowl is fixed by four screws nto wooden blocks fitted to the rear bulkhead. A *S.L.E.C.* square orange tank slides backwards into the tank bay, no hatch required.

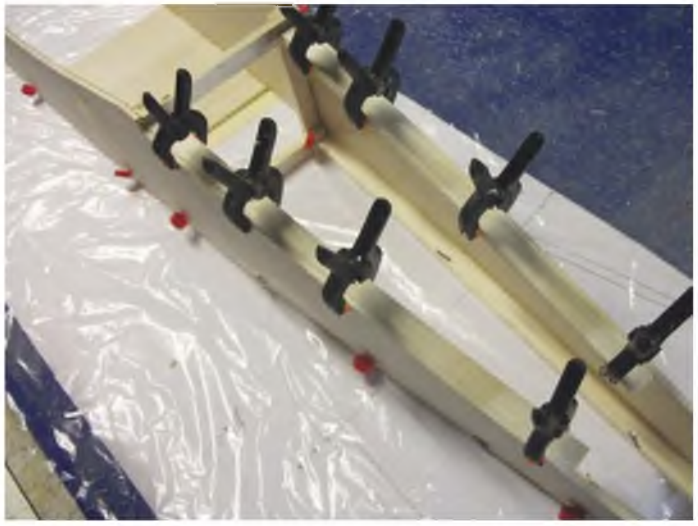
Simple construction is to either use pushrods or snakes exiting under the tailplane to activate external elevator and rudder horns with a fixed tailwheel.

Before that, fix the wing to the fuselage. Ensure that the wing is central before drilling holes for the dowels at the front and bolts at the rear. I put balsa blocks in the wing for the bolts to go through(see photos).With the wing in position the tailplane can be pinned on and given a good 'eyeballing' from the front and rear. Once satisfied with the tailplane fit, unpin and glue

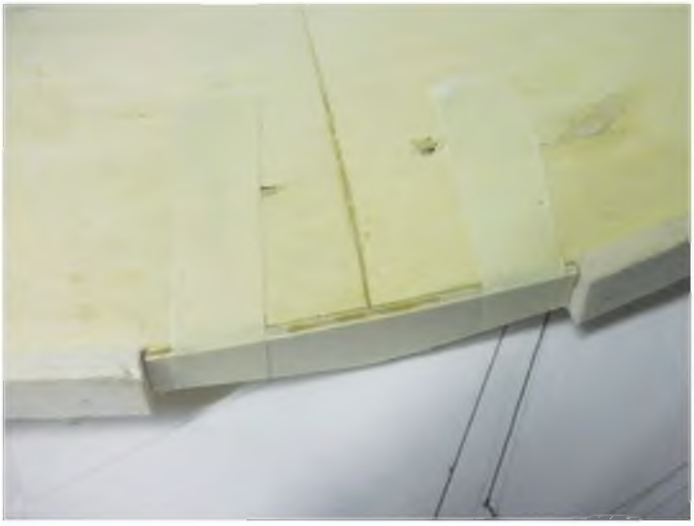
Fuselage sides and bulkheads (N.B. Make right and left hand sides.



Fuselage constructed over plan.

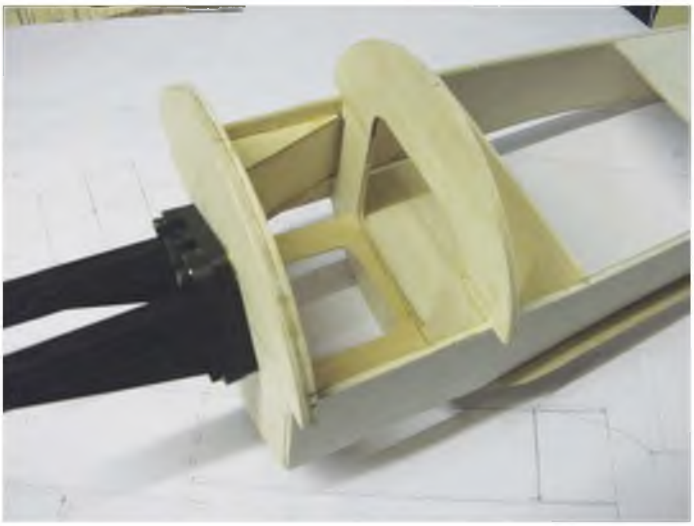


1/4" balsa doublers.



1/8" ply fitted to leading edge.

Ply bulkheads fitted.



Engine mount fitted.

with 5 minute epoxy resin and 'eyeball' again before setting aside to dry.

I now deviated from simple construction. If, like me, you want to do a steerable tailwheel and internal elevator horn you need to make an elevator joiner with horn attached from piano wire soft-soldered together (see photo). The elevators and attached pushrod, which is made from a *S.L.E.C.* nylon horn cut down and spliced into a piece of 3/16" square spruce pinned with apiece of cocktail stick and whipped with cotton and cyano, have to be fitted before the rear foam turtledeck is fitted.

The steerable tailwheel is made in a similar way. The horn of piano wire is made integrally with the tailwheel wire and the same method is used for the pushrod. A piece of threaded wire fitted with a metal quicklink and a 'Z'-bend is attached to the horn on the pushrod to activate the rudder.

Once the pushrods are installed the two turtledecks can be fitted and the wing fillet made. The front part of the fillet is from triangular stock balsa nicked with a hack-saw blade to allow it to curve round the wing seat the rear part of the fillet is 1/64" ply.

The fin is Obechi veneered foam which has a balsa leading and trailing edge. On the full size aircraft, this was built integrally with the fuselage so that the rear tuttledeck and fin should blend into each other. Proper vertical alignment is achieved by the string method i.e. stretch the string over the fin from the tailplane, mark the centre of the string and line up the top of the fin with this. This ensures that the fin is central. 1/8" balsa sheet completes the fuselage between the two foam decks forming the cockpit enclosure. Trial fit the cockpit canopy and mark the position in pencil on the rear deck. Scribe a line 1/4" up from

this and cut away with a sharp scalpel. Line this with 1/16" soft balsa.

Elevators and rudder

If you use the elevators and rudder in the kit these will need to be sanded to section. However the elevators and rudder on the fullsize aircraft were metal framed and fabric covered. I elected to use the 'Eric Coates' method. Eric was a marvellous modeller who devised a method of making lightweight but strong fabric covered elevators and rudder.

A 1/16" sheet balsa core has a solid 1/2" leading edge top and bottom with 1/16" balsa riblets added top and bottom. Once covered with Solartex it is extremely strong and the riblets can be seen as per full size.

Underwing radiator

I made this from block balsa and the vac-formed intake supplied with the kit. This could be fitted directly to the model (glue to the wing only). I vac formed the completed radiator and moulded a glassfibre one from the vacform.

The undercarriage wheel covers are from 1/32" ply and lithoplate glued with 5 minute epoxy.

Finishing

The model is now sanded. Any bumps, dinks, imperfections are filled with a lightweight filler and sanded. Finish sanding with wet or dry.

I Balsaloc'ed the whole airframe and then covered in standard *Solartex*. The weave is then filled with four coats of thinned cellulose dope and talcum powder as a sandsealer. Flat each coat of sandsealer with wet or dry.

You could use a glass-epoxy finish, but I stick to what I know. When happy with the finish clean the whole air frame with tac-rags.

Painting

When Richard Wills produced the smaller La-7 kit he advocated using *Halfords* spray cans i.e. grey primer and Ford Bermuda blue, so a trip to Halfords bought grey and white primer, Ford Bermuda blue and Ford radiant red.

The aircraft I chose to do is 'White 24' of Major Sul No.56.

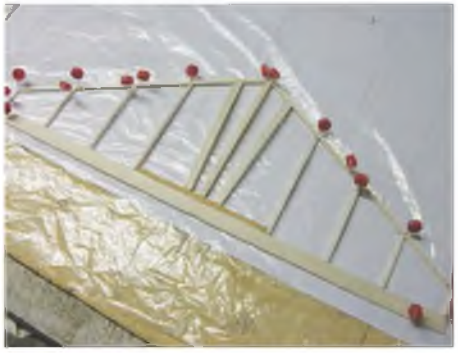
I sprayed the wing undersurface, fuselage sides and undersurface, fin and rudder and the spinner (which is a Brian Taylor Mk 1 spinner) in white primer. Leave this for at least twenty four hours to dry.

Star templates were made from Kellog boxes, positioned on the airframe and drawn round with a red ink indelible pen. I then used lining tape,1/4" on the fuselage and underwing and 3/16" on the fin and rudder. The lining tape eliminates any creep when overspraying another colour. I masked off the stars and the white arrow motif on the fuselage. The white background to the emblem on the cowl (the diving bird is hand painted) was done in the same way. The tape will stretch round a circle. Use ordinary masking tape to infill. The lining tape was also used for the demarcation line between the grey top and bottom blue on the fuselage.

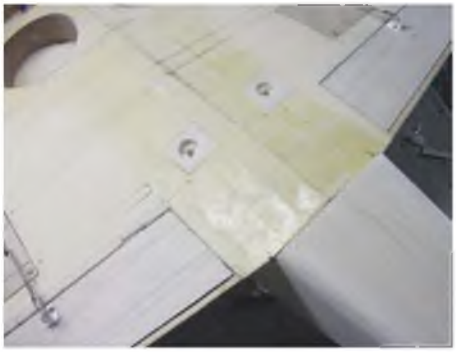
Spray with light blue first (leave to thoroughly dry). Mask off blue and spray upper surfaces with grey primer. Again make sure this is completely dry before the next stage. Uncover the red star areas and front of cowl and spray red. Leave for twenty four hours. The darker grey upper surface colour is *Humbrol* enamel no. 27 Sea Grey which I hand painted.

Steerable tailwheel with link for rudder.

Top front deck fitted.



Built up tail construction.



Position of wing bolts.

Radiator construction (glassfibre from mould).

Wing fitting to bulkhead.

Wing fillet 1/64" ply.

Elevator joiner and horn from piano wire (soft soldered.

Elevator,1/16" balsa core, block at tips,1/16" balsa half ribs added.

Take off all the masking tape. Slowly peel away the lining tape to reveal a nice neat white outline to your stars. Use the red ink pen to outline the white and the arrow motif. The white 24 on the fuselage is inkjet vinyl.

Make card templates of the numbers, lay onto the vinyl (small pieces of masking tape eliminate movement) and draw round them with the red ink pen. Cut out with a sharp blade or scissors and stick on.

Because The La-7 was basically a wooden aircraft there is a minimum of panel lines. I use a pencil to draw these on and graphite dust(scraped from the pencil) to add shading. Rub the dust over the built up elevators and rudder and the ribs appear.

Leave for two to three days to allow the paint to dry thoroughly and spray with fuel proofer. I used *KlassKote*.

The aluminium area behind the cowl is plumbers self-adhesive aluminium tape. Care has to be taken to position this correctly as once stuck it aint coming off. 1 put this on after fuel proofing.

I then installed the engine and radio and checked everything was working correctly especially the retractable undercarriage and then we wait for the fickle British weather.

Rudder and elevator pushrods.

Fin fitted (string ensures fin is central).

Flying

Having checked the centre of gravity I had no need to add any extra weight (a 3300 sub c NiMh battery was installed on top of the fuel tank).

When we arrived at the flying site it was bright and sunny if a little breezy. I checked the engine and all controls and range checked with the engine running.

The take-off was an anti-climax, plenty of power and no trim adjustment on ailerons- my building must be improving, a couple of clicks of up elevator which tells me I could be even more lenient with the centre of gravity location. By this time I had reduced power to about two thirds throttle.

Time to check out the flaps

At a reasonable height I tentatively lowered the flaps to maximum reducing power the more flap went on. There was no trim change at just under half throttle.

Loops, rolls, Immelmans, reversals, stall-turns, the Lavochkin does all these The stall is gentle with no tendency to flick.

Landing, I lined up into a crosswind with full flap, as the power reduces there is a slight nose-down attitude, no bad thing. The landing is slow, controlled, with no tendency to tip-stall. I could have done more of a three point landing as when the wheels touched the nose went down. I have since oiled the wheels and raked the undercarriage forward by putting a 1/16" ply plate under the rear retract bearer.

The Lavochkin at the time of writing has had two flights and my grandson Dominic was so impressed he wants to build one.

I thoroughly recommend The *Warbirds Replicas* La-7 and it's a British kit, so get building. ■

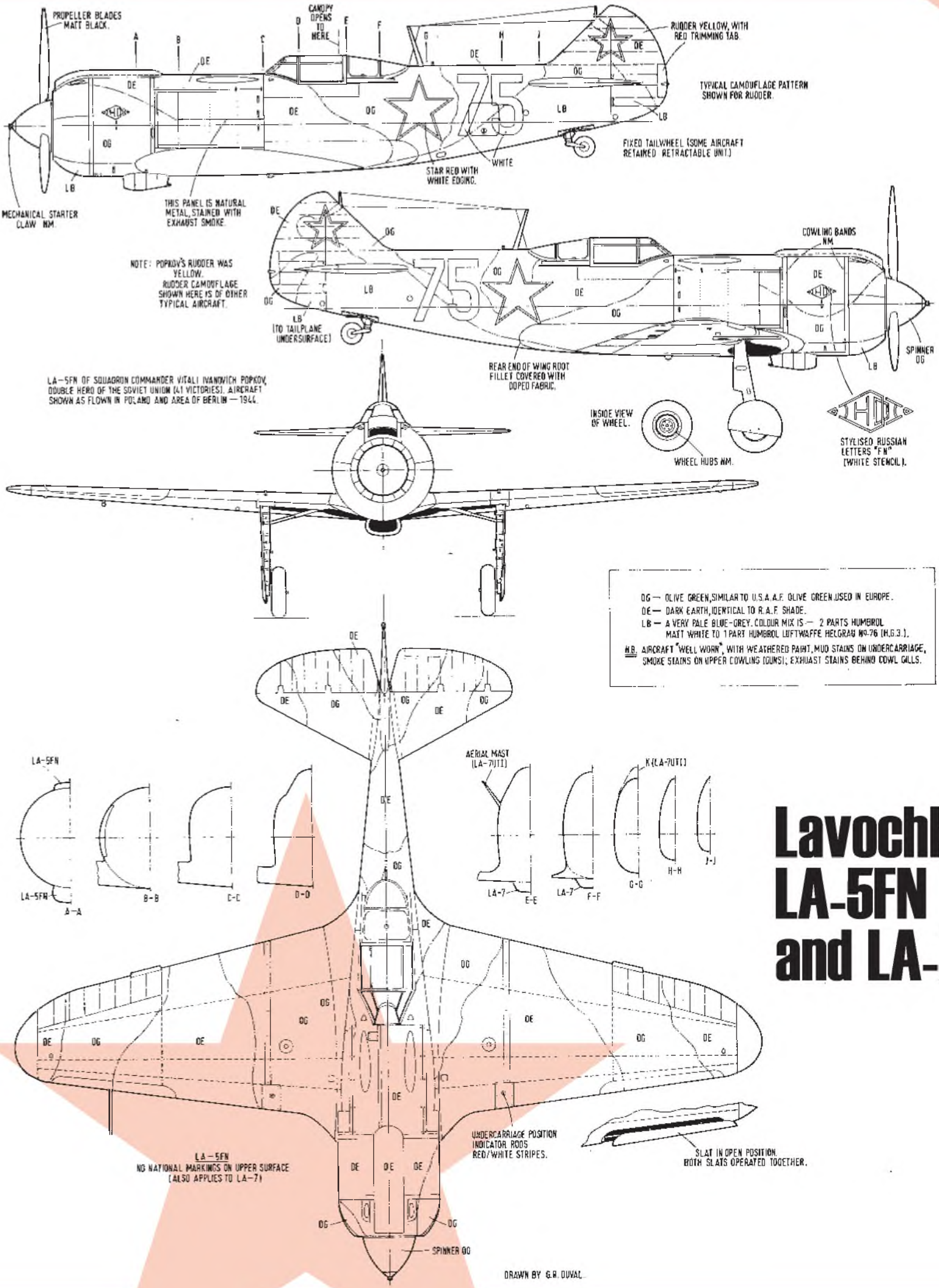
Foam deck cut out for cockpit canopy fit and sheeted with 1/16" balsa.

Rudder construction, same as elevators.

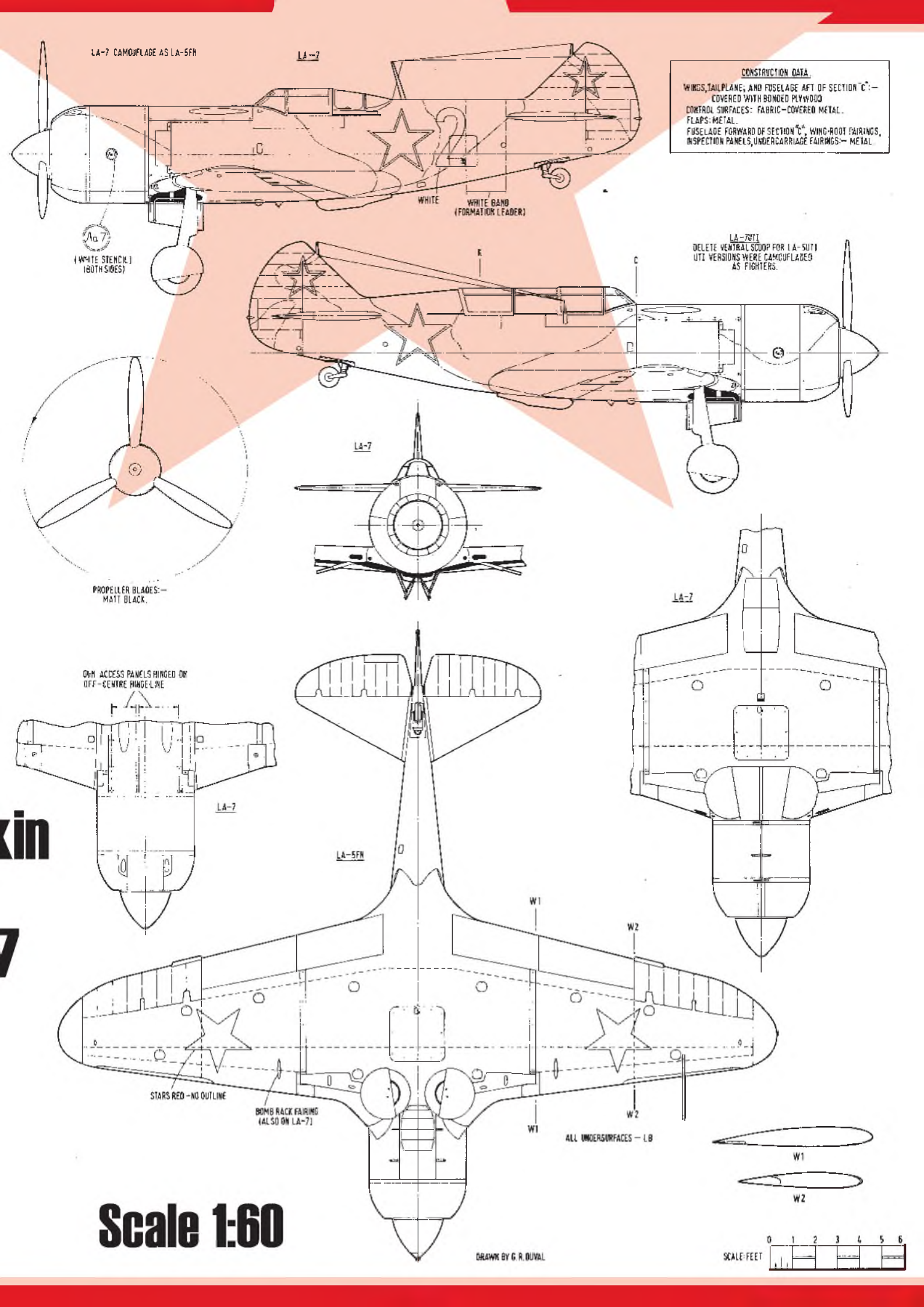
SPECIFICATION

Wingspan: 62"
Scale: 1:5.5
Engine: O.S. 91 Surpass four stroke
14 x 7 A.P.C. propeller
Retracts: Eurokit
Radio: Futaba 2.4
Weight: 9 1/2 lb.
Manufacturer: Warbird Replicas,
17 Curzon Way, Chelmsford,
CM2 6PF (tel: 01245 284791)

www.warbirdreplicas.co.uk



Lavochk
LA-5FN
and LA-


LA-7 CAMOUFLAGE AS LA-5FN
LA-7
CONSTRUCTION DATA
WINGS, TAILPLANE, AND FUSELAGE AFT OF SECTION "C":— COVERED WITH BONDED PLYWOOD
CONTROL SURFACES: FABRIC-COVERED METAL.
FLAPS: METAL.
FUSELAGE FORWARD OF SECTION "C", WIND-ROOT FAIRINGS, INSPECTION PANELS, UNDERCARRIAGE FAIRINGS:— METAL
WHITE
WHITE BAND (FORMATION LEADER)
(WHITE STENCIL) (BOTH SIDES)
LA-7UTI
DELETE VENTRAL SCOOP FOR LA-5UTI
UTI VERSIONS WERE CAMOUFLAGED AS FIGHTERS.
LA-7
PROPELLER BLADES:— MATT BLACK.
LA-7
0ffM ACCESS PANELS HINGED ON OFF-CENTRE HINGE-LINE
LA-7
LA-5FN
W1
W2
STARS RED - NO OUTLINE
BOMB RACK FAIRING (ALSO ON LA-7)
ALL UNDERSURFACES — LB
W1
W2
Scale 1:60
DRAWN BY G. R. DUVAL
SCALE: FEET
0 1 2 3 4 5 6

LAVOCHKIN L
FLOWN BY IV
JULY 1944. KO
SORTIES ON L
TOP-SCORING
WORLD WAR

WING SLAT DETAIL, OPEN POSITION

LAVOCHKIN
LA-5 & LA-7

Flying Colo

LA 5FN (FORSIROVANNYI NYEPOSREDSTVENNO)
AN KOJEDUB BETWEEN 2ND MAY 1944 AND MID
JEDUB ACHIEVED 62 AERIAL VICTORIES IN 520
LAVOCHKIN FIGHTERS; HE THUS QUALIFIES AS THE
ACE OF ANY ALLIED NATION IN THE SECOND

LAG 5 (LA 3) FLOWN BY IVAN KOJEDUB IN KHARKOV AREA, MARCH 1943. NOTE STARS OUTLINED IN BLACK.

LA 5FN FLOWN BY V. I. POPKOV IN POLAND, 1944.

LA 5FN DONATED BY MOSCOW JAZZ-BAND "THE JOLLY FELLOWS". TAKEN ON CHARGE BY V.V.S. AT MOSCOW-KUBINKA, SPRING 1943; SERVED THROUGHOUT WAR, FLOWN OCCASIONALLY BY V.I. POPKOV.

LA 5FN IN STANDARD SCHEME, FORMATION LEADER'S AIRCRAFT

LA 7 IN STANDARD SCHEME; NOTE REAR-VIEW MIRROR AND INSCRIPTION (UNKNOWN) BEHIND COCKPIT

LA 5FN OF 1ST CZECHOSLAVAK FIGHTER REGT., PROSKUROV, UKRAINE, 11 SEPTEMBER 1944

S-97 (LA 7) OF CZECHOSLOVAK AIR FORCE

S-97 OF CZECHOSLOVAK AIR FORCE, AS AT OLOMOUC, CZECHOSLOVAKIA IN AUTUMN 1958

LA 5FN OF POLISH AIR FORCE EVALUATION BATCH; NEVER SAW SQUADRON SERVICE.

CONSTRUCTION PLAN FEATURE *by Gary Sunderland*

Nifty Nieu

P

Make Gary Sunder
Neat and elegant

Some years ago I purchased a Nieuport 28 cowling from *Proctor Enterprises* in USA with the expectation that 'some day' I would want to model another WW1 rotary engined Scout. Then, last year, I tried flying my Albatros D.III for a time with an O.S. 200 four-stroke engine.

I was already flying an O.S. 200 in my 9Kg. Pfalz D.XII, with excellent results, but the 10 Kg. Albatros proved a bit much for that engine. It sounded nice in flight, but the vertical performance left a bit to be desired, so I re-installed the Moki two-stroke originally used.

Now I had a spare engine ... and a rotary cowling, but would the engine fit inside? A check showed the cowl was a bit malnourished at a bare ten inches diameter, but the O.S.200 would JUST fit, with possibly a fraction to spare.

So what to build?

Our local WW1 flyers have many models of Sopwith Pups, Sopwith Triplane and Camels, umpteen Fokker Triplanes, almost as many Eindeckers and a variety of Nieuport 11s and 17s - plus, of course, the *Proctor*-kitted Nieuport 28. The last would have been my choice, based on this model's excellent flying characteristics, but I doubted I could build a better flying example of the type and even then, most observers would have thought it was a *Proctor* kit anyway!

So I settled for the Nieuport 27 as being something a little different - a sort of Nieuport 17 in Nieuport 28 clothes, with a relatively long (in WW1 terms) in-service history and a variety of colour schemes from which to choose.

The Nieuport 27 described

This was the last of the Nieuport one-and-a-half-winged (sesquiplane) designs that started its development life as just a Nieuport 17 fitted with a nine-cylinder 130 hp. Cleget engine in place of the 110 hp. seven-cylinder Le Rhone.

Even without the extra 20 hp, the Nieuport basic airframe, which did not change, was suspect at high speeds. This led to a bewildering series of modifications and re-designations which are well detailed in the *Windsock Datafile Special* by the late J.M. Bruce.

The structural problems experienced are usually blamed on the lower wing, but I suspect that these failures were probably due to aileron flutter. The Nieuport ailerons are driven through an aluminium torsion tube, which was relatively flexible and almost guaranteed to produce flutter at anything approaching 150 mph. This was partly alleviated by rounding off the tips of the ailerons.

At the same time, the factory was also trying new tail surfaces of plywood and timber construction, replacing the Nieuport 17's simple steel tube and fabric surfaces, no doubt inspired by the opposition German Scouts, such as the Albatros series, which featured cantilever tail surfaces, the new Nieuport tail suffered a long development during most of 1917, possibly due to flutter problems.

The final fix was to add wire bracing to the fin and tailplane, with a consequent increase in drag, which negated the purpose of the development.

Other minor changes to the design of the main undercarriage and the tailskid delineated the N.27 from its predecessors, but did little to improve performance.

Armament

The various 1917 models of the Nieuport

ART 1

iport

rland's Quarter-Scale Nieuport 27 your winter scale building project.
WW1 fighter. 80.5" (2045mm) wingspan, for 2.00 cu.in four stroke engines

scouts, a supplied to the RNAS and French units were usually fitted with a fuselage mounted fixed Vickers gun as standard. Some French machines also had a Lewis gun mounted on the top wing, firing over the propeller. The RFS Nieuport scouts operated by No.1 and No.29 Squadrons as late as December 1917 had only a Lewis, mounted on the top plane with a Foster mounting. This may have been a desperate measure to save weight, given that the standard N.27s had great difficulty in reaching 17,000 feet and were this vulnerable to attack from above. (Perhaps Harry Woodman care to comment?).

Colours

The Nieuport 27 served through late 1917 and then,into 1918 at training schools, mainly in plain fabric or 'silver' finish (actually aluminium powder mixed into the dope). This could appear bright aluminium in sunlight, degrading to grey in dull overcast conditions. Many N.27s built in mid-1917 featured an attractive camouflage scheme to the upper surfaces. Actually, this was one of the reasons I chose this aircraft fort a modelling subject, as the colour details of B3637 were provided in *Cross & Cockade International Journal* Vol.35, No.3 (2004) with BOTH side of the aircraft detailed!

The N.27 was certainly obsolete by late 1917 when it saw service but, like the Airco DH5, it soldiered on at the Front, due to a chronic shortage of 200 hp Hispano Suiza engines needed for the intended replacement types. Allied factories were full of SE5a and SPAD XIII airframes at the end of 1917 just waiting for the engines!

Building the Nieuport 27 Fuselage

The sides are built as normal flat on the plan, with ply and pine timber forward and balsa aft. **Photo 1** shows the sides being added to the main bulkhead, which ensures that the sides adopt the correct slope. For most of its length, the top is wider than the bottom.

At the 'Nieuport 17' stage (i.e. basic flat fuselage sides - **Photo 2**) of construction, the unequal crosspieces are being added, together with balsa and ply corner gussets.

At this stage (**Photo 3**), the firewall is added at the front and the top fuselage stringers, followed by the tailskid frame.

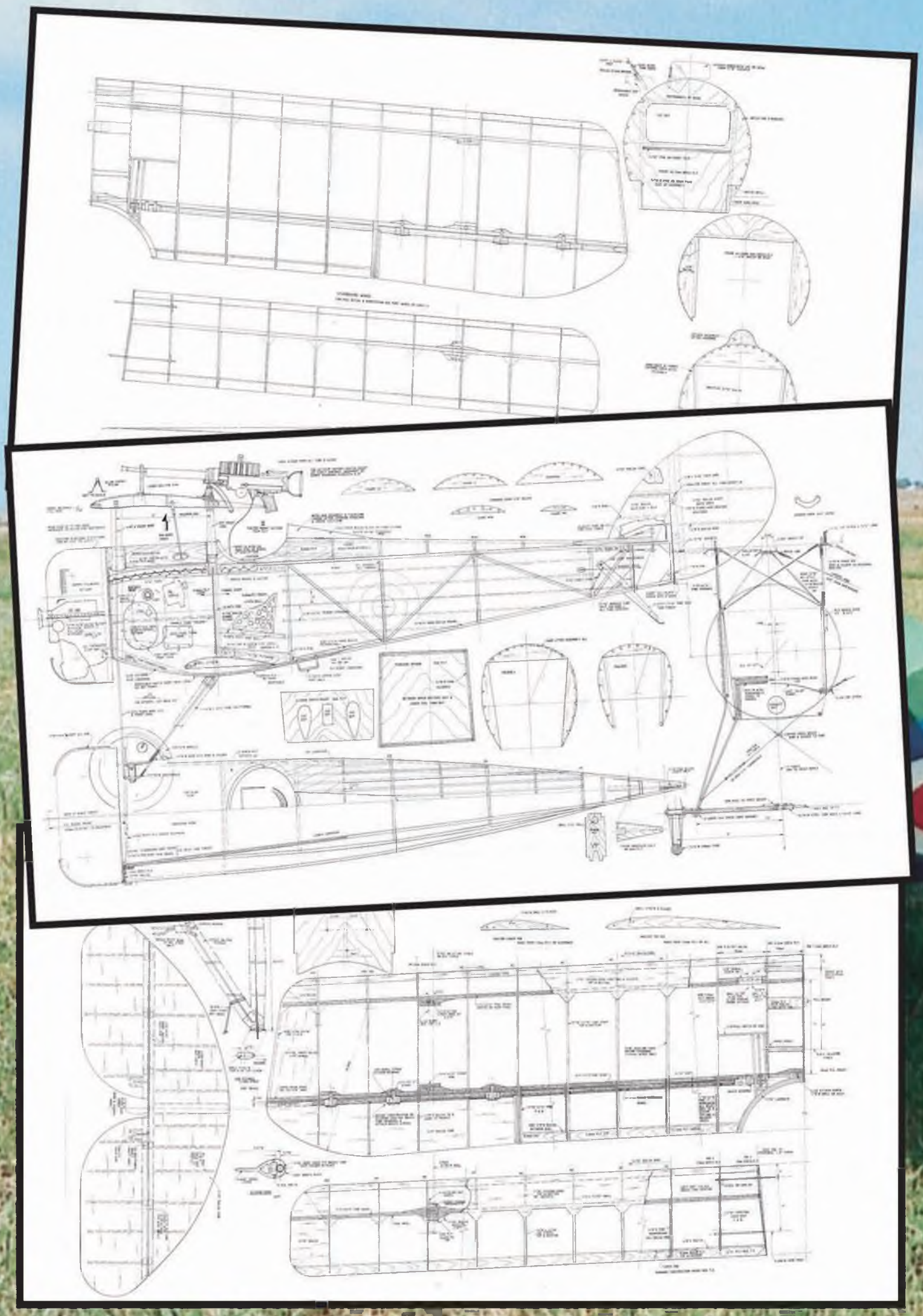
Photo 4 shows the complete tailskid assembly in place - easier to install at this stage, before the side stringers are added.

Next, again before applying the side stringers, add the main undercarriage as shown in **Photo 5**. Note that the front legs and the forward centre section wing attachment struts are one piece of 1/8" piano wire and this is NOT splayed out (bent sideways) at this stage. Pieces of timber and ply, with clamps, locate the legs accurately. This wire is boxed in with ply and glued with slow-set 'structural' epoxy.

The rear legs are bound and soft-soldered in place and then boxed in and epoxied to the main bulkhead as shown in **Photo 6**.

At this stage (**Photo 7**) we have splayed out the undercarriage legs, added the cross brace and also the centre section diagonal bracing. All joints are bound with copper wire and soft-soldered (**Photo 8**).

Before going too far, it is a good idea to check the assembly of the engine and mount, cowling and propeller clearance (**Photo 9**). Remember to measure three times and cut once! I should also add - cut oversize and trim back later!



Now, the N.27 is taking shape (**Photo 10**). The side stringers have been added, together with the rear centre section pylon.

Grooving the cowling is shown in **Photo 11**. This method, using a hacksaw blade screwed to a suitable thickness of wood, was used to cut the original cowl to length. Here, it is used just to cut a groove. The full size N.27 had a cover strip at this location.

Timber and balsa fairings are added to the sides around the lower wing roots (**Photo 12**). This is an alternative to the original aeroplane which had a very complicated lower wing root shape attached to curved sides.

After the front wing bracing lugs are soldered to the top struts, we can add timber fairings to the struts and undercarriage legs (**Photo 13**).

These are shown completed in **Photo 14** and the plywood sides are being added. Note the lower win root at left, which retains the simple N.17 shape.

Wings

The wings are of simple construction so little explanation is required, apart from my usual box-construction trailing edge, which is designed to impart an element of rigidity to the wing panels. I still meet modellers who are experiencing problems with warping wings on WW1 type scale models of the 'non-intentional' variety! I am not refering to problems with thick non-scale section wings, but the very real problem of building a stable, thin wing with ultra-thin trailing edges.

This is the very same problem we experienced in building full size sailplanes back in the 1960s, when the solution was much the same; a plywood boxed trailing edge and a re-inforced (stronger) rib, right back to the very rear. This latter prevents the tension in the covering from bending and rotating the rib at its weakest point.

The photographs illustrate the stages in construction of a really strong trailing edge. **Photo 15** shows the first stage, with the balsa ribs laid over the 0.6mm ply trailing edge bottom, with 1mm x 3mm pine (craft sticks or tongue depressors!) added.

The next step, in the case of the N.27, which later requires most of the rib near the spar to be cut away for the aileron drive, is to glue on an upper reinforcing stick, as in **Photo 16**. This is for the top wings. (only one stick is necessary for the ribs of the lower wings, of 3 x 2mm section). Pieces of 3 x 3 mm balsa infill are then added between the ribs and sanded back to a flat surface.

Finally, the top plywood is added to complete the box as in **Photo 17**. The wings are now ready for final leading edge sheeting and rib capping in the normal way.

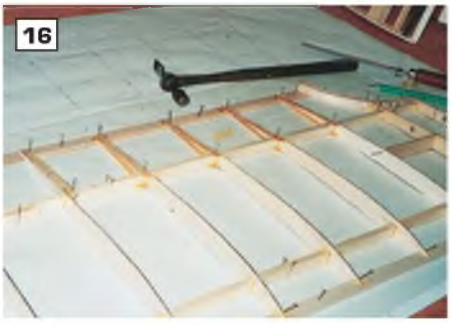
This may seem a lot of extra work, but the results are worthwhile. Boxed trailing edges may be added to any other design of course as the idea is by now means new or restricted in any way.

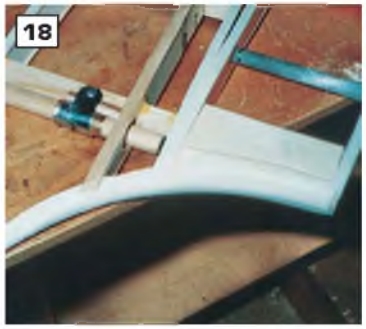
Photo 18 shows how the ribs are cut away to permit the aileron drive torque tube to pass through. Note, the inner fixed brass tube bearing has a flared end to facilitate assembly.

The outer end bearing of the aileron is shown in **Photo 19**, which illustrates the brass bearing (attach screws underneath) and the aluminium strap.

Tail surfaces

These are of cored construction through-





out, but the core of the fin, rudder tailplane and elevator are of only 1mm light balsa, with similar covering top and bottom. The tail surfaces were then covered with silk, doped onto the balsa sheet. Once again, a lot of work, but necessary to keep the weight down.

Photo 20 shows the fin and rudder complete and also shows the tailplane in the process of receiving its top skin, while the elevator core is also visible here. Note the ply reinforcement over the tail joiner slat. ■

NEXT MONTH: In Part 2 Gary Sunderland completes the construction of his Nieuport 27. November issue, one sale October 14th

SUBJECTS FOR SCALE

PZL P.11c

A very advanced design at time of its inception, the PZL P-11 is an interesting shape for scale modellers. This Polish fighter aircraft has a heroic place in the annals of aviation history.

The story of the PZL-11c begins in 1924 with Ing. Zygmunt Pulawski (born 1901) a graduate of the Warsaw Technical University. In that year the Aviation Department of the Polish War Ministry invited proposals in a contest for a new combat aircraft, and Pulawksi tied for 3rd place. That achievement led to an opportunity for further technical education in France.

When he returned to Poland, Pulawski entered the Polish military pilot's school and thereafter, joined the Panstowe Zaklady Lotnicze State Aircraft Factory (P.Z.L) in Warsaw. Here, he was able to develop his own ideas, commencing with an in-line engined fighter, the P-1 in 1929, using all-metal airframe construction. Minimising airframe drag and the provision of good pilot visibility from the cockpit were prime considerations. Tese led to the addoption of the monoplane layout in which the high-set wing was cranked into a gull shape from approximately 1/3rd span, from where the wing panels were strut-braced to the lower fuselage. Thus devoid of interplane struts and wire bracing as with the biplane layout, the new design series, initially with in-line engines offered an excellent all-round view for the pilot compared to many fighter aircraft of the time.

Further development of the design progressed, using both in-line and radial engines. The P-6 and P-7 both employed radials, leading to production of 150 examples of the P-7, with Bristol Jupiter engine. P-8, P-9 and P-10 all reverted to the use of inline engines, but the final variant, the P-11, went radial again, using the Bristol Mercury engine, commencing with P-11a.

Rumania built 50 examples of the P-11b export version under licence, using the Rumanian-built 595 h.p. Gnome-Rhone K.9.

When first introduced, the PZL fighters represented very modern thinking in fighter design, certainly well in advance of the biplanes that graced the squadrons of the British, French, and American air forces. But even further giant leaps forward were soon beginning to take shape on the drawing boards of the most forward thinking designers in those countries, that would shortly lead to the first, fully cantilever, retracting undercarriage monoplanes using more powerful engines unavailable in Poland. Design studies there continued, but although a more advanced development of the P-11, the P-24 appeared, the Polish air arm, continued to rely of the P-11c as its major fighter aircraft.

17 days in September

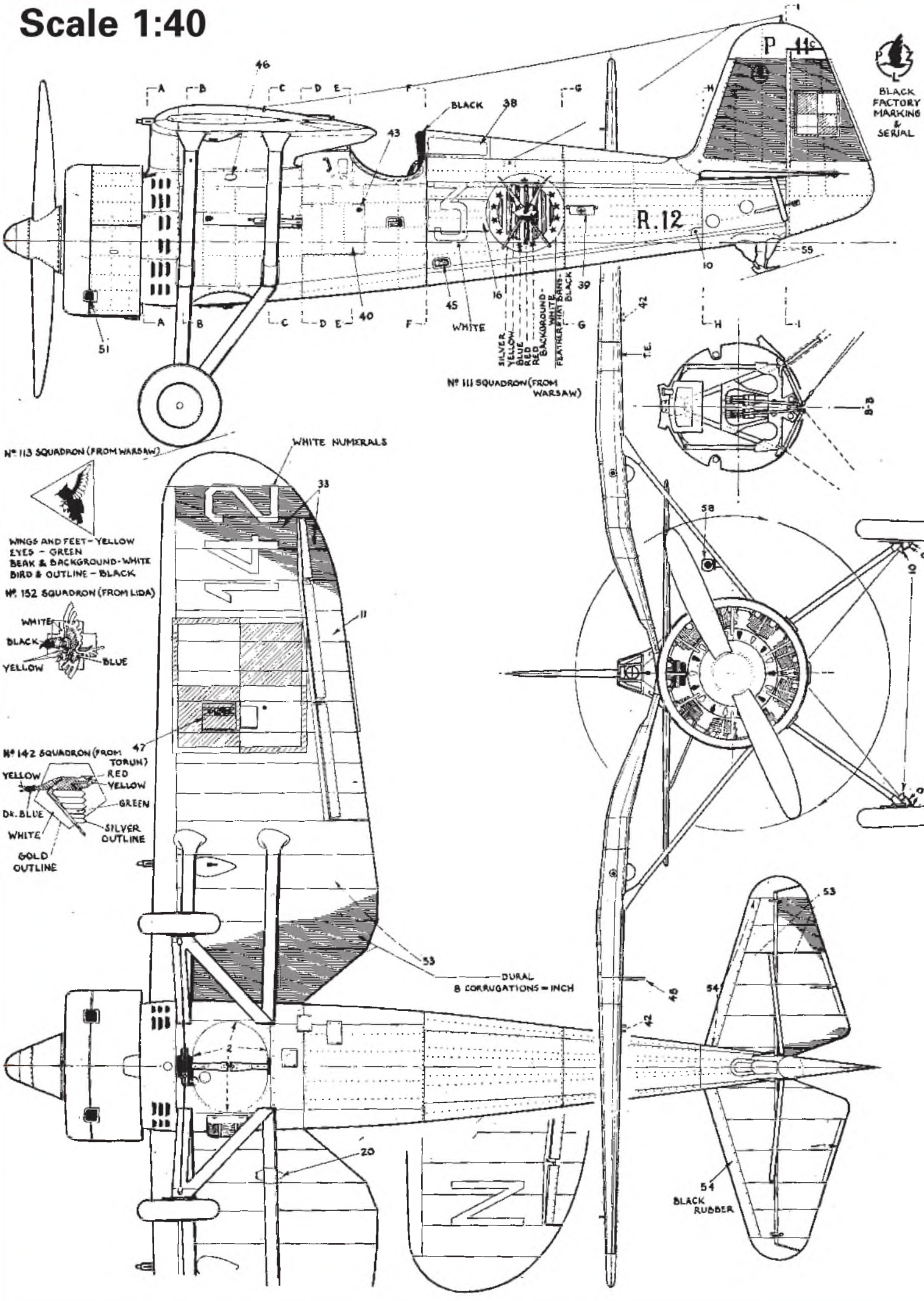
When Hitler's forces invaded Poland at dawn on September 1st 1939, the weak and ill-equipped Polish Air Force had to face alone the whole fury of the Luftwaffe.

Outnumbered by its adversaries by 9:1 and equipped with aircraft that were by then obsolete, units of the Polish Air Forces fought defiantly against enormous odds, losing 333 machines out of a total first-line strength of 430 aeroplanes in 17 days of hectic combat.

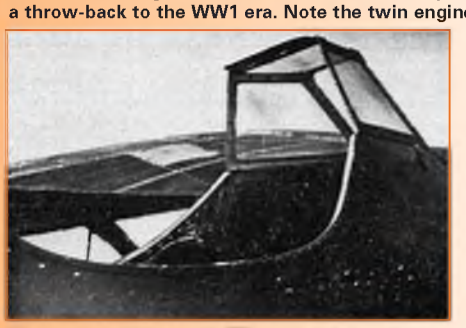
Mainstay of the Polish fighter force was the PZL P-11c. It was, by 1939, completely obsolete, but this remarkably sturdy and aggressive little beast did surprising damage to the Luftwaffe machines in this opening WW2 campaign. Overdue for replacement, well under-armed by 1939 standards, and slower than most Luftwaffe aircraft included bombers,

▸▸

Scale 1:40


BLACK FACTORY MARKING & SERIAL
P 11c
R.12
BLACK
WHITE
SILVER
YELLOW
BLUE
RED
BACKGROUND-WHITE
FEATHER BARS-BLACK
No 111 SQUADRON (FROM WARSAW)
No 113 SQUADRON (FROM WARSAW)
WINGS AND FEET - YELLOW
EYES - GREEN
BEAK & BACKGROUND - WHITE
BIRD & OUTLINE - BLACK
No 152 SQUADRON (FROM LIDA)
WHITE
BLACK
YELLOW
BLUE
No 142 SQUADRON (FROM TORUN)
YELLOW
RED
YELLOW
GREEN
Dk. BLUE
WHITE
SILVER OUTLINE
GOLD OUTLINE
WHITE NUMERALS
142
DURAL
8 CORRUGATIONS = INCH
BLACK RUBBER
T.E.
B-B

READY FOR INSPECTION. A line-up of PZL P-11 fighters. The heavily clad garb of the pilots, standing in front of their ground crews indicates climate protection against open cockpit cold in something of a throw-back to the WW1 era. Note the twin engine bombers in the background.



The open cockpit of the PZL P-11 and its framed windscreen.

Rear fuselage and tail unit showing the winged arrow insignia.

Polish pilots relied on the PZL-11's manoeuvrability and their own determination to compensate for performance shortcomings.

Despite the great disparity and quality of aircraft, the Polish Air Force put up an incredible fight and the most spectacular aspect of its war activities was the destruction by Polish fighters of 126 raiders, plus a further ten 'probables' and 14 badly damaged, which constituted a third of the total losses of the Luftwaffe during the Polish Campaign.

The excellent flight characteristics of the P-11 earned the aircraft great popularity among the pilots who flew it, and combat proved that the little fighter was able to take an extraordinary amount of punishment without ill effect. Of 15 squadrons, each equipped with 10 aircraft, that constituted the Polish fighter force at the outbreak of hostilities, 12 operated the P-11c, the remaining three operating the earlier P-7 type.

Air hostilities opened on September 1st with an assault at dawn on Warsaw, when 100 Luftwaffe aircraft were substantially scattered by the determined efforts of pilots flying P-11s of the Polish Pursuit Brigade. In the first six days the Brigade, downed 42 raiders, but in turn, lost 37 of its own.

Against such overwhelming odds though, and with continuous attrition of the limited number of fighters available to Poland's air arm, the fate of Poland was sealed when, on September 17th, Soviet forces attached from the East as part of the pre-arranged Russo-German carve-up of the country.

Surviving Polish military aircraft including spares where available, were evacuated to Rumanian. Also transferred, were workers and technicians from the P.Z.L. factory where they formed teams assisting in aircraft production at the Industria Aeronautica Romana (I.A.R.), playing a key role in the production of the P-11's immediate successor, the similarly configured P-24 and thereafter, the creation of Rumania's indigenous I.A.R. 80 cantilever low wing, radial engined, retracting undercarriage fighter which, interestingly, used the rear fuselage/fin/ rudder of the P-11-cum-P-24.

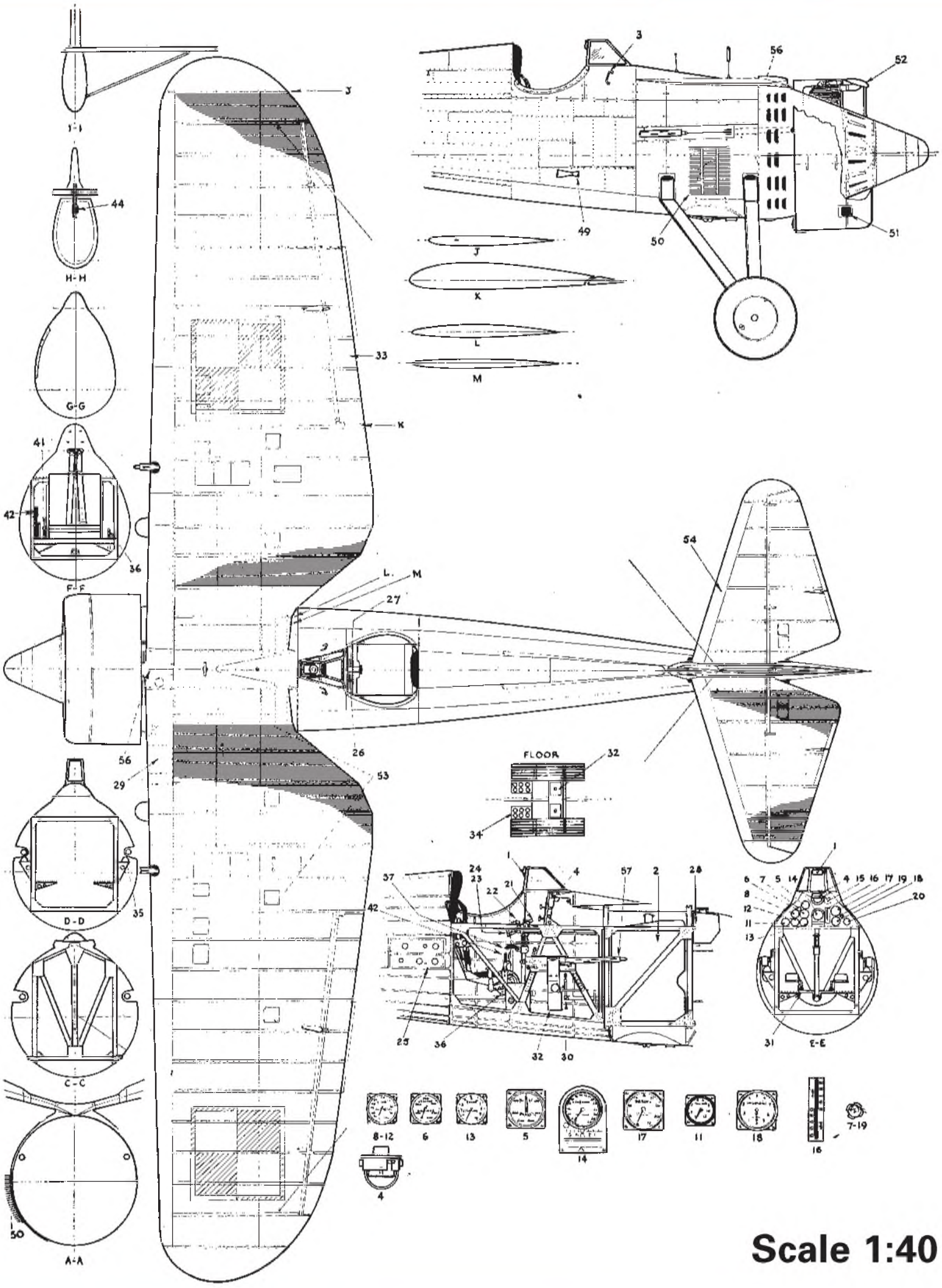
Today, a single example of the P-11c still exists at the Polish Aviation Museum, Krakow. This machine was taken to Germany after the `Polish capitulation in 1939. It survived WW2 and later returned to its country of origin. ■

1: Mirror
2: Fuel
3: Hand grip
4: Compass
5: Boost
6: Fuel pressure
7: Emergency fuel cut-off
8: Oil temperature
9: Brake drum and cable
10: Jacking point
11: Fuel gauge
12: Oil temperature
13: Oil pressure
14: Airspeed indicator and artificial horizon
15: Compass deviation table
16: Bank indicator
17: Engine r.p.m.
18: Altimeter
19: Rate of fuel flow control
20: Clock
21: Bomb release control
22: Harness tension control
23: Boost control
24: Throttle
25: Radio
26: Fuselage guns trigger button
27: Wings guns trigger button
28: Oil tank
29: Fuel header tank
30: Rudder pedals
31: Brake control
32: Amunition box
33: Dual purpose ailerons/flaps
34: Signal cartridges pack
35: Gun mountings
36: Elevator trim
37: Very pistol
38: Pilot's locker
39: First aid
40: Gun serving hatch
41: Air intake control
42: Seat adjustment
43: Opening for Very pistol
44: Elevator trim gear
45: Foot rests
46: Fuel inlet
47: Bomb rack (12.5 kg.)
48: Air speed indicator pitot
49: Venturi
50: Oil cooler
51: Exhaust
52: Exhaust collector
53: Corrugated duraluminium
54: Rubber covering to prevent damage by shell cases and links
55: Tan leather
56: Detachable panel over oil tank
57: KM Wz 33 guns
58: Camera

COLOUR SCHEME
Olive green overall – except lower surfaces of wings and tailplane which were light grey.

SPECIFICATION
Wing Span: 35ft 2 in. (10.72m)
Length: 24 ft. 9.25 in. (7.55m)
Height: 9 ft. 4 in.(2.85m)
Max. speed: 242 mph (387 kph) at 18,000 ft. (4,530m)
Climb rate: to 16,000 ft (4,000m) 6 min.; 13 min to 26,000 ft (6,550m)
Service ceiling: 36,000 ft. (9,050m)
Range: 500 miles

PZL P-11 fighters of 113 squadron warm up their engines at Warsaw Okecie airport. The aircraft closest to the camera is a four-gun armed P-11c, while the others are a mixture of 11a and 11c types.


J-J
H-H
G-G
F-F
D-D
C-C
A-A
E-E
FLOOR
J
X
L
M
Scale 1:40

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AERONCA SEDAN - (80 images)
The last and most graceful of the Aeronca line of light/sports aircraft in fine detail.

AVRO 504K - (140 images)
The Shuttleworth Museum's superbly maintained machine, in full detail.

ARROW ACTIVE II - (50 images)
Sole remaining example of this 1930s racing and aerobatic biplane restored to pristine condition.

BEECH STAGGERWING - (45 images)
The distinctive back-staggered 1930s biplane with retracting undercarriage.

BELL P-39Q AIRACOBRA - (130 images)
Superbly restored example of this much maligned WW2 fighter aircraft, that was used with great success by Russian forces in the ground attack role and with saw much action in the south Pacific, from where this restored example was recovered.

BLERIOT MONOPLANE - (74 images)
The Shuttleworth Museum's machine, the oldest original example still flying. Much close-up detail showing all the exposed rigging, structure and the 'bedstead' main undercarriage, plus Anzani engine.

BOEING PT-13/17 STEARMAN - (54 images)
Subject aircraft is a current British civil register example used for airshow displays.

BRISTOL BULLDOG - (60 images)
This collection depicts the example assembled from two donor airframes and restored to superb standard by Skysport Engineering. It can now be seen at the Royal Air Force museum, Hendon.

BRISTOL F2B 'BRISFIT' - (28 images)
Full close-up detail, including photos of engine cowls, for both Rolls Royce Falcon and Hispano-Suiza engines.

NEW... BRISTOL M.1c - (100 images)
Early WW1 fighter monoplane. Example depicted is the faithfully authentic replica built by the Northern Aero Works and operated by the Shuttleworth Trust museum.

BUCKER BESTMAN - (43 images)
Authentic example as exhibited at the Fantasy of Flight museum in WW2 Luftwaffe colour scheme.

BUCKER JUNGMEISTER - (79 images)
Radial engine version. Example from Fantasy of Flight museum.

CHANCE VOUGHT F4U-1D CORSAIR
(132 images)
The famous 'bent wing bird' and super detail.

NEW... CHILTON DW1 - (90 images)
Original upright engined version of this diminutive British low wing sports/racer.

CHRISLEA SUPER ACE - (123 images)
Late 1940s civil light aircraft with distinctive twin fins and nosewheel type undercarriage. A fully restored example.

CHRISTEN EAGLE - (90 images)
The spectacular, stylish aerobatic biplane revealed in close-up. Example shown is the two seat version.

COMPER SWIFT - (91 images)
1930s racingg aircraft. Example depicted is the radial engined example at Shuttleeworth Mussem.

CURTISS HAWK 75 - (130 images)
The 'export' version of the Curtiss P-36 that saw service in during WW2 with Finland and during the 'Battle of France' in May/June 1940. Example shown is a combat veteran.

CURTISS JN-4 'JENNY' - (130 images)
An authentic, restored example in full detail

CURTIS P-40B TOMAHAWK
(130 images)
Rare. full restored example of the early version of the Curtiss fighter aircrfaft that was at Pearl Harbour on Dec. 7th 1941 - and survived the attack!

CURTISS P-40N - (100 images)
One of the later versions of the famous Curtiss Warhawk, the WW2 fighter aircraft that saw service in just about every combat theatre of operations.

De HAVILLAND DH84 DRAGON - (40 images)
Forerunner of the m ore famous DH 89 Dragon Rapide, this collection depicts a superbly restored example.

De HAVILLAND DH89 DRAGON RAPIDE -
(100 images)
Graceful twin engine biplane airliner that saw service from pre-WW2 through to the mid 1950s. Several are still flying and three are shown in this picture collection.

De HAVILLAND DH 53 - (60 images)
1920s lightweight low wing sports aircraft designed to a low-power specification. Machine illustrated is the sole remaining example.

De HAVILLAND DH 60 - (140 images)
The aircraft that set the British 'club' flying movement on the road to success during the 1930s.

DH TIGER MOTH - (110 images)
Much close-up detail of civil register example, plus further detail of the IWM Duxford's example in Royal Navy trainer colours, showing the blind flying hood.

DHC CHIPMUNK - (70 images)
A bumper bundle of images that provides a vast array of detail pictures, plus photos of examples in both RAF trainer and civil colours.

ERCO ERCOUPE 415 & AVALON ERCOUPE
(115 images)
The elegant twin finned light/sport aircraft. Both original Type 415 and later Avalon resurection examples.

FAIRCHILD RANGER - (60 images)
Elegant U.S. high wing light aircraft in full detail. Two examples shown.

FIESELER STORCH - (90 images)
Arguably the first military STOL aircraft, this stalkey looking aircraft has long been a modellers' favourite. Two examples are represented, the machine at the Fantasy of Flight Museum, Florida and the RAF Museum Cosford's example.

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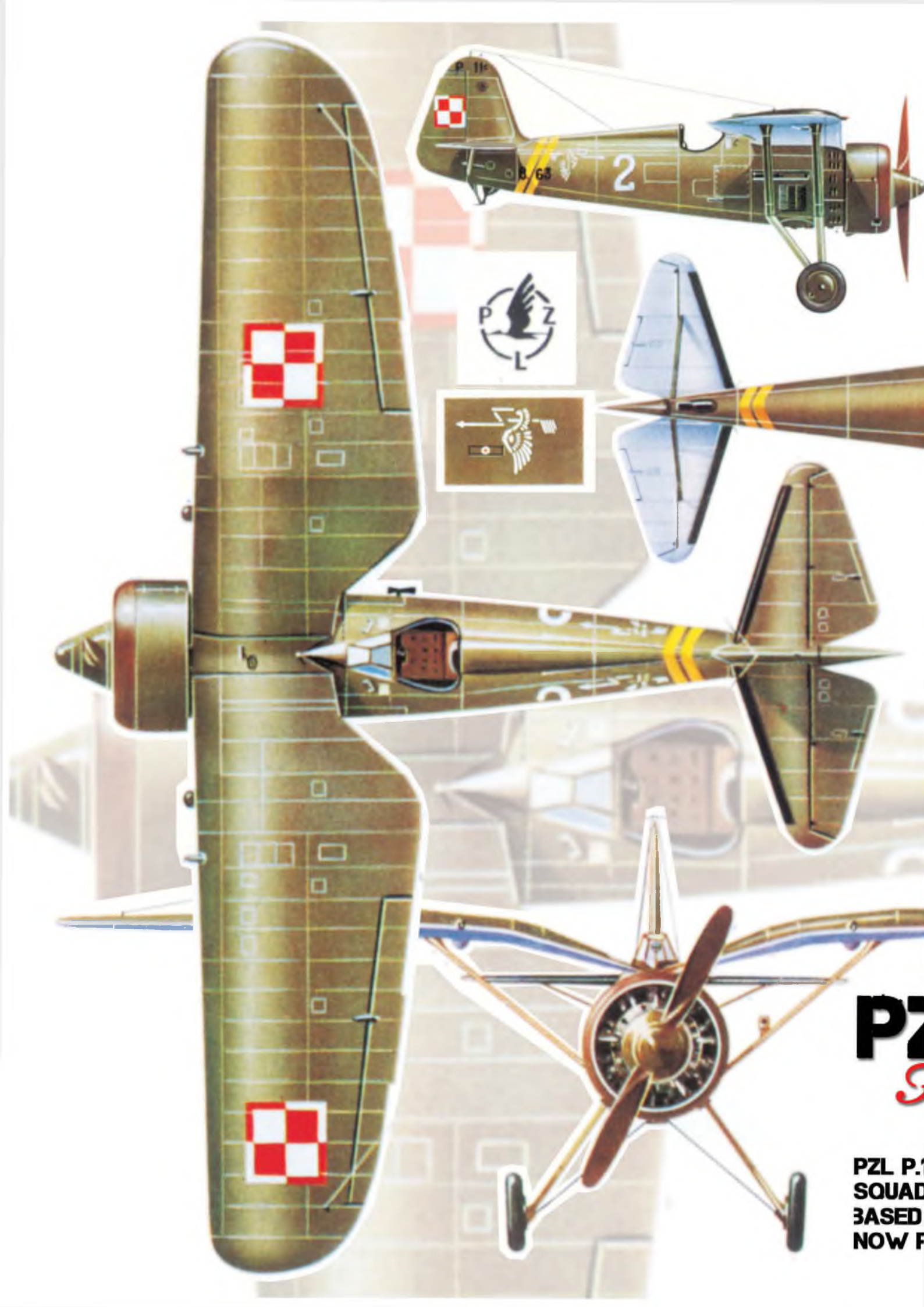

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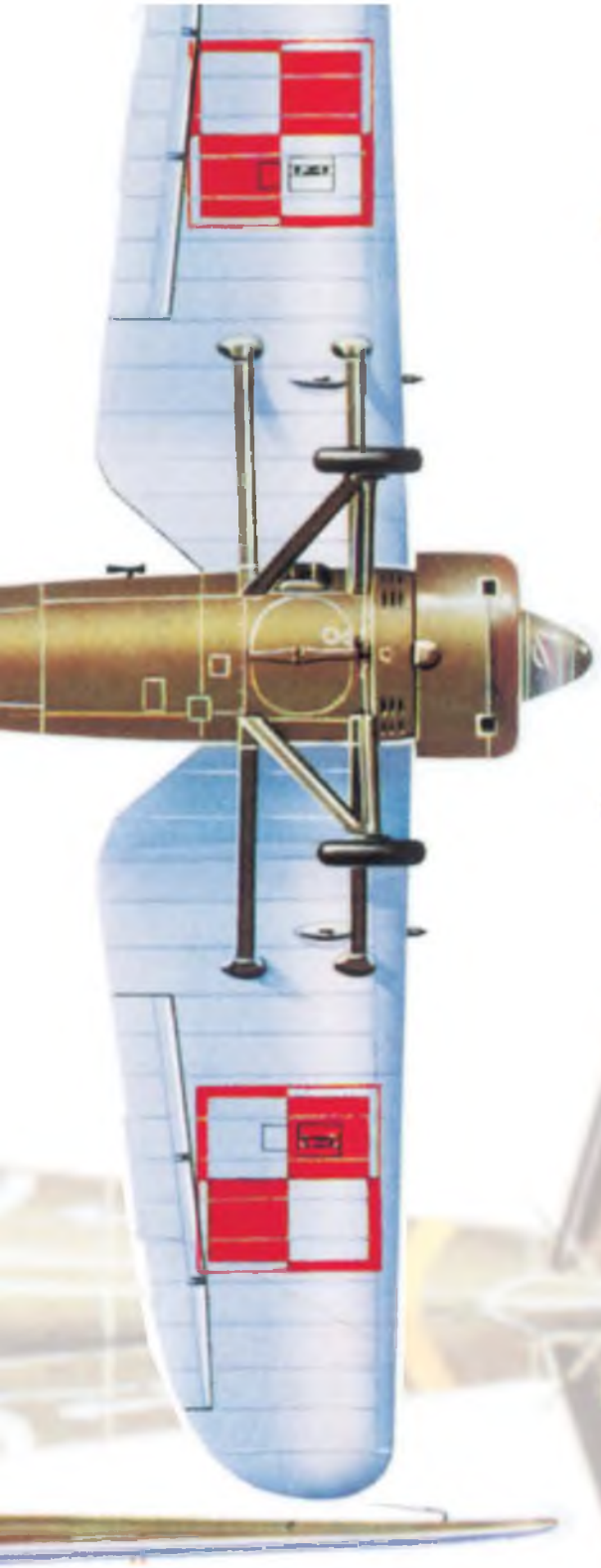

P-11A, NO. 113 'OWL' SQUADRON,
1ST AIR REGIMENT, WARSAW.

P-11C, NO. 142 'WILD DUCKS' SQUADRON,
4TH AIR REGIMENT, TORUN.

P-11C, NO. III 'KOSCIUSZKO' SQUADRON
1ST AIR REGIMENT, WARSAW.

P-11C, 500H.P. GNOME-RHONE 9 KRSE.
MISTRAL RADIAL ENGINE. SALON
INTERNATIONAL
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PARIS.

P-11C, NO. 114 ' FIGHTING COCKS'
SQUADRON, 1ST AIR REGIMENT
WARSAW.

P-11C, NO. 112 'SWALLOWS' SQUADRON
1ST AIR REGIMENT, WARSAW.

P-11F, ROYAL ROUMANIAN AIR FORCE.

ZL P.11

Flying Colours

11C (C/N 8.63) OF NO. 122
RON, 2ND AIR REGIMENT,
AT KRAKOW. THIS AIRCRAFT
PRESERVED IN POLISH MUSEUM.

ON SILENT WINGS *by Chris Williams*

SCALE SOARING

The 'Bergfalke test'

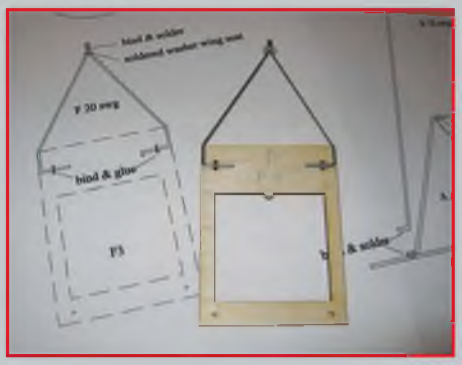
Times move on quickly sometimes with a bi-monthly column such as this one. The last time around saw the maiden flight of the 1:3.5 scale Spalinger S25a, since which I have assembled and flown a Bergfalke 1, built to 1/4 scale. The Bergfalke occupies a special place in the fleet, more of which later, but suffice it to say this is my fifth or sixth version, so I have it pretty much off 'pat' by now. The need for a new model came about when my old pal Motley lost his new version in a mid-air at an aerotow event and, feeling sorry for the old lad, I gave him my Bergfalke II 55 as compensation. The MU13E, sometimes known as the Bergfalke 1, has straight wings rather than swept forward, and a rounded rudder, as well as a few other detail differences, so I reverted to my old plan, but embarked at the same time upon a programme of weight reduction.

This involved leaving out some of the usual scale details, such as the scores of ply gussets in the wings, making up lightening holes in the formers and ply sheeting in the fuselage and covering the flying surfaces in film rather than 'Tex and paint. I have to say that I was more than a little disappointed when in the final tally the AUW came to just under 10lbs, a mere half pound lighter than its predeces-

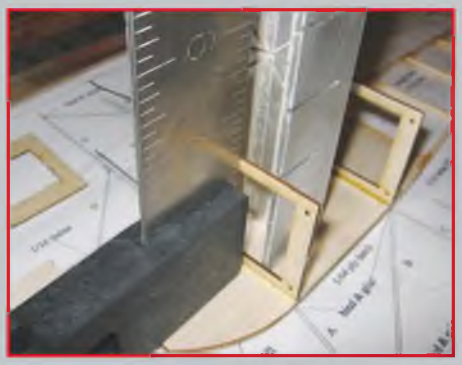
Author's MU13E Bergfalke under construction.

The Bergfalke prior to its maiden flight.

The fuselage begins. Working without the benefit of instructions, Dan didn't use the two part fuselage assembly.



Typical of binding the wire parts to formers.



Squares ensure accurate assembly of formers to fuselage sides. This would probably prove easier without the wires attached.

Fuselage

Since this is the most complicated part of an otherwise straightforward build, and since you'll need it to attach hinge tubes to, it seems like a good place to begin.

Because there is no curve on the rear fuselage structure, other than that built into the basic frames, this is a good example of a model suited to a two-part fuselage assembly. You build a front, sheet balsa sided box and then join it to a fully assembled rear structure. Because both sections can be built over the plan, independent from each other, it is easy to keep them both straight and square. Then it's a fairly simple task to accurately join the front to the rear.

If you need me to tell you precisely how to build two simple box structures, there's probably very little hope of you finishing the model and I would suggest you try an easier hobby: stamp collecting perhaps. So, rather than run through a blow-by-blow account of the blindingly obvious, I'll just point out any areas of which you may need to be aware and offer the occasional tip to make your life easier.

Once you have your basic fuselage assembled, with the lower surface sheet in place but before adding the upper sheet and decking, you will need to get some wire parts fitted. In case you're wondering why the bottom is already sheeted, it's much easier to sand and cover this area before the wires are in place. Drill through the bottom sheet, in the appropriate places and, using the open top for access, bind and glue the u/c wires to F2 and F3. Glue the lower pylon in place and then move onto fitting the c/s strut wires.

If you are unsure about fitting those wing seat washers accurately, and accuracy is vital to getting the wing incidence correct, you may want to try a simple jig. Using the strut positions shown on the wing plan, make yourself a rectangular plate with three holes in it (the strut positions). Make two identical incidence guides, from the side view, to fit onto the top of the fuselage sides and below the ply plate. Slip the washers over the wires, assemble your jig onto the fuselage and then invert the entire thing. The washers will fall against the ply plate at exactly the correct angles and may now be soldered to the struts fairly easily. Now you can remove the jig and add any remaining sheet areas.

Don't fit the tailskid or hinge tubes until later, during the final assembly stage.

Cowl

Once again, there's nothing too complicated here. Glue a strip of 1/32" ply around C2, add C1, glue on N and trim and sand to shape. That's it, one cowl built.

I've never been able to get covering to conform well to cowl fronts, not as neatly as I'd like at any rate. So usually I don't bother to cover them. I much prefer to do a thorough job of sanding, sealing and priming, with as much additional sanding between steps as required, before simply painting the cowl. Whilst the particular medium used isn't important, getting rid of any wood grain is. To this end, I use multiple coats of automotive filler/primer, sanded between coats with fine wet or dry paper, used wet, until I have a smooth, grain free surface to paint. Yes, it is a

U/c wires all bound and soldered, awaiting fitting to fuselage. See text about that step.

Using a box type motor mount meant Dan could retain the motor post mounting system and the opening in F1.

Showing just how little space there is in the fuselage once all the gear is in there.

fairly heavy method of finishing, but at least the weight is just where it's likely to be needed. These models nearly always turn out tail heavy, so a bit of extra weight on the cowl is actually a good thing.

Wings

You don't seriously expect me to give precise instructions about building these wings, do you? If you can't glue together a few bits of balsa then there's absolutely no hope for you. As previously, I'll simply give some pointers that may, with any luck, make life a little less fraught.

The first point of interest involves R1. Because of the dihedral, this needs to be set at a slight angle. Therefore, I suggest fitting R1 after the rest of the wing is built. Then, you can pack up the wing by the correct amount and fit R1 using a square or block to ensure it is upright.

Sticking with R1, you'll notice that it needs to be grooved to accept the rear centre section (c/s) strut. Since it's virtually impossible to drill accurately on a glue joint, make these grooves before joining the wings and take care not to fill the groove with glue. Now, even if your strut isn't a precise fit, you have a nice, glue free groove that can be carefully opened up to fit the strut - without the risk of the glue joint causing the drill to run off centre.

The rigging blocks should be HARD balsa, and run right through the wing, from top to bottom.

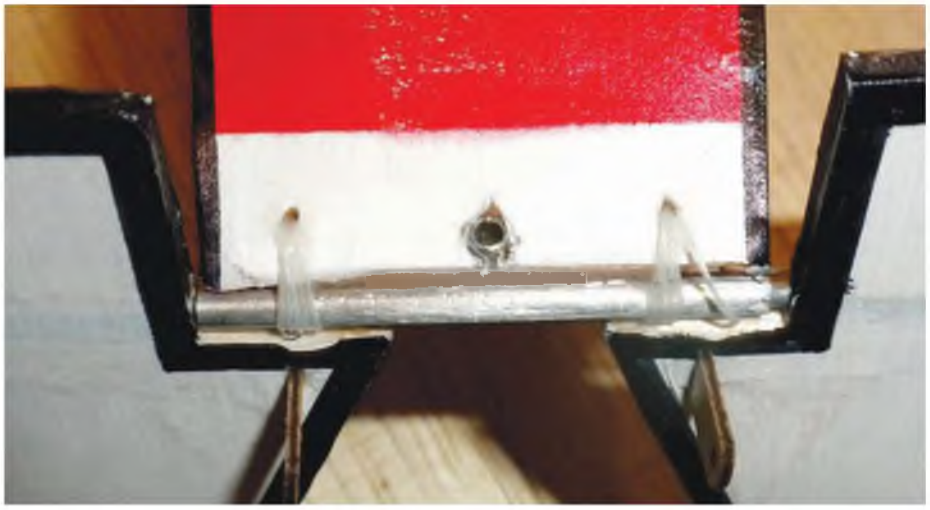
W2 glues on top of W1, but the holes are not intended to align. If they do, you may find it difficult to fit the top rigging pylon because the c/s strut is in the way.

If you want to build in a little wash out, feel free. It isn't vital, but won't do any harm.

Tail surfaces

Probably, because of the small radii involved, the hardest part of building the tail surfaces is laminating the outlines. Use the most flexible balsa you can find, soak it well and always keep the strips under tension, not compression, as you wrap them around the template; yes, template, not a row of pins. Pins are far too likely to press into the wood, kinking it and risking a crack.

Other than that, it's all pretty straightforward. You may want to consider making the rudder hinge post grooves as you build the rudder, for much the same reason as we grooved R1 prior to gluing. The most important bit is to build in the elevator joiner AND ITS HINGE TUBE while building the elevator halves. You'd be surprised how difficult it is to fit the hinge tube after you've joined the elevators. Doing it this way ensures that both elevators are level and that the hinge tube is a precise fit. The only word of warning concerns glue, don't be tempted to use cyano near that hinge tube. A hinge tube firmly glued to the joiner is precious little use for anything - unless you really want a rudder/throttle model.



The elevators, complete with hinge tube bound to tail post and the rudder hinge tube in position.

Here we see how the top elevator cables emerge from the fuselage. See details in text.

Covering and finishing

Although we all have our own favourite covering method, the prototype model is covered using *Litespan*. The colours are spray painted and the markings are homemade waterslide decals. While spraying, don't forget to mask off any openings. Dan didn't and got some paint on the inside of the covering. The black outlining was achieved by first marking them in using a fine tipped permanent marker and filling in with a thicker marker. Obviously, the thicker marker could be replaced by a brush and paint if so desired and that's almost certainly how I would have gone about it.

Personally, I would leave covering the fuselage underside, between the access hatch and TS, until AFTER the radio is installed and linkages connected.

Should anyone require it, the designer can supply a pdf file for the cross decals.

Assembly

Now things start to get interesting; we start putting it all together. Begin by firmly gluing the wing onto the C/S struts, accurately seating it on those washers we took such care to get right and ensuring that it aligns with the fuselage correctly. Whilst the rigging isn't absolutely essential, it does add a lot of scale effect to the model. The fact that it also adds a degree of bounce-ability is just a bonus.

As regards suitable material for the rigging, nylon coated beading wire or monofilament fishing line are both good options, adding a lot of rigidity to the structure. Equally so, elastic thread may be used, but that imparts no additional strength whatever. Each cable should run from a rigging point, either on a pylon or the undercarriage (u/c), right through the rigging block in a wing to the opposite rigging point. You can either use individual cables, or rig an entire side with a single run. Whichever method you use, don't glue the

cables to the rigging blocks until the entire wing is rigged. Then, it is possible to slide the cables through the rigging blocks, ensuring a warp free assembly, with even dihedral. If you decide you'd like some washout, this is the ideal opportunity to induce it. Once satisfied that all is as it should be, a spot of cyano into each rigging block will lock everything securely in position.

With this step completed, we now have something with which to align the tail surfaces. Begin by covering the section that includes part TS because this will result in a neater covering job. Bind the elevator hinge tube to the horizontal tail post, accurately align it with both fuselage and wings and then glue it securely in place - bearing in mind earlier comments about cyano and hinge tubes.

Fit, but don't glue, the tailskid and use the tailskid and a length of wire to accurately align the rudder hinge tube, and epoxy it in place. Remove the tailskid/wire and position the rudder around the hinge tube. Slip the carbon hinge rod into both the rudder and the hinge tube, glue in place the tailskid and glue the end of the carbon rod into the skid - only into the skid. Now, if you can remove the rudder, something is drastically wrong.

Make up and fit the wheels and you are looking at an almost complete Pfalz EIII.

Installation

As you'll have noticed, I've deliberately left a large section of the lower fuselage uncovered. This will greatly simplify fitting the closed loop control cables. The cables should be either beading wire, or monofilament fishing line. The upper elevator cables should exit immediately in front of the last cross brace, while the lower cables exit though TS. Fitting short nylon tubes at these points, suitable supported at the cross brace, will help guide them. Tube crimps and a spot of cyano at both ends will secure them to the servo output arms and control horns.

What equipment you use is entirely up to you, but it absolutely must be lightweight equipment. 5 gram servos and a micro receiver are ideal, but battery and ESC will depend on what motor you've used. Just remember to keep things as far forward as you can get them, in an attempt to limit the amount of nose weight you are likely to need.

The colourful finish was what attracted the designer and builder to this type. Pretty, isn't it?

Throughout the build, bear in mind that Dan was aiming for a flying weight in the region of 6 ounces.

Moment of truth

Well, after doing all the donkeywork myself, I get to pass you over to Dan's own comments about the maiden flight.

"Today was a beautiful nearly windless day, so it was time to try the maiden. After doing all my pre-flight checks, I determined that the elevator was about 1/16" above being level, so after going into my radio and making the required adjustment, I was ready to go.

After a couple tries with nothing but ground loops, I decided a hand launch was in order. I have to admit, I was a bit nervous, as I haven't tried this with a non ARF before, so after opening up the throttle fully, I gave her a nice easy toss. Turns out I was worried about nothing, she climbed up smoothly and steadily, and after I was up a bit I started flying it around to see how it stable it was. It only took two clicks of right rudder, and she was flying hands off! The only other adjustment I made was turning the throttle down, as she was continuing to climb!

After flying around for about three minutes, (Dan likes to keep his flights short) I brought her in for a landing and just missed the runway with one wheel causing a flip over. Picking her up and finding no damage, I took her up for another go and was greeted with another outstanding flight. This time I was able to float her right on the strip where she came to a stop after less than five feet."

Dan has had several more flights with the little Pfalz and she performed flawlessly on every occasion. In fact, the Pfalz instilled such confidence that it is the model he chose with which to perform his first loop. One thing that impressed him was how, if the model stalled out before completing the loop, it just carried on flying as if nothing had happened, never a bad trait in a scale model. ■

The little Pfalz powers away from a take-off more successful than those attempted for the maiden flight.

R/C SCALE ELECTRICS *by Peter Rake*

Yes, here we go again, another chapter in the never-ending saga that laughingly passes as an electric flight column. As I sit down to write this, after a bit of a prompt from our editor, summer seems to be drawing to a close after what has been a very strange year in terms of flying weather. It feels as if we had our summer (all two weeks of it) back in April and it's been fairly autumnal ever since - a very strange year indeed.

Anyway, none of that matters as far as this column is concerned. I promised you that I'd finally get around to completing (for the time being) my explanation of how I set about designing models. So, that being the case, I suppose the first thing I'd better do is check where I left off last time. Right, let's see now, blah, blah, only ever designed three models, monoplane, biplane and triplane; everything else has been a cosmetic variation on a theme, blah, blah paste 3 view into CAD, blah, blah, end up with traced outline. Okay then, now that I've caught up with what I'd already written, and know where I left things, it's time to get down to the important stuff - actually designing the model.

Some ground rules

First of all, before getting into the nitty-gritty of the actual plan drawing, and since I've been asked to expand on this area, I'll deal predominantly with using CAD (Computer Aided Design). I realise that not everyone has a CAD programme, or knows how to use one. For those people, 'Yah boo and sucks to you'. No, seriously, as serious as I get at any rate, virtually nothing that can be achieved using CAD can't be done just as well drawing by hand. How you actually go about putting it onto paper will be different, but the principles will remain much the same.

Many well-known designers do nothing but hand drawn plans, and very nicely they do them too. However, with the increasing need for precisely cut parts, a hand drawn plan doesn't help at all if you want to get your parts laser, or CNC, cut. To do this, at some point in the process some poor soul is going to have to digitise the plan, trace every single part and lay them out onto wood size panels. All of which takes a lot of time and, if you have to pay someone to do it, can get prohibitively expensive. The last time I got any CAD work done, many years ago, it cost about £40 an hour. As far as I'm concerned, that's money that would be far better spent on models.

About CAD

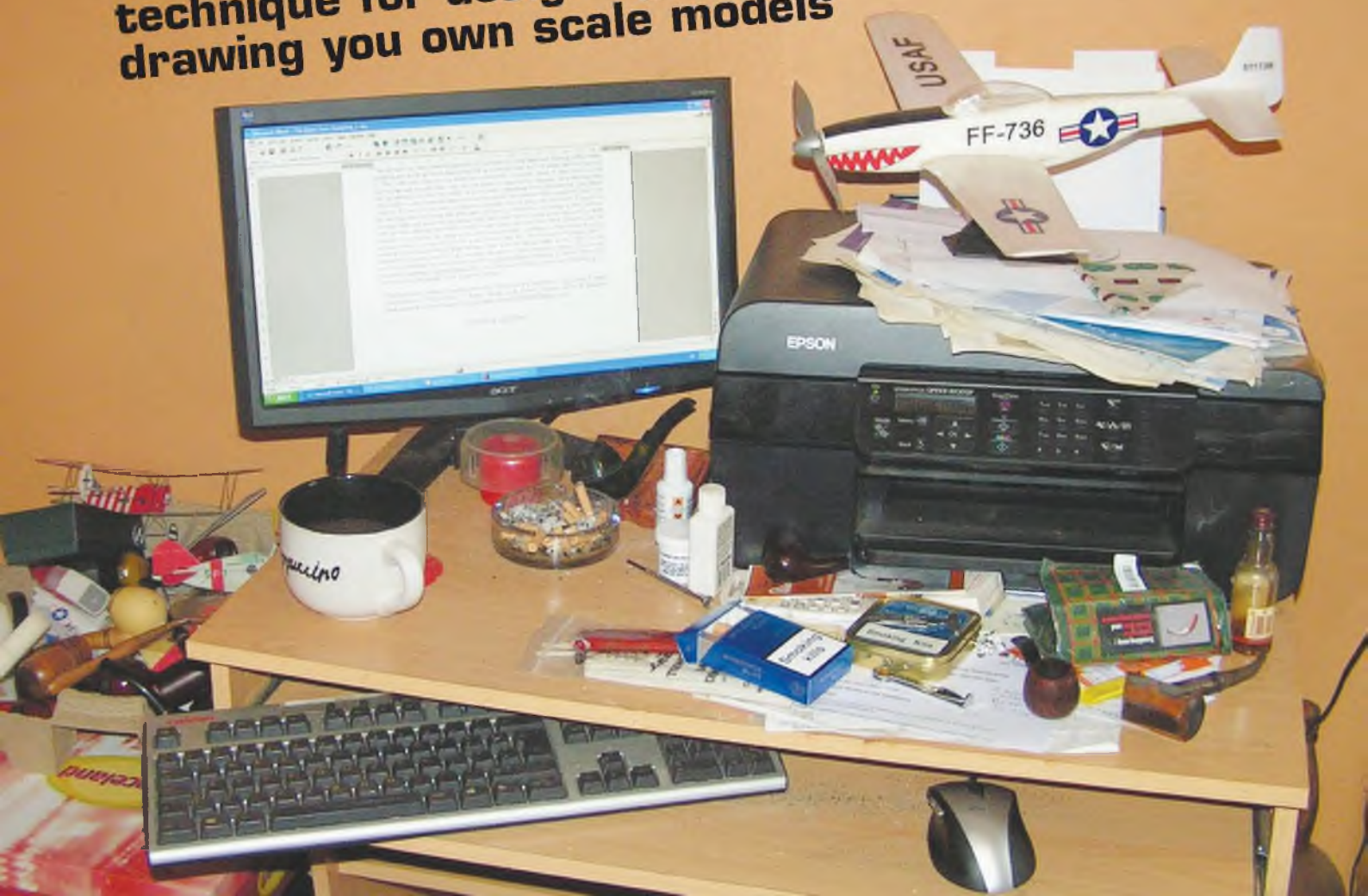
If you're anything like me, when I first started using CAD it was because I was forced into it. I'd hand drawn a plan for someone who wanted to kit the design, had converted the plan to CAD and sent me a copy of the file to check over. Instant panic, because I couldn't even open the file.

Having downloaded a CAD reader (a free download I hasten to add - I'm known for my meanness) one of the big disadvantages of CAD reared its ugly head. Not all CAD programmes are created equal. There are

The Quiet Zone

THIS MONTH:

How to 'Roll Your Own'... technique for designing and drawing you own scale models



My little corner of the world, complete with 'essential' supplies for successful design. It may be a little cluttered, but it's home.

numerous different versions of CAD, and no two are exactly the same - or interpret a drawing in exactly the same way. So, for example, if you use TurboCAD (the programme I like to work with) it may very well not open correctly in another CAD programme - if it opens at all. The sort of things you can expect to see are scaling errors (a 36" span model may suddenly become a 3" span model); lines that shouldn't be there; lines that should be there, but aren't; curves that have moved and curves that have become a series of straight lines.!As you can imagine, the latter problem makes for very interesting wheels!

So, my advice is to pick a particular brand of CAD and stick to it. As I said, I use TurboCAD simply because it's what I started with, I'm used to how it works and I find it easiest to use. It's also a good idea to choose the most recent version you can practically afford. There is a very good reason for this, I have three versions of TurboCAD and the earlier versions simply won't open a drawing made on the most recent version. Conversely, the most recent version will open anything drawn with the earlier versions. A wonderful marketing ploy, but not the most helpful of situations.

There are certain features of the earlier versions that I prefer but, having opened, edited and saved a drawing using the new version, it will then only open using the new version. Yes, it's definitely a pain in the bum.

The good news in all this is that, as long as you don't want the absolutely most recent version, slightly older versions of most CAD programmes can be bought quite cheaply. So far, all mine have come from a certain Internet auction site and I have never paid more than £15.

And then

Okay then, bear in mind that, once our plan drawing is complete we'll need to print it -or get it printed. Drawing on a computer screen is all very well, but building a model on one is somewhat less simple - the glue keeps running down the screen for a start and it's the very devil to push pins into it.

For most people, a one-sheet plan is the most convenient, but most of us don't have a printer capable of that. Yes, if you are heavily into puzzles, you can print loads of A4 sheets and join them up to create your full-size plan, but it's a bit of a pain. Besides, by the time you've taken into account paper, ink and electricity costs (not to mention the yards of sticky tape needed to join the sheets) it's very little cheaper than trotting along to your High Street print shop and getting them to print off nice, seam-free A1 or A0 size plans.

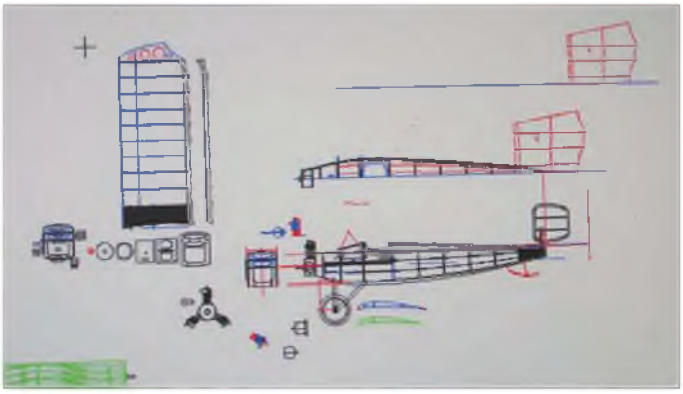
The downside of this is that very few, if any, print shops use CAD, so they won't be able to open your wonderfully accurate drawing. You need to be able to convert your CAD drawn plan into a format that their equipment can read. No, don't start to panic, it doesn't involve more expense. You should know me better than that by now! Fortunately for us, there are some very good conversion programmes available as free downloads. All you need is something that will convert a DWG or DXF (CAD formats) file into a PDF file, a format virtually everyone uses.

Before moving on

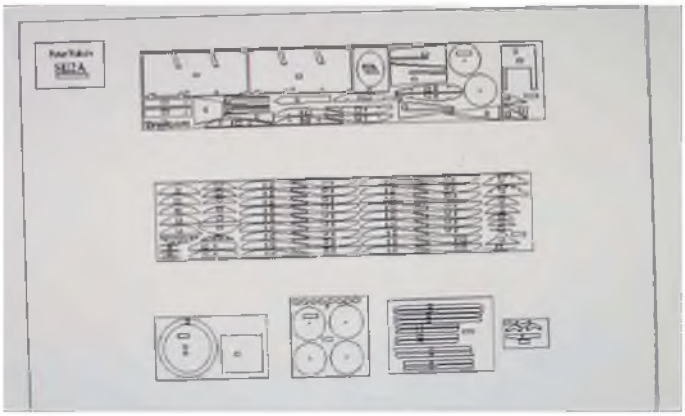
Just before we get down to the actual plan drawing (yes, I will get there eventually), let's just take a quick look at what I was saying about printing plans on your home printer. At least, how I go about it, on the few occasions I have needed to print a plan at home.

You can do it automatically, setting up your computer to

Something of a work in progress, the Caudron drawings showing the original drawing still on the screen, different colour lines and some parts separated onto wood size panels.



Looking close at the Caudron you can see items that can be moved around on the screen, or have been traced and moved, ready to form a cutting sheet.



Even if you prefer to cut parts by hand, laying them out onto wood size panels makes producing your own print-wood style kit easy.

If you're going to design your first model, something with simple outlines, like the author's Eastbourne Monoplane, is a good starting point.

Since the original was so model-like in structure, designing the Pietenpol Air Camper from original drawings was a simple task. One to watch for in the future.

accomplish the task, but there are pitfalls with this method. Not least of the problems involves paper borders. It seems that no matter how small you set the borders, you can't eliminate them entirely - without the use of yet another programme. My way around this is to view the plan at around 70% full-size and print only the part that's visible on the screen. In other words, set scaling to 'none', and select 'print current view' in the printer menu. True, it takes a while to complete an entire plan, but quite often you don't really need the entire plan. If you're building a wing panel, the plan for that wing panel is all you need to print. You simply don't need all the other information on the plan. The beauty of using this method is that it eliminates the border problem and enables you to put any overlaps exactly where you want them. There's nothing more annoying with a 'tiled' plan than having a paper join somewhere that you can't be absolutely sure you've got it right, prime examples being down the centre of a rib or a spar. This way you ensure that the entire rib, or spar, is on both sheets and that you can accurately align both sections by trimming to a line and overlapping slightly.

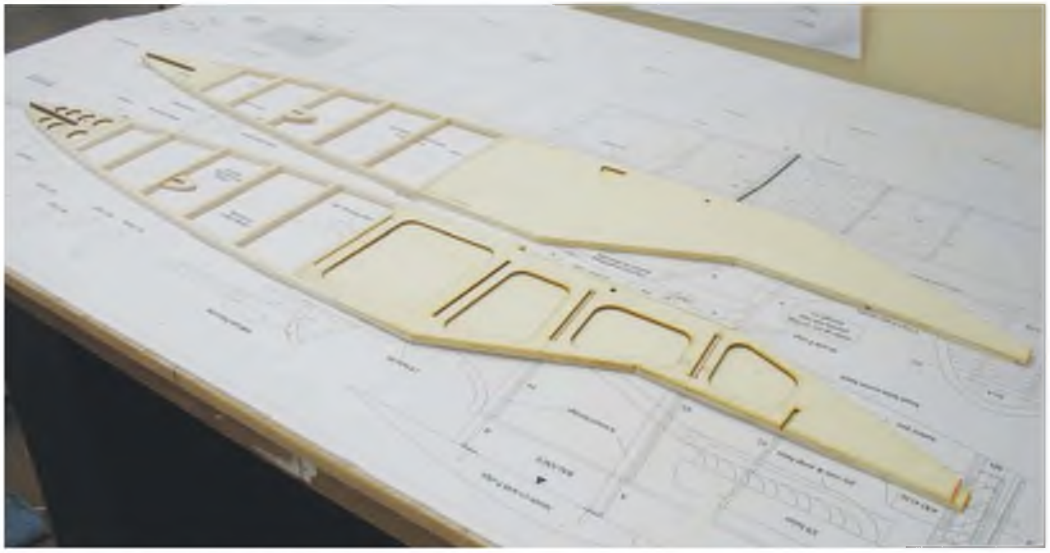
Can you imagine having to transfer that many rib outlines onto wood? Arranging them in CAD simplifies the task no end.

Back to what I was on about

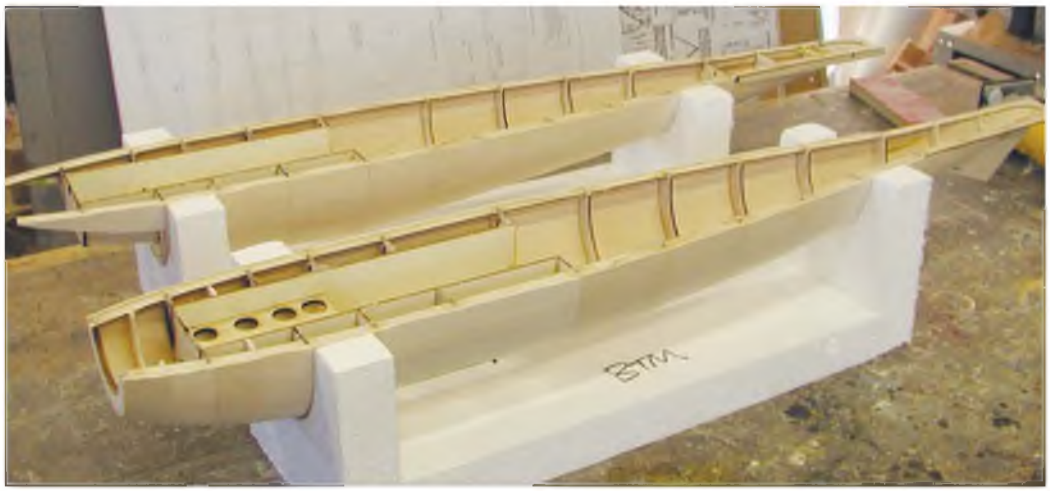
Okay then, you've selected your CAD programme, and have downloaded a conversion programme - or not if you insist on hand drawing plans. You've carefully selected the most accurate three-view drawing you can find and imported it into your chosen CAD program. How do you import it? That one, as long as you're using TurboCAD, is easily answered. Scan it into your computer, being sure to save it as a Bitmap image. Open your CAD programme and click on 'import'. Select 'picture as an object', browse to your three-view and click on 'import'. As long as the file size isn't prohibitive (usually less than 10 MB is best), the three-view will magically appear on your blank page.

At risk of repeating stuff I mentioned before, just in case you've forgotten, you have two options at this point. Either you trace the outlines at this size, and then enlarge the tracing to the size you need it, or you can enlarge the three-view and then trace. The disadvantage of the latter is that it may obscure the drawing slightly - lines become thicker and less clearly defined. A Bitmap is a series of straight lines, and curves are a collection of such lines. Enlarging such an image can make the precise curve more difficult to determine. Scaling drawings made in CAD (your traced outlines) doesn't increase the line thickness, so can result in a more

accurate representation of the shapes you are trying o achieve. All of that brings us back to where we were supposed to be starting this month's column, with a traced three-view that is about to become a model aircraft plan - eventually. Yes, I know it's taken me a while, but I wanted to explain some specific points I'd been asked about by various readers. There, and you thought you must be the only fool who reads this load of old waffle. Just goes to show how wrong you can be - and how surprisingly popular this column is in certain quarters. No, as far as I'm aware it isn't required reading in a particular type of institution, sometimes it just seems as if the author should be in one.



The accuracy of CAD allows for more intricate structures to be designed and formers that slot into fuselage sides are certain to fit properly.



Complicated structures, that need to join precisely, as with these Albatros DVa fuselage shells may not be easy to think through, but ease assembly considerably.

A plan begins

Bear with me on this. Originally I had intended to only give a basic description of how I produce a plan, but the queries I've received as follow-up to the first article lead me to believe many of you would like more of a blow-by-blow account. So, not being one to stop at one item when I can stretch it to two (or three), I can already see that this item will have to carry over to the next edition of the column too. This time, I really do promise not to make you wait months for a conclusion to the article.

So, now we really are right back at where we left things, a fully traced scale drawing scaled to the exact size our model will end up. Oh bother, I've just realised that I didn't explain how I actually scale a drawing using CAD. Okay, off we go then. You've decided what size you want your model to end up, and by how many times you need to enlarge your tracing to achieve that.

The first thing we need to do is get rid of the imported drawing we traced our outlines from. You can either just delete it or move it out of the way. I prefer to move it because you can bet that if you clear it, there'll be something you missed and you'll have to import it again. As a 'back-up' against this happening, I take it a step further than just keeping the original drawing. I like to draw a rectangle of known size around it, 'select' the entire thing, drawing, tracing and rectangle, and copy it, pasting that into a clear area on the drawing sheet. Now, you can select just the original drawing from one or the other and 'clear' just the original.

Because you chose a nice, easily multiplied size for your rectangle, you can now multiply that by the amount you need to enlarge to and draw another rectangle at that size. It is important that no lines overhang on either rectangle because that complicates the scaling process. I use the 'snap' function, set to 'nearest on graphic' and use the line length feature to ensure a precise meeting of the two ends of the lines that formed the rectangles. Now all you have to do is move the small rectangle and the tracing into the larger rectangle, set snaps as previously, and stretch the drawing to match the larger rectangle. The snaps feature will ensure they match perfectly and, because it's possible to zoom to many times full-size while drawing the rectangles, you know they'll be accurate to as many decimal places as you desire. I usually work to three decimal places because any less isn't as accurate as I want and any more complicates matters too much for my liking.

I'm fully aware that none of this is much help if you are hand drawing your plan, but I'm writing the article about how I design models. I promise you it will get more interesting for you pencil pushers as things progress.

At last

I suppose it had to happen sooner or later, I really am fully caught up now - just, you'll notice, in time to start running out of space. Oh well, nothing new there then.

With our three-view traced, and the tracing scaled to the size we want the finished model to be, we finally get to the actual designing side of things. You know, the part that involves more than just drawing lines on a computer screen. This is where you need to start using your own, in-built, computer - your brain.

We all have our own preferred methods of construction. Some hate wire bending, others detest planking and we all get more than a little fed up with parts that don't fit where they're supposed to. This is the part of the process where you can include, or exclude, much of what suits you, but still end up with a model that looks like the plane it's supposed to represent. How well the parts will fit depends on your CAD skills, so it's no use complaining if you get it wrong. This is where CAD really scores points and makes it more than worth the minimal effort required to learn how to use it. Because you can trace a component actually over the plan, and then move it around on the drawing sheet (try doing that with paper and pencil). Therefore, such things as keel sections, fuselage sides and wing ribs (including those nasty little strut-locating positions) can be traced over the basic drawing and then moved to a safe place until you need them. Because you can measure so accurately, try using a rule and pencil to draw something to three decimal places accuracy, there's no excuse for loose spars, formers that don't fit between the fuselage sides or wings at the wrong incidence angle because struts were the wrong length. A bit of care on your part and the accuracy that CAD allows make easy work of these potential problems. The fact that you can move things around even allows you to double-check everything. However, first of all, you need something to double-check, don't you? Rest assured that next time we really will get to do some actual designing on our computer screens.

In the meantime, if there's something you feel I may be able to help with, or you'd like to make a contribution to the column (I meant having your model featured, although financial contributions won't be refused), you can contact me at PETERRAKE@aol.com ■

Techno Scale

Mike Evatt scans the internet for more TechnoScale Topics

ABOVE LEFT: **Jets-Munt's new Merlin 100 Engine.**
ABOVE RIGHT: **PST Jets now manufacture a range of ARF kites such as the F9-F2 PANTHER.**

Jets-Munt SL was established in 2003 and is a joint venture of **ARMEC SL**, a company specialising in manufacturing mechanical parts using CNC, and Gaspar Espiell the owner of Xicoy Electronica SL who specialises in electronics and engine design. They have been in the turbine business since 1996 as suppliers for turbine manufacturers. During these years they have supplied thousands of mechanical and electronic turbine parts to at least nine well-known turbine manufacturers. Now they have decided to use there skills to develop their own products. Their new **Merlin 100** engine can be seen on their website at http://www.jets-munt.com

Staying with jet turbines a little longer - **PST Jets** with a web presence at http://www.pstjets.com is a company based in Bangkok Thailand. They have been designing and manufacturing miniature turbines since 1997 and now also manufacture a range of ARF kits such as the Grumman F9F-2 Panther shown in the screen-shot. All products are produced in-house using state of the art production techniques and equipment.

JetLegend is a brand of Spark Model Co. Ltd. founded in 1998 and which has-developed hundreds of model products for sale in USA, Europe and Japan. In 2002, Spark developed its first model jet using composite materials. In 2005, Spark established its own brand (JetLegend) which is customer focussed to service the needs of model enthusiasts. Today JetLegend produces some fine jets either as kits or ARTF such as the 1/6 scale F-20 Tigershark shown the screen-shot of their website at http://www.jetlegend.com

Skyshark laser-cut warbird kits are CAD designed from original scale drawings and laser-cut from hand sorted, top grade

ABOVE LEFT: **JetLegend produces some fine jets either as kits or ARTF.** ABOVE CENTRE: **A 1/9th Scale JU-87B Stuka Kit from Skyshark.**
ABOVE RIGHT: **This Mong racer is a 1:2 scale model of the original flown by Ralf Fuchs in late 80s.**

TOP LEFT: Niels Brendel's Peanut Scale Fokker FII. TOP RIGHT: Electrofly's 36in span Fokker D.VII bi-plane park-flyer. ABOVE LEFT: A delightful baby Jodel from Peol Microaviation. ABOVE RIGHT: The Baudis Salto is a third scale, 4 metre span replica and in finished in yellow.

balsa and ply. Large wing areas and light-weight design make their kits some of the best flying scale warbirds available. While most kits in the past were created using parts that were die-cut from the cheapest available wood, their kits were designed to be laser cut from the start. Skyshark kits offer extensive part detail and exact parts fit that simply cannot be reproduced by any other means. We cut with only hand sorted balsa, which insures evenly balanced parts and a consistent cut with-out too much charring. Check from out at http://www.skysharkrc.com

Air-C-Race at http://www.air-c-race.de is the home of air racers. They build models with love with a little carbon on the right places. The Mong Racer is a bit like a small Pitts, but the changes are so big it makes the Mong become a new plane. This is a racer on its own, the original has only an 4.4 metre wingspan and about 270 hp for 270 kg all up weight. This Mong racer is a 1:2 scale model of the original flown by Ralf Fuchs in late 80s so this is quite a big plane capable of using very big engines but is also very forgiv-ing in flight.

Niels Brendel is a student Mechanical Engineering at the University of Twente in Enschede in Holland. His homepages at http://members.tele2.nl/nbrendel are dedicated to his hobby of making indoor model airplanes. His website not only contains some excellent photos of his models such as the Peanut Scale Fokker FII shown in the screen-shot but also a number of interesting documentation of scale subjects together with 3-views.

Electrofly is the subsidiary of Great Planes that is dedicated to electric flight and it maintains a web presence at http://www.electrifly.com What caught my attention here was their 36in span Fokker D.VII bi-plane. Just like the full-size Fokker D.VII that was the nemesis of Allied air forces in WWI, this prebuilt park flyer is a spirited performer. Sized for easy transport, it utilizes brushless motor power that allows for long flight times and exceptional manoeuvrability. The prebuilt balsa/ply structures are precov-ered in a high-quality film. Lots of impressive details are evident, from the vacuum-formed cowl and realistic machine guns, to the scale-shaped land-ing gear and scale wheels. The cabanes and interplane struts come already paint-ed, and are shaped for easy installation and proper alignment.

The core business of **Peol Microaviation** at http://peol-microaviation.com is the creation in a reduced scale (1/20 and 1/15), of scale model replicas of airplanes whose dimensions, structural concepts, finish, and flight, are as close as possible to the full scale aircraft. In as much as possible for acceptable scale flight char-acteristics, authentic wing profiles are retained in their scale model designs. Three kit variants are offered: a basic kit destined for exhibition of the models' uncovered structure, a kit for construction of a finished scale model covered and painted for static display and thirdly a kit for the construction of a finished model, fully equipped and prepared for motor-ized radio-controlled flight.

Modelflight of Australia has recently revamped its website http://www.mod-elflight.com.au

They market a huge range of models including many scale subjects. Their Baudis Salto is a third scale, 4 metre span replica and is finished in yellow. The wing has glass fabric with Abachi sandwich whilst the fuselage is constructed from glass fabric with carbon reinforcement.

ScaleHelicopter.co.uk at, unsurprisingly, http://www.scalehelicopter.co.uk is run by LHC and Sean Brown who has 30 years of experience of building and flying scale helicopters. They are based just south of Pillerton Priors, Warwickshire UK and sell a superb range of scale models as kits or scale fuselage conversions. Sean Brown has also written a book called Scale Model Helicopters which is available on Amazon.

And finally **UControl 2000** at http://digi-lander.libero.it/ucontrol2000/U-Control-2000 is probably one of the web's best sites for displaying superb photographs of control-line scale subjects. Enjoy! If you find another as good I'm sure you will let me know.

That's all there is time for from me this month so press the button and if you find something out there of interest that might be good to share, email me at mikeevatt@hotmail.com ■

ABOVE LEFT: ScaleHelicopter.co.uk sell remarkably fine scale helicopters.
ABOVE RIGHT: UControl 2000 has some excellent photo galleries.

Shelflife

Book of the Month

Robert Taylor's Battle of Britain - Commemorative Collection

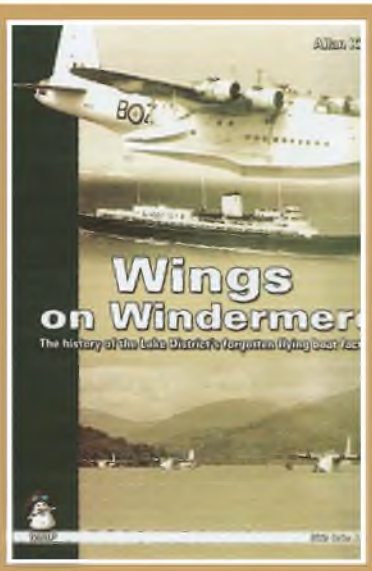
Hardback, 240 x 300mm landscape, 128 pages, profusely illustrated in b/w & colour. Published by David and Charles, available from Ian Allan Bookshop, 45/46 Lower Marsh, Waterloo, London SE1 7RG.

Tel: 020 7401 2100.
Price: 19.99.
ISBN 978-0-7153-3619-9

Robert Taylor is one of the world's leading aviation artists and the iconic planes of World War II have always been among his favourite subjects. The Battle of Britain, the legendary aerial conflict that took place during the summer and autumn of 1940, has provided some of the richest material for his unequalled skills.

This commemorative volume is a tribute to these wonderful aircraft - the Spitfires, Hurricanes, Messerschmitts and Junkers - as well as to the skill and bravery of the combatants on both sides. The pencil sketches are excellent, often featuring a plane in flight or with a pilot at the controls, or a group of pilots resting awaiting the next scramble. The paintings are stunning and so well-defined they reach photographic standard. Above all, it is a celebration of the mastery of an artist who is able to bring it all vividly to life on canvas.

Not forgetting the interesting story which accompanies each picture and also includes pilots' accounts of skirmishes and their opinions of the planes themselves. This is an outstanding publication at a very reasonable price.



WINGS ON WINDERMERE

The history of the Lake District's forgotten flying boat factory
White Series No 9105

By Allan King. Softback, 297 x 210mm, 160 pages, b/w & colour illustrations. Published by Mushroom Model Publications, imported by Chris Lloyd Sales and Marketing, available from Orca Book Services.

Tel. 01202 665432.
ISBN 978- 83-89450-82-1.

This is the story of the production of Short Sunderland flying boats in the Lake District during World War II. The trials and tribulations of building a new factory, recruiting workers and establishing a production line are described in detail, with many first-hand accounts from those involved.

Aircraft production, repair and modification are described, and the sad fate of the factory and the adjoining housing estate post-war are detailed. This never-before documented aspect of World War Two aviation history offers a full list of Lake District-bulit Sunderlands and provides details of their operational careers with the RAF and other users. Illustrated with many photographs, most published here for the first time, detailed colour profiles of representative aircraft, and maps of the factory and the surrounding area.

PLANE ESSENTIALS 3: FAIREY SWORDFISH

By John Batchelor & Malcolm V. Lowe. Softback, 287 x 210mm, 31 pages, b/w & colour illustrations. Published by Publishing Solutions, distributed by Chris Lloyd Sales & Marketing, available from Orca Book Services.

ISBN 978-1-906589-02-8.
Tel. 01202 665432.
Price £9.99.

This third volume on the Swordfish covers the famed Fairey Swordfish carrierborne torpedo bomber and general reconnaissance biplane, the important role it played in World War II for Britain's Fleet Air Arm and its combat operations worldwide.

The Swordfish was one of the very few aircraft types that was in a front-line role at the start of the war, and still in service when the war ended. It achieved an excellent record against enemy naval vessels and is forever remembered for the daring and successful raid on Italy's fleet at Taranto in 1940. Illustrated with exclusive colour plates by renowned aviation artist John Batchelor: cockpit interior, complete double-page 3-D technical cutaway, and side views of camouflage and markings, together with many b/w archive photographs, many from the author's collection.

Contents include: Development and Background; Swordfish Versions and Roles; Wartime Service; Post-War and Preserved Aircraft; Swordfish Details; Serial Numbers, Specifications, and Modelling section.

DVD: GREAT AIRCRAFT OF THE RAF: HARRIER

Running time 52mins., b/w & colour. Published by Simply Home Entertainment, available from Ian Allan Bookshop, 45/46 Lower Marsh, Waterloo, London SE1 7RG.

Tel. 020 7401 2100.
Price £9.99.

This is the fascinating story of the legendary 'Jump Jet'. With its astounding vertical take off and landing capabilities, the Harrier has proved itself a totally unique combat aircraft.
Dramatic film from NATO exercises demonstrates the aircraft's incredible flight capabilities, along with spectacular displays at airshows, where the Harrier has always proved a star attraction. Harrier pilots reveal just what its like to fly and fight in this formidable warplane, while the DVD takes you behind the scenes to uncover the secrets of the Harrier's design and development.
Also included is authentic footage of the Harrier in action during the Falklands campaign, both attacking ground positions and defending the British fleet against Argentinean bombers. There is extensive coverage of RAF Harriers in action during the First and Second Gulf Wars and operating from Royal Navy carriers during the Balkans War. Bringing the story right up to date, the DVD features front line film of Harriers operating in support of British forces in Afghanistan today - five decades after it first flew.

9TH AIR FORCE

American Tactical Aviation in the ETO 1942-1945

By Gregory Pons. Hardback, 310 x 236mm, 192 pages, profusely illustrated in b/w & colour. Published by Histoire & Collections, distributed by Chris Lloyd Sales and Marketing, available from Orca Book Services.

Tel. 01202 665432.
ISBN 978-2-35250-077-3.
Price £42.

During the preparation of the Normandy Invasion, the American high command realised soon enough that the 8th Air Force, which was wholly committed to strategic bombing, could not undertake the close support of ground units in this major offensive. The keystone of operation Overlord would indeed be mastery of the skies: tactical aviation had to be able to intervene quickly and precisely, and to operate from bases on the Continent. The concept of on-call tactical air support was therefore paramount in the Overlord plans and the 9th Air Force was transferred to England for this purpose. These hundreds of hitherto unpublished photos, copied out from the pilots' and crews' albums, the reconstructions of their flying gear and the profiles in colour of their aircraft are a unique testimony to the day to day life of 9th Air Force personnel and the missions of combat crews. This sumptously illustrated voloume provides an invaluable resource for the modeller, enthusiast and historian.

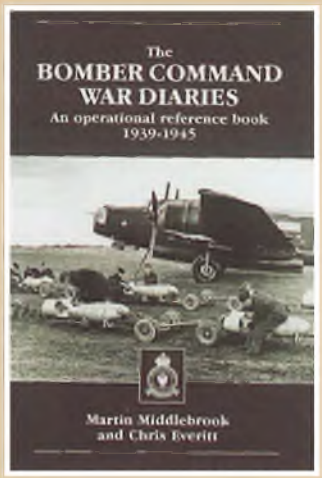
THE BOMBER COMMAND WAR DIARIES

An Operational Reference Book 1939-1945

By Martin Middlebrook & Chris Everitt. Hardback, 240 x 160mm, 808 pages, b/w illustrations. Published by Ian Allan Publishing, available from Ian Allan Bookshop, 45/46 Lower Marsh, Waterloo, London SE1 7RG.

ISBN 978-1-85780-335-8.
Tel. 01933 443863. Price £24.99.

This excellent reference book was originally published in 1985 and is recognised today as an unrivalled detailed source of information on Bomber Command's war. Published for the first time in hardback form, it holds details of each operation laid out in diary form, which makes it an easy to read reference tool. It also includes the target, the numbers and types of aircraft involved as well as the success of the operation and the aircraft lost. It concludes with a statistical section on losses suffered by Bomber Command and the operational successes of the individual units.
The Bomber Command War Diaries is a classic work of reference on WWII. Every single operation with RAF Bomber Command mounted during the war throughout enemy Europe is listed, from the first day of the war to within a few hours from its end. This operational reference book will be invaluable to all those interested in WWII as well as those researching family history for their relatives who served with Bomber Command during the war.



VF-11/111 'SUNDOWNERS': 1942-95 Osprey Aviation Elite 36

By Barrett Tillman with Henk van der Lugt. Softback, 284 x 184mm, 128 pages, b/w & colour illustrations. Published by Osprey Publishing, PO Box 140, Wellingborough, Northants. NN8 2FA.

ISBN: 978-1-84603-484-8. Tel. 01933 443863. Price £14.99.

Fighting Squadron II was established at San Diego in August 1942, beginning a half-century record that spanned aerial combat in three wars from the piston to the jet age. Earning its battle spurs at Guadacanal in Wildcats, the 'Sundowners' transitioned to Hellcats in 1944 and saw further action from USS Hornet (CV-12). Redesignated VF-III in 1948, the unit converted to F9F Panthers and scored history's first jet-versus-jet victory over Korea in 1950. FJ-3 Furies and F11F Tigers followed, before VF-III recieved the world-class F8U Crusader in 1961. During the Vietnam War, the 'Sundowners' logged six deployments, scoring MiG kills in F-8s and F-4 Phantom IIs. From 1978 to disestablishment in 1995, VF-III flew F-14 Tomcats from USS Kitty Hawk (CV-63) and Carl Vinson (CVN-70), completing 37 deployments from 17 'flattops' in its 52-year career.
Contents include: Guadalcanal; With the Fast Carriers; The Jet Age; Vietnam; Post-Vietnam Era; Appendices; Colour Plates Commentary; Bibliography; Index.

PLANS and PARTS

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Plan price £19.50 Plan No.278
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Designed by respected R/C scale expert Philip S.Kent, this quarter scale replica of the radial engined version of the 1930s air racer spans 96" (2438mm) is an ideal/introduction to the world of large scale. The model suits 1.50 cu. in. size four stroke engines and requires four function radio control operating the basic control functions of rudder, elevator, ailerons and throttle. Conventional wood airframe structure throughout.

BAE NIMROD
Plan price £19.50 Plan No.258
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The R.A.F. maritime recce/anti-submarine patrol aircraft, modelled by renowned electric scale expert Chris Golds. 86" (2185mm) span model flies on four Speed 400 electric motors, driving pusher props. Full step-by-step written building instructions.

ELECTRIC CANBERRA B(I)8
Plan price £29.50 Plan No.262
COMPONENT PACK £175.00
From the building board of electric ducted fan scale expert Chris Golds, this 84" (2,134mm) span model is the 'Interdictor' version of the famous jet bomber. Prototype used two Hacker B50-16L motors and two ten-cell 3300 NiMH power packs. Four sheet plan shows retracts and flaps. Plans are supplied complete with step-by-step written construction sequence.

HEINKEL HE 51
PLAN PRICE £17.50 PLAN NO.80
COMPONENT PACK £125.00
A 68" (1727mm) wingspan 1:6.4 scale model of the pre-WW2 German biplane fighter for 4-function radio control and .70-.90 cu.in. four-stroke motors. Can be built without recourse to glass fibre mouldings for items like engine cowl and wheel spats.
Two sheet plan.

BUCKER BU180 STUDENT
PLAN PRICE £26.50 PLAN NO.015
COMPONENT PACK £120.00
The R.A.F. maritime recce/ anti-submarine patrol aircraft, modelled by renowned electric scale expert Chris Golds. 86" (2185mm) span model flies on four Speed 400 electric motors, driving pusher props. Full step-by-step written building instructions.

De HAVILLAND DH 82a TIGER MOTH
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An 80 inch (2032mm.) wingspan, 1:4.33 scale model for 1.20 cu.in. motors and four function radio control systems, No moulded cowl required - all wood construction. Three sheet plan.

FE8
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PLAN NO.267
COMPONENT PACK £88.00
Accurate 1/5th scale 75.6" (1920mm) wing span replica of the British early WW1 pusher fighter. Requires .78-.91 four stroke engines and four function radio control system. Excellent for electric conversion.

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An amazing 1/6th scale fully flyable replica of the British WW1 maritime patrol flying boat. Model spans 100.5" (2553mm) and suits two .25-.30 cu.in. two stroke engines. Can be flown from water, or from land using a take-off dolly to safely landing on its hull. Prototype model won "Best of Show" at the prestigious Toledo R/C Expo in USA. All the detail is there on the plans for an impressive model.

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1/4 PLAN NO.241, 1/5 PLAN NO.242
PLAN PRICE (EITHER SCALE) £26.50
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1/4 scale spans 82.5" (2095mm) for 30cc (1.8 cu.in.) two stroke engines. 1/5th scale spans 65.7/8" (1673mm) and suits 15.cc (.90 cu.in.) four stroke engines. BE SURE TO QUOTE SCALE REQUIRED WHEN ORDERING!

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PLAN PRICE £17.50 PLAN NO.091
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A 1/6th scale replica of the RAF's most elegant 1930's biplane fighter. 60" (1524mm) wing span model requires four function R/C gear and .60 cu.in. motor.

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BOEING PT-13 STEARMAN

PLAN PRICE £19.50 PLAN NO.243
COMPONENT PACK £99.50

A 58" (1473mm) wingspan replica of the famous bi-plane radical engined trainer aircraft of the WW2 era. Designed for 700 size electric motors, but with option of i.c.engine power using a .52-.60 four stroke engine, with modifications shown on a separate plan sheet. (Ready-cut wing ribs and fuselage formers available - see below) Three sheet plan.

PIPER SUPER CUB

PLAN PRICE £16.50 PLAN NO.146
COMPONENT PACK £95.00
G/F COWL PRICE £17.50

A great first-time scale model for novices and sport fliers who want real scale accuracy. 79 ins span 1:5.33 scale model suits a range of engines .40-.60. Two sheet plan. Glass fibre cowl available.

CORBEN SUPER ACE

PLAN PRICE £19.50 PLAN NO.275
COMPONENT PACK £65.00

A 50" (1270mm) wing span sport-scale model of the delightful American homebuilt aircraft, this design is an excellent introduction to the world of radio control scale modelling, featuring simple airframe structure that will result in a scale replica ideally suited to regular club-field flying on a regular week-upon-week basis. 1/6th scale replica suits .26-.30 four stroke engines, or .20-.25 cu.in. two strokes. Four function radio systems required.

SOPWITH CAMEL

PLAN PRICE £14.50 PLAN NO.188
COMPONENT PACK £79.50

1/6th scale replica of the famous RFC WW1 fighter biplane, for .24-40 size motors and four function R/C. 56"(1422mm) wing span.

SOPWITH PUP

PLAN PRICE £16.50 G/F COWL PRICE £17.50
PLAN NO.177 COMPONENT PACK £135.00

Superb, true-to-scale 1/5th scale replica, features accurate outlines and rib-for-rib reproduction of the full size wing structure.63 ins. (1600mm) span model is of manageable size for transport and offers realistic flight performance.For60size motors and 4 function radio. Glass fibre engine cowl available.

TIPSY JUNIOR

PLAN PRICE £19.50 PLAN NO.286
COMPONENT PACK £95.00

A 1:3.44 scale, 79" (2006mm) wingspan replica of the late 1940s Belgian light aircraft, designed to suit .90-1.20 cu.in engines. Designed by Philip S.Kent, the model features all built-up balsa/ply construction throughout and makes an excellent entry into R/C scale modelling. Rudder, elevator, aileron and throttle controls.

WHAT DO THE CUT-PARTS SETS CONTAIN?

The components, in balsa and ply that you would otherwise have to trace off the plan onto the wood and then tediously cut out prior to commencing building! Basic strip and sheet wood not included. Be ready to start building as soon as you unfold the plans!

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The Storm Li-Po range covers all of the popular sizes in 15C, 25C and 35C, as well as some hard cased packs for cars in 30C and 40C.
The 25C rating and above are capable of very fast charging at up to 5C, allowing for less charging time and more flying/driving time.

Whether you need Li-Po, Li-Fe or NiMH for a Drive battery, Receiver or Transmitter pack, these high performance, low internal resistance packs will be perfect for the job !

Competitively priced, Storm batteries are available from all good model shops and further information and specifications can be found on our website at www.LogicRC.com

Li-Po

Capacity mAh	400	600	800	1000	1300	1600	1800	2200	2500	2600	3000	3200	3300	3700	3800	4000	4200	4500	5000	6000	8000
2S (7.4V)	35C	35C	35C	35C	35C	RX	25C&35C	35C	25C	RX	25C	35C	-	-	-	25C	-	-	25C	25C	-
3S (11.1V)	35C	35C	15C&35C	35C	35C	-	25C&35C	25C&35C	-	-	25C	35C	35C	35C	35C	25C	35C	35C	25C&35C	25C	25C
4S (14.8V)	-	-	-	-	-	-	-	25C&35C	-	-	25C	35C	-	35C	-	25C	35C	35C	25C	25C	25C
5S (18.5V)	-	-	-	-	-	-	-	-	-	-	-	-	-	35C	-	-	35C	35C	-	-	-
6S (22.2V)	-	-	-	-	-	-	-	25C	-	-	25C	-	-	35C	-	25C	35C	35C	25C	25C	25C

NiMH

Capacity mAh	750		1200		1500	1600		2000		2300	3000		3700	4500	4700
Cell Type	AAA		AA		2/3C	AA		AA		SC	SC		SC	SC	SC
Layout	Flat	Square	Flat	Square	Flat	Flat	Hump	Flat	Square	Flat	Flat	Hump	Flat	Flat	Flat
4.8V (Rx)	✓	✓	✓	✓	-	-	-	✓	✓	-	-	-	-	-	-
6.0V (Rx)	-	-	-	-	-	✓	✓	✓	✓	-	-	-	-	-	-
7.2V (Drive)	-	-	-	-	✓	-	-	-	-	✓	✓	-	✓	✓	✓
8.4V (Drive)	-	-	-	-	-	-	-	-	-	-	✓	✓	-	-	-
9.6V (Tx)	-	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-

Li-Fe

Capacity mAh	850	2100	3000
2S 6.6V (Rx)	✓	✓	✓

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