

Smoke Trails 28

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First, to remind us of what, hopefully, we have to look forward to this year, here is a nice report from Howard Metcalfe: "Only the diehards ventured to February's Middle Wallop meeting, which was very cold – you needed all your clobber on to keep out the chill – and competitors outnumbered us sport flyers at least three to one. It was slightly breezy late on, but around midday conditions were perfect. Alan Whipp had very kindly donated me some boxes of L2 motors and I was able to fly six profile models. I seemed to be the only Rapier flyer (no surprise there, given the shortage of Rapiers), but the Smoke Trails attracted interest and, no doubt, a few quiet laughs when the models occasionally ended up smoking in the grass. I had two new models to try out, my own design Boulton Paul 111A and Bill Dean's Supermarine 508. I was not expecting a brilliant performance from the L2s as not only were they rated a lowly 90 - 105mN, they were also quite old. However, all that I tried worked just as it said on the box: they didn't seem to have lost any power at all, and – a real bonus – they burned for a magnificent 25 seconds. Please bring them back, Dr Z!



I first tried the Supermarine 508 (actually the very similar 529). After a lot of chucking and gently 'tweaking' of the wings to get it flying straight, it flew off as nice as you like powered by a 90 mN L2 – straight, but not very high at around 30 ft off the deck. Unfortunately, you couldn't see much apart from smoke as it was mostly 'end on' until it started a gentle turn to the left, leaving a low lying layer of exhaust all over the car park. The glide showed it was a touch nose heavy, but, nevertheless, this was a very satisfying, if somewhat tame, first flight.

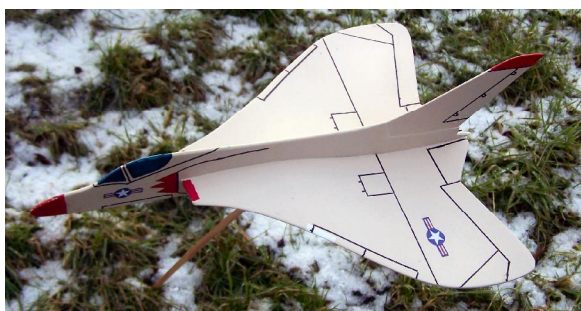
The above scenario was repeated with the Boulton Paul 111A: chucks', tweaks, then power. It climbed a little higher on 90mN and turned more, staying around longer so I could get a good look at it in flight. Great! More power (105mN) made it into a comic turn: straight up into a steep climb, a flip flop loop (can you call it a loop?), another climb and flip flop (twice), a combined flip and turn [sounds like Howard had been watching the ice dancing at Winter Olympics!] ending with a climbing turn above my head to a good height and then gliding away more or less straight. Great again! After playing with my Comet and Mirage F1 – troublesome beasts both – I tried the Spook, expecting it would be true to form and give me a few long walks. But it was not to be. I gave it a 'go' after trimming out a strong left turn, but enough remained to take it into the ground at speed. Last, but not least, I turned to my all- Depron Talon.

Top left: Howard Metcalfe's favourite all D*pr*n T-38 Talon. **Middle and Bottom** Howard's new profile models, his own BP 111 and Bill Dean's Supermarine '508/529'. All are for Rapier L2.

Happily, this did fly true to form: a lovely steep climbing turns to a fair height, a straight downwind glide and a retrieve of several hundred yards. The Talon has been consistently one of my best performing Rapier models, at 16 grams weight, 10 grams of thrust and small frontal area it is a real goer and a fair glider. One day I shall lose it in a thermal!

The Supermarine 508/529 has an interesting history. I first saw photos of the [real] 508 when I was about 12. The butterfly tail fascinated me and may well have been why my first ever scale model was a V-tailed KK Bonanza. I made a few modifications to Bill Dean's plan [*Smoke Trails (ST) 24*]: lowering the wings and adding the strakes (I like strakes) to make it into a 529. To retain the proportions of the original in my profiles I add in the width of the fuselage to the wings so that the wing tips and front and rear of the fuselage all stay in the same place. Even so, Bill's wings looked a bit short so I made them even longer.

The finish is 'Pearl Pearlescent Liquid Acrylic Silver' from the local craft shop. Two coats, rubbing down in between, looked better than one, though it was still slightly translucent. It didn't seem to weigh much, maybe 1½ grams in total; it might have been a touch lighter if had put one coat of Johnson's 'Klear' on first and rubbed that down and then the silver – I will have to do some more tests, but this is the first time I have ever brushed on silver without getting streaks, and a Jetex Sharky would look good done this way. However, the stuff is not cheap at £4 for a little bottle, though it does go a long way. The 508 weighs 15 g with the extra noseweight, giving it a power to weight ratio of 1:1.6 with a 90 mN motor, which no doubt explains the gentle flight characteristics, I'll try it on 105mN next time out. The photo shows my typical arrangement of under slung motor (which is practically invisible when the model is in flight) with 2° downthrust and a thin ply downthrust tab at the rear."



The full story of Howard's day at Middle Wallop, from which the above are merely the 'edited highlights' can be found at: <http://www.jetex.org/scripts/yabb2/nph-YaBB>.

Howard's BP 111 is inspired by, but is by no means a copy of, Bill Dean's little chuck glider (*ST 20*, Feb 2009). In particular, Howard is not fond of Bill's 'ogee' wing profile, and his plan was made from an accurate 3-view and drawn up and coloured, with all the graphics, using CAD. The templates were then printed on to heat transfer paper and ironed on to balsa. Please ask Howard for templates of his models if you want to make one. I'm sure the Talon would go just as splendidly if made from the traditional balsa. These sorts of models make excellent sense in these straightened times, especially if you have Rapiers of dubious heritage, or want something robust to try out that recently acquired Jetex motor and learn (or relearn) the eccentricities of Jetex without risking a proper scale model.

SAM stalwart Walter Snowdon is also building up a fine collection of vintage profiles, and has, so far, made a Jetex Javelin, a Bill Dean Skyray and BP 111A, as well as an Imp and a Keil Kraft Gnat.

Top left: Walter Snowdon's Jetex (Wilmot Mansour) Javelin. **Middle:** Skyray; **Bottom:** BP 111A. Both are adapted from Bill Dean's plans for 'chuckies' published in the *Eagle*. These are for genuine Jetex(Atom 35 or 50c) power.



Above: Walter Snowdon's delicious Imp (top) and KK Gnat. Both are brilliantly finished with food colourants.

Walter writes: "The Javelin is built from a template [*Jetex Natters, SAM Speaks Oct 1990*] and finished with one coat sanding sealer and one coat of very thin enamel. The Skyray is finished with one coat of sanding sealer and two coats of 'Pound Land Primer Aerosol'. This gives a lovely antique satin finish and is only £1 a can! The Imp and Gnat are finished with food colouring – one part colouring to one part water applied with a soft tissue. You can make repeat applications after drying to give deeper colours. I pre-sand the balsa and if you use as little water as possible there is no grain rise. It is better to shape and colour *before* assembly so you don't get pale glue marks. When dry, buff gently with a soft cloth. Two very thin spray coats of dope gives a lovely waterproof finish.

The Javelin has a lovely glide, and the BP 111 is a little gem, but I don't like the 'ogee' wing section at all. Both the Skyray and BP 111 were very temperamental during test glides and needed lots of work to overcome the constant 'hunting'." Hmm ... we have seen this sort of behaviour before with deltas, so I asked Walter to explain the phenomenon further. He replied:

"The BP111 is slightly larger than the Bill Dean plan and very light. I have test glided it with and without the Atom 35. Without the motor it is very sensitive to launch speed, and is best with a gentle "push" from shoulder. Any faster than this makes it hunt up and down as though the airspeed is reversing the lift into a downwards pressure on the leading edge so that the flight oscillates, though the direction is unaffected. A hard chuck turns into a flat spin! With the Atom 35 the launch is not quite so critical, why I don't know! The Skyray has a much heavier build (paint job), but has the same hunting flight pattern. I intend to build another enlarged for Jetex 50 with a flat wing. The Imp glides beautifully with a Jetex 50, requiring no change to the trim at all. The completed Gnat looks gorgeous – I haven't tested it yet – with another 2 inches on the tail boom this will be a real goer!"

There is much to think about in Walter's observations. My M.7 Flying Boat (*ST 21*) showed the same unhelpful behaviour from a test chuck or a catapult launch until I reduced the reflex to about 3° from the original's 10°.



Above: Howard Metcalfe's contrasting Skyray (left) and 'Flatray'; Both are based on Bill Dean's originals; the Flatray, as the name implies, features a straight, not reflexed 'ogee' section, with elevons with 3° of 'up'. Both fly well, but differently.

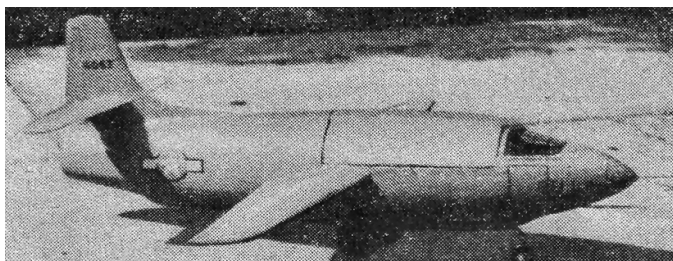
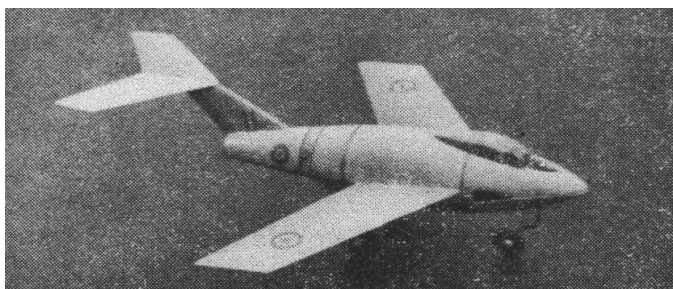
The Skyray and BP 111 glide more consistently, particularly from a hand launch, with a heavy Jetex motor on board. According to Steve Bage (*ST 23*), small deltas and tailless designs can be very sensitive to Reynolds numbers and need sufficient airspeed to prevent a 'separation bubble' of stagnant air forming in the hollow on the top surface of the wing in front of the reflex. As Lippisch and Conover found with their deltas (*ST 21*), a heavy Jetex motor can increase the wing loading and hence the flying speed, preventing this from happening and stabilising the flight pattern.

Nevertheless, Simon Firth, who won the 'Profile Scale' at Peterboro Flying Aces with one, can attest that, despite its contrary behaviour from a hand launch, an original Skyray goes well under power even in difficult conditions. Howard Metcalfe, who has built Skyrays with both the reflex section a flat section with elevons, much prefers the startling performance of the latter 'Flatray'. Bill Dean's original, he says, is a 'one speed' model', which is an advantage for stable turning characteristics and keeping it in the field, but is less exciting!

Apropos of trimming 'jet' models, Peter Coombs received an email from Dave Causer, who is, Peter observes, "A 'Master of the Art' of trimming and pursues a scientific approach – unlike we of the 'chuck it and see' pragmatists"[!]. Here are Dave's thoughts on Peter's tricky-to-trim MiG 29: "If you set a model up with lots of decalage (longitudinal dihedral) you'll need more nose weight, but it will be very pitch stable [in free flight]. A consequence of pitch stability is speed stability, so if you try to make the model go fast, it will pitch up strongly in an attempt to hold the speed that you've effectively 'trimmed in 'with the decalage. A chuck glider is set up at almost zero/zero to minimize the pitch-up created with the high speed launch. But there's not much pitch stability and they take a lot of height to pull out. With jet models, thrust doesn't drop off with speed, as it does with a fixed pitch propeller, so the models tend to fly fast under power. Hence the need to have low decalage to stop them looping. However, you need to have some decalage, otherwise the flight will be unstable in pitch. No doubt a very tricky trimming problem, but if it was easy, it wouldn't be worth it."

Hmm ... one needs 'some but not too much' decalage and perhaps the MiG 29 is a trifle lacking in that department, and prefers to be flown in a flat calm. Dave does not mention the use of downthrust, but this can be a very effective means of controlling a model's tendency to 'nose up' as the speed builds up. Pylon mounted motors are useful on sport and duration models; profile models (and the MiG 29) respond well to a thrust tab; vintage Jetex Flying Scale models are more easily trimmed with a trough modified to apply downthrust, and models with enclosed motors and augments tubes or (dare I say it) EDF may require a thrust vane. Certainly down thrust is more effective, and looks better than, great unsightly lumps of Blutac stuck on a model's nose! Let's make 2010 a 'Blutac free' year!

Reactionary Experiments, 1952



Top: Aero Enterprises 13" span RTP Excalibur. When powered by a 'thermal reaction unit' (of unknown design, but charged with Mechanite). Speeds up to 80 mph were claimed. **Below:** The larger Bell XS-1 was intended for free flight and a larger motor – a scary prospect!

My ruminations about the contents of Coffman Starters and their suitability as a rocket propellant resulted in a most welcome letter from Harry Hannant, who served at R.N.A.S Coldrose. Harry writes: "The substance was 'Mechanite'. It was, as Phil [Smith] says, like candle wax but a bit harder and a dark green colour. It could be cut down, if you were careful, to fit a Jetex 100, which I did". Harry sent me a March 1952 *Aeromodeller* article, 'Reactionary Experiments' in his letter, from which the two black and white photos on the left are taken. The (edited) relevant paragraphs within this article read: "A group of aeromodellers engaged at RAE Farnborough have [sic] been working on high speed research with models using thermal reaction units. Known as 'Aero Enterprise', this group developed a thermal reaction unit early in 1949 and first flights were made with a special design called the 'Excalibur'.

[The AM article continues] "This all-balsa 13" span model achieved speeds exceeding 80 mph on its many flights, each lasting between 20 and 30 seconds flown RTP on the end of a single strand steel wire eight feet long. The scale Bell XS-1 was span 18" and length 20" and was scheduled for free flight but actually flew as a control line model and was capable of flying faster than 100 mph, which would indicate that a larger propulsion unit was fitted". Sadly, no details of this unit are given in the article, except this resonant information: "Some difficulty has been found with the ignition of the powerful Mechanite explosive [sic] used in the rockets, electrical firing being the natural choice, but not altogether practical. Jetex fuses have proven quite successful in this application and have been used for two tests. It would be as well to recount as a warning that the first rocket changed the colour of its steel tube with the terrific heat developed, and the second, in a Keil Kraft Competitor, distributed said airframe over a range of two hundred yards in an unexpected explosion!"

This 1952 article was new to me. It is a pity that no details of the rockets are given. Harry confirms that Mechanite was to be treated with respect, "I had an RTP MiG 15 fitted with a Jetex 100, similar to those in the April 1954 *Aeromodeller* article [see (Jet) X Files no 13]. It flew on a 6 ft line attached to a two-foot pole. It was very fast and faster still with Mechanite, until the pressure overcame the safety springs with disastrous results to the fuselage."



Harry ends his letter, "There was a static water tank of about 30 ft diameter at R N A S Coldrose. I used to make Jetex 50 powered hydroplanes and set them going on it. My Keil Kraft Attacker is finished in the colours of an aircraft I worked on as an air mechanic in the Fleet Air Arm".



According to Wikipedia, Mechanite is an intimate mix of 49% nitrocellulose, 34% nitroglycerine and various inhibitors and plasticisers including 7% Carbamate (diethyl diphenyl urea). It is thus a form of cordite, which, it will be remembered, was what Ray Sharpe used in the rockets developed by the LSARA (see *JXF 24*). It is still produced in various grades and used in ejector seats. I wonder if I can get my hands on any – it might solve the problem of my dwindling stocks of genuine Jetex fuel!

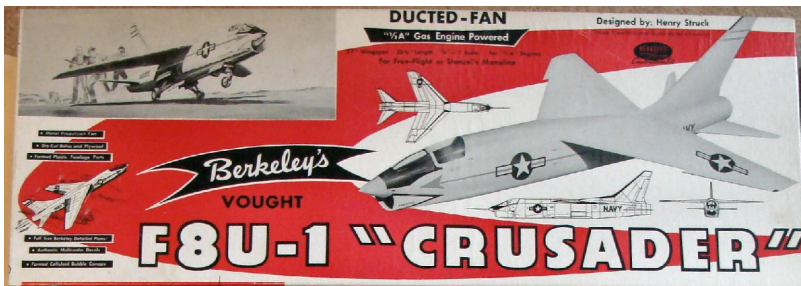
More Vintage Ducted Fans



I was very pleased with the response to my article about Veron's ducted fans: George Pelissier France is hoping to restore a Veron La 17 and F-86 he built in his youth, and Steve Bage has a very nice EDF MiG 17 on the building board. Also, in these Rapier-less days, EDF (electric ducted fan) is seen by antique modellers as a legitimate way to keep genuine 'Jetex' models in the air. Philip North has already tackled what must be one of the more difficult EDF conversions – a Wilmot Mansour Saro A/1. Phil writes: "the SARO A/1 has a single GWS 40mm fan blowing through bifurcated ducts with LiPo batteries and one of Derek Knight's magic timers. It flies well, but the motor [which I guess was 'over voltaged'] is now worn out. Perhaps I should have gone brushless?"

Top: Harry Hannant's beautifully finished KK Attacker. He doesn't say if it's for Rapier L2 or Jetex 50, or whether it has yet flown. **Below:** Phil North's ingenious EDF conversion of the Wilmot Mansour SARO A1.

I know little about these things, of course, and I hope to appoint Steve Bage as our resident 'EDF expert'. Naively, I would have thought Phil's model, with its twin 'jet pipes' breaks all the established DF rules, but it does show just what is possible with modern units and electronics, albeit at the expense of regular motor and battery replacement! Given the performance of modern EDF, perhaps I can persuade folk to attempt some other ducted fans from the 1950s that, in their original guise, would have been distinctly underpowered? For example, the lovely offerings from Berkeley below.



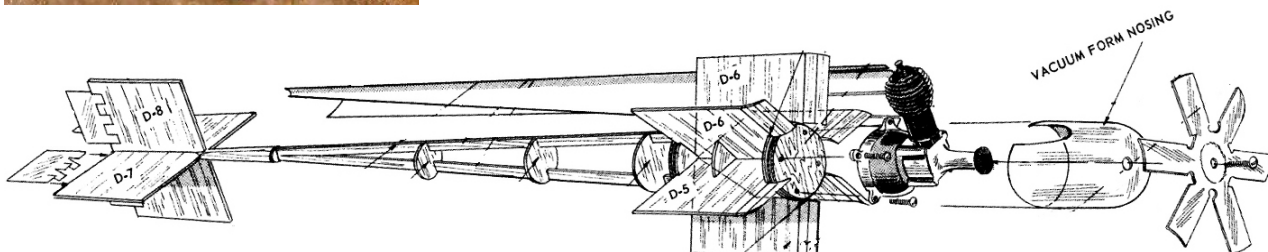
These were comparatively large models (≈25-30" span) intended for '1/2A' glow motors. Their sophistication and complexity are evident from the Tigercat plan, which is itself a work of art and beautifully festooned with detail sketches. Note the intelligently designed ducting and that the fuselage, in contrast to the Jetex Tailored models, is planked, not moulded. The recommended Cox engines were also high revving, and, with suitably doped fuel, could deliver the necessary power. Unfortunately, they were let down by the rudimentary, and possibly dangerous, 3" metal fan, which was greatly inferior to a Veron 'Imp' impeller.

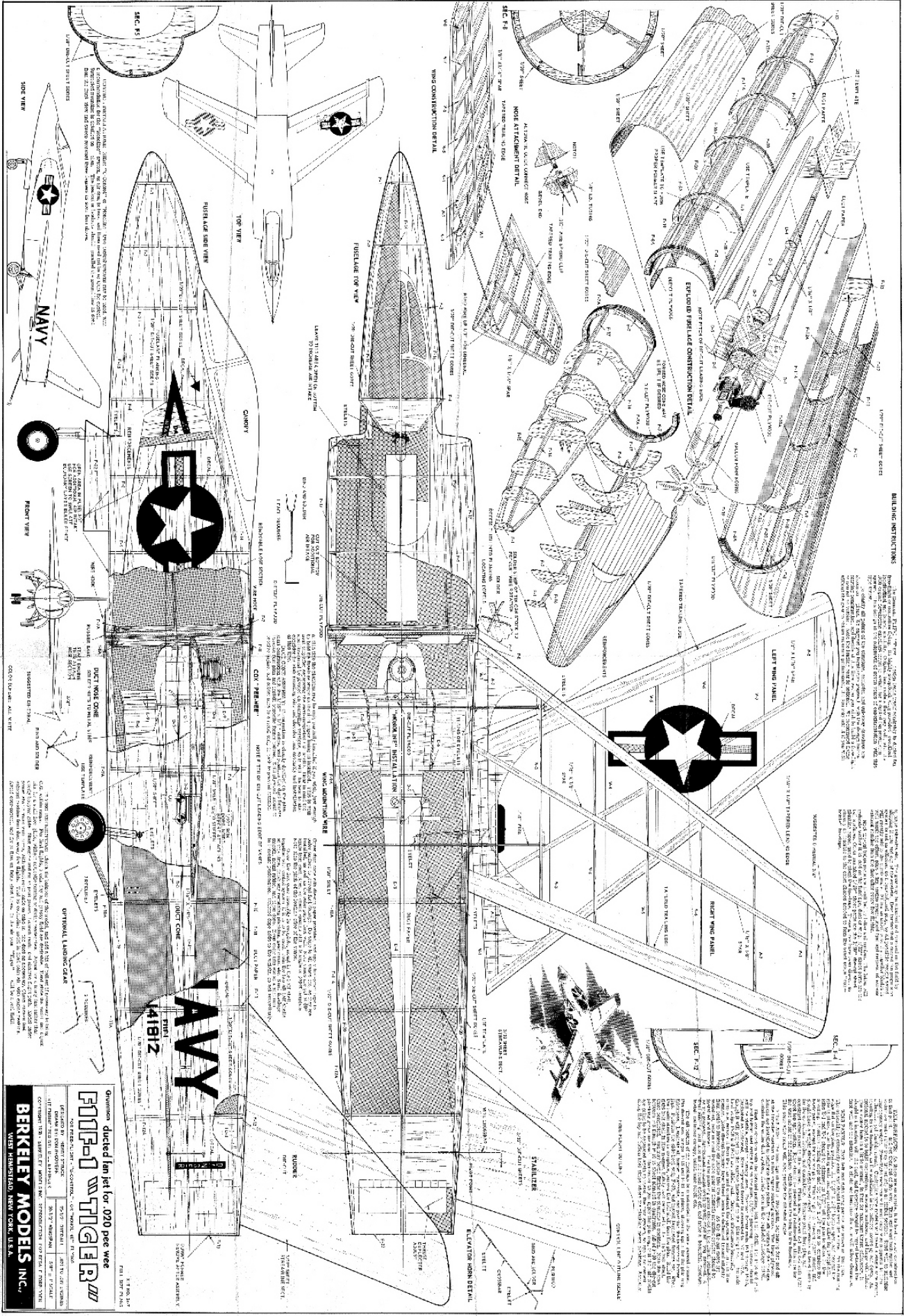
However, with modern EDF, these models are a viable proposition. Kits in good condition can still be found on eBay, where they are not (yet) as expensive as Jetex Tailored models.



John Miller Crawford (who has a 'thing' about the Skyray) is hoping to build one for a 50 mm EDF with a brushless motor and LiPos. This 'powertrain' should give a thrust of 6 - 7 oz – a lot more than the original could ever have known!

Left: this rather crude metal fan was included in the kit's extensive accessories. I wonder how efficient it was.
Below: detail of one of the many marvellous 'isometric' sketches in the plan. The motor is a Cox 'Pee Wee'.





BUILDING INSTRUCTIONS

1. Assemble fuselage, wings, landing gear, and tail section as shown in the exploded view. Use the dimensions and part numbers given in the drawing to assemble the model. The fuselage is made of balsa wood and the wings are made of plywood. The landing gear is made of brass and the tail section is made of balsa wood. The model is designed to fly with a 1/2" diameter propeller and a 1/4" diameter motor. The fuselage length is 10 1/2" and the wingspan is 12". The model is designed to fly at a speed of 15-20 mph. The landing gear is made of brass and the tail section is made of balsa wood. The model is designed to fly with a 1/2" diameter propeller and a 1/4" diameter motor. The fuselage length is 10 1/2" and the wingspan is 12". The model is designed to fly at a speed of 15-20 mph.

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