Diary

5th August Cardington	Indoor Meet: F1D; 35cm Microfilm. Contact, R L Bailey, tel: Stevenage 723642
9-12th August	15th International Igo Etrich Wanderpokalfliegen (Open International): F1A.
12-15th August Assais/Airvault	International Free Flight Days at Poitou (Open International): F1B; F1C & F1G; F1A.
18-19th August Marigny	Criterium Pierre Trebod (Open International): F1A; F1B & F1C.
25-26th August Zulpich	11th Eifel Pokal (Open International): F1A; F1B; F1C.
25-27th August Cardington	Indoor Trials for '80 World Championships team: F1D. 25th, practice; 26th & 27th, three flights each day in rounds. Contact, R L Bailey, tel: Stevenage 723642.
25th-27th August Everleigh	British National Free Flight Championships: all classes: see information issued to competitors by SMAE.
2nd September Church Fenton	Northern Area Rally: F/F events, with C/L and R/C activities on site. Contact, Jim Moseley, tel: Leeds 864026.
9th September Area venues	SMAE 5th Area Centralised event: Team Power (Keil, PL); F1B (Gutteridge); A/1 Glider (F1H).
16th September Cardington	Indoor Meet: CO_2 Duration; EZB. Contact, R L Bailey, tel: Stevenage 723642.
23rd September Odiham	Southern Gala: O/G; O/R; O/P; F1G; F1H; ½A; HLG. Contact, Norman Couling, Eastbourne 53116.
29-30th September Sculthorpe	SMAE 2-day Meet: O/G; O/R; O/P. F1A; F1B; F1C in five rounds. Contact, M Fantham, tel: 01-736 7163.
30th September Cardington	Indoor Meet: Open helicopter; HLG. Contact, R L Bailey, tel: Stevenage 723642.

AUGUST 1979 79/08

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FREE FLIGHT NEWS

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Compiled and published by Ian Kaynes, Paul Masterman, Michael Warren and Malcolm Wood.

THE WEATHER - AND WHERE TO FIND THE BEST

In Britain and in many other parts of the world where model airplanes are flown, flying conditions usually vary throughout the year - indeed, as often as not, they vary throughout the day! So any information which stops us wasting valuable time driving to the flying field only to discover that it's an unsatisfactory venture, must be good news - especially when motor fuel is scarce and expensive. Weather information defined by geographical zone is sueful for another purpose. In Britain , where we hold SMAE Area Centralised contests on up to one dozen sites across the length and breadth of the country, it is often worth moving around if (a) you are especially intent on winning, or (b) need points in the Plugge Cup.

At home, we are fortunate in having a number of sources of information which can aid us in our selection. First, we have the regular general weather forecasts which are broadcast on radio and television channels - including telefax information and Prestel - for the wealthy few able to receive it... Then there is the recorded telephone information weather forecast, usually found on an '8091' number following a local code. This data provides local area forecasts, usually for a period of 24 hours from the time of the announcement, with an outlook for a subsequent 24 hours. During the daylight period, the forecast is updated every six to eight hours. This service has its faults, particularly in the data of especial interest to model flyers who have only small testing fields available; windspeed tends to be poorly and/or erratically described. Your local telephone directory offers a long list of numbers related to the appropriate zones around the United Kingdom. Equate your favourite flying sites with the relevant telephone number, and find out where the weather's best.

Further information can be had from the London Weather Centre of the Meteorological Office by calling 01-836 4311, though data provided varies in quality apparently dependent on the mood of the Met wo/man on duty. Some are helpful; some seem hopeless.

However, there is a further service available which is particularly useful to us, but seems to be very little known among model flyers. This is provided by the Civil Aviation Authority under s scheme last described in Aeronautical Information Circular 51/1978, and known as GAVFFS - the General Aviation Visual Flight Forecast Service. This information is provided through an automatic telephone answering service and is the result of an international agreement reached through a meteorological sub-committee of ICAO, the International Civil Aviation Organisation. A three-minute recording provides information much of which is value, or by interpolation of the data, can give the listener valuable guidance on the likelyhood, or otherwise, of suitable flying conditions. Its one fault, from the contest flyers' viewpoint, is the short forward range of the forecast (this is entirely natural given the primary function of the service, and the automatic compensation is, of course, accuracy!). For the record, the duration is 6 hours.

But instead of discussing its 'pros' and 'cons', first let us describe the layout of information in the forecast, and how it can be interpreted for our purposes. Then perhaps you will be encouraged to try it out. Comments on its utility would be welcomed.

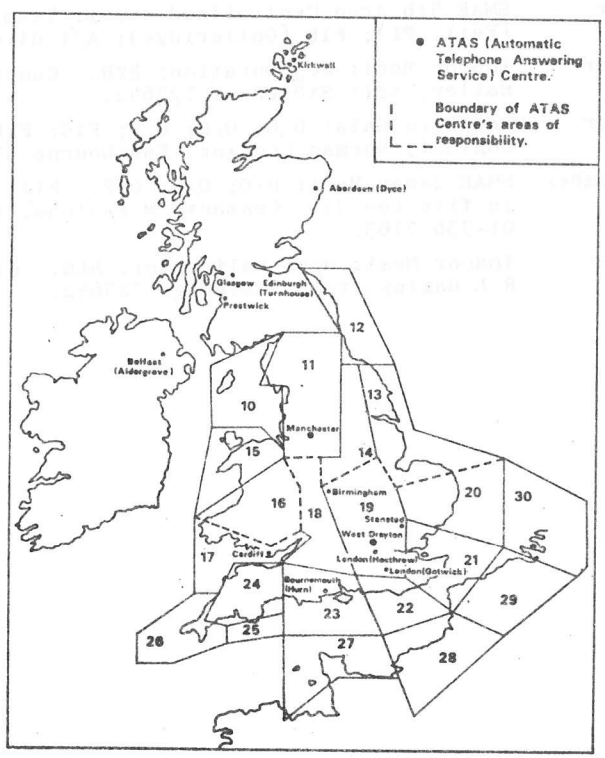
The announcement specifies the date, time and duration of the forecast and proceeds to state the general weather situation. All information is given at dictation speed. Warnings come next, and are usually the least useful items for us, except when rain, snow or fog is specified. Freezing levels (zero degrees Celsius) however, are of use, since they can be used in conjunction with the general weather situation to estimate ground level conditions, and trends beyond the duration of the forecast itself.

Weather categories, specified by geographical area follow, and are:

Category CAVOK (Ceiling and Visibility Orl Korrect): Visibility 10km or more and no cloud below 5000 feet and no cumulonimbus. Note that cloud cover is defined as 4/8 (fower - octa) or more; that is, half or more of the sky. There is no precipitation, thunderstorm, shallow fog, or low, drifting snow forecast.

O (Oscar): visibility 8 km or more; cloud base 2000 feet or more.

D (Delta): visibility 3 to 8 km and cloud base 1000 feet or more, OR visibility 8 km or more and cloud base 100 to 200 feet.



M (Mike): visibility 1.5 to 3 km and cloud base 500 feet or more, OR visibility 3km or more and cloud base 500 to 1000 feet.

X (X-ray): visibility less than 1.5 km and/or cloud base less than 500 feet.

Other verbal abbreviations used are:

GRADU - gradually becoming.
TEMPO - Temporarily
INTER - Intermittant
RAPID - Rapid or Rapidly

The last forecast topic is upper winds. These are given as vectors - that is, speed and direction, and are quoted for 2500, 5000 and 7500 feet.

It is important to record all information, even that outside your own geographical confines, since after a time, and with experience, it gives the listener a valuable opportunity to forecast likely weather changes during the day, often after the expiry of the official forecast.

Give it a whirl on the following telephone numbers:

Areas 10 - 16 (specified in the forecast as 'one zero thru one six'), Manchester (061) 4991717 or West Drayton 42513

Areas one seven thru three zero (17 -30), (061) 4993131 or West Drayton 49262 Or 3.

CIRCLE TOW EXPERIENCES by W McGarvey

Bill's article first appeared in the New Zealand 'South Island News'. Our thanks to Bill and Paul Lagan for this interesting material.

I first saw circle tow in Sweden in 1971 when the Russians circled in calm conditions for up to 20 minutes before pinging off for a modest height gain. Myself and others were convinced by that demonstration of the tactical advantage offered by circle tow and zoom. It may be worth enumerating just what those advantages are:

1) an ability to circle allows an extended tow and the increased likelyhood of contacting rising air as the tow proceeds, if rising air is there;

2) an ability to gain height from a zoom increases the potential duration of the flight under all conditions.

Note very carefully that an extended tow will also increase the likelyhood of contacting sinking air if that is there. It cannot be emphasised too often that circle towing is a process of sampling the air with a refined instrument and as such is the second best thermal detector. The best is still the glider in free flight responding to lift.

If the circle tow is to pinpoint that patch of air which is rising, then the chances of success are enhanced by commencing the tow when ground indications or other forms of thermal detection indicate that lift is building. Otherwise the circling will only confirm there is no lift, or worse, there is sink. The only time when arbitrary use of circle tow as a lift indicator is warranted is under still, cool conditions when lift and sink are small and very weak and are not detectable by other means.

A zoom launch adding 20 feet of height to the launch of a glider used throughout a contest or a season could be expected to raise the potential flight time by 20 seconds in all weathers. Over a seven round contest that adds a potential 140 seconds to the score. Allowing for three non-max flights in seven, with the remaining four lift assisted, then the total score could go up by 60 seconds for the average flyer by adding zoom and nothing else.

By the end of the '78 Trans Tasman Trials, I could no longer delay an involvement with directed towing. The choice had to be made of a system and aeroplane. The rest of the tale will document the choices I made and the results I got.

Available information in January '78 covered a wide range of hooks and systems all documented by Aero Modeller or FFn from 1972. Information on the exact details of flying and trim technique was practically non-existant. I decided on circle tow for calm conditions with zoom under all conditions. The hook had to have the following characteristics:

3) it had to have an open hook at the moment of release;

4) it had to be 'settable' for captured ring or free ring depending on whether circle or straight tow was to be attempted;

5) the ring had to stay on the hook while there was line tension irrespective of whether the ring was captured or not;

6) the hook mechanism had to provide three position rudder with incremental zoom rudder deflection.

I settled on the Russian hook of '72-73 vintage as made by Bob Hatschek.

The choice of aeroplane was simple. The Trials glider was of Russian type proportions and I decided to retain the layout while changing the construction to accept zoom loads and lighten up the back end. Other minor changes were made to improve the circling characteristics and rate of roll.

Calculations on the old wings should they would fold at about 4 lbs line pull, while 7 lbs was required for the new design. Lepp's construction gave about 2250 lbs per square inch compression in the top spar at 7 lbs pull which seemed OK for good pine or spruce. Incidentally, if any demonstration was required of the need for webs to prevent spar compression buckling this was it.

Some checks on the quantity of wood in the old wing and the required quantity of wood at the centre section of the new wing soon convinced me that fully tapering spars would be needed to keep the all-up weight down to 6 ounces. The construction was essentially Lepp's and Tchop's. The building time for the first of two sets of wings was 117 hours go to whoa. They are immensely strong both torsionally and in bending and with heavyweight tissue on the centre section plus three thinned coats of dope and one thinned coat of polyurethane weigh in at a shade under six ounces minus the dowels.

First efforts at circle tow were made with a recoil winch driven by a rubber motor. I thought that this winch would allow me time to pay out line as I ran on the downwind leg and recoil any slack for

the upwind tow. This worked well enough in calm conditions but in any sort of breeze things happened too fast and the plane whistled downwind faster than the combined speed of my run plus paying out. I made the decision to stick with the recoil winch and accept the operating limits this imposed rather than use a loose line and risk ground line tangles. This was an error of judgement as it turned out and will be discussed later.

I soon found that several flying wrinkles assisted the circling mode and reduced the amount of running required:

7) the tighter the circle tow the better;

8) a left bias on straight tow placed the plane nearer the circumference of the circle, and the tower nearer the centre;

9) towing as far forward as possible before circling placed the tower nearer the centre and the plane nearer the circumference;

10) a slight stall at the end of the straight tow induced by a gentle tug on the line would be followed by an $\frac{1}{8}$ to $\frac{1}{4}$ flick turn from the plane and reduced circle time.

It was at about this stage I encountered a tendency to spiral on the line. The reasons for it are discussed later but it was this tendency that set a practical limit to tightening up the circle beyond a certain point.

The zoom was approached with caution. Latch tension was set at $4\frac{1}{2}$ lbs initially, by measuring with a good spring balance. With the Hatschek hook as supplied I found the incremental rudder offset at unlatch too fierce and a straight tow was followed by a sharp turn with the right wing dropping and the plane peeling around in a tight banked turn. The situation was improved by filing off the bottom of the latch so that only a small hook travel (and hence rudder deflection) was required to unlatch. Used with a $5\frac{1}{2}$ lbs unlatch tension and the left bias on tow I was able to get reasonable releases and a modest gain in height (no more than 10 feet I would estimate). Higher unlatch tension (hence higher forward speed) resulted in a vicious turn followed sometimes by a spiral into the ground.

By this time I realised that a number of problems remained to be solved on the circle and zoom fronts but time did not permit. I travelled to Hastings with models that had good glides, could be circled in the calm, and had the beginnings of a zoom. At the Trans Tasman contest the first and last rounds were calm while the remaining rounds were flown in various wind strengths. The Aussie circle towers could handle the wind throughout the contest although Max Boccardo appeared extended on one or two occasions on his downwind leg. Zoom launches were noticeable by their absence. Two major reasons contributed to the superior circles of the Aussies:

11) their use of the trailing line;

12) model trim during circle and glide.

The technique employed in towing was to unreel the whole of the line which had a wrist thong or knot on the free end. Tow commenced and model speed was maintained by hauling in line hand over hand while walking back slowly to lay the line out on the ground. With about half the line on the ground and the plane overhead, the circle commenced. The tower trotted forward towards the centre of the circle letting loose line run through his hand until 180 degrees of turn was made and most of the line was in the air, when the process was repeated.

Consider the mechanics of this technique compared to the fixed line technique I and the rest of the NZ team were employing. Assume a 10 mph wind is blowing and the plane has a 15 ft per second forward glide speed and a 30 second glide circle. The wind speed is about 15 ft/second so that the fluctuation in ground speed of the model is zero to 30 ft/second on the upwind and downwind legs respectively. One half circle takes 15 seconds and in that time on the downwind leg the model will travel 375 feet from an unstalled circle. If the plane was stall turned and did a quick $\frac{1}{8}$ turn the distance covered would be about 300 feet in 11 seconds.

If the tower had all his line out at the start of the circle and the plane was at 160 feet, say, he cannot immediately turn round and sprint for the centre of the circle because he has to wait for the plane to turn and head downwind. But when the plane does turn fully downwind it is doing 30 ft/second or 20 mph and the tower must keep up or the line goes tight and the plane pulls into the ground. Thus while the average sprint speed is quite reasonable it is the Olympic burst in the middle which defeats your glider flyer.

Now look at the situation when we start the circle with the plane at 82 feet, with 82 feet of line instantly available on the ground. The plane does a stalled turn and covers 300 feet in 11 seconds as before, by which time it is down to 75 feet say. With the full line out, the distance from the circle downwind perimeter to the tower is 140 feet on plan and thus in 11 seconds the tower has to run 300 - 140 = 160 feet. Since he has 82 feet of slack line to play with, he could set off for the circle centre immediately after the stall turn and let the plane catch up. His average and maximum speed is now down to 15 ft/second. This is still too high for extended towing and the flyer would drop before finishing the contest.

Consider what happens now if we trim the plane to fly in 20 second circles and fly it in the same breeze. The downwind distance for the stalled turn is 192 ft in $7\frac{1}{2}$ seconds. The tower is still 140 ft away from the circumference when the model lies downwind. He thus has to run 52 ft in $7\frac{1}{2}$ seconds - that is, 7 ft/second. By using the loose line and reducing the circle time from 30 to 20 seconds, we have cut the speed required of the tower from 20 mph to 5 mph in a 10 mph breeze. Now we know why John Lewis made it all look so easy in the wind. John used hand over hand towing and a very tight circle tow and free glide turn. How did he get the tight turn? Well, he used Dave Simon's Marrakesh Express' (October '77 FFn). This plane is of standard proportions but uses an all flying fin and a wing set with more incidence on the whole inner (turn) half. This is achieved by using one main dowel joiner with two positioning dowels at the rear. One of the positioning dowels is adjustable up and down which allows the wing incidence to be varied. I believe about half a degree extra incidence is set on the inner wing. For free glide

the plan shows 5mm left offset at the fin trailing edge, increasing to 12mm for circle tow (the plane has a left glide). For straight tow 3mm right offset is used to counteract the extra drag of the washin. During the whole of the tow the tail trailing edge is set up 3 to 4mm to keep the nose up and counteract the effects of the tight circle, line weight and line drag. These three all combine to produce an under-elevated tow attitude. The total effect of the trim on the 'Express' was a tight flat glide and an even tighter tow circle without any sign of the spiral or nose down tendency which had plagued my own flying.

Back in Auckland I threw away the winch, put 3mm fixed packing under the tail trailing edge and connected the D/T to the timer pin. Towing was easier but my conclusion was that the wing incidence had to be employed with the tail negative to get full benefit.

To summarise our experiences thus far:

Hook requirements 3 & 5 are still necessary;

requirement 4 came out in the wash because the latch converts a captured ring to a free ring when tension builds anyway;

requirement 6 was a mistake and is now obsolete. More about this later;

wrinkles 7 to 10 are still valid;

technique 11 is essential;

model trim for circle tow in a breeze is important to keep the towing speeds down to manageable limits. A tight circle is essential.

the zoom is still something we read about.

The machinery for achieving a power climb transition is certainly not the single action rudder. Putting on glide rudder at release only achieves the familiar power model maneouvre of a wing drop followed at best by a loss, or at worst a spiral into the ground.

Once again the Russians have developed the answer. They do away with the incremental rudder turn at unlatch and release the plane with the rudder straight but timer controlled to come in gradually as the speed dies. The sequence takes 2 to 3 seconds and gives a climbing turn without wing dip. Apparently the earlier solution of using a timer-controlled flap has now been discarded.

Now we have the zoom control it only remains to get the model moving really fast for release. Clearly this calls for low drag on tow. The standard Russian glider is 84 inches span with a B 6356b wing section, a flat tail with 27 inches distance between wing TE and tail LE and with 56% CG. This will move rapidly on tow at glide incidences. Not all gliders will do this and a high aspect ratio model may require positive tail incidence to get the drag down for speed on tow. Obviously the more forward the hook position the greater the nose down moment about the CG and the lower the wing tow incidence. You can't go to excess on this adjustment or the plane weaves. The point is that in order to get height out of the zoom the release speed must be as high as possible and the glider drag after release should be as low as possible. There is room for incidence adjustment during tow to get optimum release characteristics. Having said all that it now becomes clear that if negative tail incidence is used to circle then this incidence should be removed for the final zoom. The answer is to have the VIT worked off the latch so that on the final leg the tail drops back to glide position near the downwind perimeter allowing adequate acceleration for release. Now consider the following specification for a World Championships glider:

1) 160 seconds from 164 ft line in still air (non-thermal);

2) 20 ft height gain on zoom;

3) controllable on circle tow in wind up to 10 mph.

This machine would do 180 seconds from a 20 ft zoom in calm non-thermal air. When the wind got up it would give the owner a competitive edge over most of the competition who would revert to straight tow. The plane would need to be of 'Russian' design and construction set up with differential wing incidence to give about half a degree more on the inner side, but set by experiment. The fin should be all flying to avoid the tendency of fixed fins with rudders increasing their power disproportionately with the speed. The free glide circle will probably work out fairly tight and flat because of the differential incidences. About 20 seconds per turn would be about right. The tail should be set with about 3 to 5mm negative incidence during circle tow to counteract the tighter circle (say 15 seconds) plus line weight and drag. This incidence should be removed on final tow to cut the drag and allow a really fast zoom. The actuating line should be linked to the latch. The zoom should be fast, pointed up, and straight initially with a rudder deflection controlled to come to the glide position in 2 to 3 seconds. With three such machines and six months solid practice anyone could be a threat.

CIKLON, F1C by A Meczner

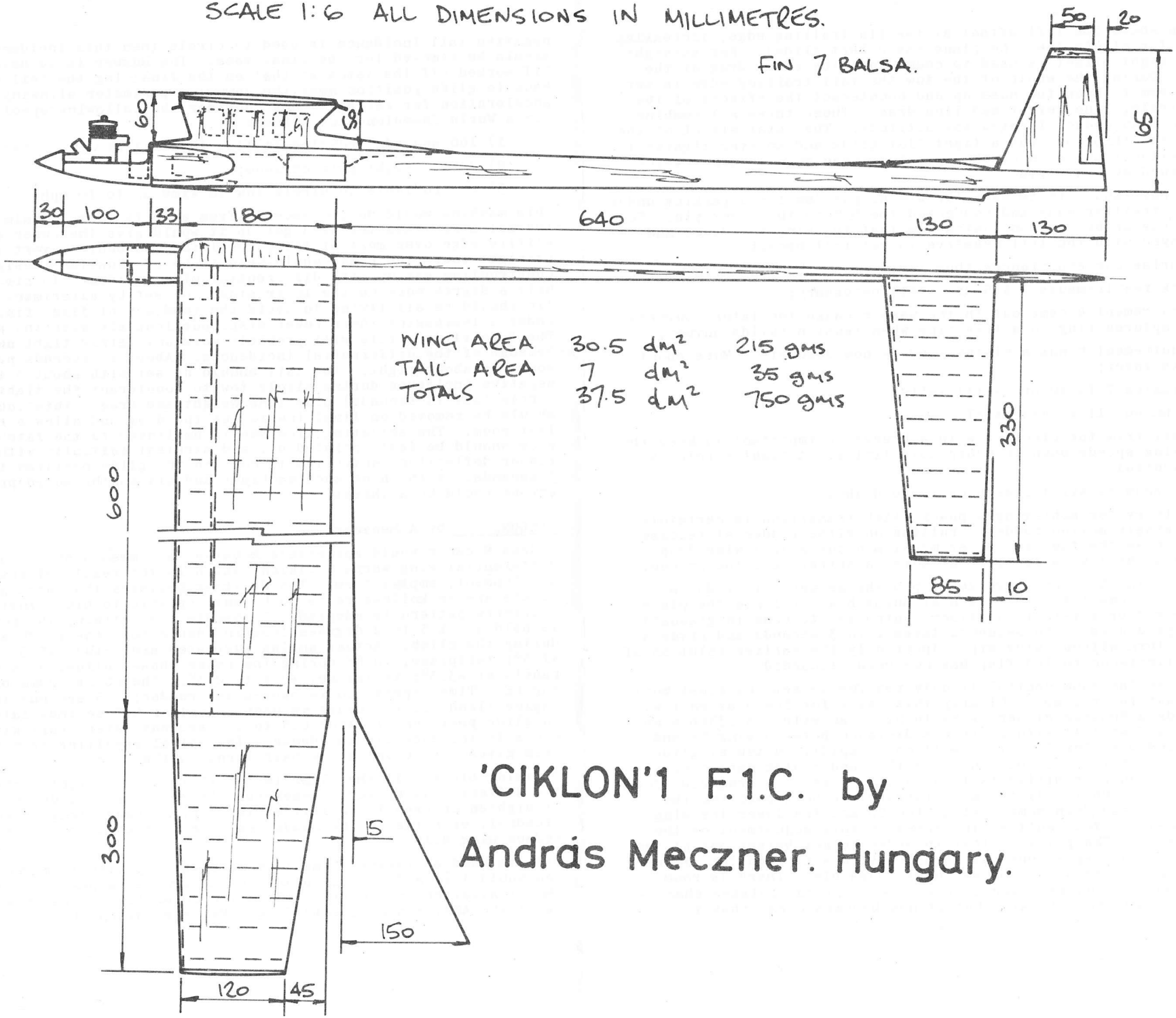
Andras Meczner would appreciate McGarvey's comments above concerning differential wing warps. Ciklon, which is the result of several years development, employs them. The designer believes that straight-up climbs are so knife-edge as to be unacceptable to him. Instead, a corkscrew pattern is adopted. To handle the pattern, the port wing is held at 1.5 to 2 degrees less incidence than the starboard panel during the climb. Actual angles suggested are: Stbd, +3.3°; Port, +1.5°; tailplane, +0.6° during the power phase. Glide, both wing panels at +3.3°; tailplane, +0.1 to 0.3°. The CG is 120mm back from the LE. Timer operation is quoted as: rudder; 0.5 seconds later, engine flood-off (no brake is used); further 0.5 seconds later, tail to glide position; further 0.5 to 0.7 seconds later, port wing TE drops to increase its incidence. The spiral resulting from this trim gives one to one and a half turns on the climb.

Trimming hints: If the climb is too flat and too tight right, increase the differential by adding washers. If there is a tendency to straighten or even to go left at the top, increase longitudinal dihedral, or bring in the rudder earlier. If this proves of no avail, reduce wing differential.

Malcolm Wood's drawings come from material supplied from Hungary. If you would like a full-size plan, the design has appeared recently in 'Model Aviation' and costs US$3.25 including first class postage. MA is at the AMA, 815 Fifteenth Street NW, Washington, DC 20005, USA.

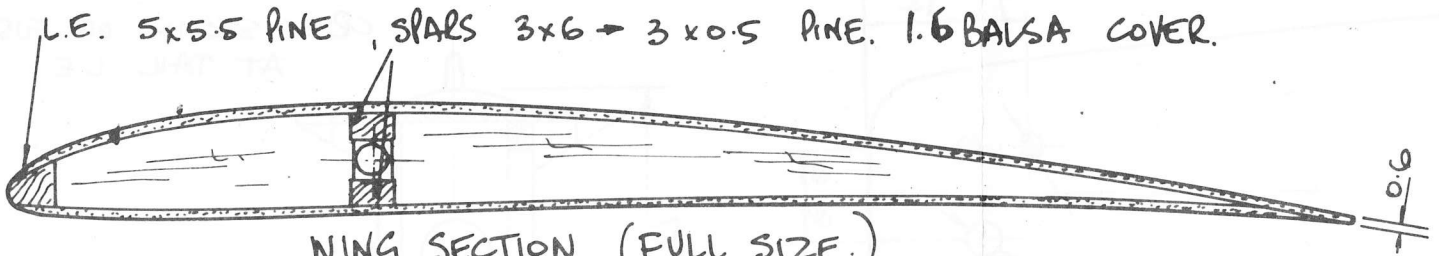
SCALE 1:6 ALL DIMENSIONS IN MILLIMETRES.

FIN 7 BALSA.

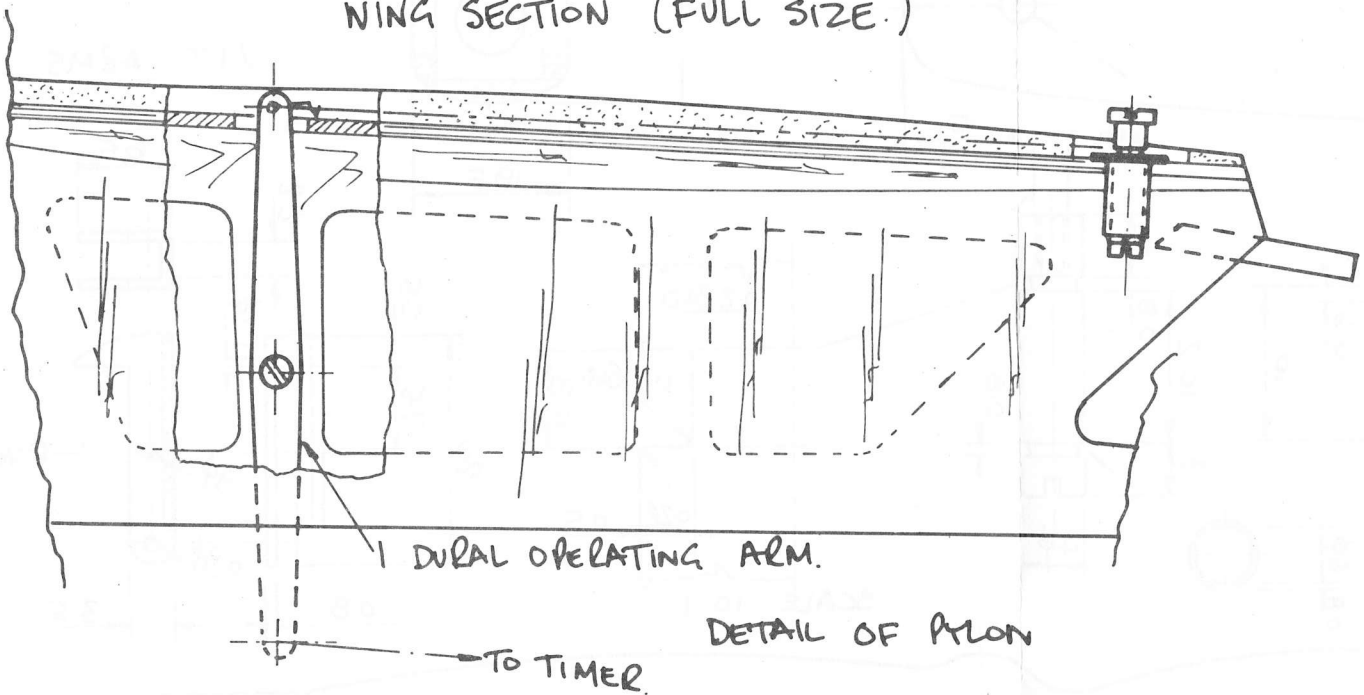


WING AREA	30.5	dm^2	215 gms
TAIL AREA	7	dm^2	35 gms
TOTALS	37.5	dm^2	750 gms

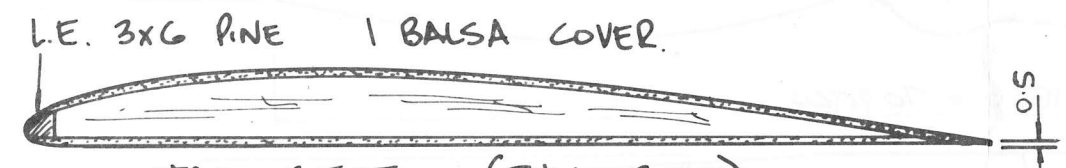
'CIKLON'1 F.1.C. by András Meczner. Hungary.



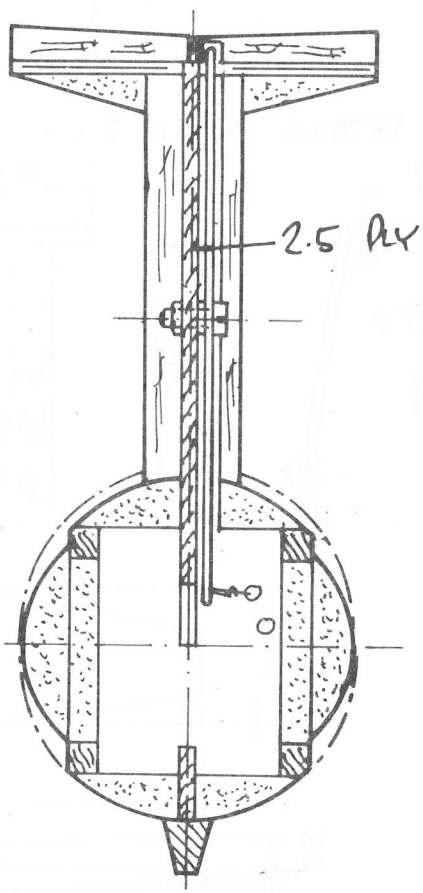
WING SECTION (FULL SIZE.)



DETAIL OF PYLON



TAIL SECTION (FULL SIZE)



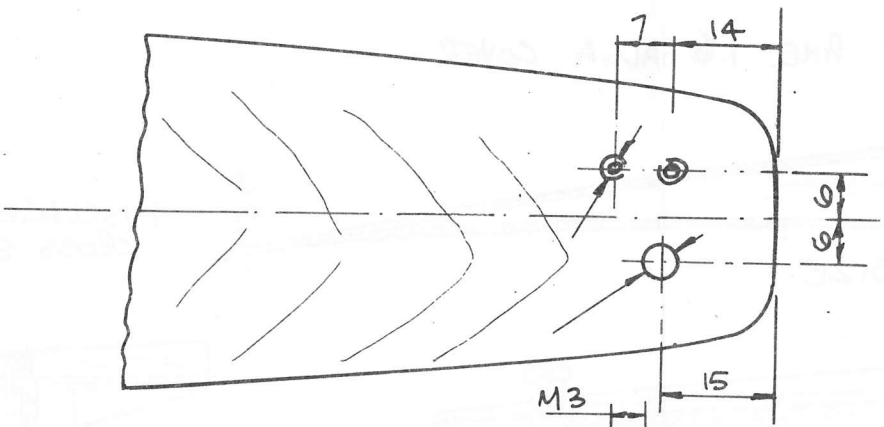
FUSELAGE : PYLON CROSS SECTION.

'CIKLON 1' Full Size Details.

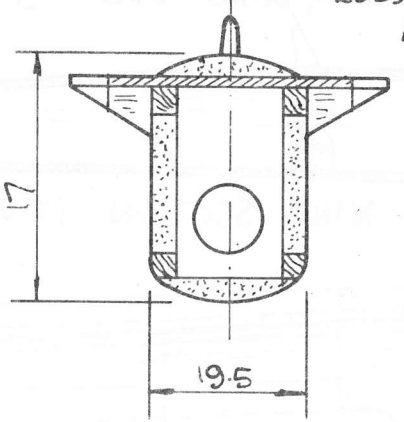
'CIKLON 1'

Details

DETAIL OF MOUNTING FOR AUTO-WASHOUT.

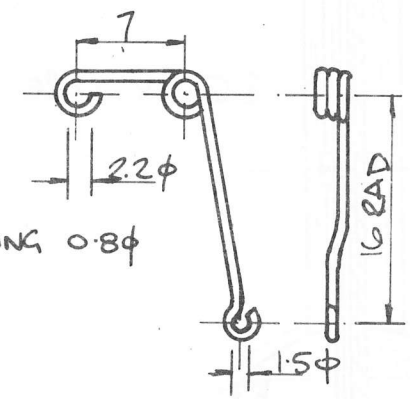


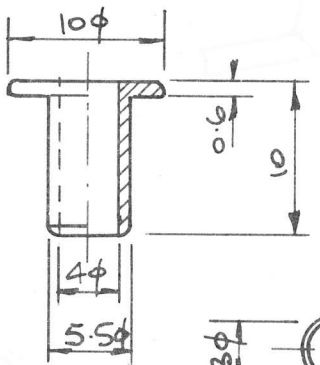
CROSS SECTION OF FUSELAGE AT TAIL L.E.

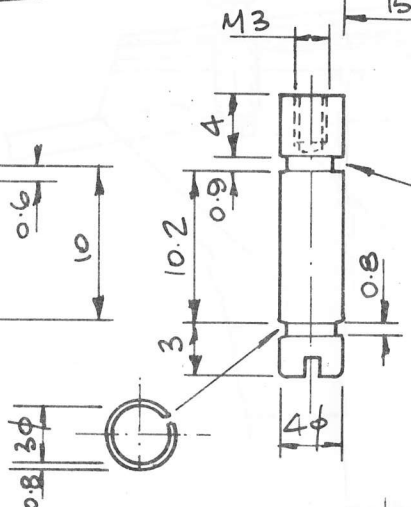


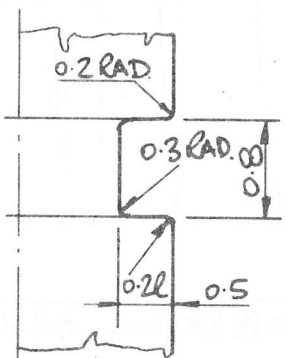
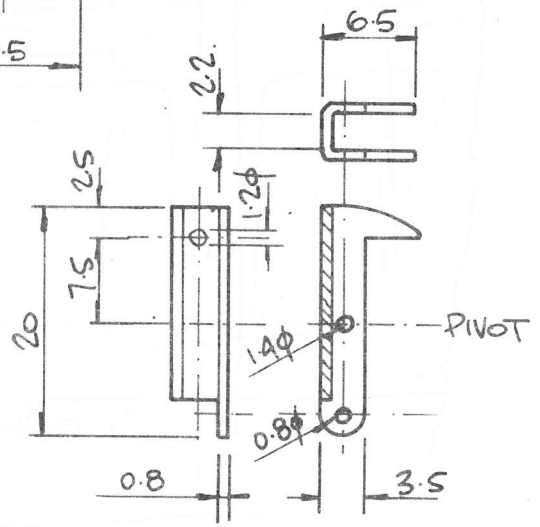
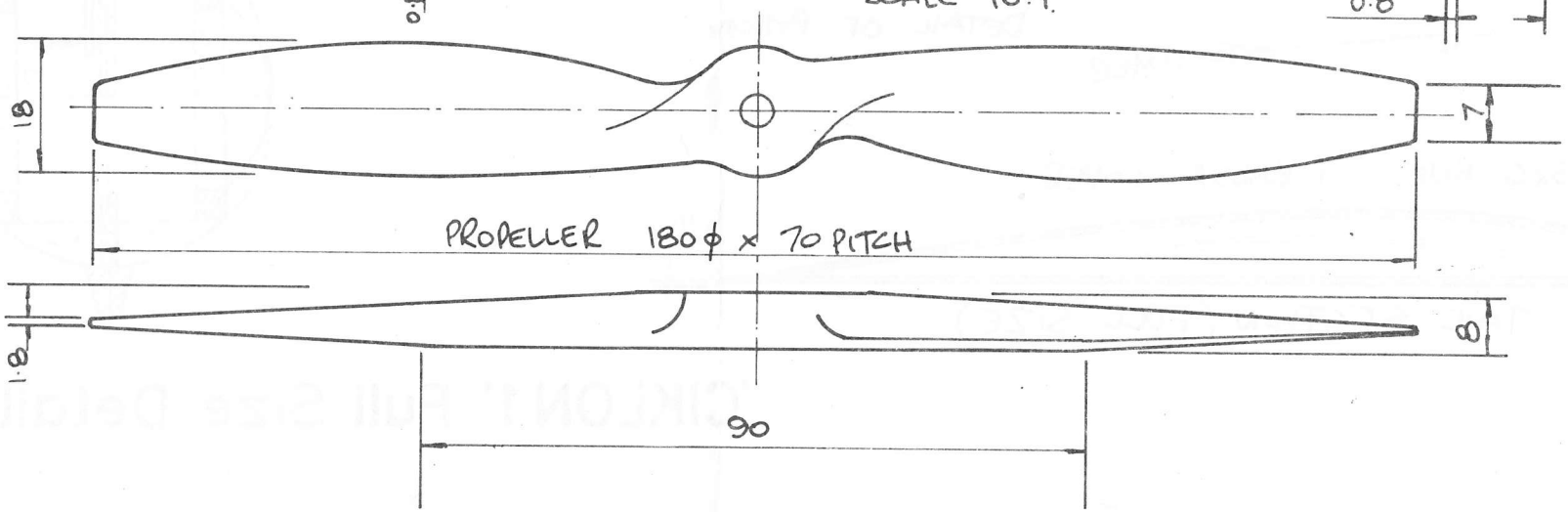
V.I.T. ARMS

COMPONENT DETAILS SCALE 2:1









SCALE 10:1