ANNEX 1

3 strand lines for F2C - Practical trials to assess effects on typical F2C model handling & speed (combination of the original 1999 test information plus subsequent updates)

1. Flight Tests: - 17th Oct 1999, 15.00, "Schwalbennest", near Basel, SUI.

2. Weather: - 11 degrees Centigrade, sunny, generally breezy, some gusting (up to approx 15 Km/h in open countryside, but virtually **nil** wind experienced at site itself - for those not familiar with the site, it's well sheltered from wind from virtually all directions, being set into a "bowl" of steep, mostly thickly-wooded hills).
   Update 1: Subsequent practical tests with both typical F2C and F2F models at various sites and under varying weather and wind conditions continue to show **no** requirement to change propeller or add tip weight.

3. Conditions: - 2 x "standard" flying-wing type F2C models were flown, one of which placed 1st at the 1999 SUI C/L Nats (best heat 3:26.7 Giger/Studer), the other placed 3rd (best heat 3:31.8 Mueller/Saccavino V.). Both powered by CB (Zuriyev) motors. 1st model weighs 340 grams, 2nd model 320 gr. **Throughout all, repeat all tests, both models were flown with their present "standard" race props, "standard" race fuels, and without additional tip weight (repeat, no prop changes, no extra tip weight added).**
   Update 2: See update 1 above.

4. Results 1: - Models were set up to run at their normal racing speeds and ranges (18.0/10, 33 to 36 laps) on present F2C standard spec lines (single wire, "solids"). These results were verified several times. Same models were flown on PAW "Staystrate" multi-strand (3 strand) "tinned" lines of same length, 0.4mm diameter nominal (see 8 below). Results were that lap times increased by between **O.4 seconds and 0.6 seconds over 1O laps,** and range was unchanged throughout (again, times & ranges were verified several times with these lines). Speeds were **not** timed with models flown in an F2A-type pylon.

5. Results 2: - "Slow" Take-offs (motor badly set), slow/long landings (half lap or more ground rolls), one and a half laps whipping with motor cut, and take offs and landings from different segments were **all specifically** tried - but see comment re wind in 1. above. Result was that pilots reported **nil** adverse effects, but experienced **improved,** more positive/less "spongy" control response with the "Staystrate" lines compared to solid lines (present F2C spec), e.g. when operating shut off; e.g. possibly slightly less anticipation needed in preparation for overtaking. **No** deterioration with model on-ground performance was seen, or felt by the pilots; **nor** was any less-than-usual acceleration off the ground felt by either pilot (from both normal speed and slow speed take offs).

6. Results 3: - Bearing in mind the above comments about improved controllability, plus other information received prior to the test which suggested that 7 strand lines have had stretching/unravelling/thinning problems in UK GY experience, a check of the oldest set of lines available for the unofficial STR class was also made (also made up from PAW "Staystrate"). These are now about one and a half years in frequent use. Further information - STR means an approx 440 gr model, but only running at speeds of about 23 seconds for 10 laps at best, often rather slower! As far as could be measured there was **no** diameter change on those lines from when they were originally made up, and there appeared to be no permanent stretching (increase in line length). The F2C "Staystrate" lines used on the above 17/Oct flight tests were also checked both before and after flying. Using a standard metric micrometer (6mm diameter spindle and anvil) at time of delivery, and a vernier calliper on site on 17/Oct, the line diameter measured exactly 0.4mm (i.e. no change before and after flying), and the length of both sets of lines also remained unchanged (as per FAI F2C spec).
   Update 3: Subsequent testing has confirmed that lines from the tested "Staystrate" material have **not** experienced the thinning/unravelling problems with other types of multi-strand lines mentioned above and some of the "Staystrate" line sets tested in 1999 remain in use today.

7. Results 4: - The pilot's comments about less "springiness" than the present FAI solid (single wire) lines then prompted a check of line length on both solid and "Staystrate" line types with a constant

10KG pull load applied. Both sets of the "Staystrate" 3 strand lines used for the F2C flight tests expanded in length by exactly 20mm, but the solid lines used in the F2C flight tests expanded by 30mm in length. These measurements were verified several times. All lines returned to the correct FAI length as soon as the 10KG load was removed. This prompted the use of the independent Test House, the results of which are detailed on the last page of this Annex.
Update 4: Copies of the original (1999) Test House results are now attached as Annex 2.

8. Availability & quality: - Paul Eifflander of Progress Aero Works Ltd (PAW) in UK was contacted per phone and confirmed on 18/Oct that adequate supplies of "Staystrate" are readily available. Our own experience was that an order placed by phone quoting a credit card number on a Monday afternoon resulted in postal delivery of the reel in SUI the following Thursday morning. Paul added some further info - PAW produce "Staystrate" C/L lines from bought-in wire which they then twist and tin (with solder) themselves in-house at PAW. The bought-in wire has an ISO/BSI number. "Staystrate" is exactly 0.015 inches (0.385 mm) in diameter but although they have no records to confirm, Paul suspects that some small variations (increases) in finished diameter do occur during manufacturing.
Update 5: It is believed that this product remains freely available, and as noted at Annex 2, some increase of line thickness does occur with the finished product (0.41 – 0.42 found on the sample measured).

9. PAW contact details: - Tel/fax: (+44) 1625 423 891
Website: www.paw.ac
E-mail: progress.aero.works@tinyonline.co. uk

10. Costs: - PAW pack "Staystrate" in 30 metre, 50 metre, and 100 metre reels, present costs are UK Pounds Sterling 6.25, 8.75, and 16.25 respectively, all prices excluding UK VAT and postage. It is stressed that neither I (Andy Sweetland) nor any member of Modelfluggruppe Breitenbach has any connection with PAW other than as satisfied customer. The 1 x 100M reel of "Staystrate" used in the above tests was bought direct from PAW approx 2 weeks before the flight tests at the above price and no one at PAW was advised of the purpose of the purchase at the time of ordering or until the above 18/Oct telecon. "Staystrate" was used for this test simply because it was "known to be available".
Update 6: Neither I (Andy Sweetland) nor MF Breitenbach wishes to promote any particular manufacturer's product and the details included here are simply added because this particular product is known to be available and has now been proven to produce the improvements noted above – this after further extensive testing, and **without** any of the potential disadvantages that some other F2 Subcommittee members noted as possible/likely when last discussed in March 2000.

11. Conclusions: - (Update 7 - as set out in the official FAI Rule Change Proposal Form).

12. Reasons: (Update 8 - as set out in the official FAI Rule Change Proposal Form).

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